

WORKING PLAN

FOR THE FORESTS OF

RATNAGIRI FOREST DIVISION (CHIPLUN)

VOLUME : I : TEXT (PART I & II)

Period 2013-14 to 2022.23

By Dr. H.N.Patil I.F.S. & Shri. S.S. Dole I.F.S. Conservator of Forests Working Plan Division, Kolhapur.

(For office circulation)

PREFACE

The preparation of working plan of Ramagiri Forest Division Chiplun started-in 2009 first PWPR was prepared by then Sub Divisional Forest Officer Shri. R.J.Rane. This Sub division is upgraded vide Govt. letter No. MFS -2009/2013/C.R. No 264/F-8 dt.22/12/2011 to Division and draft plan has been prepared by Conservator of Forest Working Plan Division, Kolhapur. Special efforts were taken by staffs of Conservator of Forests Working Plan Division Kolhapur. Basic informations, its scrutiny and compilation of data has been compiled by Shri S.A.Gatade, Assistant Conservator of Forests, Working Plan Division, Kolhapur, Shri P.D.Kamble and S.B.Patil, Range Forest Officers, laying out of coupes within the compartments was also carried out by field staffs of Working Plan Division Kolhapur, Results of previous working plan was considered and with discussion to Additional P.C.C.F.(W.P.-West) Pune, Shri. Shailendra Bahadur, Dr.H.N.Patil, then Conservator of Forest Officer Working Plan Division, Kolhapur Shri. Vijay Shelke Dy. C.F. Kolhapur (Additional charge) and Plan was prepared on the basis of data provided by Divisional Forest Officer Ratnagiri Forest Division.

The total Forest area of Ratnagiri forest Division included under plan is 6706.50 ha. There are 110 villages having scattered forest cover. All forest area except Dapoli are not at all demarcated on the ground which resulted to delay in locating them on ground. One village namely Gothane in Sangmeshwar tahsil having forest area 105.22 ha is included in Chandoli wildlife sanctuary, which was declared in 1985. In previous working plan, Takalkar allotted the area in 5 working circles. 1. Protection working circle, 2. Improvement working circle 3. Casurina working circle. 4. Bamboo plantation overlapping working circle.5. Wild life overlapping working circle. As far as future management is concerned the working circles are revised to get better result. Mangrove working circle, Miscellaneous working circle, Minor forest Produce (O.L.) is added in this working plan. Special provision for improvement of Mangrove ecosystem has been made. Mangrove forest acts as a wall and wind break for disasters like Tsunami, cyclone.

National Forest policy envisages the people's participation in management of the forests. Regarding JFM working certain guidelines are prepared to involve people in development, conservation and protection of forests in Ratnagiri forest division. The total no. of villages adjoining to forest area is 110. The Joint Forest Management committees constituted are 91. The effort to constitute Joint Forest Management committee in remaining villages should be done by Territorial Divisional Forest Officer Ratnagiri. Providing subsidized LPG/Biogas connections to villagers who are dependent on forest for firewood may be given priority in entry point activities to reduce the pressure on forests.

New concept of homestead base tourism in the vicinity of forest has been prescribed in ecotourism. Being coastal forests area, people are interested to visit the area, hence necessary steps are to be taken to promote ecotourism.

Protection of wild animals in non protected forests & non forest area is main issue in Ratnagiri forest Division. Crop damages and intensive care to protect wild animals specially panther, has been taken care in working plan. Guidelines to reduce human- wild animal conflict are laid down in plan. Avian fauna is also highlighted in working plan. Some threatened and rare species are emphasized and suggested to carryout effective programmes to increase their population.

I am extremely thankful to Dr. S.K.Khetrapal, Principal Chief Conservator (Production and Management), M.S.Nagpur ,Shri Shailendra Bahaddur, Additional Principal Chief Conservator of Forest (Working Plan-West),Pune, for providing able and valuable guidance in preparing this plan. I am also thankful for the guidance and suggestions provided by Dr. P. N. Munde, Chief Conservator of Foresters, (Territorial) Kolhapur. I am extremely thankful to Dr.Leela Bhosale, Retd. Professor and head of Botany department, Shivaji University, Kolhapur who helped in providing valuable information about Mangrove species, also thankful to Dr.S.R.Yadav, Professor of Botany dept. Shivaji University, Kolhapur who helped in giving taxonomical information of flora.

I also thankful to Shri.R.J.Rane, Sub Divisional Forest Officer, Chiplun, Shri A. A. Lad, B.R.Patil, Range Forest Officers, Shri S.S.Mulla, Forest Guard Nandgaon who supplied important photographs. I am also thankful to Shri Raman Kulkarni, Wild Life Warden, Kolhapur for adding colour photo pages in this plan. I also acknowledge and appreciate the hard work put in by Shri S.A.Gatade, Assistant Conservator of Forests, Working Plan Division, Kolhapur, Shri P.D.Kamble and S. B. Patil, Range Forest Officers, Shri S.R.Thorat and S.N.Bamane, Ranger Surveyor, Shri. A. V. Kamble and S.D.Kshirsagar, Forest Surveyor, S.V.Ghatage, Steno Typist, Mrs. S.S.Shinde, Clerk, Mrs.R.R.Patil, Forest Guard and other staff member of this office in preparing in this plan.

Date- 7/ 0/2014

Place- Kolhapur

(S.S.Dole) Conservator of Forests, Working plan Division, Kolhapur.

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List of	flora found in Ratanagiri district.	
Sr. No.	Botanical Name	Local Name
	Trees	
1	Madhuca latifolia (Roxb.) J.F. Macbr.	Moha
2	Anthocephalus cadamba	Kadamb
3	Holoptelea integrifolia Planch.	Wawala
4	Saraca Asoca	Sita Ashok
5	Ailanthus excelsa	Maharuk
6	Antiaris toxicaria Lesch.	Otsoal
7	Schleichera oleosa (Lour.) Oken	Kosamb
8	Celtis timorensis Span.	Pati
9	Macaranga peltata Boviine ex Baill.	Chandiwada
10	Caesalpinia Bonducella	Sagargota
11	Thespesia populnea (L.) Sol. ex Corrêa	Ran Bhendi (Lal)
11	Mimusops elengi L.	Bakul
12	Lagerstroemia parviflora Roxb	Nana
13	Careya arborea Roxb.	Kumbha
14	Haldina cordifolia (Roxb.) Ridsdale	Haladu
15	Ixora sp.	Khurai
16	Semecarpus anacardium L. f.	Biba
17	Rauvolfia verticillata	Hadaka
18	Erythrina variegata	Pangera
19	Ficus arnottiana Miq.	Astha / payar
20	Terminalia chebula Retz.	Hirda
21	Nothopegia colebrookianum (Wight) Blume	Ambavali
22	Holigarna grahamii Kurz	Ran Biba
23	Ficus sp.	Garud
24	Bauhinia racemosa Lam.	Apta
25	Morinda citrifolia L.	Bartondi
26	Acanthus ilicifolius L.	Dhudali (Mangro)
		Marandi
27	Mangifera indica L.	Amba
28	Syzygium cumini (L.) Skeels	Jambhul (Mothi)
29	Tamarindus indica L.	Chinch
30	Syzygium cumini (L.) Skeels	Jambhul (Lahan)
31	Cinnamomum zeylanicum Blume	Dalchin
32	Ficus hispida L. f.	Bokida/ Kala umb
33	Flacourtia sp.	Atak

34	Barringtonia acutangula (L.) Gaertn.	Nivar
35	Ficus racemosa L.	Umbar
36		Phanas
37	Artocarpus integrifolius L. f.	Avaln
	Meyna laxiflora Benth.	Bhokar
38	Cordia dichotoma.	
39	Eucalyptus citriodora Hook.	Nilgari (Sitadora)
40	Neolamarckia Chinensis	Niv
41	Sterculia guttata Roxb.	Gaidhad
42	Hydnocarpus pentandrus (BuchHam.) Oken	Kuvati / Kadu kavat
43	Zanthoxylum rhetsa DC.	Triphala
44	Thespesia lampas (Cav.) Dalzell & A. Gibson	Ranbhendi
45	Acrocarpus fraxinifolius Arn.	Acrocarpus
46	Caryota urens L.	Surmad
47	Sageraea laurifolia (Grah.) Blatt.	Kilcha
48	Santalum album L.	Chandan
49	Drypetes roxburghii (Wall.) Hurus.	Putranjiva
50	Terminalia tomentosa Wight & Arn.	Ain
51	Alstonia scholaris (L.) R. Br.	Satwin
52	Grewia tilifolia	Dhaman
53	Wrightia tinctoria R. Br.	Kalakuda
54	Avicennia officinalis	Tivar
55	Xantolis tomentosa (Roxb.) Raf.	Sutavi / Kate kumbal
56	Pongamia pinnata (L.) Merr.	Karanj
57	Xylia Xylocarpa	Jambha
58	Calophyllum inophyllum.	Surangi
59	Alseodaphne semicarpifolia Nees	Sarvada
60	Justicia procumbens	Karamal
61	Strychnos nux-vomica L.	Kajara
62	Bombax ceiba	Savar
63	Vetiveria lawsonii	Wala
64	Ficus arnottiana Miq.	Kasturi
65	Sapindus laurifolia Vahl	Rita
66	Terminalia paniculata Roth.	Kinjal
67	Mesua ferrea L.	Nagchapha
68	Acacia saundra DC.	Khair
69	Trivia polycarpa Benth. & Hook. f.	Muchundi
70	Heterophragma quadriloculare (Roxb.) K. Schum.	Varas
71	Bridelia retusa (L.) A. Juss.	Katak

72	Albizzia procera	Kinai
73	Salvadora persica	Mirzoli
74	Erinocarpus nimmoanus Mast.	Cheri
75	Xantolis tomentosa (Roxb.) Raf.	Hanmanti
76	Wrightia tinctoria R. Br.	Kala Kuda
77	Holarrhena pubescens Wall. ex G. Don	Pandhara kuda
78	Trivia polycarpa Benth. & Hook. f.	Ambadi
79	Gmelina arborea Roxb. ex Sm.	Shivan
80	Macaranga peltata Boivin ex Baill.	Chandvad
81	Aegle marmelos (L.) Corrêa	Bel
82	Anacardium occidentale L.	Kaju
83	Emblica officinalis Gaertn.	Awala
84	Ceiba pentandra (L.) Gaertn.	Pandhari Savar
85	Tectona grandis L. f.	Sag
86	Diospyros embryopteris Pers.	Tembhurni
87	Aglaia lawii (Wight) C.J. Saldanha ex Ramamoorthy	Murmi
88	Sonneratia caseolaris (L.) Engl.	Tiwar
89	Buchanania cochinchinensis	Charoli
90	Terminalia arjuna (Roxb. ex DC.) Wight & Arn.	Arjun
91	Ficus religiosa L.	Pimpal
92	Annona reticulata L.	Ramphal
93	Dalbergia latifolia Roxb.	Sisam
94	Ficus benghalensis L.	Vad
95	Butea monosperma (Lam.) Taub.	Palas
96	Dillenia indica L.	Mota Karmbal
97	Ficus callosa Willd.	Kel
98	Holarrhena antidysenterica (L.) Wall. ex A. DC.	Indrajava
99	Artocarpus incises (Thunb.) L. f.	Nir Phanas /Breed fruit trees
100	Glochidion velutinum	Salai
101	Mitragyna parviflora	Klamb
102	Radermachera xylocarpa	Kharshing
103	Tecoma stans (L.) Juss. ex Kunth	Piwala Casia
104	Naregamia alata W & A	Pitmari
		<u> </u>

Sheet No.	Botanical Name	Local Name
	<u>HERBS</u>	
1	Helicteres isora L.	Muradsheng
2	Mesua ferrea L.	Nagkeshar
3	Homonoia riparia Lour.	Shewati
4	Pterocarpus acerifolius Wild.	Machkund
5	Mallotus repandus (Rottler) Müll. Arg.	Ranbhendi (Lahan)
6	Woodfordia fruticosa (L.) Kurz	Kushiri / Dhayati
7	Hibiscus talbotii	Daiwari
8	Lawsonia inermis L.	Mendi
9	Lantana camara L.	Ghaneri
10	Grewia sp.	Aasoli
	Strobilanthes perfoliatus Anders.	Bandhari
11	Atalantia racemosa Wt.	Nataknar (Makadlimbu)
12	Grewia sp.	Chitrangi
13	Vitex altissima L. f.	Ranbell
14	Leea indica (Burm. f.) Merr.	Dinda
15	Carissa carandas L.	Karvand
16	Ziziphus rugosa Lam.	Toran
17	Acacia concinna (Willd.) DC.	Shembi
18	Memecylon umbellatum Burm. f.	Anjan
19	Aglaia lawii	Burmbi
20	Bridelia scandens Gehrm.	Chikni
21	Calycopteris floribunda (Roxb.) Lam. ex Poir.	Uakashi / Baguli
22	Pogostemon parviflorus Benth.	Pangla
23	Ficus exasperata Vahl	Karvati
24	Strychnos nux-vomica L.	Kuchala
25	Spermadictyon suaveolens Roxb.	Gidsava / Jitasa.
26	Vitex leucoxylon L. f.	Kali nirgudi
27	Morinda pubescens Sm.	Noni
28	Phyllanthus sp.	Petkul
29	Flemingia strobilifera (L.) R. Br.	Lugdi
30	Haplanthodes verticillata (Roxb.) Majumdar	Bhamti
31	Antidesma ghaesembilla	Amboti
32	Callistemon citrines (Curtis) Skeels	Bottle Brush
33	Solanum torvum Sw.	Ran Wange

	SHURBS			
1	Plumbago zeylanica L.	Chitrak		
2	Maytenus rothiana (Walp.) L. Ekali			
3	Combretum sp.	Halvi		
4	Desmodium sp.	Karbella		
5	Bruguiera gymnorhiza (L.) Savigny	Amti		
6	Calycopteris floribunda (Roxb.) Lam. ex Poir.	Bagul		
7	Colebrookea oppositifolia Sm.	Matta Mavashi		
8	Zizyphus oenoplia (L.) Mill.	Torani / Borati		
9	Lasiosiphon eriocephalms	Rametta		
10	Colebrookea oppositifolia Sm.	Zata Mavashi		
11	Turraea villosa	Kapur Bhendi		
12	Woodfordia fruticosa (L.) Kurz	Daswad		
13	Zizyphus sp.	Goti		
14	Glycosmis pentaphylla (Retz.) DC.	Makadzad		
15	Mallotus philippensis (Lam.) Müll. Arg.	Kunkuphal		
16	Embelia ribes.	Wavding		
17	Ventilago maderaspatana Gaertn.	Kanvel		
18	Zizyphus oenoplia (L.) Mill. Kaneri / kate			
19	Phyllanthus reticulatus Poir.	Lilimbi / Kanguni		
20	Ancistrocladus heyneanus Wall. ex J. Graham	Kardal		
21	Ixora coccinea L.	Pendgul		
22	Clerodendrum serratum	Bharangi		
23	Justicia adathoda L.	Adhulasa		
24	Eranthemum roseum R. Br.	Ran Aboli		
25	Mallotus philippensis (Lam.) Müll. Arg.	Rohini / Shendri		
26	Callicarpa tomotosa	Kalwai		
	<u>CLIMBER</u>			
1	Cocculus hirsutus (L.) Diels	Kawalivel		
2	Merremia umbellata (L.) Hallier f.	Bondvel		
3	Combretum sp.	Dasaravel		
4	Paramignya monophylla Wight	Kokani Vaghati/ Karvi Vaghati		
	Dinou niguum I	Kaivi vagilati Kalimiri		
5	Piper nigrum L.	Vakerivel		
7	Caesalpinia cucullata Roxb. Cyclea peltata Hook. f. & Thomson	Morvel /Pahadvel		
8		Halad vel		
9	Hiptage bengalensis	Chandwadvel		
9	Cissus pallida Salisb.	Chandwadvei		

Sheet No.	Botanical Name	Local Name
10	Tali minor	Wakeri
11	Wagatea spicata	Waghati
12	Hemidesmus indicus (L.) R. Br. ex Schult.	Amrutvel / Anant mul.
13	Lygodiu Fiereupsum	
14	Ventilago maderaspatana Gaertn.	Kandvel
15	Smilax zeylanica L.	Gotvel
16	Elaeagnus latifolia	Amagul
17	Callopteris floribunda	Bugvel
18	Cocculus hirsuta	
	BAMBOO	
1	Calamus rotang	Vet
2	Melocanna baccifera (Roxb.) Kurz	Muli Bamboo
3	Dendrocalamus strictum	Meskati Bamboo
4	Bambusa vulgaris Schrad. ex J.C. Wendl.	Pivala Bamboo
	GRASS	
1	Spodiopogon rhizophora (Steud.) Pilg.	Kocha Gavat
2	Aerva lanata (L.) Juss. ex Schult.	Karapwel Gavat /
2	Kapuri Gavt.	
3 4	Rungia sp.	Nirkat Gavat Kukdus Gavat
4	Arundinella leptochloa (Nees ex Steud.) Hook. f	Kukuus Gavat
5	Pseudanthistiria heteroclite (Roxb.) Hook. f.	Bongarat Gavat
6	Oplismenus compositus (L.) P. Beauv.	Karak Gavat
7	Apluda mutica L.	Kharas Gavat / Tambit
		Gavat
8	Canscora diffusa (Vahl) R. Br. ex Roem. & Schult.	Kadkada
9	Aerva lanata (L.) Juss. ex Schult.	Chalduva
10	Bhumca spp.	Ranbibba Gavat
11	Celosia argentaci	kurdu

LIST OF WILD ANIMALS AND BIRDS FOUND IN RATNAGIRI FOREST DIVISION.

