GOVERNMENT OF MAHARASHTRA

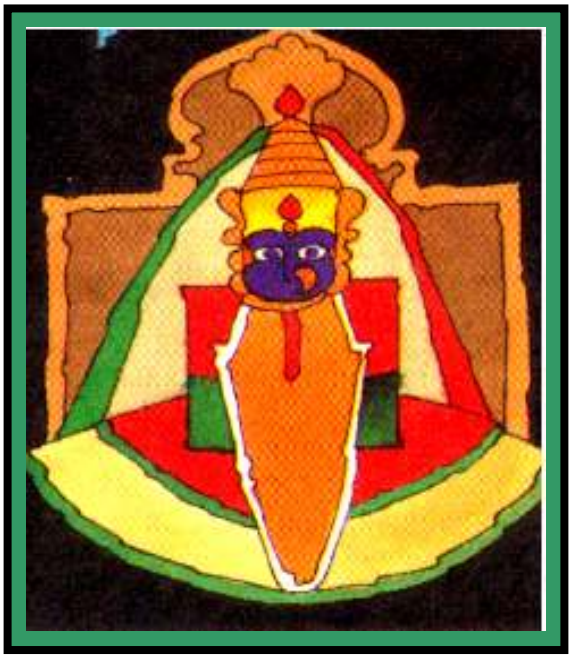
WORKING PLAN

FOR THE FORESTS OF

KOLHAPUR FOREST DIVISION

VOLUME : I : TEXT (PART I & II)

Period 2008 - 09 to 2017–18



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PREFACE

Kolhapur is an ancient city, situated in Southern Maharashtra, on the banks of river Panchganga, a tributary of river Krishna. The average height above msl varies between 390 to 900 meters. The ancient name of Kolhapur area was Karvir, which finds mention in *'Padam Purana'*. The division has eight forest ranges viz. Chandgad, Ajra, Gargoti, Radhanagri, Gaganbawada, Karvir, Panhala and Malkapur. The Kolhapur forest division has a forest area of 1,389.71 km^2 that is spread over 8 forest ranges and all 12 talukas and is 18.08% of the geographical area. This Plan excludes the areas notified as Radhanagari sanctuary and Chandoli National Park within Kolhapur district as these are covered by separate Management Plans and are under the administrative control of the Kolhapur wildlife division. The forests mainly belong to 3B/C2 – Southern moist mixed deciduous forests and 2A/C2 – West coast semi-evergreen - mixed forests as per the "Revised Classification of Indian Forest Types" by Champion and Seth. As per the 'State of Forest Report 2005' (SOFR), published by Forest Survey of India, Dehradun, the 'Actual forest cover' of Kolhapur district is 1,657 km^2 that is 21.56% of the geographic area out of which, 'Very dense forest cover' is nearly 6% while 'Moderately dense' is 57% of the total forest cover. This of course includes the sanctuary areas. The district is marked by the north-south running Sahyadri range of the Western Ghats and a series of valleys separated by lines of hills which runs north-east or east on the western side. The main rivers of Kolhapur are six in number, the Varna, the Panchganga, the Dudhganga, the Vedganga, the Hiranyakeshi and the Ghatprabha. These rivers rise in the Sahyadris and flow south-east, east or north-east 80 to 97 kms across the Kolhapur plateau towards the Krishna.

This Working Plan covers 1,389.71 sq.kms of forest area falling within the jurisdiction of Kolhapur forest division. It replaces the WP by Kate and Bapat (1990-91 to 1999-2000) which had total 10 Working Circles- 8 main WCs viz. Protection WC, SCI WC, Enrichment WC, Afforestation for SMC WC, Fodder Reserve WC, Miscellaneous WC, Nature and Wild life WC, Cashew plantation WC along with 2 overlapping WC viz. Bamboo plantation (OL) WC and Minor Forest Produce (OL) WC. The revised WP has total 8 WCs- 4 main WCs viz. Protection cum Watershed Management Working Circle, Improvement Working Circle, Old Plantations Management Working Circle, SMC cum Afforestation Working Circle along with 4 overlapping WCs viz. Bamboo Management (O.L.) Working Circle, W.L. Management (O.L.) Working Circle, Fodder Resources Management (OL) WC and NTFP (O.L.) Working Circle.

'Protection WC' of the previous Plan was rechristened as 'Protection cum Watershed Management WC' in the revised WP since catchment areas of various irrigation projects were added in it. 'SCI WC' of the previous Plan gave way to 'Improvement WC' in the revised Plan since selection girth trees were not many and therefore only improvement fellings are prescribed. 'Enrichment WC', 'Afforestation for SMC WC' and 'Fodder Reserve WC' of the previous Plan were mainly clubbed into 'SMC cum Afforestation WC' in the revised Plan. Major area under 'Nature and Wild life WC' of the previous Plan was transferred to the Wild life division Kolhapur and hence was reduced from this Plan. Cashew plantations are being dealt in the 'Old

Plantations Management WC' in the revised Plan. Forest compartments allotted to the WC of the previous Plan have been reallotted on the basis of their present stocking and enumeration data. The annual coupes have been laid in the watershed following the ridge to valley concept. Each village in a watershed shall be taken as a unit of holistic development. It is prescribed to converge and integrate forestry management interventions with development schemes of other departments under JFM, FDA, IWDP, DRDA, District Plan etc. for socio-economic upliftment of the village communities.

The total forest area covered in Kate and Bapat's Plan was 1,59,083.86 ha. It included 35,142.80 ha area which was subsequently transferred to the Wild life division Kolhapur. An extent of 15,969.26 ha of forest area has been brought under the revised Plan's prescriptions for the very first time. Seventy new compartments have been formed and areas of thirty one old compartments have been revised due to addition of adjoining new areas. Digital data pertaining to 24 toposheets of Kolhapur district on 1:50000 scale has been procured from Survey of India, Dehradun. Forest compartment, beat, round and range boundaries have been overlayed on these sheets digitally using GIS software.

Timely availability of the matching budgetary grants for the development and protection works as per the prescriptions of this Working Plan are crucial for the successful implementation of any management intervention and needs to be given proper attention for achieving desired results.

I am extremely thankful to Shri AK Joshi, Additional Principal Chief Conservator of Forests (Production & Management) M.S. Nagpur and Shri AB Bhangre, the former APCCF (P & M) MS for providing able and valuable guidance along with the necessary encouragement in preparing this Plan. I am also thankful for the guidance and suggestions provided by Dr. AD Shejale, Chief Conservator of Forests (WP) Pune. Sincere thanks are also due to Shri AV Ashtekar, Conservator of Forests, Kolhapur Circle, Shri Anurag Chowdhry, former CF Kolhapur Circle, Shri GT Chawan, DCF Kolhapur and Shri VC Ben, the former DCF Kolhapur for their suggestions and cooperation in preparing this Plan. Shri Sunil Karkare, Honorary Wildlife Warden, Kolhapur also deserve thanks for helping me updating the list of fauna found in Kolhapur district.

I also acknowledge and appreciate the hard work and labour put in by Shri NA Rajadnya, Shri AH Mulla, Shri AD Patil, Shri PM Kamble and Shri BS Jadhav all Range Forest Officers, Shri P D Patil, Ranger Surveyor, Shri G.S Dabre and Shri AV Kamble both Surveyors and Shri Sunil Varkat, Steno-typist, of this office in preparing this Plan.

Date: 27.11.2007
Place: Kolhapur

(Vikas Gupta)
Conservator of Forests,
Working Plans,
Kolhapur.

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PART – I : SUMMARY OF FACTS ON WHICH PROPOSALS ARE BASED

LIST OF TREES, SHRUBS, CLIMBERS, BAMBOOS AND GRASSES FOUND IN KOLHAPUR FOREST DIVISION.

Local name			Botanical name
		TREES	
Ain / Sadada	..	..	*Terminalia tomentosa*
Alu	..	..	*Vangueria spinosa*
Amba	..	..	*Mangifera indica*
Ambada	..	..	*Spondias mangifera*
Amberi	..	..	Nothopegia colebrookiana
Ambat	..	..	Embelia basaal
Anjani	..	..	Memecylon edule
Apta	..	..	*Bauhinia racemosa*
Asana, Katak	..	..	Bridelia retusa
Awala/ Aonla	..	..	*Emblica officinalis*
Arjun	..	..	*Terminalia arjuna*
Akash neem	..	..	*Millingtonia hortensis*
Bartondi	..	..	*Morinda tinctoria*
Bakul	..	..	Mimusops elengi
Bel	..	..	Aegle marmelos
Bhendi	..	..	*Thespesia populnea*
Bherli mad	..	..	*Caryota urens*
Bhokar	..	..	*Cordia myxa*
Bhoma	..	..	*Glochidion lanceolarium*
Bibla / Bija	..	..	*Petrocarpus marsupium*
Biba / Bilva	..	..	Semecarpus anacardium
Bibi / Ran biba	..	..	*Holigarna grahamii*
Bor	..	..	*Zizyphus jujuba*
Bulgi	..	..	Vitex altissima
Babhul	..	..	*Acacia arabica*
Bahawa	..	..	*Cassia fistula*
Behada	..	..	*Terminalia bellerica*

Local name	Botanical name
Bondara / Lendi	*Lagerstroemia parviflora*
Champhar	*Flacourtia montana*
Chandan	*Santalum alb*
Chandada / Chandiva	*Macaranga roxburgii*
Charoli / Char	*Buchanania lanzan*
Cher/Chira	*Erinocarpus nimmonii*
Chinch	Tamarindus indica
Chafa /Sonchafa	*Michelia champaca*
Dalchini	*Cinnamomum zeylanicum*
Datir	*Ficus gibbosa*
Datrang / Ajan Vriksha	Ehretia laevis
Dahivan	*Cordia macleodii*
Dhaman / Tadsal	*Grewia tiliifolia*
Dandas / Harrani	*Dalbergia lanceolaria*
Daka	*Pygium gardneri*
Dhawada	*Anogeissus latifolia*
Gela / Gel phal	*Randia dumetorum*
Kari	Diospyros montana
Gulmohar	*Delonix regia*
Hed /Haldu	*Adina cordifolia*
Hela	*Terminalia belerica*
Hirda	*Terminalia chebula*
Humb / Hoom	*Miliusa tomentosa*
Hura	*Sapium insigne*
Haldi / Out /Tawir	*Garcinia spicata*
Irai / Bobi	*Calophyllum wightianum*
Jambha	*Xylia xylocarpa*
Jambhul	Syzygium cumini
Kadamb	*Anthocephalus cadamba*
Kajara / Kuchala	*Strychnos nux-vomica*

Local name			Botanical name
Kalhoni / Kavashi	..	..	*Hopea wightiana*
Kakad / Kudak	..	..	*Garuga pinnata*
Kalamb	..	..	*Mitragyna parvifolia*
Kaphis, Khargol	..	..	*Trema orientalis*
Kokam /Ratamba	..	..	*Garcinia indica*
Karambel	..	..	*Dillenia pentogyna*
Karanj	..	..	*Pongamia pinnata*
Kadu kavath / Kavith	..	..	*Hydnocarpus launifolia*
Khair	..	..	*Acacia catechu*
Kharshing	..	..	*Radarmachera xylocarpa*
Karvath	..	..	Ficus asperrima
Safed Shirish	..	..	*Albizia procera*
Kinjal	..	..	*Terminalia paniculata*
Koker, Kolilnder	..	..	*Sterculia guttata*
Kokum	..	..	*Garcinia indica*
Koshimb / Kusum	..	..	*Schleichera oleosa*
Kuda (Kala Kuda)	..	..	*Wrightia tinctoria*
Pandra Kuda	..	..	*Holarrhena antidysenterica*
Kuda, Nag (Nag Kuda)	..	..	*Tabernaemontana heyneana*
Kumbha	..	..	*Careya arborea*
Kardal / Karai / Pandruk		..	*Sterculia urens*
Karpa /Lokhandi	..	..	*Hemigyrosa canescens*
Kavath	..	..	*Limonia ocidissima*
Kaju	..	..	*Anacardium occidentale*
Kanchan/Kachnar		..	*Bauhinia varigata*
Kathbor / Ghati / Ghuti	..	..	*Ziziphus xylopyra*
Kashid / Kasid	..	..	*Cassia siamia*
Kirmira	..	..	*Glycosmis mauritiana*
Kunkuphal /Shendri		..	*Mallotus philippensis*
Kate Kumbal	..	..	*Siderozylon tomentosum*

Local name			Botanical name
Kunti / Dhulajoti/Kamini / Pandhare		..	*Murraya paniculata*
Limbara / Bakan Nimb/ Bakayana		..	*Melia azedarach*
Lokhandi / Raikuda	..	..	*Ixora arborea*
Medshingi	..	..	*Dolichandrone falcata*
Moha	..	..	*Madhuca indica*
Moi, Shimati / Moya	..	..	*Lannea coromandelica*
Nag Chapha / Nag - Kesar	..	..	*Mesua ferrea*
Nana	..	..	*Lagerstroemia lanceolata*
Tiwar	..	..	*Barringtonia acutangula*
Naral	..	..	*Cocus nucifera*
Nandruk	..	..	*Ficus retusa*
Neem / Kadu nimb	..	..	*Aazadirachta indica*
Padali, paral	..	..	*Stereospermum chlonoides*
Pair	..	..	*Ficus arnottiana*
Palas	..	..	*Butea monosperma*
Pangara	..	..	*Erythrina indica*
Parjambhul	..	..	*Olea dioica*
Phanas	..	..	*Artocarpus integrifolia*
Phanashi / Ran phanashi	..	..	*Carallia brachiata*
Phudgus	..	..	*Alseodaphne semecarpifolia*
Pimpal	..	..	*Ficus religiosa*
Papara / Vavli	..	..	*Holoptelia integrifolia*
Panchota /Palla	..	..	*Palaquium ellipticum*
Pisa	..	..	*Actinodaphne hookeri*
Pitkuli, Bhedas	..	..	*Eugenia zeylanica*
Surangi, Undi	..	..	*Colophyllum inophyllum*
Ritha	..	..	*Sapindus emarginatus*
Sag	..	..	*Tectona grandis*
Sali/ Salai	..	..	*Aporosa lindleyana*
Satwin	..	..	*Alstonia scholaris*

Local name			Botanical name
Kate Sawar	..	..	*Salmalia malabarica*
Shindi	..	..	*Phoenix sylvestris*
Shendri, Kumkum	..	..	*Mallotus philippinensis*
Shevga	..	..	*Moringa oleifera*
Shiras	..	..	*Albizzia lebbek*
Shiras, Kala	..	..	*Albizia odoratissima*
Shissam	..	..	*Dalbergia latifolia*
Shivan	..	..	*Gmelina arborea*
Songarbi	..	..	*Vitex leucoxylon*
Suru	..	..	*Casuarina equisetifolia*
Tamal patra	..	..	*Cinnamomum tamala*
Tetu	..	..	*Oroxylum indicum*
Tupa	..	..	*Canthium dicoccum*
Tembhurni	..	..	*Diospyros peregrine*
Tiwas	..	..	*Ougenia dalbergioidis*
Tirphal	..	..	*Zanthoxylum rhetsa*
Wad	..	..	*Ficus bengalensis*
Waras	..	..	*Heterophragma quadriloculare*
Warang / Bhoti	..	..	*Kydia calycina*
		SHRUBS	
Adulsa	..	..	*Adhatoda vasica*
Akra	..	..	*Strobilanthes heyneanus*
Ankul/Ankol	..	..	*Alangium salvifolium*
Bedki/Gudmari	..	..	*Gymnema sylvestre*
Bhamani	..	..	*Colebrookea oppositifolia*
Bhandira	..	..	*Clerodendrum infortunatum*
Bharati/Hekal	..	..	*Gymnosporia montana*
Bohkada/Charbati/Kirmira	..	..	*Casearia graveolens*
Bugdi	..	..	*Ardisia humilis*

Local name			Botanical name
Bukra	..	..	Strobilanthes sessilis
Dinda/ Motha Dinda	..	..	*Leea sambucina* /
		..	*Leea macrophylla*
Dhaiti/ Dhayati	..	..	*Woodfordia fruticosa*
Hesur	..	..	*Callicarpa lanata*
Ghat bor	..	..	*Zizyphus xylopyra*
Ghaneri	..	..	*Lantana camara*
Hasoli/ Asoli	..	..	*Grewia microcos*
Hadkya	..	..	*Rauvolfia densiflora*
Karand, Karwand	..	..	*Carissa carandus*
Kadi patta/ Kadi nimb	.	..	*Murraya koenigii*
Katar, Karavti	..	..	*Streblus asper*
Kevda	..	..	*Pandanus furcatus*
Kesari/ Murud Sheng	..	..	*Helicteres isora*
Karvi	..	..	*Strobilanthes callosus*
Kulkutta/ Kirmira/ Modi	..	..	*Casearia esculenta*
Kokani/ Kutkutar/ Nagotri	..	..	*Connarus wightii*
Kutri	..	..	*Solanum giganteum*
Lajalu	..	..	*Mimosa pudica*
Lotal	..	..	*Osyris arborea*
Hadsandhi	..	..	*Litsaea glutinosa*
Makad limbu/ Ran limbu	..	..	*Atlantia monophylla*
Manikyan	..	..	*Glycosmis pentaphylla*
Modgi	..	..	*Casearia tomentosa*
Nakeri	..	..	*Melastoma malabathricum*
Narkya/ Amruta/ Ghanera	..	..	*Mappia foetida* /
		..	*Nothapodytes nimmoniana*
Nildoo, Nerali, Ambgool	..	..	*Elaeagnus latifolia*
Nirgudi	..	..	*Vitex negundo*
Nivdung	..	..	*Euphorbia neriifolia*

Local name	Botanical name
Pandhari/ Kunti/ Kamani	*Murraya paniculata*
Pandhar phalli	*Fluggea microcarpa*
Papadi	*Pavetta indica*
Patang	*Caesalpinia sappan*
Parwi, Showla	*Wendlandia notoniana*
Pit karvi, Gurgi	*Strobilanthes ixiocephalus*
Pitkuli	*Ixora coccinea*
Rametha/ Datpadi	*Lasiosiphon eriocephalus*
Ranjai/ Kusari	*Jasminum malabaricum*
Rakta rohida/ Rakta rora	*Maba nigrescens*
Rui/ Akk	*Calotropis gigantea*
Sabja/ Ran tulasi	*Ocimum* americanum
Sapshi/ Sapsan	*Aristolochia indica*
Shatavari	*Asparagus racemosus*
Sherwod/ Bhutkes	*Mussaenda frondosa*
Sundara/ Mudra/ Petari	*Abutilon indicum*
Tinpani/ Tipani	*Allophylus cobbe*
Toran	*Zizyphus rugosa*
Tupa, Arsul	*Canthium umbellatum*
Ukshi/ Baguli	*Calycopteris floribunda*
Vanda/ Bandgul	*Loranthus cuneatus*
Waiwarung/ Wavding	*Embelia ribes*

CLIMBERS

Alei	*Dalbergia volubilis*
Amgul	*Elaeagnus latifolia*
Bhui Kohola/ Vidari kand	*Ipomaea digitata*
Cane	*Calamus pseudotenuis*
Chambuli	*Bauhinia vahlii*
Chickni	*Bridelia stipularis*

Local name	Botanical name
Chillari	*Caesalpinia mimosoides*
Garambi/ Gardal	*Entada scandens*
Ghotvel/ Chopchini	*Smilax zeylanica*
Gunj	*Abrus precatorius*
Jungali miree	Piper hookeri
Kajarvel	*Strychnos colubrina*
Kanheri/ Borati/ Burgi	*Zizyphus oenoplia*
Vilayati vakundi	*Cryptostegia grandiflora*
Kali vel / Jungali kajorne	*Vitis auriculata*
Kavali	*Cryptolepis buchananii*
Khaj Kuhili	*Mucuna pruriens*
Kodan / Kaundal	*Trichasanthes palmata*
Shendri	Combretum ovalifolium
Lal chameli/ Rangoon creeper	*Quisqualis indica*
Ran tur	*Cajanus scarabaeoides*
Morvel / Shendvel	*Clematis gouriana*
Navali cha vel	*Ipomoea vitifolia*
Nagodari / Kokani / Kutkutar	*Connarus wightii*
Palas vel	*Butea superba*
Wasan vel / Jaljamni	*Coculus villosus*
Pendguli vel or Edvel	*Dalbergia horrida*
Phulsun	*Spatholobus purpureus*
Piloka	*Combretum extensum*
Poir/ Pasan / Datwan / Kanguni	*Phyllanthus reticulatus*
Kali vel / Jungli kajorni	*Vitis auriculata*
Ravan vel / Waghchawad	*Schefflera elliptica*
Shembi / Chilar	*Acacia pennata*
Samudrashoka	*Argyreia speciosa*
Shikekai	*Acacia concinna*
Tugelami	*Ipomoea campanulata*

Local name			Botanical name
Wakeri / Waghati	..	..	*Wagatea spicata*
Wild pepper	..	..	*Piper trichostachyon*
Watoli / Waten vel / Ramrik	..	..	*Cocculus macrocarpus*
		BAMBOOS	
Chiwa /Huda /Chiwan	..	..	*Oxytenanthera monostigma*/ *Pseudoxytenanthera ritcheyi*
Kalak / Padai / Mandgay / Velu / Kanak		..	*Bambusa bambos*
Konda / Managa / Chiwari / Mes		..	*Oxytenanthera stocksii* / *Pseudoxytenanthera stocksii*
Shib /Udha / Medar		..	*Dendrocalamus strictus*
		GRASSES	
Anjan	..	..	*Cenchrus ciliaris*
Bhalekusal	..	..	*Andropogon tricticeus*
Bhongrut	..	..	*Themeda quadrivalvis*
Boru	..	..	*Sorghum halepense*
Burghushi	..	..	*Eragrostis tenella*
Chikra	..	..	*Eragrostis tremula*
Chigan chara	..	..	*Panicum prostatum*
Dongari gawat	..	..	*Crysopogon montana*
Gondal	..	..	*Andropogon pumilis*
Haryali / doob	..	..	*Cynodon dactylon*
Kunda	..	..	*Ischoemum pilosum*
Kusali	..	..	*Heteropogon contortus*
Marvel	..	..	*Dichanthium annulatum*
Natgras	..	..	*Cyprus rotundus*
Nilgawat	..	..	*Panicum antidotale*
Phuli / Kodmor	..	..	*Apluda varia*
Phulera	..	..	*Themeda ciliata*

Local name			Botanical name
Pandhari Kusal	..	..	*Aristida paniculata*
Sheda	..	..	*Sehima nervosum*
Pavana	..	..	*Sehima sulcatum*
Rosha / Tokhadi	..	..	*Cymbopogon martini*
Shimpi	..	..	*Panicum isachne*
Vala	..	..	*Andropogon muricatus*
Wavashi	..	..	*Saccharum procerum*

Medicinal plants

Source: 'Flora of Kolhapur district' by Professor S.R. Yadav and Dr. M.M. Sardesai of Shivaji university of Kolhapur

Abrus precatorius, Abutilon indicum, Acacia concinna, Achyranthes aspera var. aspera, Acorus calamus, Adansonia digitata, Aegle marmelos, Alangium salvifolium var. salvifolium, Alstonia scholaris, Anacardium occidentale, Andrographis paniculata, Anogeissus latifolia, Artocarpus heterophyllus, Asparagus racemosus var. javanica, Azadirachta indica, Bacopa monnieri, Balanites aegyptiaca, Baliospermum montanum, Biophytum sensitivum, Bixa orellana, Boerhavia repens var. diffusa, Bombax ceiba, Bombyx micranthus, Boswellia serrata, Bridelia retusa, Buchanania cochinchinensis, Butea monosperma, Caesalpinia bonduc, Calotropis gigantea, C. procera, Careya arborea, Cassia fistula, C.obtusifolia, C. tora, Catharanthus roseus, Celastrus paniculatus, Celosia argentea var. argentea, Centella asiatica, Colocasia esculenta, Convolvulus arvensis, Cordia dichotoma, C. gharaf, Costus speciosus, Crateva adansonii subsp. odora, Crossandra infundibuliformis, Cullen corylifolia, Cuminum cyminum, Curculigo orchioides, Cymbopogon citratus, Cynodon dactylon, Cyperus rotundus, subsp. rotundus, Dendrophthoe falcata var. falcata, Dillenia indica, Dioscorea alata, D.bulbifera, Dodonea angustifolia, Dolichandrone falcata, Eclipta prostrata, Elaeagnus conferta, Embelia ribes, Emblica officinalis, Entada rheedei, Ficus arnottiana, F.benghalensis, F. callosa, F. carica, F. racemosa, F. religiosa, Garcinia indica,Garuga pinnata, Gloriosa superba, Glossocardia bosvallea, Gmelina arborea, Gnidia glauca, Hedyotis herbacea, Helicteres isora, Heliotropium indicum, Heterophragma quadriloculare, Hibiscus rosa-sinensis, H. sabdariffa, Holarrhena pubescens, Holigarna grahamii, Hydnocarpus pentandra, Hygrophila schulli, Indigofera cassioides, I. tinctoria, Ipomoea batatas, Jasminum auriculatum, Jatropha curcas, Justicia adhatoda, Kalanchoe olivacea, Lagenaria siceraria, Leea indica, Leonotis nepetiifolia, Leptadenia reticulata, Lencas stelligera, L zeylanica, Linum mysurense, Litsea deccanensis, L. glutinosa, Lobelia nicotianaefolia, Ludwigia octovalvis subsp. sessiliflora, Macaranga peltata, Madhuca longifolia var. latifolia, Maesa indica, Mallotus philippensis, Mangifera indica, Melia azedarach, Mimusops elengi, Mitragyna parvifolia, Momordica dioica, Moullava spicata, Mucuna monosperma, Murraya koenigii, Nelumbo nucifera, Neolamarckia cadamba, Nicandra physalodes, Nicotiana tabacum, Nothapodytes nimmoniana, Nothopegia castaneifolia, Nyctanthes arbor-tristis, Nymphaea nouchali, N. pubescens, Ocimum americanum, O. basilicum var. basilicum, O.gratissimum, Oroxylum indicum, Oxalis corniculata var. corniculata, Paranigya monophylla, Passiflora foetida, Phylanodiflora, Phyllanthus reticulantus, P.urinaria, Physalis minima, Piper betle, Pittosporum wightii, Plumbago zeylanica, Plumeria alba, Polyalthia longifolia, Portulaca oleracea, Premna obtusifolia, var. pubescens, Pterocarpus marsupium, Pterospermum acerifolium, Pueraria tuberosa, Rhinacanthus nasutus, Rhus sinuta, Ricinus communis, Rivea hypocrateriformis, Rubia cordifolia, Rumex dentatus, Ruta chalepensis, Salix tetrasperma, Santalum album, Sapindus laurifolius, Sapium insigne var. malabaricum, Saraca asaca, Sarcostemma viminale var. viminale, Schleicbera oleosa, Scilla hyacinthina, Securinega leucopyrus, Semecarpus anacardium, Sesamum orientale, Sesbania grandiflora, Sida acuta, S.rbombifolia var. rhombifolia, Smilax zeylanica, Solanim anguivi, S. virginianum, Sphaeranthus indicus, Spilanthus calva, Spondia indica, Sterculia urens, Streblus asper, Strychnos nux-vomica, S.potatorum, Syzygium caryophyllatum, S. cumini, Tabernaemontana alternifolia, Tamarindus indica, Tectona grandis, Tephrosia purpurea, Terminalia alata, T.bellirica, T.chebula, T.paniculata, Thunbergia alata, Tinospora cordifolia, Toddalia asiatica, Tribulus terrestris, Tridax procumbens, Trigonella foenumgraecum, Tylophora indica, Urena lobata subsp. lobata, Vetiveria zizanioides, Viscum angulatum, V.articulatum, Vitex negundo var. incisa, V. negundo var. negundo, Volvulopsis nummularia, Withania somnifera, Woodfordia fruticosa, Wrightia arborea, Xanthium indicum, Xylia xylocarpa, Zanthoxylum rhetsa, Zingiber officinale and Ziziphus rugosa.

Endemic plants

Source: 'Flora of Kolhapur district' by Professor S.R. Yadav and Dr. M.M. Sardesai of Shivaji university of Kolhapur

Abutilon ranadei, Adenoon indicum, Aerides dalzelliana, A maculosum, Aeschynanthus, perrottetii, Alysicarpus belgaumensis, A bupleurifolius, A. pubescens var. vasavadae, A. racemosus, Amorphophallus commutatus, Ancistrocladus heyneanus, Anisomeles heyneana, Apocopis vaginata, Argyreia pilosa, Arisaema caudatum, A. murrayi, A. sabyadricum, A. sivadasanii, Aristida redacta, A stocksii, Arthraxon jubatus, A lanceolatus var. meeboldii, Arundinella ciliata, A. leptochloa, A metzii, A. purpurea, A. spicata, A. tuberculata, Aspidopterys cordata, Asystasia dalzelliana, A. mysurensis, Barleria gibsoni, B.involucrata var. elata, Banhinia foveolata, Beaumontia jerdoniana, Begonia concanensis, B. crenata, B.trichocarpa, Bhidea burnsiana, Bidaria cuspidata, B. khandalense, Blachia denudata, Blumea belangeriana, B.eriantha, B.malcolmii, Boswellia serrata, Brachystelma edulis, Bulbophyllum fimbriatum, Bulbophyllum neilgherrense, Cajanus lineatus, C.sericeus, Calacanthus grandiflorus, Calophyllum apetalum, Canscora concanensis, C. decurrens, C. pauciflora, C. perfoliata, Capparis rheedei, Carex caricina var. glaucina, Carissa inermis, Carvia callosa, Casearia rebenscens, C.tomentosa, Cephalostigma flexuosum, Ceropegia attenuata, C.evansii, C.fantastica, C.buberi, C. jainii, C.lawii, C.oculata, C.sahyadrica, C.vincaefolia, Chlorophytum bharuchae, C.borivilianum, C.glaucoides, C.glaucum, Cissus woodrowii, Cladopus hookerianus, Clematis heynei, Cleome simplicifolia, Clitoria biflora, C.ternatea var. pilosula, Coelachne minuta, Crotalaria filipes var. filipes, C.filipes var. trichophora, C.leptostachya, C.lutescens, C.pusilla, C.vestita, Croton gibsonianus, Cryptocoryne spiralis var. cognatoides, Cucumella ritchiei, Cucumis setosus, Curcuma decipiens, C.inodora, C.neilgherrensis, C.pseudomontana, Cyanotis cerifolia, C.concanensis, C.fasciculata var. glabrescens, Cymbopogon gidarba, Cynarospermum asperrimum, Cynodon barberi, Decaschistia trilobata, Dendrobium aqueum, D. barbatnlum, D.herbaceum, D. lawianum, D.microbulbon, D.nanum, D.ovatum, Dendrophthoe trigona, Derris heyneana, Desmodium ritchiei, Dicaelospermum ritchiei, Dichanthium filiculme, D. odoratum, D.oliganthum, Dichrostachys cineria var. indica, Dimeria blatteri, D.hohenackeri, Dimorphocalyx larianus, Dioscorea belophylla, Drimia congesta, D.polyantha, Drypetes venusta, Dyschoriste dalzellii, Ensete superbum, Eranthemum roseum, Eria dalzellii, E. exilis, E. microchilos, Erinocarpus nimmonu, Eriocaulon conicum, E.cuspidatum, E. dalzellii, E. duthiei, E. elenorae, E. eurypeplon, E. heterolepis, E. lanceolatum, var. pilosum, E. margaretae, E.minutum, E.ritchieamum, E. sedgwickii, E. sharmae, E.stellulatum, E. tuberiferum, Eriolaena quinquelocularis, Eulophia ochreata, E.ramentacea, Enonymus indicus, Euphorbia notoptera, Exacum lawii, E. pumilum, Fimbristylis woodrowii, Flacourtia latifolia, F. montana, Flemingia nilgheriensis, Flickingeria macraei, Gantelbua urens, Garcinia indica, G. talbotii, Garnotia arborum, Geissaspis tenella, glochidion ellipticum, G. malabaricum, Glyphochloa divergens var. divergens, G. forficulata, G. mysorensis, Grewia heterotricha, G. umbellifera, Habenaria crassifolia, H. foliosa var. foetida, H. foliosa var. foliosa, H. foliosa var. gibsonii, H. grandifloriformis, H. heyneana, H. longicorniculata, H. multicaudata, H. ovalifolia, H. panchganiensis, H. plantaginea, H. plumosa, H. verticillata, Hedyotis stocksii, Helicanthes elastica, Helixanthera obtusta, Heracleum grande, Heterostemma urceolatum, Holigarna grahamii, Hopea ponga, Hubbardia heptaneuron, Hydnocarpus pentandra, Hydrobryopsis sessilis, Hygrophila pinnatifida, Hymenodictyon obovatum, Impatiens inconspicua, I. lawii, I. monor, I. pulcherrima, I. tomentosa, Indigofera dalzellii, I. glandulosa var. sykesii, I. Prostrata, Indopoa paupercula, Indotristicha ramosissima, Iphigenia magnifica, I pallida, I.stellata, Isachne bicolor, I elegans, I.gracilis, I. lisboae, Ischaemum dalzelli, I. diplopogon, I. impressum, I. molle, I. pilosum, I.raizadae, I. travancorense, I. tumidum, Iseilema anthephoroides, Ixora brachiata, I. chinensis, I. elongata, Jasminum malabaricum, Justicia santapaui, J. trinervia, J. wynaadensis, Kalanchoe bhidei, K.

Olivacea, Knema attenuata, Lagerstroemia microcarpa, Lamprachaenium microcephalum, Lasianthus acuminatus, L. sessilis, Lavandula lawii, Limnophila polystachya, Lophopogon tridentatus, Luvunga eleutherandra, Mackenziea integrifolia, Mallotus stenanthus, Meiogyne pannosa, Memecylon talbotianum, Mnesithea clarkei, Moullava spicata, Murdannia lanuginosa, M. versicolor, Neanotis foetida, N. lancifolia, N. montholoni, Neuracanthus sphaerostachyus, Nilgirianthus heyneanus, N. lupulinus, Nogra dalzellii, Oberonia brunoniana, Orpetium roxburghianum, O. villosulum, Pancratium parvum, Paspalum canarae var. fimbriatum, Pavetta siphonantha, Peristylus stocksii, Phyllanthus scabrifolius, Phyllocephalum ritchei, P. scabridum, Pimpinella adscendens, P. tomentosa, P. wallichiana, Pinda concanensis, Piper trichostachyon, Pittosporum dasycaulon, Pleocaulis ritchiei, Pogonachne racemosa, Pogostemon benghalensis, P. deccanensis, P. purpurascens, Porpax reticulata, Pouzolzia integrifolia, Pseudanthistiria heteroclita, Pseudodichanthium serrafalcoides, Pterocarpus marsupium, Pycreus malabaricus, Rhamphicarpa longiflora, Rotala floribunda, Rungia linifolia, Sageraea laurifolia, Salacia brunoniana, Schizachyrium paranjpyeanum, Sehima sulcatum, Senecio belgaumensis, S. dalzellii, S. edgeworthii, Sesbagiria sahyadrica, Smithia agbarkarii, S. bigemina, S. birsuta, S. pycnantha, S.salsuginea, S.setulosa, Sonerila rheedei, S. scapigera, Spatholobus purpureus, sphenostylis bracteata, Supushpa scrobiculata, Swertia densifolia, S. lawii, S.minor, Syzygium laetum, Tabernaemontana alternifolia, Tephrosia coccinea, Terminalia paniculata, Thelepaepale ixiocephala, Theriophonum indicum, Tolypanthus lagenifer, Tonningia cucullata, Trachyspermum roxburghianum, Tragus roxburghii, Trewia polycarpa, Tricholepis amplexicaulis, T. radicans, Trilobachne cookei, Tripogon capillatus, T.jacqemontii, T. lisboae, Utricularia albocaerulea, Ujanarthanamii, Unaikii, U.praeterita, U. purpurascens, Vetiveria lawsonii, Zingiber cernuum and Z. neesanum.

Threatened plants

Source: 'Flora of Kolhapur district' by Professor S.R. Yadav and Dr. M.M. Sardesai of Shivaji university of Kolhapur

Abutilon ranadei, Begonia concanensis, Ceropegia eransii, C. fantastica, C. buberi, C. jainii, C. lawii, C.oculata , C. sahyadrica. Argyreia pilosa, Begonia trichocarpa, Ceropegia attenuata, C. vincaefolia, Chlorophytum borivilianum, Crotalaria filipes, Cryptocoryne spiralis var. cognatoides, Cucumis setosus, Dicaelospermum ritchiei, Entada rheedei, Eulophia ochreata, E ramentacea, Flickingeria macraei, Habenaria multicaudata, Heterostemma urceolatum, Iphigenia magnifica, Nothapodytes nimmoniana, Salacia brunoniana, Seshagiria sahyadrica and Trilobachne cookei. Aerides maculosum, Alysicarpus belgaumensis, A pubescens var. rasavadae, Arisaema caudatum, A murrayi, A. sahyadricum, A. sivadasanii, Barleria gibsoni, Beaumontia jerdoniana, Bhidea burnsiana, Bulbophyllum fimbriatum, B.neilgherrense, Calacanthus grandiflorus, Capparis rheedei, Chlorophytum glaucoides, C.glaucum, Crotalaria lutescens, Curcuma decipiens, C. inodora, C.pseudomontana, Cyanotis concanensis, Decaschistia trilobata, Dendrobium barbatulum, Drimia polyantha, Eriocaulon dalzellii, Flemingia nilgheriensis, Habenaria crasifolia, H. foliosa var. foetida, H. foliosa var. foliosa, H. foliosa var. gibsonii, H. longicorniculata, H. panchganiensis, H. rariflora, Hydnocarpus pentandra, Hygrophila pinnatifida, Impatiens lawii, I. pulcherrima, I. tomentosa, Indigofera dalzellii, Iphigenia pallida, I. stellata, Ischaemum diplopogon, Lamprachaenium microcephalum, Lobelia nicotianaefolia, Nogra dalzellii, Paracaryopsis coelesina, Piper trichostachyon, Pogonachne racemosa, Sonerila scapigera, Zingiber cernuum and Z. neesanum.

Amorphophallus commutatus, Argyreia cuneata, Arthraxon lanceolatus var. meeboldii, Arundinella tuberculata, Bidaria cuspidata, Canscora concanensis, Carvia callosa, Ceropegia bulbosa var. bulbosa, C. bulbosa var. lushii, Cleome simplicifoloia, Coelachne minuta, Commelina hasskarlii, Crotalaria lutescens, Curcuma neilgherrensis, Cyanotis cerifolia, C. fasciculata var. glabrescens, C. tuberosa var. adscendens, C. tuberosa var. tuberosa, cynarospermum asperrimum, Danthonidium gammiei,

Dendrobium microbulbon, Dichanthium oliganthum, Dimeria blatteri, D. hohenacheri, Ensete superbum, Erinocarpus nimmonii, Exacum lawii, Indopoa paupercula, Iphigenia indica, Isachne lisboae, Ischaemum raizadae, I. travancorense, I. tumidum, Habenaria grandifloriformis, H. panchganiensis, Haplanthodes tentaculata, H. verticillata, Hoya alexicaca, Lepidagathis lutea, Murdannia dimorpha, M. versicolor, Neanotis montholoni, Oropetium roxburghianum, Porpax reticulata, Pseudodicanthium serrafalcoides, Rhamphicarpa longiflora, Rungia crenata, R. linifolia, Schizachyrium paranjpyeanum, Senecio dalzellii, Smithia agharkarii, Sorghum deccanense, Sphenostylis bracteata, Swertia minor, Theriophonum indicum, Tripogon capillatus.

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List of Animals and birds found in the Kolhapur Forest Division.

Common name	Scientific name	Status	Distribution
MAMMALS			
Bonnet Macaque	*Macaca radiata*	C	WG
Common Langur	*Presbytis entellus*	C	KD
Tiger	*Panthera tigris*	R	Radhanagari WLS.
Panther	*Panthera pardus*	C	KD
Leopard Cat	*Felis bengalensis*	R	WG
Jungle Cat	*Felis chaus*	C	KD
Desert Cat	*Felis libyca*	UC	KD
Small Indian Civet	*Viverricula indica*	UC	KD
Common Palm Civet	*Paradoxurus hermaphroditus*	C	KD
Common Mongoose	*Herpestes edwardsi*	C	KD
Striped Hyena	*Hyaena hyaena*	R	KD
Wolf	*Canis lupus*	R	GL
Jackal	*Canis aureus*	C	KD
Indian fox	*Vulpes bengalensis*	C	KD
Indian Wild Dog	*Cuon alpinus*	R	Radhanagari WLS.
Sloth bear	*Melursus ursinus*	UC	WG
Common Otter	*Lutra lutra*	C	Panchganga river
Moles	*Talpa micrura*	C	KD
Indian Tree Shrew	*Anathana ellioti*	C	WG
Slender Loris	*Loris tardigradus*	R	Chandagarh tahsil
Flying Fox	*Pteropus giganteus*	C	KD
Fulvous Fruit – Bat	*Rousettus leschenaulti*	C	KD
Short – Nosed Fruit Bat	*Cynopterus sphinx*	C	KD
Indian Pipistrelle	*Pipistrellus coromandra*	C	KD
Painted Bat	*Kerivoula picta*	UC	KD
Indian Giant Squirrel	*Ratufa indica*	C	WG
Fivestriped Palm Squirrel	*Funambulus pennanti*	C	KD
Threestriped Palm Squirrel	*Funambulus palmarum*	C	WG
Indian Field Mouse	*Mus booduga*	C	KD
Indian Bush Rat	*Golunda ellioti*	C	KD
Common House Rat	*Rattus rattus*	C	KD
Bandicoot Rat	*Bandicota indica*	C	KD
House Mouse	*Mus musculus*	C	KD
Indian Porcupine	*Hystrix indica*	C	KD
Indian Hare	*Lepus nigricollis*	C	KD
Indian Elephant	*Elephas maximus*	UC	WG
Gaur	*Bos gaurus*	C	WG
Four – Horned Antelope	*Tetracerus quadricornis*	UC	WG

Common name	Scientific name	Status	Distribution
Sambar	*Cervus unicolor*	C	WG
Barking deer	*Muntiacus muntjak*	C	WG
Mouse deer	*Tragulus meminna*	C	WG
Indian Wild Boar	*Sus scrofa*	C	KD
Indian Pangolin	*Manis pentadactyla*	UC	WG
	AVI FAUNA		
Little Grebe	*Podiceps ruficollis*	R/C	KD/WL
Little Cormorant	*Phalacrocorax niger*	RM/C	KD/WL
Darter	*Anhinga rufa*	RM/UC	WL
Grey Heron	*Ardea cinerea*	RM/C	KD/WL
Purple Heron	*Ardea purpurea*	RM/C	KD/WL
Pond Heron	*Ardeola grayii*	R/C	KD/WL
Cattle Egret	*Bubulcus ibis*	RM/C	KD/WL
Large Egret	*Ardea alba*	RM/C	KD/WL
Smaller Egret	*Egretta intermedia*	RM/C	KD/WL
Little Egret	*Egretta garzetta*	R/C	KD/WL
Night Heron	*Nycticorax nycticorax*	R/UC	WL
Little Bittern	*Ixobrychus minutus*	RM/UC	WL
Yellow Bittern	*Ixobrychus sinensis*	RM/UC	WL
Painted Stork	*Mycteria leucocephala*	RM/C	WL
Openbill Stork	*Anastomus oscitans*	RM/C	KD/WL
Whitenecked Stork	*Ciconia episcopus*	RM/UC	WL
Lesser Adjutant	*Leptoptilos javanicus*	RM/UC	WL
White Ibis	*Threskiornis aethiopica*	RM/C	WL
Black Ibis	*Pseudibis papillosa*	R/C	KD/WL
Glossy Ibis	*Plegadis falcinellus*	RM/UC	WL
Spoonbill	*Platalea leucorodia*	RM/UC	WL
Lesser Whistling Teal	*Dendrocygna javanica*	R/C	KD/WL
Ruddy Shelduck	*Tadorna ferruginea*	RM/UC	WL
Painted	*Anas acuta*	M/C	WL
Common Teal	*Anas crecca*	M/C	WL
Spotbilled Duck	*Anas poecilorhyncha*	R/C	KD/W
Gadwall	*Anas strepera*	M/UC	WL
Wigeon	*Anas penelope*	M/UC	WL
Garganey	*Anas querquedula*	M/C	KD/WL
Shoveller	*Anas clypeata*	M/C	KD/WL
Common Pochard	*Aythya ferina*	M/UC	WL
Cotton Teal	*Nettapus coromandelianus*	R/C	KD/WL
Comb Duck	*Sarkidiornis melanoto*	RM/C	KD/WL

Common name	Scientific name	Status	Distribution
Blackshouldered Kite	*Elanus caeruleus*	R/C	KD
Honey Buzzard	*Pernis ptilorhyncus*	RM/UC	WG
Black Kite	*Milvus migrans migrans*	R/C	KD
Pariah Kite	*Milvus migrans govinda*	R/C	KD
Large Indian Kite	*Milvus migrans lineatus*	RM/C	KD
Brahminy Kite	*Haliastur indus*	R/C	KD
Shikra	*Accipiter badius*	R/C	KD
Sparrow-Hawk	*Accipiter nisus nisosimilis*	M/UC	KD
Crested Hawk-Eagle	*Spizaetus cirrhatus Cirrhatus*	R/C	WG
Bonelli's Eagle	*Hieraaetus fasciatus*	R/C	KD
Booted Hawk- Eagle	*Hieraaetus pennatus*	RM/UC	WG
Tawny Eagle	*Aquila rapax vindhiana*	RM/C	KD
Lesser Spotted Eagle	*Aquila pomarina*	RM/UC*	Kalamba lake, Kop.
Black Eagle	*Ictinaetus malayensis*	R/C	WG
Indian Whitebacked Vulture	*Gyps bengalensis*	RM/UC	WG
Scanvenger Vulture	*Neophron percnopternus*	RM/UC	KD
Hen Harrier	*Circus cyaneus*	M/UC	GL
Pale Harrier	*Circus macrourus*	M/C	GL
Marsh Harrier	*Circus aeruginosus*	M/C	KD/WL
Short – Toed Eagle	*Circaetus gallicus*	R/C	KD
Crested Serpent Eagle	*Spilornis cheela*	R/C	WG
Redheaded Merlin	*Falco chicquera*	RM/UC	KD
Kestrel	*Falco tinnunculus*	RM/UC	KD
Painted Partridge	*Francolinus pictus*	R/C	KD
Grey Partridge	*Francolinus pondicerianus*	R/C	KG/DL
Grey Quail	*Coturnix coturnix*	RM/C	KD
Blackbreasted Quail	*Coturnix coromandelica*	R/C	KD
Jungle Bush Quail	*Coturnix chinensis*	R/C	KD
Painted Bush Quail	*Perdicula erythrorhyncha*	R/C	KD
Red Spurfowl	*Galloperdix spadicea*	R/C	WG
Grey junglefowl	*Gallus sonneratii*	R/C	WG
Common Peafowl	*Pavo cristatus*	R/C	KD
Common Bustard – Quail	*Turnix suscitator*	RM/UC	KD/GL
Demoiselle Crane	*Anthropoides virgo*	M/UC*	Jaising lake, Kagal
Baillon's Crake	*Porzana pusilla*	RM/UC	Rankala lake, Kop.
Purple Moorhen	*Porphyrio porphyrio*	R/C	KD/WL
Coot	*Fulica atra*	R/C	KD/WL
Great Indian Bustard	*Choriotis nigriceps*	M/UC**	Shirol tahsil
Lesser Florican	*Sypheotides indica*	M/UC*	Ambap, Hat.
Pheasant – Tailed Jacana	*Hydrophasianus chirurgus*	R/C	KD/WL
Bronzewinged Jacana	*Metopidius indicus*	R/UC	KD/WL
Blackwinged Stilt	*Himantopus himantopus*	M/C	KD/WL

Common name	Scientific name	Status	Distribution
Stone Curlew	*Burhinus oedicnemus*	RM/C	KD/GL
Indian Courser	*Cursorius coromandelicus*	R/C	KD/GL
Small Indian Pratincole	*Glareola lactea*	M/UC	WL
Whitetailed Lapwing	*Vanellus leucurus*	M/UC	Kalamba lake
Redwattled Lapwing	*Vanellus spinosus*	R/C	KD/GL
Marsh Sandpiper	*Tringa stagnatilis*	M/C	KD/WL
Little Ringed Plover	*Charadrius dubius*	M/C	KD/WL
Kentish Plover	*Charadrius alexandrinus*	M/UC	WL
Common Sandpiper	*Tringa hypoleucos*	M/C	KD/WL
Fantail Snipe	*Gallinago gallinago*	M/C	KD/WL
Little Stint	*Calidris minuta*	M/C	KD/WL
Indian River Tern	*Sterna aurantia*	RM/C	KD/WL
Indian Sandgrouse	*Pterocles exustus*	R/UC	KD/GL
Blue Rock Pigeon	*Columba livia*	R/C	KD
Nilgiri Wood Pigeon	*Columba elphinstonii*	R/C	WG
Common Green Pigeon	*Treron phoenicoptera*	R/C	KD
Red Turtle Dove	*Streptopelia tranquebarica*	R/C	KD
Indian Ring Dove	*Streptopelia decaocto*	R/C	KD
Spotter Dove	*Streptopelia chinensis*	R/C	KD
Little Brown Dove	*Streptopelia senegalensi*	R/C	KD
Emerald Dove	*Chalacophaps india*	R/UC	WG
Alexandrine Parakeet	*Psittacula eupatria*	R/C	WG
Roseringed Parakeet	*Psittacula krameri*	R/C	KD
Blossomheaded Parakeet	*Psittacula cyanocephala*	R/C	KD
Indian Lorikeet	*Loriculus vernalis*	RM/C	KD
Pied Crested Cuckoo	*Clamator jacobinus*	M/C	KD
Common Hawk-Cuckoo	*Cuculus varius*	R/C	KD
Indian Banded Bay Cuckoo	*Cacomantis sonneratii*	R/C	WG
Indian Cuckoo	*Cuculus micropterus*	RM/C	WG
Indian Plaintive Cuckoo	*Cacomantis passerinus*	RM/C	KD
Koel	*Eudynamys scolopacea*	R/C	KD
Crow-Pheasant	*Centropus siennsis*	R/C	KD
Sirkeer Cuckoo	*Taccocua leschenaultii*	R/UC	KD
Barn Owl	*Tyto alba*	R/C	KD
Great Horned Owl	*Bubo bubo*	R/C	KD
Brown Fish Owl	*Bubo zeylonensis*	R/C	KD
Spotted Owlet	*Anthene brama*	R/C	KD
Mottled Wood Owl	*Strix ocellata*	R/UC	KD
Collared Scops Owl	*Otus bakkamoena*	R/UC	KD
Ceylon Frogmouth	*Batrachostomus moniliger*	RM/UC**	Radhanagari WLs.

Common name	Scientific name	Status	Distribution
Indian Jungle Nightjar	*Caprimulgus indicus*	R/C	KD
Common Indian Nightjar	*Caprimulgus asiaticus*	R/C	KD
House Swift	*Apus affinis*	RM/C	KD
Malabar Trogon	*Harpactes fasciatus*	RM/UC*	Radhanagari WLs.
Small Blue Kingfisher	*Alcedo atthis*	R/C	WL
Threetoed Kingfisher	*Ceyx erithacus*	RM/UC	WG
Storkbilled Kingfisher	*Pelargopsis capensis*	RM/UC	WG
Whitebreasted Kingfisher	*Halcyon Smyrnensis*	R/C	KD
Lesser Pied Kingfisher	*Ceryle rudis*	R/C	WL
Small Green Bee-Eater	*Merops orientalis*	R/C	KD
Indian Roller	*Coracias benghalensis*	RM/C	KD
Hoopoe	*Upupa epops*	R/C	KD
Common Grey Hornbill	*Tockus birostris*	R/C	KD
Malabar Pied Hornbill	*Anthracoceros coronatus*	R/C	WG
Large Green Barbet	*Megalaima zeylanica*	R/C	WG
Small Green Barbet	*Megalaima viridis*	R/C	WG
Crimsonbreasted Barbet	*Megalaima haemacephala*	R/C	KD
Lesser Goldenbacked Woodpecker	*Dinopium benghalense*	R/C	WG
Yellowfronted Pied Woodpecker	*Picoides mahrattensis*	R/C	KD
Greycrowned Pigmy Woodpecker	*Picoides canicapillus*	R/UC	KD
Indian Pitta	*Pitta brachyura*	R/C	WG
Redwinged Bush Lark	*Mirafra erythroptera*	R/C	GL
Rufoustailed Finch-Lark	*Ammomanes phoenicurus*	R/C	GL
Ashy Crowned Finch Lark	*Eremopterix grisea*	R/C	GL
Sykes's Crested Lark	*Galerida deva*	R/C	GL
Dusky Crag Martin	*Hirundo concolor*	R/C	KD
Wiretailed Swallow	*Hirundo smithii*	RM/C	KD
Indian Cliff Swallow	*Hirundo fluvicola*	R/C	KD/WL
Redrumped Swallow	*Hirundo daurica*	RM/C	KD
Grey Shrike	*Lanius excubitor*	RM/C	KD
Baybacked Shrike	*Lanius vittatus*	R/C	KD
Rufousbacked Shrike	*Lanius schach*	R/C	KD
Golden Oriole	*Oriolus oriolus*	RM/C	KD
Blackheaded Oriole	*Oriolus xanthornus*	RM/C	KD
Black Drongo	*Dicrurus adsimilis*	R/C	KD
Grey / Ashy Drongo	*Dicrurus leucophaeus*	RM/UC	KD
Whitebellied Drongo	*Dicrurus caerulescens*	RM/UC	WG
Greater Racket – Tailed Drongo	*Dicrurus paradiseus*	R/C	WG
Greyheaded Myna	*Sturnus malabaricus*	RM/C	KD
Blackheaded Myna	*Sturnus pagodarum*	R/C	KD
Starling	*Sturnus vulgaris*	M/UC*	Rankala lake,

Common name	Scientific name	Status	Distribution
Rosecoloured Starling	*Sturnus roseus*	M/C	KD
Common Myna	*Acridotheres tristis*	R/C	KD
Jungle Myna	*Acridotheres fuscus*	R/C	KD
Indian Tree Pie	*Dendrocitta vagabunda*	R/C	WG
House Crow	*Corvus splendens*	R/C	KD
Jungle Crow	*Corvus macrorhynchos*	R/C	KD
Common Wood Shrike	*Tephrodornis pondiceriamus*	R/C	KD
Large Cuckoo Shrike	*Coracina novaehollandiae*	M/C	KD
Blackheaded Cuckoo Shrike	*Coracina melanoptera*	M/C	KD
Scarlet Minivet	*Pericrocotus flammeus*	R/C	WG
Small Minivet	*Pericrocotus cinnamomeus*	R/C	KD
Common lora	*Aegithina tiphia*	R/C	KD
Goldfronted Chloropsis	*Chloropsis aurifrons*	R/C	WG
Redwhiskered Bulbul	*Pycnonotus leucogenys*	R/C	KD
Redvented Bulbul	*Pycnonotus cafer*	R/C	KD
Whitebrowed Bulbul	*Pycnonotus luteolus*	R/C	WG
Yellowbrowed Bulbul	*Hypsipetes indicus*	R/C	WG
Slatyheaded Scimitar Babbler	*Pomatorhinus horsfieldii*	R/C	WG
Comon Babbaler	*Turdoides caudatus*	R/C	KD
Large Grey Babbler	*Turdoides Malcolmi*	R/C	KD
Jungle Babbler	*Turdoides striatus*	R/C	KD
Redbreasted Flycatcher	*Muscicapa parva*	M/C	KD
Bluethroated Flycatcher	*Muscicapa rubeculoides*	R/C	KD
Tickell's Blue Flycatcher	*Muscicapa tickelliae*	R/C	WG
Verditer Flycatcher	*Muscicapa thalassina*	R/C	KD
Greyheaded Flycatcher	*Culicicapa ceylonensis*	R/C	WG
Whitethroated Fantail Flycatcher	*Rhipidura albicollis*	R/C	KD
Paradise Flycatcher	*Terpsiphone paradisi*	R/C	WG
Fantail Warbler	*Cisticola exilis*	R/C	GL
Streaked Fantail Warbler	*Cisticola juncidis*	RM/UC	GL
Ashy Wren – Warbler	*Prinia socialis*	R/C	KD
Tailor Bird	*Orthotomus sutorius*	R/C	KD
Indian Great Reed Warbler	*Acrocephalus bistrigiceps*	M/C	WL
Blyth's Reed Warbler	*Acrocephalus demetorum*	M/C	WL
Brown Leaf Warbler	*Phylloscopus collybita*	M/C	KD
Bluethroat	*Erithacus svecicus*	M/C	KD
Shama	*Copsychus malabaricus malabaricus*	R/UC	WG
Oriental Magpie-Robin	*Copsychus saularis*	R/C	KD
Black Redstart	*Phoenicurus ochruros*	M/C	KD
Pied Bush Chat	*Saxicola caprata*	R/C	KD
Indian Robin	*Saxicoloides fulicata*	R/C	KD

Common name	Scientific name	Status	Distribution
Malabar Whistling Thrush	*Myiophonus horsfieldii*	R/C	WG
Blue Rock Thrush	*Monticola cinclorhynchus*	R/C	KD
Whitethroated Ground Thrush	*Zoothera citrina cyanotus*	R/C	WG
Blackbird	*Turdus merula simillimus*	R/C	KD
Grey Tit	*Parus major*	R/C	KD
Yellowcheeked Tit	*Parus xanthogenys*	R/C	WG
Chestnutbellied Nuthatch	*Sitta castanea*	R/C	WG
Velvetfronted Nuthatch	*Sitta frontalis*	R/C	WG
Indian Tree Pipit	*Anthus hodgsoni*	RM/C	KD
Paddyfield Pipit	*Anthus novaeseelandiae*	R/C	KD
Forest Wagtail	*Motacilla indica*	RM/C	WG
Yellow Wagtail	*Motacilla flava*	M/C	KD/WL
Yellowheaded Wagtail	*Motacilla citreola*	M/C	KD/WL
Grey Wagtail	*Motacilla cinerea*	M/C	KD/WL
Pied / White Wagtail	*Motacilla alba*	RM/C	KD/WL
Large Pied Wagtail	*Motacilla maderaspatensis*	R/C	KD/WL
Thickbilled Flowerpecker	*Dicaeum agile*	R/C	KD
Tickell's Flowerpecker	*Dicaeum erythrorhynchos*	R/C	KD
Purplerumped Sunbird	*Nectarinia zeylonica*	R/C	KD
Purple Sunbird	*Nectarinia asiatica*	R/C	KD
Yellowbacked Sunbird	*Aethopyga siparaja*	R/UC	WG
Firetailed Sunbird	*Aethopyga ignicauda*	R/UC	WG
White Eye	*Zosterops palpebrosa*	R/C	KD
House Sparrow	*Passer domesticus*	R/C	KD
Yellowthroated Sparrow	*Petronia xanthocollis*	R/C	KD
Baya Weaver Bird	*Ploceus philippinus*	R/C	KD
Red Munia	*Estrilda amandava*	R/C	KD
Whitebacked Munia	*Lonchura striata*	R/C	KD
Blackheaded Munia	*Lonchura malacca*	R/C	KD
Whitethroated Munia	*Lonchura malabarica*	R/C	KD
Common Rosefinch	*Carpodacus erythrinus*	M/C	KD
Redheaded Rosefinch	*Propyrrhula subhimachala*	M/C	KD
Spotted Munia	*Lonchura punctulata*	R/C	KD
Crested Bunting	*Melophus lathami*	R/C	KD
Great Pied Hornbill	*Buceros bicornis*	R	WG
Fairy Bluebird	*Irena puella*	R	WG
Great Black Woodpecker	*Dryocopus javensis*	R	WG
Black Bulbul	*Hypsipetes madagascariensis*	R	WG