Sr.No.	Local name	Zoological name
1	2 AN	NIMALS
	111	(IMILE)
1	Leopard	<u>Panthera pardus</u>
2	Sambar	<u>Rusa unicolor nigra</u> (Syn. Cervas
		unicolor)
3	Wolf	<u>Canis lupus</u>
4	Hyaena	<u>Hynaena hyaena, Hyaena striate</u>
5	Aswal	<u>Ursus</u> <u>arctos</u>
6	Bhekar	<u>Muntijak</u> <u>vaginalis</u>
7	Nilgai	Boselaphus tragocamelus
8	Ran dukkar	<u>Sus</u> <u>oristastu</u>
9	Kolha	<u>Vulpes</u> <u>vulpes</u>
10	Khokad	<u>Canis</u> <u>aureus</u>
11	Mongooses	<u>Herpestes</u> <u>edwardsic</u>
12	Sayal	<u>Hystrix</u> <u>indica</u>
13	Hare	<u>Lepus</u> <u>ruficaudatus</u>
14	Baul	<u>Felis chaus</u>
15	Kalindri	Paradoxurus hermaphroditus
16	Makad	<u>Macaca</u> <u>radiata</u>
17	Wanar	<u>Presbytis</u> <u>entellus</u>
18	Gaur	<u>Bos gaurus</u>
19	Indian Giant Squirral	<u>Ratufa</u> <u>indica</u>
20	Indian Muntjac	<u>Muntiacus</u> <u>muntjack</u>

BIRDS

1	Snipe	Gallinago Gallinago
2	Whistling duck	<u>Dendrocygana javanica</u>
3	Painted francolin	Francolinus pictus
4	The grey francolin	Francolinus pondicerianus
5	Common quail	<u>Coturnix</u> <u>coturnis</u>
6	Rainquail	<u>Coturnix</u> <u>coromandelicus</u>
7	Bustard quail	<u>Turni</u> i <u>cidae</u>
8	Jungle bush quail	<u>Perdicula</u> <u>asiati</u>
9	Pea fowl	<u>Pavo</u> <u>cristatus</u>
10	Grey jungle fowl	<u>Gallus</u> <u>sonneratii</u>
11	Blue rock pigeon	<u>Columba</u> <u>livia</u>
12	Bazzards	<u>Butex</u> rufinus
13	Pallid harrier	<u>Circus</u> <u>macrourus</u>
14	Western Reef-egret	Egretta gularis
15	Gull	Larus argentatus
16	Crested Serpent Eagle	<u>Spilornis</u> <u>cheela</u>
17	Malabar Pide Hornbill	Anthracoceros coronatus
18	Jungle Babbler	<u>Turdoides</u> <u>striatus</u>
19	Indian Pitta	<u>Pitta</u> <u>brachyura</u>
20	Purple-rumped Sunbird	<u>Nectarinia zeyloncia</u>
21	Indian Roller	<u>Coracias</u> <u>benghalensis</u>
22	Indian Blackbird	<u>Turdus</u> <u>simillimus</u>
23	Black-headed Oriole	<u>Oriolus xanthornus</u>

GLOSSARY OF LOCAL TERMS

Sr.No.	Local name	Meaning
1	Nala	Stream
2	Nachani	An edible food grain
3	Malki lands	Lands belonging to private individuals
4	Rab	A patch of ground which is given a good burn and used for regeneration purpose.
5	Tahsil	Administrative unit of district
6	Tahal	Leafy branches of tree
7	Zilla parishad	Local civic body at a district level, elected by people.

Abbreviations used in the plan.

A.C.F. Assistant Conservator of Forests.

B.H. Breast Height.

C.A.I. Current Annual Increment.

Cft Cubic feet
Cm Centimeter.

Cm3 Cubic Centimeter.

Comptt. Compartment

D.C.F. Deputy Conservator of Forests

D.F.O. Divisional Forest Officer

Dn. Division

F.L.C.S. Forest Labour Co-operative Society

F.R.H. Forest Rest House

F.S. Felling Series.F.V. Forest Village

F.Y.O. First year Operations.

g.b.h. girth at breast height.

g.b.h.o.b. girth at breast height over bark

g.b.h.u.b. girth at breast height under bark

ha hectare

Km. Kilometer

m. metre

mm. milli-metre.M3 Cubic-metre

M.A.I. Mean Annual Increment.

M.F.P. Minor Forest Produce.

P.F. Protected Forest.

P.P.O. Pre Planting Operations.

P.Y.O. Preliminary year operations

R.F. Reserve Forest

R.F.O. Range Forest Officer.

Rs. Rupees.

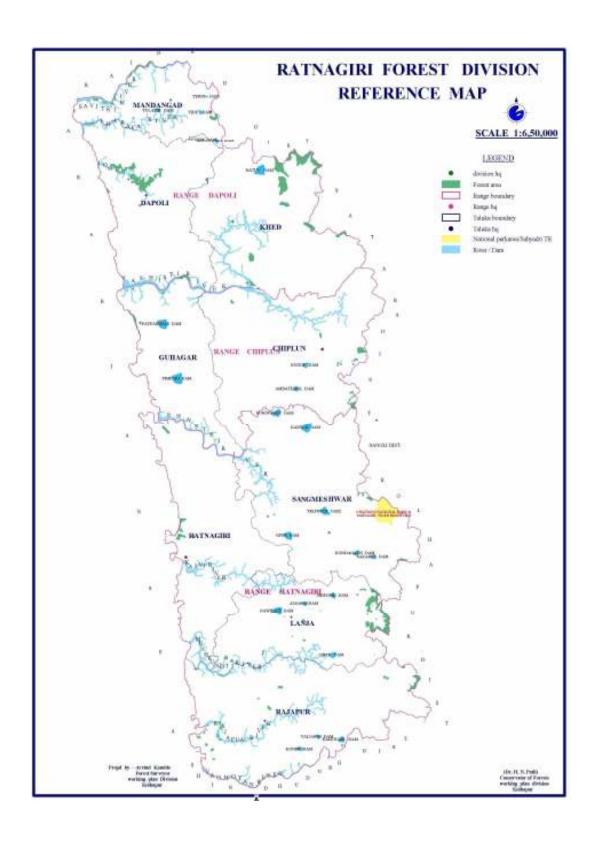
S.O.F.R. Survey of Forest Resources.

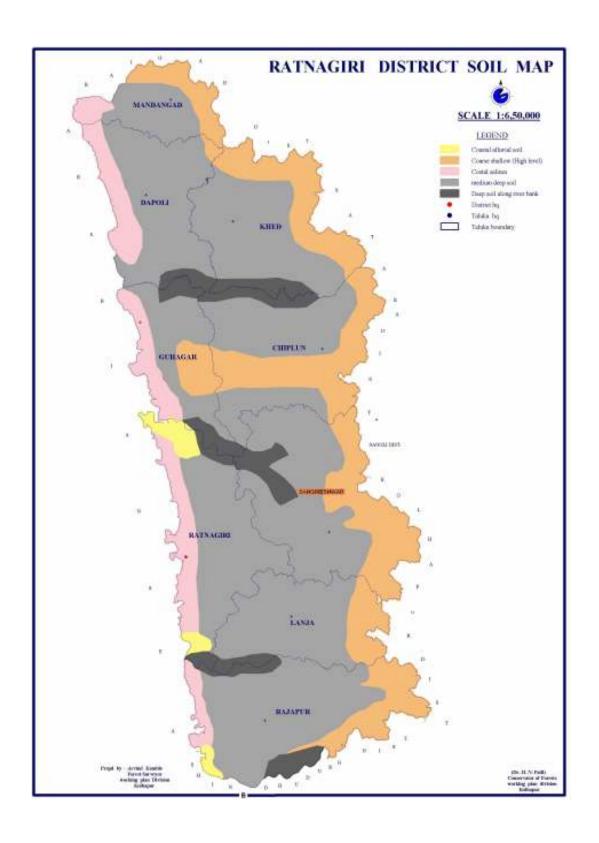
W.C. Working Circle.

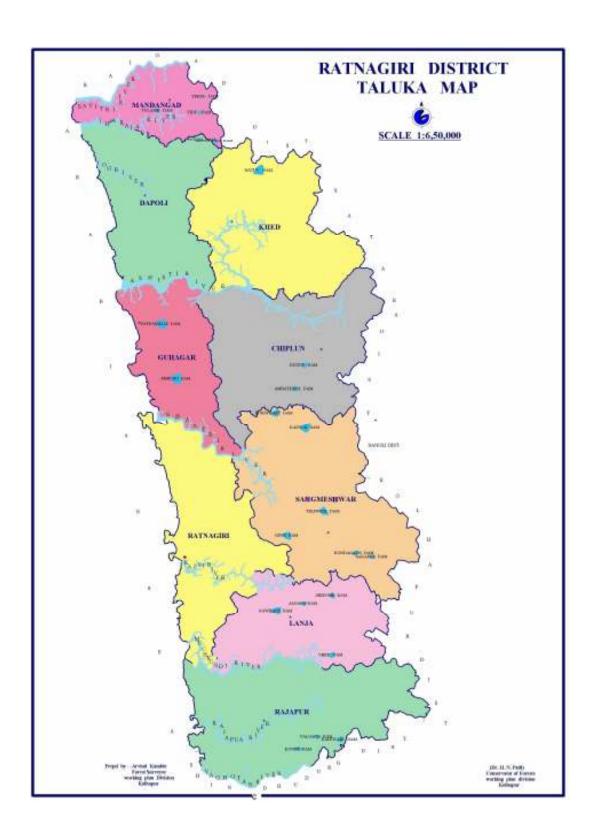
Definitions of the terms used in the working plan.

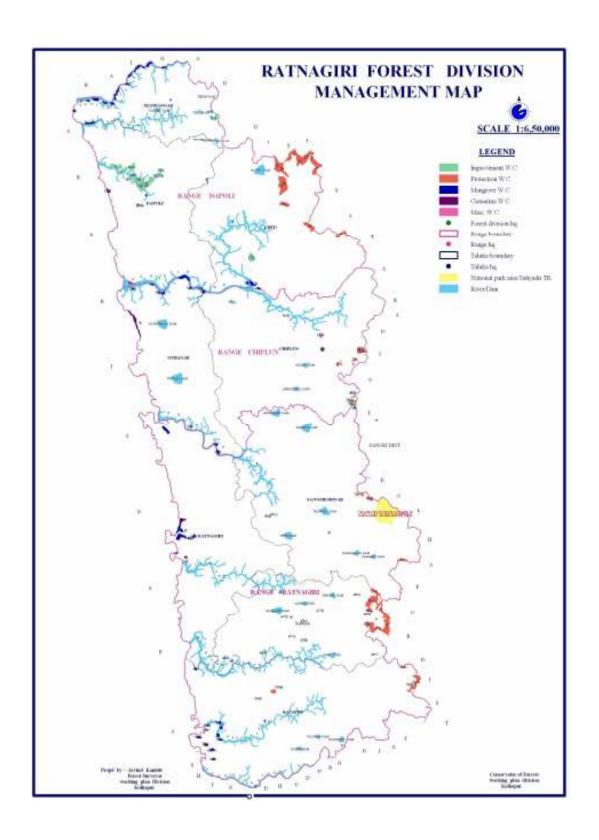
Age Class		One of the intervals into which the range of age of trees growing in a forest is divided for classification or use,	
		also the trees falling into such as interval of age gradation, (BCFT).	
Age Class period		The number of years within the limits of a given age class (BCFT)	
Abundance		The total number of particular species in an area	
Alluvial		Soil deposited through the agency of water	
Block		A main territorial division of forest, generally	
		bounded by natural features and bearing a local proper name, (BCFT)	
Browse		The rough shoots of the plant.	
Biome .		A biotic community in which all living organisms, the plants, animals, soil bacteria, fungi etc, naturally occurring within it, go to make up a living harmonious whole	
Biotic Factors		The agencies affecting vegetation which depend on the activity of living organisms other than plants.	
Compartment		A territorial unit of a forest permanently defined for purpose of administration, description and record. (Preferably designated by Arabic numerals 1,2,3,etc)	
Closed forest		An arboreal community in which there is a closed Canopy	
Coupe		A felling area, usually one of an annual series unless otherwise stated. Preferably numbered with Roman numerals, I,II,III etc.	
Cutting section		A sub division of a felling series formed with the object of regulating felling in the some special manner	
Chullahs		It is measure of conservation of fuel wood need to be popularized in rural areas.	
Coastal Sand		The soil which is along the coast support a characteristics vegetation.	
Coastal alluvium		The soil which is wetlands soils, inundated by low salined water and sometime by the fresh water	
Chira		It is well dressed box of laterite	
Dying		When the tree is dead to half the length	
Diseased		When the tree is likely to affect its neighbouring Tree.	
Exploitable size		The diameter or girth decided upon as the normal size for felling in order to fulfill the objects of management.(BCFT)	
Edge effect		The degree of transpiration caused in the vegetative community and is a measure of ecotone	
	I.	xi	

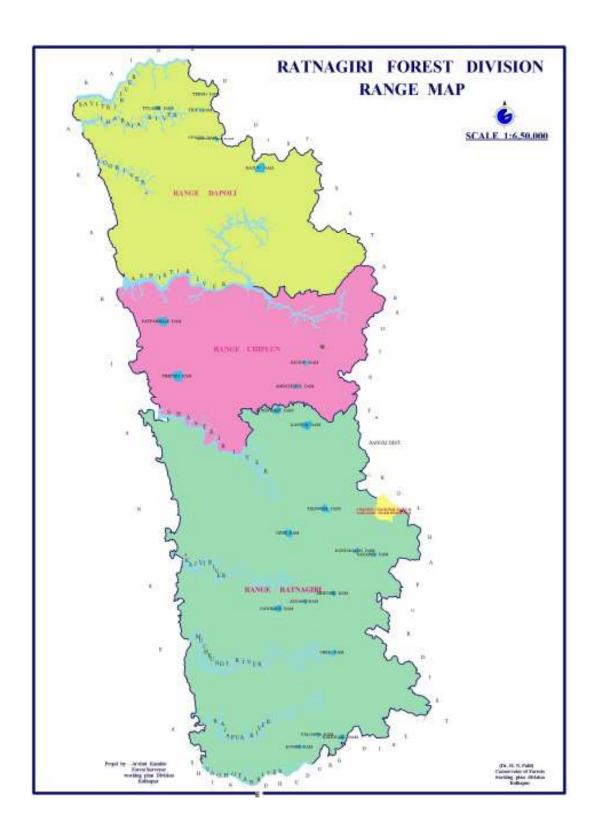
Ecotone	 The tension belt which exits between two adjoining communities of vegetation irrespective of their ecological status.
Felling Cycle	 The time which elapses between successive main fellings on the same area
Felling series	 A forest area forming the whole or part of working circle and delimited so as (1) to distribute felling and regeneration to suit local conditions and (2) to maintain or create a normal distribution of age classes. The yield is calculated separately for each felling series which should have an independent representation of age classes. (BCFT modify)
Forest edge	 The highly specialized habit at the margin of the forest where a very definite micro climate exists. Here the conditions for plant life are intermediate between the rigours of the open country and the favourable conditions within the forest
Fire protection.	 The entire area will be fire protected.
Grazing	 The area which is closed for grazing for all times
Gaonparadh	 The peoples get together in temple and prey to God for hunting of wild boar etc.
Unworkable area	 This area is a very steep and inaccessible areas, rocky out crops and natural open areas, unsuitable for raising plantation
Regur	 The soil having black, cotton soil.
Shivkalin	 The water tanks prepared for the purpose of drinking,
Panawatha	agriculture etc. at the time of Shivkalin era.
Tahal (Rab burning)	 It is process of burning of soil.
Under stocked area	 The area having density up to 0.4 with a minimum of 0.4 ha.
Well stocked area	 The area having crown density more than 0.4
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PART - I SUMMARY OF FACTS ON WHICH THE PROPOSALS ARE BASED

PART :1: SUMMARY OF FACTS ON WHICH PROPOSALS ARE BASED.

CHAPTER - 1: THE TRACT DEALT WITH

SECTION - 1: NAME AND SITUATION

1. This plan is known as "The working plan for the forests of Ratnagiri Forest Division at Chiplun". The area dealt with under this working plan comprises of all the areas consisting of I) Reserved forest area 4885.00 ha. in charge of the Forest Department II) Protected forest area 2.75 ha. III) Acquired forest under Section 3 of Maharashtra Private Forest (Acquisition) Act of 1975 area 178.07 ha. and now deemed as reserved and iv) Unclassed areas which have been transferred from the Revenue Department to the Forest Department to the extent of 1640.68 ha. Thus the total area covered in this working plan is 6706.50 ha.

The administrative set up was changed when in November 1976, an independent Ratnagiri sub-division was established with it's headquarter at Chiplun, and now this sub division has been upgraded to a Forest Division, vide Government of Maharashtra Resolution No.M.F.S.-2009/2013/Case No.264/F 8 dated 22-Dec.2011 (Appendix No. I)

2. The area covered in this plan lies between latitude 16° 30'00" to 18° 04'00" North and longitude 73° 02'00" to 73° 53'00" East. It is bounded on North by Raigad district, on East by Satara, Sangli and Kolhapur districts, on South by Sindhudurg district and on West by Arabian Sea.

SECTION: 2: CONFIGURATION OF THE GROUND/ TOPOGRPHY

3. The area dealt with in this plan lies in the district of Ratnagiri on west coast of Maharashtra and has natural drainage towards West. Most of the tract is very hilly, rugged and at places highly precipitous with general slope towards West. The prime hilly range is Western Ghat or Sahyadry running North – South and forming the eastern boundary of the area. The average width of the tract is 64.36 km. The maximum stretch from North to South is 180 km. The district has 167 km. length along the sea coast. (Appendix No. A).

The Western Ghats rise in the East to an average elevation of about 610 mtrs; the highest point being 1390 mtrs. viz. Gherasumargad in Khed taluka. All these hill ranges are badly cut up by numerous rivulets and rivers forming very irregular ravines and valleys. The forests are situated mostly on the highest slopes and on spurs of these hills,

and are usually much scattered in patches because the lower slopes and flatter tops of the hills are invariably cultivated malki lands.

4. The whole tract dealt with is well drained by number of rivers, streams which originate in Sahydries and flow west- wards by devious course to Arabian Sea. The main drainage is from East to West through Savitri, Vashisti, Shastri, Jagbudi, Bav, Jog, Muchkundi and Jaitapur rivers that originate in Sahyadri hills and drain into Arabian Sea. Vashisti River being perennial is used for navigation by locals. Rests of the rivers are not used for water navigation. Kelshi, Kalabadevi, Palshet and Borya are important creeks. (Appendix No. A)

SECTION – 3: i) GEOLOGY, ROCK AND SOIL

5. The district is endowed with variety of rock types of different ages. Rocks belonging to different lithostratigraphis units namely the Precambrian crystallines (belonging to Dharwar and Kaladgi super groups), the Deccan volcanic; (represented by ballastic flows capped by laterites). Consolidated sediments (beach-rock) and unconsolidated sediments (sand along the coast) and alluvium are present.

The rocks of this part of Ratnagiri belong to five groups.

- I. Post Tertiary, or recent
- II. Upper do.
- III. Middle or Lower Tertiary
- IV. Upper Secondary
- V. Azoic

These, arranged in their true or descending order, are—

- 7. Subaerial formations and soils.
- 6. Alluvial deposits.
- 5.Konkan laterite.
- 4. Ratnagiri plant beds.
- 3. Deccan trap and ironclay (laterite) series.
- 2. Kaladgi quartzites and shales.
- 1.Genissic (metamporphic)series with trap and granite intrusions.

In describing these groups, it will be the most convenient to begin with the oldest and then considering the others, in a ascending order. Measured by the superficial area, they cover; by far the most important is Konkan Laterite: the next is Deccan Trap; the Gneissic series covers third, and the Kaladgi quartzites cover the fourth largest area; the remaining rocks occupy very small surfaces, and are comparatively of little importance.

6. At the close of Mesozoic era, the district was over run by the sub serial Deccan lava flows in the form of nearly horizontal bed, the earlier flows filling their regularities of the pretrap relit, the traps have been divided into three groups. Upper, middle and lower, with intertrappean beds or Lametas at their base. The upper traps are found in this district with numerous intertrappean beds and layers of volcanic ash. The Deccan traps belong to the type called plateau basalt. They are extraordinarily uniform in composition over wide areas. They are generally dark grey to dark greenish grey in colour but brownish to purple tints are also met with. The most acidic types found here have a buff to creamy colour. The non-vesicular types are hard, tough, compact and medium to fine-grained, breaking with conchoidal fracture. The vesicular types are comparatively soft and break more easily. Here the traps are associated with acid, intermediate and ultra basic rock types derived through differentiation of the original magma. The common type of trap is composed of abundant labradorite of the composition Ab 1, An 2 and enstatite angite, and these the two forming the bulk of the rock.

SOILS:

- 7. The trap gives rise to either a deep brown to rich red soil or regur (black cotton soil). The regur is rich in plant nutrients such as lime, magnesia, iron and alkalis, on which cotton and certain dry crops flourish. It has the property of swelling greatly and becoming very sticky when wet by rain, on drying it contracts again with the production of numerous cracks. This type of soil is rarely found in the forest. The main soil met within the forest is red soil or red trap soil or types akin to it which occupies the major portion of the forest area. The soil is fertile in nature, typically coarse, often with ferric concretions, with a neutral or acidic reaction, poor in organic matter and mineral nutrient. The soil has a deep brown or red colour. The soil map of Ratnagiri district is attached as **Appendix No. B.**
- 8. There are other two types of soils met with which are red and yellow soil and red gravelly soil, which are more coarse and carry forests which are inferior compared to that carried by the red soils. The fourth type of soils met with is lateritic soil. This is a product of weathering, material from which silica, alkalis and alkaline earth's have been leached away, leaving behind alumina iron, manganese and titanium. It has vermicular or pisolitic structure bauxite. The lateritic rocks are usually mottled, reddish to reddish or yellowish

brown color and show vermicular and tubular cavities often stained with dark brown ferruginous solution. The rocks are soft and show bright colour when freshly cut but become very hard and dull on exposure to atmosphere. The outer surface or the bed presents a dark to dirty brown color and has a very rugged and pitted appearance. The laterite on disintegration gives rise to a dusty, reddish to reddish brown soil.

9. Coastal Sand:- This is the soil all along the coast and support a characteristics vegetation. These are mainly quartzite or calcareous sands with low salt and clay fraction. The water table here is quite high, with a high salinity. The nutrient statics is low because of salinity, it supports only particular type of vegetation, and the area—is usually above high tide level.

10 Coastal Alluvium: - These are the wet land soils, inundated by low salined water and sometime by the fresh water. The water table is at or near the surface of the land. The soils are undrained hydric soil. The soil is muddy, with slightly substrata, which produces a strong smell of hydrogen sulphide, indicated anaerotric properties, of the soil. These are basically alluvial deposite of great depth. The soil salinity varies 10% to 20%. The soil is usually rich in nutrient/mineral as river flowing into them, brings it.

Mineral resources:

10. Bauxite occurs in Dapoli and Mandangad tahsils. Occurrence of silica is abundant in Rajapur tahsil. Illminite is found in Ratnagiri tahsil along the seacoast. Clay and lime stone is also found in the district.

Building materials

11. Well-dressed box of laterite locally called "chira" are used for building purposes and bricks prepared from it normally has a life of 80 years. Alluvium and river sand is also extracted from river beds for building purposes.

ii) GEOLOGY AND VEGETATION AND ITS CORRELATION :

- 12. The distribution of soils of above types can be summarized as under
 - (1) Red soil: This type of soil in general is met with in all the ranges. It is generally found in the middle and on the lower slopes of the hills and at the foot hills. It is also found on undulating grounds. Depth of this type of soils varies from medium depth to the very deep viz. 60 cms. to 2.0 mtrs.

- (2) Red gravelly soil: This type of soil is met with on middle and upper hill slopes of hills all over the district and occasionally on plains. The depth is medium to moderately deep i.e. 60 to 150 cms.
 - (3) Red and yellow soil: These types of soils are generally met with on upper most hill slopes and flat tops of small hills. The depth is generally shallow to medium normally 30 to 90 cms. in depth.
 - (4) Alluvial Soil:-These are deep soils and are usually in forest hills. It supports a very good vegetation.

Red soil, Red gravelly soil, and Red yellow soil predominantly support the following vegetation.

Ain (<u>Terminalia tomentosa</u>), Kinjal (<u>Terminalia paniculat</u>a), Kakad (<u>Garuga pinnata</u>) Behada (<u>Terminalia belerica</u>), Hed (<u>Adina cordifolia</u>), Savar (<u>Salmalia malbarica</u>), Amba (<u>Mangifera indica</u>), Kinai (<u>Albizzia procera</u>), Jamba (<u>Xylia xylocarpa</u>), Shiras (<u>Albizzia lebbek</u>), Dhavada (<u>Anogeissus latifolia</u>), Satvin (<u>Alstonia scholaris</u>), Teak (<u>Tectona grandis</u>), Nana (<u>Lagerstroemia lanceolata</u>).

Chera (<u>Erinocarpus nimmoanus</u>), Humb (<u>Saccopetalum tomentosum</u>), Asana (<u>Bridelia retusa</u>), Kumbha (<u>Careya arboria</u>), Waras (<u>Heterophragma quadriculata</u>), Dhaman (<u>Grewia tiliefolia</u>), Pangara (<u>Erythrina variegata</u>), Karmal (<u>Dillenea pentagyna</u>), Kadam (<u>Anthocephalus cadamba</u>).

Awali (*Emblica officinalis*), Kalakuda (*Wrightia tinctoria*), Bahava (*Cassia fistula*), Palas (*Butea monosperma*), Alu (*Vengueria spinosa*), Shevga (*Morinda tintoria*).

Atrun (*Flacourtia indica*), Karvand (*Carissa carandus*), Phangla (*Pogostomon parviflora*), Dinda (*Leea macrophylla*), Dhaiti (*Woodfordia fruticosa*), Kuda (*Holarrhena antidysenerica*), Keveni (*Helicteres isora*), Ranbhendi (*Thespesia lampus*), Bharang (*Clerodendron serratum*), Wavding (*Embelia ribes*).

Chikana (<u>Sida carpinifolia</u>), Salvan (<u>Desmodium gangeticum</u>), Pithwan (<u>Uraria picta</u>), Chikata (<u>Desmodium diffusum</u>), Anantmul (<u>Hemideemus indicus</u>), Chikali (<u>Sauropus quadrangularis</u>), Kolsinda (<u>Asteracanth longifolia</u>).

Kusali (<u>Hetropogon contortus</u>), Phular (<u>Themada quadrivalvis</u>),Marvel (<u>Dechantham annulatum</u>). Chandvel (<u>Bauhinia vahlii</u>), Chilar (<u>Accacia intasia</u>),Kuhili (<u>Mucuna pruriens</u>),Gunja (<u>Abrus precatorius</u>), Shemba (<u>Acacia pennata</u>),Ukshi

(<u>Calycopteris</u> <u>floribunda</u>), Shatavari (<u>Asparagus</u> <u>racemosus</u>), Wakeri (<u>Waghtea</u> <u>spicata</u>), Kusari (<u>Jasminum arbrescens</u>), Lokandi (<u>Ventilago madraspatana</u>).

- 1) Lateritic soil: Beds of laterite cap the several peaks and ridges in the district which are formed of trap rock. The depth of the soil varies from place to place and is shallow to very deep i.e. 15 cms. to 2 mtr. The lateritic soil generally favours evergreen species like Jambha (*Xylia xylocarpa*) Jamun, (*Syzygium cumini*,), *Pisa*(*Actinodaphne hookeri*,) *Memecylon umbellatum*, *Randia dumetorum* Tambat(*,Flacourtia latifolia*), *Hirda* (*Terminalia chebula*,), Par jambhul (*Olea dioica*), *Glochidion hohenackeri*, *Pouteria tomentosa*, Carve(*Carvia callosa*), Tupa(*Canthium dicococium*), Waghati (*Scutia myrtina*), *Capparis pedunculosa*, Toran (*Zizyphus rugosa*), and Papadi(*Pavetta indica*.)
- 5) The inland areas of the district show the presence of lateritic soils. The mouths of the streams of their estuarine plains are characterized by Alluvial soils which mainly support the vegetation like Sag/Teak (Tectona grandis), Kinjal (Terminalia paniculata), Salai (Boswellia serrata), Ain (Terminalia tomentosa), Punava (Dichanthium annulatum), and climbers like Chandvel (Bauhinia vahlii), Chilar (Accacia intasia), Kuhili (Mucuna pruriens), Gunja (Abrus precatorius), Shemba (Acacia pennata), Ukshi (Calycopteris floribunda), Shatavari (Asparagus racemosus), Wakeri (Waghtea spicata), Kusari (Jasminum arbrescens), Lokandi (Ventilago madraspatana).

Mangrove- Mangrove species soils are also alluvial deposit supporting mainly found like <u>Kandal (Rhizophora mucronata)</u>, Sugandha (<u>Agiceras corniculatum</u>), Marandii (<u>Acanthus ilicifolius</u>) <u>Kandal (Rhizophora mucronata)</u>, Kandal (<u>R.apiculata</u>), Chipi (<u>Sonneratia Alba</u>)

iii) Sandy soil- Sandy soil supports species like Chilar (<u>Accacia intasia</u>),Kuhili (<u>Mucuna</u> pruriens), Lokandi (*Ventilago madraspatana*).

Desert soil supports suru (Casuarina equisetifolia) Ipomea biloba, species

Costal Alluvium supports mangrove.

SECTION: 4: CLIMATE AND RAINFALL

13. The climate of Ratnagiri district is typical that of on the West Coast of India with plentiful and regular rainfall during monsoon, oppressive weather in the hot months and high humidity throughout the year. The summer season from March to May is followed by South West monsoon season from June to

September; October and November form post monsoon or retreating monsoon season. The period from December to February is a cold season.

- 14. The annual rainfall in various parts of the tract is heavy and varies from 2451 mm to 3897 mm. The incidence of rainfall decreases as the elevation drops. The statistics of the rainfall has been collected at various rain gauge stations. The figure of average rainfall by months and average annual rainfall for the period from 2000-01 to 2009-10 is given in Appendix No. II. The Konkan Krishi Vidyapith has meteorological observatory in Dapoli. This may be taken as representative of the conditions generally prevailing in the district. Being a coastal district, the seasonal variations are not large. Rainfall graph of Ratnagiri is on page No.14.
- 15. The climate is generally warm and humid. Minimum and maximum temperatures vary between 18.7° to 33.3°. During the hot season the climate is decidedly uncomfortable. In the cold season, below ghat area experience equable temperature condition. The statement showing minimum and maximum temperature is given in **Appendix No.III** Relative temperature / graph on page no.13

WINDS

Winds are very strong and blow from west or south west during the monsoon season. During the period from October to December, winds are generally moderate but some times strong in October and blow from directions between North East and South East to South West and North West. During three months from January to March, the wind continues to be moderate and is predominantly from directions North to South and East to West. In January, the wind velocity is 11 to 19 Km/h from 250° West –South west. In April while there is a slight strengthening of the wind, the direction is variable. In May, there is a further strengthening of winds and directions are from South west to North east and North west to South east. It shows that the wind velocity required for running wind mill is not as prescribed by Non conventional energy department. Hence no wind mill could be set-up in this region.

SECTION: 5: WATER SUPPLY

17. The large number of streams and rivers mentioned in para 4 above form the main source of fresh water supply. But very few of them are perennial. The Vashisti is perennial in nature since it gets discharge of water from Koyana Hydro-Electrical work station. The chief source of water supply in the tract is South West monsoon. The water supply is critical in the month of March,

April and May. The rivers and irrigation projects are shown on reference map (**Appendix No. A**) The statement showing the water level in important wells in Ratnagiri district is given in **Appendix No. IV.** and list of percolation tanks in Ratnagiri district is given in **Appendix No.V.**

SECTION-6 HEALTH -

18. Regarding health in Ratnagiri Division following information is as under.

Table No.1

Sr. No.	Type of health center	Numbers
1.	Hospitals	12
2.	Special hospitals (Cancer, T.B. etc.)	03
3.	Clinics	06
4.	Maternity Home	14
5.	Primary Health Center	67
6.	Sub Health Center	378

Apart from this, there are 40 private hospitals, 17 Special hospitals, 634 Clinics and 87 Maternity homes providing health service to the people of this division. Main diseases present here are tuberculosis, pneumonia etc.

SECTION: 7: DISTRIBUTION OF AREA

- 19. The tract being very hilly and rugged, all available areas fit or even unfit for cultivation are under permanent or intermittent cultivation. The forests in consequence have been consigned to steep hills and are much scattered and isolated due to intervening occupied lands and in much of such occupied land, a luxuriant tree growth exists. The forest areas can be broadly grouped into following zones on the basis of locality factors.
- 1) Forest areas on the West of Mumbai Konkan Goa High-Way situated on small hills or hill ranges separated by creeks and rivers.
- 2) Forest areas on the east of Mumbai Konkan Goa High-Way situated on hills or hill ranges but situated to the west of Western Ghat or foot hills of Sahyadris.
- 3) Forest situated on slopes of Sahyadris and its spurs.

20. The total forest area included in this plan is 67.06 Sq.km. or 6706.50 ha, and Taluka wise distribution of area is given in Table No.1. (As per Form No. 1 of Ratnagiri Forest Division, (Chiplun.)) as **Appendix No. VI.**

<u>Table No.2</u> <u>Geographical and Forest area</u>

Sr. No	Name of Tahsil	Geogra- hical area of tahsil	Reserved forest in ha.	Acquired forest in ha.	Protected forest in ha.	Unclassed area in ha.	Total area in ha.	% to the geogro Phical	% to forest area
1	Mandangad	in ha.	101.15			201.21	202.46	area	4.51
1	Mandangad	42576	101.15	-	-	201.31	302.46	0.71	4.51
2	Dapoli	86339	911.62	-	-	50.61	962.23	1.11	14.35
3	Khed	86711	2421.21	-	-	173.53	2594.74	2.99	38.69
4	Chiplun	11161	164.82	22.07	2.75	182.94	372.58	3.34	5.56
5	Guhagar	78502	-	-	-	296.65	296.65	0.38	4.42
6	S.shwar	125117	141.91	-	-	125.55	267.46	0.21	3.99
7	Ratnagir i	92796	2.77	-	-	331.35	334.12	0.36	4.98
8	Lanja	73930	1003.90	156.00	-	116.58	1275.67	1.73	19.02
9	Rajapur	11884	138.43	-	-	162.16	300.59	2.53	4.48
	Total	816433	4885.00	178.07	2.75	1640.68	6706.50	0.82	100

Detals of Unclassed forests has been given in Appendix No. VIA

(Note: 104.61 ha. of Gothane village in Sangameshwar tahsil is included in Chandoli Wildlife sanctuary and hence excluded from this plan.) (Appendix No. VII)

Some of the areas notified as reserved forests are yet to be transferred to the Forest Department by Collector Ratnagiri. Such areas need to be verified by D.F.O. Ratnagiri and needs action to be taken to take possession of such land. Statement showing such areas are shown in **Appendix No. VIII.**

21. The percentage of forest area in possession of the Forest Department State Government to the geographical area of the district is 0.82 %, but as per FSI report year 2011, the total forest cover is 419800 ha. and percentage of forest cover to geographical area is approximately 51.15 (**Appendix No. IX**) percent. Being a more private forest area than Govt. forest area it is need to be highlighted. The Private forest is a part of environment and need to be protected and regulated by Forest Department. The compact

forest patch is in Dapoli tahsil and the rest of the forest areas are all scattered. Statement showing the distribution of forest areas in each range, tahsil wise with survey no. detail is given in **Appendix No. X.**

22. There are only 2 toposheets of scale 1:250000 available for these forest areas. Rest of the forest areas have been shown on village maps of different scales. The forest areas of Ratnagiri Forest Division were given compartment numbers from 1 to 60. The mangrove areas (816.56 ha.) are in possession of the Forest Department and is shown in **Appendix No. XI.**

SECTION: 8 CHANGE OF AREA

Table No.3
Change of area as per old and revised working plan.

Range	Area as per old working plan (ha.)	Area as per revised working plan (ha.)	Difference in Area in (ha.)	Remarks
Dapoli	3638.11	3859.43	(+) 221.32	Compensatory
Chiplun	396.79	669.23	(+)272.44	area made available by
Ratnagiri	2076.22	2177.84	(+) 101.62	Agencies and area
	6111.12	6706.5	(+) 592.38	transfer from Revenue Department.

SECTION: 9: STATE OF BOUNDARIES

23. The reserved forest covering an area of 889.56 ha. in Dapoli tahsil was covered by the working plan written by Shri. Damle. Rest of the reserved forest, the protected forest and the unclassed area were subsequently transferred to the Forest Department from the Revenue Department. The reserved forests covered by Shri. Damle's plans are well demarcated in the usual manner with stone cairns as per the provisions of section 123 of Bombay Forest Manual Volume II, Part V-C, wherever the boundary is artificial. Statement showing the length of natural and artificial boundaries is given in **Appendix No. XII**.