HERPETOFAUNA

SNAKES

Common name	Scientific name	Status	Distribution
Brahminy Worm Snake	*Ramphotyphlops braminus*	C	KD
Beaked Worm Snake	*Grypotyphlops acutus*	C	KD
Large Scaled Shieldtail	*Uropeltis macrolepis macrolepis*	C	WG
Indian Rock Python	*Python molurus molurus*	UC	WG
Common Sand Boa	*Gongylophis conicus*	UC	KD
Red Sand Boa	*Eryx johnii*	UC	KD
Common Trinket Snake	*Coelognathus helena helena*	C	KD
Montane Trinket Snake	*Coelognathus helena monticollaris*	UC	WG
Indian Rat Snake	*Ptyas mucosa*	C	KD
Banded Racer	*Argyrogena fasciolata*	C	KD
Slender Racer	*Coluber gracilis*	UC	KD
Russell's Kukri Snake	*Oligodon taeniolatus*	UC	KD
Common Kukri Snake	*Oligodon arnensis*	C	KD
Common Bronzeback Tree Snake	*Dendrelaphis tristis*	C	KD
Barred Wolf Snake	*Lycodon striatus*	UC	KD
Travancore Wolf Snake	*Lycodon travancoricus*	R*	RDN. WLS
Common Wolf Snake	*Lycodon aulicus*	C	KD
Dumeril's Black – headed Snake	*Sibynophis subpunctatus*	UC	KD
Checkered Keelback	*Xenochrophis piscator*	C	KD
Striped Keelback	*Amphiesma stolatum*	C	KD
Green Keelback	*Macropisthodon plumbicolor*	C	KD
Olive Forest Snake	*Rhabdops olivaceus*	R*	Near Panhala
Common Cat Snake	*Boiga trigonata*	C	WG
Ceylon Cat Snake	*Boiga ceylonensis*	C	WG
Condanarus Sand Snake	*Psammophis condanarus*	UC	KD
Leith's Sand Snake	*Psammophis leithii*	UC	KD
Common Vine Snake	*Ahaetulla nasuta*	C	WG
Brown Vine Snake	*Ahaetulla pulverulenta*	R	RDN. WLS
Common Krait	*Bungarus caeruleus*	C	KD
Slender Coral Snake	*Calliophis melanurus*	UC	WG
Striped Coral Snake	*Calliophis nigrescens*	UC	WG
Spectacled Cobra	*Naja naja*	C	KD
Russell's Viper	*Daboia russelli*	C	KD
Saw-Scaled Viper	*Echis carinatus*	C	KD
Bamboo Pit Viper	*Trimeresurus gramineus*	UC	WG
Malabar Pit Viper	*Trimeresurus malabaricus*	UC	WG

Common name	Scientific name	Status	Distribution
	CROCODILE		
Mugger	*Crocodylus palustris*	UC	Panchganga & Varna river.
	TURTLE		
Black Turtle	*Melanochelys trijuga* (Schweigger)	UC	KD
Indian Mud Turtle	*Lissemys punctata* (Lacepede)	C	KD
Brahminy River Turtle		UC	Kolhapur
Indian Flap – Shell Turtle	*Lissemys punctata punctata*	C	KD
Peninsular Flap – Shell Turtle	*Lissemys punctata granosa*	C	KD
Indian Soft Shell Turtle	*Aspideretes gangeticus*	C	KD
	GECKO		
Northen House Gecko	*Hemidactylus flaviviridis* (Ruppell)	C	KD
Brook's Gecko	*Hemidactylus brookii* (Gray)	UC	WG
Termite Hill Gecko	*Hemidactylus triedrus* (Daudin)	UC	GL
Rock Gecko	*Hemidactylus maculatus* (Dum. & Bibr)	UC	GL
	AGAMIDS		
Common Garden Lizard	*Calotes versicolor* (Daudin)	C	KD
Forest Calotes	*Calotes rouxi* (Dum. & Bibr)	C	WG
Southern Green Calotes	*Calotes calotes* (Linn)	C	WG
Fan-throated Lizard	*Sitana ponticeriana* (Cuvier)	R	Near Kolhapur
	CHAMELEONS		
Indian Chameleon	*Chamaeleon zeylanicus* (Laurenti)	UC	KD
	SKINKS		
Brahminy Skink	*Mabuya carinata* (Schneider)	C	KD
Little Skink	*Mabuya macularia* (Blyth)	C	KD
Snake Skink	*Lygosoma punctatus* (Beddome)	C	KD
	MONITOR LIZARD		
Common Indian Monitor	*Varanus bengalensis* (Schneider)	C	KD

Common name	Scientific name	Status	Distribution
	TOADS		
Common Indian Toad	*Bufo melanostictus* (Schneider)	C	KD
Marbled Toad	*Bufo stomaticus*	C	KD
	FROGS		
Bush Frog	*Philautus sp.*	UC	KD
Common Tree Frog	*Polypedates maculatus* (Gray)	C	WG
Skittering Frog	*Rana cyanophlyctis* (Schneider)	C	KD
Indian Pond Frog	Rana hexadactylus (Lesson)	C	KD
Indian Bull Frog	*Rana tigerina* (Daudin)	C	KD
Indian Cricket Frog	*Rana limnocharis* (Gravenhorst)	C	KD
Fungoid Frog	*Rana malabarica* (Tschudi)	C	WG
Bicoloured Frog	*Rana curtipes* (Jerdon)	C	KD
Golden Frog	*Rana aurantiaca* (Boulenger)	C	WG
Indian Burrowing Frog	*Rana breviceps* (Schneider)	C	WG

BUTTERFLIES

Common name			Scientific name
Twany Coster	..	..	*Acraea violae* (Fabricius)
Blue Tiger	..	..	*Tirumala limniace exoticus* (Gmelin)
Common Crow	..	..	*Eploea core core* (Cramer)
Dark Blue Tiger	..	..	*Tirumala septentrionis dravidarum* (Fruhstorfer)
Glassy Blue Tiger	..	..	*Parantica aglea aglea* (Cramer)
Malabar Tree Nymph	..	..	*Idea malabarica* (Moore)
Plain Tiger	..	..	*Danaus chrisippus chrisippus* (Linnaeus)
Striped Tiger	..	..	*Danaus genutia genutia* (Cramer)
Banded Angle	..	..	*Odontoptilum angulata angulata* (Felder & Felder)
Brown Awl	..	..	*Badamia exclamationis* (Fabricius)
Common Banded Awl	..	..	*Hasora chromus chromus* (Cramer)
Common Spotted Flat	..	..	*Celaenorrhinus leucocera* (Kollar)
Dark Palm Dart	..	..	*Telicota ancila bambusae* (Moore)
Golden Angle	..	..	*Caprona ransonnetta potiphera* (Hewitson)
Indian Palm Bob	..	..	*Suastus gremius gremius* (Fabrius)
Indian Skipper	..	..	*Spialia galba galba* (Fabrius)
Malabar Flat	..	..	*Celaenorrhinus ambarreesa* (Moore)
Banded Blue Pierrot	..	..	*Discolampa ethion vavasanus* (Fruhstorfer)

Common name	Scientific name
Bright Babul Blue	*Azanus ubaldus* (Cramer)
Common Cerulean	*Jamides celeno aeliamus* (Fabricius)
Common Pierrot	*Castalius rosimon rosimon* (Fabricius)
Common Silverline	*Spindasis vulcanus vulcanus* (Fabricius)
Indian Cupid	*Everes lacturnus syntala* (Cantlie)
Pale Grass Blue	*Zizeeria maha ossa* (Swinhoe)
Red Pierrot	*Talicada nyseus nyseus* (Guerin-Meneville)
Zebra Blue	*Syntarrucus plinius* (Fabricius)
Baron	*Euthalia aconthea meridionalis* (Fruhstorfer)
Baronet	*Symphaedra nais* (Forster)
Black Rajah	*Charaxes solon solon* (Fabricius)
Blue Pansy	*Pecis orithya* (Linnaeus)
Chocolate Pansy	*Precis iphita iphita* (Cramer)
Commander	*Moduza procris undifragus* (Fruhstorfer)
Common Castor	*Ariadne merione merione* (Cramer)
Common Leopard	*Phalanta phalantha phalantha* (Drury)
Common Map	*Cyrestis thyodamas indica* (Evans)
Common Nawab	*Polyura athamas athamas* (Drury)
Common Sailer	*Neptis hylas varmona* (Moore)
Common Sergeant	*Athyma perius perius* (Linnaeus)
Danaid Eggfly	*Hypolimnas misippus* (Linnaeus)
Great Eggfly	*Hypolimnas bolina jacintha* (Drury)
Grey Pansy	*Precis atlites* (L.)
Indian Red Admiral	*Vanessa indica pholoe* (Frushstorfer)
Joker	*Byblia ilithyia* (Drury)
Lemon Pansy	*Precis lemonias lemonias* (Linnaeus)
Peacock Pansy	*Precis ariann ariann* (Linnaeus)
Tawny Rajah	*Charxes bernardus imna* (Butler)
Yellow Pansy	*Precis hierta hierta* (Fabricius)
Plum Judy	*Abisara echerius prunosa* (Moore)
Blue Mormon	*Papilio polymnestor* (Cramer)
Common Blue Bottle	*Graphium sarpendon teredon* (Felder & Felder)
Common Mime	*Chilasa clytia* (Linnaeus)
Common Mormon	*Papilio polytes polytes* (Linnaeus)
Common Mormon	*Papilio polytes ramulus* (Cramer)
Common Rose	*Pachliopta aristolochiae aristolochiae* (Fabricius)
Crimson Rose	*Pachliopta hector* (Linnaeus)
Lime Butterfly	*Papilio demoleus* (Linnaeus)
Red Helen	*Papilio helenus daksha* (Moore)
Southern Birdwing	*Troides minos* (Cramer)
Spot Swordtail	*Pathysa nomius nomius* (Esper)
Tailed Jay	*Graphium arianne menides* (Felder & Felder)

Common name			Scientific name
Common Emigrant	..	..	*Catopsilia crocale* (Cramer)
Common Grass Yellow	..	..	*Eurema hecabe arianne* (Moore)
Common Gull	..	..	*Cepora nerissa nerissa* (Fabricius)
Common Jezebel	..	..	*Delias eucharis* (Drury)
Common Wanderer	..	..	*Pareronia valeria arian* (Fabricius)
Crimson Tip	..	..	*Colotis danae danae* (Fabricius)
Great Orange Tip	..	..	*Hebomoia glaucippe australis* (Butler)
Lemon Emigrant	..	..	*Catopsilia arian* (Fabricius)
Mottled Emigrant	..	..	*Catopsilia pyranthe* (Linnaeus)
Pioneer	..	..	*Anaphaeis aurota* (Fabricius)
Three Spot Grass Yellow	..	..	*Eurema blanda siletana* (Wallace)
White Orange Tip	..	..	*Ixias arianne* (Cramer)
Yellow Orange Tip	..	..	*Ixias pyrene sesia* (Fabricius)
Bamboo Treebrown	..	..	*Lethe europa ragalva* (Fruhstorfer)
Common Bush Brown	..	..	*Mycalesis perseus typhlus* (Fruhstorfer)
Common Evening Brown	..	..	*Melantitis leda leda* (Drury)
Common Four Ring	..	..	*Ypthima huebneri* (Kirby)
Common Tree Brown	..	..	*Lehe rohria* (Fabricius)
Nigger	..	..	*Orsotrioena medus medus* (Fabricius)
Cloudy Brown	..		
			MOTHS
Moon Moth	..		
Owlet Moth	..		
Bee Hawk Moth	..		
Monkey Moth	..		
Atlas Moth	..		
Tussar Silk Moth	..		
			INSECTS
Stick Insect	..		
Hornet Wasp	..		*Vespa orientalis*
Hooded Grass Hopper	..		*Teratodes monticollis*
Painted Grass Hopper			- -
Praying Mantis			- -
Leaf Insects			- -
Tortoise Shelled Beetle			- -
Dragon Fly			- -
Damsel Fly			- -
Leopard Beetle			- -
Bombardial Beetle			- -
Long Horned Beetle			- -
Spittle Bug			*Philaenus spumarius*

ORDER	COMMON NAME	SCIENTIFIC NAME
	ARACHNIDS	
Scorpiones	Scorpion	species not known
Opiliones	Harvestmen	species not known
Acarina	Ticks and Mites	species not known
Uropygi	Whipscorpion	species not known
Araneae	Spiders	Boat Trapdoor
	Speckled Band Fourleg	
	Banded Fourleg	
	Giant Wood Spider	
	Black Wood Spider	
	Ashy Social Spider	
	Common Two tail	
	Giant Crab Spider	
	Tunnel wolf	
	Green Lynx	
	Brown Lynx	
	Box Long Legs	
	Round Long Legs	
	Dandy Long Legs	
	Zebra Jumper	
	Common Big Jaw.	

ABBREVIATION :

STATUS : C : Common, UC : Uncommon, R : Rare

DISTRIBUTION :

KD **:** Through out Kolhapur district.

WG **:** Western Ghat (Includes western part of Chandgarh, Ajara, Gadhinglaj, Bhudargarh, Radhanagari, Gganbawada, Shahuwadi, Panhala tahasils.

GL **:** Grass land (Includes Karveer, Kagal, Hatkanangale, Shirol)

WL **:** Wetland (Includes Rankala, Kalamba, New palace lake of Kolhapur, Jaising lake of Kagal, Lakshimi lake of Peth Wadgaon & Rivers of Kolhapur District.)

** : Unconfirmed

* : Reported once.

GLOSSARY OF LOCAL TERMS / ABBREVIATIONS

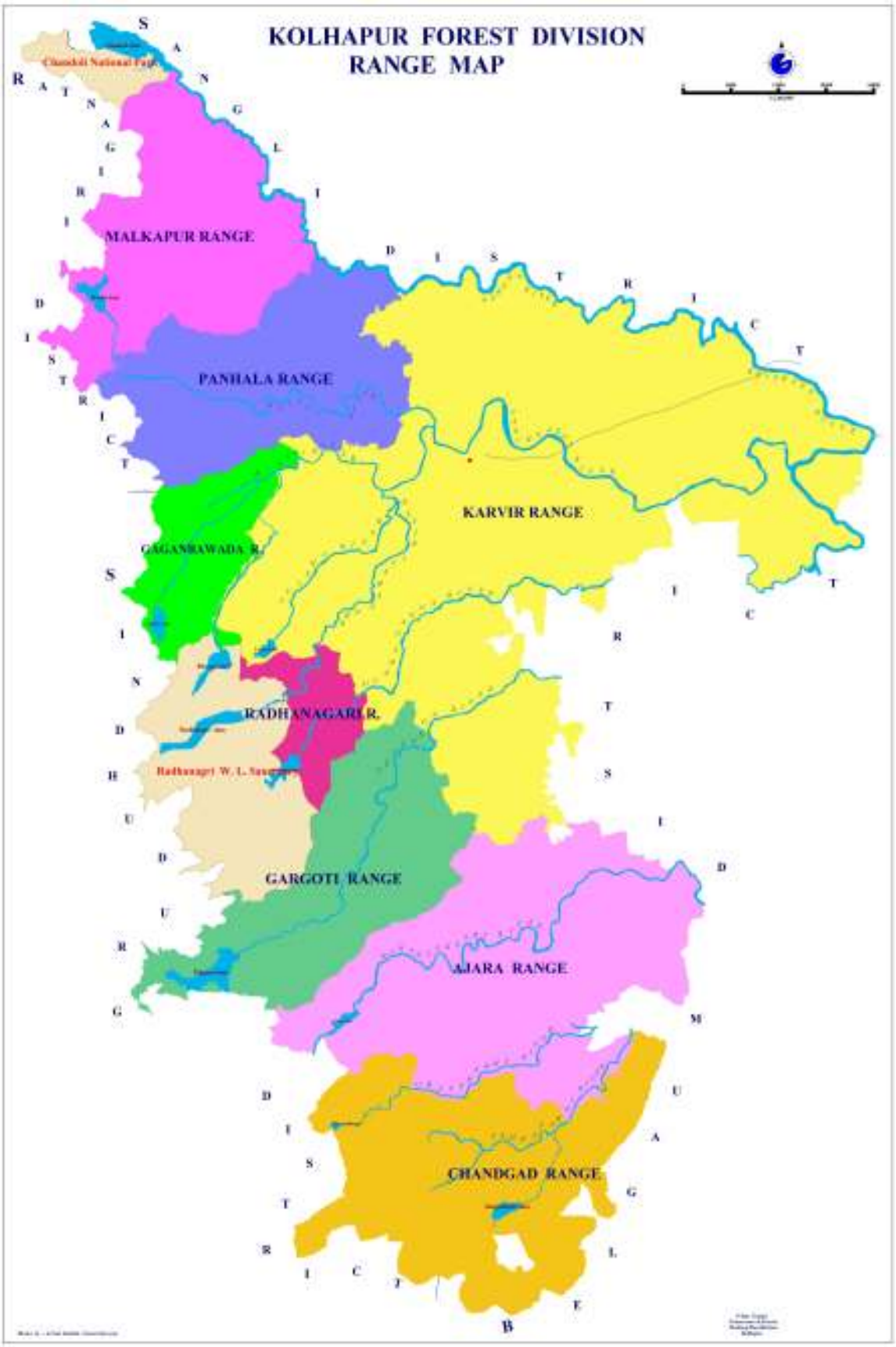
Sr.No.	Local name	Meaning
1.	Geru	Red ochre or red earth
2.	Ghat	A road with a steep gradient
3.	Jhirras	Temporary small well dug in nallas during Summer
4.	Kuran	A grass reserve close to grazing
5.	Malki lands	Lands belonging to private individuals
6.	Murrum	Lateritic soil reddish brown in colour
7.	Nalla	A water course
8.	Nachani	An edible food grain
9.	Rab	A patch of ground which is given a good burn and used for regeneration purpose.
10.	Tahsil/ Taluka	An administrative unit of district
11.	Tahal	Leafy branches of trees

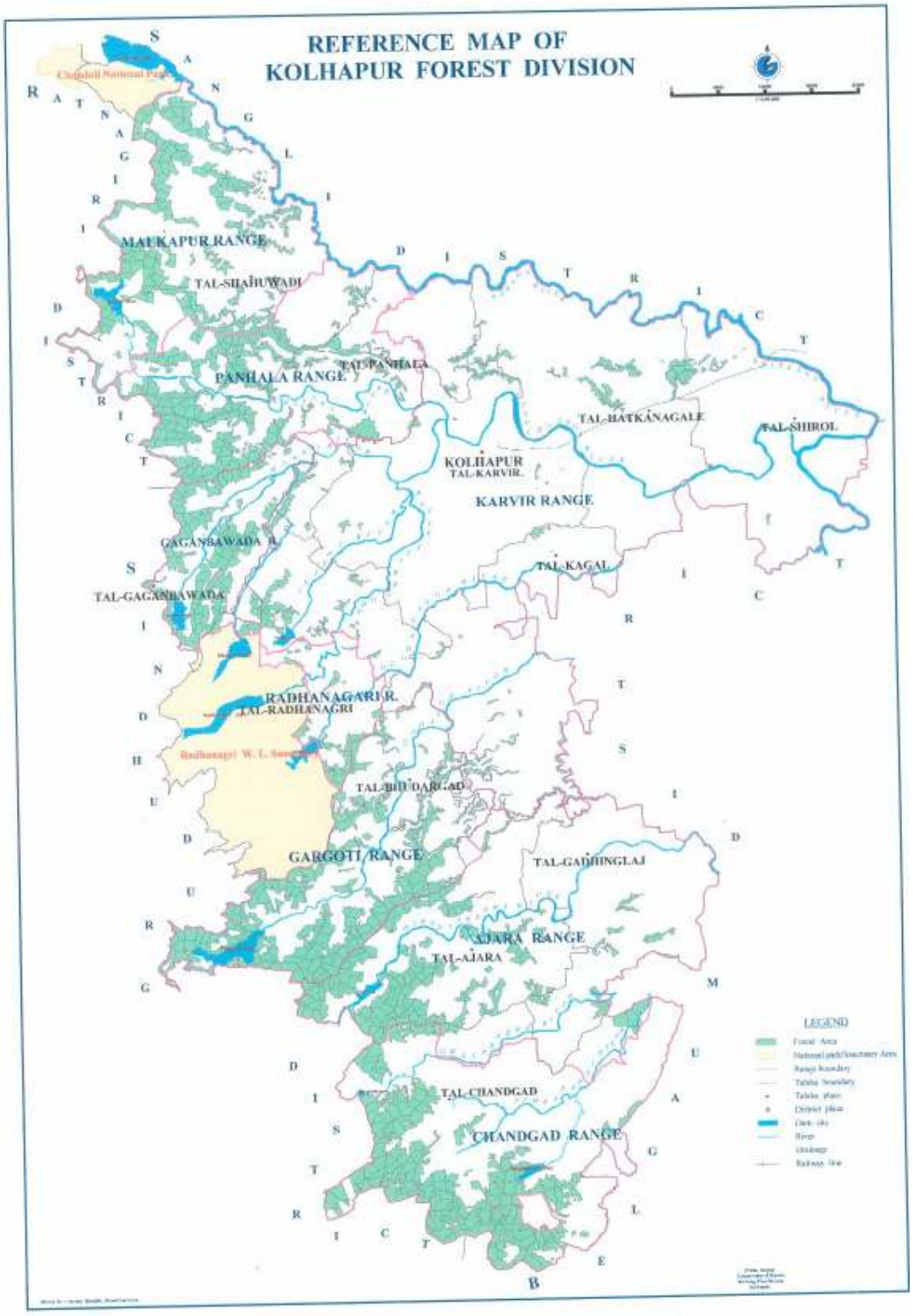
ABBREVIATIONS USED IN THE PLAN

ACF	:	Assistant Conservator of Forests
APCCF	:	Additional Principal Chief Conservator of Forests
AR	:	Artificial Regeneration
CAI	:	Current Annual Incremant
CBO	:	Cutting Back Operations
CCT	:	Continuous Contour Trenches
Cum	:	Cubic metre
CF	:	Conservator of Forests
DILR	:	District Inspector of Land Records
DRDA	:	District Rural Development Agency
DCF	:	Deputy Conservator of Forests
EPT	:	Elephant proof Trench
FCA	:	Forest Conservation Act
FD	:	Forest Department
FDA	:	Forest Development Agency
FLCS	:	Forest Labourers' Cooperative Society
FPC	:	Forest Protection Commitee
FRSSU	:	Forest Resources Survey Scheme Unit
FYO	:	First Year Operations
FYP	:	Five Year Plan
GIS	:	Geographic Information System
GBH	:	Girth at breast height
Ha.	:	Hectare
IUCN	:	International Union for Conservation of Nature
IWC	:	Improvement Working Circle
IWDP	:	Integrated Watershed Development Programme
JFM	:	Joint Forest Management
MAI	:	Mean Annual Increment

MEDA	:	Maharashtra Energy Development Agency
MPCA	:	Medicinal Plants Conservation Area
MSL	:	Mean Sea Level
MSEDC	:	Maha State Electricity Distribution Co.
NTFP	:	Non Timber Forest Produce
NR	:	Natural Regeneration
PA	:	Protection Area
PCCF	:	Principal Chief Conservator of Forests
PF	:	Protected Forest
PPO	:	Pre planting Operations
PWD	:	Public Works Department
RF	:	Reserve Forest
RFO	:	Range Forest Officer
SCI	:	Selection cum Improvement
SHG	:	Self Help Group
SMC	:	Soil and Moisture Conservation
SOFR	:	State of Forest Report
SYO	:	Second Year Operation
TCM	:	Trench cum mound
TM	:	Treatment map
TYO	:	Third Year Operations
WC	:	Working Circle
WP	:	Working Plan
WL	:	Wild life
WS	:	Working Series


TALUKA MAP OF
KOLHAPUR DISTRICT
Chandoli National Park
TAL-SHAHUWADI
TAL-PANHALA
TAL-HATKANAGALE
TAL-SHIROL
KOLHAPUR
TAL-KARVIR
TAL-KAGAL
TAL-GAGANBAWADA
TAL-RADHANAGRI
Radhanagri W. L. Sanctuary
TAL-BHUDARGAD
TAL-GADHINGLAJ
TAL-AJARA
TAL-CHANDGAD


KOLHAPUR FOREST DIVISION
RANGE MAP
MALKAPUR RANGE
PANHALA RANGE
KARVIR RANGE
GAGANBAWADA R.
RADHANAGARI R.
GARGOTI RANGE
AJARA RANGE
CHANDGAD RANGE


REFERENCE MAP OF
KOLHAPUR FOREST DIVISION
MALKAPUR RANGE
TAL-SHAHUWADI
PANHALA RANGE
TAL-PANHALA
TAL-HATKANAGALE
TAL-SHIROL
KOLHAPUR
TAL-KARVIR
KARVIR RANGE
GAGANBAWADA R.
TAL-GAGANBAWADA
TAL-KAGAL
RADHANAGARI R.
TAL-RADHANAGRI
TAL-BHUDARGAD
GARGOTI RANGE
TAL-GADHINGLAJ
AJARA RANGE
TAL-AJARA
TAL-CHANDGAD
CHANDGAD RANGE
LEGEND

PART - I

SUMMARY OF FACTS ON WHICH THE PROPOSALS ARE BASED

CHAPTER - 1

THE TRACT DEALT WITH

SECTION 1: NAME AND SITUATION

This Working Plan deals with the entire forest area including all reserved forests, protected forests, unclassed forests, and finally acquired forests in charge of the Kolhapur forest division within the geographical boundaries of Kolhapur district. This Plan however excludes the areas notified as Radhanagari sanctuary and Chandoli National Park within Kolhapur district as these are covered by separate Management Plans and are under the administrative control of the Kolhapur wildlife division.

Kolhapur is an ancient city, situated in the southern Maharashtra, on the banks of river Panchganga, a tributary of the river Krishna. The average height above msl varies between 390 to 900 metres. The ancient name of Kolhapur area was Karvir, which finds mention in *'Padam Purana'*. The present name of Kolhapur has given rise to the legend of '*kolhasura'* an asura or the fox demon whom the goddess Mahalakshmi slew on a hill near the city. However, the most likely origin somehow appears to be from the word *कोलं* , the Kanarese name for the lotus flower. The city is very famous for the ancient temple of the goddess Mahalakshmi or *Ambabai.* The temple was built in 700 AD by the Chalukyas. The Puranas have listed 108 sites where Shakti, the goddess of power is manifested. Amongst these, the Karvir area where the present town of Kolhapur is located is of special significance. It is said to be one of the six abodes of Shakti, where one can achieve both fulfillment of desires as well as salvation from them. Shri Mahalakshmi is the consort of Shri Vishnu and it is said that they both reside in the Karvir area.

A view of river Panchganga

The district has been divided into 12 talukas and 4 sub divisions for administrative purpose. These are Karvir, Panhala, Shahuwadi and Kagal talukas under Karvir sub division, Hatkanangle and Shirol talukas under Ichalkaranji sub division, Gadhinglaj, Chandgad and Ajra talukas under Gadhinglaj sub division and Bhudargad, Radhanagari and Gaganbavda under Radhanagari sub division. The forest areas of Kolhapur division lie between latitude 15^0 43' to 17^0 10' north and longitude 73^0 40' to 74^0 42' east. The division has eight forest ranges viz. Chandgad, Ajra, Gargoti, Radhanagri, Gaganbawada, Karvir, Panhala and Malkapur. Kolhapur is bounded on the north by the Varna river that flows eastwards for 120 km separating Kolhapur and Sangli district, before joining Krishna river in the north east; On the east, it is bounded by the river Krishna for

some length, and Belgaum district of Karnataka; on the south by Belgaum district; and on the west by the Sahyadharis which separate it from Ratnagiri and Sindhudurg districts.

The erstwhile ruling family of Kolhapur, the Chattarpatis enjoy a common ancestry with the Bhonsle dynasties of Tanjore and Satara. They claim descent from the Sisodia clan of Rajputs, the same descent as the ancient rulers of Chittor and Udaipur and are the direct descendents of the great Maratha king Chhatrapati Shivaji Maharaj. In 1498, on the dissolution of the *Bahmani* kingdom and the elevation of its chief feudatories into the position of sovereign princes, Kolhapur and the adjoining country fell to the share of *Bijapur*. When the great Shivaji set upon his work of founding an empire, the hill forts in the Kolhapur territory were too favourably situated for his purpose not to attract his notice. Shivaji, in 1659 obtained possession of Panhala, Pavangad, Vishalgad and other forts in the district and from there carried on operations in Konkan. The great Maratha king Chhatrapati Shivaji Maharaj breathed his last in 1680. Panhala was subsequently used as a place of safe confinement by Shivaji's eldest son Sambhaji who nine years afterwards sallied forth from it to be captured by the Moghuls. The subsequent death of Sambhaji and the capture of his infant son Shahu Shivaji by the Moghuls made Rajaram, the second son of Shivaji Maharaj the de facto Raja of the Marathas. On the death of Rajaram in 1700, his widow Maharani Tarabai, proclaimed Shahu Shivaji's younger cousin and her son as Chhatrapati Maharaj under her regency.

The states of Satara and Kolhapur came into being in 1707, because of the succession dispute over the Mahratta kingship. The Moghuls released Shahu Shivaji under certain conditions in 1707, and he returned to claim his inheritance. He defeated the regent Maharani Tarabai at the battle of Khed and established himself at Satara, forcing her to retire with her son to Kolhapur. By 1710 two separate principalities had become an established fact, eventually confirmed by the Treaty of Varna in 1731. The British sent expeditions against Kolhapur in 1765 and 1792; Kolhapur entered into treaty relations with the British, after the collapse of the Mahratta confederacy in 1812. In the early years of the 19th century the British invaded again, and appointed a political officer to temporarily manage the state. The state acceded to the Dominion of India on 14th August 1947 and merged with Bombay state on 1st March 1949.

The geographical area of Kolhapur district is 7,685km^2 and is spread over 12 talukas viz. Chandgad, Gadhinglaj, Ajara, Kagal, Bhudargad, Hatkanangle, Gaganbawada, Panhala, Shirol, Radhanagari, Karvir and Shahuwadi. The recorded forest area of the district including sanctuary areas is 1,744.50 sq.km which is 22.70% of the geographical area of the district. The Kolhapur forest division however has a forest area of 1,389.71 km^2 that is spread over 8 forest ranges and all 12 talukas and is 18.08% of the geographical area.

As per the 'State of Forest Report 2005' (SOFR), published by Forest Survey of India, Dehradun, the 'Actual forest cover' of Kolhapur district is 1,657 km^2 that is 21.56% of the geographic area out of which, 'Very dense forest cover' is nearly 6% while 'Moderately dense' is 57% of the total forest cover. The 'Open forest cover' constitutes 37% of the total area under forest cover. This means about 63% of the actual forest cover within the district is moderately dense to very dense.

SECTION 2: CONFIGURATION OF THE GROUND

The western boundary of the district is marked by the north–south running Sahyadri range of the Western Ghats and a series of valleys separated by lines of hills which runs north-east or east. The natural drainage is therefore towards the east and forms the major watershed areas of the Varna river flowing eastwards in the northern part of the district and the watershed of the Ghatprabha river in the south. Between these two major watersheds are a series of minor watersheds of smaller tributaries flowing eastwards and north eastwards. The area is thus hilly and rugged along the Western boundary and gradually tapers off as one moves to the eastern side, forming a plateau.

The district can be divided mainly into three elongated strip shaped regions from north to south, on the basis of natural formations, viz.

i. The Western region with hilly and rugged terrain

It consists of the Sahyadri range, a rugged tract of hills with steep slopes and valleys popularly called '*konkan ghat matha'*. The width of this north–south strip is approximately 30-35 km. The average elevation varies between 800 metres in the west to nearly 650 metres towards the eastern side. It is wet and cool region with red latritic soil. The scenery is wild and picturesque. The areas of Shahuwadi, Panhala, Gaganbawada, Bhudargad, Ajara and Chandgad talukas are included in this strip. Gajapur in the north near Vishalgad is located at 1000 metres above msl whereas in the Chandgad taluka in the south, Kasarsada is 1100 metres, Kalanandigad is 1075 metres and Mahipalgad is at 1000 metres above msl.

ii. The Central region

The central region includes mainly Karvir and Kagal talukas. The tract is moderately undulating. The soil is fertile with fine silt deposition by the rivers flowing from west to east.

iii. The Eastern plateau like region

The width of this strip would be approximately 30 kms in the north and 15-20 kms towards the south. The average elevation above msl is around 550 metres. It has by and large flat terrain. Some occasional hillocks are seen in this area. The Shirol and Hatkanangle talukas are included in this region.

SECTION 3: GEOLOGY, ROCK AND SOIL

The Deccan trap is the major geological formation of upper Cretaceous-Eocene era, covering almost the entire tract except in the south where are some ridges of sandstone and quartzite. The chief varieties of the trap are basalt, amygdaloidal trap, vesicular trap and clayey trap which with some few intertrappean sedimentary beds and numerous highly ferruginous clayey beds make up the great mass of the trap flows. The lower flows are mostly basaltic in character, the medium flows are alternately basaltic and amygdaloidal and the upper are chiefly basaltic capped by beds of clay and laterite. In the Sahyadri region, the position of flow is more distinct than in further east. When carefully studied from some commanding point, they are seen to dip at a very low

angle generally to the north east. Because of their dominantly basaltic composition and tendency to form flat topped plateaus, the lavas are termed plateau basalts.

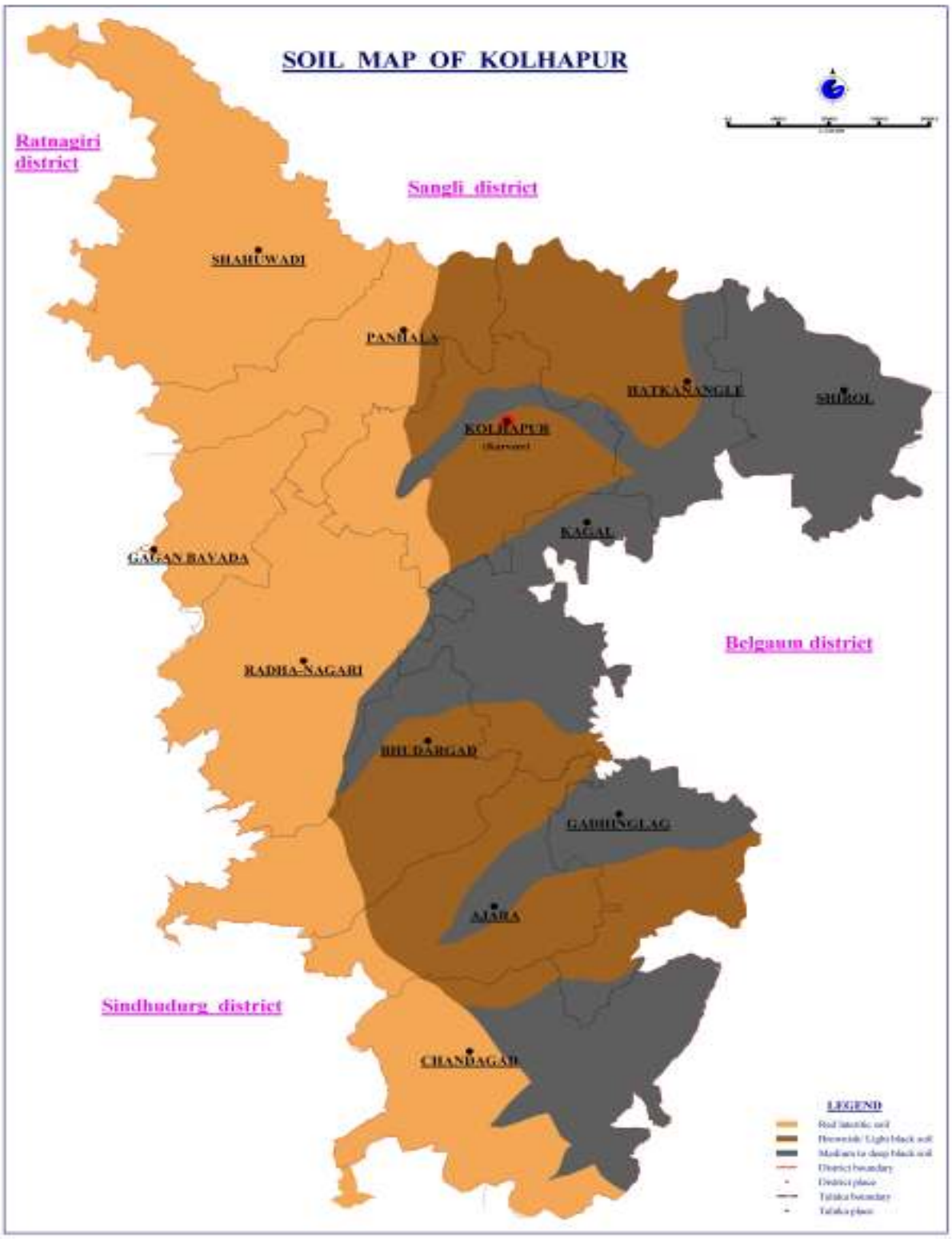
The Laterite is compact and vesicular rock formation of Pleistocene to recent era. It is composed of hydrated oxides of aluminium and iron with small amount of oxides of manganese and titanium and is generally reddish-brown in colour. Beds of laterite usually formed by the mechanical and chemical disintegration due to atmospheric agencies on the underlying trap are seen in various areas of the district. The beds vary in thickness from five to fifty feet or more. The rocks are usually mottled, reddish or yellowish brown in colour. The lateritic rocks are soft and show bright colours when freshly cut but become very hard and dull on exposure to atmosphere. The outer surface of the beds present a dark to dirty brown colour and a very rugged and pitted appearance. The traps are considered as one of the best materials for use as building stones, road metal and ballast and there is no dearth of these in the district. Jambha (Lateritic stone) is seen to be used in construction of many buildings and compound walls. Bauxite deposits of economic importance are found mainly in Radhanagari, Ajra and Gadhinglaj talukas of the district.

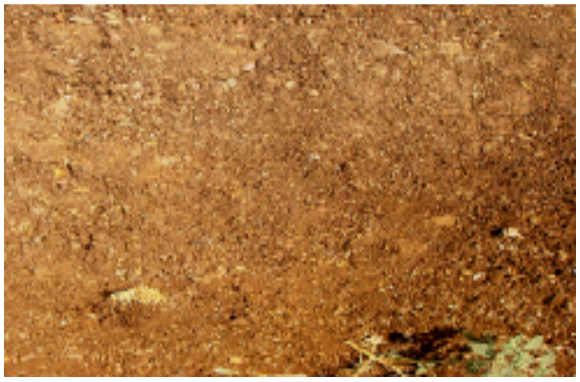
The disintegration of the basalts produces soils varying considerably in depth and physical properties like colour and texture. The soils vary in nature from sandy and clayey loam to hard murram inter-mixed with boulders. Differential weathering of rocks over a period of time has resulted in different variations of soil in the district. All these soil types blend with each other in varying proportions and are often found containing sand, lime and gravel. However the various soil variations can be broadly divided into following three categories:

Red lateritic soil

The red lateritic soil, the murrum is found predominantly in the western zone. In areas which are thickly forested and have minimum biotic interference the soil depth, quality and fertility is very good. In areas where the tree cover is sparse or areas with excessive exploitation leaching of salts has led to hard layers of lateritic soil where regeneration of forest cover is extremely difficult. Kumri / Rotational cultivation has led to the formation of such areas in the past.

The Red lateritic soil is seen in most of the areas of Shahuwadi, Panhala, Gaganbawada and Radhanagari talukas and western parts of Karvir, Bhudargad, Gadhinglaj and Chandgad talukas. The brownish or light black coloured soil is seen predominantly in Kagal, Karvir, central parts of the Hatkanangale, Radhanagari and eastern parts of the Bhudargad, Gadhinglaj and Chandgad talukas. The soil type is mainly fine silt, sandy and clayey loam which is deposited in the valleys along the course of rivers and is very rich and fertile.


SOIL MAP OF KOLHAPUR
Ratnagiri district
Sangli district
SHAHUWADI
PANHALA
HATKANANGLE
SHIROL
KOLHAPUR
KAGAL
GAGAN BAVADA
Belgaum district
RADHA-NAGARI
BHUDARGAD
GADHINGLAG
AJARA
Sindhudurg district
CHANDAGAD
LEGEND



Medium to deep black soil

Rice, Jowar, Groundnut is generally grown in these soils and in irrigated areas, Sugarcane is also being cultivated.The Medium to deep black soil is seen in the Shirol, Hathkanangale and eastern parts of Karvir, Kagal and Gadhinglaj talukas. These talukas have small scattered forest patches.

SECTION 4: CLIMATE AND RAINFALL

The climate of Kolhapur district is moderate and pleasant. It does not show extremities. However, three distinct seasons are experienced. These are monsoons from June to October, winters from November to February followed by a warm to hot summer from March to May.
The Western part of the district along the top of the Western Ghats has cool climate even during the summers. However in the eastern and northern part of the district, hot winds are experienced during April and May. The evenings are however cooled by the sea breeze, which sets in the afternoon and lasts till at about eight at night. The nights are never oppressive. The situation of Kolhapur city opposite a gap in the line of western hills, gives it the benefit of a strong sea breeze in the afternoons and cool nights.

The changes in temperature are gradual. The mean annual maximum temperature is 31.5^0C and the mean annual minimum temperature is 19.2^0C. Maximum temperature in April could reach up to 40.7^0C and temperature in January could be as low as 10^0C. A statement showing mean monthly maximum and minimum temperatures at Kolhapur centre is given in **Appendix 1.1** of Volume II of the Plan.
The bulk of the rainfall is received from the South West monsoons between June to October. Lightning occurs mostly during the pre monsoon showers. However the rainfall is not evenly distributed throughout the district. It varies from a mean annual rainfall of 480 mm in the eastern Shirol taluka to around 6000 mm along the Western Ghats in Gaganbawada Taluka. However, the north- south variations within the district are not seen. Based on the east-west variation in the mean annual rainfall, Kolhapur district can be divided into four zones.

i. High rainfall zone in the West

A north-south strip of about 10-15 km. width along the Western Ghats falls in this zone. The mean annual rainfall could be as high as 6000 mm with 90-95% of the rain being received from the south west monsoons between June and September and of this, about 35-40% of the rain is received in the month of July. The Western portions of Shahuwadi, Panhala, Gaganbawada, Bhudargad, Gadhinglaj and Chandgad talukas fall in this zone. Mixed semi evergreen and moist mixed deciduous forests are found in this zone.

ii. Medium rainfall zone in the Central part:

A north-south strip between 15-30 km parallel to the Western Ghats falls in this zone. The mean annual rainfall is between 1450-2000 mm received mainly from the South West Monsoon between June to September end with a few showers in October. Of this about 30% of the rain is received in the months of July and August. The Eastern portions of Shahuwadi, Panhala, Bhudargad, Ajara and Chandgad talukas and western portions of Karvir, Kagal, Gadhinglaj talukas fall in this zone. Moist mixed deciduous forests and Dry mixed deciduous forests are found in this zone.

iii. Low rainfall zone in the East:

A north-south strip between 30 kms to 60 kms parallel to the Western Ghats falls in this zone and has low rainfall. The Mean Annual rainfall is between 775- 900 mm. and 80% of this is received from the south west monsoons between June- September. Some rain is received in October and even occasionally in November. The eastern portion of Karvir, Kagal, Gadhinglaj talukas and the Shirol and Hatkanangle talukas fall in this zone. Dry deciduous forests are found in this zone.

iv. Drought prone zone in the Eastern most part:

The mean annual rainfall along the eastern boundaries of the Shirol and Hathkanangale talukas is only about 475 – 500 mm. This is received between June to September from the south west monsoons and a few showers upto November end from the north east monsoons. However, the rainfall in this zone is very low and unreliable. Stunted scrub forests are found in this zone. A statement showing month wise rainfall data at various centres in Kolhapur district is given in **Appendix 1.2** of Volume II of the Plan.

SECTION 5: WATER SUPPLY

Kolhapur on the whole is well supplied with water. Besides the six chief rivers and their numerous feeders, spring water is available in most parts twenty to fifty feet below the surface. The water table in the entire Kolhapur district is very high thus resulting in good water levels in all wells and tanks. This is also due to the fact that many big, medium and small dams, percolation tanks, Kolhapur type bandharas have been constructed over the past few years in various parts of the district. Every village has atleast 1 or 2 wells. Lift irrigation through 'Jack wells' constructed in the river beds is a routine feature in the district. The drinking water supply is also adequate. Statements showing existing forest wells and forest tanks are given in **Appendices 1.3 and 1.4** respectively of Volume II respectively.

Extensive network of canals, irrigation tanks and lift irrigation facilities in the eastern part of the district has resulted in irrigated sugarcane and paddy fields in most of the flat areas in the eastern part of the district although the rainfall in this area is not high. Infact even in the Western hilly areas, which are not really suited for sugarcane considering the terrain and also in some cases

soil conditions, the farmers are resorting to terracing for sugarcane cultivation in view of good water presence to get better returns. This may however prove counter productive in the long run as the soil run off is very high because of this practice of terracing.

The high level of water supply which has resulted in all round development in agriculture and animal husbandry practices needs to be sustained by protection of the forest cover in the watersheds of all the water sources. The development in the district thus can be sustained only through proper and effective inputs for forest protection and conservation.

The main rivers of Kolhapur are six in number, the Varna, the Panchganga, the Dudhganga, the Vedganga, the Hiranyakeshi and the Ghatprabha. These rivers rise in the Sahyadris and flow south-east, east or north-east 80 to 97 kms across the Kolhapur plateau towards the Krishna. Though the river courses are winding especially in the west, yet there are no falls and few rapids.

The Varna River forms the northern boundary of the district for about 130 kms before falling into the Krishna at the north eastern corner of the district. The Krishna River then flows southwards for about 40 kms along the eastern boundary of the district before entering Karnataka state. The Chandoli dam has been constructed on this river leading to irrigated agricultural development in the Shahuwadi, Panhala and Shirol talukas. The catchment of the Chandoli dam has been constituted into the Chandoli sanctuary and this area is now managed by the Kolhapur wildlife division.

The Panchganga is formed from north to south of four streams, the Kasari, the Kumbhi, the Tulsi and the Bhogavati. The fifth stream is the underground Saraswati. They flow north-eastwards and eastwards ultimately joining near the Kolhapur city forming the Panchaganga river which also flows eastwards and later joins the Krishna at Kurundvad. This network of rivers in the northern part of the district has been used to form a series of small and minor irrigation schemes resulting in excellent water supply to otherwise low rainfall eastern part of Kolhapur district. The Radhanagari project has come up at the originating point of the Bhogavati River and the catchment of this dam is constituted into the Radhanagari wildlife sanctuary being managed by the Kolhapur wildlife division.

The Vedganga and the Dudhganga are other rivers in the central part of the district also flowing north eastwards and meeting the Krishna. The Kalammawadi medium hydro electric project has been commissioned at the originating point of the Dudhganga and the catchment of this river is also part of the extended Radhanagari sanctuary.

The Hiranyakeshi River flows north eastwards in the southern portion of the district along with the Ghatprabha river which is a major tributary of the Krishna. Tamraparani and Dhotikand are minor tributaries of the Ghatprabha River.

The only river which originates in the Western Ghats and flows westwards to meet the Arabian Sea is the Tilari River and its tributaries the Gel, Sina, Khar and Bandar. These flow in the Chandgad taluka in the southern portion of the district. The Tilari River further enters the Sindhudurg district and meets the Arabian Sea. A medium hydroelectric project has been

commissioned at Tilari nagar in Chandgad taluka and the forests of this taluka form an important catchment for this project.

The district has a net work of irrigation projects. It has four major irrigation projects namely Radhanagari, Tulsi, Dudhganga and Varna with total command area of 2, 98,121 hectares in Kolhapur district. Nearly 1, 17,642 hectare area is under irrigated cultivation in the district. The district has 12 medium and 140 minor irrigation projects also. Medium irrigation projects are Kasari, Patgaon, Kumbhi, Kadbi, Chitri, Chikotra, Jangamhatti, Dhamni, Jambhare, Ghatprabha, Hiranyakeshi and Surfnala out of them few are yet to be completed.

SECTION 6: DISTRIBUTION OF AREA

This Working Plan covers 1,389.71 sq.kms of area falling within the jurisdiction of Kolhapur forest division. This area includes 65.34 km^2 of Sheri land which is included in the Form no 1 Area Register but only 11.77 km^2 area is in actual possession of the Kolhapur division. Remaining 53.57 km^2 Sheri land as well as 3.36 km^2. forest area is still in the possession of the Revenue department. Therefore actual forest area in possession of the Kolhapur forest division is 1,332.78 km^2 while 351.43 km^2 forest area falls within two wild life sanctuaries viz. Radhanagari Sanctuary (282.32 km^2) and Chandoli Sanctuary and National Park (69.11 km^2) and is managed under separate Management plans by the Kolhapur wildlife division. A statement showing forest area transferred to WL division Kolhapur is given in **Appendix 1.5** of Volume II of the Plan. Similarly 56.93 km^2 forest area lies with the Revenue department which includes 53.57 km^2 of Sheri lands. The recorded forest area of Kolhapur district therefore is 1,744.50 km^2 which is 22.70% of the geographical area of the district.

In addition, 136.64 km^2 area has been identified as 'forest' as per the dictionary meaning within the district (112.56 km^2 on the government lands and 24.08 km^2 on the private lands). A statement of the said area is given in the **Appendix 1.6** of Volume II of the Plan.
The range wise distribution of the forest area is given in the following table.

Table 1

Range wise distribution of forest area in Kolhapur division

Sr. No.	Range	No. of Comp.	Reserved forest				Protected forest	Unclassed Forest	Total area of Dn.
			Sec 20	Sec 4	Acquired	Total			
1	Chandgad	146	24,938.82	121.72	0.00	25060.54	0	2164.50	27225.04
2	Ajara	172	1,040.72	10,987.00	370.44	12398.14	6169.33	134.51	18701.98
3	Gargoti	176	0.00	16,152.05	2,584.58	18736.63	6575.82	38.33	25350.78
4	Radhanagari	27	466.75	330.28	0.00	797.03	1776.04	0	2573.07
5	Karvir	107	3,046.22	3,766.70	292.40	7105.32	5715.30	476.55	13297.17

6	Gaganbavada	91	3,421.86	1.072.24	436.19	4930.29	5845.23	808.53	11584.05
7	Panhala	163	0.00	15,298.07	517.13	15815.20	4053.73	424.88	20293.81
8	Malkapur	154	0.00	13,622.79	1,945.51	15568.30	3294.20	1082.60	19945.10
	Total	**1,036**	**32,914.37**	**61,350.85**	**6,146.25**	**1,00,411.45**	**33,429.65**	**5,129.90**	**1,38,971.00**

Taluka wise distribution of the forest area in Kolhapur forest division is given in the following table.

Table 2

Taluka wise distribution of forest area in Kolhapur division

Sr. no.	Taluka	Range	RF			PF	UF	Total
			Sec. 20	Sec.4	Acquired	Sec.29		
1	Chandgad	Chandgad	24938.82	121.72	0.00	0.00	2164.50	27225.04
		Ajara	889.11	96.96	0.00	185.19	0.00	1171.26
	Total		**25827.93**	**218.68**	**0.00**	**185.19**	**2164.50**	**28396.30**
2	Gadhinglaj	Ajara	151.59	0.00	286.18	1312.95	0.00	1750.72
3	Ajara	Ajara	0.00	10890.04	84.26	4671.19	134.51	15780.00
		Gargoti	0.00	0.00	0.00	29.42	0.00	29.42
	Total		**0.00**	**10890.04**	**84.26**	**4700.61**	**134.51**	**15809.42**
4	Bhudargad	Gargoti	0.00	16152.05	2584.58	6497.02	38.33	25271.98
5	R.nagari	Radhanagari	466.75	330.28	0.00	1776.04	0.00	2573.07
		Gaganbavada	184.05	0.00	0.00	338.27	25.18	547.50
		Karvir	1454.09	1355.96	0.00	948.75	116.63	3875.43
	Total		**2104.89**	**1686.24**	**0.00**	**3063.06**	**141.81**	**6996.00**
6	G.bavada	Karvir	0.00	0.00	0.00	341.55	0.00	341.55
		Gaganbavada	3237.81	1072.24	436.19	5506.96	783.35	11036.55
	Total		**3237.81**	**1072.24**	**436.19**	**5848.51**	**783.35**	**11378.10**
7	Kagal	Gargoti	0.00	0.00	0.00	49.38	0.00	49.38
		Karvir	226.74	0.00	292.40	996.59	72.38	1588.11
	Total		**226.74**	**0.00**	**292.40**	**1045.97**	**72.38**	**1637.49**
8	Karvir	Karvir	0.00	912.95	0.00	1254.15	287.54	2454.64
9	Shirol	Karvir	679.63	0.00	0.00	218.07	0.00	897.70
				9				

10	H.kanangle	Karvir	685.76	0.00	0.00	1406.49	0.00	2092.25
11	Panhala	Karvir	0.00	1497.79	0.00	549.70	0.00	2047.49
		Panhala	0.00	8610.80	**46.52**	1960.68	308.62	10926.62
	Total		**0.00**	**10108.59**	**46.52**	**2510.38**	**308.62**	**12974.11**
12	Shahuwadi	Malkapur	0.00	13622.79	1945.51	3294.20	1082.60	19945.10
		Panhala	0.00	6687.27	470.61	2093.05	116.26	9367.19
	Total		**0.00**	**20310.06**	**2416.12**	**5387.25**	**1198.86**	**29312.29**
TOTAL OF KOLHAPUR DIV.			**32914.35**	**61350.85**	**6146.25**	**33429.65**	**5129.90**	**138971.00**

The following table gives the distribution of forest areas in Kolhapur district as per the actual possession of the forest area with the respective agencies.

Table 3
Distribution of forest area in Kolhapur district

Sr. No	Area in Charge of	RF	PF	UF	Total
1	Kolhapur Forest Division	96,884.91	31,399.42	4,993.97	**1,33,278.30**
2	Wild Life Division	23,147.50	5,056.37	6,938.93	**35,142.80**
3	Revenue department	3,526.54	2,030.23	135.93	**5,692.70**
	Total	**1,23,558.95**	**38,486.02**	**12,068.83**	**1,74,113.80**

A statement showing existing Ranges, rounds and beats is given in **Appendix 1.7** of Volume II of the Plan. A statement showing forest area incharge of Revenue department is given in **Appendix 1.8** of Volume II. The forests of this division are covered in 24 toposheets of 1:50,000 scale. A statement showing list of toposheets is given in **Appendix 1.9** of Volume II of the Plan.

SECTION 7: STATE OF BOUNDARIES

The state of the boundary demarcation is not much satisfactory except for the areas in Chandgad range. The boundaries of Chandgad Range are well demarcated. Before the reorganisation of the States, the Chandgad taluka was a part of the Belgaum district of Karnataka State. The topographical survey of this area had been done by the Survey of India in the past and therefore the forest boundaries and stones are distinctly marked. However the boundary demarcations in other Ranges cannot be relied upon totally. The compartments in the other Ranges were carved out for the first time during the last revision of the Working Plan by Shri Kate and Shri Bapat. However the demarcation on the ground is still not very clear at places and therefore it is imperative to undertake survey and demarcation of all these areas on top priority.

SECTION 8: LEGAL POSITION

The legal position of the forests included in the Chandgad taluka is clear. Most of these areas were notified as Reserved Forests from 1880 to 1909. The legal status of the forest areas received from the merged Sansthan (Princely estate) and of the erstwhile Jahagirs is not clear and is confusing and difficult to reconcile. Registers similar to the form 1 A were maintained to show the forest areas in the Sansthan and Jahagirs. All villages having forest areas were divided into classified villages and unclassified villages. This division was important upto the time of merger. The forests areas in both types of villages were also further classified into reserved and protected forests. However it is not clear whether any inquiry or settlement was actually done before such classification. The settlement proceedings also do not mention any rights, privileges or concessions. Actually all rights for classification of forests into reserved or protected rested with the erstwhile Kolhapur Rulers. Rules were laid down in 1880 to facilitate this. According to rule no. 2, classifying forests into reserved or protected rested solely with the Kolhapur ruler. However it is seen from the registers kept by the Sansthan that individual Jahagirdars had themselves notified forests into reserved or protected as seen from the council resolution numbers and dates mentioned in the registers by the Jahagirdars.

The Kolhapur sansthan, the Vishalgad and Ajara Jahagiris have clearly mentioned the council resolution numbers and dates notifying forests into reserved or protected in most cases. Other Jahagirs however have not followed any particular system for notifying forests under their control. A list of notifications of RF and PF is given in **Appendix 1.10** of Volume II.

Sheri lands

Sheri lands were the forest areas that were kept reserved to meet the personal expenditure of the rulers of the princely state. Nearly 6,534.01 ha forest area included in 59 villages was reserved for this purpose. At the time of merger, the management of these Sheri lands were with the Maharajas' Sheri department. After the merger, maintenance of such lands was transferred to the Revenue department. Although the area is notified as Reserved and Protected forests, the physical possession of 5,357.18 ha area of these notified reserved and protected forests is still with the Revenue department. Shri Wagale therefore, had not included these Sheri lands in his Working Plan. After repeated persuation by the forests department, the Govt. vide letter no. FRT- 1253/ IJ, dated 30/4/1958 had directed the Agriculture and land conservation department to classify such Sheri lands into A, B, C, and D. It was also stated that transfer of class C and Class D lands fit for plantations could be subsequently considered to forest department. Records show that the Sheri lands have been classified in to A, B, C, D classes. However the transfer of such lands from the Revenue department to the forests department is still not completed. In fact only upto 1,176.83 ha of Sheri lands have actually been handed over to the forest division. This matter needs to be taken up with the Collector so that the status of these lands is clear and proper management of such Sheri lands could be finally taken up.

After merger, the form no. 1 A of the forest department was prepared in 1950. The protected forests included in this form were re-notified under section 29 of the Indian Forest Act as per

notification of the Revenue and Forest department no. FLD – 1153/57127- (A to H) dated 23/10/1953 as protected forests. Total number of villages with protected forests was 393. This also included Sheri villages with protected forests. However even these re-notified Sheri protected forests were not handed over to the Forest department.

The areas included as reserved forest in form 1A prepared in 1950 were again re-notified under section 4 of the Indian Forest Act 1927 vide R and FD Notification no. FLD - 1153/57127 (1 to 12) – J, dated 23/10/1953. The intention constituting these areas as reserved forests was for 103 villages including the area of 56586.49 ha. Sheri villages with reserved forests were also re-notified under this notification. The forest settlement Officer had written the settlement report for all the 12 talukas of the district from 1955 to 1957. Of these, reports of Shirol, Hatkanangle, Kagal, Gadhinglaj, Gaganbavada (part) and Radhanagari (part) had been approved by the Govt. Most of the forest areas notified under section 4 had been finally notified under section 20 as reserved forests for these talukas vide notification no. R and FD DFS / 2060 / 25901 –Y, dated 14/9/1965. Accordingly entries had been taken in form 1 A. The forest settlement report for Shahuwadi, Panhala, Bhudargad, Ajara, Karvir, Gaganbavada (part) and Radhanagari (part) were returned for re examination to the Forest Settlement Officer, Sawantwadi. In fact these talukas have the maximum forest land including the maximum Sheri lands. A statement showing details of Sheri lands is given in **Appendix 1.11** of Volume II.

Acquisition of Private Forest:

Private forests in the district were acquired under the Private Forest Acquisition Act, 1975. Further in 1978 to prevent acquisition of small and marginal land holders it was decided to restore up to 12 ha of such land to the owner after due enquiry by the Collector. The area acquired in the Kolhapur district under this Act is 9,595.01 ha out of which 3,382.91 ha area has been restored to the original khatedars while 4,119.48 ha has been vested with the FD. An extent of 1,402.36 ha area is pending for enquiry by the Collector which needs to be expedited. An extent of 690.26 ha area is being contested in the Courts of law. A statement showing details of Acquired forests under Private Forest Acquisition Act is given in **Appendix 1.12** of Volume II.

Area diverted for non forestry purposes under Forest Conservation Act 1980

An extent of 3,183.44 ha forest area of Kolhapur division, has been diverted for non forestry use under Forest Conservation Act, 1980. These lands have been diverted against 65 projects majority of them are irrigation projects. Statements showing areas diverted under FCA and areas transferred to Kolhapur division for Compensatory afforestation are given in **Appendices 1.13 and 1.14** respectively of Volume II. A list of forest areas disforested before 1980 is given in **Appendix 1.15**.