The survey and demarcation work of forest areas which are not demarcated so far needs to be done urgently. Survey & demarcation need to be carried out by the competent authority (T.I.L.R. /S.L.R.). Thereafter laying of cement pillar / cairns should be erected on the points fixed by the competent authority.

The total length of external boundary is approximately 472.67 km.

SECTION: 10: LEGAL POSITION

24. Following classes (legal) of forests are dealt under the plan.

1) Reserved forest : 4885.00 ha. 2) Acquired forest : 178.07 ha. 3) Protected forest : 2.75 ha 4) Un- classed forest : 1640.68 ha. Total. 6706.50 ha.

- 25. The extent of forest area in each taluka and its legal clarification is given in Section 6 (Table No.1). The reserved and protected forests are covered by the various provisions of Indian Forest Act, 1927. The un-classed area of 1640.68 ha. has been transferred to the Forest Department from the Revenue Department, mostly for taking up afforestation activities and 178.07 ha. of forest area has been acquired as Reserved Forest under section 3 of Maharashtra Private forest (Acquisition) Act of 1975. Similarly mangrove forest of area 816.56 ha. has been transferred to the Forest Department as per Hon'ble Supreme Court Order. The area of 10.34 ha. has been diverted for various Government Projects under section 2 of Forest (Conservation) Act,1980. An area 250.29 ha. has been transferred as compensatory land to the Forest Department. The detail statement of these areas is given in **Appendix No XIII** and **Appendix No XIV** respectively. There is an immediate need to declare these unclassed forest/non forest area and protected forest under section 4 of Indian Forest Act 1927 and subsequently to be a Reserved Forest as per procedure.
- **26.** The notification numbers by which these forest areas were constituted as Reserved and Protected forests is given in **Appendix No XV**.

SECTION: 11: MAPS:

27. There are only two of topo-sheets of 1:250000 scale available in Ratnagiri division. The work of demarcation and laying down of the coupe is carried out with the help of village maps.

Table No.4

Sr. No.	District	Toposheets No.	Scale	numbers
1	Ratnagiri	47 G	1:250000	01
2	Ratnagiri	47 H	1:250000	01

SECTION: 12: RIGHTS AND CONCESSIONS

- 28. Rights & privileges for the villagers adjacent to reserved and protected forests has been briefly elaborated in Govt. publication of Govt. of Maharashtra "MAHARASHTRA RAJYAT VAN VISHAYAK SAWALATI" in which it is mentioned that, the villagers are eligible for availing rights and concessions only when:-
- (i) They will assist the forest officers in extinguishing forest fire,
- (ii) They will assist forest officers in detecting forest offences.
- (iii) They will give information of forest offences to forest personnel and will take necessary precautionary measures for prevention of offences in the forest area

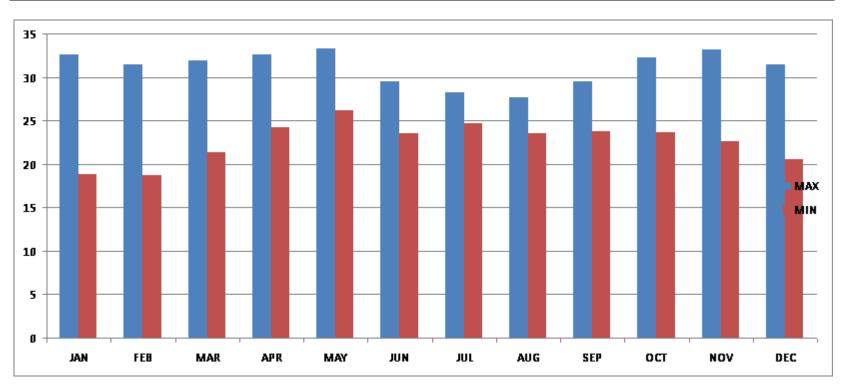
Following rights & privileges as stated in Bombay Forest Manual Part-III in sec.132 to 146 are listed as below.

Ratnagiri District-

- (i) No one will be prohibited from drawing water obtainable in forest, in cases where it is not, procurable within a reasonable distance.
- (ii) No charges can be levied for drawing water from stream, bandhara and tank and all natural resources of water in forest area, on which no expenditure has been incurred by the Government.
- (iii) Permission will be given freely for clearance of choked up tanks and channels in the forest area.
- (iv) Villagers will have a free access to water resource.
- (v) Free grazing will be permitted for the cattle, other than sheep and goats, in forest areas where there is no presence of tiger or leopard subject to grazing policy.
- (vi) Villagers are permitted to collect dead or wind fallen wood from the floor of the forest, except the dead wood belonging to species like teak, khair and shisum, only and for their bonafide domestic purpose and not for sale/barter.
- (vii) Villagers may use twigs/branches of tree species not exeeding15cms.(6") in dia. from annual coupes.
- (viii) The villagers are entitled of getting small wood for agricultural implements, such as plough etc. free of cost on approval of JFM committee.
- (ix) The villagers are entitled to utilize fallen leaves, fallen wood and twigs free of cost for agriculture purpose.
- (x) for extracting water for domestic use, and to visit temples, the villagers are entitled to use the existing footpaths in the forest areas.

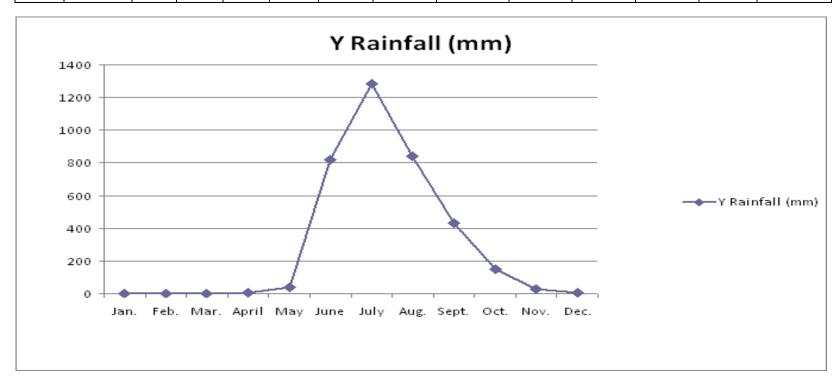
TEMPERATURE VARIATION IN RATNAGIRI (CHIPLUN) DIVISOIN

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC
MAX	32.6	31.5	31.9	32.6	33.3	29.5	28.2	27.6	29.5	32.2	33.2	31.4
MIN	18.8	18.7	21.3	24.2	26.2	23.5	24.7	23.5	23.8	23.6	22.6	20.5

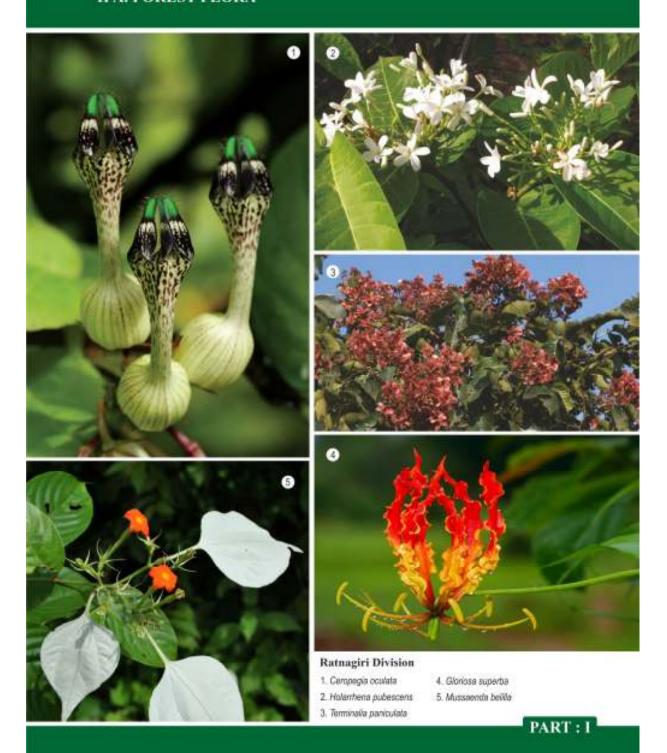


RAINFALL GRAPH OF RATNAGIRI

Х	Month	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Y	Rainfall (mm)	1.4	0.4	0.9	7.00	36.40	817.90	1286.40	839.00	430.90	146.80	28.20	6.10



CHAPTER : II THE FORESTS II A. FOREST FLORA



CHAPTER: II: THE FORESTS

II A. FOREST FLORA

SECTION: 1: GENERAL DESCRIPTION AND CONDITIONS OF THE CROP.

- (a) Forest classification as per Champion & Seth.
- **29**. According to the classification of Forest Types of India by Champion and Seth, the Forests of Ratnagiri Forest Division belong to following types.
 - 1) 2A/C2 -- West Coast Semi-ever green forests
 - 2) 3B/C2 Southern moist mixed deciduous forest
 - 3) 3B/2S1- Southern secondary moist mixed deciduous forest
 - 4) 8A/C2 Western Sub-tropical hill forest
 - 5) 4E/RS1– Tropical riparian fringing forest.
 - 6) 4B/TS1 Tidal swamp forests, Mangrove scrub
 - 7) 4A / L1 Littoral and swamp forest (Casuarinas man made forest)

1] 2A/C2 –West Coast Semi-evergreen forest

This is sub-type of tropical semi-evergreen forest; and is marked by the presence of both evergreen and deciduous component of species in the dominants, but the concentration of evergreen like Jambhul (Syzygium cumini), Umber (Ficus glomerata), Amba (Mangifera indica), Pendkul (Ixora Coccinia), Sisum (Dalbergia latifolia), Behada (Terminalia bellerica), Awala (Emblica officianalis) Jambha (Xylia Xylocarpa) is more than the ,deciduous components of Ain (Terminalia tomentosa), Teak (Tectona grandis), Bahawa (Cassia fistula) etc. The bark of these species is usually thicker and rougher. There is an abundance of climbers in the forests. The diversity of species in dominants is fairly high. The lower storey consisting of Anjani (Memesylon edule) is mostly evergreen.

This type is found mainly on the hill tops. It extends west ward down to the precipitous hilly slopes to an elevation of about 900 meters above msl. where it slowly and imperceptibly merges with Southern Moist Mixed Deciduous Forests type.

The mean annual temperature in these forests is approximately 25.50 °C. In the month of January it is 22.80 °C and the mean May temperature is 26.11 °C. The average annual rainfall is more than 2500 mm and spreading over the months from June to Oct. There is long spell of dry weather for almost 7 months. The rainfall/climate is highly

conducive for a good vegetative growth for deciduous but not that much for a evergreen components due to restricted number of rainy days.

Topography of the area is precipitous immediately on Western side of Sahyadris and undulating in the plateau region. The elevation ranges between 900 mtr. to 1050 mtr. The soil is lateritic and well drained and forms a hard crust on exposed locations over disintegrated basaltic trap rocks.

The condition of the crop in general is not very satisfactory due to biotic reason and edaphic condition as all the land in the plateau has been converted into an agricultural land. The natural regeneration of dominant species is practically absent as these are all light demanders species and the forest area has a closed canopy. The regeneration of the middle canopy species is adequate.

The forest crop is somewhat stunted in growth and there the growth remained undisturbed and the soil is deep; the semi evergreen forest is in full vigor. Few individual species has even reached upto height of 28 meters and above. The average crop height is between 6 to 12 meters.

The main species on the plateau forming the top canopy is anjani - <u>Memecylon edule</u>, which associates in order of incidence with hirda - <u>Terminalia chebula</u>, amba - <u>Mangifera indica</u>, shendri - <u>Mallotus philippinensis</u>, asana - <u>Bridelia retusa</u>, lendi - <u>Lagerstroemia parviflora</u>, bibi - <u>Holigarna amottiana</u>, Callicarpa species and Jambhul - <u>Syzygium cumini</u>. The second story is made up of bhoma - <u>Glochidion lanceolaria</u>, parjambhul - <u>Olea dioica</u>, Dinda - <u>Lea macrophylla</u>, Tamalpatra - <u>Cinnamomum tamala</u>, pandhari - <u>Murraya paniculata</u>, Makad limbu - <u>Atalantia monophylla</u>, Kutkuta - <u>Connarus wightii</u>, Narkya - <u>Mappia foetida</u>, Bhandira - <u>Clerodendron infortunatum</u>, tupa - <u>Canthium umbellatum</u>, dikmali - <u>Gardenia lucida</u>, Karavti - <u>Streblus asper</u>, Triphal - <u>Zanthoxylum rheisa</u>, Kalhoni - <u>Hydnocarpus laurifolia</u> and <u>Glycosmis pentaphylla</u>, Kapshi - <u>Ligustrum nelgherrense</u> and Kumbhal - <u>Pouteria tomentosa</u>, Parjambhul (<u>Olea dioica</u>) tupa (<u>Canthium Umbellatum</u>) and thriphal (<u>Zanthoxylum Rhaetia</u>) occuring in both the upper as well as middle stories. The undergrowth consists of both evergreen and deciduous species such as hasoli - <u>Grewia microcosm</u>, wakeri - <u>Vagatea spicata</u>, Karvi - <u>Strobilanthes callosus</u>, harki - <u>Rauvolfia serpentina</u>, nirgudi - <u>Vitex negundo</u>, Nirgunda - <u>Vitex thwaitesii</u>.

The composition on the western slopes is characterized by rapid disappearance of anjani – <u>Memecylon edule</u>, as the elevation decreases and an increasing presence of members in the top canopy of such as jambhul – <u>Syzygium cumini</u>, parjambhul – <u>Olea dioica</u>, nana – <u>Lagerstroemia lanceolata</u> and ain <u>Terminalia tomentosa</u>, jamba – <u>Xylia xylocarpa</u> and koshimb - <u>Schleichera oleosa</u>. This is prominently making a transition from the ever green forest to the moist deciduous forest.

Grasses: Kocha Gavat (<u>Spodiopogon rhizophorus</u>), Karapwel Gavat (<u>Aerva lanata</u>), Bongarat Gavat (<u>Pseudanthistiria heteroclita</u>), Kadkada (<u>Canscora diffusa</u>), Kurdu (<u>Celocia argentaci</u>)

2) 3B/C2 – Southern moist mixed deciduous forest

31. This is one of types of South India Moist Deciduous forests and this floristic type is found near Dapoli and is confined to lower slopes of hill and occasionally upto a height of 400 meter. These forests usually become leafless in dry summer: The dominant are mostly deciduous, while the middle canopy consisting of Asana (*Bridelia retusa*) is usually of evergreen species. The mean temperature of the area is between 24°C to 27°C, with mean maximum temperature as 43°C. The annual rainfall is 2500 mm with approximately 85 numbers of rainy days.

There is a high percentage of species like Ain (10.878), Shirus (1.336), nana (0.763), etc. Teak is also present occasionally. The forests attain its best form where the biotic influence is negligible. Soil met with is generally red soil but occasionally lateritic soil patches are also met with. Site quality of the crop varies from III to IVa. The density of the crop varies from 0.5 to 0.8. The crop is mostly young to middle aged. The regeneration of teak is very little but that of ain is profuse. **Natural bamboo is almost absent**. Cane is present at higher altitude on the slopes of Sahyadri.

The general floristic are as under.

Top canopy:

Ain (Terminalia <u>tomentosa</u>), Kinjal (<u>Terminalia paniculata</u>), Kakad (<u>Garuga pinnata</u>) Behada (<u>Terminalia belerica</u>), Hed (<u>Adina cordifolia</u>), Savar (<u>Salmalia malbarica</u>), Amba (<u>Mangifera indica</u>) Kinai (<u>Albizzia procera</u>), Jamba (<u>Xylia xylocarpa</u>), Shiras (<u>Albizzia lebbek</u>), Dhavada (<u>Anogeissus latifolia</u>), Satvin (<u>Alstonia scholaris</u>), Teak (<u>Tectona grandis</u>), Nana (<u>Lagerstroemia lanceolata</u>).

Second story:

Chera (<u>Erinocarpus nimmoanus</u>), Humb (<u>Saccopetalum tomentosum</u>), Asana (<u>Bridelia retusa</u>), Kumbha (<u>Careya arboria</u>), Waras (<u>Heterophragma quadriculata</u>), Dhaman (<u>Grewia tiliefolia</u>), Pangara (<u>Erythrina variegata</u>), Karmal (<u>Dillenea pentagyna</u>), Kadam (<u>Anthocephalus cadamba</u>).

Under storey:

Awali (*Emblica officinalis*), Kalakuda (*Wrightia tinctoria*), Bahava (*Cassia fistula*), Palas (*Butea monosperma*), Alu (*Vengueria spinosa*), Shevga (*Moringa tintoria*).

Bamboos: Mostly absent

Cane (<u>Calamus rotang</u>)

Shrubs:

Atrun (<u>Flacourtia indica</u>), Karvand (<u>Carissa carandus</u>), Phangla (<u>Pogostomon parviflora</u>), Dinda (<u>Leea macrophylla</u>), Dhaiti (<u>Woodfordia fruticosa</u>), Kuda (<u>Holarrhena antidysenerica</u>), Keveni (<u>Helicteres isora</u>), Ranbhendi (<u>Thespesia lampus</u>), Bharang (<u>Clerodendron serratum</u>), Wavding (<u>Embelia ribes</u>).

Herbs:

Chikana (Sida carpinifolia), Salvan (Desmodium gangeticum), Pithwan (Uraria picta),

Chikata (<u>Desmodium</u> <u>diffusum</u>), Anantmul (<u>Hemideemus</u> <u>indicus</u>), Chikali <u>Sauropus</u> <u>quadrangularis</u>), Kolsinda (<u>Asteracantha longifolia</u>).

Grasses:

Kusali (*Hetropogon contortus*), Phular (*Themada quadrivalvis*), Marvel (*Dechantham annulatum*).

Climbers:

Chambvel (*Bauhinia vahlii*), Chilar (*Accacia intasia*), Kuhili (*Mucuna pruriens*),

Gunja (*Abrus precatorius*), Shemba (*Acacia pennata*), Ukshi (*Calycopteris floribunda*), Shatavari (*Asparagus racemosus*), Wakeri (*Waghtea spicata*), Kusari (*Jasminum arbrescens*), Lokandi (*Ventilago madraspatana*).

3)3B/2S1 - Southern Secondary Moist Mixed Deciduous Forests:-

32. This forest is notable seen around cultivations - forest interface; and is a result of climatic climax being mutated by the human interference. The big size trees are mostly absent and a secondary succession has set in. The climatic and edaphic conditions are same as almost the same as above. The species commonly found are Nana (*Lagerstroemia parviflora Roxb*), Kumbha (Careya arborea Roxb) Haladu (Haldina cordifolia), Pendkul (*Ixora coccinia*.), Hirda (*Terminalia chebula Retz*), Apta (*Bauhinia racemosa Lam*), Jambhul (Syzygium cumini)

4 8A/C2 – Western sub tropical hill forest

33. This type occurs on the plateau at the ridge top of Sahyadri hills usually upto 1000 meters and above and is mostly on the northern part of the Western Ghats. The extent of this forest type is very small and in 3-4 patches in Khed tahsil. Density varies between 0.5 to 0.7. The average height of the crop is approximately 15 meters and occasionally upto 20 meter even. The main species are pisha (<u>Aetumdaphne hookari</u>), parjambhul (<u>Olea dioica</u>), anjani (<u>Memecylon Umbellate</u>), gela (<u>Randie dumetorum</u>) and ramitha (<u>Lasiosiphon erocephalus</u>). The crop is mostly middle aged.

The general floristics are

Top and second storey:

Jambhul (<u>Syzygium cuminii</u>), Parjambhul (<u>Olea dioica</u>), Pisa (<u>Actinodaphene hookeri</u>), Anjani (<u>Memecylon umbellatum</u>), Hadka (Rauvolfia verticillata), Amba (<u>Mangifera indica</u>), Waras (<u>Heterophragma quadriloculare</u>), Umbar (<u>Ficus glomerata</u>), Gela (<u>Randia dumetorum</u>), Rohini (<u>Mallotus philippinensis</u>), Jambh (<u>Xyilia xylocarpa</u>), Hirda (<u>Terminalia chebula</u>), Asana(<u>Bridelia retusa</u>), Rametha (<u>Lasiosyphon eriocephalus</u>). <u>Olea divica</u>, <u>Flacourtia latifolia, Glochidion holenackeri, Pouteria tomentosa</u>

Bamboo:

Ranchiva (Oxytenanthera monostigma).

Shrubs:

Lingad, Karvi (Strobilanthus callosus), Bhoma Pandhari (Murraya

Herbs:

Phangala (*Pogostemon purpuria*), Dinda (*Leea macrophylla*).

Grasses:

Kusali (*Heteropogon contortus*), Phular (*Anthistiria ciliata*)

Climbers:

Shikekai (Acacia concinna) Waghati (Wagetea spicata)

5 4E/RS 1 – Tropical riparian fringing forests.

34. This type is confined to the main river and stream banks and forms very narrow strip. It is found along Jog River in Dapoli range. The crop is well grown over the areas, which are away from habitation and that near the habitation it is more open due to biotic interference. The crop is mostly middle aged and is usually sub green. Density varies from 0.4 to 0.8 and natural regeneration of tree species is scattered and inadequate. The species met with in this type are limited and are found to occur along the watercourse only. The soil is alluvial in most places. The coarse grass is usually present. The area covered by this type is very small in extent.

The floristic are

Top canopy:

Umbar (*Ficus glomerata*), Jambul (*Syzygium cuminii*), Karanj (*Pongamia pinnata*), Amba (*Mangifera* indica)

Second canopy

Taman (*Lagerstroemia speciosa*) (la) Padal (*Stereospermum perconatum*)

Shrubs

Karvand (<u>Carissa carandus</u>), Phangli (<u>Pogostromon parviflora</u>), Kuda (<u>Holerrhena antidysentrica</u>), Ranbhendi (<u>Thespesia lampas</u>),

Herbs

Chikna (<u>Sida carpinifolia</u>), Salvan (<u>Desmodium gangetieum</u>), Chikata (<u>Desmodium diffusum</u>), Chikali (<u>Sauropus quadrangularis</u>), Kolshinda (<u>Asteracantha longifolia</u>),

6] 4B/TS 1 – Tidal swamp forests, Mangrove scrub

35. This type is met with along creeks and is small in extent. There is practically no area which has not been affected by the biotic influences such as illicit cutting, hacking as a result the vegetation is progressively reduced at places to low cover almost entirely of <u>Acantus ilicifolius</u>. This crop is maltreated and in the form of deformed trees and coppice shoots. As such the density is 0.4 to 0.7 and age cannot be ascertained.

Table No.5

8) Wetland classes and its area extent of Ratnagiri

S.No	Wetland classes	Area in Km2
01	Mangrove	0.36
02	Mud Flat	5.6
03	Sandy area	5.9
04	Rocky Coast	0.27
05	Salt Marsh	0.87
06	Other Vegetation	0.64

Flora:

Woody mangroves cover the area. The dominant species are <u>Rhizophora mucronata</u>, <u>R. apiculata, Sonneratia Alba, Avicennia officinalis, A. marina, Ceriops tagal, Aegiceras corniculatum</u>, and <u>Excoecaria agallocha</u>. The subdominants are: <u>Bruguiera gymnorrhiza, Kandelia candel, Lumnitzera racemosa</u>, and <u>Derris heterophylla</u>. <u>Acanthus ilicifolius</u> helps as a biomonitor of sewage pollution. <u>Rhizophora apiculata</u> is found only along Bhatye estuary (Kajvi river). There are total of 28 mangrove species, including mangrove associates.

Shrubs:

Acantus ilicifolius, Aegiceras corniculata

Herbs: Absent

Grasses: Absent

Climbers: Ipomea spp

7) 4A / L1 - Littoral and swamp forest (Casurina man made forest)

36. This type occurs in Dapoli and Chiplun area. It is not a natural forest; but the portion of successful <u>Casuarina equisetifolia</u> plantation. It is mostly confined to coastal and creeks area of forest, above tidal level. Soil met with is generally coastal sandy and it's quality of the crop varies from II to IIIa. The crown density varies from 0.5 to 0.8. The crop is mostly young to middle aged. The regeneration is negligible.

Top canopy-

Suru (Casuarina equisetifolia)

Second canopy -

Arjun (*Terminalia arjuna*), karanj (*Pongamia glabra*), Pangara (*Erithrina indica*).

Shrubs

Karvand (Carissa *carandus*), Bor (*Ziziphus mauritiana*)

Grasses

Grasses are mostly absent

Climbers

Climbers are mostly absent except ipomoea species present sporadically.

(b) Forest series as per Gaussian Classification

This system of classification is based on bio-climatic types that are temperature, rainfall and the duration of the dry period. The classification is based on the principle of steady state, expected to be attended under conditions of no-interference in a period of 100 years or so. The following series have been differentiated.

. <u>VEGETATION TYPES</u>

01.	Mangrove Series.
02	Albizzia amara and Acacia series
03	Acacia and Capparis series
04	Anogeissus – Chloroxylon-Albizzia amara series
05	Acacia and Anogeissus series
06	Hardwickia- Anogeissus series
07	Anogeissus- Terminalia-Tectona series.
08	Tectona-Terminalia-Adina-Anogeissus series.
09	Bridelia-Syzygium-Terminalia-Ficus series.
10	Memecylon-Syzygium-Actinodaphne series.

Coastal Protection Measures:

Plantation and re-plantation of <u>Casuarina equisetifolia</u> is one of noticeable coastal protection measures taken here.

(c) Density abundance and frequency of species in different working circle.

This matter is discussed in relevant working circle.

(d) RET species

The following Rare, Endangered & Threatened Species (RET) are found in Northern aspect of Sahydri hills in kokan region .

- 1) Critical Endangered (CR)- <u>Abutilon ranadei, Aponogeton bruggenii. A.</u> satarensis, Begonia concanensis, Brachystelma malwanense, Camptorrhiza indica, Ceropegia evansii, C.huberi, C.jainii, C. lawii, C. maccannii, C.oculata, C.sahyadirca, C.santapaui, <u>Dipcadi concanense</u>, Ipomoea salettensis,
- 2) Endangered (EN) Begonia trichocarpa, Bidaria khandalensis, Ceropegia attenutum, C.vincaefolia, Chlorophytum attenuatum, C.borivilianum, Crotalaria filipes, Cryptocoryne cognatoides, Cucumis setosus, Dicaelospermum ritchiej, Entada rheedei, E.ramentacea, Glyphochloa santapaui, Habenaria multicaudata, Heterostemma deccanense, H.urceolatum, Iphigenia magnifica, Nothapodytes nimoniana, Seshagiria sahyadrica, Trilobachne cooke and Triplopogon ramosissimus.
- 3) Vulnarable (VU)- Aerides maculosum, A morphophallus, Arisaema caudatum, A.murrayi, A.sahyadricum, Barleria gibsonii, B. gibsonioides, Beaumontia, B.neilgherense, Beaumontia jerdonia, Belosynapsis vivipara. Bhidea burnsiana, Bbulbophyllum fimbriatum, B. parattensis, Calacanthus grandiflorus, Cryptocoryne cognate, Curcuma amada, C.decipiens, C.inodora, C.pseudomontana, Cyanotis concanensis, Decaschistia trilobata, D.woodrowiii, Euphorbia concanensis, Hydnocarpus, Hyphaene dichotoma, Indigofera dalzellii, Iphigenia pallida, I.stellata, Ophiuros bombaiensis, Sonnerila scapigera, Wiesneria triandra, Zingiber cernum and Z.neesanum.
- 4) Lower Risk (LR)-Allophylus concanicus, Amorphophallus commutatus, Argyreia cuneata, Begonia phrixophylla, Bidaria cuspidate, Canscora concanensis, Carvia callosa, Ceropegia bulbosa, Crotalaria lutescens, Curcuma neilgherrensis, Dimeria blatteri, D.hohenackeri, D.stapfiana, D.woodrowii, Dipcadi minor, Ensete superbum, Erinocarpus nimmonii, Eriocaulon ratnagirica, Garnotia arborum, Glyphochloa acuminate Indopoa paupercula, Iphigenia indica, Rhamphicarpa longiflora, Senecio dalzellii, Theriophonuim dalzellii, Tripogon capillatus, T.jacquemontii, Trithuria konkanensis, Typhonium bulbiferum, Utricularia praeterita, Vigna khandalensis.

(e) Grass-associates

The five grass types have been recognized in the survey conducted in India, and following type has been identified in this part of the peninsular India.

Sehima-Dichanthium type-

This grass cover type is spread over the whole of Peninsular India, including the central Indian plateau, the Chhota Nagpur plateau and the Aravali ranges with a coverage of approx. 17,40,000 km2 between 8° and 28° N and between 68° and 87° E. The cover is also found in the coastal region. Dominant perennial grass species are <u>Heteropogon contortus</u>, <u>Chrysopogon orienalis</u>, <u>Crytococcum oxyphyllum</u>, <u>Themeda tremula</u>, <u>Ischaemum indicum</u>, <u>Ischaemum dalrelii</u>. Many of the grasses on lateritic plateaus viz. <u>Glyphochloa forficulata</u>, <u>G. ratanagirica</u>, <u>Dimeria woodrowii</u>, <u>Dimeria hohenackri</u> and many more which are endemic to the region. The typical grassland associates include several species <u>Smithia</u>, <u>Indigofera</u>, <u>Geigastis</u> cristata, <u>Flemingla tuberisa</u>, Murdauin species etc.

(f) Important medicinal plants in the area

The following some important medicinal plants occur in Ratnagiri division

Sr.No.	Botanical Name	Local Name
	Trees	
1	<u>Anthocephalus</u> <u>cadamba</u>	Kadamb
2	<u>Sarac</u> a <u>Asoca</u>	Sita Ashok
3	<u>Ailanthu</u> s <u>excelsa</u>	Maharuk
4	<u>Caesalpini</u> a <u>Bonducella</u>	Sagargota
5	<u>Mimusop</u> s <u>elengi</u> L.	Bakul
6	<u>Careya</u> arborea Roxb.	Kumbha
7	<u>Semecarpu</u> s <u>anacardium</u> L. f.	Biba
	<u>HERBS</u>	
1	<u>Helicteres isora L.</u>	Muradsheng
2	Mesua ferrea L.	Nagkeshar
3	<u>Leea indica (Burm. f.) Merr</u> .	Dinda
4	<u>Carissa</u> <u>carandas</u> <u>L</u> .	Karvand
5	<u>Vitex leucoxylon L. f.</u>	Kali nirgudi
6	<u>Morinda pubescens</u> <u>Sm</u> .	Noni
	<u>SHURBS</u>	
1	Embelia ribes.	Wavding
2	Ventilago maderaspatana Gaertn.	Kanvel
3	Eranthemum roseum R. Br.	Ran Aboli
4	Mallotus philippensis (Lam.) Müll. Arg.	Rohini / Shendri
5	<u>Caallicarp</u> a <u>tomotos</u> a	Kalwai
	24	

	<u>CLIMBER</u>			
1	Paramignya monophylla Wight	Kokani Vaghati/ Karvi Vaghati		
2	Cyclea peltata Hook. f. & Thomson	Morvel /Pahadvel		
3	<u>Hiptag</u> e <u>bengalensis</u>	Halad vel		
4	<u>Cissus pallid</u> a <u>Salisb.</u>	Chandwadvel		
5	<u>Tal</u> i <u>minor</u>	Wakeri		
6	Ventilago maderaspatana Gaertn.	Kandvel		
7	<u>Canscora</u> <u>diffus</u> a (Vahl) R. Br. ex <u>Roem</u> . & <u>Schult</u> .	Kadkada		

(g) Phytogeography of the Division

37. Phytogeography of Chiplun Forests:-

The landscape of the Ratnagiri district is basically influenced by Deccan lavas, which cover most of the area except southern and south-eastern parts which are underlain by metamorphic types. The typical lava landscape developed under humid tropical conditions, persists almost everywhere.

The geological formalities found in the area include those of the Precambrian, Mesozoic, tertiary and quaternary ages.

The soils like latertic soils, coastal alluvium, saline soils, Humic phase under forest, Tropical black clays etc observed in Ratnagiri district.

The vegetation found in Ratnagiri district as following.

- 9) 2A/C2 -- West Coast Semi-ever green forests
- 10) 3B/C2 Southern moist mixed deciduous forest
- 11) 3B/2S1- Southern secondary moist mixed deciduous forest
- 12) 8A/C2 Western Sub-tropical hill forest
- 13) 4E/RS1– Tropical riparian fringing forest.
- 14) 4B/TS1 Tidal swamp forests, Mangrove scrub
- 15) 4A / L1 Littoral and swamp forest (Casuarinas man made forest)

There are lot of Indian and exotic component in the vegetation of Chiplun Division. Both geology and geography has contributed and influenced the Vegetation of this area. The phytogeography of Chiplun reveals that a approximately 70 % of the species found here could strictly be called as endemic to Indian peninsula. There are some of exotic elements in this vegetation. The Malayan, Sub Himalayan, Himalayan, African, Andaman, Burma elements are present here.

<u>Elements of India</u>:- The percentage of endemic elements here is very less. Very few species like <u>Bridelia retusa</u>, <u>Buchnania</u> <u>lanza</u>, <u>Diospyros melanoxylon</u>, <u>Terminalia arjuna</u>, <u>Eugenia jambolana</u>, <u>Careya arborea</u>.

<u>Eastern elements</u>:- The eastern elements are marked by the presence of Andman, Indo-malayan, Western ghat and North –east India. The species such identified are <u>Tectona grandis</u>, <u>Gmelina arborea</u>, Santalum <u>album</u>, <u>Holoptetlia integrifolia</u>, <u>Malotus philippilelsis</u>, <u>Terminalia chebula</u>, <u>Terminalia bellerica</u>, <u>Dioseorea pentephylla</u>, <u>Dioseorea daemanana</u>, <u>Bauhinia variegata</u>, <u>Bauhinia variegata</u>, Solanum indicum.

Western elements:- The presence of western elements identified by the presence of elements from Sahara ,Sudan, Rajasthan, Indo- Africa , Madagascar and Mediteranean.The following species are identified <u>Andropogen contortus</u> , <u>Acacia arabica</u> , <u>Wood fordia floribunda</u> .

Temperate elements :- The following are the temperate elements in West Chiplun forests <u>Ficus religiosa</u>, <u>Ficus racemosa</u>, <u>Acacia catechu</u>, <u>Anogeissus latifolia</u>, <u>Indigofera pulchella</u>, <u>Ficus bengalensis</u>.

SECTION: 2 INJURIES TO WHICH CROP IS LIABLE

38. ATMOSPHERIC FACTORS

1. Wind – The strong wind blows specially in coastal region and uproots the trees. The damage is more specific in monsoon period.

Biotic factors

- (i). Fire: Damage by forest fire is meager.
- (ii). Illicit cutting: The damage by illicit cutting is negligible in the forest. Few cases are recorded but it is not a major problem, as a large scale forest areas are under private holding.
- (iii)Encroachment: The encroachment is negligible in Ratnagiri Forest Division
- (iv) Grazing & wild animals

Damage by grazing is also negligible except near habitation because of the large areas are under private forests.

- (v) Weeds: No significant weed growth is observed,
- (vi) Insects and fungi

There is a sporadic attack, soon after the rains, by teak skeletonizer (<u>Hapalia machaeralis</u>) and teak defoliator (<u>Hyblea puera</u>) but it does not become epidemic. Damage by fungi is not common. <u>Casuarina equisetifolia</u> suffers with disease due to the attack of fungus, <u>Trichosporium vasiculosum</u> and the plant dies immediately.

Stem borer disease in <u>Casuarina equisetifolia</u> is caused by <u>Indarbela quadrinotala</u> and it makes a deep hole inside the pole of Casuarina equisetifolia plant.

Insect pest and diseases of Mangrove species.-

- (a) <u>Pteroma plagiophteps</u>- This pest is found to cause to a severe defoliation of <u>Rhizophora mucronata</u> sapling and trees in a varying degree. The life cycle is completed in 3 months.
- (b) <u>Dasychira mendosa:</u> It is a defoliator and is widely distributed. It occurs in nature as a serious pest of <u>Acacia catechu</u>, <u>Dalbergia sissoo</u>, <u>Terminalia species</u>, <u>Tectona grandis</u> etc. It affects <u>Avicennia species</u>.
- (c) <u>Hyblaea puera:</u> It principally becomes important defoliator. It attacks on mangrove plants.
- (d) <u>Homona coffeaira</u> This insect attacks <u>Avecinia</u> plants.
- (e) Calandra species—This causes an extensive damage to a need of Avicennia species.