SECTION 9: RIGHTS AND CONCESSIONS

No rights detrimental to forests existed in the forests of the merged Kolhapur Sansthan, Jahagirs as well as the area of Chandgad taluka at the time of merger of Kolhapur district after the

reorganisation of the state. However many concessions like access to water sources and places of religious importance as well as collection of essential forest produce were given under certain conditions from time to time. Concessions like carrying head loads or providing fuel wood on concessional rates for sale, giving land for eksali plots or traditional kumri cultivation were in vogue.

Eksali plots

To take care of the livelihood needs of adivasis staying in remote forest areas, there was a tradition of allotting plots of forest land for cultivation on yearly basis. These were known as seasonal / eksali plots. Shri Dashputre in his Working Plan indicated that in forests of Chandgad itself about 512.74 ha area was under seasonal cultivation upto the 1960-61. Similarly Shri Wagle in his Working Plan noted that an area of 696.06 ha from the Kolhapur Sansthan and Jahagirs was under such cultivation up to 1951-52. Considering the loss of forests cover and other harmful effects, efforts were made to reduce the allotment of such plots. However even now about 447.18 ha land is under such cultivation in Kolhapur district. As per Govt resolution no FLD – 1069 / 43178 – Y, dated 27/3/1969, it was proposed to prepare disforestation proposals for all eksali / seasonal cultivators. These types of eksali plot cultivations have resulted in openings in the forests leading to loss of contiguity. Moreover since the boundaries of these plots are not clearly demarcated, encroachments into adjoining forest land cannot be ruled out. The issue therefore needs to be resolved once and for all. A statement showing details of Eksali plots is given in **Appendix 1.16** of Volume II of the Plan.

Kumri cultivation

Kumri or rotational agriculture was being allowed on forest land as a concession in Chandgad Range since 1879 for villagers of Isapur, Morle, Mirwel, Kondali, Chinchani and Waghotra. In this form of cultivation the entire land used to be divided into 8 parts and one part was clear felled every year and the debris/ rab was burnt. In the first year warai and in the second year nachani was cultivated. Simultaneously the second part was clear felled in the following year. The first part was abandoned after two years. This rotation continued and cycle of 16 years was practised, each part being cultivated for two years. An area of 1520.52 ha was under such kumri cultivation in Chandgad range. The practice is extremely harmful. There is repeated loss of forest cover. Most of the areas being hilly such practice leads to heavy soil erosion.

<u>Concessions:</u>

The concessions in practice before the merger of the Sansthan and Jahagirs were continued. These were regulated as per rule 132 of volume II of BFM. The concessions are as follows.

a) The villagers would be allowed to bring water from the adjoining forest land in case there is no water source within a reasonable distance.
b) In case of nallas, streams, ponds, bandharas and other natural sources of water on which the Govt. has not incurred any expenditure the villagers would be allowed to take water for cultivation without any charges.

c) Where the villagers have a right to water sources within forest areas, they would be allowed to clear a path of 15 metres wide so as to reach the water source.

d) Grazing would be regulated as per the grazing policy issued by the Govt. vide resolution No. MFP 1365 / 132211 / Y, dated 6/12/1968

e) The forest will not be closed for any type of grazing upto 0.4 km. from the Gavthan as shown in the village map.

f) To reach the areas open for grazing, the forest department would mark a sufficiently wide path through the closed area.

g) Villagers would be allowed to collect earth, sand and stones from the place marked by and under permission from the Divisional Forest Officer for use of their own house or cultivated land.

h) The villagers would be allowed to collect fallen leaves, grass to meet their own needs.

i) In compartments where works of felling and exploitation were going on, the villagers would be allowed to take away the felled but left over un-usable timber after the work of exploitation was over and before the plantation works started. Similarly lops and tops of trees below 15 cm. girth could be carried away by the villagers for meeting their fuel wood needs even while the work of felling and exploitation went on.

j) In case of damage to the houses of villagers staying around forest areas due to fire, the Range Forest Officer had to make available timber of Injaili species to construct temporary houses for the affected parties, on the recommendation of the tahsildar to that effect.

Apart from the concessions mentioned above the Govt. had also allowed continuation of the following concessions vide Govt. order no. AFD 5898, dated 21/9/1953, in specified areas of Kolhapur district.

Specific concessions for areas under erstwhile Kolhapur Sansthan

a) Taking away head loads of fallen and dried wood for personal use.

b) 25 head loads of leaf litter and twigs for rab burning free of cost and at a rate of 1 Anna per extra head load.

c) Timber to be provided as a grant or on Govt. approved rates to poor and eligible people.

Specific concessions for area of Bavada Jahagir

a) Free head loads of dried and fallen wood or timber for poor and eligible people as a grant.

Specific concessions for Vishalgad Jahagir

a) No specific forest related concessions were given to people of this Jahagir. However they were allowed access to water sources and places of worship.

Specific concessions for Ajara Jahagir

a) Taking away free dried, fallen wood of dead trees for use of villagers.

b) There were no forest related concessions for poor or eligible villagers.

Specific concessions for Torgal Jahagir

a) To take away head loads for personal use of wood from dried and fallen trees free of cost.

b). 25 head loads of leaf litter and twigs for rab burning free of cost and at rate of 1 Anna per extra head load.

c) Timber to be provided as grant or on Govt. approved rates to poor and eligible people.

The concessions regarding grazing mentioned above are controlled by the grazing settlement report approved by the Govt. vide letter no MFP / 1374 /251743 – F-2, dated 7/11/1975.

CHAPTER – 2

THE FLORA AND FAUNA

THE FOREST FLORA

SECTION 1: COMPOSITION AND CONDITION OF THE CROP

The Western Ghats region is considered as one of the eight 'hottest' biodiversity hotspots of the 34 identified biodiversity hotspots worldwide. The region boasts of a tremendous diversity of plant and animal life. The diverse natural wealth of the region is an important source of livelihood for a number of ethnic communities inhabiting the region. For instance, local communities harvest nearly 150 uncultivated food plants and more than 500 medicinal plants from forests for food and medicine. The forests are also a source of varied NTFPs and industrial raw materials.

Nearly 2,227 species of plants belonging to 1,023 genera of 182 families have been recorded for Kolhapur district in the book on 'Flora of Kolhapur district' by Professor S.R. Yadav and Dr. M.M. Sardesai of Shivaji university of Kolhapur. Out of the total taxa '**endemic'** to peninsular India, 694 are found in Maharashtra (Singh and Karthikeyan, 2000) of which 340 occur in Kolhapur district. Similarly, a total of 251 species are reported to be '**threatened'** in Maharashtra state (Singh and Karthikeyan, 2000) of which 136 are found in this district. *Nine* taxa of *critically endangered (CR)* category of threatened plants are found in the district. They comprise *Abutilon ranadei*, *Begonia concanensis* and 7 species of *Ceropegia* viz. *Ceropegia evansii, C. fantastica, C. huberi, C. jainii, C. lawii, C. oculata and C. sahyadrica*. *Twenty two* taxa of *Endangered (EN)* category, *Fifty two* taxa of *vulnerable (VU)* category as well as *sixty* taxa under *lower risk (LR)* category of threatened plants have also been recorded in the district. India harbours over 2000 '**medicinal plants'** of which over 600 plant species of some therapeutic value have been enumerated in the district. The detailed list of Endemic, Threatened and Medicinal plant species is given in this volume.

However, forests in the Western Ghats region are under increasing stress due to over exploitation, degradation and habitat destruction. Due to variations in climatic conditions the composition of the forests varies in the Kolhapur district as we move from the Western Ghat areas towards eastwards flat plateau land. Variations are also observed due to varied elevations above msl and also due to variations in soil types. The top of the Western Ghats receive maximum rainfall upto 6000 mm. and have cloud cover for most of the rainy season. It supports semi evergreen but stunted forests. Beyond the width of about 4 to 5 km the rainfall reduces to around 2500 mm. and here semi evergreen forests or moist deciduous forests of site quality IV a to IV b are seen. As we move further eastwards when the rainfall reduces to about 1250 to 2500 mm. moist deciduous forests are found. Further eastwards in the rainfall zone 650 to 1250 mm. mixed dry deciduous forests are seen. At about 60 km. east of the Western Ghat ranges the

rainfall reduces to 250 to 500 mm. and the rainfall here is irregular and hence the forests seen are stunted, thorny type forests.

In these areas most of the tree covered areas are found in a North South belt parallel to and at a distance 25 to 30 kms from the Western Ghats. According to the Champion and Seth classification of the forests types of India the main forest types found in Kolhapur division are as follows.

i. $_2A/C_2$ – Southern tropical West coast semi-evergreen forests
ii. $_3B/C_2$ – Southern moist mixed deciduous forests
iii. $_5A/C_3$ – Southern dry mixed deciduous forests
iv. $_6A/C_1$ – Southern tropical thorn forest and its degraded types.

SECTION 2: THE GENERAL DESCRIPTION OF THE GROWING STOCK

I. *$_2A/C_2$ – Southern tropical West coast semi-evergreen forests*

This type is found on top of the Ghat along a 15 km. wide North South belt. Some representative places are Amba Ghat, Vishalgad, Anuskura, Padsali, Kothe, Bavada, Manbet, Hasane, Nidan khand, Savarde, Kitwade, Soyeran, Isapur, Waghotra, Kothali, and Kolik. The rainfall received in this belt is about 3000 to 6000 mm. Most of the area is under constant cloud cover. The vegetation is evergreen but stunted. Tree species are diversed without pre dominance of any particular species.

Floristic composition

1) At around 800 – 1000 metres above msl and upto 5 kms from Western strip the vegetation mainly comprises of Jamun (*Syzigium cumini*), Amba (*Mangifera indica*), Hirda (*Terminalia chebula*), Anjani (*Memecylon edule*), Surangi (Acrocarpus longifolius). Scattered trees of Phanashi (Carallia brachiata), Hesur (Callicarpa lanata), and Bibi (*Holigarna arnottiana*) are found in the top storey. The lower storey consist of Shendri (*Mallotus philipinensis),* Wild nimbu (*Glycosmis pentaphylla*), White kunti (*Murraya exotica),* Karvi (*Strobilanthus callosus*), Ferns (*Pteris aquirina*). Pisa (*Actinodaphne hookeri*) is found abundantly around Vishalgad Jahagir with occurrence of cane and Chiva bamboo (*Oxytenanthera monostigma*).

2) At around 500 to 800 metres elevation from msl and between 5 to 10 km strips from western ghat, the vegetation comprises mainly of Anjani (*Memecylon edule*), Jamun (*Syzigium cuminii*), Phanshi (*Carallia brachiata*), Amba (*Mangifera indica*), Shendri (*Mallotus philipinensis*), Pangara (*Erythrina indica*), Kumbhi (*Careya arborea*) etc.

3) Along slopes on lower altitudes and on the boundary of deciduous forest in the western strip of about 10 to 15 km. width the species occur are Asana (*Bridellia retusa*), Kinjal (*Terminalia paniculata*), Nana (*Lagerstroemia lanceolata*), Hirda (*Terminalia chebula*), Kokam (*Garcinia indica*) Bakul (*Mimosups elengi*), Tamal patra, (*Cinnamomum tamala*) Shisham (*Dalbergia latifolia*), Kumbhi (*Careya arborea*), Karvi (*Strobilanthus callosus*), Karvand, (*Carissa carandus*) Rametha (*Lasiosyphon eriocephalus*) Hasoli (*Grewia umbellifera*), Tupa (*Canthium*

umbellatum), Chikani (*Bridellia stipularis*) etc. and climbers found in these areas are such as Ghotwel (*Smilax microphylla*) Shikekai, (*Acacia concinna*) Wagati (*Wagetea spicata*), Chilati (*Acacia pennata*) etc.

II. $_3B/C_2$ - Southern moist mixed deciduous forests

This type of forest is found at a distance of 15 to 30 km. parallel to western ghat in form of North south strip. Here rainfall is around 1250 to 2500 mm. The climate is humid and the area experience high moisture level upto winter season but the summer season is dry. Many species become leaf less between March and June. Representative places are Durgwadi, Aarul, Palsambe, Malkapur, Ambarde, Sonurle, Pat Panhala, Pohalwadi, Taliye, Lakhamapur, Borbet, Saitawade, Phejiwade, Shelap, Pharale, Waki, Bambavade, Dubalewadi, Manope, Patgaon, Phaye, Donwade, Antiwade, Kitwade, Suleran, Harpawade, Bhogoli, and Pilani. A fair amount of Teak (Tectona grandis) is found in this belt in Ajara and Gargoti Ranges. The Teak plantations raised in Radhanagari, Gaganbavada and Malkapur Ranges are found to be reasonably good.

Floristic composition

Top canopy: Teak (Tectona grandis), Ain (Terminalia tomentosa), Kinjal (Terminalia paniculata), Hirda (Terminalia chebula), Bibla (Pterocarpus marsupium), Nana (Lagerstroemia lanceolata), Beheda (Terminalia belerica). Few scattered trees of Jamun (Syzigium cumini), Amba (Mangifera indica), and Umbar (Ficus glomerata) are also seen**.**

Second storey : Biba (*Semicarpus anacardium*), Bahava (*Cassia fistula*), Asana (*Bridellia retusa*), Shendri (*Mallotus phillipenensis*), Kumbhi (*Careya arborea*) and planted cashew (*Anacardium occidentale*) Bushy undergrowth comprises of Ghaneri (*Lantana camara*), Rametha (*Lasiosyphon eriocephalus*), Karvand (*Carissa carandus*), Murud-sheng (*Helicteris isora*), Wavding (*Embelia ribes*) Dikemali (*Gardenia lucida*), Chikani (*Bridellia stipularis*) and climbers like Chilati (*Acacia pennata*), Wagheri (*Wageta spicata*) , Palasvel (*Butea superba*) , Khaj khujali (*Mucuna monocarpa*) Petgul (*Dalbergia sympathetica*) occur.

III. *$_5A/C_3$ – Southern dry mixed deciduous forests*

Running parallel to the Western Ghats at a distance of 30 to 70 kms eastwards the rain fall received is between 1250 to 350 mm. The hilly nature of the terrain seen in the Western side also reduces as we go eastwards. The forest areas here are scattered and the vegetation is representative of the dry deciduous forests. This type occupies about 2/3rd area of the division.

Floristic composition

Teak (*Tectona grandis*), Ain (*Terminalia tomentosa*), Dhawada (*Anogeissus latifolia*), Bondara (*Lagerstroemia parviflora*), Payar (*Ficus spp.*), Moha (*Madhuca latifolia*), Awala (*Emblica officinalis*), Sawar (*Bombax ceiba*), Bahava (*Cassia fistula*), Shiras (*Albizzia lebbeck*), Shisham (*Dalbergia latifolia*), Chandan (rare) (*Santalum album*) Bushy undergrowth comprises

of Dhayati (*Woodfordia fruticosa*), Gela (*Randia dumatoram*), Henkal (*Gymnosporea montana*), Ghaneri (*Lantana camara*), Ghat Bor (*Zizyphus xylopyra*), Karvand (*Carissa carandus*) etc.

IV. *$_6A/C_1$- Southern tropical thorn forest and its degraded types*

In the eastern most part of the district at a distance of 50 to 60 km. from western ghat with rainfall of about 500 to 700 mm. thorny, bushy, dry forests are seen. Following species are found in North south strip. However in the farthest eastern portion of district rainfall is below 500 mm. and that too is highly irregular, the entire area is draught prone.

Floristic composition

Ghat Bor (*Zizyphus xylopyra*), Bor (*Zizyphus jujuba*), Gela (*Randia dumatorum*), Khair (*Acacia catechu*), Hivar (*Acacia leucophloea*), Apta (*Bauhinia racemosa*), Prosopis (*Prosopis juliflora*) .

The following type of grasses are found in Kolhapur forest division

a) Area with heavy rainfall and humid climate - Lavala (*Rottboollia perforata*), Boru (*Andropogon halepense*), Vala (*Andropogon muricatus*), Bhongrut (*Themeda quadrivalvis ciliata*), Kunda (*Ischoemum pilosum*), Dongari gavat (*Crysopogon montana*), Rosha grass (*Cymbopogon martinii).*
b) Area with medium rainfall and dry climate - Bhuri (*Aristida paniculata*), Bhalekusal (*Andropogon tricticeus*), Gondval (*Andropogon pumilis*), Ghanya-marvel (Andropogon *pertusus*), Marvel (*Andropogon annulatus*), Pawnya (*Ischaemum sulcatum*), Sheda (*Ischaemum laxum*), Bhongrut (*Anthistiria ciliata*) and Dongari grass (*Andropogon monticola*).
c) Area with low rainfall and dry climate (DPAP) – Kusali (*Heteropogon contortus*), (*Aristida redecta*), (Aristida *funiculata*), (*Setaria intermedia*), Sheda (*Sehima nervosum*). On the banks of nallas, Munj (*Saccharum munja*).

A detailed list of floral species is given on pages ix to xxii

Devrais or Sacred Groves are small patches of forests, protected and preserved in their natural form in reverence to local deities by villagers. Many of these are part of notified forest areas. Since these Devrais are worshipped by villagers they are not exploited and in fact even grazing is prohibited. It is a common belief that interference in Devrais results in inviting wrath of the deities resulting in calamities like drought, floods, storms, epidemics. These Sacred Groves are excellent repositories of bio diversity and can be used for creating awareness among people regarding importance of forests. Many of these devrais are owned by the Gram Panchayats, Devasthan samitis. As many as 68 Devrais covering 346.74 hectare have been recorded in Kolhapur district. A list of devrais is given in **Appendix 2.1** of Volume II.

SECTION 3: STATUS OF NATURAL REGENERATION

Natural regeneration

Young recruits of Ain, Kinjal, Anjani, Jamun, Pisa, Katak, Kumbhi, Chandada, Umbar etc. appear profusely after first few showers of the season. The status of NR in general can be treated as satisfactory except for the forest patches adjoining villages that are prone to fires and unregulated grazing. A statement showing status of NR is given in **Appendix 2.2** of Volume II.

SECTION 4: INJURIES TO WHICH THE CROP IS LIABLE

I. *Atmospheric factors*_: The overall atmospheric factors in Kolhapur district are conducive to support good vegetation. However extremities of the following nature affect the vegetation to a limited extent.

- *Rains* - Heavy Rains limited rainy days and fog have affected the growth and regeneration in semi evergreen forests of the Western Ghats. The trees though belonging to the semi-evergreen type are dwarf and have stunted growth. The heavy rains also have affected the growth of the naturally regenerated seedlings.
- *Drought* – Irregular and scanty rainfall dry spell from March to June occurs in the Eastern most part of the Division which receives less than 500 mm. rainfall. Lift irrigation has solved the problem in respect of the agricultural crops. The role of Social Forestry Department assumes critical importance as most of the areas are privately owned and Bund planting and village wood lots can be encouraged.
- *Wind* - On the ridge top, during June to September strong winds damage the trees by crown breaking and also uprootal of the shallow rooted trees.
- *Soil erosion* - Along the ridge top in a strip of upto 15 km. width running parallel to the Western Ghats, the, open areas experience repeated soil erosion due to heavy rains leading to Laterisation. Such open hard lateritic rock patches are evident at many places. This is not conducive to tree growth. It is therefore very important to protect the soil from erosion by maintaining the existing tree cover.

II. *Epiphytes, parasites, climbers and weeds etc:* Damage due to epiphytes, fungi and parasites is negligible and restricted to high rainfall areas which remain covered under fog during the rains. In fact since most of these areas are purely meant for protection, the various epiphytes, fungi etc. add to the biodiversity and have important ecological functions. Lianas and other climbers seen are Garambi (*Entada scandens*), Palasvel (*Butea superba*), Tupvel (*Derris*

scandens), Lalvel (*Ventilago* spp.) Ghotvel (*Clematis* spp.), Mehus (*Bauhinia vahlii*), Chilati (*Acacia pennata*), Toran (*Zizyphum rugosa*), Ukshi (*Calycopteris floribunda*), Wagheti (*Wagetea spicata*). These climbers affect the important timber tree species in plantations and can affect their form and yield. Weeds commonly seen are Karvi (*Strobilanthus callosus*), Rametha (*Lasiosyphon eriocephalus*) and Ghaneri (*Lantana camara*). In the recent past however the spread of Ranmodi (Eupatorium spp.) is alarming in Ajara and Chandgad Ranges. Another weed known as Bakra (*Strobilanthus sessilis*) is also spreading alarmingly in open areas of Chandgad and Ajara Ranges and part of Malkapur Range.

III. *Fire :* Incidences of fire in Semi-evergreen forests are rare except in areas with Karvi and Bakra. In the Central and Eastern part having dry grass lands or bushy vegetation, fire incidences are common. Main reason for fire is Rab burning in the agriculture land and for inducing fresh flush of grass. It has a damaging effect on the soil and affects growth of naturally regenerated seedlings. Burning of leaf litter also makes the soil prone to erosion in the incoming rains.

IV. *Human agency :* Biotic interference is causing major injuries to the crop. Different causes are given below.

a) Kumri cultivation is practiced in a few villages of Chandgad range b) Seasonal cultivation on Eksali plots c) Encroachments: New encroachments can be ascertained only after proper survey and demarcation, as the status of the forest demarcation is not very clear d) Cutting for fire-wood e) Illicit felling for small timber f) Branch cutting for rab g) Clearing the ground by burning for poaching h) Removal of humus for agriculture i) Moss collection (potential threat).

V. *Cattle Grazing:* Although the Grazing settlement Report for Kolhapur district has been prepared, its proper implementation needs to be done. The eastern part of the district faces fodder shortage. The grazing settlement report has banned goat grazing on forest lands however this is on the increase considering the rise in goat population. The population of cattle in the district is also on the increase. Statements showing number of cattle grazed and revenue realised as well as extent of damage due to fire, grazing and other offences is given in **Appendices 2.3 and 2.4** respectively of Volume II.

THE FOREST FAUNA

Kolhapur forest division is rich in forest fauna. There are as many as 47 species of mammals, 264 species of avifauna, 59 species of reptiles and 66 species of butterflies have been reported in the district. 7 species of mammals of endangered status namely Leopard, Sloth bear, Gaur, Mouse deer and Pangolin and two endangered species of reptiles namely Indian python and Indian Monitor lizard are also been found in the district. The commonly occurring fauna in this district are as follows

a. *Mammals*

Tiger (Panthera tigris), Panther (Panthera pardus), Jungle cat (Felis chaus), Hyena (Hyaena hyaena), Jackal (Canis aureus), Indian grey mongoose (Herpestes edwardsi), Ruddy mongoose

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(Herpestes smithis (grey), Common fox (Vulpes bengalensis), Indian wild dog (Cuon alpinus), *Sambar (Cwrvus unicoolor), Barking deer (Muntiecus mutjak), Gaur (Bos gaurus), Wild boar (Sus scrofa), Sloth bear (Melursus ursinus), Common langur (Presbytis entellus), Bonnet macaque (Macaca radiata), Indian pangolin (Manis crossicaudata), Indian crested porcupine (Hystrix indica), Five striped palm squirrel (Funambulus pennanti), Jungle palm squirrel (Funambulus tristriatus), Three striped palm squirrel (Funambulus palmarum), Giant squirrel (Ratufa indica), Small Indian civet (Viverricula indica), Common palm civet (Paradoxurus hermaphroditus), Indian flying fox (Pteropus giganteus), Short nosed fruit bat (Cyonopterus sphinx), Flvous fruit bat (Rousettus leschenaulti), Madras shrew (Anathana ellioti), Madras shrew (Anathana ellioti), House shrew (Suncus murinus), Indian long tailed mouse (Vandeleuria oleracea), Soft furred field rat (Millardia meltada), House rat (Rattus rattus), House mouse (Mus musculus), Little Indian field mouse (Mus booduga), Indian brown spiny mouse (Mus platythrix), Indian bush rat (Golunda ellioti), Indian hare (Lepus nigricollis).*

b. *Birds*

Jungle bush quail (*Prodigal asiatica*), Gray partridge (*Francolinus pondicerianus*), Gray quail (*Coturnix coturnix*), Rain quail (*Coturnix coromandelica*), Painted partridge (*Francolinus pictus*), White breasted kingfisher (*Halcyon smyrnensis*), Golden oriole (*Oriolus oriolus*), Babbler (*Chrysomma sinense*), Green imperial pigeon (*Dacula aenea*), Imperial pigeon (*Dacula badia*), Yellow legged green pigeon (*Treron phoenicoptera*), Blue rock pigeon (*Columba livia*), Green bee eater (*Merops orientalis*), Indian robin (*Saxicoloides fulicata*), Tree pipit (*Anthus trivialis*), Purple sunbird (*Nectarinia asiatica*), Little grabe (*Podiceps ruficollis*), Cormorant (*Phalacrocorax carbo*), Indian shag (*Phalacrocorax fuscicollis*), Little cormorant (*Phalacrororax niger*), Paddy bird (*Ardeola grayii*), Cattle egret (*Bubulcus ibis*), Ardea alba (*Large egret*), Smaller egret (*Egretta intermedia*), Little egret (*Egretta garzetta*), Night heron (*Nycticorax nycticorax*), Little bittern (*Ixobrychus minutus*), Black winged kite (*Elanus caeruleus*), Honey buzzard (*Pernis ptilorhyncus*), Brahminy kite (*Haliastur indus*).

c. *Reptiles*

Python (*Python molurus*), Banded krait (*Bungarus fasciatus*), Common Indian krait (*Bungarus caeruleus*), Indian cobra (*Naja naja*), Russell's viper (*Vipera russelli*), Bamboo pit viper (*Trimeresurus gramineus*), Rat snake (*Ptyas mucosus*), Mugger Crocodylus palustris.

In addition 66 species of butterflies are also found in the forest areas of Kolhapur division. The detailed list of the fauna is given in this Volume.

SECTION 5: INJURIES TO WILDLIFE

The major reasons for depletion of wild animal populations are as follows:

i. Poaching of wild animals for meat and other non consumptive uses.
ii. Habitat destruction / shrinkage.
iii. Diversion of forest land for various projects.
iv. Mining disturbances.

v. Easy access to forest areas because of extensive road network.
vi. Hand over of shikar traditions.
vii. Loss of contiguity of forest areas.
viii. Inadequate and ill-equipped field staff for protection.
ix. Lack of awareness amongst people regarding importance of wildlife conservation.
x. Forest fires.
xi. Availability of guns with farmers for crop protection.

The animals like Barking deer, Hare, Wild boar, Sambar, Jungle fowl, Peafowl, Quails and Partridges have been known to be hunted. Usually electric wires, guns and locally made hand bombs are used for poaching. Dogs are trained and used to chase and hunt the prey at places.

CHAPTER – 3

UTILISATION OF THE FOREST PRODUCE

SECTION 1: AGRICULTURAL CUSTOMS AND WANTS OF THE POPULATION

The people of Kolhapur are known to be industrious, progressive and prosperous. The district is having one of the highest per capita income in the state. The population of Kolhapur district is 35.15 lakhs as per 2001 census out of which 70% live in the rural areas. The 1997 live stock census estimated 12.82 lakh domestic cattle in the district.

Agriculture is the main occupation of the people. Out of total population 39 % constitutes the working population and 46 % of this working population is farmers. Only 4% people have land holdings above 4 hectares while majority 67% have holdings less than 1hectare.

The district has a net work of irrigation projects which includes 4 major, 12 medium and 140 minor irrigation projects. As per the statistics during the year 1988-89, agricultural area covered under irrigation was 1,35,374 hectares out of which 78 % of the irrigated area was covered under sugar cane while nearly 12% area was covered under cereal crops. It indicates that irrigation potential of the district is being primarily utilized in raising sugar cane crop.

Terraced field

The terrain being undulating, fields are terraced before cultivation. The important agricultural crops of Kolhapur districts are Rice, Jowar, Nachni, Wheat, Sugarcane, Ground nut and Soybean covering 20%, 5%, 5%, 1%, 19%, 11% and 11% of cultivable area respectively. Rice is chiefly grown in Chandgad, Shahuwadi, Bhudargad, Radhanagri, Panhala and Karvir talukas. Nachni is grown mainly in the western side i.e. Chandgad, Ajara, Shahuwadi and Bhudargad while Jowar is mainly grown in the eastern side i.e. Hatkanangle, Gadhinglaj, Kagal, Karvir and Shirol. Sugar cane is grown wherever the source of irrigation is available.

Sunflower crop as source of oil seeds

The Paddy and Sugarcane are the main crop in terms of total production. In the year 2002-03 high yielding varieties of Rice and Wheat are cultivated on a large area of nearly 1 lakh hectare, hybrid crop varieties are grown over 0.22 lakh hectares.

The district grows and gets a good harvest of all vegetables viz. Tomato, Onion, Potato, Cauli flower, Brinjal and leafy vegetables etc. In addition, oil seeds are taken from Soya bin, Groundnut, Sunflower, Til and Kardi etc for the production of the oil. The horticulture somehow could not develop much in the district since major share of irrigated cultivable lands are under sugarcane cultivation which is the major cash crop in this area.

The Kolhapur district has four major market places for storage and marketing of agricultural produce. These market places are famous for certain agricultural produce viz. Gadhinglaj for chillies, Kolhapur for Jaggery, Jaisinghpur and Vadgaon for Jowar, Soybean and Groundnut. Jaisinghpur is also a major market for the sale and purchase of tobacco which is mainly produced in nearby areas of Nipani taluka in Karnataka state and bidi manufacturing.

SECTION 2: MARKETS AND MARKETABLE FOREST PRODUCE

Major forest produce

1. *Timber*: The main timber yielding species of the district are Kinjal, Nana, Ain, Bija, Dhaman, Jamun and Mango. Since the timber of these species is not very good it is mostly used by locals to fulfill their small timber requirements. The timber supply is inadequate in the district. The requirements of important timber species like Teak, Ain, Haldu and Shisham are met mainly from the adjoining district of Belgaum in Karnataka State and from Konkan and Vidarbha Regions of Maharashtra. Annual revenue received from sale of timber is given below:

Table 4

Annual Revenue from Sale of Timber

Sr.No.	Year	Qty (cum)	Revenue
1.	2004-05	106.44	3,07,571.00
2.	2005-06	102.06	1,90,000.00
3.	2006-07	221.58	4,87,263.00

A statement showing market rates of Teak and other important miscellaneous species is given in

Appendix 3.1 of Volume II.

2. *Firewood*: The main species yielding firewood are Kinjal, Ain, Nana, Anjani, Dhoma, Phanashi and Gela. In villages near forests people collect firewood by lopping trees and from dead and fallen wood in the forests. Sale of exploited fire wood does not have any demand in the villages but there is a good demand in the urban and semi urban areas like Kolhapur, Jaisinghpur,

Gadhinglaj, Kagal etc. Firewood supply in the district is inadequate and it has to be brought from Belgaum and Konkan Regions. Karvi, Lantana, agricultural waste, crushed sugarcane is also used as fuel. The demand for fuel wood can be met by plantations on the extensive private lands by the owners or by the Social Forestry Department.

Table 5

Annual Revenue from Sale of Fire wood

Sr. No.	Year	Qty (cum)	Revenue
1.	2004-05	743.45	1,18,953.00
2.	2005-06	2457.67	6,28,493.00
3.	2006-07	4238.24	13,30,807.00

A statement showing annual outturn of timber and firewood and revenue realised is given in **Appendix 3.2** of Volume II.

3. *Sandalwood*: The Sandalwood tree was reserved in the past by the sansthan and felling without permission was banned. Ajara and Chandgad areas had good patches of Sandalwood. In the period between 1935 –1951 an annual yield of 10-12 tonnes was obtained by exploiting about 600 trees. However since then the number of Sandalwood trees has reduced drastically as efforts for their regeneration were inadequate.

Non Timber Forest Produce (NTFP)

1. *Bamboo* : Although the yield of bamboo from the forest is negligible it can be seen that bamboo has a good demand from the fact that it is being grown privately on any spare land available and exploited for sale in the semi-urban, urban areas of the district. It was exploited on permit basis in the past but this has since been stopped to prevent overexploitation of clumps. The Chiva bamboo has a good demand and growing conditions in the forests are favourable. Bamboo is used in making baskets, mats, as props to vegetable plants like tomato and in fencing. The revenue earned from Bamboo sale was Rs. 60,435.00 and Rs.54,000.00 in the years 2005-06 and 06-07 respectively.

2. *Grass and Grazing*: Grazing permits are issued for grazing cattle in the forest areas. Grazing pressure is quite high in areas around Kolhapur. Grass is sold through auctions and the revenue obtained from such auctions for the year 2005-06 was Rs. 1,55,522.00 and the outturn was 2,303.30 MT while for the year 2006-07 was Rs. 78,088.00 and outturn was 1,149.81 MT.

3. *Hirda*: There is a tannin factory at Amba village in Malkapur range which uses Hirda fruits for tanning of leather. The revenue from Hirda for 2006-07 was Rs.73, 533 and the outturn was 25.73 MT. Kolhapur is famous for the Kolhapuri chappals and there is a great demand for Hirda from the local manufactures of these chappals for tanning.

4. *Other NTFP*: The other NTFP obtained and sold in this division are as follows.

Table 6

Revenue obtained from auction of important NTFP in 2006-07

Sr. No.		Quantity(MT)	Revenue in 2006-07
1.		41.71	4,69,250.00
2.	Kaju	06.14	1,92,599.00
3.	Hirda	25.73	73,533.00
4.	Shikekai	58.33	55,555.00
5.	Gardaal seeds	06.50	13,000.00
6.	Honey	----	7,500.00
7.	Amsul	02.10	7,000.00
8.	Kadi patta	----	6,815.00
9.	Karanj	10.38	6,000.00
10.	Trifal	----	1,200.00
11.	Gum	----	700.00
12.		----	600.00

All these are sold in auctions considering a Range as one unit. Since there is no cost involved in collection, the above revenue is actually in the form of royalty. Many other non wood forest produce are collected from the forests of Kolhapur division but it has not been possible to bring these on record. The methods of harvesting of these NTFP including many medicinal plants are destructive in nature and pose a threat for future sustained yields. Rare and endemic plants need to be strictly protected from exploitation and efforts are required to build up their population. A statement showing outturn of NTFP is given in **Appendix 3.3** of Volume II.

SECTION 3: DEMAND AND SUPPLY OF FOREST PRODUCE AND PRESSURE ON FORESTS

The major thrust in the Western ghat forests is on the conservation. The miscellaneous forests of Kolhapur district otherwise also have few timber species of commercial importance. Percentage of Teak trees in the forests is very less. Species like Ain, Kinjal, Nana, Katak etc are used locally for use as small timber in the house-hold constructions. The supply of timber and bamboo locally from the forests is much less than the demand and is met with by the supply made from the other surplus areas.

The farmers produce a large share of the total fodder requirement themselves. The green foliage of Sugarcane i.e. *Usa- cha- pala, Kadba* i.e. the dried remnants of Jowar and bajari and Bhata-cha-pinjar i.e. dried remnants of Paddy crop are the main sources of fodder for the cattle in the district. In addition the farmers grow fodders like *Kadval*, *Makka* etc. in the fields to fulfill their needs. The eastern part of the district faces some shortage of fodder during the dry season. Few cases of illicit felling of trees for use as small timber and illegal grazing are reported at places in the forests though the pressure on the forests due to these two threats is not very serious.

SECTION 4: METHODS OF HARVESTING AND THEIR COSTS

Harvesting of timber and firewood: The exploitation of timber and fuel wood was done by auctioning coupes with standing trees to contractors after marking them till the year 1979-80. According to the Government resolution no. FCP – 1581 / 93544 / F-1, dt. 4-5-81 this method has been stopped. In this division, 11 Forest Labour Cooperative Societies were established and they were also allotted coupes for exploitation in the past. However presently there is no FLCS. The present exploitation which is very less is being done by employing labourers by the department. The rates for various items of expenditure involved in exploitation and other forestry operation are fixed every year before the commencement of the working season by the circle level wage board committee presided over by the Conservator of forests, Kolhapur circle.

Harvesting of Non Timber Forest Produce: The harvesting of NTFP is done through contractors or cooperative societies by considering a Range as a unit by annual auctions. The collection year is taken as 1st July to 30th June. The various NTFP which are collected in Kolhapur division are Tamalpatra, Gum, Karanj seeds, Biba seeds, Bahava pods, Gardal seeds, Trifal, Wavding, Adulsa, Tulsi leaves, Takala pods, Amsul, Watsol, Bee wax etc.

Harvesting of bamboo: In the past, removal of bamboo on the basis of permits issued to applicants was in vogue. However this system has been presently discontinued fearing over exploitation of clumps. Now a days only departmental harvesting is allowed.

Harvesting of Grass: Grass reserves are sold in open auction. Grass removal is allowed on cutting basis only. The priority for allowing grass removal is decided as follow

1. Gram Panchayat
2. Milk Cooperative Society / Other Societies
3. Forest labour Cooperative Society
4. Open auction.

SECTION 5: LINES OF EXPORT

The Kolhapur division forests are well connected by a network of roads. The railway line from Mumbai – Pune terminates at Kolhapur via Miraj. However it is the road network which is important as far as transport of forest produce is concerned.

The Mumbai-Pune-Kolhapur-Bangalore National Highway No. 4 runs along the eastern part of the District connecting the adjoining district headquarters viz. Satara to the North and Belgaum to the South.

The other major roads connecting important towns/ cities are as follows.

1. Kolhapur- Ratnagiri via Malkapur and Amba ghat
2. Kolhapur- Ratnagiri via Anuskura ghat
3. Kolhapur- Kankavli – Sawantwadi via Karul ghat near Gaganbavada
4. Kolhapur -Sawantwadi via Radhanagari-Dajipur- Phonda

5. Kolhapur- Sawantwadi via Gargoti, Ajara, Amboli ghat
6. Kolhapur- Sangli via Hathkanangale
7. Hathkanangale- Amba via Wadgaon and Malkapur
8. Gargoti- Gadhinglaj- Nipani
9. Ajara- Gadhinglaj- Nipani
10. Gadhinglaj- Chandgad- Dodamarg- Panaji
11. Belgaum- Vengurla via Chandgad- Amboli

Some roads get cut off for a short period during the rainy season but the overall position of roads in the district is good and hence this does pose a challenge for checking transport of forest produce. There are a few roads inside remote forest areas which are maintained by the forest department depending on the availability of funds

SECTION 6 : PAST AND CURRENT PRICES

The prices of all the forest produce have changed drastically in the last few years. The amount of timber and other major forest produce harvested is not very high as regular coupe working has not been done in the past few years. Infact most of the timber and fuel wood requirements is met from other areas.

The revenue of the division in the past few years is as follows:

2004-05	82,94,154.00
2005-06	1,05,15,400.00
2006-07	79, 79,567.00

CHAPTER – 4

SOCIO ECONOMIC SURVEY

SECTION 1: SOCIO ECONOMIC SURVEY

As per socio-economic survey report of 2002-03, the land use pattern of the district as in1998-99 estimates 18% of the geographical area under forests, 10% area is not available for cultivation, 15% is kept fallow while only 57% area is under cultivation.

Table 7

Land use pattern

Sr.No.	Land use pattern	Area in 1000 ha.	Percentage
1.	Total geographic area	775	
	Area under forest	140	18%
3.	Area not available for cultivation		10%
	a) Area under non agricultural use	35	
	b) Barren and not suitable for agricultural	42	
4.	Area not sown		15%
	c) Permanent pasture and grazing land	31	
	d) Area covered under crop	4	
	e) Fallow land	40	
	f) Cultivable work	41	
5.	Sown	442	56%

Agriculture is the main occupation of the people. Out of total population 39 % constitutes the working population and 46 % of this working population is farmers. 17 % are farm laborers and 37 % are engaged in the employment. 2.09 lakh people (7 % of total population) are marginal laborers. Although agriculture is the predominant occupation in the district, only 4% people have land holdings above 4 hectares, 10% have between 2-4 hectares,19% have between 1-2 hectares while majority 67% have holdings less than 1hectare. The important agricultural crops of Kolhapur districts are Rice, Jowar, Nachni, Wheat, Sugarcane, Ground nut and Soybean. . The Paddy and Sugarcane are the main crops in terms of total production.

The population of Kolhapur district is 35.15 lakhs as per 2001 census out of which 70% live in the rural areas and 30% in urban areas. As per 1991 census around 13 % population of the district belongs to scheduled castes whereas percentage of scheduled tribes is less than 1 %. The population density of the district is 454 per sq. km. which is more than the state average of 314 per sq. km. Karvir taluka has the highest population density of 1340 per sq. km. while Gaganbavda taluka has the lowest density of 116 per sq. km. The district has sex ratio of 949 which is more than the state average of 922.

The average literacy rate of the district is 77% comprising 86 percent for men and 63 percent for women. The literacy rate in the rural and urban areas is around 73 % and 86 % respectively.

The 1997 live stock census estimated 12.82 lakh domestic cattle in the district, density being 165 per sq. km. Buffaloes consists 51% of cattle population followed by cow/ox as 20%, while sheep and goat consists 14% each. There is 13% increase in live stock population of the 1991 live stock census. These cattle graze both in forest areas as well as in gairan land. Majority of sheep and goats are confined to eastern portions of the district which are comparatively drier areas. Out of 12 talukas, climate of 5 talukas viz. Hatkanangle, Shirol, Karvir, Kagal and Gadhinglaj is dry and average rain fall varies between 500 mm to 1000 mm. The area of these talukas constitutes 36% of the district area but contains 54% of cattle causing heavy biotic pressure in the forest area of these talukas. A statement showing Cattle population is given in **Appendix 4.1**of Volume II.

The people of Kolhapur are industrious, progressive and prosperous. Kolhapur is amongst the pioneering districts known for successful establishment of cooperative societies in the field of marketing of agricultural produce, milk, sugar, local financial institutes etc. In all there are 10,518 registered cooperative societies in the district. Being a leading producer of Sugarcane, the district has 17 cooperative sugar factories, three each in Karvir, Kagal, Hatkanangle and two in Panhala taluka which produced 11.88 lakh metric ton of sugar during the year 2002-03. Similarly the district is a leading producer of milk. There are 3,176 milk cooperatives in the district attached to three major federations viz. Gokul, Varna and Mayur which produced 3267 lakh litre milk during the year 2002-03, collecting and marketing nearly 9 lakh litres of milk every day.

The district is having one of the highest per capita income in the state. Kolhapur is best known nationally as well as internationally for its leather footwear, the Kolhapuri chappals. Kolhapur is also well known for its spicy non-vegetarian cuisine of mutton, chicken, *pandra rassa* and *tambda rassa*. Kolhapuri *missal paav* is a mouth watering, hot and spicy vegetarian dish very popular in all parts of Maharashtra. Kolhapur gets a bumper harvest of mirchis or chillies which are known to be very hot. Milk production is very high in Kolhapur and fresh milk can be procured directly from the buffaloes or cows at *doodh kattas*. In the olden times, milkmen would take their buffaloes, cows from house to house and milk them there at the door step to give fresh milk to the customer. In certain areas of the city, this tradition is still being maintained. Kolhapuri *Gurh* or the jaggery is also very famous, Kolhapur being the main district belonging to the sugar bowl of Maharashtra. Kolhapuri *pheta* is the traditional head gear and it is customary to honour and welcome the guests by offering them to wear *pheta*. Kolhapuri *saaj* is a kind of a gold necklace unique and famous for its design and pattern peculiar to this area.

Industrially also, Kolhapur city is well known for the manufacture of *oil engines, forging and casting units*, *agricultural implements* etc. and is also known for the contractors dealing in heavy earth moving equipment. Ichalkaranji town is a leading centre for the manufacture of *textiles* while Hupri town is a well known centre for the manufacture of *silver and gold ornaments*. Industrial areas have been developed at Shiroli, Udhamnagar in Kolhapur city, Ichalkaranji,

Jaisinghpur and Hupri in the district. In all, there are 1423 factories registered in the district which give employment to nearly 37,000 labour.

The Chhatrapati Shahu Maharaj of Kolhapur had great love for wrestling and football and so patronized them well. Many *talim mandals* for training of the budding wrestlers as well as many football clubs were established in Kolhapur during that period. The popular sports in Kolhapur are wrestling, football, shooting and swimming etc. and many players have reached national as well as international levels.

Kolhapur is known to be a great centre of art and culture since olden times. It was a known centre of Hindi and Marathi film making and had two film studios viz. Jai Prabha and Shalini, which still exist but are now, not functioning. Eminent personalities like Bhalaji Pendharkar (Cinema), V. Shantaram (Cinema), Master Vinayak (Cinema), Baburao Painter (Cinematographer), Keshavrao Bhosale (Music), Tatya sahib Kore (Varna Cooperative movement), Dr. D. Y. Patil (Educationist), Dr. Jayant Narlikar (Astro-physicist), Dr. Vasant Gowarikar (Astro-physicist), Abha Lal Rehman (Painter), G. Kamble (Painter) and Ashutosh Gowarikar (Cinema) etc. belong to Kolhapur. The famous Mangeshkar sisters stayed here for few years during their formative years before migrating to Sangli and then to Mumbai.

Kolhapur, which is one of the few towns of its size to sport a Mercedes Benz showroom, has been on the Benz "watchlist" since pre-independence days.This is because the then ruler of Kolhapur, Chhatrapati Shahu Maharaj, was one of the early owners of a Maybach along with Ethiopian, Greek and Dutch royalties.While that vintage Maybach continues to roll out every year during the annual Dussehra procession, the aspiration to own a Merc by the wealthy in this south Maharashtra town can perhaps be related to the royal family's love for its Maybach. Kolhapur is known to have the highest number of Mercedes after Mumbai, in Maharashtra.

SECTION 2 : HARVESTING AND MARKETING OF FOREST PRODUCE BY FDCM

The Forest Development Corporation of Maharashtra (FDCM) was established in 1974 to convert low quality forests into high quality forests. A sub divisional office of the FDCM, under an Assistant manager was established at Gadhinglaj taluka in 1987-88 and was entrusted to take up afforestation works on the denuded and under stocked hill ranges of Kolhapur forest division. The funding source was Employment Guarantee Scheme at district level. Initially, 5,752 hectare area of Ajra, Gargoti and Chandgad forest ranges was made available in Bhudargad, Ajra, Gadhinglaj and Chandgad talukas of Kolhapur district. Thereafter, additional 3,034 hectare area was made available to the FDCM. The FDCM planted nearly 15 lakh seedlings on 8,786 hectare degraded area in twelve years since its inception in 1988 till 2000. The species planted were Eucalyptus, Australian babul, Karanj, Neem, Jambhul, Amba, Kaju, Aonla etc. Nearly 32 lakh mandays were generated. The unit was however closed in March 2001 as no other land was made available to the FDCM for afforestation by the department. The forest areas along with the plantations raised during this period were handed over back to the Kolhapur forest division. The FDCM therefore does not have any role in harvesting and marketing of forest produce in Kolhapur district.

The dependence of local people on the forests for fuel and fodder is more in the western part of the district where human habitations are near forests. This has been explained in Section 3 of chapter on ‘Utilization of forest produce’.

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CHAPTER – 5

FIVE YEAR PLANS

Forest Resources

India is one of the 12 mega diversity countries, commanding 7% of the world's biodiversity and supporting 16% of the major forest types, varying from tropical rainforest in the north-east, to desert and thorn forests in Gujarat and Rajasthan; mangrove forest in West Bengal, Orissa, Maharashtra and other coastal areas; and dry alpine forests in the western Himalaya. The most common forest types are tropical moist deciduous forests, tropical dry deciduous forests, and wet tropical evergreen forests. India has 45,000 identified plant species, including 15,000 flowering plants [5154- endemic] and 81,000 species of fauna. Though India has only 2.5% of the land and less than 2% of the world's forest area but it support more than 7% of its variety of flora and fauna.

But nearly half of the country's area is degraded, affected by the problems of soil degradation and erosion. According to the Government statistics, nearly 22%, or 65 million ha, of the country's land have been recorded as forests, but only 19.5% have forest or tree cover, which is much less than the goal of 33% set by the National Forest Policy, 1988.

The rising population has forced the rural poor to deplete the natural resources. It was reported that the population reached one billion people in 2000, comprising about 16% of the world's population. The problem is further compounded by the high cattle population, estimated to be 450 million, about 18% of the cattle population in the world. Most of these animals have a very low productivity but graze freely in forest areas, causing the degradation of forests. This has led to severe erosion, loss of soil, and floods in the lower plains, in addition to the destruction caused by shifting cultivation. As a result, the demographic and economic landscape of the country is plagued with poverty and underemployment. Agricultural productivity is only 1 ton per ha against the actual capability of 4 ton per ha. How to achieve the optimum land use, including soil and moisture conservation measures, are the main challenges confronting the policy and decision-makers.

Mobilization of Funds in the Past

Since the commencement of the First Five Year Plan (FYP) in 1951, a total Rs 85 billion have been spent by the end of the Eighth FYP in 1996-97, on forestry development planning activities. During this period, afforestation of about 26.9 million ha has been carried out. Financial allocation to the forestry sector has increased from Rs 76 million in the First FYP to Rs 40 820 million in the Eighth FYP, but has always been less than 1% of the total plan outlay of the country. This is one of the main reasons for the continuous deterioration of forest resources

A provision of Rs 68 billion has been made for the Ninth Plan. During 1997-98, afforestation of 1.48 million ha was completed and thus, up to 1997-98, the total area afforested is 28.38 million

ha. The average annual plan outlay for the forestry sector during the Eighth FYP was about Rs 8.16 billion whereas the estimated annual value of harvests (recorded and unrecorded) from the forests was worth Rs 300 billion during the same period, which is about 36 times more than the planned investment. Budgetary allocation for forestry under the Five Years Plans is given in the following table.

Table 8

Budget allocation for forestry under the Five Year Plans, (million RS) (GOI)

Plan/Year	Thrust Areas	Total Plan		Forest and Wildlife Plan		Forest Outlay
		Outlay	Actual	Outlay	Actual	(%)
First Plan (1951-1956)	S&D, Rehabilitation of degraded forest	23 780	19 600	76	85	0.32
Second Plan (1956-1961)	As above	45 000	46 720	212	212	0.47
Third Plan (1961-1966)	Increasing Productivity, Fast growing spp. Pl. Modern logging	75 000	8 577	458	459	0.61
Annual Plan (1966-1969)	As above	66 250	66 225	419	421	0.63
Fourth Plan (1969-1974)	As above	159 020	157 790	894	938	0.56
Fifth Plan (1974-1979)	Social Forestry	393 220	394 260	2 088	2 088	0.53
Annual Plan (1979-1980)	Social Forestry	126 010	121 760	683	683	0.54
Sixth Plan (1980-1985)	Social Forestry Forest Cons.	975 000	1 092920	6 924	NA	0.71
Seventh Plan (1985-1990)	Forest Cons. Massive Aff. Wasteland Dev.	1 800 000	2 187 300	18 519	19759	1.09
Annual Plan (1990-1991)	As above	647 170	583 690	6 299	5 764	0.97
		35				

Annual Plan (1991-1992)	As above	723 170	647 500	7 831	7 153	1.08
Eighth Plan (1992-1997)	JFM, Ecotourism Biodiversity Conservation Wasteland utilisation	4 341 000	-	40 820	39 930	0.94
Ninth Plan (1997-2002)	As above	8592000	7058180	68 228		0.79
Tenth Plan (2002-2007)	Bio diversity Conservation	15923000				
Total up to 9th FYP		**17966620**		**153523**		**0.85**

Forest Policy and Planning

India has a long tradition of professional forestry and a nation wide concern for forest resources. Contemporary forestry legislation and policy date to at least 1864, at which time forests became almost exclusively State property under the then British rule. The first forest policy of 1894 was revised in 1952. The present guiding legislation dates back to the Indian Forest Act of 1927. The National Commission of Agriculture (NCA) studied the forestry planning in the country in 1976 and made recommendations for future action. This led to the emergence of Social Forestry and the establishment of Forest Development Corporations (FDCs). The new policy accords highest priority to the environmental role of forests and the derivation of direct economic benefit must be subordinated to this priority.

The main aim of establishing FDCs was to enable the Forest Department to retain earnings from the sale of products for investment in plantations. However, this policy had two undesirable effects, namely:

Given the realities of budgetary allocations, external aid for social forestry resulted in the earmarking of 70 to 80% of the funds for social forestry. As a result natural forests received little attention.

The establishment of high value plantations at the expense of natural forests resulted in the loss of biodiversity and non-wood forest products. As a result, there was opposition to the practice from the people, and the Government had to revise the plantation programme strategy.

The forest policy has been updated, most recently through the National Forest Policy (1988). Other supplementary legislation has been enacted to explicitly provide for control and regulations covering non-forest resources, wildlife protection and environmental protection,

together with other broad directives in substantive areas of national policy which have an impact on forestry, including land use. A Wildlife Action Plan was formulated in 1983, a National Conservation Strategy in 1992, followed by a National Environmental Action Plan in 1993.

As a result of the National Forest Policy, 1988, the mechanism of Joint Forest Management (JFM) was legalised in 1990. Its principal aim is to ensure environmental stability and maintenance of the ecological balance through the preservation and rehabilitation of forests, while providing for fuel wood, fodder, Non-Timber Forest Products (NTFPs), and small timber needs. The JFM has since been institutionalised by most of the States. The emphasis has been on the formation of Village Forest Committees and empowering them for participatory management of degraded forests on a benefit-sharing basis.

It was reported that the country's achievement in raising forest plantations, in terms of area, has been impressive. Up to 1998, the total area of tree plantations was 28.38 million ha, of which about 17 million ha were planted before 1990's. The current annual rate of plantation is 1.2 million. The quality of these plantations varies considerably. It should be noted that forest plantations are a means to meet the increasing demand for industrial raw material or for direct consumption, i.e. fuel wood, but not to justify deforestation or claim restoration of biodiversity and other environmental services.

The performance of forest plantations, in terms of survival, growth and yield, has been poor caused by several factors, including inadequacies in site selection and site-species matching, poor planting stock, lack of proper maintenance and protection (from fire, grazing, pests and diseases), lack of timely tending/thinnings, delays in fund allocation, and inadequately trained staff.

According to the latest State of Forest Report, 2005, the total forest cover of the country is 67.71 million ha. or 20.60 % of the geographical area, with very dense forest (VDF) accounting for 1.66%, moderately dense forest (MDF) accounting for 10.12% and open forest constituting 8.82%. *The Report states that the forest cover has decreased by 728 km^2 since the last survey in 2003.* Funding to the tune of Rs 66.95 billion per year is required in order to achieve one-third forest cover within the next 20 years whereas, Rs 16 billion per year is available from both the central and state budget together to be allocated for afforestation.

Despite the enactment of all the above legislations, clear symptoms of degradation and a declining capacity in meeting the various needs of the population, particularly the rural poor and tribals are evident. Efforts to enlarge the forest estate as set forth in the National Forest Policy (from the present 19 percent to 33 percent of the total geographical area) would require a substantial increase in fund allocation to the forestry sector.

To reverse the process of degradation and for the sustainable development of forests, the Government has prepared the National Forestry Action Programme (NFAP).

National Forestry Action Programme (NFAP)

In 1993, the Government decided to start a new strategic planning process following the National Forestry Action Programme (NFAP) concept. The preparation of an NFAP was decided with the goal of addressing the issues underlying the major problems of the forestry sector in line with the National Forest Policy, 1988. The NFAP is to evolve as a development process by integrating forestry development in the country within the framework of the national five-year plans. The exercise was supported by the UNDP.

The objective of the NFAP is to enhance the contribution of forestry and tree resources to ecological stability and people-centred development through qualitative and quantitative improvement in investment on sustainable conservation and development of forest resources.

The basic purpose of the NFAP is to establish a direct linkage between the national forest policy and the national five-year plans. In the past, there has not been a comprehensive and constant programme structure, so it was difficult to get linkages and establish trends.

In the context of sector policies, the NFAP exercise proposed that imperatives need to be identified which represent the absolute requirements to which all supporting objectives should contribute. For the forest policy in India, three imperatives are suggested: *sustainability, efficiency, and people's participation*. Sustainability should be the guiding factor for forest management. Neither conservation nor development can be achieved in isolation. Efficiency in production implies improving productivity, reducing wastes and indirect costs, and thus registering a higher economic rate of return compared to other alternatives. The philosophy of people-based development assumes that participation is not only a fundamental precondition for, and a tool of, any successful development strategy, but also is an end in itself.

Five Year Plans

The basic purpose of the NFAP is to establish direct linkages between the National Forest Policy and the National FiveYear Plans (FYPs). In the past, there was no comprehensive and constant programme structure for forestry. Every FYP has had its own programme structure, so it was difficult to get linkages and establish trends. Although plans had specific objectives and programmes, the main activity under most of them was tree planting. The emphasis of different FYPs regarding forestry was as follows:

· First and Second FYPs: Rehabilitation of degraded forest, introduction of economic species, survey, and forest demarcation;

· Third and Fourth FYPs: Increasing productivity of forest through fast growing species plantations, scientific assessments, and modern logging;

· Fifth FYP: Social forestry and fuel wood reserves to save natural forests;

. Sixth FYP: Social forestry, Forest conservation

· Seventh FYP: Forest conservation, massive afforestation, and wasteland development; and

· Eighth and Ninth FYP: Preservation of biological and genetic diversity (both flora and fauna), protection of forest against biotic interference, utilisation of wastelands, and promotion of people's participation through Joint Forest Management (JFM) schemes. The percentage share of Forestry Sector Outlay changed from 0.32 percent of the total outlay in First FYP to 0.94 percent in Eighth FYP. The highest allocation was in the Seventh FYP (1.09%). For the sustainable development of the sector, allocation to the forestry sector should be raised to about 4 to 5 percent of the total outlay of the country.

CHAPTER – 6

STAFF AND LABOUR SUPPLY

SECTION 1: STAFF

The Kolhapur sansthan and the independent Jahagirs had appointed a fairly large contingent of staff for managing the forests. The Kolhapur Sansthan had posts like Conservator of Forests, Wildlife Warden, Forest settlement Officer and Conservator of Forests (Reforestation). In 1948-49, just before merger, these posts were abolished on the advice of the Forest Advisor of the durbar. The Chief of the forest areas was designated as forest inspector. None of the employees were trained in forestry and Forest Management. After the implementation of the Working Plan of Shri F.X. Saldhana in 1945 – 46 some trainees were deputed to the forest college at Dehradun. After merger, 5 trained foresters were appointed in the scale of Range Forest Officers of the then Bombay State on the 1st March 1949. The following was the staff contingent as on 1-7-1950.

i) Range Forest Officers – 7
ii) Foresters – 31
iii) Beat guards – 111 (including 2 depot guards and 1 naka guard)
iv) Orderly guards – 14

The works of the forest department increased manifold after the merger especially after the five year plans came into force. However the staff strength did not increase proportionately. There are 08 Ranges, 29 Rounds and 98 forest beats while there are 11, 38 and 149 sanctioned posts of RFOs, Round officers/ Foresters and Forest guards. Total staff strength sanctioned is 254. In addition there are 194 Van majoors. The present administrative structure and the staff strength is given below.

Table 9

Number of Administrative units

Sr.No.	Name of Range	No. of Rounds	No. of Beats
1.	Malkapur	4	13
2.	Panhala	5	16
3.	Gaganbavada	2	8
4.	Karvir	4	12
5.	Radhanagari	1	1
6.	Gargoti	5	18
7.	Ajara	4	16
8.	Chandgad	4	14
	08 Ranges	**29Rounds**	**98 Beats**

The number of sanctioned posts presently in Kolhapur division is as follows.

Table 10

Number of Sanctioned Posts

Sr.No.	Designation	Sanctioned posts	Filled Posts	Vacant Posts
1.	DCF	01	01	00
2.	ACF	02	02	00
3.	RFO	11	11	00
4.	Asst. Engineer	01	01	00
5.	Foresters	38	38	00
6.	Forest Guards	149	147	02
7.	Chief Accountant	01	01	00
8.	Accountants	13	13	00
9.	Clerks	22	21	01
10.	Surveyor	02	01	01
11.	Junior statistical Asst.	01	01	00
12.	Drivers	03	02	01
13.	Tractor Driver	01	00	01
14.	Police Constable	01	00	01
15.	Peons	04	04	00
16.	Watchman	01	00	01
17.	Tractor Cleaner	01	00	01
18.	Gardener	02	00	02
	Total	**254**	**243**	**11**
	Van Majoors	----	194	---

A list of officers who held the charge of DCF, Kolhapur in the past is given in the **Appendix 6.1**of Volume II.

SECTION 2: LABOUR SUPPLY

Labourers required for forestry works are not easily available within the district. The local labour prefers working on agricultural activities which clash with the forestry activities like plantations since the returns from the agricultural activities are also more compared to the forestry works and the work is available nearer or in the village itself compared to the remote locations of forestry works. The rate structures of forestry works therefore need to be revised keeping this in view. The increased industrial activities and the overall increase in the standard

of living of the people considering better irrigation facilities also fail to attract labourers for the hard work and low returns they get in forestry activities. For nearly all the forestry works, labour is brought from adjoining district of Belgaum and other villages of Karnataka state. They are mostly from the 'Lamani' tribe and work as camping labour.

CHAPTER - 7

PAST SYSTEMS OF MANAGEMENT

SECTION 1: GENERAL HISTORY OF THE FOREST

Forests under Ex-Kolhapur Sansthan and Jahagirs:

The history of forest management of these areas began in 1884. The forests were managed with the intention of yielding certain fixed revenue to the Sansthan or Jahagirs before introduction of written Working Plan. Each year, areas suitable for working were selected and coupes of purely non-Teak or Teak were laid out and sold with standing trees. In Ajara Jahagir, there was a tradition of selling all standing trees in the areas around a particular forest village. The work of felling was allowed to continue for 5-7 years in such selected coupes. This resulted in low density of tree cover with increase in number of injaili tree species most of which were crooked or diseased. This type of management was seen in the early part of the 20th century in Ajara Jahagir and Kolhapur Sansthan whereas in Vishalgad Jahagir this type of management existed till around 1930-40s.

Apart from such irregular felling there was a tradition of allowing trees to be felled and taken away at a nominal fee of Re. 1.00 per tree in the Jahagir areas. This resulted in selective felling of good timber yielding trees and lowering the quality of the remaining forests.

There was no restriction on diverting notified forest land for agriculture. After cultivating such land for 2-3 years it was abandoned to take up new areas. Soil erosion in such areas turned land barren. This also encouraged the habit of Kumri or rotational agriculture especially in the Western part of the district which had extensive forest areas. This resulted in vital loss of tree cover. The forest land abandoned after 2-3 years cultivation was not given any treatment resulting in the growth of only crooked, non important and diseased trees. Such patches were scattered all over.

In the Eastern part of the district where Teak was reserved for the Sansthan, the other species disappeared. All this resulted in barren hill tops and hill slopes and degraded forests in the plains. Aiming at an effort for forest conservation, species like Teak, Hirda, Chandan and Shisham were not allowed to be felled, by declaring them as “Rajmanya trees” in forest areas as well as private areas under the Sansthan or Jahagirs. Efforts to take up Teak plantations were made in the Sansthan area as well as areas under the Ajara, Vishalgad and Bawada Jahagirs. Such plantations exist even today indicating suitability of some of these areas for Teak plantations.

Forests of Chandgad Range before Reorganisation of States:

Prior to the Reorganisation of States in 1956, the management of Chandgad forests was similar to the management of forests of Belgaum district. Specific and separate efforts for

management of Chandgad forests were not evident during the British rule. However there are indications that there was a total ban on fellings on extensive and contiguous hill slopes during the earlier Maratha regime to afford strategic protection. However the Maratha regime did not last long and there were intermittent periods of instability between the Maratha regime and the British rule. The villagers cut the trees in this period for their own use as well as for sale. Forest areas were clear felled even for agriculture. Inspection notes made by Dr. Gibson in 1863 describe the areas as high quality but totally destroyed and degraded forest areas subjected to repeated fires, encroachments in the last 13 years.

Kumri cultivation / Rotational cultivation was practiced by villagers on the plateaus and steep hill slopes since the past 150 years even on lands not fit for ploughing. Efforts to stop Kumri cultivation were first made in 1854. However since 1879 the practice of allotting land for Kumri cultivation started again. The then, Conservator of Forests, Belgaum Shri. Hudgson had proposed banning of Kumri cultivation in 1917. However this proposal was never approved. The Divisional Commissioner of Belgaum had vide his letter no. SG FOR – AP-53, dated 24th June 1922 written that "the practice of Kumri was extremely damaging and the agricultural yield is also very poor. This is being practiced even in countries like Bulgaria since it is easy and requires minimum efforts. However such practices should be stopped all over since the ultimate result is devastation of such areas."

The work of demarcation of forests areas in Chandgad Range started in 1870 as a precursor to declaring these areas as reserved forests. All forests in Chandgad were notified as reserved forests between 1880 and 1909. The focus even after reservation was however on generation of revenue. The departmental method of forest exploitation was started around 1879 –80 and went on upto 1912. The forests on the Eastern side of the Pune-Bangalore highway which were of better quality and "valuable", drew more attention of the forests officers of the Belgaum district and thus the forests of Chandgad Range remained "neglected"

SECTION 2: PAST SYSTEMS OF MANAGEMENT AND THEIR RESULTS

The first Working Plan for areas of Kolhapur sansthan was written in 1936. The Plan which was sketchy basically segregated all areas having Teak forests and divided them into annual coupes for felling. The Working circle was called 'Teak Working Circle'. It was prescribed that the coupes be clear felled and the coppice shoots be maintained. No plantations were prescribed. Clear felling at the end of 50 years and thinning in the 15^{th} and 25^{th} year was proposed. No mention of regeneration works was made. This resulted in overexploitation of Teak areas without adequate regeneration and the overall results were not very encouraging.

Working Plan of Shri Saldhana
(Period before merger 1945-1949 and later between 1949 to 56-57)

This Working Plan was implemented from 1945-46. The area was divided into following 3 Working Circles:

a) *Clear Felling Working Circle:*

This WC was divided into 119 Felling Series. 60 annual coupes each averaging 30-40 acres and corresponding to a cycle of 60 years were made in each felling series. The size of the coupe was small considering shortage of labour, unavailability of roads and other infrastructure. Areas included in this WC had Semi-evergreen to moist deciduous forest. It was expected that after clear felling and maintaining the coppice crop and planting the clear felled areas with Teak and other species, a good stock of Teak and mixed species would come up at the end of the cycle of 60 years. It was prescribed that all trees of Teak and Shisham below 12" girth and all trees of Chandan, Hirda and other fruit yielding trees would be reserved. The crop of this WC was irregular and not uniform resulting in irregular yield. The plantation programme also did not receive the support from the sansthan. Some efforts were made and some Teak nurseries were also raised. The implementation of the Working Plan prescriptions was thus not complete. The details of works done between 1945-46 to 1950-51 are an indicator of this. Only 37.7% i.e. 8,331 acre 2 guntha area was worked against the prescribed 22,470 acre 5 guntha during 1945-46 to 1950-51.

b) Reforestation cum Improvement Working Circle

The area was divided into 6 felling series each corresponding to a cycle of 60 years and 60 annual coupes for felling. The areas to the east and north of the Clear Felling Working Circle were included. Out of the tree species reserved (Chandan, Hirda) trees above 4 feet girth and all dead trees as well as all fruit bearing trees whose fruit bearing period was over were to be marked for felling. Upto 50 % of Teak trees were to be retained. In areas with rainfall less than 500 mm. it was proposed to level the areas and planting done in contour trenches. 50 % of the area was to be planted with Teak and the rest was to be planted with mixed species. However implementation of these prescriptions is not seen except in a patch of 40 Acres in Narande where records indicate that planting by leveling and contour trenching was done. The forest stock thus remained irregular.

c) Protection Working Circle:

The area included in this WC was 38,216.15 ha mainly along the Western Ghat tops. This area was degraded because of excessive fellings in the previous Working Plan period and had a predominance of Anjani (Memecylon edule). It included areas where laterisation had set in because of continuous exposure to heavy rains. The main objective of this WC was to provide total rest to these areas and allow them to regenerate naturally. No felling was therefore prescribed. Extensive plantations were also not prescribed since the technique of planting in such areas was not known. However gap filling of open areas by planting suitable species in consultation with forestry experts was proposed. The area was divided into 20 felling series with 20 coupes in each. However no planting activities were carried out to fill the gaps. The rest provided to the area resulted in improvement of the stock and density to a certain extent. Since no work was proposed in the area the boundary demarcation was also not done in time. Illicit felling by locals to meet their needs however continued.

Grass and Hirda fruits were recognized as valuable minor forest produce. However systematic management of this MFP was not prescribed in Saldhana's Plan. Annual auctions done for both grass and Hirda yielded good revenue.

Past management of forests of Vishalgad Jahagir

The Working Plan of this Jahagir (Present Malkapur Range) was written by Shri V.G. Kulkarni and it was approved by the then CCF of Bombay State vide his letter No. 37/A/1943, dated 9th March 1950. The Plan period proposed was from 1949-50 but the implementation started in 1950-51. Two Working Circles were proposed.

a) Semi evergreen forests Working Circle
b) Teak timber Working Circle

a) Semi evergreen forests Working Circle:

The areas included were the semi-evergreen forests and some portions of moist deciduous forests in the east. The area was divided into 15 felling series. Felling series numbers 1 to 3 and 11 to 15 were deleted from felling considering remoteness and uneconomic yields. A 40 years felling cycle was proposed. 20-30 trees in areas on hill slopes and 15-20 trees on lower slopes were to be left standing and all other mature trees were to be felled. It was also proposed to reserve, sandalwood, Shisham, Teak and other state recognised trees as well as fruit bearing shade giving trees and promising young trees of less than 12" girth of all tree species.

b) Teak timber Working Circle:

It was proposed to cut all mature trees in the area in the first 3 years and give complete rest to the area for the next 30 years expecting that this rest would allow the area to restock and become available for felling. This resulted in excessive felling in the entire area in a short period and a coppice growth of young shoots. It was proposed to plant the areas after the first 3 years of felling.

Period after merger (1949-1959)

The works prescribed in the Working Plan continued as such in the period after merger. In addition a list of coupes where interim fellings could be done in a 5 year cycle from 1949-50 was prepared for Ajara and Bawada Jahagir areas. It was proposed that these interim fellings would be done only in well protected selected areas having mature tree growth. The yield was mostly of fuel wood. The effect on the tree cover as a result of works done during the period was as follows.

It was proposed to reserve 40 trees per acre. In some areas especially of Ajara Jahagir the proportion of State recognised Sandalwood and Hirda was very high resulting in reservation of trees of these species and felling of all other species. This led to unavailability of fuel wood species as expected in the next rotation. Since the Sandalwood trees which depend on other trees for support for shade as well as for food were left standing alone, the growth of Sandalwood also

suffered. In an attempt to achieve more revenue, the reservation of even 40 trees per acre was not followed resulting in overall degradation of the area. The natural regeneration was not good and the growth of seedlings was very slow. The areas under semi-evergreen forests opened up leading to soil erosion and reduction in water holding capacity. In areas given for agri-silviculture, the plantations of Mango, Jackfruit, Jamun and cashew were disappointing. The plantations of Teak and Sawar (Bombax ceiba) done in the semi evergreen forest areas of Bawada, Ajara and Radhanagari were also not successful resulting in stunted semi evergreen forest patches in Bawada Range with a predominance of Anjani (Mymexylon indicum). Successful examples of cashew plantations like the one raised by the Jahagirdars of Ichalkaranji at Sulgaon (Ajara Range) and other plantations like at Tudiye near Radhanagari, Uchat in Vishalgad Jahagir and Mahipat in Chandgad are also however seen.

Efforts of reforestation were made in 1942 in Naslapur and Dastaward of Rambag Mahal and at Narande in Hathkanangale Taluka. Naslapur and Dastaward are now part of Belgaum district. The planting was done at a spacement of 6 x 6 on trenches after terracing. Phoenix dactylifera, Dalbergia sissoo, Tamarindus indica and Hardwickia binata was planted. The ends of the trenches were planted with Agave bulbils. The cost of planting excluding establishment costs was Rs. 35/- per acre. The results initially were good however there are notes indicating porcupine damage. The grass growth in the closed areas was however very good indicating good fodder potential in dry deciduous areas with less rainfall if the areas are protected from grazing.

The number of Hirda trees in the entire forest areas was very high and the fruits yielded a good source of revenue. However the average annual yield could not be sustained. The demand for other NWFP was not high and the methods of exploitation were non destructive. The revenue from sale of grass was also good from the 20,000 acre area kept as Kurans. The grazing pressure in the areas other than the low rainfall eastern part was not very high. The number of cattle in the western part did not exceed the grazing potential and hence it was possible to supply fodder from these areas to the fodder shortage areas whenever required.

Wagle's Working Plan (1957-58 to 1990-91)

Wagle's Working Plan divided the areas into the following Working Circles.

1. Protection Working Circle	38216.95 ha.
2. Fuel wood production Working Circle	50914.70 ha.
3. Conversion Working Circle	22455.85 ha.
4. Teak Improvement W.C.	5688.39 ha.
5. Sandalwood Conservation Working Circle	277.22 ha.
6. Fodder Development Working Circle	3725.41 ha.
7. Grazing area development WC	9419.71 ha.
8. Minor forest produce (overlapping) WC	(overlapping)
Total	1,30,697.43 ha.

The main prescriptions of various Working Circles and their results are discussed below.

1. *Protection Working Circle***:**

No felling series were formed. It was proposed to mark mature and silviculturally available trees except those on steep and precipitous slopes. Works with an intention to improve the future crop were prescribed along with planting of suitable trees in plantable areas. Other works were not prescribed and very few plantations were done. However the locals cut the trees to meet their daily fuel wood and household needs and took away the fallen trees and twigs. This resulted in a stock of crooked malformed trees.

2. *Fuel wood Production Working Circle:*

The area was divided into 40 felling series each having 30 coupes. Well stocked areas on the slopes of Sahyadris with mainly mixed semi-evergreen species was included in this WC. The area received high to medium rainfall with high humidity. The marking rules were conservative with an intention to prevent opening of the canopy. It was proposed to thin out areas with high density and congestion and plant the natural blanks to close the canopy. However these prescriptions were not followed in totality. The coupes were demarcated, marked and coupes with standing trees were sold to contractors. No attention was paid to the regeneration. In addition felling to meet the fuel wood needs was done by the locals. The resulting tree growth was therefore not healthy.

3. *Conversion Working Circle:*

The area was divided into 19 felling series with 7 coupes in each felling series. The area included the lower slopes of the Sahyadris adjoining the semi-evergreen forests in the west and the eastern semi ever green forest areas. The prescriptions were basically to promote growth of Teak. The marking rules mentioned that care be taken to ensure canopy opening only to a limited extent. Plantations of teak over patches not more than 10 gunthas at one place were prescribed. It was also prescribed that each coupe should have atleast 25 % of its area under such plantations of 10 gunthas each. Planting of Teak was proposed in felled areas or natural blanks. Selected mature trees of other species were to be felled in other areas. The rotation of 60 years was fixed along with a conversion period also of 60 years with expectation that the entire area would be converted into Teak at the end of the conversion period. Trees like Mango, Cashew, Sandalwood and Hirda were to be reserved. Promising contiguous patches of Shisham (Dalbergia latifolia), Shiwan (Gmelina arborea), Haldu (Adina cordifolia), Kalamb (Mitragyna parviflora), Jambha (Xylia xylocarpa) and Ain (Terminalia tomentosa) were also to be reserved. It was prescribed that the contractor exploiting the coupe would arrange the lops and tops and branches in rab in strips 30 metres long and 2 metres wide at intervals of 6 metres. Rab burning and planting of teak stumps would be done by the department. Three weedings were prescribed in the year of planting.

It was not however found feasible to take up small scattered patches of plantations not exceeding 10 gunthas at a place. As a result very few patches of Teak plantations were taken up and these

were not successful. The irregular felling of other species by the locals to meet their needs also resulted in unhealthy growth. The coupes were marked and felled but the expected planting was not done. The natural regeneration was also not adequate. All this led to degradation of the forests. Efforts to cover the unsuccessful patches by planting Australian acacia (Acacia auriculiformis), Silver Oak (Grewelia robusta) and Eucalyptus (Eucalyptus spp.) under five year plan schemes were made. However the sequence of felling and planting was not followed leading to patches of exotics in Natural forests.

4. Teak Improvement Working Circle:

The area was divided into 4 felling series. Felling and planting of Teak was prescribed in 3 felling series and improvement fellings and thinnings were proposed in the fourth felling series.

Areas having moist to dry deciduous forests were included in this WC with predominance of naturally growing teak. The entire area had a young crop which was congested. Hence improvement fellings were prescribed. It was proposed to retain all trees with straight boles with girth less than 90 cms and fell all crooked and malformed trees to ease congestion. Teak, Mahuwa, Shisham, Bibla were to be reserved along with fruit yielding trees like Mango, Ficus, Jackfruit, Jamun, Hirda, Cashew etc. and commercially important trees like Khair, Sawar and Sandalwood. It was proposed that the contractor would arrange the rab in strips and burning of rab and planting of Teak would be done by the Department. Weeding, mulching and mounding were proposed after planting. Cleaning in the 5^{th} year and thinning in the 15^{th} year was proposed.

Although the prescriptions were detailed, the implementation was not proper and the plantations were not successful. Since most of the areas of this working circle were adjoining habitation repeated fellings of promising young trees took place leading to overall degradation. The staff available for protection was inadequate. Some plantations in remote areas were successful indicating that the technique, where properly implemented and where protection was adequate, was successful. Inadequate funding and irregular availability of labour were also important reasons for failures.

5. Sandalwood Conservation Working Circle:

An area of 2,791 ha was included in this WC by Shri. Wagle, of which only 277.22 ha was exclusively in the sandalwood WC and 2515 ha was overlapping with the Conversion WC. Based on the density of sandalwood trees, found out through sample enumerations, the areas were classified as “A” “B” “C” types.

A type had 235 sandal trees / ha and the area was 277.22 ha.

B type had 30 sandal trees / ha and its area was 1556 ha

C type was presumed to have 12.5 sandal trees / ha covering an area of 959 ha (No enumeration was done and this was a presumption)

It was proposed to cut all unsound sandal trees in a felling cycle of 10 years to obtain sustained equal outturn of sandal wood. The sample enumerations showed that 25, 2.5 and 1.25 unsound

trees / ha were available in A,B & C type areas respectively meaning there by that the total number of trees available would be 6900, 3890 and 1198 in A,B, C type areas respectively totaling 11,988 trees or 1198 trees per year considering a felling cycle of 10 years. In was however proposed to exploit only about 50 % of such trees thus reducing the yield to about 500 trees per year. Accordingly coupes of 28 ha in A type areas and 240 ha in B and C type areas were prescribed yielding 240 and 260 trees respectively thus totaling 500 trees / year. Since the exploitation of sandalwood trees is done by uprooting, it was prescribed that open space so available would be again used for promoting growth of sandalwood by sowing sandalwood seeds along with seeds of Ber, Bamboo, Neem, Karvand and Cassia siamea. However because of illicit felling in the area the occurrence of sandalwood trees has reduced considerably.

6. Fodder development Working Circle:

An area of 12,936 ha was included of which independent fodder areas covered 3,725.41 ha in 62 grazing units and 9201 ha of 54 grazing units were overlapping areas. The main objective of this WC was to produce good quality grass and fodder. It was proposed to plant Neem, Anjan, Sissoo, Siris and Rain tree saplings in 50 % of the area available for planting to produce nutritious fodder. It was also prescribed to do fire tracing. It was proposed to auction the standing grass. However the prescribed planting was not done. Inquiries with the local staff indicated that there was no demand for grass and fodder except for areas around Kolhapur city. The fodder development of the areas under this WC did not take place mainly because of scattered compartments and increasing cattle and human population.

7. Grazing development Working Circle:

9419.71 ha area was included in this WC. A severe problem of grass shortage is not seen in most of the areas of the district except for the eastern part and areas around Kolhapur city. The main objective of this WC was to provide a sustained uniform yield of good quality grass for cattle by implementing the concept of rotational grazing. However this could not be implemented and the uncontrolled grazing in these areas led to further degradation.

8. Minor forest produce (overlapping) Working Circle:

Considering a Range as a unit auctions for honey, wax, shikekai, cashew, grass, gum were done. Hirda fruits were collected either departmentally or the areas were auctioned.

Working Scheme of Shri Dashputre for the forests of Chandgad Range (1962-63 to 1982-83)

The Chandgad taluka earlier in Belgaum district was included in Kolhapur district after the reorganisation of states in 1956. A separate Working Scheme for the forests of Chandgad was written by Shri Dashputre and the following WCs were constituted.

1. Protection Working Circle	3229.46 ha.
2. Selection cum Improvement Working Circle	9935.25 ha.
3. Plantation Working Circle	11248.48 ha.
4. Coppice with Reserve Working Circle	889.11 ha.
5. Miscellaneous Working Circle	1889.64 ha.
6. Sandalwood conservation Working Circle (Over lapping)	
Total	27,191.94 ha.

1. Protection Working Circle:

The areas to the west of Kodali including the Sahyadri cliffs and the difficult terrain of the catchment of Tilari river were included in this Working Circle. Semi evergreen forest areas and moist deciduous forest areas with lateritic soil were included in this Working Circle. The biotic interference was low in these areas considering their remoteness and inaccessibility. However since the construction of the hydroelectric project at Tilari started, many all weather roads were made. This resulted in increased accessibility and the deleterious effects of these on the forests started being felt. The density of the forests reduced and the tree growth become stunted and bushy.

2. Selection cum Improvement Working Circle:

Mixed forests of about 0.5 density in moist areas with semi evergreen and deciduous species were included in this WC. Such areas were scattered all over Chandgad Range. It was proposed to improve the stock by reserving healthy young, straight trees of important species like Kinjal, Nana, Shisham, Jamun, Mango, Ain, Jackfruit and taking adequate care to prevent soil erosion it was proposed to mark trees above 120 cms girth for felling. The area was divided into 20 coupes. It was expected that improvement fellings would take place in the entire area after a felling cycle of 20 years.

Considering excessive fellings in the past the canopy had opened up at many places encouraging the growth of Karvi which hampered the natural regeneration through seeds. The works expected on the coppice shoots like thinning and tending were not done after the improvement felling. Upto 1978-79 the fellings were done either through forest labour cooperative societies or through contractors. It was expected that after 1980, the works would be done departmentally. However considering inadequate funds and untrained staff the prescriptions could not be implemented. The increased biotic interference as a result of improved accessibility and illicit felling resulted in degradation of the growing stock.

3. Plantation Working Circle:

Areas having semi evergreen species in moist regions and deciduous tree species were included in this WC. Semi evergreen areas with less than 0.4 density were also included. Excessive fellings in the past, allotment of some areas for seasonal agriculture and high rainfall had led to severe top soil loss. Hence these areas were degraded and the exposed areas were invaded by Karvi, Bakra and Lantana. It was proposed to improve the tree cover in such areas. The area was divided into 2 felling series and it was proposed to plant evergreen species in one felling series. The choice of species was left to the Divisional Forest Officer. It was proposed to plant valuable deciduous species like Teak, Shiwan, and Haldu in the other felling series. Inadequate fund availability as well as inadequate trained staff resulted in very few plantations. The growth in the few plantations that were taken up was also not good and many plantations failed because of excessive rainfall and continuous cloud cover (fog) in the areas. Some teak plantations of 1962-63 however showed good results. Under the five year plan schemes Eucalyptus plantations were taken up in areas with less biotic interference. 60 % of such plantations were taken up in the deciduous trees felling series and 40 % in the semi evergreen felling series. The sequence of planting as prescribed in the Working Plan was however not followed. Since many of these Eucalyptus plantations were successful and mature, a separate scheme for their exploitation was drawn up by Shri Kelavkar and implemented since 1982-83. The plantations of Acacia auriculiformis and cashew done later in this WC were also successful.

4. Coppice with Reserve Working Circle:

Areas of Chinchani and Kamewadi were included in this WC. The forests of this area have dry deciduous species like Lendia, Moha, Dhawada which are good coppicers and there was a good occurrence of sandalwood. The main objective of this WC was to produce fuel wood and promote sandalwood growth. The area was divided into one felling series and further divided into 40 coupes considering a rotation of 40 years. The marking rules were detailed for this WC. The coppice shoot growth was however not encouraging considering increasing biotic interference. The number and quality of sandalwood trees reduced drastically because of illicit felling. Fearing illicit removal it was decided to exploit the sandalwood trees to get revenue. Sandalwood trees are therefore hardly seen now and the area opened up and only crooked, malformed and bushy trees were left.

5. Miscellaneous Working Circle:

Areas which could not be included in any other WC were included in this Working Circle. Kumri cultivation was practiced in these areas and hence regular works were not prescribed in these areas. It was suggested / recommended that after convincing the Kumri plot holders, important species like Cashew, Mango, Teak or Eucalyptus should be planted in rows 30 feet apart and at a spacing of 12 feet with the cooperation of the plot holders. These recommendations were however not implemented. It however resulted in restricting areas under Kumri cultivation.

6. Sandalwood Conservation (Overlapping) Working Circle:

The areas of Kamewadi and Chinchani covering 804.12 ha which were overlapping with the CWR Working Circle were included in this WC. The effects of management have been discussed in the Para on CWR Working Circle above.

Working Plan of Shri K.A. Kate and Shri A.R. Bapat (1990-91 to 1999-2000)

The work of revising the Working Plan for the areas included in Shri Wagle's Working Plan and Shri Dashputre's Working Scheme was taken up and completed by Shri K.A. Kate and Shri A.R. Bapat for implementation from the year 1990-91. The entire area was divided into compartments for the first time. Before this, compartment numbers existed only for forests of the Chandgad Range. The following circles were proposed in this Working Plan.

1.	Protection Working Circle	59,907.97 ha
2.	Selection cum Improvement Working Circle	19,997.02 ha
3.	Enrichment Working Circle	04,227.60 ha
4.	Afforestation for SMC WC	17,986.45 ha.
5.	Fodder Working Circle	14,995.76 ha
6.	Miscellaneous Working Circle	01,901.81 ha.
7.	Nature and Wildlife Conservation Working Circle	34,412.07 ha.
8.	Cashew Plantation Working Circle	03,163.68 ha
9.	Bamboo Plantation (overlapping) Working Circle	
10.	Minor Forest Produce (overlapping) Working Circle	
	Total area	1,56,592.36 ha.

1. Protection Working Circle:

The area of this WC was 59,907.97 ha covering areas under the same WC of Shri Wagle's Plan and Shri Dashputre's Plan and in addition catchment areas of major irrigation projects as well as areas not found fit for exploitation and areas with slope of more than 25^0. The additional areas are mainly from the fuel wood production WC of Shri Wagle and the Selection cum Improvement WC of Shri Dashputre. The areas support mainly semi evergreen tree species. The tree cover was sparse except in valleys. The area was divided into 62 working series each having 20 annual coupes. The main objective of the WC was to maintain the tree cover and improve the tree density in order to reduce soil erosion in the catchment areas of dams and also to prevent laterisation. It was also expected to improve the sub soil moisture levels. Planting of minor forest produce yielding trees to improve production was proposed. No felling was prescribed considering precipitous to heavy slopes. Sowing of seeds and tending of regeneration was proposed to improve the tree cover. Priority was proposed for local species. Emphasis was laid on getting survey and demarcation done. Patches with density less than 0.2 with a minimum area of 0.4 ha were proposed for planting.

Results: The working and sequence of coupes as given in the WP was not followed except in the initial 2 to 3 years due to lack of budgetary grants. Otherwise few mixed species plantations of Acacia auriculiformis, Eucalyptus, Aonla, Siwan and Suru etc were taken in the protection areas on the moderate slopes during the WP period and majority of them are found to be partially successful. Acacia and Eucalyptus have at most places suppressed other miscellaneous species. Similarly SMC works involving LBS, CCT, kache bandhare etc were taken under Western Ghats scheme in different ranges during the plan period. The majority of the area being on the steep slopes is naturally well protected. There are very few incidents of illicit felling though the area is prone to fires.

2. Selection cum Improvement Working Circle:

The area included in this WC was 19,997.02 ha. It supported moist deciduous forests which were degraded but which had potential to support IV A to IV B site quality forests. The reasons for degradation were illicit felling, excessive exploitation in the past and unregulated grazing. The area was divided into 30 felling series with 20 coupes in each. The main objective of this WC was to improve and maintain the tree cover to prevent soil erosion and subsequent laterisation and also to improve the growing stock by planting valuable tree species and tend the forest in order to get trees fit for selection fellings.

The areas included in the Selection cum Improvement Working Circle of the previous plan had 756 trees / ha. 82 % of these trees were in 15 – 60 cm. girth class, 11 % in 60 – 90 cm. girth class and only 7 % in girth class above 90 cms. Utility species like Ain, Anjani, Nana, Jamun and Teak formed 35 % of the stock which was dominated by Ain (96 trees / ha) and Anjani (74 trees/ha) whereas the proportion of Hirda, Salai and Sawar was 3 %. In areas carved out of the earlier plans' Fuel wood Production WC, the number of trees per ha was 749.30 composed of 50 % in 15-30 cm. girth class and in all 88 % in 15-30 cm, 30-45 cm and 45-60 cm. girth classes taken together dominated to the extent of 50 % by Ain, Anjani, Gela, Jamun and Kinjal. Anjani (Memecylon indicum) was predominant with 133 trees / ha or 15 %. Timber yielding trees like Ain, Jamun, Xylia xylocarpa and Nana comprised only about 19 %.

Considering virtual non availability of higher girth class trees, only improvement fellings could be prescribed along with planting local species to improve tree cover. A felling cycle of 20 years was fixed corresponding to one fifth of the rotation period which was fixed at 100 years. This was of academic importance only since there were no selection fellings prescribed on account of non availability of higher girth class trees. Each coupe was on an average about 30 ha considering the undulating to steep terrain. It was proposed to lay emphasis on survey and demarcation. Marking rules were prescribed for improvement fellings in workable areas which included cutting of lianas and woody climbers except those of Shikekai and Entada and dressing of stools and marking of dead trees. However the marking rules prevented removal of all dead trees to avoid opening up of the canopy unless adequate established trees of more than 30 cms
girth were present. Thinning was prescribed in areas with density more than 0.4 laying a condition that no single tree composition should exceed 50 %. Seed sowing / planting of species which would yield fruits and important minor forest produce was prescribed in workable areas

***Results*:**

The title of this WC was a misnomer since no selection fellings were prescribed due to lesser availability of higher girth class trees. Only improvement fellings were to be carried out in the form of removal of only dead trees and cutting of woody climbers. However, prescriptions could not be implemented due to instructions to stop felling in Western Ghats by the Secretary (Forests), Revenue & Forests Department, Government of Maharashtra issued vide his letter No.TRS/1088/PR/265-F dated 7-6-1988. The areas are having young to middle aged crop with a crop density of 0.6 and above. Improvement fellings resulting in opening up of areas to encourage younger regeneration and to maximize the growth of tree species need to be carried out.

3. Enrichment Working Circle:

The area included in this WC was 4,227.60 ha. This area had a good potential to produce small to medium sized teak timber, poles and sandalwood. The area had small old teak plantations as well as natural patches of teak. Considering favourable soil, rainfall and weather for sandalwood it was also proposed to restore sandalwood through plantations in Chandgad and Ajara. The area was divided into 10 felling series with 20 coupes in each. The overall objective of this WC was to promote growth of valuable species so as to improve the quality of the growing stock to meet the local needs of the people for poles and small timber and also improve the density.

The group selection system was proposed where in 3 x 3 chain area was to be tackled and efforts made to promote advance growth by felling bigger trees. Open areas were proposed to be planted by 50 % Teak and bush sowing of sandalwood. Planting of Bija, Shisham and sandalwood was also proposed. Considering that the site quality was mostly IV b and considering that the increment put on by the trees beyond 90 cms girth was very slow and also considering that hollowness, malformation starts in the bigger trees it was decided that the exploitable girth would be fixed at 75 cms at breast height and the rotation period was fixed at 100 years. The felling cycle was fixed at 20 years.

It was proposed to cut all woody climbers except Entada and Shikekai at the time of marking in the entire area of the WC. All dead trees were proposed to be marked for felling taking care that such felling does not damage the surrounding tree growth. In workable areas all trees were to be enumerated and classified into 10 cm girth classes and noted in the compartment history and treatment map.

The marking rules were detailed and very conservative ensuring that the canopy is not opened up and also ensuring that advance growth is promoted. Gap planting was proposed to enrich the area using polypot seedlings of Bija, Shisham, Teak, Sandalwood and Khair.

***Results*:**

Felling of selection girth trees of 75 cm and above was not carried out due to instructions to stop felling in Western Ghats by the Secretary (Forests), Revenue & Forests Department, Government of Maharashtra issued vide his letter No.TRS/1088/PR/265-F dated 7-6-1988. Planting of Sandal

wood was not given a try. Teak plantations had been taken in the past before Kate Bapat's Plan as well as during the Plan period though not exactly in the area as prescribed in the WP. Few of them like one at Salvan in Gaganbawada range taken up in sixties and another at Dindewadi in Gargoti range taken up in 1992 have shown good results but in general Teak plantations have been found to show stunted growth and their overall growth is not found to be encouraging.

4. Afforestation for Soil and Moisture Conservation Working Circle:

The area proposed for this WC was 17,986.45 ha spread over 52 compartments and included degraded areas subjected to repeated illicit cutting because of the high level of human presence in the surrounding areas mostly in the eastern part of the district. Most of the trees were stunted or bushy and the tree density was lower than 0.4 and barren at some places. The soil depth was not much and exposed rock could be seen at some places. The effects of soil erosion were evident in the area. It was important to increase the cover in the area for the prime purpose of soil and moisture conservation even if it meant repeated plantations. The area was divided into 22 working series with 20 working coupes in each working series. It was proposed that local species be given priority over exotics. Areas fit for planting were proposed to be classified according to their depth into 3 zones. Improvement fellings to promote growth of reserved trees was proposed. Soil conservation works were proposed to be carried out before the onset of rains. Emphasis was laid on planting seedlings around 12 months old, raised in nurseries close to the site of plantations. It was also proposed to close the area to grazing for a period of 10 years after planting. As the area was facing high grazing pressures the planting sequence was arranged to ensure that not more than 50 % of the compartment area was closed for grazing in any particular year.

***Results*:**

SMC as well as Afforestation works were taken on a large scale in the division during the Plan period though sequence of coupes and the area as given in the WP was not followed. SMC works have shown good results in the past and need to be taken more vigorously. Plantations of Acacia and mixed species taken in the Plan period have also shown good results. The plantations taken on the CCT and trenches have shown better growth than the ones taken in the pits. Teak plantations taken in the Plan period in general have not shown good results. Bamboo plantations are found to be badly affected due to attacks of Wild boar and Porcupine.

5. Fodder Reserve Working Circle:

The area included in this WC was 14,995.76 ha and had sparse tree cover. The main objective of this WC was to promote growth of fodder yielding tree species and to improve the quality and yield of good local grass and also to improve the tree cover and enrich the soil by planting legumes. Emphasis was laid on keeping the entire area closed for grazing and it was proposed to auction the areas for cutting and taking away grass each year giving priority to the gram panchayats or Milk cooperative societies. It was proposed to remove weeds, coarse grass and lantana before rains and protect the area from fire. Necessary soil and water conservation works

were also proposed. Planting of fodder species like Subabul, Tiwas, Sissoo, Sesbania, Shiras, Anjan was proposed. Water absorbing trenches in zone 3 areas were proposed. Emphasis was laid on fire protection.

Results:

The prescriptions were not followed hence the areas had deteriorated. Due to repeated fires and non removal of weeds, the inferior fodder grasses like Kusali had taken over larger areas. Large scale tree plantations mainly of Acacia auriculiformis and other mixed species were taken in these reserves resulting in the loss of the good fodder grasses. These areas need to be rehabilitated.

6. Miscellaneous Working Circle:

The area included in this WC was 1901.81 ha of Chandgad taluka which was under Kumri cultivation or Rotational cultivation. The area was divided into 2 working series with 10 coupes in each. The main objective of this WC was to maintain the ecological balance in the area under Kumri cultivation and improve the quality and productivity of the area through technical inputs and in the process also improve the standard of living of the Kumri cultivators. It was proposed to follow the Agri-Silvicultural system by planting trees at a spacing of 5 m x 4 m and use the intervening space for cultivation. The species to be planted would be such that the usufructs supplement the requirements of a cottage industry on a sustained basis. This was expected to wean away the Kumri cultivators in a phased manner from the practice of shifting cultivation and thus help in stabilizing the area.

Thus the idea was to promote species which would yield minor forest produce. The revenue obtained from these areas was to go to the members of the cooperative society formed out of Kumri cultivators who would also get wages from plantation and soil conservation works.

Results: The prescriptions were not followed. The areas are still under kumri cultivation and had deteriorated further.

7. Nature and Wildlife Conservation Working Circle:

The area proposed for this WC was 34,412.07 ha and included the areas of the Radhanagari Sanctuary and the area of Chandoli Sanctuary which formed part of the Kolhapur district. The main objective of this WC was to conserve the biodiversity and its gene pool by protecting its habitat and through scientific wildlife management practices. It was also proposed to utilise these areas for spreading awareness regarding conservation and to promote wildlife tourism. Habitat improvement measures, development of camping places, development of trails and interpretation facilities were prescribed. It was proposed that a separate management Plan be drawn up for these areas.

Results:

A separate Wildlife division with head quarters at Kolhapur was created in 1993-94 under the Maharashtra Forestry Project and these areas were transferred to the Wildlife division for management.

8. Cashew Plantation Working Circle:

The area proposed for this WC was 3,167.68 ha. The main objective of this WC was to utilise the areas fit for growing cashew to increase the productivity and to provide employment opportunities in remote areas and also to increase the tree cover and achieve the objective of soil and moisture conservation. The area was divided into 6 working series with 20 coupes in each working series. It was proposed to improve the productivity of the old cashew plantations taken up in the 2nd and 3rd five year plan periods mainly under the soil and water conservation schemes. It was also proposed to resort to improvement fellings and plant cashew saplings using the technological advancements in horticulture. It was proposed to use the Vengurla 2 variety of cashew for plantation. The rotation cycle was fixed at 40 year considering that the optimum fruit bearing capacity is upto the age of 40 years. The working areas were restricted to 10 ha. It was expected that the plantations would yield revenue at the age of 5 years onwards upto around 35 years if proper soil working and other cultural operations are done regularly. It was proposed to get the work done through Forest Labour Cooperative Societies.

Results:

For the initial 2-3 years soil working around the cashew trees was done in few plantations as per the availability of funds. Other prescriptions were not followed in their entirety and as a result, Cashew plantations could not show any improvement. Rather the yield got reduced due to lesser inputs.

9. Bamboo Plantation (overlapping) Working Circle:

The area included in this WC was 4,227.60 ha which overlapped with the area of the Enrichment Working Circle. It was proposed that the three distinct areas running north south parallel to each other as one moved away from the Western Ghats towards the eastern part of the district had potential to support 3 different species of bamboo viz. Katas / Kalak (Bambusa bambos), Mes-kathi / Managa (Oxytenanthera stocksii), Chiva (Oxytenanthera monostigma) and Udha bamboo (Dendrocalamus strictus). The main objective of this WC was therefore to enrich the area by planting suitable species of bamboo and to use the productive capacity of bamboo to provide sustainable raw material to support cottage industry there by generating sufficient mandays.

It was proposed to plant Katas / Kalak bamboo (Bambusa bambos) and Chiva bamboo (Oxytenenthera monostigma) in the western most belt of 0-15 kms of the district with high rainfall and Red lateritic soil. It was proposed to plant Mes-kathi / Managa bamboo (Oxytenenthera stocksii) in the 15 – 30 km belt parallel to the main Western Ghats and it was proposed to plant Dendrocalamus strictus beyond 30 kms from the western boundary upto the eastern most part of the district. Inter-planting of bamboo was proposed in areas suitable for bamboo at a spacing of 4 m x 4 m in pit size 45 cm^3 using either 1 year old polypot saplings or rhizomes. Thinning of clumps in the 7th year of planting and cutting at a cycle of 4 years thereafter was prescribed. A yield of 0.25 Metric tones / ha. / year was expected at the end of 11 years from planting. Detailed cutting rules were prescribed.

Results:

Bamboo species were not planted as per the prescriptions. Only bamboo seedlings of Dendrocalamus strictus species were raised in the nurseries and planted in the field. Majority of the plantations were found to be badly affected due to Wild boar and Porcupine attacks. Other species found locally were not tried in the field.

10. Minor Forest Produce (Overlapping) Working Circle:

The area of this WC overlapped with the entire area of the Division. The objective of this WC was to collect minor forest produce in a scientific manner to ensure a sustained yield and to increase the production of the minor forest produce. It was proposed to plant seedlings of MFP yielding species on the TCMs on the compartment boundaries as well as in all other plantation programmes.

Reservation of MFP yielding trees was proposed in the marking rules prescribed for various working circles. It was also proposed to sow seeds of MFP yielding tree species. The Range was proposed to be considered as a unit for exploitation of the MFP. It was also proposed to have strict control on the transport of collected MFP and make efforts to find out the actual yield of each MFP.

Results:

Seedlings of MFP species like Hirda, Baheda though were introduced in the plantations yet many more species could have been introduced. More vigil needed to be kept on the destructive harvesting techniques employed by the contractors.

SECTION 3: SPECIAL WORKS OF IMPROVEMENT UNDERTAKEN

A number of special works undertaken under various schemes for improvement in the division are as follows:

Plantations:

Plantations under various five year plan schemes have been undertaken in Kolhapur district. An area of 14,680.453 ha was planted in the district during 1954-55 to 1984-85 and an area of 29,170.35 ha was planted in the district during 1985-86 to 2002-03. Species planted include Teak, Eucalyptus, Australian acacia, Casuarina, Shiwan, Sawar, Maharukh, Neem, Sissoo, Shiras, Glyricidia, Subabul, Cashew and Bamboo and Cane to a certain extent either in monocultures or mixed species.

The observations regarding plantations done in Kolhapur district during 1954-55 to 1984-85 given in Shri Kate and Bapat's Working Plan are summarised as follows.

"Although the plantations showed good survival percentage and growth in the initial years the present results of most plantation schemes are not good. In cases where the survival percentage is good the growth is not satisfactory. The main reasons for failures of plantations are:

1) Lack of cooperation from the local people
2) Illicit cutting of poles and excessive grazing
3) Inadequate protection from fire
4) Inadequate post plantation care (techniques of tending)
5) Improper site and species selection and planting very small saplings."

Nurseries:

There are 16 nurseries in the district and 14 of these are under the territorial division and 2 are with the Research wing of the department. The main irrigated nurseries are at Chikhli (Karvir), Salvan (Gaganbawada), Phejiwade (Radhanagari), Shirwade (Gargoti) and Vesarde (Ajara) all being more than 2 ha in area. The other smaller nurseries are at Tarabai Park, Narande, Tamdalge, Atigre (All Karvir Range) Panhala (Panhala Range) Gargoti (Gargoti Range) Patne (Chandgad Range). The 2 nurseries under the Research wing are at Sulgaon (Ajara) and Parewadi (Malkapur Range).

Tabak Udyan (Forest park) at Panhala fort:

Panhala fort which has great historical importance attracts many tourists. A forest park has been developed here with the intention to provide recreation to the visiting tourists and impart education regarding the various tree species of this area. A snake park and a small animal orphanage was started here but has now been closed down.

Radhanagari Sanctuary:

The original Radhanagari Sanctuary (196.10 sq.kms.) famous for the Gaur (Bos gaurus) was extended vide notification no WLP-1085/CR-588/f-5, dated 16th Sept. 1985 and now covers 351.16 sq.kms. The sanctuary is now under the control of the Kolhapur (Wildlife) division.

Chandoli National Park:

The catchment forests of the Varna dam including the Udgiri devrai and surrounding forests of Kolhapur district and parts of Satara district, Ratnagiri district and Sangli district were constituted into the Chandoli Sanctuary vide notification no. WLP – 1085 / CR-588 / F-5, dated 15-9-1985 covering 308.97 sq.kms and later into a National Park.

Grazing settlement report:

According to the unified grazing policy of the Maharashtra Government declared vide notification no MFP – 1362 / 132211 / Y, dated 6th Dec. 1968, the grazing settlement report for Kolhapur district was prepared and this was approved by the govt. vide notification no. MFP – 1374 / 251734 / F-2 dated 7th Nov. 1975.

*Joint Forest Management***:**
The Joint Forest Management concept was declared by the State Government vide GR. No. MLN – 1091 / CR 119 / 91 C – 11, dated 16/3/92. This was started in Kolhapur division in the year 1996-97 and upto 2005-06, 442 villages were brought under the JFM programme and 442

Forest Protection Committees have been formed. Various activities like plantations, soil conservation works and welfare activities for the villages have been taken up under the programme.

Forest Development Agency:

The main objective of this programme is to integrate all schemes aimed at the development of the villages in and around forest areas and to avoid the delay in transfer of the funds from the Government of India to the implementing agencies. Accordingly 36 villages located in Panhala, Malkapur, Ajara, Chandgad, Gargoti and Gaganbavada Ranges have been selected and the Societies have been registered according to the provisions of the Maharashtra Registering of Societies Act 1950 and Mumbai Public Trust Act. 1950.

SECTION 4 : PAST YIELD, REVENUE AND EXPENDITURE

The total revenue earned during the years 2004-05, 2005-06 and 2006-07 are 82,94,154, 1,05,15,400 and 79,79,567 respectively while the total expenditure for the same years is 4,35,19,041, 5,17,70,212 and 4,72,28,210 respectively. The yield of timber for the same years is 106.44 m^3, 102.06 m^3 and 221.58 m^3 while yield of fuel wood is 743.46 m^3, 2457.67 m^3 and4238.24 m^3 respectively. The statement showing Revenue and Expenditure for last 10 years is given in **Appendix 7.1** of Volume II.

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CHAPTER-8

STATISTICS OF GROWTH AND YIELD

SECTION I: GROWTH

The preliminary surveys of the forests included in this Working Plan give an idea that the crop is generally young to middle aged. The Western part of the division consists mainly of evergreen and semi evergreen species. The eastern part of the division is degraded and experiences low rainfall. Major part of this eastern portion is blank or under stocked. The stocking is extremely irregular. Good vegetation growth can be seen in the valleys and on higher ridges of hills.

Teak:

Information regarding growth of teak in the princely state of Kolhapur and Jahagiris was not collected before the merger. After merger, during revision of W.P. by Sh. Wagle, stump analysis of 12 sound teak trees having straight bole from three different forest types viz. moist deciduous forests, dry deciduous forests and Old teak plantations taken up in the moist deciduous forest area, was done. The result of analysis is produced below from Wagle's Working Plan for ready reference.

Table 11
Stump Analysis

Type of forest / No. of trees	Age	Height in ft.	G.B.H. in inch	Volume ft^3	C.A.I.	M.A.I.
Moist deciduous forest (Natural teak trees) /4 nos.	10	10.5	6.03	0.198	0.0198	0.0198
	20	21.2	13.00	1.795	0.1597	0.0897
	30	28.0	18.80	3.828	0.2093	0.1296
	40	31.5	22.80	5.100	0.1212	0.1275
	50	32.8	25.10	6.200	0.1100	0.1240
	60	33.2	27.10	6.500	0.0300	0.1083
	70	34.0	28.01	6.904	0.0404	0.0987
Dry deciduous forest (Natural teak trees) /5 nos.	10	13.7	5.53	0.190	0.0190	0.0190
	20	23.6	12.60	2.583	0.2397	0.1293
	30	29.6	18.50	4.143	0.1556	0.1381
	40	32.4	22.60	5.600	0.1457	0.1400
	50	32.5	24.10	6.100	0.0500	0.1220
	60	---	---	---	---	---
	70	---	---	---	---	---
Old teak plantation taken up in the moist deciduous forest / 3	10	13.0	6.72	0.360	0.0360	0.0.60
	20	22.3	11.68	0.901	0.0541	0.0455
	30	30.5	15.61	2.161	0.1260	0.0720
	40	37.7	18.84	3.604	0.1443	0.0901

As natural teak trees have nearly vanished from the forests of Kolhapur, stem analysis was not done during the revision of the WP by Kate and Bapat. Even if stem analysis of existing rare teak trees is done, same can not be considered to be representative for future plantations. Therefore it has not been done during this revision also.

Two old teak plantations at Salwan in Gaganbawada range are in very good condition. Kate and Bapat analysed the data pertaining to these plantations. Information regarding standing crop of these plantations and its analysis is given below. Though the growth is not representative, it can provide certain guidelines.

Table 12

Teak plantation Year 1945-46 Salwan forest survey No. 49, 50
Moist deciduous forest area 4.82 ha. Average ht. 12 to 15 metre
Period of measurement Jan. 1985

Girth class cms	No. of trees	Avg. girth in cms	No. of trees x avg. girth	Production multiplication factor	Expected yield in cum.
Under 22	12	015.0	00180.00	0.014	00.168
22 to 30	195	026.0	05070.00	0.014	02.730
30 to 45	293	037.5	10987.50	0.021	06.153
45 to 60	343	052.5	18007.50	0.028	09.604
60 to 90	568	075.0	42600.00	0.084	47.712
90 to 120	219	105.0	22995.00	0.182	39.858
120 to 150	40	135.0	05400.00	0.301	12.400
150 to 180	12	165.0	01980.00	0.504	06.048
Above 180	2	180.0	360.00	0.630	1.260
Total	**1684**	**---**	**107580.00**	**---**	**125.933**
Weighted average girth	---	63.88	---	0.0748	0.0018
Annual increment	---	1.597	---	Growth / ha	0.629
Stock per ha. (No. of trees)	349.38	On 40th year			25.16 cum

Table 13

Teak plantation Year 1949-50
Moist deciduous forest
Avg ht 12 to 15 metre

Salwan forest survey no. 26, 27
Area 2 ha.
Period of measurement Jan. 1985

Girth class	No. of trees	Avg. girth in cms	No. of trees X avg. girth	Production multiplication factor	Expected yield in cum.
Under 22	39	15.00	585.00	0.014	0.546
22 to 30	184	26.00	4784.00	0.014	2.557
30 to 45	283	37.5	10612.50	0.021	5.943
45 to 60	243	52.5	12757.50	0.028	6.8043
60 to 90	130	75.00	9750.00	0.084	10.920
90 to 120	12	105.00	1260.00	0.182	2.184
120 to 150	4	135.00	540.00	0.301	1.204
150 to 180	---	165.00	---	0.504	---
Above 180	1	180.00	180.00	0.630	0.630
Total	**896**	**---**	**40468.50**	**---**	**30.788**
Weighted average girth	---	45.17		0.0344	0.0010
Annual increment	---	1.255			0.4480 / ha
Stock per ha. (No. of trees)	448	On 36th year			16.128 cum.

Conclusion:
It is observed from the above data that teak plantations taken in moist deciduous forest area yield very good results. Resulting crop is expected to be of IV a quality. If forty years rotation is fixed, average 20 cum. teak timber can be produced from such plantation. Average height and girth class will be 12 to 15 mt. and 45 to 60 cms respectively.

Eucalyptus:

Eucalyptus plantations in Kolhapur division were done mostly during the period 1964-65 to 1971-72 under five years plan in moist deciduous forest areas of Chandgad, Ajara and Gargoti ranges. Species planted were mostly Eucalyptus grandis, Eucalyptus citriodora and hybrid.
Enumerations of these plantations were done during 1978-79 by forest resources survey scheme unit. Summary of the enumeration is reproduced below from WP by Mr. Kate and Mr. Bapat.

Eucalyptus stock in Kolhapur division

Plantation year (1978-79)

Table 14

Girth class in cms	Chandgad range 1232 ha. stock in cum. / %	Ajara range 279 ha. stock in cum / %	Gargoti range 231 ha. stock in cum / %	Kolhapur div. Total 1742 ha. stock in cum / %
5-10	109.73 / 0.58	29.49 / 1.17	24.19 / 1.21	163.41 / 0.70
10-15	270.72 / 1.43	81.84 / 3.25	84.12 / 4.22	436.48 / 1.87
15-20	425.63 / 2.25	115.54 / 4.59	106.49 / 5.35	647.66 / 2.77
20-25	629.87 /3.33	156.48 / 6.22	146.36 / 7.35	932.71 / 3.99
25-30	942.76 /4.99	237.25 / 6.22	146.36 / 7.35	932.71 / 3.99
30-35	1355.55 / 7.17	274.79 / 10.93	233.67 / 11.33	1854.01 / 7.92
35-40	1675.94 / 8.87	276.38 / 10.99	235.93 / 11.84	2188.25 / 7.92
40-45	2051.11 / 10.85	275.69 / 10.69	195.39 / 9.81	2522.19 / 9.35
45-50	2304.59 / 12.20	243.76 / 9.69	231.09 / 11.60	2779.44 / 11.88
50-60	3648.73 / 19.31	296.46 / 11.79	255.70 / 12.84	4200.89 / 17.95
60-70	2844.86 / 15.05	250.09 / 9.95	177.63 / 8.92	3272.58 / 13.98
Above 70	2637.42 / 13.97	277.10 / 11.03	122.04 / 6.13	3036.56 / 3036.56
Total	**18896.91 / 100.00**	**2514.67 / 100.00**	**1991.93 / 100.00**	**23403.51 / 100.00**
Per ha.	**15.33**	**9.01**	**8.62**	**13.43**

Results of the enumeration show that growth is irregular and stock per ha is not related to the age, girth or height of the crop. Enumeration done during the revision of working plan by Kate and Bapat confirmed irregular growth of eucalyptus plantations. Sample enumeration of one good quality plantation in Gargoti range and one best quality plantation in Chandgad range was carried out. The data collected is given below. The same can only be used as a guideline.

Table 15

Range – Chandgad
Year of Planting – 1969-70
Species – Eucalyptus
Area – 20 ha.
Average ht. 12 to 15 mt.

Village - Asagaon
Age – 15 years at the time of enumeration.
Spacement 2mt x 2 mt.
Period of enumeration Dec.1985

Girth class in cms.	No. of trees	Avg. girth in cms	No. x girth	Production multiplication factor	Expected yield cum.
Under 20	118	015.0	01770.0	0.0058	000.6844
20-30	711	025.0	17775.0	0.0162	011.5182
30-40	1358	035.0	47530.0	0.0410	055.6780
40-45	749	042.0	31832.5	0.0688	051.5312

45-50	686	047.5	32585.0	0.1035	071.0010
50-60	1330	055.0	73150.0	0.1337	177.8210
60-70	1242	065.0	80730.0	0.2018	250.6356
70-75	597	072.5	43282.5	0.2432	145.1904
75-80	480	077.5	37200.0	0.2845	136.5600
80-90	868	085.0	73780.0	0.3672	318.7296
90-100	616	095.0	58520.0	0.4499	277.1384
100-110	235	105.0	24675.0	0.5326	125.1610
110-120	122	115.0	14030.0	0.6153	075.0666
	9112	---	536860.0	----	1696.7154
Avg. growth	1	58.52	---	0.1862	000.01241
Per / ha.	455.6	---	----	---	005.65399
Stock / ha on 15th year 84.835 cum.					

Table 16

Range – Gargoti Village - Antiwade

Year of Planting – 1969-70 Age – 15 years at the time of enumeration.

Species – Eucalyptus Spacement 2mt x 2 mt. Area – 10 ha

Period of enumeration Dec 1985 Average ht 12 to 15 mtr

Girth class in cms.	**No. of trees**	**Avg. girth in cms**	**No. x girth**	**Production multiplication factor**	**Expected yield cum.**
Under 20	246	15.0	3690.0	0.0058	1.4236
20-30	788	25.0	19700.0	0.0162	12.7656
30-40	743	35.0	26005.0	0.0410	30.4630
40-45	311	42.5	13217.5	0.0688	21.3968
45-50	266	47.5	12635.5	0.1035	27.5310
50-60	459	55.0	25242.0	0.1337	61.3683
60-70	251	65.0	16315.0	0.2018	50.6518
70-75	74	72.5	5365.0	0.2432	17.9968
75-80	38	77.5	2945.0	0.2845	10.8110
80-90	50	85.0	4250.0	0.3672	18.3600
90-100	15	95.0	1425.0	0.4499	6.7485
100-110	4	105.0	420.0	0.5326	2.1304
110-120	1	115.0	115.0	0.6153	0.6153
Above 120	2	125.0	250.0	0.6980	1.3960
Total	**3248**	**---**	**131577.00**	**---**	**263.6613**
Avg. gowth	1	40.51	--	0.0812	0.0054
Per / ha.	324.8 on 15th year				26.366
Annual increment 1.75392					

Conclusion :

As per the tables given above it can be seen that average eucalyptus stock is 13.43 cum / ha. In Chandgad range it is 84.835 cum /. ha and in Gargoti range it is 26.313 cum / ha. As per enumeration done under the forest resources plan the stock is as given below.

1. Fuel wood production WC 59.618 cum / ha.
2. Conversion WC 24.283 cum / ha.
3. Selection cum Improvement WC 81.323 cum / ha.

Sample tree enumeration was done during preparation of Wagle's Working Plan. Enumerations were done in one chain wide strip in three different forest types viz. Semi evergreen, moist deciduous and dry deciduous forest.

Table 17

Type of forest: Semi evergreen Area enumerated: 68.4 acre (26.929 ha.)

Period: Nov. 1951- April 1952

Girth class in cms	No. of trees / acre	No. of trees / ha	Percentage of trees	Average wood volume /acre & ha.
Under 15	83.00	210.80	29.95	
15-30	80.00	203.50	28.95	
30-45	50.00	127.00	18.04	
45-60	30.00	76.20	10.83	
60-75	16.00	40.64	5.77	920 cum / acre
75-90	9.00	22.86	3.25	65 stacked cum/ha.
90-105	5.00	12.70	1.80	
105-120	2.25	5.72	0.81	
120-135	0.50	1.27	0.18	
135-150	0.50	1.27	0.18	
Above 150	0.75	1.91	0.271	
Total	**277.00**	**703.87**	**100.00**	

Table 18

Type of forest: Moist deciduous forest, timber yielding species area.

Girth class in cms	No. of trees / acre	No. of trees / ha	Percentage of trees
Under 15	68.93	179.10	35.31
15-30	49.47	125.65	25.34
30-45	31.17	79.17	15.97
45-60	20.32	51.61	10.41
60-75	15.32	38.91	7.85
75-90	6.70	17.02	3.43

90-105	1.91	4.86	0.98
105-120	0.85	2.16	0.44
120-135	0.43	1.08	0.22
135-150	0.11	0.27	0.05
Total	**195.21**	**495.83**	**100.00**

Table 19

Type of forest: Dry deciduous forest Species: Teak

Area enumerated: 5 acre (2.5 ha) Period: Nov. 1951 to April 1952

Girth class in cms	No. of trees / acre	No. of trees / ha	Percentage of trees	Average wood volume /acre & ha.
Under 15	37.20	93.00	19.44	Expected production from trees having GBH more than 30 cms. is 349 cu.ft / acre.
15-30	27.40	68.50	14.32	
30-45	53.60	134.00	28.00	
45-60	46.00	115.00	24.03	
60-75	19.00	47.50	9.93	
75-90	6.40	16.00	3.34	
90-105	1.60	4.00	0.84	
105-120	----	----	----	
120-135	0.20	0.50	0.10	
135-150	----	----	----	
Total	**191.40**	**478.50**	**100.00**	

Sample enumerations were carried out by FRSSU during revision of the WP by Kate and Bapat. Enumerations were carried out from October 1977 to June 1980 according to different WC of Wagle and Dashputre's Plan. Details are as given below.

Table 20

Name of WC	Total area in ha	Effective area enumerated	Percentage of area enumerated
Conversion W.C.	22455	14261	63.500
Fuel W.C.	50913	50881	99.937
SCI W.C.	9935	6799	68.435

Table 21

Name of WC	Area actually enumerated	Percentage	Method of enumeration
Conversion W.C.	483	3.39	Stratified random sampling
Fuel W.C.	2485	4.88	
SCI W.C.	648	9.53	

Results of the enumeration:

Table 22

Conversion WC

Forest types as per Wagle's Working Plan. Mixed moist deciduous forest

Total area: 14261 ha. Area enumerated: 483 ha

Percentage: 3.39

Period: 1979 – 80

Girth class in cms	No. of trees per ha.	Percentage	Production multiplication factor	Production cum /ha.
15-30	127.67	50.50	0.011	1.404
30-45	58.11	22.29	0.059	3.428
45-60	27.03	10.69	0.118	3.190
60-75	15.06	5.96	0.223	3.346
75-90	9.74	3.85	0.325	3.166
90-105	4.81	1.10	0.490	2.357
105-120	2.97	1.17	0.573	1.702
120-135	3.26	1.29	0.698	2.275
Above 135	47.15	1.65	0.823	3.415
Total	**252.81**	**100.00**	**---**	**24.283**

Conclusion:

After carefully study of data it was observed that the average no. of trees in this Working Circle was 252.81, 84 % of which belonged to girth classes' between 15 to 60 GBH. Percentages of Ain and Kinjal were 23 and 14 respectively. Average no. of Ain trees per ha was 58 of which 85 % belonged to 15 to 60 cms girth classes, 10 % to 60 to 90 cms girth class and 4 % belonged to more than 90 cms girth class.