Marine wood borer-

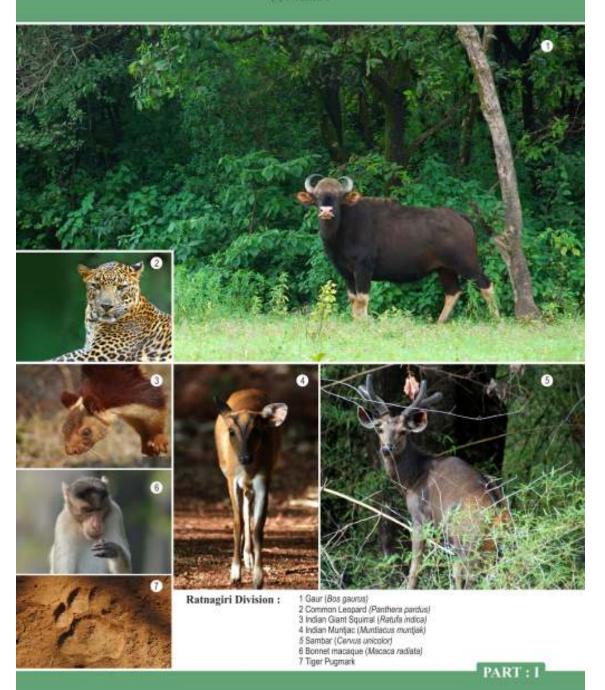
- (a) <u>Teredinidae</u>- These are wood borer worms and have boring organs. The boring is done by the larva which gets inside timber, and grows inside by making a canal inside it. It consumes cellulose as food.
- (b) <u>Pholadidae</u> It is a mangrove borer, but as it can not digest cellulose and it gets inside timber only for shades.
- (c) <u>Sphaeromatidae</u>- It destroys timber by boring inside it, but it does not consume cellulose. It makes cylindrical bores for shelter only.

(vii) Parasite and epiphytes-

It is commonly seen in the semi evergreen forests and Dendrobium species form a large masses on the branches of trees. The damage is however not serious. Some Loranthus species infest tree species like teak, kinjal, anjani etc. and the attack is apparently endemic.

II B-FOREST FAUNA

(a) Mammals



II B-FOREST FAUNA

SECTION:1:

(a) Mammals

Sr.No.	Local Name	Zoological Name (Binomial name)
1	2	3
1.	Panther	Panthera pardus.
2.	Sambar	Rusa unicolor nigra (Syn. Cervas unicolor).
3.	Wolf	<u>Melurusus</u> <u>ursinus.</u>
4.	Hyaena	Hynaena hyaena, Hyaena striate.
5.	Aswal	<u>Ursus</u> <u>arctos.</u>
6.	Bhekar	<u>Muntijak</u> vaginalis.
7.	Nilgai	Boselaphus tragocamelus.
8.	Ran dukkar	<u>Sus cristastu.</u>
9.	Kolha	<u>Vulpes</u> <u>vulpes.</u>
10.	Khokad	Canis aurenus.
11.	Moongoose	<u>Herpestes</u> <u>edwardsic</u>
12.	Sayal	<u>Hystrix</u> <u>leucura.</u>
13.	Hare	<u>Lepus</u> <u>ruficaudatus.</u>
14.	Baul	<u>Felis</u> <u>cheus.</u>
15.	Kalindri	<u>Viverra Malaccansis.</u>
16.	Makad	<u>Macaca radiata.</u>
17.	Wanar	Semmopithecus entethus.
18	Gaur	<u>Bos gaurus</u>
19	Indian Giant Squirral	<u>Ratufa indica</u>
20	Indian Muntjac	<u>Muntiacus muntjack</u>

(b) Birds

BIRDS

1.	Snipe	<u>Rhynchaca-engalensis.</u>
2.	Whistling teal	<u>Dendrocyngana fulva.</u>
3.	Painted partidge	Ortigornis pondicariann.
4.	The grey partridge	Prancolinus pondicrianus.
5.	Grey quail	Coturnix coturnis.
6.	Rainquail	Coturnix coromandelicus.
7.	Bustard quail	<u>Turnix aigoor.</u>
8.	Jungle bush quail	<u>Perdicula</u> <u>asiatica.</u>
9.	Pea fowl	<u>Pavo eristalus.</u>
10.	Grey jungle fowl	Gallus <u>sonnerattii.</u>
11.	Blue rock pigeon	<u>Columbera livia.</u>
12.	Bazzards	Butex furox.
13.	Pale harrior	Coicus marrurus

(c) Reptiles

Python, Monitor Blizzard, Snakes, Rat snakes, Kraits, Vipers, Crocodile, Cobra.

(d) Fish: Species include <u>Ambasis gumnocephalus</u>, <u>Batrachus grunniens</u>, <u>Caranx boops</u>, <u>Chateossus nasus</u>, <u>Chorinemus toloo</u>, <u>Chrysophrys haffara</u>, <u>Echeneis naucratus</u>, <u>Equula dussumieri</u>, <u>E. fasciata</u>, <u>Gerres poeti</u>, <u>Gobius criniger</u>, <u>Hippocampus guttulatus</u>, <u>Mugil carinatus</u>, <u>Platycephalus macracanthus</u>, <u>Naucratus doctor</u>, and <u>Sardinella melanura</u>.

SECTION:2: INJURIES TO WHICH THE FAUNA IS LIABLE.

39. There is custom of Gaonparadh in holy festival and a greater vigilance is required during that period. The incidences of animals trapping are very common. There are number of cases of snake bites and crocodile attack. This causes a threat to crocodile and snakes. Considering the strength of the Forest Department in this division, there is necessity of awareness among the local people regarding the wildlife.

40. Soil erosion

It is necessary to retain vegetation to protect the surface soil, which will otherwise likely to get washed. Few patches that are devoid of tree growth or has a sparse tree population are subjected to sheet erosion, because of heavy rains and soil texture,

Sea erosion

Sea erosion is also very conspicuous on the coastal sandy plains, thereby reducing gradually the coastal area. Therefore there is a need to take effective steps to prevent erosion, due to corrosive action of sea by raising suru plantations.

II B-FOREST FAUNA

(b) Birds



- Ratnagiri Division: 1 Western Reef-egret (Egretta gularis)
- 1 Western Reef-egret (Egretta gularis) 6 Indian Pitta (Pitta brachyura)
 2 Gull 7 Purple-rumped Sunbird (Nectarinia zeylonica)
 3 Crested Serpent Eagle (Spilomis cheela) 8 Indian Roller (Coracias benghalensis)
 4 Malabar Pide Hombill (Anthracoceros coronatus) 9 Indian Blackbird (Turdus simillimus)
 5 Jungle Babbler (Turdoides striatus) 10 Black-headed Oriole (Oriolus xanthomus)

PART: I

CHAPTER: III: UTILIZATION OF FOREST PRODUCE

SECTION: 1: AGRICULTURAL CUSTOMS AND NEEDS OF THE POPULATION

41. Out of the total population of the district which is about 16.97 lacs as per 2011 census, 89 percent population lives in rural area and 11 percent is urban based. The total geographical area of Ratnagiri district is 8164 sq. km. with density of population is 207 per sq.km. As per the details of socio economic status of Ratnagiri district 2010 report is given as below.

Table No.6

Sr. No.	Particulars	Details
1	Area	8164 Sq. Km.
2	Number of Taluka	9
3	No. of cities	10
4	No. of villages	1543
5	No. of blocks	9
6	No. of Grampanchayties	848
7	Rural Population	15.05 lacks
8	Civilian Population	1.92 lacks
	Total	16.97 lacks
9	Male Population	7.95 lacks
10	No. of Woman Population	9.02 lacks
11	Schedule Cast Population	25(1.44%)
12	Schedule Tribe Population	20 (1.18%)
13	Population per Sq.km.	207
14	<u>Literacy</u>	
	Rural	73.22 %
	civil	88.26 %
	Total %	80.74 %
15	Families below poverty line (Rural)	1.22 lacs
16	<u>Cattle Population</u>	
	Total Cattle Population	4.87 lacks
17	Cow	4.01 lacks
18	Buffalo	0.50 lacks
19	Sheep/Goats`	0.36 lacks
20	Agriculture	3.38 lacks ha.
21	Area under irrigation	0.13 lacks ha.
22	Waste land	0.73 lacks ha.
23	Road Network	
	National Highway	275 Km.
	State Highway	857 Km.
	Major District Roads	1424 Km.
	Other District Roads	1294 Km.
	Village Roads	3607 Km.
	Total	7457Km.

Source- District socio-economic survey report 2010.

<u>Table No. 7</u>

Families Below Poverty line in Rural areas

Sr.	Tahsil	Total	S.C.	S.T.	Minoritie	Others	Total	Percen
No.		Rural			S			t
		familie						
		S						
1	Mandangad	16958	777	314	322	4100	5513	32.51
2	Dapoli	41920	1039	742	524	8962	11267	26.88
3	Khed	40007	1900	333	489	11665	14387	35.96
4	Chiplun	52934	2916	435	624	18977	22952	43.36
5	Guhagar	31848	863	18	288	9041	10210	32.06
6	Ratnagiri	49513	1278	70	557	11757	13662	27.59
7	Sangameshwa	51936	2511	57	502	18377	21447	41.30
	r							
8	Langa	25455	1069	12	271	7723	9075	35.65
9	Rajapur	40587	637	0	933	11673	13243	32.63
Tota		351158	1299	198	4510	10227	12175	34.67
1			0	1		5	6	

Agriculture is the predominant occupation in Ratnagiri district. Out of the total population of the district, 37.3 % constitutes the working population and out of this working population, 73.1 % is dependant on agriculture sector for its livelihood.

42. The population consists of agriculturists of various classes, such as Marathas, Malis, Kunabis, Koli, Thakur, Katkaris, Dhangar and Harijans. Marathas and Malis are well to do and are engaged on their own lands for on work. Koli and Aagri communities go out of village doing other non- agricultural works, when their agricultural works are over. Thakur and Katakaris are poor people, and have to go out for work throughout the year to earn a living for themselves, since most of them do not possess land of their own. They are engaged on forest work, when the agricultural works are over.

The agricultural lands are two types viz. 'Jirayat 'and 'Workas'. 'Jirayat' lands are flat deep and fertile, while 'warkas' lands are shallow poor and situated on undulating to sloping grounds. People burn 'tahal' grasses and dried leaves by spreading them in the field in order to reduce weed growth. The main crop of Rantagiri district is rice and it covers 78810 ha. Another important activity in the district is horticulture. Cashew and mango plantations cover an area of 76012 ha. Fishing is another activity mainly limited to the coastal population. Large scale male population has migrated for livelihood to the industrial cities mainly Mumbai.

43. Following is the land use pattern in the district.

1.	Forest land	6706	ha.	
2.	Pasture land	33800	ha.	
3.	Area under irrigation	13000	ha.	
4.	Waste land	73000	ha.	

(Source: District Statistical report of Ratnagiri district for the year .2010

Major constituent of the population of the district resides in rural area) whose main occupation is agriculture. They generally require small timber for agricultural implements, and house construction, fire wood as fuel, fodder and minor forest produce for other purpose.

- **44.** There are 475 industries registered in the district generating jobs to 13014 workers.
- **45.** The local demand is for
 - i) Timber of small size for building purposes and agricultural implements.
 - ii) Firewood.
 - iii) Bamboos.
 - iv) Grass for stall feeding, cattle, thatching huts.
 - v) Grazing.
 - vi) Tahal for burning in the field.
 - vii) Thorns for fencing.
 - viii) Other minor forest produces.

46. The general requirements of people from forests are as under

- i. **Timber** Timber is required for building purposes, agricultural implements, furniture etc. Teak is preferred but due of its prohibitive cost, other miscellaneous species are also used as an alternative. The timber is used for buildings, huts, cattle shed etc. and requirement is mostly small size timber of species like ain, kinjal, dhaman etc. Similarly agricultural implements are also made out of above species. It is estimated that annual demand of timber is about 11321Cum. (377366 families x 0.03 (Cub.m.). Timber is exported to nearby districts like Kolhapur and even to Mumbai. Much of the timber is produced from the private holdings.
- ii. **Fire wood** The dead and fallen wood was allowed to be removed on head loads for their domestic needs. The privilege is abused occasionally as many a time, the green wood is cut in grab of a dead wood, or tree is girdled to make it dead. There is a great demand for fire wood throughout the district. The annual demand for firewood is

estimated to be 815110 mt. (377366 families x 2.16 Cum..) The fire wood is also exported to Kolhapur and even to Mumbai.

- iii. **Bamboo** Bamboo is present to some extent in the private areas. The requirement of the people is either met with by importing bamboos from the adjacent district or from local cultivators, growing them in the private land. Within the district, bamboos are used for basket making and house building. Planting of bamboo in the private area is done through rhizomes.
- iv. **Grass** Thatching grass is of considerable importance in villages. Now a day's use of tiles is more common, but poor people still depend on grass, which is available in remote areas of the forests. Compared to geographical area of the district, the forest area is very meager and is not the main source of thatching grass. However a very small quantity of grass is available from forest for stall feeding the cattle. Other minor forest produces such as apta leaves, gum, shikekai, fruits of moha, awala, jambhul etc. are also collected and exported to Mumbai and near by districts.
- v. **Grazing** Non Forests areas are in plenty, and hence the local people are not exclusively dependent on the Govt. forests for grazing their cattle. The incidence of illicit grazing is negligible. Statement showing cattle population of Ratnagiri district is given in **Appendix No. XVI.**
- vi. **Tahal** Agriculturists depend much on tahal for burning of soil (rab burning) for preparing seed beds. The pressure of tahal cutting is on increase in view of the fact that it is difficult for a common cultivator to obtain tahal from private land.
- vii. **Thorns** The local people require thorny shrubs for fencing their fields. They mostly use branches of Karvand, for this purpose and it is invariably brought from the forest.
- viii. Other Minor Forest Produce This includes variety of products. Among fruits which are collected by them, the most important are edible fruits like amba, karvand, jambhul, kokam, char, toran, awala, moha, alu, kaju fruits Pods of shikekai, hirda, behada, garambi, karanja are also collected and the bark of chillar and ain are collected for the purpose of tanning. Apta leaves are collected for bidi making. Some medicinal plants are also locally collected. The statement showing annual out turn of Non Timber Forest Produce is given in Appendix No. XVII.

SECTION: 2: MARKET AND MARKETABLE PRODUCE

47. The timber produce in the district is not mostly consumed locally but most of it, is transported to places like Kolhapur and Mumbai where it fetches a very good price. There is as such no known market center for sale of timber. At taluka places viz. Chiplun, Khed, Ratnagiri etc some timber of teak and injaili and firewood is sold locally in the licensed sawmill. There are a total of 198 licensed sawmills in Ratnagiri District. Statement showing the list of licensed sawmills in Ratnagiri district is given in **Appendix No. XVIII.**

As regards firewood, about one third of the produce is consumed locally and remaining is transported to Mumbai by road.

The various cities/towns in and away from this region such as Mumbai and Kolhapur etc. are the major marketing centers. In addition smaller towns like Ratnagiri, Dapoli, Mandangad, Guhagar, Khed, Chiplun, Sangameshwar, Lanja, Rajapur are the other centers for marketing of the forest produce. The forest products are in great demand and have ready markets.

48. The chief marketable products derived from these forests are timber, firewood and minor forest produce. Timber of teak and other species such as ain, kinjal, jambha, hed, amba, nana, shivan, bibla, dhaman, jambhul, kakad, hela, siras, sawar, khair are exported mostly in the form of logs, poles and posts, in a round form. Teak sawn timber is also transported to Mumbai and other adjacent areas. The casuarina poles are used as fishing stakes. Firewood produced from malki land in the district is mostly used by the local people for self-consumption and is partly exported outside. Minor forest produce such as Karvi, hirda, shikekai, ain and chilar bark, honey, wax, silk cotton, apta and tembhurni leaves, gums, kadhipatta etc are collected by local people from forests for sale or barks, if the produce has not been auctioned by the forest department.

SECTION: 3: LINES OF EXPORT

49. Ratnagiri Forest Division, (Chiplun) is very well connected outside by a road network, having large number of metal roads with fair weather tracks, and with numerous navigating creeks and by Indian railways. Mumbai Goa National highway as well as Konkan railway line traverses the whole district joining Mumbai, Goa and Mangalore respectively. This facilitates the speedy transportation of almost all the forest produces to main consumption center such as Mumbai. It also ensures the cheapest mode of transport. The existing rivers connecting Arabian Sea are not suitable for transporting to the produces

except rivers like Vashisti and Kelshi, Kalabadevi, Palshet and creeks like Borya, due to their shallowness. The sea routes are not feasible due to turbulence. The line of export at present is through various net work of roads in the area. It is the main convenient and economical mode of transport directly to the destination at present.

50. The district has following net work of roads

1. National highway	275 km.
2. State highway	857. km.
3. Major district roads	1424 km.
4. Village and other roads	4901 km.

Total 7457 km.

There is no forest road in Ratnagiri Forest Division, (Chiplun.). There are some roads which are known as other district roads (ODRs) in charge of Zilla parishad.

Table No.8

Sr.No.	Name of the road	Passing through ranges
1.	Dapoli – Bandhtivre road (MDR)	Dapoli
2.	Dapoli – Khed road (SHW)	Dapoli
3.	Dapoli – Dabhol road (MDR)	Dapoli
4.	Dapoli – Mandangad – Mhapral road (MDR)) Dapoli

The mode of transport by road is gaining importance day by day and it is due to the fact that the road transport is quicker and comparatively much reliable.

SECTION: 4: METHODS OF HARVESTING AND THEIR COSTS.

- 51. Prior to 1988, annual coupes were worked departmentally or through Forest Labour Co-operative Societies. Felling, logging, stacking of firewood and timber was used to be done either through labours engaged departmentally or through Society members, and felling was done through saws. Conversion of fuel wood into charcoal has stopped since 1990. Harvesting of minor forest produce is carried out through the agencies of contractors, cooperative societies, village panchayats etc.
- 52. The piece work rates to be paid for the various forestry operations are fixed each year by the Circle Wage Board, presided over by the Chief Conservator of forests, (T) Kolhapur. The sanction rates for year 2010 –2011 are given in **Appendix No. XIX**.