Fuel Working Circle:

Table 23

Forest type as per Wagle's Working Plan. Sub tropical evergreen and semi evergreen forest.

Total area: 50881 ha. Area enumerated: 2485 ha.

Percentage 4.88 Period 1977 to 79

Girth class in cms	No. of trees per ha.	Percentage	Production multiplication factor	Production cum /ha.
15-30	360.07	48.05	0.011	3.961
30-45	212.36	28.34	0.059	12.529
45-60	88.00	11.74	0.118	10.384
60-75	39.66	5.29	0.222	8.805
75-90	21.98	2.93	0.325	7.144
90-105	9.89	1.32	0.490	4.846
105-120	6.51	0.87	0.573	3.730

120-135	5.16	0.69	0.698	3.602
Above 135	5.61	0.77	0.823	4.617
Total	**749.30**	**100.00**	**---**	**59.618**

Conclusion:

After carefully study of data it was observed that average no. of trees / ha. was 449.30, 50 % of which belonged to 15 to 30 girth class. 88 % stock belonged to girth classes between 15 to 60 cms. Ain, Anjani, Gela, Hadaka, Jamun and Kinjal constituted about 50 % of the stock. Anjani was the principal species having 113 trees per ha that is about 15 % of the stock. Timber species viz. Ain, Jamun, Nana made up about 19 % of the stock.

Selection cum Improvement Working Circle:

Table 24

Forest type as per Dashputre's Working Scheme: Semi evergreen and moist deciduous forest.

Total area: 6799 ha. Area enumerated: 648 ha.

Percentage: 9.53

Girth class in cms	**No. of trees per ha.**	**Percentage**	**Production multiplication factor**	**Production cum /ha.**
15-30	320.28	42.36	0.011	3.520
30-45	205.00	27.11	0.059	12.095
45-60	96.68	12.78	0.118	11.408
60-75	51.64	6.83	0.222	11.464
75-90	31.29	4.14	0.325	10.169
90-105	15.14	2.00	0.490	7.149
105-120	12.21	1.61	0.573	6.996
120-135	12.13	1.60	0.698	8.467
Above 135	11.89	1.57	0.823	9.782
Total	**756.26**	**100.00**	**----**	**81.323**

Conclusion:

Average no of trees / ha was 756.26 of which 82 % belonged to girth classes 15 to 60 cms., 11 % belonged to 60 to 90 girth class and 7 % to more than 90 cms girth class. General utility timber species viz. Ain, Anjani, Nana, Jamun, Teak constituted more than 35 % of the stock. Average no of Ain trees / ha was 96 and average no. of Anjani trees / ha was 74. These two were principal species of this working circle. Hirda, Salai and Sawar trees constituted 3 % of the stock.

Enumeration during present Plan

While revising the Plan by Kate and Bapat, the enumeration of the forest crop was carried out by the 'Forest Resources Survey Scheme Unit' Nashik along with the active cooperation of the field

staff from December 2004 to October 2005. The sampling design and overall technical guidance was given by the Chief Forest Statistician, MS, Nagpur. The sampling design of 'Systematic Line Plot sampling with random start' was adopted with the sample plot size of 20 x 20 metres i.e. 0.04 ha roughly at an interval of 600 metres. Out of total 476 plots which were laid in the field, 231 lied in the areas allotted to Protection cum Watershed Management WC, 145 in Improvement WC, 51 in SMC cum Afforestation WC and 49 in Old plantations Management WC of the present Plan. Around 19 hectare area out of total forest area of 1,38,971 ha is actually enumerated with a sampling intensity of 0.01 %.

The analysis of the data revealed the stocking of nearly 542 trees per hectare for the entire division. Stocking of trees per hectare for each of the WC is as follows: 726 for Protection cum Watershed Management WC, 601 in Improvement WC, 578 in Old Plantations Management WC and 264 in SMC cum Afforestation WC. A detailed statement showing Working Circle wise enumeration results is given in the **Appendix 8.1** of Volume II. A statement showing number of trees per hectare and their percentage distribution in various Working Circles as per the previous Plan is given in the **Appendix 8.2** of Volume II.

Table 25

No. of trees per hectare and their percentage distribution in various Working Circles

Sr. No.	Name of W.C.	General utility species	Special utility species	Other species	Grand total	NTFP Spp.
1	Prot cum Watershed WC	54.75	68.86	602.24	**725.85**	138.3
	% distribution	7.54	9.49	82.97	**100**	19.05
2	SMC cum Afforestation WC	27.44	31.85	204.55	**263.84**	27.93
	% distribution	10.4	12.07	77.53	**100**	10.58
3	Improvement WC	111.69	65.48	423.77	**600.94**	69.94
	% distribution	18.59	10.89	70.52	**100**	11.63
4	Old Plantation WC	80.60	40.29	456.61	**577.52**	24.48
	% distribution	13.95	6.98	79.07	**100**	4.23
	Total	68.62	51.62	421.79	**542.03**	65.16
	% of stock to total stock	12.65	9.53	77.82	**100**	12.02
	NTFP. Spp. shown in column no 7 are included in column no 3,4 and 5					

Table 26

A comparative statement of girth class wise percentage distribution to total stock of species
Survey Period: Dec 04 to Oct 05

Sr. No.	Working circle	GIRTH CLASS								
		16-30	31-45	46-60	61-75	76-90	91-105	106-120	121-135	ABOVE 135
1	Prot. Cum Watershed WC	39.91	25.76	15.15	8.59	5.59	2.45	1.24	0.49	0.82
2	SMC cum Afforestation WC	46.62	26.62	15.6	5.57	1.86	2.23	1.12	0	0.38
3	Improvement WC	51.44	25.76	10.7	5.08	3.25	1.18	0.94	0.42	1.23
4	Old Plant. M WC	39.48	32.95	14.66	6.88	3.54	1.68	0.36	0.18	0.27

SECTION 2: YIELD

Annual production of timber, fuel wood and charcoal in Kolhapur forest division during 1976-77 to 1986-87 was as given below.

Table 27

Type of produce	Average annual worked area	Average annual production cum.	Average annual production per ha. cum.
Timber	516.73	2263.68	3.650
Fuel wood		61661.73	99.440
Charcoal		1341.26 tones	2.250 tones

Some mature Eucalyptus plantations were sold in 1977-78. Production obtained from these plantations was as given below.

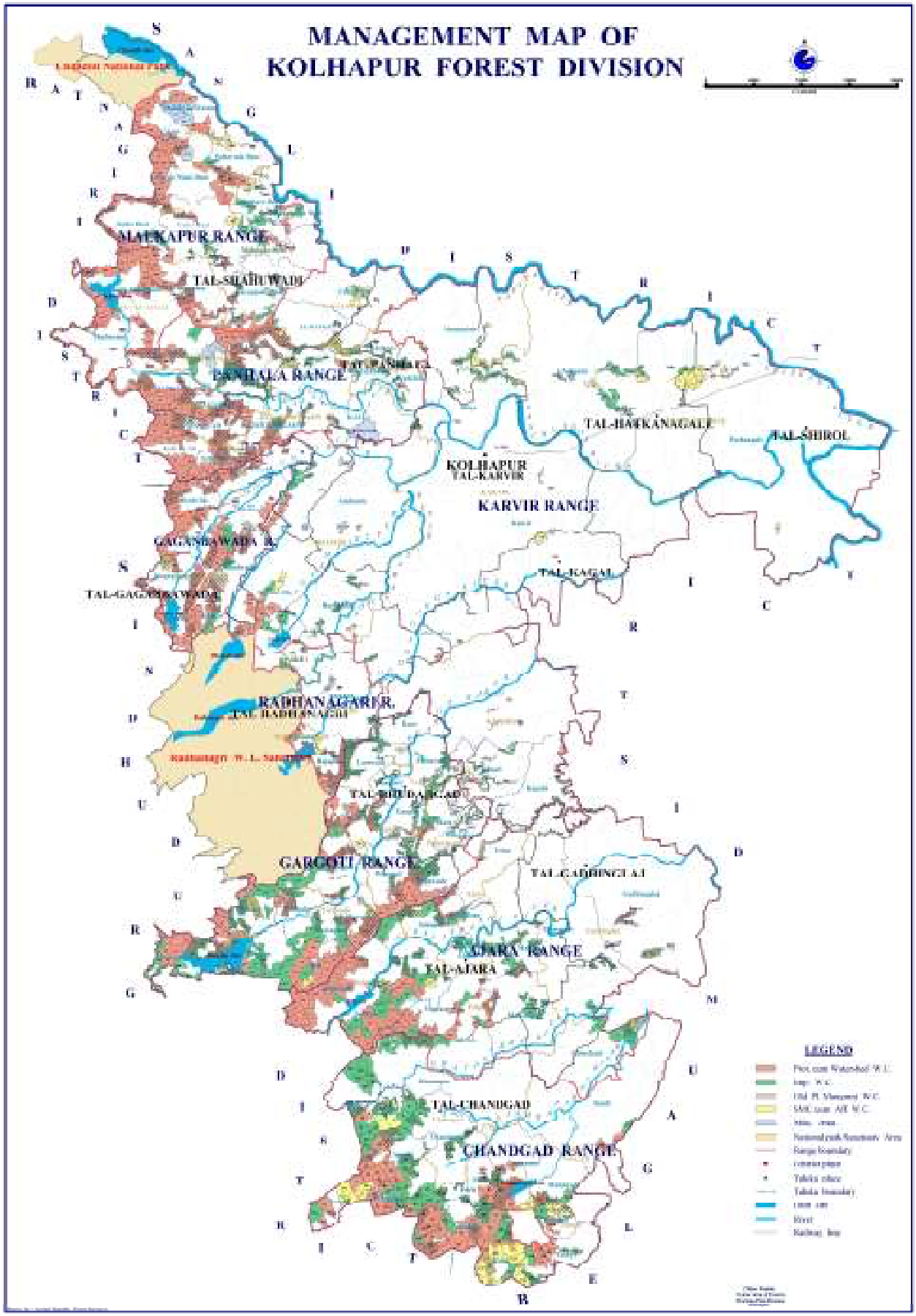
Table 28

Sr.No.	Range / village	Area of coupe in ha.	Production		Production per ha	
			Cum	Tonnes	Cum	Tonnes
1	**Gargoti**					
	Donwade	38.00	727.50	314.935	19.145	8.288
	Nitwade	24.00	227.25	98.377	9.469	4.099
2	**Ajara**					
	Karapewade	20.00	252.35	109.242	12.618	5.562
	Ajara	20.00	286.50	124.260	14.325	6.213
			71			

	Sulgaon	4.00	---	30.00	----	7.500
3	**Chandgad**					
	Kaliwade	12.80	----	40.00	----	3.125
	Total	**118.80**	**1494.60**	**716.814**	**----**	**----**

In the previous WP by Kate and Bapat, some yield was expected mainly from the Selection cum Improvement WC, which covered an area of 19,997.52 ha. However, prescriptions could not be implemented due to instructions to stop felling in Western Ghats by the Secretary (Forests), Revenue & Forests Department, Government of Maharashtra issued vide his letter No.TRS/1088/PR/265-F dated 7-6-1988. Therefore yield was not obtained as per the prescriptions in the previous WP. However the quantity of timber obtained and revenue realised from the forest offence cases and wind-fallen material during the year 2000-01, 01-02, 02-03 is 86 m^3 (Rs. 1.98 lakhs), 95 m^3 (1.43 lakhs), 47 m^3 (Rs. 0.37 lakhs) respectively.

The thrust in the present WP is on conserving the forests in the Western Ghats and therefore only improvement fellings have been prescribed. The anticipated yield shall be around 100 cum timber and 1000 cum of fuel wood by way of improvement felling and thinning earning revenue of Rs. 3.50 lakhs approximately. In addition, an annual harvest of around 15,000 bamboos shall also yield around 1.50 lakhs annually.


MANAGEMENT MAP OF
KOLHAPUR FOREST DIVISION
MALKAPUR RANGE
TAL-SHAHUWADI
PANHALA RANGE
TAL-PANHALA
TAL-HATKANANGALE
TAL-SHIROL
KOLHAPUR
TAL-KARVIR
KARVIR RANGE
GAGANBAWADA R.
TAL-GAGANBAWADA
TAL-KAGAL
RADHANAGARI R.
TAL-RADHANAGARI
TAL-BHUDARGAD
GARGOTI RANGE
TAL-GADHINGLAJ
AJARA RANGE
TAL-AJARA
TAL-CHANDGAD
CHANDGAD RANGE
LEGEND

PART - II

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED

CHAPTER –9

BASIS OF PROPOSALS

SECTION 1: NATIONAL FOREST POLICY

The National forest policy for India was enunciated in the years 1894, 1952 and 1988. As per the Resolution No. 3.1/86- F. P, dated 7th Dec. 1988 of the Ministry of Environment and Forest 'National Forest Policy 1988" has come into force prescribing a new strategy for forest conservation. *The basic objectives governing the new Policy are:*

1. Maintenance of environmental stability through preservation and where necessary, restoration of the ecological balance that has been adversely disturbed by serious depletion of the forests of the country.
2. Conserving the natural heritage of the country by preserving the remaining natural forest with the vast variety of flora and fauna, which represent the remarkable biological diversity and genetic resources of the country.
3. Checking soil erosion and denudation in the catchment areas of rivers, lakes, reservoirs in the interest of the soil and water conservation for mitigating floods and droughts and for the retardation of siltation of reservoirs.
4. Checking the extension of sand dunes in the desert areas of Rajasthan and along the coastal tracts.
5. Increasing substantially the forest tree cover in the country through a massive afforestation and social forestry programme, especially on all denuded, degraded and unproductive lands.
6. Meeting the requirements of firewood, fodder, minor forest produce and small timber of the rural and the tribal population.
7. Increasing the productivity of forests to meet essential national needs.
8. Encouraging efficient utilization of forest produce and maximizing substitution of wood.
9. Creating a massive people's movement with the involvement of women for achieving these objectives and to minimize pressure on existing forests.
10. The derivation of direct economic benefit must be subordinated to the environmental stability and maintenance of the ecological balance.

SALIENT FEATURES OF THE NATIONAL FOREST POLICY, 1988:

1. The National goal is to have a minimum of 1/3rd of the total land areas under forests or tree cover.

2. Severe restrictions on schemes and projects which interfere with forests that clothe the steep slopes, catchments of the rivers, lakes and reservoirs.

3. No working of forests without the Government having approved the management plan.

4. No introduction of exotics without long term scientific trials.

5. The rights and concessions, including grazing, should always remain related to the carrying capacity of the forests.

6. Rights and concessions from forests should primarily be for the bona-fide use of the communities living within and around forest areas, specially the tribals.

7. The rights and concessions enjoyed by the tribals and the people living around forests should be fully protected. Their domestic requirements for firewood , fodder, minor forest produce and construction timber should be the first priority.

8. On the front of domestic energy, firewood needs to be substituted as far as practicable with alternate sources like bio-gas, LPG and Solar energy.

9. Diversion of forest lands for non-forestry purposes should be subjected to careful scrutiny. Projects which involve such diversion should provide funds for compensatory afforestation.

10. Forest management plans should take special care for needs of wildlife conservation.

11. Effective action should be taken to prevent encroachments on forest land and not to regularize the existing encroachments.

12. Forest based industries should raise the raw material needed by themselves in arrangements with the private cultivators.

13. People should be made forest conscious by extension activities.

14. Survey of forest Resources should be completed on scientific lines for updating information.

SECTION 2: FOREST CONSERVATION ACT, 1980

In the past large tracts of forest lands were dis-forested for providing land for different developmental projects such as irrigation dams, hydro-electric projects, roads, railways, transmission lines, rehabilitation of project affected persons etc. As the country was already short of the desired forest cover, the need for some legislation to restrict and regulate further diversion of forest lands in the name of developmental projects resulted in the Forest Conservation Act, 1980. It came into force from the 25th Oct. 1980 and extends to the whole of India, except the State of Jammu and Kashmir. It places restrictions on

the de-reservation of forest or use of forest land for non forestry purposes. It mainly stipulates that -

1. No State Government or other authority shall make, except with the prior approval of the Central Government, any order directing that any reserved forest or any portion thereof shall cease to be reserved and that any forest land or any portion thereof may be used for any non-forestry purpose.
2. The Central government may constitute a committee to advise the Government with regards to this Act and any other matter connected with the conservation of forests.
3. The Central Government may by notification in the Official Gazette make rules for carrying out the provisions of this Act.

SECTION 3: THE MAHARASHTRA FOREST DEPARTMENT'S MISSION

The Maharashtra Forest Department carried out institutional reforms under the Maharashtra Forestry Project and came out with a clear mission statement and objectives of the Forest Department. This mission and the objectives were approved by the Govt. of Maharashtra vide GR No. R&FD-FDM/1098/CR-540/F-11 dated 22nd April 1998. The mission statement and the objectives are as follows-

The Mission

To activate the sector by catalyzing the positive involvement of all the stakeholders in enrichment, expansion and sustainable development of the forest resources by being a responsive and transparent learning organization.

Core Elements of the Mission

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

Primary Objectives

Sectoral

- To recommend to the State and Central government, policies which will provide an enabling environment for various non-governmental players to play an active role in this sector.
- To generate and disseminate knowledge and information relevant to the sector to various stakeholders and provide Research & Development support to the sector.

- To regulate the activities of various players involved in forestry sector development.
- To undertake and co-ordinate planning along with the other government departments and agencies
- To develop a pro-active interface with the political and executive arm of the government and public.
- To act as a nodal agency at the grass-root levels in the forest lands.

Institutional

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

Operational

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

SECTION 4: FACTORS AFFECTING THE GENERAL OBJECTIVES OF MANAGEMENT

1. The area falls within the fragile Western Ghats eco-system and has an undulating topography with moderate to steep and precipitous slopes at places. Hence emphasis will be laid on conservation of bio diversity existing in the areas.

2. The entire tract is well drained by rivers and their tributaries. Many dams have been constructed over these rivers. There is a need to provide vegetation cover as well as other SMC measures in the catchment areas of these reservoirs.

3. The vast tract of the forests has young to middle aged crop which require improvement through silvicultural operations with an emphasis on improving the wildlife habitat.

4. There are certain areas that are under-stocked and degraded and therefore require to be afforested. While there are certain areas that have been successfully regenerated and old plantations over these areas need to be managed.

5. The local people depend upon the forest for fuel wood, fodder, and minor forest produce like grass, agave, medicinal plants etc. The NTFP in the area has low productivity and highly amorphous forward linkages. The village communities need to be involved in managing and sharing the forest resources in and around their villages under J.F.M.

6. The area gets a heavy average rainfall of about 4000 mm. per year but most of the valuable rain water goes waste as run-off into the streams, rivers and ultimately into the sea. Therefore a large tract of this division faces shortage of water during the summer months.

7. The wildlife in the tract has reduced considerably over the years. Yet the incidents of man-animal conflict involving wild elephants have taken a serious proportion and need effective management.

SECTION 5: GENERAL OBJECTIVES OF MANAGEMENT

1. To conserve and improve the biodiversity and composition of the growing stock of the western ghat eco-system and to increase the productivity of the forest by employing various silvicultural operations.
2. To protect and improve the catchment areas to minimise soil erosion and to reduce the rate of siltation in these reservoirs.
3. To preserve, protect and improve the forest cover and to prevent soil erosion by taking up afforestation and by adopting suitable soil and moisture conservation measures.
4. To raise the plantations to meet future demand for fuel, fodder, poles and timber and to tend and help the NR to establish through various silvicultural operations.
5. To manage old successful plantations by using various tending operations and by improving hygienic conditions in the stand.
6. To improve the stocking of various NTFP species in the forest and to enhance their yield and collection by employing improved management and collection techniques.
7. To meet the requirements of small timber, firewood and fodder of the local people, as far as possible.
8. To improve the habitat for the wild-life and to try to reduce conflict situations between humans and wild elephants.
9. To develop and improve various eco-tourism destinations to improve public awareness in favour of forests and wildlife.
10. To involve the local village communities in managing and sharing the forest resources and financial benefits in and around their villages under J.F.M. and eco-tourism projects.

SECTION 6: FUNCTIONAL CLASSIFICATION OF FORESTS

The state government vide R & FD resolution no. MRF-1365/1322 11/Y dated December 6, 1968 recognized following classes of forests on functional basis:

Protection forests: It includes forests on very steep slopes (25^0 and above) or along river banks and forests that have become depleted due to maltreatment and further exploitation of

which shall accentuate soil erosion and adversely affect the productivity of agricultural lands in the lower region. The management shall aim at soil and moisture conservation measures.

a. *Tree forests*: These forests are situated in remote areas on which there is little or no local demands and which are mainly capable of growing large sized timber and other products of commercial value.

b. *Minor forests*: It includes forests that are interspersed with cultivated lands and the areas capable of producing small timber and firewood and providing grazing which are indispensable needs of the adjoining population.

c. *Pasture forests*: These are openly stocked forests or scrub lands that have ceased to yield even small timber but which are conveniently situated for providing grazing to the cattle.

d. *Miscellaneous forests*:

i. *Grass reserves*: They are small block of forests situated amidst intensively cultivated tracts carrying scrubby growth and are capable of producing good fodder grasses.

ii. *Remaining areas*: Areas needed for other purposes

SECTION 7: METHOD OF TREATMENT TO BE ADOPTED

The forests must be effectively protected against illicit-cutting, unregulated grazing and forest-fires. Natural regeneration by seeds, wherever present will be properly tended. For planting, local tree species will be preferred and participation of local villagers in various forestry activities like afforestation and protection will be encouraged. Keeping in view the general objects of management mentioned above and as per the functional classification of the forests, different classes of the forests shall be treated as follows:

Protection Forests:

The protection forests are mainly situated in the Western and Southern part of the Kolhapur division. These forests are situated on the steeper slopes, the watershed areas and along nalla banks. These areas are mainly allotted to 'Protection cum Watershed management' WC. No felling is prescribed in these areas. NTFP can be harvested. Most of these forests are situated mainly on the higher ridges in the division and belong to site quality III, IVa and IV b. These forests form important corridors ensuring contiguity and connectivity in the Western Ghat Ranges.

Tree Forests:

This category includes all such forests which are capable of growing small to medium sized timber and other products of economic value. These forests also give some NTFP. Such forests occur in Gargoti, Ajara, Chandgad and Malkapur Ranges of the division. Due to over exploitation in the past the percentage of valuable species has diminished. Timber yield is much

less than the demand. The productive capacity of the area is otherwise good. Many old successful plantations are also seen in these areas. Therefore these areas will mainly be tackled under the 'Protection cum Watershed Management WC' and 'Improvement Working Circle' while areas under successful plantations shall be tackled under 'Old Plantations Management WC'.

Minor Forests:

The site quality is generally IV 'a' and IV 'b'. These forests are in general mostly devoid of mature tree crop and include degraded sites fit for afforestation. The crop is malformed and pollarded at places. They need tending operations. These areas have been allotted either to the "Improvement Working Circle" or 'SMC cum Afforestation WC'.

Pasture Forests and Grass Reserves:

Such areas are scattered throughout the division. They are devoid of much tree growth and have shallow soil cover. These areas have mainly been allotted to 'Improvement Working Circle' and 'SMC cum Afforestation WC'. Areas carrying successful old plantations have been allotted to 'Old Plantations Management WC'. An overlapping 'Fodder Reserve WC' has also been constituted to take care of the areas carrying good fodder grasses.

SECTION 8: ANALYSIS & VALUATION OF THE CROP

The stock mapping work has been carried out on toposheets of 4 inch = 1 mile for Chandgad range and on village maps with scale 8 inch = one mile for rest of the division. It has been observed that the eastern part of the division comprises mostly of under stocked forests. These areas receive little rain fall. The Western portion of the division as well as the Southern portion receives very high rain fall and are extremely hilly and rugged. These areas carry well stocked forests. The analysis of the data revealed the stocking of nearly 542 trees per hectare for the entire division. Stocking of trees per hectare for each of the WC is as follows: 726 for Protection cum Watershed Management WC, 601 in Improvement WC, 578 in Old Plantations Management WC and 264 in SMC cum Afforestation WC. The details for the division are given in the Chapter 8 on 'Statistics and Growth' and for each WC are given in the respective Chapters ahead. A statement showing WC wise details of enumeration results is given in **Appendix 8.1** of Volume II.

SECTION 9: FORMATION OF WORKING CIRCLES

Keeping in view the objectives of management and methods of treatment, the following 4 main Working Circles along with 4 overlapping Working Circles are constituted:

Table 29
Area allotted to various Working Circles

Sr. No.	Working Circle	Area allotted (ha.)	%age of area allotted
1.	Protection cum Watershed Management WC	68,834.38	49.53%
2.	Improvement Working Circle	39,014.61	28.07%
3.	Old Plantation Management Working Circle	13,253.44	9.54%
4.	SMC cum Afforestation Working Circle	10,279.55	7.40%
5.	Bamboo Management (O.L.) Working Circle	----	
6.	Wild Life Management(O.L.) Working Circle	----	
7.	Fodder Resources Mngmnt (OL) Working circle		
8.	NTFP Management (O.L.) Working Circle	----	
	Other		
	Miscellaneous area	7,589.02	5.46%
	TOTAL	**1,38,971.00**	

1. Protection cum Watershed Management Working Circle

This Working Circle includes the catchment areas of Radhanagari, Tulsi, Dudhganga, Warna, Kasari, Patgaon, Kumbhi, Kadbi, Chitri, Chikotra, Jangamhatti, Dhamni, Jambhare, Ghatprabha, Hiranyakeshi, Sarfnalla reservoirs. The water from these reservoirs is mainly used for hydro electricity generation, drinking water supply and for irrigation. This Working Circle also includes the forests areas situated on steep to very steep and precipitous hill slopes of Western Ghats and other hill ranges. Such typical forest areas are situated mostly in the western and southern part of the Kolhapur division. The rainfall in these areas during monsoons is very heavy.

2. Improvement Working Circle

This WC includes forests which have the capacity to produce good quality timber and fuel wood for use in the future but as of now need improvement measures including singling and cut back operations, improvement fellings as well as SMC measures. The forest areas in the Western and Southern portions of the district where the slopes are not very steep are allotted to this Working Circle.

3. Old Plantations Management Working Circle

This WC includes all areas containing successful old plantations of Acacia auriculiformis, Eucalyptus, Miscellaneous species, Cashew and Teak.These areas are scattered throughout the

division in small patches. The prescriptions for their management will be different for each species and the emphasis will be on slow replacement of these species with local utility species.

4. SMC cum Afforestation Working Circle

The typical areas which are included in this WC are mainly from low rainfall areas. These areas are also suitable for taking up soil and moisture conservation works. Afforestation works are recommended only after taking adequate SMC works. Earlier some plantations that were taken up in these areas had low survival percentage due to fire damage and heavy biotic pressure etc. The top soil has been washed away from most of the areas. The areas are mostly barren. Hence intensive soil and moisture conservation measures need to be taken up in these areas. Afforestation will be done only after the water regime and the soil conditions are improved in these areas.

5. Bamboo Management (overlapping) Working Circle

Bamboo is found mainly along the hilly slopes and along the nallahs in scattered but dense patches in Chandgad, Ajra, Gargoti and Malkapur ranges of Kolhapur division. Old bamboo plantations and naturally occurring bamboo are included in this WC. These bamboo clumps have never been worked before and require immediate management interventions.

6. Wild life Management (overlapping) Working Circle

Habitat improvement works, strengthening corridors along its Western Ghats i.e. Radhanagari Sanctuary and Chandoli National Park, reduction of man animal conflict and strengthening of the infrastructure to handle wild life emergencies will be aimed at in these areas.

7. Fodder Resources Management (overlapping) Working Circle

This Working Circle overlaps with the forest areas which were previously allotted to 'Fodder Reserve WC' in Kate and Bapat's Plan but have now been allotted to various WCs. In these Kuran areas prescriptions regarding developing fodder resources as given in the previous WP were not followed and instead large scale plantations of Acacia auriculiformis, Glyricidia etc. were taken in these areas in the past. As a result, areas with good growth of grasses are very few and are found scattered in between largely degraded Kuran areas. These areas need to be revived with luxuriant growth of fodder grasses.

8. Non Timber Forest Produce (overlapping) Working Circle

In Kolhapur division harvesting of NTFP is being done through contractors or co-operative societies. The important NTFP are Tamal patra, Cashew fruits, Shikekai pods, Gum, Kokam, Hirda, Awala, Curry leaves etc. This WC deals with the management including utilization of the NTFP resource base on sustainable basis.

9. Miscellaneous Area

This chapter includes those areas that cannot be effectively managed due to encroachments, forest diversions and legal or administrative hurdles.

SECTION 10: BLOCKS AND COMPARTMENTS

In the previous Working Plan by Kate and Bapat, forest areas of the Kolhapur division, were divided into compartments for the first time. This Plan includes all the Reserved forests,

Protected forests, Acquired forests, Unclassed forests and areas handed over to the forest department for compensatory afforestation work under the FC Act. For the newly included areas in the Working Plan, new compartment numbers have been given wherever necessary by suffixing the letter (A) to the old compartment no. when the new area is adjoining to the existing compartment / village. When the new area is far away from the existing compartment or in a new village then a different compartment number has been given. The previous Plan had a provision to allow inclusion of new compartments by leaving out some numbers serially for each Range. This list of compartments for each Ranges and for each Working Circle has been given in the Volume II.

SECTION 11: PERIOD OF THE PLAN

The period of the WP will be for ten years that is from the year 2008-2009 to 2017-2018. The Plan prescriptions will be implemented only after the receipt of approval from Government of India. The mid term review of this Working Plan shall be undertaken in the 5th year of its implementation.

CHAPTER – 10

PROTECTION CUM WATERSHED MANAGEMENT WORKING CIRCLE

SECTION 1: GENERAL CONSTITUTION

This Working Circle includes catchment areas of major and minor irrigation and hydro electrical projects in Kolhapur district as well as forest areas with steep to precipitous slopes of more than 25^0 as included in Kate and Bapat's Plan.

The forest areas from Malkapur, Panhala, Radhanagari, Gaganbawada, Gargoti, Chandgad, and Ajara ranges, situated in the Western Ghats are included in this W.C. The majority of the area is hilly and with rugged terrain. The mean annual rainfall in these areas ranges between 2000 mm to as high as 6000 mm. These are highly vulnerable areas where retention of tree cover is essential to protect the soil from erosion and laterization due to heavy rainfall.

Protection areas

This Working Circle includes the catchment areas of Radhanagari, Tulshi, Dudhganga, Warana, Kasari, Patgaon, Kumbhi, Kadvi, Chitri, Chikotra, Jangamhatti, Dhamni, Jambhre, Ghatprabha, Hiranyakeshi and Sarfnalla reservoirs. The water from these reservoirs is mainly used for hydro electricity generation, drinking water supply and for irrigation. The precipitous slopes are mostly devoid of tree growth and vegetation occurs only in sheltered valleys and on steep slopes which are inaccessible. A list of compartments included in Catchment areas is given in **Appendix 10.1** of Volume II.

The areas were previously allotted to mainly 'Protection WC', Afforestation for SMC WC', 'Selection cum Improvement WC' and 'Fodder Reserve WC'. The area included in this Working Circle is 68,834.38 ha that is 49.53% of the total area being dealt in this Plan.

Table
Allotment of area

Sr.No.	Range	Area of the Range	No.of compartment			Area Allotted to the WC	% to area of the range	% to area of the division
			Full	Part	Vill			
1	Chandgad	27,225.04	50	12	0	11,364.01	41.74	8.18
2	Ajara	18,701.98	56	13	0	8,400.89	44.92	6.05

3	Gargoti	25,350.78	48	21	0	10,974.13	43.29	7.90
4	Radhanagari	02,573.07	4	7	0	1,039.06	40.38	0.75
5	Karvir	13,297.17	19	0	0	1,951.13	14.67	1.40
6	G. Bawada	11,584.05	45	27	0	8,251.55	71.23	5.94
7	Panhala	20,293.81	62	38	0	11,765.64	57.98	8.47
8	Malkapur	19,945.10	92	23	0	15,087.97	75.65	10.86
	Total	**1,38,971.00**	**376**	**141**	**0**	**68,834.38**	**-------**	**49. 53**

SECTION 2: GENERAL CHARACTERS OF THE VEGETATION

The forests included in this Working Circle are mix of 'Southern moist mixed deciduous' forests type i.e. 3B/C2 and 'West Coast semi evergreen' forest type i.e. 2A/C2 as per Champion and Seth's revised survey of the forest types of India.

The site quality ranges between IV-b to IV-a. Occasional patches of site quality III are observed on gentle slopes or in valleys but such areas are negligible in extent. The areas occurring on very steep and precipitous slopes are almost blank with shrubby growth of Karvi (Carvia callosa), Lokhandi (Ixora nigricans), Pandhari (Murraya exotica), Rametha (Lasiosiphon eriocephalus) and Euphorbias. There is hardly any tree-growth over vast stretches of exposed rocks, which have little or no soil cover while it is fairly dense in patches on gentle and moderate slopes. The quality in sheltered patches and valleys is better as compared to the areas exposed to high velocity winds, mist and foggy atmosphere during the monsoon where it is stunted and malformed. In general evergreen species show stunted growth with a height of 5-8 metres. Evergreen species such as Anjani (*Memecylon edule*), Jamun (*Syzigium cumini*), Amba (*Mangifera indica*), Hirda (*Terminalia chebula*), Kinjal (*Terminalia paniculata*), Karanj (*Pongamia pinnata*) and Gela (*Randia dumatorum*) occur in the upper canopy, while Rametha (*Lasiosiphon eriocephalus*), Shendri (*Mallotus philipinensis*), Karvi (*Carvia callosa*), Karvand (*Carissa carandus*), Lokhandi (Ixora arborea) and Pandhari (*Murraya exotica)* are noticed as undergrowth. Bamboos are found in some areas on slopes. A few trees of Shikekai (*Acacia concinna*) and occasionally Canes (*Calamus spp*.) are seen along with Chivar kathi Bamboo

Anjani (Memecylon edule) : A Prominent tree spp.

(*Oxytenanthera monostigma*). In 'Southern moist mixed deciduous' forest type species like Ain, Kinjal, Hirda, Nana, Shisham, Behada etc are found.

SECTION 3: SPECIAL OBJECTIVES OF MANAGEMENT

1. To conserve the Biodiversity in the ecologically sensitive and biodiversity rich Western Ghats falling in Kolhapur forest division.
2. To maintain the existing vegetal cover on the hills to prevent soil erosion due to heavy rainfall and to conserve the water.
3. To protect and improve the catchment areas to minimise soil erosion and to reduce the rate of siltation in these reservoirs.
4. To protect, maintain and improve the existing vegetation for the protection and maintenance of the physio-geographic and climatic factors of the locality and to ensure that the vegetal contiguity of the Western Ghats is not broken to prevent isolation of species.

SECTION 4: COMPARTMENTS AND WORKING SERIES

The compartments allotted to the Working Circle and the statement showing the Working Series and sequence of working of annual coupes are given in the **Appendices - 10.2 and 10.3** of volume II respectively. A coupe that could not be worked in the designated year, shall be worked in the next year along with the current years coupe.

SECTION 5: ANALYSIS AND VALUATION OF CROP

i. *Stock- mapping* :

The stock-mapping was done with the help of local territorial staff. Steep and precipitous slopes are practically blank and devoid of any tree growth due to absence of soil in the exposed rocks. There is however dense growth of evergreen species in the valleys comprising Amba (*Mangifera indica*), Jambhul, Hirda (*Terminalia chebula*), Kalamb (*Mitragyna parviflora*), Gela (*Randia dumatorum*), Anjani (*Memecylon edule*) etc. The stock mapping results indicate nearly 88 % area to be well stocked while nearly 8% area is under stocked. The details of the stock mapping exercise for the areas included in this Working Circle are given in **Appendix 10.4** of Volume II while the abstract of the result is given below:

Table 31

Extent of planimetered area as per stock maps

Sr.No.	Range	Well Stocked area(ha)	Under Stocked area (ha)	Eroded and Scrub(ha)	Total (ha)
1	Chandgad	10,526.131	585.188	252.691	11,364.01
2	Ajra	7,787.691	497.322	115.877	8,400.89
3	Gargoti	9,797.12	515.009	662.001	10,974.13
4	Radhanagri	819.289	59.486	160.285	1,039.06
			85		

5	Karvir	1,814.542	136.588	0	1,951.13
6	Gaganbawada	7,241.129	508.71	501.711	8,251.55
7	Panhala	9,658.809	1,093.409	998.172	11,750.39
8	Malkapur	12,673.797	2,048.376	365.797	15,087.97
	Total	**60,318.508**	**5,444.088**	**3,056.534**	**68,819.13**
	% to WC	**87.65**	**07.91**	**04.44**	**------**

** An extent of 15.26 ha. (Injoli vill. 7.06 ha. and Kolik vill. 8.19 ha. of Panhala range) area received for comp. afforestation was not stockmapped.*

ii. ***Age & Density*** **:**

The crop age varies from young to middle aged and the crop condition in general is stunted. Natural regeneration is adequate. The crop density varies from 0.3 to 0.7.

iii. ***Enumeration*****:**

Enumeration work in the field was completed by the FRSS unit, Nashik while its analysis was done in this office. Average total number of trees per hectare is found to be 726 out of which nearly 66% fall within 16-45 cm girth class while nearly 24% fall within a larger girth class of 46-75 cm. It implies majority of the crop is young and is in pole stage. Anjani, Jambhul, Ain, Hadaka and Gela are the top five species in terms of number of trees per hectare. Sixteen important NTFP species have been identified and listed below. Jambhul, Hirda, Amba, Aonla and Biba are the top five NTFP spp in the descending order. A detailed statement showing WC wise enumeration results is given in **Appendix 8.1** of Volume II.

Table 32
Number of trees per hectare

Girth Classes (cms)									
16-30	**31-45**	**46-60**	**61-75**	**76-90**	**91-105**	**106-120**	**121-135**	**Above 135**	**Total**
289.71	186.98	109.97	62.33	40.59	17.76	8.98	3.57	5.94	**725.85**

Table 33

Species having maximum number of trees/ha in descending order

Sr.No.	**Species**	**No. of trees / ha.**	**Percentage**
1	Anjani	116.12	16.00
2	Jambhul	73.27	10.00
3	Ain	46.00	06.34
4	Hadka	42.96	05.92
5	Gela	37.77	05.20
6	Kumbha	30.95	04.26
7	Nana	30.62	04.21
8	Kinjal	27.49	03.79
9	Hirda	27.05	03.73

Table 34

Estimated number of NTFP species per hectare

Sr. No	NTFP Spp.	No./ha
1	Jambhul	73.22
2	Hirda	27.05
3	Amba	11.80
4	Aonla	07.90
5	Bibi	04.53
6	Tamal patra	04.10
7	Palas	03.12
8	Karvand	02.38
9	Amruta	01.94
10	Karanj	01.83
11	Shikekai	01.78
12	Apta	01.62
13	Kokam	00.75
14	Wavding	00.58
15	Trifal	00.33
16	Kadi patta	00.11
	Total	**143.04**

SECTION 6: WORKING CYCLE

Working cycle shall be of 20 years duration.

SECTION 7: DEMARCATION OF COUPES AND PREPARATION OF THE TREATMENT MAP

Demarcation: The annual coupes shall be demarcated one year in advance.

Preparation of Treatment map:

After the demarcation of the coupe, a treatment map shall be prepared by the R.F.O. It shall be verified by the A.C.F. emphasising the suitability of sites for plantations if any as well as promising NR areas.

The following areas shall be shown distinctively in the map:

I. Area 'A' - Protection Areas: include following areas

i. Areas with steep slopes i.e. more than $25^{0.}$

ii. Eroded areas or areas liable to erosion.

iii. Twenty meters wide strip on either side of the water courses.

II. Area 'B' - Under stocked Areas: include areas with crop density less than 0.4.

III. Area 'C' - Old plantation areas: include areas under old plantations.

IV. Area 'D' - Well stocked areas: include areas with crop density more than 0.4.

The TM shall also show all prominent nallas, perennial sources of water, water bodies etc. which shall be numbered.

Treatment:

The various treatments proposed for the above mentioned areas are as follows:

I. Area 'A' :

i. The SMC works including nalla-bunding and gully plugging will be carried out wherever essential. Sites with perennial sources of water locally known, as 'jivant jhirra' should be tackled appropriately as explained under 'general prescriptions'.

ii. In the accessible under stocked areas having good soil depth, seed-dibbling shall be done to suitably clothe the area. Bamboo and other suitable species shall be planted in accessible under stocked areas within 20 meters wide strip on either side of water courses.

iii. Felling is not prescribed.

II. Area 'B' :

i. The SMC works like van tale, cement bandhs, nalla-bunding, gully plugging etc will be carried out wherever required. Sites with perennial sources of water locally known, as 'jivant jhirra' should be tackled appropriately as explained under 'general prescriptions'.

ii. Suitable miscellaneous species shall be planted in the accessible under stocked areas having good soil depth and which are more than 2 hectares in extent in a compact block. In smaller areas seed dibbling shall be done.

iii. Rooted stock shall be properly tended.

iv. Felling is not prescribed.

III. Area 'C' :

i. Felling or thinning is not prescribed.

IV. Area 'D' :

i. The SMC works like van tale, cement bandhs, nalla-bunding, gully plugging etc will be carried out wherever required. Sites with perennial sources of water locally known, as 'jivant jhirra' should be tackled appropriately as explained under 'general prescriptions'.

ii. No planting shall be done in these areas.

SECTION 8: GENERAL PRESCRIPTIONS

Most of the areas included in this Working Circle are situated in the Western Ghats and has hilly and rugged terrain. The main objective is to manage the runoff water and maintain the vegetation cover. This will mitigate the rate of soil erosion in the various catchments and will also check the silt inflow in the reservoirs, thereby increasing their life.

Hence the following prescriptions shall be followed:

1. Management of run-off water will be of utmost importance as most of the villages suffer from water scarcity for few months during summers. All major nallas, perennial sources of water, water bodies etc. shall be shown prominently in the treatment map. All prominent nallas shall be numbered and a plan shall be chalked out to treat all these nallas, gullies from ridge towards valley. Each selected nalla shall be treated completely with series of loose boulder structures (LBS) at the top to arrest the speed of the run off along with the fertile soil being washed away. At the appropriate sites downstream, water harvesting structures like forest tanks i.e. 'van talis', cement bandharas, Kolhapuri bandharas etc. shall be taken. In addition, various soil moisture conservation works like gully plugging, gabion structures, brushwood dams, Vanrai bandharas, contour bunding, contour trenching, van talis, cement plugs, etc. shall be done as per suitability and requirement of the area. Ridge to valley concept shall be followed while treating the watershed. Water level in the village wells shall be monitored regularly by the forest staff and raised water level in the village wells during the scarcity period or raised ground water level and resulting changes in land use pattern, and increased productivity of crops and vegetables shall be taken as indicators of success.

2. Sites with perennial sources of water locally known, as 'jivant jhirra' within the forest areas shall be identified and their locations shall be marked on the map of each Range, which shall be displayed prominently in each Range office. These sites shall be tackled appropriately through various means like desilting, deepening, , diverting small trickles into dug out troughs adjacent to nallahs, construction of Forest tanks locally known as 'Van-talis' or construction of cement bandharas in the nearby vicinity . This will ensure availability of water sources for wild animals and reduce straying of those animals into agricultural fields thus reducing conflict situations.

3. Accessible under-stocked areas with good soil-depth and more than 2 hectares in extent in a compact block shall be planted with suitable local species. In smaller areas, seed-dibbling shall be done to suitably clothe the area. Follow the various prescriptions for tending of regeneration in the accessible areas, which have been discussed under Section 8 of chapter on 'SMC cum Afforestation Working Circle'.

4. Any fellings in these areas will enhance the soil erosion and landslides. It is also not feasible to work these areas systematically and economically due to their remoteness and inaccessibility. Hence, no fellings are prescribed in this Working Circle. All areas included in this Working Circle shall be given complete protection.
5. Wind fallen material shall be removed from the accessible areas.
6. Collection of Non Timber Forest Produce (NTFP) shall be permitted according to prescribed Rules. Care shall be taken to not to cause any harm to the plants while collecting NTFP.
7. Each village in a watershed shall be taken as a unit of holistic development. It shall be endeavored to integrate forestry management interventions with development schemes of other departments under JFM, FDA, IWDP, DRDA, District Plan etc. for socio-economic upliftment of the village communities with an objective to develop clusters of villages in various watersheds. Proper linkages shall be developed with other departments like Animal husbandry, Fisheries, Horticulture, Minor irrigation, Social forestry, MEDA, PWD, MSEDC etc. for convergence of various developmental schemes of different agencies in the same village to develop cluster of villages into model villages, the areas of excellence.

SECTION 9: OTHER REGULATIONS

i. **Fire Protection**: The area needs to be strictly fire protected annually. These areas are quite susceptible to fires. Effective protection against fire for the period from February 15th to June 15th is a must to ensure survival and establishment of natural regeneration of all species for developing them into future growing stock. Special fire lines shall be provided and they should be cleared annually. Firewatchers shall be appointed during the summer season. Entire area of this Working Circle shall be rigidly fire-protected and shall be classified as class I forest areas with reference to fire protection, the details of which are given in the 'Miscellaneous Regulations'. 'Village forest protection committees' shall be formed and a comprehensive fire fighting scheme shall be chalked out, the details of which are given in the 'Miscellaneous Regulations'.

ii. **Closure to Grazing**: Entire area shall remain closed to grazing completely for a period of 5 years from the Ist year of its working.

iii. **Protection Measures**: The area will be strictly protected from illicit felling and encroachments including seasonal encroachment for the purpose of agriculture.

iv. Resolving conflict with Micro Plans made under JFM/ FDA: If any conflict is noticed between the prescriptions given in this WC and the Micro Plan written under JFM, FDA etc. for the same area, then the said area shall be treated in accordance with the special objects of management pertaining to this W.C. and suitable amendments shall be made in the Micro Plan, if necessary.

v. The prescriptions of this WC will not be applicable on areas bearing Seed Orchards, Sample Plots, Candidate Plus Trees, Plantations, nurseries etc falling in the areas allotted to this WC

and which are otherwise in possession of the Silva MS. These areas are managed with a perspective of research and extension in forestry and hence will be managed as per their Silviculture requirements as included in the Plan of Operations duly approved by Research and Advisory Committee (RAC) MS chaired by the PCCF.

vi. The Workshops should be organized in each Range to sensitize and train the field staff in implementing the prescriptions of this WP. The induction training of the field staff should be organised on priority by the CF education which will help in effective implementation of various WP prescriptions.

CHAPTER – 11

IMPROVEMENT WORKING CIRCLE

SECTION 1: GENERAL CONSTITUTION

This Working Circle includes the forest areas in the Western and Southern portion of the district. The areas have gentle to moderate slopes. The areas carrying young to middle-aged crop which require improvement through silvicultural operations are allotted to this Working Circle. These areas were previously allotted mainly to 'Fodder Reserve WC', 'Afforestation for SMC Working Circle', 'Selection cum Improvement Working Circle', and 'Cashew plantation WC'. Nearly 5,660 ha area, previously not allotted to any WC is also allotted to this WC. The area has potential to support a good crop and proper tending and protection would result in a harvestable stock in the next 10-15 years. Silvicultural operations like singling, cut back operations and improvement fellings shall yield poles, small timber, and fuel-wood which would meet the demands of the local people to some extent. The total area included in this WC is 39,014.61 ha which makes 28.07% of the total area being dealt in this Plan.

Table 35

Allotment of area

Sr. No	Range	Area of the Range	No. of compartment			Area allotted to WC	% to area of the Range	% to area of the division
			Full	Part	Vill.			
1	Chandgad	27,225.04	45	22	--	10,794.91	39.65	7.77
2	*Ajara*	18,701.98	61	22	--	7,445.32	39.81	5.36
3	Gargoti	25,350.78	59	40	--	11,053.36	43.60	7.95
4	Radhanagari	02,573.07	5	3	0	338.27	13.15	0.24
5	Karvir	13,297.17	53	1	--	3,907.84	29.39	2.81
6	G. Bawada	11,584.05	6	5	--	844.22	07.29	0.61
7	Panhala	20,293.81	19	21	--	2,526.60	12.45	1.82
8	Malkapur	19,945.10	17	6	--	2,104.09	10.55	1.51
	Total	**1,38,971.00**	**265**	**120**	**--**	**39,014.61**	**------**	**28.07**

SECTION 2: GENERAL CHARACTERS OF THE VEGETATION

A typical forest area requiring Improvement

The majority of the forests included in this Working Circle belong to Southern moist mixed deciduous forests type i.e. $_3B/C_2$ and a part belong to West Coast semi evergreen forest type i.e. $_2A/C_2$ as per Champion and Seth;s revised survey of the forest type of India. The site quality of the forests varies between IVa to IVb with patches of site quality of the III generally found in the valleys. The crop is young to middle aged. The crop density varies from 0.3 to 0.6 of even more at place.

The species found are Ain, Kinjal, Hirda, Nana, Shisham, Behada, Anjani, Kumbha, Jamun etc. The stock is largely degraded and with low densities at many places.

SECTION 3: SPECIAL OBJECTIVES OF MANAGEMENT

i. To enrich and improve composition of the growing stock

ii. To conserve soil and moisture within forest areas.

iii. To meet demands of local people for fuel wood and small timber to some extent.

SECTION 4: COMPARTMENTS AND WORKING SERIES

The details of the Compartments allotted to Working Circle and statement showing WS and sequence of working of annual coupes are given in **Appendices 11.1 and 11.2** of Volume II respectively. A coupe that could not be worked in the designated year, shall be worked in the next year along with the current years coupe.

SECTION 5: ANALYSIS AND VALUATION OF THE CROP

i. *Stock- mapping* **:**

The stock-mapping was done with the help of local territorial staff. The stock mapping results indicate nearly 90% area to be well stocked. The details of the stock mapping exercise for the areas included in this Working Circle are given in **Appendix 10.4** of Volume II while the abstract of the result is given below:

Table 36

Extent of planimetered area as per stock maps

Sr. No	Range	Well Stocked area (ha)	Under Stocked area	Eroded and Scrub (ha)	Total
1	Chandgad	10,180.921	552.206	61.783	10,794.910
2	Ajra	7,013.551	425.27	6.499	7,445.320
3	Gargoti	10,078.528	684.8	290.032	11,053.360
4	Radhanagari	315.924	22.346	0	338.270
5	Karvir	2,905.016	755.987	246.837	3,907.840
6	Gaganbawada	819.65	24.57	0	844.22
7	Panhala	2,047.375	330.107	149.028	2,526.510
8	Malkapur	1,971.459	109.003	23.628	2,104.090
	Total	**35,332.424**	**2,904.289**	**777.807**	**39,014.52**
	% to WC	**90.56**	**07.45**	**01.99**	**-------**

**An extent of 0.09 ha. area of Kanheri vill. of Panhala range received for comp. afforestation was not stockmapped.*

ii. *Age & Density* **:**

The crop in general is young to middle aged. The crop density varies from 0.3 to 0.7.The blank and under-stocked areas existing in the compartments have also been included.

iii. *Enumeration* **:**

The enumeration of the growing stock has been done and is being analysed below. Average total numbers of trees per hectare are found to be 601 out of which nearly 51% fall within 16-30 cm girth class while nearly 88% fall within a larger girth class of 16-60 cm. It implies majority of the crop is young and is in pole stage. Ain, Kumbha, Kinjal, Anjani and Jambhul are the top five species in terms of number of trees per hectare. 12 important NTFP species along with their stocking per hectare have been listed below. Jambhul, Hirda, Palas, Tamalpatra, Amba and Aonla are the top six NTFP species in terms of stocking. A detailed statement showing WC wise enumeration results is given in **Appendix 8.1** of Volume II.

Table 37

Number of trees per hectare

Girth Classes (cms)									
16-30	**31-45**	**46-60**	**61-75**	**76-90**	**91-105**	**106-120**	**121-135**	**Above 135**	**Total**
309.13	154.81	64.30	30.51	19.48	7.05	5.68	2.58	7.40	600.94

Table 38

Species having maximum number of trees/ha in descending order

S.No.	**Species**	**No. of trees/ha.**	**Percentage**
1	Ain	62.06	10.33
2	Kumbha	34.31	05.71
3	Kinjal	32.76	25.45
4	Anjani	32.41	05.39
5	Jambhul	22.76	03.79
6	Hirda	19.14	03.18
7	Gela	18.62	03.10
8	Katak	17.93	02.98
9	Hadaka	15.86	02.64
10	Nana	10.86	01.81

Table 39

Estimated number of NTFP species per hectare

Sr. No.	**NTFP Spp.**	**No./Ha**
1.	Jambhul	22.74
2.	Hirda	19.14
3.	Palas	7.59
4.	Tamalpatra	4.48
5.	Amba	4.47
6.	Aonla	4.13
7.	Biba	3.96
8.	Apta	1.71
9.	Karanj	1.55
10.	Kokam	0.17
11.	Karvand	0.17
12.	Wavding	0.17

SECTION 6: SILVICULTURAL SYSTEM

The crop is young to middle aged and is mainly situated on moderate slopes. Number of mature trees for harvesting purpose is very few. Therefore any silvicultural system involving selection fellings and creating larger openings in the canopy is not suitable to these areas. The objective here essentially is to improve and enrich the existing growing stock by carrying out improvement

works including 'improvement fellings'. But 'improvement fellings/ works' in themselves do not constitute any silvicultural system; they are being carried out only with a view to improve the crop which may later be worked under a suitable silvicultural system in future.

SECTION 7: WORKING CYCLE

The Improvement cycle has been fixed at 20 years. The period is also sufficient for the successful establishment of the regeneration.

SECTION 8: HARVESTABLE GIRTH

Improvement fellings shall include removal of dead, diseased, unsound and malformed trees for which there is no need to prescribe any harvestable girth. The removal of such trees shall help establishment of NR along with overall improvement of the forest flora. No such fellings shall however be done to create permanent openings in the canopy.

SECTION 9: FORMATION OF COUPES

The details of sequence of working of annual coupes are given in **Appendix 11.2** of Volume II.

SECTION 10: REGULATION OF YIELD

Since only improvement fellings have been prescribed, the yield of timber will be negligible and hence has not been calculated.

SECTION 11: AGENCY OF HARVESTING

The coupes will be worked departmentally or by an agency as per the prevalent government rules/ policy.

SECTION 12: DEMARCATION OF COUPES AND PREPARATION OF THE TREATMENT MAP

Demarcation: The main annual Improvement coupes shall be demarcated in advance.

Preparation of Treatment map:

After demarcation of the coupe, a treatment map shall be prepared by the R.F.O. It shall be verified by the A.C.F. emphasizing the suitability of sites for SMC as well as other improvement works.

The following areas shall be shown distinctively in the map:

I. Area 'A' - Protection Areas : It shall include the following areas.

i. Areas with steep slopes i.e. more than $25^{0.}$

ii. Eroded areas or areas liable to erosion.

iii. Twenty meters wide strip on either side of the water courses.

II. Area 'B' - Under stocked Areas : include areas with crop density less than 0.4.

III. Area 'C' - Old plantation areas **:** include areas under old plantations.

IV. Area 'D' - Well stocked areas : include areas with crop density more than 0.4.

Treatment: The various treatments proposed for the above mentioned areas are as follows:

I. Area 'A' :

i. The SMC works including nalla-bunding and gully plugging will be carried out wherever essential. Sites with perennial sources of water locally known, as 'jivant jhirra' should be tackled appropriately as explained under 'general prescriptions'.

ii. In the accessible under stocked areas having good soil depth, seed-dibbling shall be done to suitably clothe the area. Bamboo and other suitable species shall be planted in accessible under stocked areas within 20 meters wide strip on either side of water courses.

II. Area 'B' :

i. The SMC works like van tale, cement bandhs, nalla-bunding, gully plugging etc will be carried out wherever required.

ii. Accessible under stocked areas having good soil depth and more than 2 hectares in extent in a compact block shall be planted with suitable miscellaneous species while in areas less than 2 ha. in extent, seed dibbling shall be done.

iii. Rooted stock shall be properly tended.

III. Area 'C' :

i. Old plantations shall be treated as given under 'Marking Rules'.

IV. Area 'D' :

i. No planting shall be done in these areas.

ii. Improvement fellings shall be done as prescribed under 'Marking Rules'.

SECTION 13: MARKING TECHNIQUE AND MARKING RULES

a. Marking technique for the trees to be marked for felling is discussed in the chapter on 'Miscellaneous Regulations'.

b. Marking Rules: Marking shall be done under the close supervision of the R.F.O. The ACF and the DCF shall inspect majority of the marked coupes to impart proper guidance and instructions to the staff as well as to guard against excessive marking if any.

I. Area 'A' :

i. No tree shall be marked for felling.

i. Area 'B' **:**

ii. No tree shall be marked for felling.

iii. All live high stumps shall be cut flush to the ground and shall be dressed thereafter with a sharp axe to get vigorous coppice shoots.

iv. The established multiple coppice shoots and poles shall be reduced to one per stool retaining the vigorous one while the newly risen coppice shoots shall be removed.

v. The undesirable under-growth which is preventing or likely to prevent the development of seedling regeneration of the desired species shall be removed.

III. Area 'C' :

i. Old successful plantations shall be treated as per the prescriptions and sequence of Felling/ thinning as given in the 'Old Plantations Management W.C'.

ii. Any other successful old plantation or its part on slopes less than 25^0 that is not included in 'Old Plantations Management WC' inadvertently but falls within the coupe shall be worked as per its year of formation and sequence of working given for other plantations.

IV. Area 'D' :

i. All climbers on the trees except those having medicinal properties and which are used and traded shall be cut.

ii. Only dead, diseased, unsound and malformed trees shall be marked for felling, retaining two dead trees per hectare for the benefit of the wild-life.

iii. All live high stumps shall be cut flush to the ground and shall be dressed thereafter with a sharp axe to get vigorous coppice shoots.

iv. The entire multiple coppice tree or pole crop shall be marked to reduce the number of stems or poles to one per stool retaining the most promising one.

v. No fruit tree shall be marked for felling.

vi. The undesirable undergrowth which is preventing or likely to prevent the development of seedling regeneration of the desired species shall be removed.

- *A tree will be considered as*

(a) ***Unsound*** *when its bole emits a hollow sound when struck by any hard object or when it does not have any marketable timber.*

(b) ***Malformed*** *if it is badly shaped having defective stem or abnormal crown occupying more space than its future value warrants and includes conditions like stag headedness, gnarls, twists, or constrictions due to climbers or crookedness etc., heavily burnt by fire at its base*

and likely to fall down, with general cavities dug in the stem for taking out honey or has many ant holes or fungus, rots or other diseased portion.

SECTION 14: SOIL AND MOISTURE CONSERVATION WORKS

The area gets heavy average rainfall of about 2000 mm. per year but most of the valuable rain water goes waste as run-off into the streams, rivers and ultimately into the sea. Therefore a large tract of this division especially on the eastern side faces shortage of water during the summer months. The soil becomes compact during the pinch period resulting in poor drainage as well as poor aeration of the soil. Intensive SMC works viz. gully plugging, nalla-bunding, contour trenching, van-tali, cement bandharas and other appropriate water harvesting structures shall help young regeneration to establish easily. Ridge to valley concept shall be followed while treating the watershed. A village shall be taken as a unit of holistic development. For this purpose, it shall be endeavored to integrate forestry management interventions with development schemes of other departments within the selected villages. Prescriptions 1 and 2 under Section 8 of Chapter on 'Protection cum Watershed Management Working Circle' should be followed.

SECTION 15: REGENERATION

The young recruits of Ain, Kinjal, Anjani, Aonla, Karvand, Jamun, Pisa, Katak, Kumbhi, Chandada, Umbar etc. appear profusely after first few showers of the season. Areas having good NR of the above species will be identified. NR within such patches shall be properly spaced and tended as well as protected from fire and grazing. The various prescriptions have been discussed in detail under Section 8 in the chapter on 'SMC cum Afforestation Working Circle'.