SECTION: 5: PAST AND CURRENT PRICES

53. The prices of all the forest produce have increased considerably in the last three decades. In the recent past it is seen that the prices have increased more rapidly out of proportion. It is due to the fact that large scale development programme / activities have been undertaken in the previous Five Year Plans and the district has exported the various forest produce considerably, to the main consumption centres, such as Mumbai and Kolhapur. The current market prices for timber, firewood and other produces are given in **Appendix No.**XX.

CHPATER: IV: ACTIVITIES OF FDCM

SECTION:1:

54. The F.D.C.M. had not carried out any activity till today in this Division.

CHAPTER: V: FIVE YEAR PLANS

Forest Resources

55. 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 semi evergreen forest on western coast; 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 Forest, Wet Tropical Evergreen Forests and Tropical Semi Evergreen Forest. 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 mass and less than 2 % of the world's forest area, but it support more than 7% of the varieties of flora and fauna. India is a biocenogenesis of three flora, Indo Malayan, Siberian and Madagaskar.

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 a goal of 33 %, set forth by National Forest Policy, 1988.

The rising population has forced the rural poor to deplete the natural resources. It has been stipulated that the population of India will reach, one hundred and twenty crores by 2050 and that will comprise about more than 16% of the world's population. The problem is further compounded by enormous cattle population, estimated to be 45 crores, about 18% of the cattle population in the world. Much of these animals have a very low productivity, but due to socio-economic conditions, these are retained by the dwellers and these cattle graze freely in forest area, causing a systematic degradation of forests and that has led to severe erosion leading to floods in the lower plains. A further degradation has been caused by the practice of shifting cultivation. As a result, the demographic and economic landscape of the country is plagued with poverty and under employment. Agricultural productivity is only 1 ton per ha against the actual stipulated capability of 4 ton per ha. The achievement of this stipulated target is the main challenge before the Planners and decision makers of this country.

Mobilization of Fund in the Past

56. Since the commencement of the First Five Year Plan (FYP) in 1951, a total Rs. 8500 crores have been spent by the end of the Eighth FYP in 1996-97, on forestry

development activities. During this period, afforestation of about 2.69 crores ha. was carried out. Financial allocation to forestry sector has increased phenomenally from Rs. 7.6 crores in the First F.Y.P. to Rs 4082 crores in the Eighth F.Y.P., but this was still less than 1% the total plan outlay of the country. This was one of the main reasons for the continuous deterioration of forest resources. A provision of Rs 68700 crores has been made in the Ninth Five Year Plan. During 1997-98, afforestation of 0.148 crores Ha. was carried out and thus, up to 1997-98, the total area afforested was 2.838 crores ha. The average annual plan outlay for the forestry sector during Eighth F.Y.P. was about Rs 816 crores, whereas the estimated annual value of harvests (recorded and unrecorded) from the forests, was worth Rs. 30000 crores 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 No.9

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	23780	19600	76	85	0.32
Second Plan (1956-1961)	As above	45000	46720	212	212	0.47
Third Plan (1961-1966)	Increasing Productivity, Fast growing spp.pl. Modern logging	75000	8577	458	459	0.61
Annual Plan (1966-1969)	As above	66250	66225	419	421	0.63
Fourth Plan (1969-1974)	As above	159020	157790	894	938	0.56
Fifth Plan (1974-1979)	Social Forestry	393220	394260	2088	2088	0.53
Annual Plan (1979-1980)	Social Forestry	126010	121760	683	683	0.54
Sixth Plan (1980-1985)	Social Forestry Forest Cons.	975000	1092920	6924	NA	0.71
Seventh Plan (1985-1990)	Forest Cons. Massive Aff. Wasteland Dev.	1800000	2187300	18519	19759	1.09
Annual Plan (1990-1991)	As above	647170	583690	6299	5764	0.97
Annual Plan (1991-1992)	As above	723170	647500	7831	7153	1.08
Eighth Plan (1992-1997)	JFM Ecotourism Biodiversity Conservation Wasteland utilization	4341000	_	40820	39930	0.94

Ĭ	Ninth Plan	As above	8592000	7058180	68228	0.79	
	(1997-2002)						
ľ	Tenth Plan	Bio diversity	15923000	-			
I	(2002-2007)	Conservation					

Forest Policy and Planning

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

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

Given the realities of budgetary allocations, external aid for social forestry resulted in the earmarking of 70 to 80% of the funds for extension of social forestry. As a result, the management of natural forests received a 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 National Forest Policy of 1988. Other supplementary legislation has been enacted to explicitly provide for control and regulations covering non- forestry resources, wildlife protection and environmental protection, together with other broad directives in substantive areas of National Policy, which have an impact on forestry, including the other multiple 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 legalized in 1990.

Its principal aim was to ensure an environmental security and maintenance of ecological balance, through the preservation and rehabilitation of forests, while providing for fuel wood, fodder, non-timer forest products (NTFPs) and small timber needs to the local people. The JFM has since been institutionalized by most of the States. The emphasis has been on the formation of Village Forest Committees and by empowering them for participatory management, of degraded forest on a benefit- sharing basis.

It has been observed that the country's achievement in raising forestry plantations, in terms of area, has been impressive. Up to 1998, the total area under tree plantations was 2.838 crores ha, of which about 1.7 crores ha were planted before 1990 decade. The current annual rate of plantation is about 0.12 crores ha. The quality of these plantations varies considerably. It must be noted that forest plantations is meant to meet the increasing demand of industrial raw material, or for direct individual consumption, i.e. fuel wood.

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

According to the Report of F.S.I., 2011, the total forest cover of the country is about 6.9207 crores ha or 21.05 % of the total geographical area of India, with very dense forest consisting only 2.54%, moderately dense forest accounting for 9.76% and open forest constituting 8.75 %. The Report further states that the forest cover has decreased by 728 sq.km. since the last survey in 2003. Funding to the tune of Rs. 6695 crores per year will be required in order to achieve one third forest cover, within next 20 years whereas, Rs. 1600 crores per year is available from both the central and state budget, together to be allocated for afforestation.

Despite the enactment of all above legislations, clear symptoms of degradation in forest and a ever declining capacity in meeting the various needs of the local population, particularly of the rural poor and tribal is 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 forest, the Government of India has prepared the National Forestry Action Programme (NFAP).

National Forestry Action Programme (NFAP)

58. In 1993, the Government of India decided to start a new strategic planning process following the National Forestry Action Programme (NFAP) concept. The formation of NFAP was done with the goal of addressing the issues underlying the major problems in the forestry sector, in line with 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 NFAP programme is to enhance the contribution of forestry and tree resources to the ecological stability and people- centered development scheme 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 National Forest Policy 1988 and the National Five Year Plans . In the past, there has not been any comprehensive and constant programme structure with a result, it was difficult to get linkages and established trends.

In the context of sector policies, the NFAP exercise proposed that imperative needs should be identified, which represent the absolute requirement to which all supporting objectives should contribute as envisaged in Forest Policy of India. Two imperatives were 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 a successful development strategy, but also is an end in itself.

Five Year Plans

59. The basic purpose of the NFAP programme is to establish direct linkages between National Forest Policy 1988 and the National Five Year 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 is as follow:

First and Second FYPs aimed at rehabilitation of degraded forest, introduction of economic species, survey, and forest demarcation; third and fourth FYPs envisaged increase in productivity of forest, through fast growing species plantations, scientific assessments, and modern logging; .Fifth FYP stressed for the formulation of social forestry and fuel wood reserves with a view to save natural forests, Sixth FYP stressed on social forestry and forest conservation. Seventh FYP envisaged forest conservation and massive afforestation and wasteland development and. Eighth and Ninth FYP stressed on: preservation of biological and genetic diversity (both flora and fauna), protection of forest against biotic interference, utilization of wastelands, and promotion of peoples 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%). It is opined by many economist and conservationist that for the sustainable development of this sector, allocation for the forestry sector should be raised to about 4 & 5 percent of the total outlay of the country.

CHPATER: VI: STAFF AND LABOUR

SECTION: 1: STAFF

60. The forest areas in Ratnagiri District falls within the jurisdiction of Ratnagiri Forest Division at Chiplun. The position of staff deployed is given below

Table No.10

Name of the post	Total posts	Pay scale	
1. Divisional forest officer	01	Rs 10000-15200	GP 6600
2. Range forest officer	04	Rs 9300-34800 G	P4400
3. Forester	11	Rs 5200-20200 G	P2400
4. Forest guards	45	Rs 4440-7440 G	P1600
5. Accountant	06	Rs 5200-20200 G	P2800
6. Clerk	06	Rs 5200-20200 G	P1900
7 Surveyor	02	Rs 5200-20200 G	P2400
8. Jeep driver	02	Rs 5200-20200 G	P1900
9 Peon	02	Rs 4440-7440 G	P1300
10. Permanent van majur	05	Rs 4440-7440 G	P1300

Details of the staff sanctioned (posts wise) is given in **Appendix No XXI.** Details of present structuring of range, rounds and forest beats are given in **Appendix No XXII.**

SECTION: 2: LABOUR SUPPLY

61. With the increased tempo of developmental works undertaken during Five Year Plans, the problem of procuring labour in sufficient numbers for different forestry operations has become increasingly very difficult. The main factors which has contributed to this problem is that more and more labours are being attracted towards industries than towards the agricultural operations, because of comparatively higher skilled nature of work, superior wages and other amenities. For various forestry operations, local unskilled labours from the vicinity or from the neighbouring districts are engaged.

Forestry operations being a time bound activities and many a time overlaps with agricultural operations, the procurement of local labour for forestry works, become problematic and hence labour gangs are engaged on job-rate/piece- work basis to complete these operations in a time bound manner.

The Ratnagiri district was taken over by Bombay Presidency in 1818. In 1829, on the suggestion of the Collector of Ratnagiri, Shri Dunlop, most of the forests were placed at the disposal of the people thinking that the stake-holders would husband them with care. But the people very soon felled and exported practically everything to Bombay; fleets of naval craft even were built for the purpose. Until Shri Dunlop's proclamation, the forests on the Southern banks of Shastri and the Bav rivers had stood almost unharmed, but thereafter most of forests in Ratnagiri District disappeared. The above remarks as to the disappearance of the Ratnagiri forests, with the exception of the Bandh-Tivre, Dapoli, Kadwan and Harnai reserves (and a few other interior reserves in charge of the Collector of Ratnagiri, some of which have not been transferred to the Forest Department) is true, except in case of some land owners, who have taken to planting of teak, casuarina etc. in their own land.

FLCS:- No Forest Labourers Cooperative Society has been registered in this Division.

CHAPTER: VII: PAST SYSTEMS OF MANAGEMENT

SECTION: 1: GENERAL HISTORY OF FORESTS

- **62.** This plan deals with following types of forest areas.
- 1. Reserved forest
- 2. Protected forests
- 3. Acquired forests under Maharashtra Private Forest (Acquisition) Act 1975 and are deemed to be the reserved forest.
- 4. Unclassed areas which have been transferred from the Revenue Department to the Forest Department.

1.1 General history of each area is given below.

63. Forests of Ratnagiri District – (Which were subsequently declared as Reserved forests)

The Angria chief rose to high power in Ratnagiri district during the period 1690-1840 and they appeared to have carefully guarded their timber supplies. With regard to Bandh-Tivare reserves in Dapoli taluka of Ratnagiri District, it is recorded in the Ratnagiri Gazetteer published in 1880, that the Government teak reserve on the river Jog was planted nearly 200 years previous to that date, by Kanhoji Angre and that although at the time of writing the Gazetteer, most of the Ratnagiri forests had been destroyed, the Bandh-Tivre reserve used to provide the highly priced Bankot knees from the bank of Bankot creek, to Indian Navy.

1. Reserved forests of Ratnagiri District

- **64.** Prior to 1898, in the reserved forests of Ratnagiri district, the felling were carried out in an unsystematic manner and recourse was taken through four agencies namely:-
- 1. Contractor,
- 2. Departmental
- 3. Felling of trees by privilege holders and
- 4. Felling of trees by non-privileged population on permit system.

The method of exploiting teak, injaili and dead wood before the introduction of sanctioned working plan was as follows.

TEAK

65. In the early days of forest conservancy, teak was removed by unregulated selection felling under a fee system. The contractors were allowed to cut and remove teak trees from

the forests at a fixed rate as per tree, and the result naturally was that teak trees were felled only in the accessible areas. At that time, the forestry establishment protecting these forests was extremely meager and in addition to that, the supervision was very lax and a large number of trees were illicitly removed from these forests, over and above what the authorization permitted them. This resulted in a reckless felling, leading to a depletion of the forest resource.

A system of departmental felling was next introduced and a special protective staff was provided and that resulted in some restoration of forest and prevention of un-systematic felling, but still then only the best teak trees were harvested, and an excessive tree felling was continuing in all accessible areas. This wholesale removal of teak tree, from large contiguous patches of forests and the injury caused to injaili trees, by unrestricted and unregulated lopping, for tahal, brought the deterioration of much fine forest beyond recovery, and now in many areas, throughout the district, nothing but a pure teak coppice crop with an undergrowth of injaili, annually cut for 'tahal', can be found.

These departmental felling usually took the form of cutting out a fixed number of teak trees nearly 2000 stems on an average, per year in different types of forests, in each taluka and these felling continued till all the growth in the easily accessible forests were removed. The system of felling of all teak trees was usually adopted but in some cases, standards were retained, which used to be the young poles over which the contractor had no fiduciary interest. In the later 'eighties' or around 1880, more attention was paid to the selection of standards and a rule was made, whereby 10 standards per acre were to be reserved for seeds.

INJAILI

- 67. In addition to felling of teak trees in the specified areas; injaili fellings were permitted under the 'Kaval khandi' (boats tonnage) system and according to which, the contractor used to pay a fixed rate for each 'Kaval khandi' of fuel exported through boat. Under that system, a great deal of swindling took place, as boats were loaded with more fuel than the registered capacity (kaval).
- 68. The Kaval khandi system was stopped in 1894, and a new system was introduced whereby contractors were required to pay a certain fixed rate, per 100 cubic feet of stacked fuel, but this system was too stopped after the introduction of the working plans for Central and Southern Kolaba in year 1895 and 1898 respectively.

- 69. In addition to the disposal of teak and injaili as described above, dead-wood was disposed of under 'Kolpat' system, whereby the right of collecting dead-wood annually in the forest was recognized. This resulted in great damage to the forests, as it induced people to cut or kill a living tree surreptitiously in order to manufacture dead-wood for ensuing years. This system was stopped in the earlier nineties (or 1890), but the villagers, and the 'local tribes' were still allowed to remove dead wood on permit or grants basis, with the result unscrupulous killing of trees shall continued. Dead-wood was no longer sold on permit but the local tribes were still abusing the privilege and were manufacturing dead-wood.
- **70.** Protected forests is very small in extent that is 2.75 ha. and it was notified as Protected Forest under section 29 of I.F.A. 1927 vide notification no. RH/Desk-2/ for- 7929 dated 25st March1992. Similarly1640.68-ha. of unclassed area has also been transferred from the Revenue Department. The forest acquired under section 3 of Maharashtra Private Forest (Acquisition) Act 1975 has a status of Reserve Forest but had been excluded from –scientific management.. No scientific management was done in all these three categories.

SECTION: 2: PAST SYSTEMS OF MANAGEMENT AND THEIR RESULTS

71. This deals with certain forest area of Ratnagiri district with past systems of management and their results.

1) Reserved Forests of Ratnagiri district.

Thomson's working plan (1906-07 to 1922-23)

72. In the year 1906-07, Thomson drew up a revised working plan for whole of the Kolaba Division (including Bandh-Tivre reserves in Ratnagiri district) and it was immediately introduced, although it did not receive Government sanction until 15th July, 1908. This working plan prescribed for the coppice with standards system under a rotation of 40 years, and directed that 40 standards of various species should be repeat reserved per acre.

It was observed that these standards were suppressing the coppice growth and were likely to die before second rotation. The rotation fixed was too short for the forest to build up its capital value. For all these reasons its revision was deemed essential, and was accordingly taken in hand by Mr Starte in 1922-23.

Results of Thomson's working plan

73. Under the coppice with standards system, the selection of teak standards was very erratic in both quantity as well as quality, being too many in some places while too few at other places. Again many of them being unsound, old and suppressed, no financial benefit seemed to have been derived by their retention. The coppice was fairly profused and vigorous, but had suffered much from suppression by the overhead standards and other unsaleable injaili growth, which was remained intact in most of the coupes.

Starte's working plan (1924-25 to 1950-51)

74. In 1922-23, some annual coupes of Thomson's working plan were extended by 20 acres, and these were demarcated and were clear felled as an experimental measure. As the result of that experiment was encouraging in realizing better prices and obtaining profused regeneration of the valuable species, Starte prepared his working plan on that basis, which came to be introduced in 1924-25. This plan was later sanctioned by Government in 1926-27.

Table No. 11

Sr. No	Name of th working circle	Area acres	Silvicultural system	Coupes worked	Remarks
1.	Teak Timber W.C.	129572	Clear felling and planting	28 out of 65	-

Results of Starte's working plan

75. From 1943-44 onwards, advance coupes were worked from accessible localities for an increased production of charcoal, for supplying to Mumbai and Pune. This practice continued till 1947-48, when coupe no. 28 was worked along with other unsold coupes. In 1948-49, 1949-50, 1950-51, only those coupes, which remained unsold during the previous years, were worked.

In addition to advance fellings for charcoal, irregular fellings had to be made during 1941-1944 in order to supply 50000 ballies (teak rafters) of the various classes for the war efforts, from these forests. Similarly, sawar was supplied by irregular fellings.

As regards to regeneration, the working plan prescriptions prescribed planting of teak stumps on burnt patches (rabs). In 1934, this prescription was revised, and a minimum of 20 acres of plantation was prescribed in harvested coupes, the favourable sites being planted with teak stumps at 9' x 12' spacing and remaining areas with species like khair, ain, dhavada, kinjal and jamba. In addition to that, 20 rabs were required to be prepared for raising dry nurseries for teak stumps in each harvested coupe.

Upto 1934, the plantations were mostly carried out in burnt rabs at kiln sites. Thereafter large scale plantations were carried out up to 20 acres in each coupe. The plantations were successful only where the biotic influence was minimum. The biotic influences, which were responsible for the failure of plantations were mainly illicit cutting, the indiscriminate tahal cutting, illicit grazing and uncontrolled fire. Besides that, it appears that the staff, both protective and executive was inadequate. Further supervision became more slack due to War supplies during World War II period and due to adverse conditions prevailing in the post war period. So in areas, where biotic influence was minimal, , the young sapling growth was straight and promising and teak plantations raised on burnt rabs, did come up well. The effort of large scale planting was vigorous from 1935 till the beginning of War, but these were not continued with the same vigor, during the War period, and in the post War period. In general, the prescriptions of the plan though effective, were carried out only partially, in most of the case.