SECTION 16: PRE-PLANTING AND PLANTING OPERATIONS

The various pre-planting and planting operations have been discussed in detail under Section 14 in the chapter on 'SMC cum Afforestation Working Circle'.

SECTION 17: SUBSIDIARY SILVICULTURAL OPERATIONS

CBO: The cutting back operations shall be carried out one year after the main working in the coupe as per the following rules -

i. All left over established multiple coppice shoots and poles shall be reduced to one per stool.

ii. All newly risen coppice shoots from the freshly felled tree stumps shall be reduced to two per stool retaining the most promising ones.

iii. All newly risen coppice shoots from the old stumps shall be removed.

iv. NR shall be tended as per the prescriptions given in the Section 15.

Cleaning: It shall be carried out during the 3rd and 6th year of the main felling as per the following rules:

i. All inferior species including the undesirable undergrowth interfering or likely to interfere with the growth and development of seedling regeneration of teak and other valuable misc. species shall be cut back.

ii. Only the most promising coppice shoot out of the two kept from the freshly felled tree stumps previously shall be retained. All newly risen coppice shoots shall be removed.

iii. Only the most promising coppice shoot out of the two kept from the freshly felled tree stumps previously shall be retained and the established seedling regeneration of teak and other miscellaneous species shall be spaced out suitably.

SECTION 18: OTHER REGULATIONS

i. **Fire Protection:** Main Improvement coupe shall be fire-traced and rigidly fire-protected for a period of five years from the Ist year of its working. The area shall be cleared-off of all the dry and cut remains of bushes, leaves etc. by end of February to avoid fire hazards to standing crop as well as to NR. Effective protection against fire for a period between Feb.15 to June 15 is a must to ensure survival and establishment of NR of all species for developing it into the future growing stock. 'Village forest protection committees' shall be formed and a comprehensive fire fighting scheme shall be chalked out, the details of which are given in the 'Miscellaneous Regulations'.

ii. **Closure to grazing: Main** Improvement coupes shall remain closed to grazing for a period of 5 years from the Ist year of its working.

iii. **Resolving conflict with Micro Plans made under JFM/ FDA:** If any conflict is noticed between the prescriptions given in this WC and the Micro Plan written under JFM, FDA etc. for the same area, then the said area shall be treated in accordance with the special objects of management pertaining to this W.C. and suitable amendments shall be made in the Micro Plan, if necessary.

iv. The prescriptions of this WC will not be applicable on areas bearing Seed Orchards, Sample Plots, Candidate Plus Trees, Plantations, nurseries etc falling in the areas allotted to this WC and which are otherwise in possession of the Silva MS. These areas are managed with a perspective of research and extension in forestry and hence will be managed as per their silviculture requirements as included in the Plan of Operations duly approved by Research and Advisory Committee (RAC) MS chaired by the PCCF.

v. The workshops should be organized in each Range to sensitize and train the field staff in implementing the prescriptions of this WP. The induction training of the field staff should be organised on priority by the CF education which will help in effective implementation of various WP prescriptions.

CHAPTER - 12

OLD PLANTATIONS MANAGEMENT WORKING CIRCLE

SECTION 1: GENERAL CONSTITUTION

This Working Circle includes areas containing patches of old successful plantations of Acacia auriculiformis, Eucalyptus species, miscellaneous species, Glyricidia, Teak and Cashew. Old successful plantations taken since sixties till 94-95 are included in this WC. These areas were previously allotted to 'Protection WC', 'Fodder Reserve WC, Afforestation for SMC WC' and 'Selection cum Improvement WC'. The area included in this WC is 13,253.44 ha that makes 09.54% of the total area. A list of successful old plantations is given in the **Appendix 12.1** of Volume II of the Plan.

Table 40

Allotment of area

Sr.No.	Range	Area of the range	No. of compartment		Area allotted to WC	% to area of the range	% to area of the division
			Full	Part			
1	Chandgad	27,225.04	0	36	1,267.00	4.65	00.91
2	Ajara	18,701.98	5	44	1,857.80	9.93	01.33
3	Gargoti	25,350.78	3	64	2,814.37	11.10	02.02
4	Radhanagari	02,573.07	7	10	734.04	28.53	00.53
5	Karvir	13,297.17	3	1	144.34	01.08	00.10
6	G. Bawada	11,584.05	5	32	2,070.55	17.87	01.49
7	Panhala	20,293.81	4	65	3,539.75	17.44	02.54
8	Malkapur	19,945.10	2	29	825.59	04.13	00.59
	Total	**1,38,971.00**	**29**	**281**	**13,253.44**	**-----**	**09.54**

SECTION 2: SPECIAL OBJECTIVES OF MANAGEMENT

1. To improve the condition of plantations and to improve the productivity of the old cashew plantations by using tending operations.
2. To enrich the area by taking AR of suitable species.
3. To supply small timber and firewood to the local communities.
4. To create employment opportunities for the natives.

SECTION 3: COMPARTMENTS AND WORKING SERIES

The details of the Compartments and sequence of working for Eucalyptus, Acacia and Miscellaneous species plantations as well as Teak and Cashew plantations are given in the **Appendices 12.2, 12.3 and 12.5** of Volume II of the Plan respectively.

SECTION 4: ANALYSIS AND VALUATION OF THE CROP

The enumeration of the growing stock has been done and is being analysed below. Average total number of trees per hectare is found to be 577 out of which nearly 72% fall within 16-45 cm girth class while nearly 22% fall within a larger girth class of 46-75 cm. It implies majority of the crop is young. A detailed statement showing WC wise enumeration results is given in the **Appendix 8.1** of Volume II of the Plan.

In the IInd stage Evaluation report of plantations taken in 1995, it has been observed that *'within the plantation areas, trees of Acacia auriculiformis and Eucalyptus have shown good growth in the patches of old plantations raised between 1975 and 1985. It has also been observed that NR of Acacia coming under the plantations has adversely affected natural regeneration of important local species like Anjani, Jambhul and Karvand etc. Plants raised on the slopes are observed to be more in number than on the plains within a plantation. In the plantation areas with good teak coppice, singling is recommended'.*

Table 41

Number of trees per hectare

Girth Classes (cms)									
16-30	**31-45**	**46-60**	**61-75**	**76-90**	**91-105**	**106-120**	**121-135**	**>136**	**Total**
228.0	190.30	84.69	39.79	20.40	9.69	2.04	1.02	1.53	**577.52**

SECTION 5: WORKING CYCLE

Since area under old plantations vary considerably in different ranges, hence working cycle will vary depending upon the species and the total area to be tackled in each range.

SECTION 6: DEMARCATION OF COUPES

The annual coupes shall be demarcated one year in advance. Plantations that could not be worked in the designated year, shall be worked in the next year along with the current years plantations.

SECTION 7: METHOD OF TREATMENT

For its continuous healthy development, a tree crop requires food, light and adequate space to grow. The individual members of the forest crop have to compete amongst themselves for getting these essentials. The requirement of the individual members increase with age and their growth is seriously hampered if the forest crop is not tended properly.

'Tending' is defined as operations carried out for the benefit of a forest crop at any stage of its life between the seedling and mature stages; it essentially covers operations on the crop itself and

on the competing vegetation and includes weeding, cleaning, thinning and pruning and does not include regeneration fellings and ground operations like soil working, drainage and controlled burning. The tending operations required for the management of the old plantations are explained below.

I. Cleaning: It is done in the sapling crop involving the removal or topping of inferior growth including individuals of favoured species, climbers etc, when they are interfering with the better grown individuals of the favoured species. It merges with thinnings as saplings grow into poles. It is done to improve light conditions and to reduce root competition and transpirational water loss. It shall be done in the 7th year of the formation of the crop. The following operations will be carried out:

i. All climbers shall be cut in the plantation area.

ii. Individuals of inferior species interfering or likely to interfere with the growth of planted saplings shall be cut back.

iii. Malformed, diseased and damaged individuals of the planted saplings shall also be cut back.

iv. Coppice shoots arising from the stumps shall also be cut.

II. Thinning: It 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. Few years after the plantations are raised; there starts an intense competition amongst the saplings for limited light, minerals and water. Therefore, to avoid the adverse affects on the growth of the future crop, thinnings are required to gradually reduce the number of saplings, poles and trees per unit area, as the crop advances in age. It consists of series of successive felling operations before the crop matures and is carried out in a crop after it reaches the sapling stage and continued upto the beginning of the regeneration period. The interval between two successive fellings may be fixed but it depends upon the time required for canopy closure.

First mechanical thinning in the 10th year is prescribed in Acacia, Eucalyptus and Teak plantations. The detailed prescriptions for each plantation are listed ahead.

The following norms are laid down to adjudge success or failure of plantations as per the 'Evaluation Code'

Table 42

Norms for plantations as per Evaluation code

Area category	Successful plantations	Partially Successful plantations	Failure plantations
Suitable sites with soil depth >2', rainfall 50"-150", average prevalence of adverse biotic factors, gentle to moderate slopes	60% and above	33% to 60%	Less than 33%
Medium quality sites with soil depth > 1', rainfall 35"- 50", average prevalence of adverse biotic factors, moderate slopes	50% and above	25% to 50%	Less than 25%
Poor sites with soil depth < 1', rainfall < 35" or > 125", excessive prevalence of mist and fog, adverse biotic factors	40% and above	20 % to 40%	Less than 20%

The RFO shall inspect the plantations due for tending operations and prepare treatment map for the successful as well as partially successful plantations as per the norms laid above and will show the following areas.

I. Area 'A' - Protection Areas : include the following areas.

i. Areas with steep slopes i.e. more than $25^{0.}$

ii. Eroded areas or areas liable to erosion.

iii. Twenty meters wide strip on either side of the water courses.

II. Area 'B' - Under stocked Areas: include areas with crop density less than 0.4

III. Area'D'-Well Stocked Areas: include areas with crop density more than 0.4

The plantations, which are found to be failure as per the evaluation code, shall be evaluated by the DFO evaluation to ascertain the causes of failure so as to avoid and overcome them in future. Deviation proposals shall be prepared for such plantations and sent to CF Kolhapur/ CF WP.

Nearly all Plantations of Acacia, Eucalyptus and Miscellaneous species are mature and have crossed the age for Cleaning or Thinning and ought to be felled. *But considering the fragile ecosystem of the Western Ghats and vulnerability of the area, felling in Acacia, Eucalyptus and Miscellaneous species plantations shall first be done for a period of initial two years. A mid term review of such felled plantation areas shall be undertaken in the 5th year of the WP to know the impact of following prescriptions, which may be suitably revised, if found necessary after proper analysis.* The DCF Kolhapur should prepare an analytical report in this

regard in the beginning of 5th year of the WP and submit it to CF Kolhapur and CF WP for further necessary action. If prescriptions are found suitable and no changes are required then the plantations will be worked 6th year onwards as per the sequence given in the Volume II.

I. Eucalyptus Plantations

Areas containing successful plantations of Eucalyptus have been included in this part. The area covered under Eucalyptus plantations is 1,314.00 hectares.

Area under Eucalyptus plantation

Extensive forest areas were brought under Eucalyptus plantations since late sixties. Most of these plantations have standing mature and over mature trees of Eucalyptus considering the rotation of the species to be 15 years. These plantations have crossed the age for thinning and are due for felling. These need to be felled so that a coppice crop is available and at the same time the openings created by these fellings can be utilised to augment the stock of local species in order to restore the character of the forest. The mature plantations of Eucalyptus of age fifteen years and above shall be worked under *'Coppice with Reserves System'* in which felling is prescribed only in suitable areas likely to benefit after reserving such crop as is essential for protective reasons. The sequence of operations is given in **Appendix 12.2(a)**.

The selected Plantation shall be physically inspected and a TM shall be prepared delineating different areas as explained above.

1. Trees falling within the 'Protection areas' as well as 'Under stocked areas' as shown in the Treatment map shall be reserved for protection against the adverse climatic factors.

2. All standing Eucalyptus trees within 'Well stocked areas' shall be enumerated girth class wise.

3. 25% of the enumerated Eucalyptus trees falling in 'Well stocked areas' shall be reserved against felling for protection against the adverse climatic factors

4. The trees which have long clean boles and are capable of putting on increment and increasing in value in future shall only be reserved. The selected reserve trees should be wind firm. They should be so selected that they are uniformly distributed over the whole area. For selecting such trees, the 'Well stocked areas' can be divided into grids of suitable size.

5. Taking into consideration the topography and vulnerability of the region, the entire regeneration of miscellaneous species including trees if any, coming under Eucalyptus tree crop within the 'Well stocked areas' will also be reserved and tended.

6. Rest of the Eucalyptus trees in 'Well stocked areas' shall be felled.

7. A maximum of 2 leading coppice shoots arising from the stumps of felled Eucalyptus trees should only be retained in the second and the third year. In the fourth and fifth year, only one leading coppice shoot shall be retained, cutting back all others.

8. The NR of Eucalyptus induced by the fallen seeds from the reserved trees in the felled area shall be properly spaced out and tended. NR shall be supplemented by AR wherever required by planting 1.5 to 2.5 years old tall plants of local miscellaneous species with an emphasis on fodder yielding species in areas erstwhile under fodder development Working Circle.

9. Considering that the coppice growth of Eucalyptus would soon cover the area, species to be chosen for AR within Eucalyptus plantations should not be light demanders. Bamboo which can establish within the first year may also be tried.

10. Wherever necessary soil and moisture conservation works as per the site requirement should be done.

11. The DCF may decide to auction the harvested material at the site itself considering the local demand, quantity of the material and economics of the transportation.

II. Acacia auriculiformis

Areas containing successful plantations of Acacia auriculiformis have been included in this part. The area covered under Acacia plantations is 2,011.39 hectares.

Area under Acacia plantation

Large areas of Kolhapur division have been covered with extensive patches of Acacia auriculiformis plantations mainly planted in the last 2-3 decades. Most of these plantations have standing mature to over mature trees of Acacia auriculiformis considering its rotation age to be 15 years. Out of these, few plantations actually were planted as mixed plantations to be where Acacia auriculiformis suppressed other species to emerge as the 'dominant' species. The success rate of these plantations is quite good. Instances of many dried trees standing in the mature plantations as well as wind fallen trees are noticed commonly. Underneath the standing trees, generally little ground flora has been found to come up. In the IInd stage Evaluation report of plantations taken in 1995, it has been observed

that the NR of Acacia coming under the plantations have adversely affected natural regeneration of important local species like Anjani, Jambhul, Karvand etc and the soil is covered with their own leaf litter. This also makes the plantation areas prone to fire. Heavy uprooting of trees over a period of time or continued drying may expose the soil leading to erosion. The basic character of the forest also needs to be restored. These plantations have crossed the age for thinning and are now due for felling. The sequence of operations is given in **Appendix 12.2 (b)**.
The method of treatment is given below:

1. The selected Plantation shall be physically inspected and a TM shall be prepared.

2. Trees falling within the 'Protection areas' as well as 'Under stocked areas' as shown in the Treatment map shall not be felled.

3. All standing Acacia trees shall be enumerated within the 'Well stocked areas'.

4. 25% of the enumerated Acacia trees falling within the 'Well stocked areas' shall be reserved as 'Seed bearers' and shall not be felled for protection against the adverse climatic factors as well as for supply of seed for regeneration.

5. The sound trees capable of putting on increment and increasing in value in future shall be selected as 'Seed bearers'. The selected 'Seed bearers' should be wind firm and should be so selected that they are uniformly distributed over the whole area. For selecting 'Seed bearers', the plantation area can be divided into grids of suitable size.

6. Rest of the Acacia auriculiformis trees falling within the 'Well stocked areas' shall be felled.

7. The entire regeneration of miscellaneous species including trees if any, coming under Acacia trees will be retained and tended.

8. The NR of Acacia induced by the fallen seeds from the 'Seed bearers' in the felled area shall be properly spaced out and tended. The seedlings of Acacia so raised should not constitute more than 20% of the total AR stock. NR shall be supplemented by AR in the following rains by planting 1.5 to 2.5 years old tall plants of local miscellaneous species with an emphasis on fodder yielding species in areas erstwhile under Fodder Development Working Circle.

9. Wherever necessary soil and moisture conservation works should be undertaken as per site requirement.

10. The DCF may decide to auction the harvested material at the site itself considering the local demand, quantity of the material and economics of the transportation.

III. Miscellaneous Plantations

Areas containing successful miscellaneous plantations have been included in this part. Large areas of Kolhapur division have been covered with extensive patches of Acacia auriculiformis, Eucalyptus and Miscellaneous plantations mainly planted in the last 2-3 decades. In many miscellaneous plantations however, Acacia auriculiformis or Glyricidia suppressed other species to emerge as the 'dominant' species. The area covered is 8,497.07 ha. The sequence of operations is given in **Appendix 12.2 (c)**.

The method of treatment is given below:

1. The selected Plantation shall be physically inspected so as to prepare the TM.
2. Trees falling within the 'Protection areas' as well as 'Under stocked areas' as shown in the Treatment map shall not be felled.
3. All standing trees shall be enumerated species wise and girth class wise within the 'Well stocked areas'.
4. 25% of the enumerated trees falling in 'Well stocked areas' shall be reserved as 'Seed bearers' and shall not be felled for protection against the adverse climatic factors as well as for supply of seed for regeneration.
5. The 'Seed bearers' need not be of the same species and can be selected from the varied species of valuable sound trees capable of putting on increment and increasing in value in future. The selected 'Seed bearers' should be wind firm and should be so selected that they are uniformly distributed over the whole area. For selecting 'Seed bearers', the plantation area can be divided into grids of suitable size.
6. Rest of the miscellaneous trees falling within 'Well stocked areas' shall be felled.
7. The entire natural regeneration of valuable miscellaneous species pertaining to 0-15 cm girth class will be retained and tended.
8. The NR of misc. species induced by the fallen seeds from the 'Seed bearers' in the felled area shall be properly spaced out and tended.
9. NR shall be supplemented by AR by planting 1.5 to 2.5 years old tall plants of local miscellaneous species with an emphasis on fodder yielding species in areas erstwhile under Fodder Development Working Circle.
10. Wherever necessary soil and moisture conservation works should be undertaken as per site requirement.
11. The DCF may decide to auction the harvested material at the site itself considering the local demand, quantity of the material and economics of the transportation.

IV. Glyricidia

Few degraded and eroded forest areas in the eastern parts of Kolhapur district viz. Karvir and Hatkanangle taluka were planted with Glyricidia species during 1980-90s. The objective was to bind, conserve and improve the soil cover in such refractory areas. These areas being largely degraded with shallow soil cover, it would just be proper to retain these plantations for the time being. The DCF Kolhapur in the mean time should study different areas under these plantations to find out any improvement in soil conditions in such areas since raising these plantations and other suitable plant species for such areas. An analytical report based on the above assessment should be prepared and submitted by the DCF to the CF Kolhapur and CF WP Kolhapur .

Area under Glyricidia plantation

Based on this report and personal assessment of the CF WP, the prescriptions may be suitably revised if found necessary during 5th year mid term review of the WP.

V. Teak Plantations

Teak plantations have been raised mainly in Gaganbawada, Panhala and Gargoti Ranges. Area allotted to this WC is 241 ha. However these have not been tended and thinned as per the prescriptions of the earlier Plans, thus affecting their growth. First mechanical thinning will be done in the 10th year of formation of the plantation followed by 'Ordinary thinning' or 'Low Thinning' a type of silvicultural thinning which shall be resorted to in the 15th and every 10th year subsequently till the plantation attain the age of 65 years. Successful Teak plantations which have been left out inadvertently shall also be thinned as per the above schedule. *All Teak plantations shall be thinned in one year only since area under these plantations is not much.*

Area under Teak plantation

The method of treatment shall be as follows:

i. Cleaning shall normally be done in the 7th year of the plantation but since cleaning operations have not been carried out in the past, they shall be taken in the older plantations only if necessary prior to 'Thinning'**.**

ii. 'C' grade 'Ordinary thinning', a kind of silvicultural thinning shall be done which consists of removal of inferior individuals of the crop, starting from the suppressed class to the dominated class to some of the dominants but not creating any permanent gap in the canopy. The trees selected for retention are the trees with good boles and crown, evenly distributed over the area, with space on all sides for proper development. In this grade, few suppressed or dominated trees whose removal is of no economic or hygienic value may be left as soil cover in the gaps created by the removal of dominant trees. Thinning schedule is given in **Appendix 12.3.**

iii. Thinning shall be done as per the Yield Tables which give the number of trees per unit area left after thinnings at different ages by site qualities. Site quality of the area where the plantation is raised and the age of the crop shall be ascertained. Site quality is measured in terms of average height of dominant trees in the plantation area. Yield tables prepared for teak plantations by the FDCM may be consulted if local yield tables are not available.

iv. Girth class wise distribution of poles or trees in the plantation area shall be obtained by random sampling. Sample plots of size 0.5 ha i.e. of 100x50 meters dimensions shall be laid with sampling intensity of 10% only. Corresponding to age and site quality the number of stems per ha and their distribution among different girth classes shall be obtained from the Yield Table, which shall then be compared with the number of stems actually available per ha in the stand to obtain the number of stems to be retained girth class-wise after the thinning. The deficiency in stems in any girth class shall be compensated with the surplus and healthy stems in nearest girth classes on the basis of basal area.

v. After sample marking, basal area per ha of the stand excluding trees already marked for felling, shall be obtained by using wedge prism. This shall be compared with that of Yield Table value, to ascertain the correctness of thinning marking. Deficiencies if any shall be removed and thinning marking shall be completed by the RFO. The detailed marking list shall be prepared which shall be checked and verified by the concerned ACF and the DCF in the field. Thinning shall be completed after removal of deficiencies, if any. The following rules shall be observed while thinning.

a) The dead, dying, diseased and malformed poles shall be marked first for thinning.

b) The multiple pole crop shall also be thinned to one pole per stool retaining the most promising one.

c) Care shall be taken to remove the poles of coppice origin first while retaining the poles of seedling origin.

d) All live high stumps shall be cut flush to the ground and shall be dressed thereafter with a sharp axe to get vigorous coppice shoots.

e) The established multiple coppice shoots shall be reduced to one per stool retaining the vigorous one while the newly risen coppice shoots shall be removed.

f) The undesirable under growth which is preventing or likely to prevent the development of seed based NR of the desired species, shall be removed.

VI. Cashew Plantations

Cashew plantation

During the second and third five year plans in Chandgad, Ajra and Gargoti tahsils, cashew plantations were carried out. These plantations were raised under Afforestation for soil conservation and Plantations of valuable species schemes. Trees are characterized by intermingling and overcrowding of shoots with few shoots touching down the ground.

They are scattered and have not been tended on regular basis thus showing reduction in yield. In many cases fruit bearing capacity has reduced over the years and is negligible. This is also coupled with infestation of pests and diseases. The area allotted is 170.80 **hectare.**

The Agriculture department has prepared estimates for different fruit species under the scheme 'Rejuvenation of the Senile Orchards'. An estimate for the 'Rejuvenation of the Old Cashew Plantations' as prepared by the Agriculture department and working schedule are given in the **Appendices 12.4 and 12.5** respectively. The broad guidelines for the rejuvenation of Cashew plantations are outlined below but the DCF should consult the Agriculture officer for arranging field training for the staff and for an updated estimate as well as for the technical inputs at the time of the field work.

1. Mark dead, dying and diseased Cashew trees and remove them.

2. Plant improved grafted varieties of Cashew in the gaps thus created as well as in the other natural gaps.

3. Weedings and soil workings shall be done around the newly raised seedlings as per the provisions of the estimate.

4. Prune the overcrowded tree branches of Cashew trees in the months of December and January.

5. An integrated management of application of fertilizers and the pesticides along with the soil working around the older trees as well as the newly raised seedlings should be done.

VII. **Bamboo Plantations:**

The details have been dealt in the chapter on 'Bamboo management (overlapping) WC'.

SECTION 8: OTHER REGULATIONS

i. The prescriptions of this WC will not be applicable on areas bearing Seed Orchards, Sample Plots, Candidate Plus Trees, Plantations, nurseries etc falling in the areas allotted to this WC and which are in possession of the Silva MS. These areas are managed with a perspective of research and extension in forestry and hence will be managed as per their silvicultural requirements as included in the Plan of Operations duly approved by Research and Advisory Committee (RAC) MS chaired by the PCCF.

ii. The Workshops should be organized in each Range to sensitize and train the field staff in implementing the prescriptions of this WP. The induction training of the field staff i.e. Forest guards and Foresters should be organised by the CF education on priority for the effective implementation of the Plan.

CHAPTER - 13

SMC CUM AFFORESTATION WORKING CIRCLE

SECTION 1: GENERAL CONSTITUTION

This Working Circle includes mainly the under stocked and denuded forest areas in the eastern part of the Kolhapur division and some degraded forests in the central portions. These areas bear sparse vegetation, the soil condition is deteriorated due to heavy grazing and frequent fires in the past. The areas were previously allotted mainly to 'Fodder WC', 'Afforestation for SMC WC', and 'Selection cum Improvement WC'. The total area that is included in this Working Circle is 10,279.55 ha that is 07.40% of the total forest are

Table 43

Allotment of area

Sr.No	Range	Area of the Range	No. of compartment		Area allotted to WC	% to area of the range	% to area of the division
			Full	Part			
1	Chandgad	27,225.04	15	2	3799.12	13.95	02.73
2	Ajara	18,701.98	6	9	997.97	05.34	00.72
3	Gargoti	25,350.78	2	3	508.92	02.00	00.37
4	Radhanagari	02,573.07	1	0	117.93	04.58	00.08
5	Karvir	13,297.17	31	0	2160.84	16.25	01.55
6	G. Bawada	11,584.05	3	0	417.73	03.61	00.30
7	Panhala	20,293.81	13	6	1275.17	06.28	00.92
8	Malkapur	19,945.10	14	0	1001.87	05.02	00.72
	Total	**1,38,971.00**	**85**	**20**	**10,279.55**	**-------**	**07. 40**

SECTION 2: GENERAL CHARACTERS OF THE VEGETATION

The areas in general are under stocked and open with a crop density from less than 0.1 to 0.4 though some patches of better stocked areas are also met with in a few compartments. The better stocked patches are due to partially successful plantations or natural crop. The areas are degraded to the extreme condition and are bare without any significant tree crop. The site quality is at the most IV-b. The forest type conforms to the 'South Indian moist deciduous' and 'dry deciduous' forests. The tree height is generally less than 10 meters. The crop consists of bushy, thorny scrub forest with a predominance of unpalatable grasses and other weed species. The principle species are Glyricidia, Dhawada, Hiwar, Dhaity (*Woodfordia fruicticosa),* Bahawa *(Cassia fistula),* Palas *(Butea monosperma)* and Khair.

SECTION 3: SPECIAL OBJECTIVES OF MANAGEMENT

1. To increase the vegetal cover and to increase the productivity of the land.
2. To arrest the soil erosion and to conserve moisture by adopting suitable SMC measures.
3. To recharge ground water supplies.
4. To meet the demands of the people for bamboo, fuel wood and small timber.

SECTION 4: COMPARTMENTS AND WORKING SERIES

The list of compartments allotted to Working Circle is given in the **Appendix 13.1** of Volume II. The statement showing various Working Series under this Working Circle and the annual sequence of working is given in the **Appendix 13.2** of Volume II of the Plan. A coupe that could not be worked in the designated year, shall be worked in the next year along with the current years coupe.

SECTION 5: ANALYSIS AND VALUATION OF THE CROP

The stock mapping work for all these areas has been carried out on village maps of scale 8" =1 mile, except for forests of Chandgad Range which have been done on topo sheets on the scale of 4" = 1 mile. The stock-mapping was done with the help of local territorial staff. Steep and precipitous slopes are practically blank and devoid of any tree growth due to absence of soil in the exposed rocks. The stock mapping results indicate nearly 51% area to be under stocked and eroded while nearly 49% area is well stocked. The abstract of the result of stock-mapping for the areas included in this Working Circle is given below:

Table 44

Extent of planimetered area as per stock maps

Sr. No.	Range	Well Stocked area (ha)	Under Stocked area (ha)	Eroded and Scrub (ha)	Total
1	Chandgad	2,943.2	771.921	83.999	3,799.120
2	Ajra	433.751	555.609	8.61	997.970
3	Gargoti	284.593	157.392	66.935	508.920
4	Radhanagari	32.956	61.834	23.14	117.930
5	Karvir	445.213	1,296.886	418.741	2,160.840
6	Gaganbawada	78.587	339.143	0	417.730
7	Panhala	403.667	643.629	204.694	1,251.990
8	Malkapur	388.965	612.905	0	1,001.870
	Total	**5,010.932**	**4,439.319**	**806.119**	**10,256.370**
	% to WC	**48.86**	**43.28**	**07.86**	**-------**

** An extent of 23.18 ha. area belonging to Kasba Thane and Marli villages of Panhala range received for comp. afforestation was not stock mapped.*

The details of stock mapping exercise are given in the **Appendix 10.4** of Volume II.

Enumeration work in the field was completed by the FRSS unit, Nashik while its analysis was done in this office. Average total number of trees per hectare is found to be 264 out of which nearly 73% fall within 16-45 cm girth class while nearly 21% fall within a larger girth class of 46-75 cm. It implies majority of the crop is young and is in pole stage. Arjun, Ain, Kumbha, Kinjal, Bor, Jambhul and Hirda are the top seven species in terms of number of trees per hectare. Amongst the important NTFP species, Jambhul, Hirda, Aonla, Karvand, Amruta and Apta are listed.

Table 45

Number of trees per hectare

Girth Classes (cms)									
16-30	**31-45**	**46-60**	**61-75**	**76-90**	**91-105**	**106-120**	**121-135**	**136-150**	**Total**
123.02	70.26	41.16	14.70	04.90	05.88	02.94	0.00	0.98	**263.84**

Table 46

Species having maximum number of trees/ha in descending order

S.No.	Species	No. of trees/ha.	percentage
1.	Arjun	28.92	10.96
2.	Ain	23.04	08.73
3.	Kumbha	17.16	06.50
4.	Kinjal	15.20	05.76
5.	Bor	14.70	05.57
6.	Jambhul	11.76	04.46
7.	Hirda	11.27	04.27

Table 47
Estimated Number of NTFP species per hectare

Sr. No	NTFP Spp.	No./ha
1	Jambhul	11.76
2	Hirda	11.27
3	Aonla	02.45
4	Karvand	01.47
5	Apta	00.49
6	Amruta	00.49
	Total	**27.93**

SECTION 6: PREPARATION OF THE TREATMENT MAP

The proposed annual working units will be demarcated one year in advance of working. After demarcation of the area a treatment map will be prepared by the RFO and will be verified by the ACF. The following areas shall be shown distinctively in the map:

I. Area 'A' - Protection Areas : include the following areas.

i. Areas with steep slopes i.e. more than $25^{0.}$

ii. Eroded areas or areas liable to erosion.

iii. Twenty meters wide strip on either side of the water courses.

II. Area 'B' - Under stocked areas: include areas with crop density less than 0.4.

III. Area 'C' - Old Plantation areas**:** include areas under old plantations.

IV. Area 'D' - Well stocked areas: include areas with crop density more than 0.4.

In addition, the TM shall also show prominently the type and location of SMC works to be undertaken.

Treatment:

The various treatments proposed for the above mentioned areas are as follows:

I. Area 'A' :

i. The SMC works including nalla-bunding and gully plugging works shall be carried out wherever needed.

ii. Cuttings of Ficus, Vitex spp. (Nirgudi), bulbils of Agave etc. shall be planted for binding the soil where ever possible.

II. Area 'B' :

These areas shall be treated in following two stages:

A) Restorative Phase: During this phase, soil and moisture conservation works shall be carried out during the initial first year. The area of the annual working unit shall be protected completely from biotic interference by digging a T.C.M. During this phase various works will be taken up as under.

i. Preparation of the T.C.M. and live hedge around the working area.

ii. The SMC works like van tale, cement bandharas, nalla-bunding, gully plugging, contour trenches etc will be carried out wherever required and as per the suitability of the area.

iii. Species like Chilar, Agave, Ipomoea, Vitex negundo, Shembati (Acacia pinnata), bamboo, Karvand and other suitable local species should be grown on the mound of the live hedge and TCM.

iv. Singling and cutting back of the rooted stock

iv. Motivating the villagers for J.F.M. shall be done during this period.

B) Productive Phase: In the second year, the planting activity shall be taken in the same annual working unit.

i. Suitable local miscellaneous species including medicinal plants will be planted in the under-stocked areas having good soil depth. Preferred species are indicated in the Section 8 on Regeneration. Areas prone to excessive grazing shall be excluded from planting activity.

ii. Rooted stock shall be properly tended.

iii. Only fodder trees/ grasses shall be planted in the erstwhile fodder reserve areas.

III. Area 'C' :

i. The plantations shall be treated as per the prescriptions and sequence of thinning as given in the 'Old Plantations Management W.C'.

ii. Any other successful old plantation or its part on slopes less than 25^0 that is not included in 'Old Plantations Management WC' inadvertently but falls within the coupe shall be worked as per its year of formation and sequence of working given for other plantations.

IV. Area 'D' :

i. No planting shall be done in these areas.

SECTION 7: SOIL AND MOISTURE CONSERVATION WORKS

The area gets heavy average rainfall of about 2000 mm. per year but most of the valuable rain water goes waste as run-off into the streams, rivers and ultimately into the sea. Therefore a large tract of this division especially on the eastern side faces an acute shortage of water during the summer months. The soil becomes compact during the pinch period resulting in poor drainage as well as poor aeration of the soil. Intensive SMC works viz. van-tale, cement bandharas and other appropriate water harvesting structures shall be undertaken as per site requirement for helping young regeneration to establish easily. A village shall be taken as a unit of holistic development. For this purpose, it shall be endeavored to integrate forestry management interventions with development schemes of other departments within the selected villages. Prescriptions 1 and 2 under Section 8 of Chapter on 'Protection cum Watershed Management Working Circle' should be followed.

Degraded areas

SECTION 8: REGENERATION

The young recruits of Ain, Kinjal, Anjani, Aonla, Karvand, Jamun, Pisa, Katak, Kumbhi, Chandada, Umbar etc. appear profusely after first few showers of the season. The status of NR in general can be treated as satisfactory except for the forest patches adjoining villages that are prone to fires and unregulated grazing. So to help the young recruits of above mentioned species to establish and to further induce the NR, the following prescriptions shall be followed:

i. The areas containing promising NR shall be identified inside the coupe.

ii. The undesirable undergrowth which is preventing or likely to prevent the development of seedling regeneration of the desired species shall be removed.

iii. Identified NR patches shall be properly spaced and tended and rigidly fire-protected.

iv. Coppice shoots interfering with the development of young seedlings shall be removed.

Artificial Regeneration and Choice of the Species:

The limiting factors of a plantation to be successful are listed below. They should be properly addressed before taking up any new plantation activity

i. Timely plantation targets.
ii. Selection of suitable plantation sites.
iii. Choice of species as per the sites and as per the requirement of the village communities.
iv. Analysis and eradication of reasons for previous failures.
v. Timely release of budgetary grants.
vi. Seed procurement from known sources.
vii. Healthy and hardy nursery stock.
viii. Proper depth of trenches or pits.
ix. Proper soil-working.
x. Full protection from biotic-interference.

The choice of the species to be planted shall depend upon the area suitability of the species and its local demand and shall be decided by the DCF in close consultation with the local village communities. Local plant species should be preferred. The species suitable for these areas for planting are Aonla, Jambhul, Amba, Hirda, Behada, Ain, Shisham, Shiwan, Khair, Shikekai, Karvand, Asana (Grewia nervosa), Sawar, Palas, Tamal patra, Amruta, Bhokar (Cordia sp.), Bamboo etc. Areas suitable for bamboo plantations should be identified and planted preferably with locally available and sought after bamboo species viz. Managa bamboo (Oxytenanthera stocksii) using offset planting or Kanak bamboo (Bambusa bambos). However, the list of all suggested species is only indicative and not exhaustive. Only good fodder grasses and fodder tree species should be planted in the erstwhile fodder development Working Circle areas so as to restore and augment the fodder yielding potential of the areas. Planting of other tree species should not be done in the erstwhile fodder reserves.

Care shall be taken to give due representation to local fuel and fodder tree species (about 15% of the misc. stock) as well as to the edible fruit and NTFP tree species (another 15% of the misc. stock). Seedlings raised preferably in root-trainer containers shall be used. Tall plants of 1.5 to 2.5 years old should also be raised in the nurseries and few plantations should be raised using these tall plants. The DCF should consult the Silva MS for seeking his guidance to introduce certain new/exotic/endangered species for field trials in a limited way which have been found to successfully establish after fair trials in the research areas. The DCF should also try to raise irrigated plantations at suitable places having permanent source of water.

Suitable fodder grasses shall also be raised either on the mounds of the contour- trenches or on the fodder beds as per the plantation model adopted. The objective shall be, to provide fuel and fodder to the local community under JFM and to encourage them to raise fast growing fuel and fodder trees and fodder grasses on the mounds of their fields or fallow lands and community lands under appropriate schemes of the Social Forestry department so as to make them self-sufficient and to reduce their dependence on forests.

SECTION 9 : PRE-PLANTING AND PLANTING OPERATIONS

i) Pre-planting operations:

PPO shall be carried out during the restorative phase i.e. one year before the actual planting works are to be taken up.

(a) Soil Working:

It will include digging up of pits/trenches along with nalla-bunding, check-dams and other SMC works. Proper depth of the pits/trenches as per the plantation model is essential for the early establishment of the seedlings and therefore should be given appropriate attention by the inspecting officers.

(b) Fencing:

The area to be planted shall be fenced with a TCM but care shall be taken not to dig it across the contour and instead live-hedge fencing shall be provided across the contour. On the mound of the TCM, a row of suitable fast growing species like Chilar, Ipomoea, Vitex negundo, Acacia pinnata (Shembati) shall be planted along with Agave bulbils and tussocks of Khus and Sabai grasses on either side. Karvand and Bamboo may also be planted at suitable places on the TCM. In the drier areas on the eastern side of the district, Prosopis and Parkinsonia can be the preferred species to be planted on the mound. Repair of the TCM in the following years shall be attended to, if required in order to keep it effective and cattle-proof.

(c) *Nursery:*

Nursery shall be raised well in time using root trainers/ poly pots as per the yearly requirement of the stock. *Only good quality seeds of known origin should be used. The Silva MS has maintained many seed orchards across the State*. The DCF should first try to procure good quality seeds of

the required species from the Silva as well as from the seed units of the FDCM for raising nurseries. Adequate budgetary grants must be provided to the DCF in time so as not to affect the nursery operations. Nursery stock should be a judicious mix of indigenous species valuable to the local community for their daily needs like that of timber, fuel, fodder, NTFP as well as of bamboo. *Tall plants (1.5 to 2.5 years old) of miscellaneous species should also be raised in the nursery so as to introduce them in the field at a large scale.* The stock should be tended with great care so that the seedlings of various species grow into healthy and hardy planting stock and attain sufficient height and age before they are planted out. The sorting and grading of the planting stock should be done on regular basis and only healthy and hardy seedlings of sufficient height and age should be allowed to leave the nurseries for planting in the field. A list of central nurseries is given in **Appendix 13.3** of Volume II.

ii) Planting Operations :

(a) Planting

The planting of miscellaneous species shall be done in the pits/ trenches during the Productive phase in the next year. It shall be completed within a fortnight from the outbreak of monsoons. *The DCF should also try to raise irrigated plantations at suitable places having permanent source of water.*

(b) *Weedings, Soil-working and Casualty-replacement*

Weedings, Soil-working and Casualty-replacement shall be done timely and as per the plantation model adopted. Proper soil-working of the seedlings planted is absolutely essential and therefore close attention should be given to it by the inspecting officials.

SECTION 10 : OTHER REGULATIONS

i. **Fire Protection:** Main Afforestation coupe shall be fire-traced and rigidly fire-protected for a period of five years from the Ist year of its working. The area shall be cleared-off of all the dry and cut remains of bushes, leaves etc. by end of February to avoid fire hazards to standing crop as well as to NR. Effective protection against fire for a period between Feb.15 to June 15 is a must to ensure survival and establishment of NR of all species for developing it into the future growing stock. 'Village forest protection committees' shall be formed and fire tracing and other related works will be carried out through these committees.

ii. **Closure to grazing:** Coupe shall remain closed to grazing for a period of 5 years from the Ist year of its working.

iii. **Resolving conflict with Micro Plans made under JFM/ FDA**: If any conflict is noticed between the prescriptions given in this WC and the Micro Plan written under JFM, FDA etc. for the same area, then the said area shall be treated in accordance with the special objects of management pertaining to this W.C. and suitable amendments shall be made in the Micro Plan, if necessary.

iv. The prescriptions of this WC will not be applicable on areas bearing Seed Orchards, Sample Plots, Candidate Plus Trees, Plantations, nurseries etc falling in the areas allotted to this WC and which are in possession of the Silva MS. These areas are managed with a perspective of research and extension in forestry and hence will be managed as per their Silviculture requirements as included in the Plan of Operations duly approved by Research and Advisory Committee (RAC) MS chaired by the PCCF.

v. The Workshops should be organized in each Range to sensitize and train the field staff in implementing the prescriptions of this WP. The induction training of the field staff should be organised on priority by the CF education.

CHAPTER-14

BAMBOO MANAGEMENT (OVERLAPPING) WORKING CIRCLE

SECTION 1: GENERAL CONSTITUTION

Bamboo is found mainly along the hilly slopes and along the nallahs in scattered but dense patches in Chandgad, Ajra, Gargoti and Malkapur ranges of Kolhapur division. Old bamboo plantations and naturally occurring bamboo areas falling outside 'Protection cum Watershed' WC shall be managed under this WC. A statement showing a list of bamboo areas is given in **Appendix 14.1** of Volume II.

SECTION 2: GENERAL CHARACTERS OF THE VEGETATION

Highly congested and badly entangled culms of

Bamboo crop is both natural as well as planted in origin. Dendrocalamus strictus is the main bamboo species which was planted in the forest areas while Bambusa bambos (Kanak bamboo) and Oxytenanthera monostigma (Chiva Kathi) are found growing naturally in the wild in the forest areas mainly on tops of ridges and hills.

Oxytenanthera stocksii (Managa / Chivari / Mes) on the other hand is found growing luxuriantly on the bunds of private cultivations in the western region of the district but is rarely seen in the forest. Majority of the old bamboo clumps found growing naturally or in plantations

A Clump of Oxytenanthera stocksii on a field

Culms of Oxytenanthera monostigma on top of forest ridge

in the forest areas have never been worked before and show lot of congestion bearing dead, deformed and over mature bamboos. The culms of Bambusa bambos are found to be badly entangled within the clumps due to over congestion. The growing stock is also damaged due to forest fires and illicit cutting. These clumps therefore require immediate management interventions.

NT

1. To harvest bamboos scientifically to get maximum yield on sustainable basis.
2. To improve bamboo productivity by using various management interventions.
3. To meet the local market demand by regular harvesting of bamboos.
4. To generate employment to the local people.

SECTION 4: COMPARTMENTS AND WORKING SERIES

The statement showing the Bamboo Working Series and sequence of annual coupes is given in the **Appendix 14.2** of volume II. A coupe that could not be worked in the designated year, shall be worked in the next year along with the current years coupe.

SECTION 5: CUTTING CYCLE

A Cutting cycle of 3 years duration is kept for the bamboo harvesting.

SECTION 6: AGENCY FOR HARVESTING

The coupes will be worked departmentally or as per the prevailing government policy.

SECTION 7: METHOD OF TREATMENT

Naturally occurring bamboo areas as well as bamboo plantations falling within 'Protection cum Watershed' WC will not be worked. Such bamboo areas/ plantations which are left out inadvertently from the list given in **Appendix 14.1** and which do not fall within 'Protection cum Watershed' WC will also be worked as per the following prescriptions. The DCF should submit list of such bamboo areas and their sequence of working to the CF Kolhapur and seek his/ her approval along with a copy to the CF WP Kolhapur.

Considering heavy congestion and entanglement of culms in the clumps especially in the case of Bambusa bambos, practicing following prescriptions in the annual coupes being worked for the first time may not be easy. Harvesting of highly entangled bamboos may not be possible without breaking them. *Such clumps of Bambusa bambos or other species which are difficult to work as*

per standard bamboo working due to heavy congestion should be worked so as to retain culms in 'U' shape or to retain bamboo culms on the periphery of the clumps. This should be done only once after which following standard bamboo working prescriptions should be strictly followed.

1. Bamboo harvesting will not be permitted during June 15 to September 30, the period of culm formation.

2. Bamboo cutting will be done with a sharp axe. A bamboo culm must be cut in a single stroke with a slant cut so that cutting is above the first inter-node and the height of the cut is between 15 cm to 45 cm above the ground, to avoid drying of the rhizome due to capillary action.

3. All clumps will be cleaned during the coupe working. Cleaning operations in bamboo clumps will include the following:

a. Climbers infesting bamboo clumps will be removed.
b. All dead, decayed and dry culms will be removed.
c. All culms will be cut above the first internode.
d. Twisted culms will be removed.
e. Top broken culms with more than half of the top damaged and malformed culms will be removed.

4. No clump shall be considered fit for harvesting unless it contains more than 12 culms of one year or older in age.

5. While extracting bamboo, it should be ensured that the reserved culms are evenly spaced and some mature culms are present on the periphery of the clumps.

6. All current year and previous year culms will be retained. Current year culms have the culm sheath on the lower half and abundant bloom i.e. white powdery dust which comes off easily when touched. Previous years culms do not have the culm sheath and the patchy bloom does not come off easily. Older or mature culms have blackish grey bloom.

7. The mature culms equal in numbers to the current year culms subject to minimum of 8 culms must be retained to provide support to the younger culms.

8. The remaining mature culms after reserving as described in the preceding paragraph may be harvested. No culm shall be extracted without cleaning the clump which should be an integral part of the bamboo harvesting.

9. Debris after cutting the bamboos should be stacked atleast 3 metres away from clumps.

10. Digging of rhizomes, removing tender parts of older culms or cutting of current or previous year culms will be strictly prohibited.

11. The culms at the periphery of the clump will not be removed except where it is absolutely necessary for facilitating working in the interior portion of the clump.

12. The leading exterior culms may not be cut under any circumstances even if they are malformed. Their relation is in the interest of the outward growth of rhizome and clump as they support new culms.

13. The working of the clump will be such that the culms after working are well spaced.

14. The bamboo extraction should end by March when the culms are almost devoid of starch and attract less insect borers.

15. Areas suitable for bamboo plantations should be identified and planted preferably with Managa bamboo (Oxytenanthera stocksii) or Kanak bamboo (Bambusa bambos).

Gregarious flowering

The period, extent and location of the gregarious flowering shall be recorded in the divisional notebook. The clumps will be clear felled after seeds are matured and have been collected. The areas after gregarious flowering will be provided with strict protection from fire and grazing so as to facilitate germination and establishment of bamboo seedlings. Seed collection, disposal of bamboos from dried clumps after flowering and tending operations for bamboo seedlings requires extensive planning and timely action. In case the seeds after the gregarious flowering are subjected to fungus attack, then the area should be sprayed with a light solution of a fungicide.

To induce formation of healthy clumps, evenly distributed clump foci of 1 meter diameter at 5x5 meter spacement (from centre of one clump foci to another) will be formed in the area having good bamboo regeneration. Groups of bamboo seedlings showing good growth will be preferred for the foci formation. Weeds, climbers and other bamboo seedlings upto 2 meter around bamboo foci should be cleared in July- August to assist growth of bamboo seedlings in the selected foci. The entire area will strictly be protected from fire.

Immature crop will receive cleaning operations till the crop becomes harvestable. All badly grown, twisted and damaged culms will be removed from the selected foci. Weeds, climbers and other bamboo seedlings upto 2 meter around bamboo foci should be cleared and soil working should be carried out in August. The entire area will continue to receive protection from fire and grazing. Fully mature clumps may be harvested in the eighth year onwards depending upon location in the annual coupe.

CHAPTER - 15

WILDLIFE MANAGEMENT (OVERLAPPING) WORKING CIRCLE

SECTION 1: GENERAL CONSTITUTION

The forests of Kolhapur district were always known for their rich wildlife biodiversity. With mounting agricultural, industrial and demographic pressures, wilderness areas, which are the richest repositories of wildlife and biodiversity have either shrunk or disappeared. Their continued existence is crucial for the long-term survival of the biodiversity and the ecosystems supporting them. This WC overlaps with the entire area being dealt in the WP.

SECTION 2: SPECIAL OBJECTIVES OF MANAGEMENT

i. To conserve and protect the rich wildlife bio-diversity.
ii. To reduce man-animal conflict situations.
iii. To strengthen the corridors connecting the two sanctuaries in this district along the Western Ghats.
iv. To increase habitat suitability in areas rich in wild animal populations or endemic and rare species.
v. To train the staff and to strengthen the infrastructure to handle wildlife emergencies.

SECTION 3: GENERAL DESCRIPTION

The term wildlife encompasses all uncultivated flora and undomesticated fauna. Nearly 2,227 species of plants belonging to 1,023 genera of 182 families have been recorded for Kolhapur district. There are as many as 47 species of mammals, 264 species of avifauna, 59 species of reptiles and 66 species of butterflies have been reported in the district. The jungles of this district had been known to be the favourite hunting grounds for shikaris in the past. The Royals of Kolhapur in the past initiated the sport of *saathmari*, a kind of Indian version of *bull fighting* of Spain. It was about capturing mast elephant in the *saathmari maidan* by the trained personnel. The *'hides'* in the ground were used to seek protection against the wrath of the elephant while trying to capture it. Similarly in another royal sport, Cheetahs were brought from Africa and were reared and trained to chase and hunt black bucks.

However the increase in human population resulting in increasing demands for housing and agricultural land, easy access into forest areas through the development of an extensive road network, diversion of forest for various "developmental" projects, mining, hangover of shikar traditions, paucity of staff and no specific schemes for wildlife conservation in areas other than sanctuaries have all contributed to the decline of wildlife in the district. The habitats of the wild animals have been drastically reduced and the populations of wild animals that remain feel cornered in small isolated pockets of wilderness. The contiguous patches of forests are lost in

most areas of the district. It is important to note that although the focus of wildlife protection has normally been on the bigger wild animal species like the Tiger and Gaur, the Western Ghats harbour innumerable small endemic and extremely rare species of plants and animals many of which may not even have been reported as yet. These gene pools assume great significance in today's shrinking world and all out efforts are required to ensure their protection and conservation.

The Western Ghats running along the western boundary of the district and the adjoining forest areas however still have good populations of wild animals and plants. The two areas in the district viz. Radhanagari sanctuary and Chandoli sanctuary were declared wild life sanctuaries vide Govt. notification no. WLP 1085 / CR-588 / V / F-5, dated 16/9/1985 and WLP 1085 / CR-588 / II / F-5, dated 16/9/1985 respectively. Chandoli sanctuary area has been declared as a National Park vide. Govt. notification no. WLP 1099 / CR 117 / F-1, dated 14/5/2004.

SECTION 4: LEGAL POSITION

There were no written regulations for control over hunting when these areas were under the erstwhile Sansthan and Jahagiris except that hunting by people other than the Rulers was generally not permitted. The Wild Birds and Animal Protection Act of 1912 was the first legislation which was implemented in the Chandgad forests which were under British regime. However the provisions of this Act were not enough to control the hunting of wild animals. The Indian Forest Act of 1927 had provisions under section 26 (1) (i) and 32 (j) for protection of wild animals in notified Reserved and Protected Forests but these provisions were not applicable outside notified Reserved and Protected forests.

The Bombay Wild Animals and Wild Birds Protection Act 1951 was a more comprehensive piece of legislation affording much wider protection to wild animals and wild birds and also included constitution of a State Wildlife Advisory Board, Procedures for issuing licences for hunting certain wild animals and birds, Constitution and control of game sanctuaries, Regulations for dealing in trophies and Prevention and detection of offences and penalties for contravention of the provisions of the Act.

Accordingly the Indian Board for Wildlife was first constituted in 1952 to advise the Government on policies related to Wildlife Conservation and Protection. In 1972 the Wildlife (Protection) Act was passed and the long title of the Act was as follows. "An Act to provide for the protection of Wild animals, birds and plants and for the matters connected therewith or ancillary or incidental thereto".

The Wildlife (Protection) Act 1972 has undergone major amendments in 1982 (Amendment Act. 23 of 1982), 1986 (Amendment Act. 28 of 1986), 1991 (Amendment Act 44 of 1991), 1993

(Amendment Act 26 of 1993) and 2003 (Amendment Act 16 of 2003). The long title of the recently amended Act 2003 reads as follows.
"An Act to provide for the Protection of Wild animals, birds and plants and for matters connected therewith or ancillary or incidental thereto with a view to ensuring the ecological and environmental security of the country".
It is thus evident that the scope of the recently amended Wildlife Protection Act has been broadened to correlate the ecological and environmental security of the country with the protection of Wild animals, birds and plants.

The first National Wildlife Action plan was adopted in 1983 and recently i.e. in 2002 this has been modified by the second National Wildlife Action Plan (2002 – 2016). The Preamble of this new National Wildlife Action Plan is as follows:

"The first National Wildlife Action plan was adopted in 1983 based on the decisions taken in the XVth meeting of the Indian Board for Wildlife held in 1982. The plan had outlined the strategies and action points for Wildlife Conservation, which is still relevant. In the mean while, however, some problems have become more acute and new concerns have become apparent, requiring a change of priorities. Increased commercial use of natural resources, continued growth of human and live stock populations and changes in consumption patterns are causing greater demographic impacts. Biodiversity conservation has thus become a focus of interest. The National Forest policy was also formulated in 1988, giving primacy to conservation. Hence this new National Wildlife Action Plan (2002 – 2016)".

Thus the present policies and legislation concerning Wildlife conservation / protection are as follows:

1. National Wildlife Action Plan (2002-2016)
2. Wildlife (Protection) Act 1972 as Amended in 2003
3. National Zoo Policy 1998
4. The Biological Diversity Act 2002

SECTION 5: RIGHTS AND CONCESSIONS

There are no rights and concessions granted to people in respect of wild animals and birds for capturing, hunting or shooting.

SECTION 6: STATISTICS OF WILD ANIMALS

The population estimation for wild animals in the territorial division is done once every four years. The estimation of Tigers and Leopards was basically done using the Pug Mark Estimation technique between the 18th and 22nd of April 2005 (both days inclusive) and the estimation of other animals was done using the Waterhole Count method on 2 occasions viz. the 23rd – 24th April and the 22nd – 23rd May 2005 in the entire state including Kolhapur territorial division.

According to the state level committee report, 2005 the population estimates for various wild animals in Kolhapur division are as follows:

Table 48

Population Estimates of Wild animals in Kolhapur territorial division-2005

	Name	**Nos.**
1	Tigers	001
2	Leopards (Panthers)	018
3	Gaur	363
4	Sambar	030
5	Sloth Bear	001
6	Barking Deer	100
7	Wild Boar	360
8	Macaques	202
9	Common Langurs	231
10	Jackal	029
11	Wolf	001
12	Giant Squirrel	008

One important recommendation made in the Report of the State level Committee on population Estimation, 2005 is as follows.

"*Tiger presence in Kolhapur circle including its Protected Areas needs closer monitoring through a system of keeping records of direct sightings by the field staff at the lowest level and proper follow up of all cattle kill cases to find out probable territories of the predator. This is important considering that getting pugmarks is very difficult in these areas".*

The Muggers (Crocodylus palustris) though not the part of the population estimates-2005, are otherwise found commonly in the river Varna bordering Kolhapur and Sangli districts as well as in river Panchganga. A statement showing population estimates of wild animals in Kolhapur Wild life division is given in **Appendix 15.1** of Volume II of the Plan.

SECTION 7: MAN-ANIMAL CONFLICT

George Eliot once said, *"*Animals *are such agreeable friends- they ask no question, they pass no criticism"*. Though it is very true yet man-animal conflict levels have been known to increase manifold over the years. While increasing man-animal conflict is an outcome of shrinkage, fragmentation and deterioration of habitats, it has caused destruction of wildlife and generated animosity against wild animals. Habitat destruction to meet the ever increasing needs of the human population force large herbivores like Gaur (Bos gaurus), Sambar (Cervus unicolor) to enter agricultural fields leading to crop depredation as well as Panthers entering human habitations leading to man-animal conflict situations.

Wild elephants in Chandgad forests

Of late, **Wild elephants (*Elephus maximus*)** have also been visiting Chandgad, Ajra, Bhudargad and Radhanagri talukas of Kolhapur district frequently from nearby Dandeli sanctuary in Karnataka and now have become residents of this area. The wild elephants who first got strayed into Hasur village in Chandgad taluka from Karnataka side in march, 2004 have now become regular visitors to Kolik, Mhalunge, Tudiye, Tekodi, Surute, Jangamhatti, Dhangarwada, Ambewadi, Patne, Kalasgade, Yelgude etc. in Chandgad taluka, Vite, Khanapur, Dewarde, Pernoli etc. in Ajara taluka and Aaradgundi, Dindewadi, Naganwadi, Shengaon, Girgaon, Kolvan etc in Bhudargad taluka and Yeni, Farale, Bhandane etc.

Destroyed Sugarcane crop

in Radhanagari taluka. They raid the sugarcane and paddy fields in the villages frequently and bring about the destruction of the paddy crops, bamboo, and coconut trees etc. at a large scale.

There were five incidents of human killings, four by the elephants and one by the bison till 2007. There were three incidents of serious injuries to humans by the elephants till 2006 while seven incidents of serious injuries to the humans by the bisons were reported in the year 2005-06. In addition, six more incidents of minor injuries to the humans, two by the bisons, two by the panthers, one by the wild boar and one by the hyena were reported in the same year. There were 1323 reported incidents of crop depredation since 2003-04 till August 2007 resulting into financial loss of 38.52 lakhs while 1291 cases of crop depredation by bisons were reported resulting into financial loss of 10.17 lakhs since 2004-05 till August 2007. Chandgad and Ajra are the worst affected areas bearing the wrath of the raiding herds of elephants. On the other hand, four elephants- three females and one male calf were found electrocuted to death in a malaki area at the village Yelgude in Chandgad taluka in the year 2006. These conflict situations are on the rise and figure prominently in legislative discussions. Though efforts are

A shocked survivor of Panther attack

being made to find solutions and to reduce the conflict levels yet till such time the poorly equipped and untrained field staff faces the wrath of the people and the forest department gets lot of bad publicity in the local press. Barbed wire fencing, use of crackers have been found to be very effective against the raiding herds of elephants. A statement showing listing attacks by wild animals on humans is given in **Appendix 15.2** of Volume II of the Plan. A team of officials from the Ministry of Environment and Forests (MoEF) visited the elephants areas of Maharashtra, Karnataka and Goa in May 2006 and accepted the state' claim

Using crackers to disperse elephant herd

on migratory wild elephants from the neighbouring Karnataka having become the permanent residents in the districts of Sindhudurg and Kolhapur. It is important since earlier the MoEF considered Maharashtra to be a non elephant state and therefore has declined to accept the states' claim of permanent wild elephant population. It will lead to financial as well as technical assistance from the central government.

In an effort to mitigate the growing conflict between man and elephant, the CF Kolhapur has submitted an action plan for Rs. 32.85 crores for the period 2006-07 to 2010-11 which includes measures for habitat improvement, research, purchase of vehicles and equipment, Solar fencing, digging of elephant proof trenches (EPT) etc. An amount of Rs. 21.44 lakhs towards compensating human deaths and crop loss was distributed in the year 2006-07. Budgetary grants of Rs. 12 lakhs and 23.32 lakhs were sanctioned for the year 2006-07 and 2007-08 under centrally sponsored schemes of Project Elephant.

A combination of measures like solar fencing, erection of stone walls, digging of EPT etc. depending upon the terrain can limit the movement of the herds to habitations. Bursting crackers, burning dry cakes of cow dung mixed with dried red chillies by villagers have been reported to

Elephant proof trench (EPT)

force elephants to move away from the affected areas. Sugarcane, Bananas, Coconut and Paddy are the favourite fruit/crops of elephants and therefore attract them to move towards human habitations. Change in cropping pattern if possible in the affected areas for few years may also help the elephants to go back to their natural habitat.

Forest infrastructure in the form of more jeeps, wireless sets, tranquilizing equipment etc need to be strengthened. Staff should be adequately trained to handle field emergencies. Identification of routes frequently used by the elephants to enter from the neighbouring state/ district, their entry and exit points can help to devise strategies to effectively block their entry points. Capturing and translocation of elephants is very laborious and expensive exercise and should be used as a last resort only if decided so by the PCCF WL MS.

The time has also come to explore possibilities for developing continuous corridor of contiguous blocks of forested land and ensuring connectivity right from Chandgad forests in the southern portion of the district to the Chandoli forests in the northern most portion, for free movement of the wild animals. A close look at the satellite imagery suggests that such connectivity is still possible although it would mean that some areas which are not Government owned would need to be acquired for the larger and extremely important interests of biodiversity conservation in the Western Ghats. It is important to reiterate that the Western Ghats have been recognized as one of the hot spots for biodiversity conservation in the world and all out efforts need to be made at the state and national level to strengthen the connectivity. Recent movements of Elephants (Elephus maximus) into forests of adjoining Sindhudurg district from Karnataka state and even into Chandgad forests of Kolhapur district have proved that connectivity in some form exists even today and thus this connectivity can go up all the way upto the forests of Mahabaleshwar in Satara district.

SECTION 8: MEASURES ADOPTED FOR WILDLIFE PROTECTION AND CONSERVATION

1. The main achievement towards this goal is the notification of the Radhanagari sanctuary and the Chandoli sanctuary in the district. These areas have been transferred to the Kolhapur wildlife division and thus it is expected that intensive management of these two sanctuary areas on the basis of prescriptions given in separate Management Plans would improve the status of wildlife conservation in these areas. A proposal for further extension of the Radhanagari sanctuary is also under consideration to include certain portions of the Gaganbawada range.

2. The practice of giving shooting permits has been stopped after the 1991 amendment to the Wildlife (Protection) Act.

3. The Wildlife week is observed in the first week of October every year with an objective to create awareness amongst the people regarding the importance of wildlife conservation.

4. The rates of compensation for cattle killed by wild animals have been substantially increased since January 2003 and compensation upto a maximum of Rs. 9000/- is now payable to the cattle owner. The compensation payable for human deaths and injuries has also been substantially increased since January 2003 and in case of human death or permanent handicap, the compensation now payable is Rs. 200000/- This was earlier Rs. 40000/- for adults and Rs. 20000/- for children upto 18 years of age.

5. As per the latest GR dated June 2, 06 full compensation can be given in case of crop damage by elephants upto Rs. 2000. For crop damage upto Rs. 10,000 a compensation of Rs. 2000 plus 50% of the amount exceeding 2000 upto maximum 8000 is payable while for crop damage exceeding Rs. 10000, a compensation of Rs. 6000 plus 30% of the amount exceeding Rs. 10000 upto maximum Rs. 15000 is payable. Similarly compensation payable for the damage to fruit trees like that of Coconut, Supari, grafted mango, banana and other fruits by the elephants is Rs. 9000, Rs. 1200, Rs. 1600, Rs. 48 and Rs. 200 per tree respectively. This GR is applicable only to the districts of Sindhudurg, Ratnagiri and Kolhapur.

SECTION 9: METHODS OF TREATMENT

i. A detailed survey of the fauna and flora of the district, their occurrence, status and conservation strategies with a focus on the endemic and endangered species should be undertaken by the expert agencies appointed by the forest department. A database shall be prepared identifying all endemic and endangered species of flora and fauna, surveying their environs and habitats to establish the current level of security and the nature of threats. Periodic reviews of flora and fauna species status should be conducted and the same should be correlated with the IUCN Red data list of this region every three years.

ii. An expert committee shall be constituted to explore possibilities for developing continuous corridors of contiguous blocks of forested land and ensuring connectivity right from Chandgad forests in the southern portion of the district to the Chandoli forests in the northern most portion for the free movement of the wild animals. The committee shall also explore the possibility of constituting the conservation reserves or declaration of certain areas as ecologically sensitive areas and give its recommendation.

iii. Since water is the major limiting factor in the forest during the summers, so development of various water sources by gully-plugging and by erecting nalla-bunds, check-dams, cement bandharas etc. needs to be done. Sites with perennial sources of water locally known, as ‘jivant jhirra’ within the forest areas shall be identified and their locations shall be marked on the map of each Range, which shall be displayed prominently in each Range office. These sites shall be tackled appropriately through various means like desilting, deepening,

diverting small trickles into dug out troughs adjacent to nallahs, construction of Forest tanks locally known as 'Van-talis' or construction of cement bandharas in the nearby vicinity. Water holes shall be created at the appropriate places. This will ensure availability of water sources for wild animals and reduce straying of those animals into agricultural fields thus reducing conflict situations.

iv. Areas where fodder availability can be increased to prevent straying of wild herbivores like gaur and elephants into agricultural lands should be identified and tackled. Fodder and fruit tree species favoured by the wild fauna shall be planted as part of the various afforestation schemes.

v. The infrastructural facilities to handle wildlife emergencies should be strengthened. One set of tranquilizing equipment along with capture and trapping equipment like cages etc. shall be provided to each Range within the first two years of the Plan. A Rescue centre at an appropriate place should be established to handle wildlife emergencies.

vi. To mitigate man-animal conflict situations, the DCF should prepare an analytical report in consultation with the wildlife wing, concerned officers of the neighbouring Karnataka state, NGOs etc. suggesting the affectivity and necessity of different measures like elephant proof trenches, Solar fencing and others along with the financial projections.

vii. The forest staff and officers at different levels shall be trained and equipped fully to handle wildlife emergencies including handling of tranquilizing as well as trapping equipment.

viii. Insufficient or badly presented evidence often coupled with non-availability of witnesses, frivolous appeals and interim orders stall most wildlife offence cases at trial courts. The frontline staff should be trained to provide adequate professional skills in prosecution matters related to wildlife offences.

ix. Mass awareness camps should be organized as a part of sustained campaign to educate masses regarding man-animal conflict situations, the reasons, the analysis and the management being done by the forest department. The awareness can be enhanced by personal contact, by publishing and distributing written material. The local press should also be educated and properly briefed from time to time.

Forest officials and villagers discussing elephant Problem at Mhalunge camp

x. The willing veterinarians preferably from the government departments shall be imparted basic and advanced training in the wildlife medication in different batches. The outstanding wildlife trained veterinarians should be empanelled by the forest department and a list of the same should be sent to the wildlife and the territorial wings to handle the wildlife emergencies in the field.

xi. Felling shall not be allowed near the water holes as well as on the paths frequently used by the wild animals. Two dead trees per hectare shall be retained in each coupe where felling is prescribed, for nesting and resting of the wild-life. These trees shall preferably be of low commercial value. Also during harvesting of the coupes, some unsound and hollow logs of commercially low utility may also be left in the forest to serve as shelter to the wild-life.

xii. Complete and effective protection of the wild-life from poaching and hunting is a must. For this purpose, watch-towers should be erected at suitable locations and the provisions contained in the Wildlife Protection Act, 1972 should be enforced rigidly. Important entry and exit points from the forests of this Division should have check posts manned by staff for 24 hours. They should have a system of wireless communication.

CHAPTER - 16

FODDER RESOURCES MANAGEMENT (OL)WORKING CIRCLE

SECTION 1: GENERAL CONSTITUTION

This Working Circle overlaps with the forest areas which were previously allotted to 'Fodder Reserve WC' in Kate and Bapat's Plan but have now been allotted to various WCs viz. 'Improvement WC', 'SMC cum Afforestation WC', 'Old Plantation management WC' and 'Protection cum Watershed Management WC' depending upon the present stocking of these compartments.

SECTION 2: GENERAL CHARACTERS OF THE VEGETATION

Fodder reserve area of previous Plan

These areas though are largely degraded yet few green patches in the valleys, along the nallahs etc are found scattered in between. In these Kuran areas prescriptions regarding developing fodder resources as given in the previous WP were not followed and instead large scale plantations of Acacia auriculiformis, Glyricidia etc. were taken in the past.

As a result, areas with good growth of grasses are very few and are found scattered in between largely degraded kuran areas. Grasses of lesser nutritional value like Kusali, Kunda, are the main species found growing in these areas. The site quality is IV b. The crop consists of bushy, thorny scrub forest with a predominance of unpalatable grasses and other weed species. Keeping these areas in 'Fodder Reserve WC' as in the previous WP may only degrade the sites further. Hence these areas have been allotted to the respective WC for their improvement. Intention here is to maintain and improve the existing fodder resources especially the grasses in these areas. Felling of plantations of Acacia, miscellaneous species etc during the Plan period will eventually open up the area under Kurans for the introduction of good quality fodder grasses. Kurans viz. Charan, Kale, Pole in Panhala range, Hatkanangle, Tamdalge in Karvir range, Gangapur, Sonali in Gargoti range, Saave in Malkapur range and Mahipalgad and Umgaon in Chandgad range have the potential to develop into good fodder reserves.

The local farmers produce a large share of the total fodder requirement themselves. The green foliage of Sugarcane i.e. *Usa- cha- Pala* and *Kadba* i.e. the dried remnants of Jowar and bajari are the main sources of fodder for the cattle in the district. In addition the farmers grow fodders like *Kadval*, *Makka* etc. in the fields to fulfill their needs. Cattle are largely stall fed in the

eastern part while in the western part of the district they graze in the fallow lands and forest areas as well. The eastern part of the district faces shortage of fodder during the dry season.

SECTION 3: SPECIAL OBJECTIVES OF MANAGEMENT

i. To augment fodder supply to meet the needs of the locals and their cattle.
ii. To improve the quality and quantity of fodder resources in the forests by introducing improved varieties of fodder grasses.

SECTION 4: COMPARTMENTS AND WORKING SERIES

This WC being overlapping in nature, separate Working Series are not being formed. Areas allotted to Fodder reserves in the previous Plan as well as other suitable areas ideally not more than 50 hectares per annum should be identified by the DCF for treatment purpose as outlined below.

SECTION 5: WORKING CYCLE

Working cycle shall be of ten years duration.

SECTION 6: METHOD OF TREATMENT

i. Areas with existing good growth of palatable fodder grasses as well as areas suitable for growth of fodder grasses shall be identified and closed to grazing.

ii. All obnoxious weeds and thorny shrubs and bushes shall be uprooted from these identified areas.

iii. Existing fodder grasses shall be allowed to be cut and taken away after October 31st every year.

iv. Seeds of superior fodder grasses like Sheda, Pawnya, Marvel, Dinanath etc. should be sown on the freshly excavated and heaped soil bund on the lower side of the contour trenches in the suitable areas. Other suitable models for raising fodder grasses may also be used after getting prior approval from the CF, Kolhapur.

v. The newly introduced fodder grasses shall not be permitted to be cut during the first two years of their introduction so as to allow them to seed and multiply.

vi. No other tree species except for only suitable fodder tree species may be introduced in the erstwhile Kuran areas.

vii. The area under treatment shall be effectively fire traced and permanently closed to grazing. For this local village communities should be taken into confidence.

CHAPTER- 17

NON-TIMBER FOREST PRODUCE MANAGE (OVERLAPPING) WORKING CIRCLE

SECTION 1: GENERAL CONSTITUTION

This is an overlapping WC, covering the entire forest area being dealt in this WP. Many species yielding Non Timber Forest Produce (NTFP) including the medicinal plants are found in these forest areas. The Western region of Kolhapur district along the Ghats and especially Chandgad and Ajara talukas in South are rich in medicinal plants. The important NTFP found in the Kolhapur district are Tamal patra, Cashew, Shikekai, Hirda, Karanj, Kadi patta, dink, Amsul etc. The collection and sale of these NTFP generate employment to the local communities as well as considerable revenue to the government. The quantity and annual revenue obtained in 2006-07 are given in Section 2 of the Chapter 3 on 'Utilisation of Forest Produce'. A list of NTFP found and auctioned in Kolhapur division is given in **Appendix 17.1**.

NTFPs account for 70% of India's forest product exports. India has probably the oldest, richest and most diverse cultural traditions in the use of medicinal plants. Exploration for forest-based plant products for pharmaceuticals and the demand for medicinal plants are increasing in both developing and developed countries. In India, medicinal plants are widely used by all sections of the population and it has been estimated that, in total over 7500 species of plants are used by several ethnic communities (Anthropological survey of India 1994). The bulk of the traded material is still from the wild and a very small number of species are cultivated. According to the data compiled by the International Trade Centre, Geneva, India is ranked second amongst the exporting countries, after China, with an annual export of 326 000 tonnes with a value of Rs 45.95 million (about US$ 1.4 million) during 1992-93. Recent trends have indicated further increase in this trade with the herbal cosmetic industry playing a major role in fuelling the demand for herbals worldwide. The expanding trade in medicinal plants has serious implications on the survival of several plant species, many of which are under threat of becoming extinct. Today this rich biodiversity of medicinal plants is facing a serious threat because of the rapid loss of natural habitats and overexploitation of plants from the wild. To meet the demands of the Indian herbal industry, which has an annual turnover of about US$ 300 million, medicinal plants are being harvested every year from some of 165 000 ha of forests (FRLHT 1997). A list of important medicinal plants and their uses and a list of NTFP based industries in Kolhapur district are given in **Appendices 17.2 and 17.3** of Volume II of the Plan.

The ownership rights over certain NTFP in the scheduled areas have been vested in the village communities through statutory provisions. Rights over the trees and the land however remain with the government. Tendu, Apta and Bamboo are excluded from this list. However there are no scheduled areas presently in Kolhapur district.

SECTION 2: SPECIAL OBJECTIVES OF MANAGEMENT

i. To identify and conserve the forest areas rich in NTFP.
ii. To build up a database on NTFP.
iii. To promote sustainable methods of harvesting NTFPs.
iv. Identification of Medicinal Plants Conservation Areas (MPCA) for long term in- situ protection to rare and endemic medicinal plants.
v. To improve the socio-economic condition of the local communities by generating employment.

SECTION 3: DESCRIPTION OF SOME IMPORTANT NTFP

Terminalia chebula (Hirda)

Hirda trees are quite common on hill slopes of Chandgad, Gaganbawada, Borbet, Manoli, Tillari forests. Fruits are pendulous, ellipsoid, brown in colour and obscurely five ribbed and are used in the manufacture of triphala churna. Current level of collection of the fruits is quite erratic. Felling of trees as well as lopping of tree branches for the collection of fruits is strictly prohibited. Fruits should be plucked without damaging the trees. Compartments having good NR of Hirda should be identified and tended to remove the congestion in each range.

Acacia concinna (Shikakai)

It is a prickly, scandent shrub occurring commonly in the forests of Ajra, Amba, Barki, Chandgad and Patgaon etc. Leaves are bipinnate; flowers are in yellow, globose, auxillary heads; pods are brown, wrinkled and depressed between the seeds and contain 6-10 seeds in each pod. The pods are extensively used as a shampoo as well as in the manufacture of shampoos for cleaning the hair and the dry ones are powdered and perfumed, and sold in the market as soap nut powder.

Cinnamomum tamala (tamala patra, tej patta)

Cinnamomum tamala is a moderate sized evergreen tree attaining a height of 8 m, and a girth of nearly 150 cm. Leaves are alternately placed, opposite and short stalked and are 3-nerved from the base. The ease with which essential oils can be obtained from this plant's material makes it ideal for cash crop farming. Leaves are ready for harvesting when trees are 10 years. Tree longevity is up to 100 years, and they continue bearing in old age. Leaves are collected every year from vigorous plants. The annual harvest of Tamal patra in Kolhapur division usually varies between 400 to 700 metric tonnes bringing about revenue of Rs.7 to 11 lakhs per annum. Collections are made in dry weather from October-March. Small branches with leaves are dried in the sun for 3 or 4 days and tied up into bundles for marketing. The leaves are used extensively as a spice, especially in the famous Mogul cuisine that was developed at the Imperial courts in Delhi and Agra. Mature leaves can be plucked with hand or pruned with secateurs. Care should be taken not to damage the plant while plucking the leaves.

Murraya koenigii (Kadi patta)

Murraya koenigii or Kadi-patta tree is a tropical to sub-tropical tree in the family Rutaceae, which is native to India. It is a small tree, growing 4-6 m tall, with a trunk up to 40 cm diameter. The leaves are pinnate, with 11-21 leaflets, each leaflet 2-4 cm long and 1-2 cm broad. The flowers are small white, and fragrant.

The curry leaf tree is native to India, Sri Lanka, Bangladesh and the Andaman Islands. Later spread by Indian migrants, they now grow in other areas of the world where Indian immigrants settled. Widely cultivated, the leaves are particularly associated with south Indian cuisines to provide flavourings for curries. The use of the curry leaf tree to treat diabetes has attracted a great deal of interest. Special compounds have been found which might make it an effective new medicine for diabetes sufferers.

The branches of Murraya koenigii are very popular for cleaning the teeth as datun and are said to strengthen the gums and the teeth. Mature leaves can be plucked with hand or pruned with secateurs. Care should be taken not to damage the plant while plucking the leaves.

Nothapodytes nimmoniana (Narkya/ Amruta)

It is a small shrubby tree, widely distributed in Western Ghats from Satara, Kolhapur and Konkan southwards- Nilgiris, Anamalais and common in North Kanara. In Maharashtra, it is found in forests and non forest areas in and around Radhanagari in Kolhapur district and Mahabaleshwar, Koyna in Satara district and Mulshi in Pune district. The species can easily be recognised in field during its blooming season by its strong foetid odour leading to its earlier scientific name- Mappia foetida. Leaves are alternate and simple, broad, ovate and acute at both ends with whitish yellow in colour. Bark is rough, grey coloured with peculiar lenticels. The plant shows good coppicing when cut or pollarded. It is not preferred as fodder by the cattle or as fuel due to its bad taste and bad smell. The plant yields from its stem and root bark, an alkaloid called ‘Camptothecin’ (CPT) having anti cancer properties and as a result, the wood of the plant has a high demand in the pharmaceutical market world wide. It is feared that as a consequence of its overexploitation and habitat loss, the natural populations of this species have declined by 50 to 80 percent in the last one decade. Hence it is now designated as an endangered species in the North Western Ghats and threatened in the remaining parts of Western Ghats.

The individuals of this species can bear only male flowers, only female flowers, male and female flowers, male and hermaphrodite flowers, female and hermaphrodite flowers or only hermaphrodite flowers. The flowers emit fowl odour of rotting meat to attract the pollinators such as dipteran flies. The species usually flowers during August and the fruits ripe till December. Only the female and hermaphrodite flowers can bear the fruits. Birds like Bulbuls, Barbets are known to feed on the pulp, thus helping in seed dispersal.

The fruits can be collected from December to February. At maturity, seeds turn black in colour. It is preferable to collect seeds from the plant itself since fallen ones are highly susceptible to fungal attacks. The fruits or de-pulped seeds after collection should be dried in the shade. The

seeds should be stored in airtight containers under ordinary room conditions if not required immediately for sowing. Such storage may give 100% viability of seeds upto 45 days which may decrease upto 50 % in 120 days.

Pongamia pinnata (Karanj)

It is a small or middle sized tree, found commonly in the forests. The Karanj trees have also been extensively used as avenue trees in Kolhapur city. Seeds and seed oil are used in ayurvedic medicines. Oil cakes are used as manure and keeps off white ants.

Garcinia indica (Kokum, Amsul)

Trees are with conical crown usually buttressed at the base. Fruits are spherical, purple red and the pulp is red, acidic and fleshy. Fruits are eaten and are also used for making syrups. The dried fruit skins i.e. Amsul is used in the curries.

Adhatoda vasica (Adulsa)

It is a branched, evergreen shrub with broad leaves tapering at both ends. Flowers are white, bi-lipped arranged in dense and short spikes. It is found commonly in the forest areas of Kolhapur. Its leaves are used in curing the cough and respiratory troubles, hoarse throat, burning sensation of feet, menstrual disorders and the roots are used to cure the fever. Mature leaves can be plucked with hand or pruned with secateurs. Care should be taken not to damage the plant while plucking the leaves.

Asparagus racemosus (Shatawari)

It is a spiny climbing shrub with leaf like rudimentary branchlets arranged in whorls. It bears white, fragrant flowers in spikes and small black pepper like fruits. Its roots are clusters of cylindrical tubers. It is also cultivated as an ornamental. The plant likes sunlight and thrives well in hot and dry conditions. Its tuberous roots are used for curing acidity, burning feet, hoarse throat, menstrual disorders, scanty breast milk and increasing general immunity. Root tubers can be collected from a year old plant. A ‘C’ shaped pit can be dug around the plant and a few tubers can be collected without uprooting the plant. The pit should then be filled with the dug earth.

Cymbopogon citratus (Lemon grass)

It is a tall grass that grows into about 2 metres tall clumps. Leaves are long with rough margins and are strongly aromatic. The aromatic leaves are used in cough and respiratory troubles. Mature leaves should be cut from near the base while dried leaves should also be removed along with.

Tinospora cordifolia (Guduchi, Gulvel)

It is a large spreading climber with stems having papery bark and many small eruptions. The plant bears small flowers and round pea sized seeds that turn attractive red on maturity. It can be found climbing upon the trees with thread like aerial roots dangling from the stems. The stem of the climber is used for curing acidity and fever. Stem extracts are also used as a liver tonic, for

increasing the general immunity and for hair care. Mature stems of pencil thickness can be cut with the help of sharp knife.

Embelia ribes (Vavding)

It is a large spreading shrub. Leaves are 2 to 4 inches long. Fruits are globose and turn black when ripe. Seeds are used against the flat worms' infestation of the humans.

Gum

Dhaoda (Anogeissus latifolia), Ain and Kulu (Sterculia urens) are three main species found in these forests which produce edible gum. Cashew gum is also collected and eaten locally. But only first three species are found naturally in the forests. The tapping rules as derived by the FRI, Dehradun are listed below:

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

ii. 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.

iii. Only trees above 90 cm in girth at breast height will be tapped.

iv. Each tree will be tapped continuously for three years and will be given a rest for three years thereafter. The second tapping cycle will begin in the 7th year after the commencement of tapping season and will continue for another period of three years.

v. The initial blaze of 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 edge having 7.5 cm wide blade. The blaze made is 0.6 cm deep in the bark.

vi. Blazes shall be made horizontally leaving approximately equal space between the two blazes. The blazes should not have any loose fiber. The lower surface of the blaze should be slightly slopping outwards to avoid lodging of gum in the blazed pocket.

vii. The gum starts oozing out soon after the blazes are made and may be collected initially after a month. i.e. around December when the blazes may also be freshened. Subsequent collections and freshening may be done fortnightly upto May. Overall, 12 freshening are required to be made during the year.

viii. In each freshening, the lower surface is not to be freshened. The edges may be scraped so that only 3.8 cm is increased on either side in width, at the end of 12th freshening. This means that about 0.3 cm should be scraped off from either side in width in each freshening.

ix. The lowest row of blazes will be at one meter above the ground level. The next row of blazes will be made at the height of 60 cm from the lower. The vertical portion of

the blaze of upper row will alternate with similar portion of the row and no two blazes of the two rows will be directly one above the other.

x. The number of blazes to be made on each tree will depend on its girth at breast height, as given below:

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

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

xii. Each blaze will be in a shape of parabola with a 2.5 cm wide base. The curved side of the parabola will be upwards and of height not more than 7.5 cm and the depth of the blaze will not exceed 0.6 cm in the wood.

xiii. At the end of the season, the height of the blaze shall not be greater than 12.50 cm. Maximum permissible dimension of each blaze shall be 10 cm x 12.5 cm x 0.6 cm in width, height and depth, respectively.

xiv. Since 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 the depth remaining the same.

xv. In the second cycle that is, in the 7th year new blazes will be made in the same way in the unblazed 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.

SECTION 4: METHOD OF TREATMENT

1. Make a resource inventory of all Non Timber Forest Produce in every Range of the Division and mark areas rich in such NTFP including Medicinal Plants. A database for unit (Beat, Range, Division) wise potential and production for various NTFPs should be compiled.

2. The areas having promising regeneration of NTFP species and which is not less than half hectare in extent in compact block will be identified in the annual coupes of each year and will be properly spaced and tended to remove congestion and promote their growth.

3. Identify and demarcate areas rich in medicinal plants, preferably with an area of 200 ha or more as ‘Medicinal Plant Conservation Areas’ (MPCA) for long term in situ protection to rare and endemic medicinal plants.

4. The weekly markets should be surveyed to know the extent of various NTFP reaching the markets, methods of harvesting, their market price and purpose of their utilisation in domestic or international markets. The analytical report based on this data should be prepared by the DCF and submitted to the Working Plans, Research and Education wings of the Forest department for further analysis.

5. Use sustainable methods of harvesting of NTFP and develop expertise for training villagers to put these non-destructive methods into practice. Leaves and fruits shall be plucked from the tree or shrub branches in a non destructive manner. Lopping of branches or felling of trees/ shrubs for collecting NTFP should be strictly dealt with.

6. Training programmes in association with the Research and Education wing of the department should be organized to impart training for non-destructive and sustainable methods of NTFP harvesting, their value addition and marketing.

7. Important NTFP species to the extent of 10 to 15 % will be planted in the various afforestation schemes to increase the stocking of these species. Emphasis should be laid on species like Hirda, Narkya, Jamun, Karanj, Tamal patra, Kokum and Shikakai etc. amongst tree species and Adulsa, Shatawari, Gulvel etc. amongst herbs/ shrubs.

8. The Research Circle which has done field trials on many medicinal plants should be consulted to promote use of medicinal plants in various plantation programmes.

9. The provisions of 73rd amendment will be translated into practice for NTFP in the scheduled areas. For rest of the NTFP in such areas and for all NTFP in all other areas, handling of the same will be attempted through Joint Forest Management Committees and/ or the items may be sold by open auction subject to the existing exercise of privileges for the specific items.

CHAPTER - 18

MISCELLANEOUS AREA

SECTION 1: GENERAL CONSTITUTION

This Chapter includes the following areas:

i. Sheri lands which are not in charge of forest department but form part of form 1 Area register. Such areas are distributed in Karvir, Panhala and Radhanagri ranges. The extent of the area is 5,357.18 ha.

ii. Sheri lands which are in charge of forest department but are not yet surveyed and whose maps are not available with the FD. Such area is distributed only in Karvir range. The extent of the area is 831.40 ha.

iii. Areas which were acquired under Private Forest (Acquisition) Act, 1975 but are not yet finally vested in the forest department pending inquiry. This area is in Malkapur as well as Panhala ranges. The extent of the area is 1,395.99 ha.

iv. Forest areas which are under Chikali nursery, Kolhapur nursery, office/ bungalows, RFO Malkapur office at Chandwad. The extent of the area is 4.45 ha.

The total area included in this Chapter is 7,589.02 hectares which is 05.46% of the total forest area being dealt in this Plan.

Table 49

Allotment of area

Sr.No	Range	Area of the Range	No.of compartment			Area allotted to the WC	% to area of the range	% to area of the division
			Full	Part	Vill			
1	Chandgad	27,225.04	0	0	0	0	0	0
2	Ajara	18,701.98	0	0	0	0	0	0
3	Gargoti	25,350.78	0	0	0	0	0	0
4	Radhanagari	02,573.07	0	0	03	343.77	13.36	-------
5	Karvir	13,297.17	0	0	44	5,133.02	38.60	-------
6	G. bawada	11,584.05	0	0	0	0	0	0
7	Panhala	20,293.81	0	0	02	1,186.65	05.85	-------
8	Malkapur	19,945.10	0	0	02	925.58	04.64	--------
	Total	**1,38,971.00**	**0**	**0**	**51**	**7,589.02**	**-------**	**05. 46**

The details of the miscellaneous area is given in **Appendix 18.1** of volume II.

SECTION 2 : METHOD OF TREATMENT

The method of treatment for different areas as specified in Section 1 shall be as follows:

i. These Sheri lands are in the possession of the Revenue department and are in state of neglect and degraded to large extent but form part of the Form 1 Area register. These lands are to be transferred to FD from the Revenue department as per the government directive. The DCF must pursue the matter with the Collector to get these Sheri lands transferred to the FD.

ii. These Sheri lands though are in the possession of the FD, yet their maps are not available with the FD and hence areas are not demarcated in the field. The DCF must get these areas surveyed and demarcated in the field at the earliest with the help of the DILR and Revenue authorities. The maps should be prepared. The DCF must pursue the matter with the Collector to get the survey and demarcation completed in the shortest possible time.

iii. These areas are not yet demarcated fully in the field and are largely encroached. The DCF must get these areas surveyed and demarcated in the field since possession of the said areas pending inquiry by the Collector lies with the FD. The encroachments should be removed at the earliest. Since these RF are not yet finally vested in the FD, they lie in a state of neglect as no developmental schemes can be taken in these areas. The inquiries in the said areas by the Collector have already been delayed by 20 to 25 years. The DCF must pursue the matter with the Collector to get the inquiries completed in the shortest possible time.

iv. These areas do not require further treatment.

CHAPTER-19

JOINT FOREST MANAGEMENT

SECTION 1 : GENERAL CONSTITUTION

Forests are facing severe threats detrimental to their survival. These threats are mostly in the form of biotic pressures like illicit felling, encroachments, grazing, fires etc. The increased pressure of burgeoning population is subjecting forests to high pressures resulting in increase in area of degraded forests and decrease in the dense forest cover. Considering these realities, the concept of befriending the stakeholders in forests by way of a participatory process was conceived in the revised National Forest Policy of 1988. Based on this the Government of India in 1990 issued directives in this regard and the GOM by its GR dated March 16, 1992 resolved to introduce Joint Forest Management in degraded forest areas and laid down the procedure for this purpose. The provisions of the same were revised and extended to urban areas also vide a GR dated April 25, 2003. Accordingly the stakeholders are assured of a certain share in the usufructs and they are taken into confidence in the planting and management of the forest areas. Managing forests with the active cooperation of village communities will not only help in protecting our forests but will also safeguard the interest of the village communities.

SECTION 2: SPECIAL OBJECTIVES OF MANAGEMENT

1. Making forestry more relevant by balancing between the needs of the community and forest protection.
2. Protecting and conserving the bio-diversity in the forests with the active participation of the local communities.
3. Integrating forestry management interventions with development schemes of other departments for holistic development of the villages.
4. Promoting eco-tourism in forest areas to increase awareness amongst people regarding importance of conservation and protection of forests and wildlife.
5. Empowering local communities by generating employment for the local people in forestry activities, SMC works, eco-tourism and by imparting new skills for alternative income sources to the Self Help Groups.

SECTION 3: GENERAL DESCRIPTION

By the end of 2005-06, 442 Forest Protection Committees (FPC) had been formed in the same number of villages in Kolhapur district. Most of the villages as well as the villagers are quite progressive. On the eastern side of the district where the forest cover is comparatively less, the dependence of the villagers on the forests for fuel, fodder or other uses is much less. Stall feeding of the cattle is common. Grasses on the fallow lands are cut and sold in the market. Maize and Sugarcane leaves are also used as fodder. Biogas is also becoming popular in the villages. There is well developed network of rivers and canals so water availability is good except only for two to three months in the summers. Local people in general are prosperous and their dependence on

forests for their daily needs is not much except in the western part of the district. Their general as well as political awareness level is also quite high. It requires lot of reasoning and persuation to get their support and cooperation in managing the forests. Out of 442 villages, the response of the village communities to the JFM can be rated as good in nearly 60 villages while in others more efforts and inputs are required. Villages viz. Borbet in Gaganbawada range, Kambalwadi in Karvir range and Amba in Malkapur range have shown good results in JFM activities.

On the lines of the JFM, an Integrated Wasteland Development Programme i.e. IWDP has also been implemented as well as a Forest Development Agency (FDA) has also been established. Integrated Wasteland Development Programme i.e. IWDP, a centrally sponsored project was sanctioned for a period of five years by Government of Maharashtra vide its letter dated 22.02.2000 for 15 villages in National Watershed No. KR-79 falling in Chandgad taluka of Kolhapur district. The project period of late has been extended by few years. The project was implemented by three different Project Implementing Agencies (PIAs) out of which one PIA is the FD which is looking after five villages out of total fifteen viz. Dhamapur, Bijur, Bhogoli, Bujhwade and Kurni. The main objective is to achieve the holistic development of the villages by treating their watersheds as well as to empower the village communities by providing them adequate training and by establishing Self Help Groups. Various development works in the forest as well as non forest areas were to be executed and supervised by the Watershed Development Team (WDT) headed by an RFO with the active cooperation of the village communities. Various types of SMC works like CCT, nalla bunding etc. were undertaken along with raising plantations of medicinal plants, bamboos, cashew etc.

The proposal for constitution of Forest Development Agency (FDA) was sanctioned for Kolhapur division vide Forest and Environment ministry's letter dated 8.02.02. The main objective of this programme is to integrate all schemes aimed at the development of the villages in and around forest areas and to avoid the delay in transfer of the funds from the Government of India to the implementing agencies. Accordingly 36 villages i.e. 5 in Karvir, 5 in Panhala, 6 in Malkapur, 5 in Ajara, 6 in Chandgad, 5 in Gargoti and 4 Gaganbavada Ranges have been selected and the Societies have been registered according to the provisions of the Maharashtra Registration of Societies Act 1950 and Mumbai Public Trust Act. 1950. The details are given in the table below.

Table 50

Villages under FDA

S.No.	Range	Villages
1.	Karvir	Sadle-madle, Giroli, Aptal, Altae, Madhyal.
2.	Panhala	Kaneri, Nandari, Waghve, Pendakale, Ijoli.
3.	Malkapur	Amba, Nilae, Pusarle, Panudre, Gajapur, Y.Jugai.
4.	Ajra	Badyachiwadi, MagnurT.Savatwadi, Korivade, Devkandgaon,
5.	Chandgad	Aasgaon, Umgaon, Parle, Kodali, Kalivade and Tudiye

6.	Gargoti	Pangire, Barve, Gangapur, Donvadae, Shivdav
7.	Gaganbavada	Salwan, Mhalunge, Andur, Vesaraf

The development works under the FDA were started since 2002-03 and till 2006-07 SMC works and afforestation works to the extent of 1358 ha (Natural Regeneration-648 ha and Artificial Regeneration- 710 ha) have been completed. In addition under 'entry point activities' permanent assets like construction of cultural hall, construction of two rooms in a school building etc have been created in certain villages while set of utensils, musical instruments, speakers etc have been provided in other villages.

The eco-tourism or sustainable nature-tourism can be developed in and around forest areas having scenic spots or places of historical importance. There are many old forts and places of tourism interest in and around Kolhapur forest areas e.g. Panhala fort, Samangad fort, Vishalgad fort, Paargad fort and Bhudargad fort in Panhala, Ajra, Malkapur, Chandgad and Gargoti ranges respectively. Forests around Gaganbawada and Amba are very scenic and popular with the tourists and therefore can be developed into popular eco tourism spots. Waterfalls at Donwade in Gargoti range as well as at Ramtirath in Ajra range are also very popular scenic spots. In addition there are two popular forest parks viz. Tabak udyan at Panhala and Alte forest park in Hatkanangle taluka as well as many forest nature trails and tracking routes all around which are very popular with the tourists. A complete list of the same is enclosed as appendix. Since eco-tourism is distinguished from the resort-tourism for requiring lesser infrastructure development and a lower impact on the environment, it can generate more revenue at lesser costs to the FD as well as can generate employment to the local inhabitants. The FD should take lead to involve various stake-holders like local communities, FD, tourism department and local tour operators and seek their active participation and cooperation to make the eco tourism projects successful ventures. Eco tourism projects for the development of Panhalagad-Masai plateau and Tabak forest park in Panhala range as well as for Vishalgad, Amba, and Udgiri etc. have already been prepared and submitted to the government.

SECTION 4: METHOD OF TREATMENT

Following initiatives should be taken by the DCF as a part of the strategy for the success of JFM:

i. Principles of participatory management, usufruct sharing, eco-system protection, democratic set-up, gender equality, open communication, rights and duties of the community, effective conflict resolution, effective monitoring and evaluation and Shramadaan should be adhered to during the implementation of JFM in any village.

ii. A comprehensive publicity and awareness campaign regarding JFM should be taken up by organizing mass awareness camps in the villages, by distributing pamphlets, by publishing success stories in the print media etc. with the active participation from the schools, NGOs and gram panchayats. The village communities should be sensitized to the concept of sustainable forest management, the tangible and intangible benefits of the

forests, the perils of depleting forests, the benefits of stall feeding to the cattle and benefits of using bio gas, LPG, fuel efficient chullahs, solar cookers etc over using fuel wood.

iii. The villagers owning land should be convinced to grow the fuel-wood and fodder trees species on their field bunds or fallow lands by involving Social Forestry department.

iv. Short orientation courses should also be conducted for the forest staff, to equip them with better communication skills and to orient them towards the forestry extension.

v. It shall be endeavored to integrate forestry management interventions with development schemes of other departments as well as eco-tourism under JFM for holistic development of the villages. Proper linkages should be developed with other departments like Animal husbandry, Fisheries, Horticulture, Minor irrigation, Social forestry, MEDA, PWD and MSEDC etc. for convergence of various developmental schemes of different agencies in the same village.

vi. The DCF should select the scenic spots having potential to develop into excellent ecotourism spots. Infrastructure for awareness creation like setting up of Nature interpretation centres, Nature trails, Watch towers, Pagodas, Log huts and Camping sites should be developed. Local communities shall be involved in these projects and the benefits should go to the 'host communities' and in the long run capacity building in this regard should be built in for forging partnership with the local people. Rules and Regulations of visitors' conduct need to be framed and widely circulated to tourists and tourist agencies as well as prominently displayed on notice boards. These eco-tourism complexes should be run primarily by the local management committees formed under JFM. Necessary prior permission under FCA from the appropriate authority should be taken if required.

vii. Establish Self Help Groups in the villages and organize necessary training camps for imparting new skills like manufacture of herbal oils, herbal face packs, and bamboo craft etc resulting in alternative employment generation to the local communities. Select Eco guides from the local communities, who shall be trained to impart knowledge of nature conservation and prevention of abuse of identified sites.

viii. The DCF should periodically monitor and evaluate the success of the JFM by considering parameters like reduction in number of forest offences, watershed development, involvement of other development agencies, increased alternative sources of employment generation, women empowerment, effective conflict resolving, voluntary shramdaan by community members, well established SHGs, reduction in migration to urban areas, increase in annual household income, usufruct sharing etc.

SECTION 5 : GENERAL REGULATIONS

The area to be included under JFM, FDA or other JFM related schemes will be treated according to the Micro Plans for the area which will be prepared in consultation with the villagers as per the guide lines given by the Government of Maharashtra R & F D G.R. of 25th April 2003. But while writing the Micro Plan, it would be mandatory to adhere to the special objectives of management mentioned for the concerned Working Circle to which the area has been allotted in the Working Plan. If any conflict is noticed between the prescriptions given in the WC to which the area is allotted and the Micro Plan written under JFM, FDA etc. then the said area shall be treated in accordance with the special objectives of management pertaining to the concerned W.C. and suitable amendments shall be made in the Micro Plan, if necessary.

CHAPTER-20
FOREST PROTECTION

SECTION 1: GENERAL CONSTITUTION

The rich bio-diversity of forests of Kolhapur needs to be protected against the incidents of illicit felling, poaching, fires, encroachments and unregulated grazing. These injuries to the forests are generally man made and are largely inflicted due to ignorance, poverty, needs and greed of the communities living around. Protection of forests from the biotic interference is completely essential for prescribed management interventions to be effective.

SECTION 2: SPECIAL OBJECTIVES OF MANAGEMENT

i. To protect forests in their pristine forms with the active participation of the people.

ii. Empowering local communities by generating employment and alternative income sources for the local people.

iii. To link up forest protection with JFM initiative.

SECTION 3: INJURIES TO THE FOREST

The forests are inflicted injuries mainly by the humans and their cattle for their needs and greed. Major factors causing damage to the forest are listed below.

i. *Forest fires:* The forests are susceptible to fires during summers which are mostly man-made. Fires are caused intentionally sometimes to get good flush of grass or for hunting of wildlife or for making encroachments. Sometimes fires caused for rab burning or burning agricultural wastes accidentally stray into the adjoining forests while at

Forest fire

times careless throwing of lighted cigarette or bidi butts in the forests by the villagers cause the fires. Recurrent fires badly affect the regeneration status of the forest by killing the young recruits and seedlings. Fires also destroy the soil cover as well as humus on the forest floor as a result of which there is less moisture absorption and more run-off thereby resulting into soil erosion and degradation of the site.

ii. *Grazing:* Unregulated grazing in the forests is more prominent along the western side of the district. On the eastern side, milch cattle are usually stall-fed due to well developed milk dairies. The district is having larger area under sugarcane cultivation and therefore the green leaves of the sugarcane are largely used as fodder for the cattle. In addition, *Kadba*, the dried lops, tops and remains of the jowar and bajari after the final harvest, is used as a fodder and is mainly procured from Satara and Sangli. Apart from these two, kadval, makka and grasses coming on the field bunds or fallow lands are also used as fodder. Unregulated grazing by the cattle in the forest areas badly affect the NR status of different species. Frequent trampling and browsing not only destroys the young seedlings and coppices but also has resulted into compaction and hardening of soil, thus hampering the establishment and growth of the young recruits and seedlings and thereby affecting the natural process of restocking of the forests.

iii. *Illicit-Felling:* The forest crop comprises of miscellaneous species mainly. The percentage of commercially valuable trees in the forest is very less. Therefore the extent of illicit felling in the district is not very serious. Yet illicit-felling and lopping of the trees for small timber, poles, firewood and fencing material is often resorted to, mainly for fulfilling the domestic requirements of constructing or repairing the huts and firing the hearth. It results into further depletion of the growing stock and degradation of the forest area.

iv. *Encroachments:* The state of boundary demarcation is not satisfactory in almost all the ranges. Such situation leads to encroachments in forest areas. Encroachments in the forest lands for cultivation as well as for habitation cause a lot of damage to the forests. Encroachments lead to forest- fires, illicit-cutting of trees as well as tahal-cutting. Rab-burning i.e. burning the field before planting paddy and tahal-cutting are common practices along the western side of Chandgad, Ajra, Gargoti and Malkapur ranges. The areas under sacred groves, acquired private forest, eksali plots, Sheri lands etc. need to be protected against the encroachments. Lists of encroachments done between 1972 to 1978 and after 1978 are given in **Appendices 20.1 and 20.2** of Volume II respectively.

v. *Poaching:* The jungles of the district were known to be the favourite hunting grounds of the shikaris in the past. The hangover of these shikar traditions still persists. Though the incidents of poaching have comparatively reduced over the years but it is mainly because of the dwindling population of wild animals in the district. The wild boars, hares and peacocks are still available in good numbers in and around the forests and are hunted secretively. The preys are hunted either by electrocuting them using live wires around the fields, by shooting them using guns procured for crop protection or self-defence as well as by using small explosive bombs, locally called '*daru-che-gole*'. Pet dogs are also used sometimes to chase the prey to a point where it can be shot easily.

vi. *Mining:* Bauxite deposits are found mainly in Chandgad, Ajra and Malkapur ranges in the district. Though there are no reported incidents of illegal mining in the forest areas yet

continuous vigil is absolutely essential for prevention of the illegal mining activity if any.A statement showing extent of damage due to fires, grazing, illicit felling and other offences is given in **Appendix 2.3** and a list of vehicles confiscated in forest offences is given in **Appendix 20.3** of Volume II.

SECTION 4: METHOD OF TREATMENT

Following are the *general prescriptions* for the forest protection

i. Each check naka should be adequately staffed to run day and night as well as should be connected to the Division /range HQ through wireless/ telephones. Proper checking of vehicles should be ensured by the staff at the check nakas. The check nakas should be frequently visited by the senior officers to review their working.

ii. The Range HQs and mobile squad units should be strengthened by providing faster mode of communications like telephones/ wireless, jeeps etc.

iii. The field staff should be imparted professional training for handling fire arms, martial art forms for self defence and for keeping them fit.

iv. Identified extra sensitive and sensitive beats should be patrolled in group formations atleast once or twice a week.

v. Field staff should be sensitized to protect forest areas in possession of research wing.

vi. The DCF had submitted a Forest Protection Plan 2000-01 to the CF Kolhapur circle vide his letter dated 9.01.2001 which in turn had been submitted to the PCCF MS vide CF letter dated 18.09.2001. Suitable necessary action may be taken in this regard.

vii. A schedule of beat checking, saw mill checking by RFOs, ACFs and DCF as prescribed by the CCF (Protection) shall be strictly adhered to.

viii. Forest protection should be effectively linked up with the JFM initiative in the villages and village forest protection committees should be strengthened.

ix. To seek cooperation of local village communities, they should be empowered financially by generating employment opportunities through JFM/ FDA/ other developmental activities, skill upgradations, formation of SHGs etc.

x. Awareness campaign should be organised from time to time highlighting ill effects and gravity of forest fires, grazing, lopping/ tahal cutting, poaching and their legal complications.

A statement showing list of licensed saw mills in Kolhapur district is given in **Appendix 20.4** of Volume II.

Following are the *specific prescriptions* for forest protection

4.1 Fire Protection

This important operation in forest management has been neglected in the past. The characteristics of the system of fire protection in the area under the Plan are a) a very low rate of expenditure per square kilometer, b) a high percentage of area actually burnt year after year and c) a high proportion of failure to protect the forest from fire. The successful protection year after year of a comparatively small area of valuable forest is of greater importance than imperfect protection of a large area.

The forests of the area under Plan are liable to recurrent annual fires which cause considerable damage to young regeneration as well as the old crop, especially if they occur late in the hot season. Some of the plantations, even though fire protected, have been damaged severely due to such fires. In view of the occurrence of repeated fire, some of the very valuable areas should be completely fire protected. For this purpose, special fire lines of 20 metres width should be cleared. Besides all along the boundary of the forest a line of 10 metres will be cleared of all growth and burnt every year. This will prevent fire from entering from the malaki areas. All new fire lines to be prepared should be got approved from Conservator of Forests, Kolhapur circle.

The expenditure on fire protection is very low compared to the area involved and their vulnerability to fire. Hence, more funds should be made available for this purpose. It is also essential to take steps to educate the public in this connection as more often fires occur due to carelessness or neglect of elementary precautions on the part of passers by or the residents of adjoining villages. Without the cooperation and good will of the neighboring villagers, no scheme of fire protection, however perfect, will give the desired results. Often the burning of fire lines along the fire protected coupe has found to be fatal because of carelessness on the part of the subordinates. Hence, this should be seen with great care or else the object with which it is prescribed will be defeated.

Rules for fire protection operations

The forest areas of the division will be divided into three classes for the purpose of protection against fire by orders of the CF, Kolhapur Circle.

The areas would be classified as follows.

Class I Areas: Strictly Protected areas

This class includes the following

i. Regeneration areas

ii. Young regeneration in the Watershed Management WC, Improvement WC and Afforestation WC upto 5 years.

iii. Such other areas as the CF Kolhapur may by special reasons direct e.g. important sacred groves etc.

All areas in this class will be isolated by means of fire lines and cut guide lines which will be patrolled by fire watchers. Any fire occurring in them will be a calamity and must be reported along with the area burnt, the date of occurrence and the amount of loss.

Class II areas generally protected

This class includes

i. All forests under systematic working but not included in class I and
ii. Such other areas as the CF Kolhapur circle may for special reasons direct.

All areas in this class, will be isolated from the surrounding country by means of external fire lines, and divided into convenient blocks by interior fire lines. Guide lines will be cut, but all fire lines, roads, paths, suitable ridges, grassy maidans, etc will be burnt in successive stages as the grass dries sufficiently to become combustible. Fire watchers may be employed only if sanctioned by the CF Kolhapur circle. The DCF Kolhapur will submit a proposal for all such areas in the forest.

Class- III areas Protected by provisions of law only

In this class are included all forests not included in the two foregoing classes. In forests of this class deliberate burning is prohibited, but no special measures of protection will be undertaken. The forest guards, however, will be responsible for ensuring fire protection through extensive patrolling.

Fire lines

Fire lines are of two kinds, exterior and interior. The responsibility for their up keep rests with the DCF, Kolhapur. The following instructions will be carefully attended to by the staff in the performance of this duty-

1. It is an established principle in case of exterior fire lines that as far as practicable they should be within the limits of the Government forest and that they should follow the boundary thereof. Occasions may sometimes arise when, in order to secure efficiency, it is necessary to deviate from this.

2. Interior fire lines are made within Government forest and are intended to restrict within limits, fires which have broken out in protected areas and cannot be controlled except by counter firing. These fire lines should follow the course of roads open to the public and the beds of rivers and streams which in addition to other advantages; themselves constitute natural efficient interior fire lines. Interior fire lines should, as far as possible, not be constructed along ridges, as there the effect of wind is greatest and water is scarce.

3. Fire lines should be selected and laid out on the ground such that it will be not only practicable, but easy to traverse them with speed. Steep gradients and rough ground should be avoided as far as possible. Where ever practicable fire lines should be following natural clearings such as open edges of cultivated plains, or the beds of wide ravines and streams.

4. They should be located to be as near water as possible and the localities where wells exist or should be made and all spots where water can be procured should be marked on the fire maps.

In Class - I Forests: The following measures are prescribed

i. The first consideration is the isolation of the forest from the surrounding country. This will be affected by clearing the exterior fire lines of all inflammable material to a width determined by local circumstances, ordinarily not less than 40 feet or more than 100 feet. Not later than the month of November two guide lines will be cut one on either side of the area on the fire line. The width of guide lines will depend on the height of the grass through which they run and they must be carefully cleared. This work must be completed by the end of December.

ii. Exterior lines include coupe lines which form the boundary between class 1 area and areas of class II and III. In adjoining Class II & III areas no fire lines will be cleared but a guide line will be cut and burnt.

iii. Interior fire lines will be similarly treated, but will usually be narrower than exterior lines.

iv. As the season advances, the grass in the center of the fire lines will dry and should either be burnt off standing or cut close to the ground over the whole width of the line. If the latter course is followed, the cut grass should be spread over the fire line between the guides and burnt as soon as dry.

v. Dry leaves and other dry material on fire lines must be collected from time to time and deposited along the edge of the fire lines, but burning such material on the lines after the hot weather has commenced, is strictly prohibited.

vi. Except with the express order of the DCF, Kolhapur and in the presence of the RFO or any other subordinate authorized by the DCF Kolhapur no fire lines shall be burnt after January 31st.

In Class II areas: Fire protection measures will be taken by fire tracing the existing roads, cart-tracks, range boundaries, etc. All operations of fire tracing and burning should be over by 31st Jan every year.
Existing fire lines will be utilized as far as possible, new lines will not be made without the sanction of the CF, Kolhapur Circle.

Fire Watchers

It is the duty of fire watchers constantly to patrol the fire lines in their beats, to keep them entirely free from inflammable material, to prevent the carrying or making of fire within or in the vicinity of the protected area, to give immediate notice of the occurrence of a fire to the beat officer to collect assistance and themselves to aid in extinguishing any fire that may occur.

Fire watchers must always be on their beats. The DCF Kolhapur will see that proper machans for the men to stay on by night and fair accommodation below for cooking by day are provided at suitable places. Fire stations must be situated on elevated spots, so that the watchers may command a good view of the forest they are watching.

Fires

Any RFO, Forester or FG who may see smoke rising any where in or near the forest shall at once collect such aid as is immediately available and proceed in person to the spot. He must not sit quiet and send some one else to enquire or report. The forest official who arrives at a spot where a fire is burning shall at once proceed to extinguish it even if the fire is outside his own beat or range, unless the fire is so strong as to demand further help. This rule applies to all three classes of forest.

Greatest care must be taken that fires are thoroughly extinguished and all smoldering materials are absolutely quenched. No official shall leave the burnt locality till the senior Forest Officer present has satisfied himself that no smoldering material remains. All men assisting in extinguishing fire in a Government forest shall be paid according to the amount of assistance rendered, at rates fixed by DCF Kolhapur in consultation with the CF, Kolhapur circle.

The RFO will be held personally responsible for the efficiency of the fire protection in his range. Where protected forests of two ranges adjoin, the responsibility for efficient protection and clearing on the common fire line will rest with one of the RFO to be selected, by the DCF Kolhapur.

The DCF Kolhapur will be personally responsible for carrying out efficiently the fire protection measures in the division. He must satisfy himself that the exterior fire lines have been properly cleared and thoroughly burnt before danger from external fire arises, and that at the same time all interior fire lines are in good order. He must by continual inspection assure himself that the protective staff is efficient and he must continue to attend to this work until arrangements for the efficient protection of the forest from fire are made. He must, during his tour, satisfy himself by constant enquiries that no fires in fire protected areas have gone unreported and that the areas of reported fires have been accurately estimated. These checks require extensive and thorough personal inspection by him.

Fire Reports

The RFO shall report the outbreak of a fire to the DCF Kolhapur at once, using special dispatch if the fire extends over a large area. The RFO must provide for rapid communication between himself and his staff in fire protected areas so that no delay may occur in his receiving report of the outbreak of a fire and in transmission by him of such intimation to the DCF Kolhapur. The inspection of the area burnt and submission of a full final report with a sketch map by the RFO shall not, without a valid excuse, be delayed for more than a fortnight after the outbreak.

The DCF will submit a monthly summary to the CF Kolhapur of fires showing the serial number, date of occurrence, cause, area burnt, extent of damage. Measures taken to extinguish the fire and further precautionary measures taken will be included in the summary. The summary must consist of the following:

(a) All fires in class I areas

(b) All fires that have occurred in class-II areas after the date fixed for completion of the time of the burning prescribed in the paragraph above and

(c) All fires that have occurred in class-II areas before that date if obviously of a serious nature.

A record of fires in a map form will be maintained for class-I areas only, and will be filed in the Compartment histories form no V.

4.2 Maintenance of forest boundaries

The forest boundaries have not been properly maintained and boundary marks are not seen at many places. The survey and demarcation of acquired private forest has not yet been done. At many places, there is no boundary distinction between this class of RF and the adjoining private agricultural fields or revenue lands. Hence it is necessary that the D.C.F. Kolhapur division should attend to this work without loss of time and get the accurate maps prepared. One trace map showing the boundary pillar numbers should be given to the C.F., Working Plans, Kolhapur for showing these pillar numbers on the master set maintained in his office. A statement showing the extent of natural and artificial boundaries is given in **Appendix 20.5** of Volume II.

The following works are required to be carried out for these areas

1) The village maps and 7/12 extracts of all types of forest lands will be obtained from the DILR and compared with the records of the forest department. The discrepancies found will be identified and removed with the help of DILR by carrying out survey and final maps of the areas will be prepared and demarcated on the ground as suggested in the Bombay Forest manual Volume II article 120 – 129, except that the

An old forest cairns and a newly erected cement pillar

2) The specifications of cement concrete pillars for boundary demarcation work, viz. size, design and cost are already approved by the PCCF, Maharashtra state, Nagpur.

3) Compilation of forest area notifications. All Gazette notifications under various Indian forest Acts, (1878, and its amendments from time to time, 1927 IFA) declaring lands as reserved and disforested will be collected.

4) Updating the area statement in Form No. 1

5) Updating the forest maps and survey records

6) After survey and demarcation the area will be included in the annual boundary maintenance programme according to the one fifth boundary demarcation programme.

The work of survey, mapping and demarcation for all areas of the Division will be completed within a period of 2 years. The 1/5th boundary demarcation programme will continue according to the schedule which will be prepared after the completion of the survey and demarcation.

The boundaries of the forests will be maintained as given below.

A 12 meter wide outer boundary of the forest will be cut by clearing off the brushwood and shrubs so that one boundary mark is visible from its neighbouring one. Trees on the boundary line will not be felled. Demarcation will be done erecting concrete pillars on the boundary line except where the natural features form the boundary.

The pillars will be of the specifications as approved by the PCCF office. These concrete pillars will eventually replace the cairns. But till the time, the concrete pillars replace all the cairns, the cairns also need to be maintained annually.

Rules for the inspection and maintenance of forest boundary marks.

(i) The forest beat guard shall be responsible for the maintenance and protection of all the boundary marks in his beat. He shall himself colour wash them annually after rains and shall make a special report of having performed this work. Each forest boundary mark in his beat shall be specially inspected by the beat guard atleast once every year and a record of his inspection shall be entered in his diary.

(ii) The Round Officer shall be responsible for the maintenance and protection of all the boundary marks in his round and shall see that they are maintained and properly repaired and colour washed by the beat guard. He shall check all the boundary marks in a year which come up for maintenance and repair as per the 1/5th boundary demarcation scheme. A mention of this shall be made by him in his diaries. He shall also annually submit the R.F.O. a certificate in the following form –

" I, Shri. _____ R.O.

_____ certify that the annual length of the boundary lines as prescribed under the scheme given in the Appendix of the Working Plan for Kolhapur division

has been verified by me personally and that boundary line and marks are found to be correct as per the maps. I further certify that each cairn bears a correct serial number and next cairn is visible from either side of each cairn. There are no encroachments or encroachments are as detailed below:

Signature of the R.O. with date.

Legal provisions available for protection of the boundary marks:

Under Section 63 (c) of IFA 1927, altering, moving, destroying or defacing any boundary mark of any forest to which the provisions of this Act apply, is punishable with imprisonment for a term which may extend to two years, or with fine, or with both. This offence is non-compoundable under Section 68.

A statement showing 1/5th boundary demarcation programme is given in **Appendix 20.6** of Volume II.

4.3 Grazing and Fuel wood Regulations

Inadequate protection of regenerated areas from grazing has been one of the main adverse factors responsible for failure of plantations carried out in the past. Traditional methods of TCM/ Live hedge fencing around the regenerated areas and plantation watchmen etc. have not proved to be very effective. Protection can be further ensured by encouraging the people to raise their own resources by raising fodder and firewood species on their farm lands and by popularizing stall feeding efforts to reduce the dependence of local people on forests for grazing and fire wood to whatever extent feasible. The practice of 'Cut and carry' with regards to fodder should be popularised in respect of areas specifically mentioned in the respective WC.

Efforts should be made to popularise the use of energy saving devices like more efficient smokeless chullahs. Use of solar cookers and alternate sources of energy like biogas and gobar gas plants etc should be promoted to curtail the dependence of local people on forests for meeting their fuel wood needs. JFM committees should be involved in the promotion and distribution of material earmarked and also in containing the problem of removals by head loads. LPG connections which are now easily available should be promoted through JFM/FDA programmes. Efforts should also be made to promote and popularize alternate source of gainful self employment by net working with the other departments and private institutions for development of dairy, sericulture, apiculture and cottage based industries in the rural areas to curtail the dependence of local people on the removal and sale of firewood by head loads as source of livelihood. Grazing will be controlled according to the policy formulated by the Government of Maharashtra vide its Resolution No. MFP-1365/13221/Y dated 6-12-1968 and the grazing rules as framed by the Govt. of Maharashtra vide its Resolution No. MFP-1371/237035-Z dated 13-11-1973 and the grazing settlement report for Kolhapur district.

4.4 Sacred Groves

There are many sacred groves i.e. *Devrais* in the district, few within the forests belonging to the government while others on the community lands near the villages. The village communities had been protecting them since ages because of their religious beliefs. But of late, because of the increasing biotic pressure, these groves are being encroached upon for cultivation, housing and fuel wood etc. Following prescriptions shall help the cause of their revival.

i. Identify all the Government owned Sacred Groves in the division and undertake clear demarcation along with measurement of areas.

ii. Undertake fencing of these Sacred Groves using chain linked fencing for areas even upto 25 ha.

iii. Proposals to notify privately owned Sacred Groves as 'Community Reserves' under section 36-C of the Wildlife (P) Act 1972, should be made with the consent of the local community for their effective protection.

iv. Proposals to notify Government owned Sacred Groves as 'Conservation Reserves' under section 36-A of the Wildlife (P) Act 1972, should be made for their effective protection.

v. Undertake floristic inventory studies in all the Sacred Groves.

vi. Create small Information Centres in all big Sacred Groves and use these centres to promote awareness on the importance of bio diversity conservation.

A list of sacred groves is given in the **Appendix 2.1** of Volume II.

4.5 Research Areas

There are many research areas bearing Seed Orchards, Sample Plots, Plantations, Candidate Plus Trees, nurseries etc being managed by the Silva, MS. These assets formed by the research wing over the years need to be protected and therefore the territorial staff should be sensitized towards protection of these assets. A list showing 'Research areas' is given in the **Appendix 20.7** of Volume II.

4.6 Management of Acquired Forests and Sheri lands

Acquired Forests:

Private forests admeasuring 9,595.01 ha were acquired under Maharashtra Private forests (Acquisition) Act 1975. An extent of 4,119.48 ha area is finally vested with the FD but is not yet demarcated in the field. In a few cases the land owners have gone to court regarding the legal status of the land. Nearly 1,402.36 ha area is still pending for the final decision with the Collector. This position needs to be settled in the next 2 years so that proper demarcation on the ground and map preparation can be done.

Sheri land :

Sheri Lands notified as forests which are still with the Revenue Department should be transferred to the Forest Department and survey and demarcation should be done in the first 2 years of this Plan. The DCF should pursue the matter with the Collector.

Eksali, Kumri:

The issue regarding Eksali Plots and Kumri should be finalised and if any area needs to disforested, proposals should be submitted to the Government of India by the end of the first year of the implementation of this Working Plan.

CHAPTER - 21

FINANCIAL FORECAST AND COST OF THE PLAN

SECTION 1: FINANCIAL FORECAST

Anticipated Annual Yield and Revenue:

The present Working Plan emphasizes on the development of forests and conservation of biodiversity in the ecologically sensitive Western Ghat areas of Kolhapur division. Therefore revenue generation is not the prime objective. Annual yield of timber, poles and firewood will be negligible as only improvement fellings are prescribed. Some small timber, poles and firewood are anticipated from the areas included in the Improvement Working Circle by way of improvement fellings while some yield is expected from the Old Plantations Management WC by way of fellings and thinnings. The following table gives an estimate of the anticipated annual yield and revenue as part of the tangible benefits derived from the forest. Though, due to unstable market trends, it is not possible to forecast the anticipated revenue accurately.

Table 50

Anticipated Annual Yield and Revenue

Sr.No.	Working Circle	Forest Produce	Annual Yield	Anticipated annual Revenue (Lakhs)	Rates
1.	Improvement	Firewood	500 m^3 (App)	0.50	@Rs 100/m3
2.	Old Plantations Management	Teak Timber Firewood	10 m^3 500 m^3	0.50 0.50	@Rs 5000/m3 @Rs 100/m3
3.	Bamboo (OL)	Bamboo	15000 nos.	1.50	@Rs 10/bamboo
4.	Fodder resources (OL)	Fodder grass	----	0.50	-----
5.	NTFP (OL)	Tamal patra, Shikekai, Cashew, Hirda	----	3.00	-----
	TOTAL			**06.50**	

The intangible benefits of the forests e.g. mitigating climatic changes, carbon sequestering and providing shelter to the wildlife etc are very high. It is, however not easy to assign economic value to the intangible benefits. Yet some of the parameters contributing to the environmental services provided by a medium sized tree of 50 tonnes during its 50 years life span (excluding the value of timber, fruits and flowers) have been assigned notional values by

Professor TM Das in 1980 using surrogate market techniques as given in 'The value of a tree by TM Das 1980- Proceedings of Indian Science Congress'.

Table 51

Environmental benefits derived from a medium sized tree

Sr. No	Environmental benefits	Single tree Rs (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	01.64
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**

So, according to Das, from 1 hectare of subtropical forest, environmental benefits worth Rs. 128.74 lakhs are accrued over a period of 50 years i.e. benefits worth Rs. 2.60 lakhs per hectare are accrued per year at 1980-81 rates. Hence the intangible benefits being accrued from the well stocked forests of Kolhapur division (approx. 1,14,000 hectares) are worth Rs. 2960 crores per year at 1980-81 rates.

Estimated Annual Expenditure and Mandays Generation

The anticipated expenditure for the implementation of the WP prescriptions along with the mandays generated is given below. Wage board rates as fixed by the CF, Kolhapur for the year 2006-07 have been used for calculation purposes. Calculations for expenditure on Afforestation activities have been made on the basis of the sanctioned estimate of Afforestation model for zone III by pit planting at 2x2 meter spacing. The annual expenditure on the various activities for the next 10 years has been calculated by progressively increasing 10% in the previous year's rate.

Table 52

Estimated Annual expenditure

Sr. No	Working Circles	Mandays generated annually (Lakhs)	Estimated annual expenditure during first three years of Plan period (Lakhs rupees)		
			Ist Yr	IInd Yr	IIIrd Yr
I	Prot cum Watershed management WC	1.63	80.57	119.95	142.92
II	Imp. WC	1.56	71.90	114.62	138.53
III	Old Pl. management WC	2.78	85.40	160.04	199.21
IV	SMC cum Aff. WC	2.46	87.85	174.43	219.14
V	Fodder (OL) WC	0.02	02.62	002.88	003.17
	Total	**8.45**	**328.34**	**571.92**	**702.97**

Cost Benefit Analysis

Cost

Estimated average annual expenditure for the prescribed operations = 534 lakhs

Benefit

Estimated annual Revenue from tangible benefits = 6.50 lakhs
Estimated annual intangible environmental benefits = 296000 lakhs
Total benefits accrued from forests of Kolhapur division annually = 296007 lakhs
The cost benefit ratio is 534 lakhs: 296007 lakhs i.e. 1:554

SECTION 2: COST OF THE PLAN

The total expenditure incurred on the preparation of this Plan is Rs 29.65 lakhs which works out to be Rs 21.33 per hectare. It has been worked out by summing up the expenditure incurred from 2003-04 to July 2007-08 and does not include the expenditure incurred on the enumeration of the forest stock undertaken by the FRSS unit at Nashik.

CHAPTER -22

MISCELLANEOUS REGULATIONS

SECTION 1: PETTY FELLING

It is tree felling of small nature to meet departmental demands, research needs and special grants in exceptional circumstances. Forest produce required for departmental works and free grants may be removed on the orders of the DCF under the provisions contained in Article 256 of BFM Vol. I and Article 147 of BFM Vol. III respectively up to the limits of his power. The fellings under these provisions however must be on silvicultural lines and as far as possible will be confined to the coupe of the year or to the coupe to be worked next. Felling of fruit trees will be excluded and fellings in a radius of 40 mt. from the perennial water-holes, nalas and springs will be prohibited. The detailed guidelines regarding the procedure and quantum of petty felling should be fixed for the state by the PCCF.

In addition removal of dead, fallen firewood on rated passes is permitted from all parts of the forest except in the coupes due for working. Every year in the month of October each beat guard will report the availability of dead fallen firewood compartment wise to the concerned RFO. The DCF will compile this information and fix the quantum of the dead fallen firewood to be removed from each range by mid November. Each RFO under the guidance of the concerned ACF will distribute the targets of the available material amongst various gram panchayats as per their demand and availability along with the location of the area from where it could be collected. The list of the persons so prepared by each gram Panchayat will be handed over to the concerned RFO latest by 15th December. Based on this list, the rated passes will be issued to the concerned persons by the RFO No felling of trees will be permitted to obtain firewood. The DCF may however stop extraction of firewood on rated passes from a specified area, in case, he is satisfied that no firewood exists in that area for such removal.

Felling of trees on forest land required by the other departments such as Irrigation, B & C etc. should only be undertaken after the proposals for the use of forest land for non- forestry purposes are approved by the GOI under the provisions of Forest (Conservation) Act, 1980. The cost of harvesting of trees is to be provided by the concerned agency.

SECTION 2: DEVIATIONS

Petty fellings carried out as mentioned in Para under Petty fellings as well as removal of dead fallen firewood will not be constituted as deviation from the Working Plan.

All other deviations can be classified into following two categories as per National Working Plan Code, 2004:

1. Deviations which do not permanently alter the basis of management

1a. Minor deviations which would seek to alter the schedule of working given in the Working Plan, for example:

i. Both non-working a coupe in the prescribed year or working the coupe in the year not prescribed by the WP.

ii. Changes in the areas of coupe on account of disforestation or undertaking areas for execution of any special scheme under plan programme.

2. Deviations which permanently alter the basis of management

2a. Minor deviations which would involve alteration in the silvicultural treatment, for example:

i. Stopping or curtailing fellings or planting because of shortage of labour, funds, material for plantation work, or unsuitability of terrain and soil or excessive biotic pressure for undertaking plantations to the extent prescribed by the WP.

ii. Fellings involving modifications in the prescribed marking rules etc.

2b. Major deviations of the following nature

i. Change in Silvicultural system

ii. Clear felling of natural forest

iii. Formation of new Felling Series

iv. Large scale felling due to natural calamities, which cannot be adjusted against future yield

Procedure for obtaining sanction for deviations:

1a. In case of deviations of the type '1a' above, the territorial DCF will submit in quadruplicate the proposals of deviations yearly with his copy of control forms to the CCF, Working Plans, Pune through the territorial CF who will forward it to CF WP. The CF WP will submit it to CCF WP Pune along with his remarks. No explanatory remarks are required on the deviation form but these should be given in the forwarding letter. One copy each of the statement will be returned to the DCF, CF (T) and CF WP after the deviations have been sanctioned by the CCF WP. In case of difference of opinion between the CCF WP and CF (T), the former will refer the matter to the PCCF for instructions.

2a. In case of deviations of the type '2a' above, the DCF (T) should submit in quadruplicate the proposals of deviations with a copy of control form to the PCCF through the CF (T), CF WP and CCF WP. The PCCF will then issue necessary sanction orders.

2b. In case of the deviations of the type '2b' above, the DCF (T) should submit in quadruplicate the proposals of deviations with a copy of control form to the PCCF through the CF (T), CF WP and CCF WP. The PCCF, before sanctioning the specified major deviations, will necessarily take prior approval of the Regional CCF, Bhopal.

The format of the deviation statement is given in **Appendix 22.1** of Volume II.

SECTION 3: RESEARCH AREAS

The prescriptions of this WP will not be applicable on the Research areas bearing Seed Orchards, Experimental and Sample Plots, Candidate Plus Trees, Plantations, nurseries etc which have been handed over to the State Silviculturist and are in his possession. These areas are managed with a perspective of research and extension in forestry and hence will be managed as per their Silviculture requirements as included in the Plan of Operations duly approved by Research and Advisory Committee (RAC) MS chaired by the PCCF. A list of research areas is given in **Appendix 20.7** of Volume II.

SECTION 4: DEMARCATION AND MARKING TECHNIQUE

The annual coupes shall be demarcated one year in advance of its due year of working as shall be specified in the appendix.

A. Demarcation of Coupes :

i. Annual coupes shall be demarcated by cutting and clearing bushy undergrowth on 3 meter wide line.

ii. Trees selected at suitable intervals along the coupe boundary will be given two coaltar bands and a geru band in between after scrapping the loose dead bark except where the coupe boundary runs along a permanent feature like a big nalla, a fire-line or a road.. Lower coaltar band will be at the breast height while the upper coaltar band will be 15 cm. above it. The tree shall also bear the coupe number, name of the F.S. and the W.C. on the side away from the area of the coupe.

iii. Tree serial number will be given just below the lower coaltar band and away from the area of the coupe. Serial number of such trees will be maintained in the marking register in the following form :

Sr. No.	Species	G. B. H.	Remarks
1.	2.	3.	4.

iv. No tree bearing coupe demarcation bands will be marked for felling.

B. Demarcation of Protection Areas :

Selected trees on periphery of the protection areas shall be given two geru bands, 15 cm apart with the lower one at the bh. In addition a cross (X) mark in geru shall also be given in between the bands, on the side away from the protection area. The tree serial number shall be given just below the lower geru band on the side bearing the cross. If the number of protection areas is more than one in a coupe, then all the PA's shall be numbered in Roman numerals and the trees standing on periphery of each PA shall be numbered in Arabic. For example, the trees on periphery of PA No. I shall bear the Sr.No.I/1; II/2 etc. while the trees on the periphery of the PA No. II shall bear the Sr.No. II/1, II/2 and so on.

C. Demarcation of other areas given in the treatment map :

The other categories of areas if any shall be marked by giving one geru band and one coaltar band 5 cm apart with the geru band at the bh. The coupe demarcation shall be certified by the R.F.O. in the following format.

"I, ----------, RFO, ----------certify that I have personally inspected the demarcation of coupe No --------- in compartment No ---------- of ---------- F. S of----------W.C on dated ----------and found that coupe has been demarcated as prescribed in the Working Plan. The area of the coupe is ---------- hectares."

Date: Signature of the RFO

D. Marking Technique :

i. All trees to be marked for felling shall be given a geru band at bh and shall bear marking hammer mark at the bh as well as on the base of the tree on a clear blaze of size 10 cm X 10 cm

ii. All trees marked for felling shall bear serial nos. in coaltar only. The number of the trees marked shall be written vertically on the blaze as shown below :

For tree No. 123 xx

1

2

3

Where xx gives marking hammer inscription and 123 is the serial no. of the marked tree.

iii. All trees bearing serial nos. will be recorded in marking book in the following format :

Serial No.	Species	gbh (ob)	Remarks
1.	2.	3.	4.

iv. Abstract of trees marked for felling shall be made in 15 cm girth classes. Timber, poles and firewood trees shall be indicated in the marking book.

*** If a tree is capable of yielding 30 % of the timber expected form it as per the form factor, it is classed as 'Timber tree'. 10 % to below 30 % as 'carpentry tree' and below 10 % as 'Fire wood tree'.*

SECTION 5: USE AND DISPOSAL OF MAPS

The different categories of maps and their scale are as under:

Stock maps

As a general rule, if the stock maps of previous WP are available they should only be checked and if they are found to be reasonably accurate, no further action is required. But if they do not already exist, they will have to be prepared on 1:50,000 scale. Normally a stock map will show the crop composition, crop density, quality age classes, regeneration and blank areas. A statement showing signs used in stock maps is given in **Appendix 22.2** 0f Volume II.

Management maps

It will show divisional, range, block, compartment boundaries and boundary pillars with their numbers. In addition it will bear the name and boundaries of Working Circle, Felling/ Working Series and coupes. It will be prepared on 1:50,000 scale.

Working Plan maps

These are prepared on 1:25,000 scale. These are like management maps which in addition to silvicultural units like WC, FS/ WS, Coupes etc, show as many management, administrative and physiographic features as possible.

Reference map

When reading a WP, it is inconvenient and unnecessary, except when detailed information is sought, to have to refer to a separate WP/ management map. Thus each WP will include a small reference map on the inside of the back cover. The map will be of such a convenient size as can be simply folded once or twice to the size of the printed volume. It should show the main boundaries, the forests, ranges, roads, canals, FRH, neighbouring towns and villages and such other relevant features as can be shown without overcrowding it.

Disposal of maps

Eight sets of fresh maps have been prepared as follows:

1. Stock maps - 3 sets (1 cut and mounted + 2 uncut and mounted)
2. Management maps - 3 sets (1 cut and mounted + 2 uncut and mounted)
3. Working Plan maps- 2sets (2 uncut and mounted)

The distribution of these maps will be as follows:

I. Conservator of Forests, Working Plans :

One rough uncut and mounted set showing the existing compartment boundaries and stocking details will be prepared based on which the master sets of stock maps and management maps showing the compartments, coupes, Felling series, Working Circles and other management details will be prepared.

i. Management maps - 1 master set (cut and mounted)

ii. Stock maps- 1 master set (cut and mounted)

II. Deputy Conservator of Forests, Kolhapur division :

i. Management maps - 1 set (1 uncut and un mounted)

ii. Stock maps- 1 set (uncut and un mounted)

iii. Working Plan maps- 1 set (uncut and un mounted)

III. Chief Conservator of Forests, Working Plans Circle, Pune :

i. Management maps - 1 set (uncut and un mounted)

ii. Stock maps- 1 set (uncut and un mounted)

iii. Working Plan maps- 1 set (uncut and un mounted)

Additional copies of these maps may be made by the DCF, Kolhapur division as per their requirement.

SECTION 6: ROADS AND BUILDINGS

Most of the forest areas are connected by district roads. But in the interior hilly areas the road network is not well developed. The paths are maintained by the department for going to plantations and nursery sites. There are a few short roads which are maintained by the Kolhapur division. The complete list of forest roads in Kolhapur division is given in **Appendix 22.3** of volume II.

The position of the buildings both for office and residential purposes in the Division is not very satisfactory. Sufficient residential accommodation is not available for the Range officers, field staff, and the ministerial staff. Under the Maharashtra Forestry Project some residential buildings have been constructed in Kolhapur division but these are not sufficient to fulfill the requirement of the whole staff. There is a prime property at Bindu Chowk in Kolhapur city which presently houses the Range office for Karvir Range, Kolhapur mobile squad, Deputy Engineer as well as the office of the CF, Kolhapur Wildlife division. The building is however very old and is in a dilapidated condition. Similarly there is no proper office building for the CF WP Kolhapur. Therefore an office complex that can house all these offices need to be constructed urgently at a suitable good location. The DCF should pursue the matter with the Collector for getting the land allotted at a suitable location for this purpose. The list of buildings in Kolhapur division is given in the **Appendix 22.4** of Volume II.

SECTION 7: WEED ERADICATION

To control the rapid spread of Ranmodi (Eupatorium spp.) and Bukra (Strobilanthes sessilis) , the Research wing of the Forest Department should be requested to lay out sample plots and study various methods of control and eradication of these weeds and to bring out a model including cost estimates for preventing its further spread. The ecological aspect of Bukra should also be studied to examine its role as a soil binder as well as its vulnerability to fire.

CHAPTER-23

ESTABLISHMENT AND LABOUR

SECTION 1: THE ESTABLISHMENT AND LABOUR

The DCF Kolhapur is assisted by 2 ACFs, 11 RFOs, 38 Round Officers and 149 forest guards, 1 Police Constable for managing the field while 1 Chief accountant, 13 Accountants and 22 Clerks, 2 Surveyors, 1 Junior Engineer, 1 Statistical Assistant etc assist him in performing his office job. In addition 194 Van majoors are also part of the establishment. Overall, Kolhapur division has an establishment of 448 personnel.

The DCF had submitted a reorganisation proposal of Kolhapur division vide his letter dated 30.04.03. In this Proposal, out of total 8 ranges, 5 ranges viz. Malkapur, Gargoti, Ajra, Chandgad and Panhala were proposed to be bifurcated into two ranges each thereby increasing the number of proposed ranges from present 8 to 13, proposed rounds from present 29 to 42 and beats from present 98 to 132. There are 289 sawmills in the division out of which 182 are located within Kolhapur city limits. It was therefore proposed to have two posts of saw mill foresters. Similarly considering other factors, it was proposed to have one post of forester each for the management of timber depot, wild life and handling proposals under FCA. In totality extra deployment of field staff i.e. RFOs from present 11 to 14, ROs from present 38 to 48 and forest guards from present 149 to 166 were proposed. Deployment of vehicles and wireless network at the range level was also proposed for effective protection and wildlife management. The division has a large cadre of 194 Van majoors whose services should be put to maximum and appropriate use.

Adequate health and education facilities are usually not available at many beat and round head quarters in the interior locations. Even staff quarters at many such places are either not available or are not in use due to poor maintenance. Therefore majority of the staff members posted in interior areas had to keep their families at other places out of compulsion.

Various Staff welfare activities can be undertaken under newly created Forest welfare fund apart from the regular government schemes. The staff should be encouraged to first become the member of the Fund to become eligible to avail the facilities. It is also seen that the staff is not adequately trained to handle the wild life emergencies, court cases etc. They are usually unaware of the latest developments in the field of forestry and wild life. Therefore forest guards and foresters should be imparted induction training at the time of recruitment itself that will help equip them with the knowledge pertaining to various aspects of forestry. The trained field personnel can shoulder the overall responsibilities of their job as well as the implementation of the prescriptions of this WP in more efficient and effective manner. Short term training modules should also be devised by the CF education wing to train the officers as well as field staff at regular intervals to keep them abreast of the latest developments in the field of forestry.

CHAPTER- 24

CONTROL AND RECORDS

SECTION 1: CONTROL FORMS

The records of all harvesting, subsidiary silvicultural operations, regeneration works and soil and moisture conservation works carried out in each Working Circle as per the Working Plan prescriptions will be maintained in the control forms. The prescribed performae of the coupe control forms and felling control forms are given in **Appendix 24.1** of volume II of the WP.

The DCF (T) will annually make entries in his copy of the control forms and send them together with the deviation statement in triplicate to the CCF WP Pune through the CF (T) Kolhapur. After the entries have been checked and approved, the CCF WP will first get his copy completed and then send the DCF's copy to the CF (T). The later will then complete his copy and finally return the DCF's set for deposit in the latter's office till next year. The CCF WP Pune will send three copies of deviation statement to the PCCF for sanction. After the sanction, one copy each will be sent to the CF (T) and the DCF for their record and the CCF WP will keep the third copy for his set of control forms.

The control forms should be submitted by the DCF to the CF (T) on or before December 1 and the latter should send them to the CCF WP on or before January each year.

SECTION 2: COMPARTMENT HISTORIES

Compartment histories i.e. the record of various forestry activities and observations made in the past year will be maintained in Form Nos. 1 to 5 as given below.

i. Form No. 1 : Compartment description to be filled by the CF WP

ii. Form No. 2 : Compartment enumeration to be filled by the CF WP

iii. Form No. 3 : Trees marked for felling to be filled by the DCF (T)

iv. Form No. 4 : Compartment out-turn to be filled by the DCF (T)

v. Form No. 5 : Compartment History to be filled by the DCF (T)

The formats for the different forms are given in the **Appendix 24.2** of Volume II.

If compartment history with full entries already exists, past entries made by the DCF will be scrutinized by the CF WP Kolhapur 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 CF WP. At the next revision of the WP, the CF WP will scrutinize 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.

SECTION 3: PLANTATION AND NURSERY REGISTERS

Plantation registers will be maintained for all the areas regenerated artificially in the Form Nos. 1 to 9 in standard format.

Nursery registers will be maintained in Form Nos. 1 to 10 in standard format.

SECTION 4: DIVISIONAL NOTE BOOK

The matters of divisional importance will be recorded under standard headings for records and ready reference in the divisional note-book. A brief note of the plantations will also be recorded by the Deputy Conservator of Forests, Kolhapur division under the appropriate heads.

CHAPTER – 25

SUMMARY OF PRESCRIPTIONS

THE TRACT DEALT WITH

This Working Plan deals with the entire forest area including all reserved forests, protected forests, unclassed forests, and finally acquired forests in charge of the Kolhapur forest division within the geographical boundaries of Kolhapur district. This Plan however excludes the areas notified as Radhanagari sanctuary and Chandoli National Park within Kolhapur district as these are covered by separate Management Plans and are under the administrative control of the Kolhapur wildlife division.

The division has eight forest ranges viz. Chandgad, Ajra, Gargoti, Radhanagri, Gaganbawada, Karvir, Panhala and Malkapur. Kolhapur is bounded on the north by the Varna river that flows eastwards for 120 km separating Kolhapur and Sangli district, before joining Krishna river in the north east; On the east, it is bounded by the river Krishna for some length, and Belgaum district of Karnataka; on the south by Belgaum district; and on the west by the Sahyadharis which separate it from Ratnagiri and Sindhudurg districts.

The geographical area of Kolhapur district is 7,685km^2 and is spread over 12 talukas viz. Chandgad, Gadhinglaj, Ajara, Kagal, Bhudargad, Hatkanangle, Gaganbawada, Panhala, Shirol, Radhanagari, Karvir and Shahuwadi. The recorded forest area of the district including sanctuary areas is 1,742.50 sq.km which is 22.67% of the geographical area of the district. The Kolhapur forest division however has a forest area of 1,389.71 km^2 that is spread over 8 forest ranges and all 12 talukas.

As per the 'State of Forest Report 2005' (SOFR), published by Forest Survey of India, Dehradun, the 'Actual forest cover' of Kolhapur district is 1,657 km^2 that is 21.56% of the geographic area out of which, 'Very dense forest cover' is nearly 6% while 'Moderately dense' is 57% of the total forest cover. The 'Open forest cover' constitutes 37% of the total area under forest cover. This means about 63% of the actual forest cover within the district is moderately dense to very dense.

The western boundary of the district is marked by the north–south running Sahyadri range of the Western Ghats and a series of valleys separated by lines of hills which runs north-east or east. The area is thus hilly and rugged along the Western boundary and gradually tapers off as one moves to the eastern side, forming a plateau.

The various soil variations can be broadly divided into following three categories: The red latritic soil, the murrum is found predominantly in the western zone. The brownish or light black coloured soil is mainly fine silt, sandy and clayey loam which is deposited in the valleys along the course of rivers and is very rich and fertile. The medium to deep black soil is seen in the Shirol, Hathkanangale and eastern parts of Karvir, Kagal and Gadhinglaj talukas.

The climate of Kolhapur district is moderate and pleasant. The bulk of the rainfall is received from the South West monsoons between June to October. It varies from a mean annual rainfall of 480 mm in the eastern Shirol taluka to around 6000 mm along the Western Ghats in Gaganbawada Taluka.

The main rivers of Kolhapur are six in number, the Varna, the Panchganga, the Dudhganga, the Vedganga, the Hiranyakeshi and the Ghatprabha. These rivers rise in the Sahyadris and flow south-east, east or north-east 80 to 97 kms across the Kolhapur plateau towards the Krishna. The water table in the entire Kolhapur district is very high thus resulting in good water levels in all wells and tanks. **This Working Plan covers 1,389.71 sq.kms of area falling within the jurisdiction of Kolhapur forest division.**

THE FLORA AND FAUNA

The Western Ghats region is considered as one of the eight 'hottest' biodiversity hotspots of the 34 identified biodiversity hotspots worldwide.

The region boasts of a tremendous diversity of plant and animal life.

According to the Champion and Seth classification of the forests types of India the main forest types found in Kolhapur division are as follows.

i. $_2A/C_2$ – Southern tropical West coast semi-evergreen forests
ii $_3B/C_2$ – Southern moist mixed deciduous forests
iii. $_5A/C_3$ – Southern dry mixed deciduous forests
iv. $_6A/C_1$ – Southern tropical thorn forest and its degraded types.

Nearly 2,227 species of plants belonging to 1,023 genera of 182 families have been recorded for Kolhapur district in the book on 'Flora of Kolhapur district' by Professor S.R. Yadav and Dr. M.M. Sardesai of Shivaji university of Kolhapur. Out of the total taxa endemic to peninsular India, 694 are found in Maharashtra (Singh and Karthikeyan, 2000) of which 340 occur in Kolhapur district. Similarly, a total of 251 species are reported to be threatened in Maharashtra state (Singh and Karthikeyan, 2000) of which 136 are found in this district. *Nine* taxa of *critically endangered (CR)* category of threatened plants are found in the district. The Kolhapur forest division is also rich in forest fauna. There are as many as 47 species of mammals, 264 species of avifauna, 59 species of reptiles and 66 species of butterflies have been reported in the district. 7 species of mammals of endangered status namely Leopard, Sloth been, Gaur, Mouse deer and Pangolin and two endangered species of reptiles namely Indian python and Indian Monitor lizard are also been found in the district.

UTILISATION OF THE FOREST PRODUCE

The population of Kolhapur district is 35.15 lakhs as per 2001 census out of which 70% live in the rural areas and 30% in urban areas. Agriculture is the main occupation of the people. The important agricultural crops of Kolhapur districts are Rice, Jowar, Nachni, Wheat, Sugarcane, Ground nut and Soybean. The Paddy and Sugarcane are the main crops in terms of total production.

The major thrust in the Western ghats forests is on the conservation. The miscellaneous forests of Kolhapur district otherwise also have few timber species of commercial importance. Percentage of Teak trees in the forests is very less. Species like Ain, Kinjal, Nana, Katak etc are used locally for use as small timber in the house-hold constructions. The supply of timber and bamboo locally from the forests is much less than the demand and is met with by the supply made from the other surplus areas. The farmers produce a large share of the total fodder requirement themselves. The eastern part of the district faces some shortage of fodder during the dry season. Few cases of illicit felling of trees for use as small timber and illegal grazing are reported at places in the forests though the pressure on the forests due to these two threats is not very serious.

STAFF AND LABOUR SUPPLY

The division has sanctioned staff strength of 252 and in addition has a large contingent of 217 van majoors. Labourers required for forestry works are not easily available within the district. The increased industrial activities and the overall increase in the standard of living of the people considering better irrigation facilities also fail to attract labourers for the hard work and low returns they get in forestry activities.

PAST SYSTEMS OF MANAGEMENT

General history of Forests (1884-1930s)

- Forests managed with intention of yielding revenue
- Standing trees (Teak/Non Teak) in suitable areas were sold annually
- Felling was allowed to continue for 5-7 years in selected coupes
- Resulted in low density of tree cover with an increased number of crooked or diseased injaili tree species
- Trees allowed to be taken away at a nominal fee of Re. 1 per tree in Jahagir areas - Resulting in selective felling of good timber yielding trees
- Kumri cultivation practice also resulted in vital loss of tree cover

First WP for Sansthan areas (1936-44)

- Segregated all areas having Teak Forests and divided them into annual coupes for felling (Teak Working Circle)
- Prescribed clear felling of coupes followed by maintenance of coppice shoots
- Regeneration works were not prescribed
- Resulted in overexploitation of teak areas

Saldhanha's WP (1945-57)

- 3 Working Circles
- Protection WC- resting the area; gap filling; resulted in imp. of stock
- Clear Felling WC- areas were not regenerated as prescribed; deterioration of stock
- Reforestation cum Imp. WC- Selective felling of trees; Dead trees and trees above 4 ft. girth to be felled; Planting by leveling and contour trenching not followed

Wagle's WP (1957-90)

- 8 Working Circles
- Protection WC 38216.95 ha
- Fuel wood Production WC 50914.70 ha
- Conversion WC 22455.85 ha
- Teak Improvement WC 05688.39 ha
- Sandalwood Conservation WC 00277.22 ha
- Fodder dev. WC 03725.41 ha
- Grazing area dev. WC 09419.71 ha
- MFP (OL) WC

Dashputre's Working Scheme for Chandgad Range (1962-83)

- 6 Working Circles
- Protection WC 3229.46 ha.
- SCI WC 9935.25 ha.
- Plantation WC 11248.48 ha.
- Coppice with Reserve WC 889.11 ha.
- Miscellaneous WC 1889.64 ha.
- Sandalwood conservation (OL) WC

Working Plan of Shri K.A. Kate and Shri A.R. Bapat (1990-91 to 1999-2000)

This WP had 10 Working Circles; 8 main WC along with 2 overlapping WC as given below.

1. Protection Working Circle:

The area of this WC was 59,907.97 ha covering areas under the same WC of Shri Wagle's Plan and Shri Dashputre's Plan and in addition catchment areas of major irrigation projects as well as areas not found fit for exploitation and areas with slope of more than 25^0. No felling was prescribed considering precipitous to heavy slopes. Sowing and tending of seeds was proposed to improve the tree cover. Patches with density less than 0.2 with a minimum area of 0.4 ha were proposed for planting.

Results: The working and sequence of coupes as given in the WP was not followed except in the initial 2 to 3 years due to lack of budgetary grants. Otherwise few mixed species plantations of Acacia auriculiformis, Eucalyptus, Aonla, Siwan and Suru etc were taken in the protection areas

on the moderate slopes during the WP period and majority of them are found to be partially successful. Acacia and Eucalyptus have at most places suppressed other miscellaneous species. Similarly SMC works involving LBS, CCT, kache bandhare etc were taken under Western Ghats scheme in different ranges during the plan period. The majority of the area being on the steep slopes is naturally well protected. There are very few incidents of illicit felling though the area is prone to fires.

2. Selection cum Improvement Working Circle:

The area included in this WC was 19,997.02 ha. It supported moist deciduous forests which were degraded but which had potential to support IV A to IV B site quality forests. Considering virtual non availability of higher girth class trees, only improvement fellings could be prescribed along with planting local species to improve tree cover.

Results: The title of this WC was a misnomer since no selection fellings were prescribed due to lesser availability of higher girth class trees. Only improvement fellings were to be carried out in the form of removal of only dead trees and cutting of woody climbers. However, prescriptions could not be implemented due to instructions to stop felling in Western Ghats by the Secretary (Forests), Revenue & Forests Department, Government of Maharashtra issued vide his letter No.TRS/1088/PR/265-F dated 7-6-1988. The areas are having young to middle aged crop with a crop density of 0.6 and above. Improvement fellings resulting in opening up of areas to encourage younger regeneration and to maximize the growth of tree species need to be carried out.

3. Enrichment Working Circle:

The area included in this WC was 4,227.60 ha. The overall objective of this WC was to promote growth of valuable species so as to improve the quality of the growing stock to meet the local needs of the people for poles and small timber and also improve the density. The group selection system was proposed where in 3 x 3 chain area was to be tackled and efforts made to promote advance growth by felling bigger trees. Open areas were proposed to be planted by 50 % Teak and bush sowing of sandalwood. Planting of Bija, Shisham and sandalwood was also proposed. It was decided that the exploitable girth would be fixed at 75 cms at breast height.

Results: Felling of selection girth trees of 75 cm and above was not carried out due to instructions to stop felling in Western Ghats by the Secretary (Forests), Revenue & Forests Department, Government of Maharashtra issued vide his letter No.TRS/1088/PR/265-F dated 7-6-1988. Planting of Sandal wood was not given a try. Teak plantations had been taken in the past before Kate Bapat's Plan as well as during the Plan period though not exactly in the area as prescribed in the WP. Few of them like one at Salvan in Gaganbawada range taken up in sixties and another at Dindewadi in Gargoti range taken up in 1992 have shown good results but in general Teak plantations have been found to show stunted growth and their overall growth is not found to be encouraging.

4. Afforestation for Soil and Moisture Conservation Working Circle:

The area proposed for this WC was 17,986.45 ha spread over 52 compartments and included degraded areas subjected to repeated illicit cutting because of the high level of human

presence in the surrounding areas mostly in the eastern part of the district. Areas fit for planting were proposed to be classified according to their depth into 3 zones. Improvement fellings to promote growth of reserved trees was proposed. Soil conservation works were proposed to be carried out before the onset of rains.

Results: SMC as well as Afforestation works were taken on a large scale in the division during the Plan period though sequence of coupes and the area as given in the WP was not followed. SMC works have shown good results in the past and need to be taken more vigorously. Plantations of Acacia and mixed species taken in the Plan period have also shown good results. The plantations taken on the CCT and trenches have shown better growth than the ones taken in the pits. Teak plantations taken in the Plan period in general have not shown good results. Bamboo plantations are found to be badly affected due to attacks of Wild boar and Porcupine.

5. Fodder Reserve Working Circle:

The area included in this WC was 14,995.76 ha and had sparse tree cover. The main objective of this WC was to promote growth of fodder yielding tree species and to improve the quality and yield of good local grass and also to improve the tree cover and enrich the soil by planting legumes. It was proposed to remove weeds, coarse grass and lantana before rains and protect the area from fire. Necessary soil and water conservation works were also proposed. Planting of fodder species like Subabul, Tiwas, Sissoo, Sesbania, Shiras, Anjan was proposed.

Results: The prescriptions were not followed hence the areas had deteriorated. Due to repeated fires and non removal of weeds, the inferior fodder grasses like Kusali had taken over larger areas. Large scale tree plantations mainly of Acacia auriculiformis and other mixed species were taken in these reserves resulting in the loss of the good fodder grasses. These areas need to be rehabilitated.

6. Miscellaneous Working Circle:

The area included in this WC was 1901.81 ha of Chandgad taluka which was under Kumri cultivation or Rotational cultivation. The main objective of this WC was to maintain the ecological balance in the area under Kumri cultivation and improve the quality and productivity of the area through technical inputs and in the process also improve the standard of living of the Kumri cultivators. It was proposed to follow the Agri-Silvicultural system by planting trees at a spacing of 5 m x 4 m and use the intervening space for cultivation.

Results: The prescriptions were not followed. The areas are still under kumri cultivation and had deteriorated further.

7. Nature and Wildlife Conservation Working Circle:

The area proposed for this WC was 34,412.07 ha and included the areas of the Radhanagari Sanctuary and the area of Chandoli Sanctuary which formed part of the Kolhapur district. The main objective of this WC was to conserve the biodiversity and its gene pool by protecting its habitat and through scientific wildlife management practices. Habitat improvement measures, development of camping places, development of trails and interpretation facilities were prescribed.

Results: A separate Wildlife division with head quarters at Kolhapur was created in 1993-94 under the Maharashtra Forestry Project and these areas were transferred to the Wildlife division for management.

8. Cashew Plantation Working Circle:

The area proposed for this WC was 3,167.68 ha. The main objective of this WC was to utilise the areas fit for growing cashew to increase the productivity and to provide employment opportunities in remote areas and also to increase the tree cover and achieve the objective of soil and moisture conservation. It was proposed to improve the productivity of the old cashew plantations taken up in the 2nd and 3rd five year plan periods mainly under the soil and water conservation schemes. It was also proposed to resort to improvement fellings and plant cashew saplings using the technological advancements in horticulture. . The rotation cycle was fixed at 40 year considering that the optimum fruit bearing capacity is upto the age of 40 years.

Results: For the initial 2-3 years soil working around the cashew trees was done in few plantations as per the availability of funds. Other prescriptions were not followed in their entirety and as a result, Cashew plantations could not show any improvement. Rather the yield got reduced due to lesser inputs.

9. Bamboo Plantation (overlapping) Working Circle:

The area included in this WC was 4,227.60 ha which overlapped with the area of the Enrichment Working Circle. It was proposed to plant Katas / Kalak bamboo (Bambusa arundanesia) and Kadhni bamboo (Oxytenenthera stocksii) in the western most belt of 0-15 kms of the district with high rainfall and Red lateritic soil. It was proposed to plant Mes-kathi / Managa bamboo (Oxytenenthera monostigma) in the 15 – 30 km belt parallel to the main Western Ghats and it was proposed to plant Dendrocalamus strictus beyond 30 kms from the western boundary upto the eastern most part of the district.

Results: Bamboo species were not planted as per the prescriptions. Only bamboo seedlings of Dendrocalamus strictus species were raised in the nurseries and planted in the field. Majority of the plantations were found to be badly affected due to Wild boar and Porcupine attacks. Other species found locally were not tried in the field.

10. Minor Forest Produce (Overlapping) Working Circle:

The area of this WC overlapped with the entire area of the Division. The objective of this WC was to collect minor forest produce in a scientific manner to ensure a sustained yield and to increase the production of the minor forest produce. It was proposed to plant seedlings of MFP yielding species on the TCMs on the compartment boundaries as well as in all other plantation programmes.

Results: Seedlings of MFP species like Hirda, Baheda though were introduced in the plantations yet many more species could have been introduced. More vigil needed to be kept on the destructive harvesting techniques employed by the contractors.

STATISTICS OF GROWTH AND YIELD

Enumeration during present Plan

While revising the Plan by Kate and Bapat, the enumeration of the forest crop was carried out by the 'Forest Resources Survey Scheme Unit' Nashik along with the active cooperation of the field staff from December 2004 to October 2005. The sampling design and overall technical guidance was given by the Chief Forest Statistician, MS, Nagpur. The sampling design of 'Systematic Line Plot sampling with random start' was adopted with the sample plot size of 20 x 20 meters i.e. 0.04 ha roughly at an interval of 600 meters. Out of total 476 plots which were laid in the field, 231 lied in the areas allotted to Watershed Management WC, 145 in Improvement WC, 51 in Afforestation WC and 49 in Old plantations Management WC.

The analysis of the data revealed the stocking of nearly 542 trees per hectare for the entire division. Stocking of trees per hectare for each of the WC is as follows: 726 for Watershed Management WC, 601 in Improvement WC, 578 in Old plantations Management WC and 264 in Afforestation WC.

AREA ALLOTTED TO VARIOUS WORKING CIRCLES IN THE REVISED PLAN

Four main WC along with 4 overlapping WCs are proposed in the revised Plan.

Sr. No.	Working Circle	Area allotted (ha.)	%age of area allotted
1.	Prot. cum Watershed Management WC	68,834.38	49.53%
2.	Improvement Working Circle	39,014.61	28.07%
3.	Old Plantation Management Working Circle	13,253.44	9.54%
4.	SMC cum Afforestation Working Circle	10,279.55	7.40%
5.	Bamboo Management (O.L.) Working Circle		
6.	Wild Life Management(O.L.) Working Circle	----	
7.	Fodder Resources Mngmnt (OL) Working Circle	----	
8.	NTFP (O.L.) Working Circle	**----**	
	Other		
	Miscellaneous area	7,589.02	5.46%
	TOTAL	**1,38,971.00**	

PROTECTION CUM WATERSHED MANAGEMENT WORKING CIRCLE

This Working Circle includes catchment areas of major and minor irrigation and hydro electrical projects in Kolhapur district as well as forest areas with steep to precipitous slopes of more than 25^0 as included in Kate and Bapat's Plan. The majority of the area is hilly and with rugged terrain. The mean annual rainfall in these areas ranges between 2000mm to as high as 6000mm. These are highly vulnerable areas where retention of tree cover is essential to protect the soil from erosion

and laterisation due to heavy rainfall. The area included in this Working Circle is 68,834.38 ha that is 49.53% of the total area being dealt in this Plan. The main objective is to manage the runoff water and maintain the vegetation cover. This will mitigate the rate of soil erosion in the various catchments and will also check the silt inflow in the reservoirs, thereby increasing their life. Each village in a watershed shall be taken as a unit of holistic development. Various soil moisture conservation works like gully plugging, gabion structures, brushwood dams, Vanrai bandharas, contour bunding, contour trenching, van talis, cement plugs etc. shall be done as per the suitability and the requirement of the area. Accessible under-stocked areas with good soil-depth and more than 2 hectares in extent in a compact block shall be planted with suitable local species. In smaller areas, seed-dibbling shall be done to suitably clothe the area. No exploitation of timber or fuel-wood shall be done. Wind fallen material shall be removed from the accessible areas. Collection of Non wood Forest Produce (NTFP) shall be permitted according to prescribed rules. Care shall be taken to not to cause any harm to the plants while collecting NTFP. It shall be endeavored to integrate forestry management interventions with development schemes of other departments under JFM, FDA, IWDP, DRDA, District Plan etc. for socio-economic upliftment of the village communities with an objective to develop clusters of villages in various watersheds.

IMPROVEMENT WORKING CIRCLE

This Working Circle includes the forest areas in the Western and Southern portion of the district. The areas have gentle to moderate slopes. The areas carrying young to middle-aged crop which require improvement through silvicultural operations are allotted to this Working Circle. The total area included in this WC is 39,014.61 ha which makes 28.07% of the total area being dealt in this Plan. The objective is to improve and enrich the growing stock and to meet the demand for small timber and fuel which will be achieved by carrying out improvement works with an emphasis on soil and moisture conservation works along with improvement fellings. NR will be tended and supplemented with AR wherever needed. The SMC works like van tale, cement bandhs, nalla-bunding, gully plugging etc will be carried out wherever required. Accessible under stocked areas having good soil depth and more than 2 hectares in extent in a compact block shall be planted with suitable miscellaneous species while in areas less than 2 ha. in extent, seed dibbling shall be done. Rooted stock shall be properly tended. All climbers on the trees except those having medicinal properties and which are used and traded shall be cut. Only dead, diseased, unsound and malformed trees shall be marked for felling, retaining two dead trees per hectare for the benefit of the wild-life. All live high stumps shall be cut flush to the ground and shall be dressed thereafter with a sharp axe to get vigorous coppice shoots.

OLD PLANTATIONS MANAGEMENT WORKING CIRCLE

This Working Circle includes areas containing patches of old successful plantations of Acacia auriculiformis, Eucalyptus species, miscellaneous species, Glyricidia, Teak and Cashew. The area included in this WC is **13,253.44** ha that makes **09.54**% of the total area. The main objectives are to improve the condition of plantations by using tending operations as well as to enrich the area by taking AR of suitable species. Nearly all Plantations of Acacia, Eucalyptus and Miscellaneous species are mature and have crossed the age for Cleaning or Thinning and ought to be felled. But considering the fragile ecosystem of the Western Ghats and vulnerability of the area, *felling in*

Acacia, Eucalyptus and Miscellaneous species plantations shall first be done for a period of initial two years. A mid term review of such felled plantation areas shall be undertaken in the 5th year of the WP to know the impact of following prescriptions, which may be suitably revised, if found necessary after proper analysis. 25% of the enumerated trees falling in 'Well stocked areas' shall be reserved and shall not be felled for protection against the adverse climatic factors as well as for supply of seed for regeneration. Trees falling within the 'Protection areas' as well as 'Under stocked areas' as shown in the Treatment map shall not be felled. The entire regeneration of miscellaneous species including trees if any will be retained and tended. NR shall be supplemented by AR by planting 1.5 to 2.5 years old tall plants of local miscellaneous species. In Teak plantations, first mechanical thinning will be done in the 10th year of formation of the plantation followed by 'Ordinary thinning' or 'Low Thinning' a type of silvicultural thinning which shall be resorted to in the15th and every 10th year subsequently till the plantation attain the age of 65 years. Old Cashew plantations will be managed as per the prescriptions given in the scheme named 'Rejuvenation of senile orchards' of agriculture department.

SMC CUM AFFORESTATION WORKING CIRCLE

This Working Circle includes mainly the under stocked and denuded forest areas in the eastern part of the Kolhapur division and some degraded forests in the central portions. These areas bear sparse vegetation, the soil condition is deteriorated due to heavy grazing and frequent fires in the past. The total area that is included in this Working Circle is 10,279.55 ha that is 07.40 % of the total forest area. The under stocked areas shall be treated in two phases; the restorative phase during which the soil and moisture conservation works shall be carried out during the initial first year and the productive phase during which, the planting activity will be taken in the second year.

BAMBOO MANAGEMENT (OL) WORKING CIRCLE

Bamboo is found mainly along the hilly slopes and along the nallahs in scattered but dense patches in Chandgad, Ajra, Gargoti and Malkapur ranges of Kolhapur division. Old bamboo plantations and naturally occurring bamboo areas falling outside 'Protection cum Watershed' WC shall be managed under this WC. Majority of the old bamboo clumps found growing naturally or in plantations in the forest areas have never been worked before and show lot of congestion bearing dead, deformed and over mature bamboos. The culms of Bambusa bambos are found to be badly entangled within the clumps due to over congestion. All clumps will be cleaned during the coupe working. All dead, decayed, dry and twisted culms will be removed. No clump shall be considered fit for harvesting unless it contains more than 12 culms of one year or older in age. All current year and previous year culms will be retained. The mature culms equal in numbers to the current year culms subject to minimum of 8 culms must be retained to provide support to the younger culms. The remaining mature culms after reserving as described in the preceding paragraph may be harvested. *Such clumps of Bambusa bambos or other species which are difficult to work as per standard bamboo working due to heavy congestion should be worked so as to retain culms in 'U' shape or to retain bamboo culms on the periphery of the clumps. This should be done only once after which following standard bamboo working prescriptions should be strictly followed.* No culm shall be extracted without cleaning the clump which should be an integral part of the bamboo harvesting.

WILDLIFE MANAGEMENT (OVERLAPPING) WORKING CIRCLE

The forests of Kolhapur district were always known for their rich wildlife biodiversity. With mounting agricultural, industrial and demographic pressures, wilderness areas, which are the richest repositories of wildlife and biodiversity have either shrunk or disappeared. Their continued existence is crucial for the long-term survival of the biodiversity and the ecosystems supporting them. This WC overlaps with the entire area being dealt in the WP. Nearly 2,227 species of plants belonging to 1,023 genera of 182 families have been recorded for Kolhapur district. Also there are as many as 43 species of mammals, 237 species of avifauna, 56 species of reptiles and 79 species of butterflies which have been reported in the district out of which there are seven species of mammals viz. Leopard, Sloth bear, Gaur, Mouse deer and Pangolin and two species of reptiles viz. Indian python and Indian monitor lizard which are endangered.

While increasing man-animal conflict is an outcome of shrinkage, fragmentation and deterioration of habitats, it has caused destruction of wildlife and generated animosity against wild animals. Habitat destruction to meet the ever increasing needs of the human population force large herbivores like Gaur (Bos gaurus), Sambar (Cervus unicolor) to enter agricultural fields leading to crop depredation and man-animal conflict situations. Of late, Wild elephants (Elephus maximus) have also been visiting Chandgad, Ajra, Bhudargad and Radhanagri talukas of Kolhapur district frequently from nearby Dandeli sanctuary in Karnataka and now have become residents of this area. There were five incidents of human killings, four by the elephants and one by the bison till 2007. There were three incidents of serious injuries to humans by the elephants till 2006 while seven incidents of serious injuries to the humans by the bisons were reported in the year 2005-06.

A detailed survey of the fauna and flora of the district, their occurrence, status and conservation strategies with a focus on the endemic and endangered species should be undertaken by the expert agencies appointed by the forest department. An expert committee shall be constituted to explore possibilities for developing continuous corridors of contiguous blocks of forested land and ensuring connectivity right from Chandgad forests in the southern portion of the district to the Chandoli forests in the northern most portion for the free movement of the wild animals. Since water is the major limiting factor in the forest during the summers, so development of various water sources by gully-plugging and by erecting nalla-bunds, check-dams, cement bandharas etc. needs to be done. Areas where fodder availability can be increased to prevent straying of wild herbivores like gaur and elephants into agricultural lands should be identified and tackled. The infrastructural facilities to handle wildlife emergencies should be strengthened. The forest staff at different levels shall be trained and equipped fully to handle wildlife emergencies including handling of tranquilizing as well as trapping equipment. The frontline staff should be trained to provide adequate professional skills in prosecution matters related to wildlife offences. Mass awareness camps should be organized as a part of sustained campaign to educate masses. The willing veterinarians preferably from the government departments shall be imparted basic and advanced training in the wildlife medication in different batches.

FODDER RESOURCES MANAGEMENT (OL) WORKING CIRCLE

This Working Circle overlaps with the forest areas which were previously allotted to 'Fodder Reserve WC' in Kate and Bapat's Plan but have now been allotted to various WCs viz. 'Improvement WC', 'Afforestation WC', 'Old Plantation management WC' and 'Watershed Management WC' depending upon the present stocking of these compartments. In these Kuran areas prescriptions regarding developing fodder resources as given in the previous WP were not followed and instead large scale plantations of Acacia auriculiformis, Glyricidia etc. were taken in these areas in the past. As a result, areas with good growth of grasses are very few and are found scattered in between largely degraded Kuran areas. Grasses of lesser nutritional value like Kusali, Kunda, are the main species found growing in these areas. The site quality is IV b. The crop consists of bushy, thorny scrub forest with a predominance of unpalatable grasses and other weed species. Seeds of superior fodder grasses like Sheda, Pawnya, Marvel, Dinanath etc. should be sown on the freshly excavated and heaped soil bund on the lower side of the contour trenches in the suitable areas. Other suitable models for raising fodder grasses may also be used after getting prior approval from the CF, Kolhapur. The newly introduced fodder grasses shall not be permitted to be cut during the first two years of their introduction so as to allow them to seed and multiply.

NON-TIMBER FOREST PRODUCE MANAGEMENT (OL) WORKING CIRCLE

This is an overlapping WC, covering the entire forest area being dealt in this WP. Many species yielding Non Timber Forest Produce (NTFP) including the medicinal plants are found in these forest areas. The important NTFP found in the Kolhapur district are Tamal patra, Cashew, Shikekai, Hirda, Karanj, Kadi patta, dink etc. It is proposed to make a resource inventory of all Non Timber Forest produce in every Range of the Division and mark areas rich in such NTFP including Medicinal Plants. The areas having promising regeneration of NTFP species and which is not less than 0.5 hectare in extent in a compact block will be identified in the annual coupes of each year and will be tended to remove congestion and promote their growth. The weekly markets should be surveyed to know the extent of various NTFP reaching the markets, methods of harvesting, their market price and purpose of their utilisation in domestic or international markets. The DCF should prepare an analytical report based on this. Only sustainable methods of harvesting of NTFP should be used and expertise for training villagers to put these non-destructive methods into practice should be developed. Leaves and fruits shall be plucked from the tree or shrub branches in a non destructive manner. Lopping of branches or felling of trees/ shrubs for collecting NTFP should be strictly dealt with.

MISCELLANEOUS AREA

This Chapter includes the areas under Sheri lands not in charge of forest department but is part of form 1 Area register. Such area is distributed in Karvir, Panhala and Radhanagri ranges. The extent of the area is 5,357.18 ha; Sheri land in charge of forest department but is not yet surveyed and maps are not available with the FD. Such area is distributed only in Karvir range. The extent of the area is 831.40 ha; Areas which were acquired under Private Forest (Acquisition) Act, 1975 but are not yet finally vested in the forest department pending inquiry. This area is in Malkapur as well as Panhala ranges. The extent of the area is 1,395.99 ha and forest areas which are under

Chikali nursery, Kolhapur nursery, office/ bungalows, RFO Malkapur office at Chandwad. The extent of the area is 4.45 ha. The total area dealt in this chapter is 7,589.02 hectares which is 05.46% of the total forest area being dealt in this Plan. The DCF must pursue the matter with Collector with regards to sheri lands as well as private forests.

FOREST PROTECTION

The rich bio-diversity of forests of Kolhapur needs to be protected against the incidents of illicit felling, poaching, fires, encroachments and unregulated grazing. Protection of forests from the biotic interference is completely essential for prescribed management interventions to be effective. This chapter contains general forest protection regulations along with regulations on fire protection, grazing etc.

JOINT FOREST MANAGEMENT

Forests are facing severe threats detrimental to their survival. These threats are mostly in the form of biotic pressures like illicit felling, encroachments, grazing, fires etc. Considering these realities, the concept of befriending the stakeholders in forests by way of a participatory process was conceived. Managing forests with the active cooperation of village communities will not only help in protecting our forests but will also safeguard the interest of the village communities. By the end of 2005-06, 442 Forest Protection Committees (FPC) had been formed in the same number of villages in Kolhapur district. On the lines of the JFM, an Integrated Wasteland Development Programme i.e. IWDP has also been implemented as well as a Forest Development Agency (FDA) has also been established. Similarly eco-tourism or sustainable nature-tourism under JFM can also be developed in and around forest areas having scenic spots or places of historical importance. Principles of participatory management, usufruct sharing, eco-system protection, democratic set-up, gender equality, open communication, rights and duties of the community, effective conflict resolution, effective monitoring and evaluation and shramdaan should be adhered to during the implementation of JFM in any village. A comprehensive publicity and awareness campaign regarding JFM should be taken up. The villagers owning land should be convinced to grow the fuel-wood and fodder trees species on their field bunds or fallow lands by involving Social Forestry department. Short orientation courses should also be conducted for the forest staff, to equip them with better communication skills and to orient them towards the forestry extension. Establish Self Help Groups in the villages and organize necessary training camps for imparting new skills. The DCF should select the scenic spots having potential to develop into excellent ecotourism spots.

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सत्यमेव जयते

भारत सरकार
GOVERNMENT OF INDIA
पर्यावरण एवं वन मंत्रालय
MINISTRY OF ENVIRONMENT & FORESTS

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3 JAN 2009

No.: 12-8/2004 (FOR)/ 29,

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Dt- 01-01-2009,

To,
The Principal Secretary,
Revenue and Forest Department,
Mantralaya,
MUMBAI

Sub : **Approval of Working Plan of Kolhapur Forest Division written by Shri Vikas Gupta, IFS, Shri Nitin Kakodkar, IFS and Shri Devendra Kumar, IFS for the period of 2008-09 to 2017 to 2018.**

Ref : Revenue and Forest Department, Government of Maharashtra letter Fdm-2008/CR-106/F-2, dated 7.10.2008

Sir,

With reference to the above mentioned subject, I am to directed to say that after careful examination of the Working Plan of Kolhapur Forest Division, the Central Government hereby conveys its approval to the said working plan in accordance with the powers vested under Forest (Conservation) Act, 1980 subject to following conditions:-

(1) The currency of the Working Plan shall be for a period of 10 years i.e. from 2008-09 to 2017-18.

(2) The modified definition of "malformed tree" shall be followed in the implementation of "Improvement Working Circle".

(3) The orders of Hon'ble Supreme Court in the matter of Godaverman Therumalkpad Vs Union of India in W.P. (Civil) No. 202/95 and related Inter Locutory applications shall be strictly adhered to. Any prescription or operation at variance with the Hon'ble Supreme Court's order shall be kept in abeyance till the order is in force or otherwise modified.

(4) Further, in compliance with orders of Hon'ble Supreme Court's dated 22.09.2000, the Sate Government of Maharashtra shall ensure that regeneration of forests is commensurate with fellings carried out under this working plan.

(5) No clearfelling should be carried out in any part of the Improvement Working Circle at any stage.

(6) The intensity of cleaning of inferior growth and thinning intensity (s) have not been proposed. The level/extent of thinning have to be decided with the approval of the competent authority before operations are actually carried out.

(7) No felling shall be carried out without allocating necessary fund for implementation of regeneration operation so as to make regeneration commensurate with fellings. 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.

(8) Following the directions of the Hon'ble Apex Court in their order dated 22.09.2000, a Core Group has been constituted under the Chairmanship of the Director General of Forests and Special Secretary for deciding the extent of harvesting that could be permitted under approved Working Plans for ensuring regeneration to be commensurate with fellings. Instruction/directions of the Central Government in the matter to be issued in future shall be strictly complied with. Felling to be done by State Government only after seeking permission from Core Group constituted by the MOEF, New Delhi.

(9) No forests bearing naturally grown trees shall be clear felled for any purpose whatsoever.

(10) Prescriptions of microplans for JFM (if made) should not deviate the broad framework/guidelines of the working plan and shall be in accordance with various orders of Hon'ble Supreme Court.

(11) Felling carried out on forest land after seeking approval of the Central Government under Forest (Conservation) Act, 1980 will not be treated as deviation. However, proposed felling in the forest division shall be restricted proportionately in the current/following years to compensate this removal.

(12) No deviations shall be made from the prescriptions of working plan read with the conditions stipulated herein without prior approval by the Central Government under Forest (Conservation) Act, 1980. However, deviations of positive nature i.e. out of turn plantations carried out outside the worked area under any project, schemes and compensatory afforestation may be approved by the competent authority of the State Government.

(13) The Central Government reserves the right to review, modify, withdraw this approval at any time if any of the conditions of approval are not implemented or relevant modification in the working plan is required so as to keep it in conformity with the orders, circulars and guidelines issued by the Central Government or the Apex Court under Forest (Conservation) Act, 1980 or any other statute and National Forest Policy.

Yours faithfully,

(Pradeep Vasudeva)
Deputy Conservator of Forests (Central)

Copy to :

1. The Additional Director General of Forests (FC), Ministry of Environment and Forests, Paryavaran Bhawan, CGO Complex, Lodi Road, New Delhi - 110 003.
2. The Principal Chief Conservator of Forests, Govt. of Maharashtra, Seminary Hills, Nagpur.
3. The Chief Conservator of Forests (Working Plan), Government of Maharashtra, Nagpur.

(Pradeep Vasudeva)
Deputy Conservator of Forests (Central)

GOVERNMENT OF MAHARASHTRA

FAX

NO. FDM 2008/CR-106/F-2
Revenue and Forests Department,
Mantralaya, Mumbai-400 032
Dated :- 28.01.2009

Subject : APPROVAL OF WORKING PLAN OF KOLHAPUR FOREST DIVISION FOR THE PERIOD OF 2008-2009 TO 2017 ~~to~~ 2018.

MEMORANDUM:

The undersigned presents compliment to the Additional Chief Conservator of Forests (Production & Management) and with reference to his letter no. Desk-14/WP/CR-67/148/2008-09, dated 28/08/2008 on the above subject, is directed to convey the sanction of Government of Maharashtra to the working plan of KOLHAPUR FOREST DIVISION prepared by SHRI VIKAS GUPTA I.F.S., SHRI NITIN KAKODKAR I.F.S., & SHRI. DEVENDRA KUMAR I.F.S.. for the period of 2008-2009 to 2017-2018.

The Government of India, Ministry of Environment and Forests has already conveyed its approval to the above said working plan vide its letter No.12-8/2004(FOR)/29, dated 01/01/2009 under certain conditions. These conditions should be strictly followed.

By order and in the name of the Governor of Maharashtra ,

(NITIN KAKODKAR)
Joint Secretar
Revenue and Forests Department

To,

THE ADDITIONAL CHIEF CONSERVATOR OF FORESTS,(PRODUCTION & MANAGEMENT) MAHARASHTRASTATE, NAGPUR.

Copy to :

The Conservator of Forests , Working Plan, Kolhapur Forest Division.