R.R. Chaudhari's working plan (1951-52 to 1967-68)

76. Shri. R.R. Chaudhari prepared the Working Plan for forest of Kolaba district. This plan was introduced in 1951-52 and was in force till 1968. The area of Dapoli forests was included in Main (Teak) Working Circle.

The Main (teak) Working Circle.

This working circle comprises of teak and mixed forests, with percentage of teak as high as 25%. The silvicultural system of this Working Circle was selection-cum-improvement-cum-clear felling system, with a felling cycle of 30 years. The coupes were divided into two components viz. 'a' and 'b'. The "a" component constituted of the forest areas, which were clear felled and planted under Starte's plan and component 'b' constituted of the areas, which were remained un-worked during Starte's plan. The selection girth for teak was fixed at 120 cms. GBH and for other valuable injaili species, it was kept at 90 cms. GBH.

Results of Chaudhari's working plan

1) Main (teak) Working Circle.

77. It was noticed that the volume check prescribed in the Working Plan had hardly exceeded in any annual coupe. It was therefore, evident that the figure arrived at for applying the volume check, appeared to be too high, and in practice, it was more or less ineffective. One of the important prescriptions, which was kept in abeyance, was the cultural operations to be done in coupes worked under Selection-cum-Improvement system. This has resulted in suppression and malformation of coppice growth, in the coupe and the objective with which the prescription was made, was defeated. Some of the teak plantations, where the cultural operations were timely carried out came up well.

Damle's working plan (1969-70 to 1988-89)

78. Shri.V.V. Damle revised the Working Plan of Shri. R.R. Chaudhary. He allotted the forests of BandTivre reserves (8 comptt.s) to conversion working circle, with three periodic blocks viz. P.B. I, P.B. II, and P.B. III. The prescription under P.B. I was mainly clear felling and planting with teak or khair, except on the steep slopes, or area with packets of advance growth or with the existing old plantations. In P.B. II, improvement fellings were prescribed, and in P.B. III, the areas allotted were mostly having young to middle aged crop worked earlier under clear felling system, during the Starte's Working Plan. The prescriptions in P.B. III were of selection system.

Results of Damle's working plan

It was observed subsequently that the conversion really did not take place to the full extent. The coupes were planted with teak plantation in small areas, which could generally easily be located. Similarly in P.B. III, the silvicultural works were not carried out with the result, the congestion existed and as such the revenue retarded. The plantations raised during Shri. Damle's plan were quite successful.

V.G. Takalkar's working plan (2002-03 to 2012-13) & its result

I- Protection Working circle (4730.74 Ha.)

No felling of trees of any kind was proposed under this Working Circle, and the annual coupe was divided into three felling series. It was envisaged to carry out soil and nature conservation works, such as check dams, gabian bandharas, nala bunding and gully

Plugging in accessible area, along with sowing or dibbling of seeds of local suitable forestry species, through protective staff. Minor forest produces like hirda, shikekai, apta leaves, kaju etc. were permitted to be collected by the local people. Mangrove forest areas were included in this working circle without any special prescription. This Working Circle has been retained by excluding mangrove areas.

Result - Most of these forest area are situated on the high slopes and spurs of Sahyadri hills and scattered in patches. The lower fertile slopes and flatter tops of the hills are malki lands. The flow of water is tremendous in forest area during heavy rainfall due to steep slopes. The remaining area of this Working Circle was mangrove forest. Therefore, the proposed soil conservation works—were not carried out. Sowing/ dibbling of seeds through staff was carried out, but results were not satisfactory.

Minor forest produce like shikekai, apta leaves, kaju, were auctioned yearly. The area of this working circle has been enriched due to natural regeneration caused by the rest, and the protective measures taken by the staff.

II- Improvement Working circle (1220.55ha.)

No clear felling in this Working Circle was permitted and only dead and wind fallen trees were allowed to be removed. Thinning in old teak plantation was proposed and planting of forestry species on CCT, in blank areas was prescribed, along with creation of nala bunds, gabian bandharas, gully plugging etc.

Result – Only the dead and wind fallen trees were removed. Thinning in old plantation was not carried out, as no congestion was reported. As there were no suitable blanks, the work of nala bunding, gabian bandhara, gully plugging etc were not carried out. The forest area in this Working Circle is dense and has few refractory rocky blanks. Afforestation work was not carried out. The forest of this working circle has been enriched due to natural regeneration, and protective measures taken by the staff. The stock has improved considerably.

III- Casuarina Working circle (160.38 ha.)

The clear felling of old Casuarina equisetifolia plantation was proposed, with a prescription of retaining ten rows towards sea side. This was to be followed by plantation of suru in January-February, at a spacement of 2m x 2m with the poly pot seedlings.

The uncovered plantable area was proposed for plantation during the Plan period. Thinning was proposed in casuarina plantation in 7^{th} year.

Result - Clear felling of casuarina plantation was not carried out, due to shortage of funds. Uncovered plantable areas were planted with casuarina seedlings raised in poly pots. The casuarina plantations raised in this working circle were successful. These were proved to be a good wind breakers and have given a good protection to plantations of kaju, coconut, mango, supari etc. adjacent to it, from the heavy wind flow from sea side. Work of thinning in casuarina plantation in 7th year was not carried out, as there was no congestion reported. Only wind fallen trees were removed. This Working Circle has been retained looking at the success of Casuarina plantations.

IV- Bamboo plantation (Overlapping) Working circle

Inter planting of bamboo was proposed in old teak plantations, immediately after thinning, and in new plantations, bamboo planting was proposed on CCT, along with other species, at suitable spacement.

Result - As there was no congestion reported in old teak plantations, thinning was not carried out. Hence inter planting of bamboo was not done. New plantation was also not raised, so here too bamboo was not planted.

V- Wild life Management (Overlapping) Working circle

It was proposed to give adequate publicity to the cause of wildlife protection by creating awareness among the local inhabitants. It was also proposed to provide water, shelter and salt licks to the existing wildlife where ever it was required. The planting of edible fruit trees were also prescribed. Along with special attention to protect the area strictly against fire, grazing and poaching, new water holes and anicuts were proposed in the Plan, at the selected sites.

Result - Public awareness camps were taken and pamphlets were distributed to each Grampanchayat in the District .The provisions of Wild life (Protection) Act 1972 were explained in the pamphlet and were read in Gramsabha on Republic Day function, and now it has resulted in a better awareness to the public towards the wildlife about. The area is strictly protected against the fire, by clearing and cutting of fire lines, and by appointing fire watchers. The area was also strictly protected against grazing and poaching, with the help of the field staff.

The work of new water holes, anicuts, providing shelter, salt licks could not be taken due to paucity of funds.

SECTION: 3: SPECIAL WORKS OF IMPROVEMENT UNDERTAKEN

- 79. In the past, a number of special works have been taken under various schemes for improvement of forests in the Division and notable among them are:-
- 1. Plantations Number of teak and other miscellaneous plantations have been raised during the past. The species planted are mainly teak, suru, khair, kaju and bamboo. The survival percentage in plantation is very good, except in case of bamboo, and partially in kaju. The growth of plantations is also satisfactory. The list of plantations raised in Ratnagiri Forest Division at Chiplun is given in following **Appendices**
- Appendix No. XXIII :- Statement showing list of yearwise plantation raised under different scheme since 1975 1976 to 2010-11 in Ratnagiri Forest Division, Chiplun.
- Appendix No XXIV: Statement showing classification of plantations (abstract) since 1975-76 to 2010-11 in Ratnagiri Forest Division, Chiplun.
- Appendix No. XXV:- Statement showing specieswise list of plantation raised under different schemes since 1975 76 to 2010-11. in Ratnagiri Forest Division, Chiplun.
- 2. Establishment of Nurseries There are few nurseries in the Division, for raising seedlings of forestry species which are required for raising plantations under various schemes.
- 3. Creation of Sanctuaries Chandoli Wild Life Sanctuary includes the forest area of Ratnagiri range (Gothane village of Sangameshwar taluka). The sanctuary was established in order to preserve the unique wild life in the tract dealt with. The sanctuary is now a part of Sahyadri Tiger Reserve. The copy of the notification is given in **Appendix No. XXVI.**

SECTION: 4: PAST YIELD

80. Damle's plan period had expired in the year 1988-89, which had prescribed for a yield, and in the previous plan (or current Plan) no yield was stipulated.

SECTION: 5: PAST REVENUE AND EXPENDITURE

81. There has been no harvesting of forest produce in the recent past. The revenue is basically from non-timber forest produce, and partly from wind fallen material of suru trees and from other timber seized in transit. The details are as follows.

Table No. 12

Year	Revenue (in Rs.)	Expenditure (in Rs.)
2000-01	2329233	7388814
2001-02	2412715	6719562
2002-03	2488004	7175669
2003-04	2835351	7258937
2004-05	2841144	8613191
2005-06	2983662	9891944
2006-07	4584490	10325773
2007-08	5165268	13375047
2008-09	4710587	15381906
2009-10	4264741	52503794

The revenue realizing NTFP are apta leaves, cashew fruits, shikekai, hirda, chillar, bark grass etc.

The major expenditure is under revenue head and a residual is on capital expenditure.

CHAPTER: VIII: STATISTICS OF GROWTH AND YIELD.

SECTION: 1: GROWTH

82. Sufficient growth data was collected during the revision of Starte's Working Plan for the reserved forests by Mr. Chaudhari. Complete stem analysis was carried out from 117 teak trees, cut from various places all over the reserved forests. While selecting trees, care was taken not to select exceptionally well grown trees from specially favoured sites like ravines and terraces. Well grown trees, with fairly straight and sound boles of over 42" in girth were taken from an average slope and soil. Two trees per felling series, first one from the lower region and second one from the middle slopes were taken so as to emphasize that the area is capable of producing a large sized timber.

The stem analysis was carried out on the large sized timber and age- height, age-diameter, age – volume and mean and current annual increment curves were drawn. In all calculations, it was assumed that it takes two years for a seedling to attain height of 5 feet.

83. The result derived from the average curves for the mean tree are tabulated in the form given below.

Table No.13.

Age in	Height in	Girth	in cms	Volume	M.A.I.	C.A.I.
years	mtr			in M3		
		Under Bark	Over Bark			
10	5.88	22.00	26.77	0.002	0.002	0.002
20	9.56	43.54	48.31	0.085	0.0042	0.0083
30	11.89	61.26	66.04	0.20	0.0067	0.0115
40	13.83	74.50	79.27	0.32	0.0080	0.0120
50	14.86	84.86	89.64	0.44	0.0088	0.0120
60	15.72	94.59	99.36	0.56	0.0093	0.0120
70	16.54	102.08	106.86	0.695	0.0099	0.0135
80	17.55	108.92	113.72	0.82	0.0103	0.0125
90	18.02	115.80	120.57	0.92	0.0102	0.0100
100	18.75	122.33	126.10	1.01	0.0101	0.0090
110	20.68	127.91	132.74	1.08	0.0098	0.0070
120	21.92	132.08	137.13	1.14	0.0095	0.0060

84. From the figures given in the table, it was concluded that the average teak tree attains a girth (over bark) of 47.47 inches, height 59.12 ft. and volume of 29.85 cft., when it is 90 years old. It was also observed from the curves of current annual increment and mean annual increment that it intersects at the age of 90 years and thus 90 years becomes the rotation of maximum volume production.

Besides stem analysis, stump analysis was also carried out on 107 teak trees and the result shows that the average girth of teak tree is 36.8" at the age of 61.16 years.

Similarly data collected for 22 Sawar (<u>Bombax ceiba</u>) trees during Shri Chaudhari's plan showed that an average Sawar tree attains a girth (over bark) of 51.31 inches, height 51.40 ft. and volume 30.45 cft., when it is 60 years of old. The current annual increment curve and mean annual increment curve intersects at the age of 80 years which is the age of rotation of maximum volume production.

The information collected by Mr. Chaudhary, at the time of revision of the last plan in respect of injaili trees, at the age 40 years showed following results.

Species Girth (at 40 years) inches (61.5 cms.) Ain 24.2 25.1 Kinjal inches (63.8 cms.) 22.04 inches (56.0 cms) Shisum Khair 22.8 inches (57.9 cms) Hed 28.9 inches (73.4 cms) Shivan 23.7 inches (60.2 cms)

Table No.14

SECTION: 2: STOCKING

85. The tree enumeration in this Division was carried out by SOFR Unit Nashik, during the year 1998-1999 in Protection Working Circle, of Working Plan of Ratnagiri Forest Division, written by Shri.V.B.Damale. The population sample area taken into consideration was 875.15 ha. and sampling in 8.62 ha was carried out. The sampling intensity was 1.00 percentage. Similarly the enumeration work was also carried out during the year 2011-12, by SOFR Unit Nasik, in Ratnagiri Forest Division, while revising the working plan of Chiplun Division. The population area under consideration was 5305.81 ha.

and the sampling area was confined to 8.82 ha. The intensity of sampling was kept as 0.17 percentage, and the growing stock were enumerated, by random sampling method, and the data was compiled by Chief Forest Statistician M.S.Nagpur. The results of comparison of past and current enumerations are given as below.

Table No.- 15 :

Estimated growing stock – No. of sound trees. (As per S.O.F.R. Data of 1998)

Species	15-30	30-45	45-60	60-75	75-90	90-105	105-120	120-135	135 & a	bove Total
Teak	44979	54816	45258	27970	16380	4748	2435	570	-	197146
Ain	33435	37323	32649	14053	5428	512	151	-	-	123551
Kumbha	2219	1574	1013	163	154	-	-	-	-	5123
Kinjal	28029	28092	25051	14637	7074	356	75	-	-	103314
Modhal	794	989	1779	1856	805	492	361	306 -		7462
Dha-	13974	5233	3250	875	227	-	-	-	-	23539
wada										
Bondar	11713	6805	2635	1536	728	-	-	-	-	23417
Sawar	841	1866	2117	2335	447	156	75	-	-	7855
Hed	2160	3424	1871	2590	445	-	-	-	-	10490
Dhaman	5118	1516	1281	33	-	-	-	-	-	7948
Total	143262	141638	116884	66056	31688	6264	3097	956	-	509845
Others	7250	5166	6034	1496	1421	454	209	639	454	23123
G.total	150512	146804	122918	67552	33109	6718	3306	1595	454	532968

<u>Table No. -: 16</u>

Estimated growing stock (consolidated) – No. of sound trees.

(As per S.O.F.R. Data of 2011)

ζ.	(
species	15-30	30-45	45-60	60-75	75-90	90-105	105-120	120-135	135-150	150& above	Total
Teak	58412	38802	30252	16246	11765	8403	7283	0	0	0	171163
Ain	36562	38105	27032	15126	5324	6303	5743	2801	0	701	141897
Kumbha	0	0	0	0	0	0	0	0	0	0	0
Kinjal	0	0	0	0	0	0	0	0	0	0	0
Moha	560	0	0	0	0	0	0	0	0	0	560
Dhawada	0	0	0	0	0	0	0	0	0	0	0
Bondar	2942	2942	3922	8124	4482	2801	0	0	0	0	25213
Sawar	2521	2241	1681	560	1120	0	0	0	0	0	9804
Hed	0	0	0	0	0	0	0	0	0	0	0
Dhaman	0	0	0	0	0	0	0	0	0	0	0
Total	99877	82090	62887	40056	22691	17507	13026	2801	0	701	341636
other	273273	111416	123356	92869	49473	28115	15668	8318	3282	1962	707732
Grand total	373150	193506	186243	132925	72164	45622	28694	11119	3282	2663	1049368

Table No.-17

Name of W.C.	No. of trees/ha. As per	No. of trees/ha. As per
Enumeration per ha.	1998 SOFR data	2011 SOFR data
I.W.C.	608.98	264.623
Casuarina W.C.		113.877
P.W.C.		142.005
Weighted average	608.98	197.776

The Working Plan of then Chiplun Forest Sub-Division contained three working circles:-

- (i) Protection Working Circle
- (ii) Improvement Working Circle
- (iii) Casuarina Working Circle and from above data, it is evident that the present stock is only 32.47% of the growing stock available during Shri Damale's Plan, written in the year 1998-99. The enumeration result of sampling in year 2011 by S.O.F.R. Unit, Nasik was classified as General Utility Species, Special Utility Species and Minor Forest Produce and the detail is as given below:-

Table No.-18

Sr.	Name of	Total	G.U.	S.U.	M.F.P.	Other
No.	W.C.		Spp.	Spp.	Spp.	Spp.
1	I.W.C.	264.623	107.709	5.667	19.501	131.746
2	P.W.C.	142.005	27.913	0.542	2.439	111.111
3	Casuarina	113.877	-	-	-	113.877
	W.C.					
4	Total	197.776	63.754	2.903	10.269	120.850
	weighted					
	average					
5	Percentage of	100	32.24	1.47	5.19	61.10
	Stock to total					
	stock					

From the above statistical data of recent enumeration, it is evident that, species of General Utility such as ain, teak, nana are consisting 32.24 percent of the growing stock, and is approximately 1/3 of the total growing stock.

The species of Special Utility, such as khair,sawar,shivan are 1.47 percent while M.F.P. species such as amba, bhehada, chinch, palas, kaju, moha, shiras constitutes 5.19 percent of the total growing stock, and the remaining species such bahawa,umbar,anjani, are 61. 10 percent to the total growing stock.

In the year 1998.99 and 2011.12, tree enumeration work was carried out in the various W.C. of Chiplun Sub-Forest Division and a comparative chart of these two surveys is given below.

Table No.19
No of trees/ha.

Year of	G.U.spp.		S.U.	M.F.P.	Other	Total
Enumeration	Teak	others	Spp.	Spp.	Spp.	
1998	225.26	167.93	20.97	N.A.	194.82	608.98
2011	32.26	31.49	2.90	10.27	120.85	197.77
Difference	-193.00	-136.44	-18.07	-	-73.97	-411.21
Percentage	-85.68	-81.25	-86.17	-	-37.97	-67.52

Table No-20

Girth class-wise distribution during 1998 and 2011 No. of trees/ha.

Year	15-30	30-45	45-60	60-75	75-90	90-105	105.120	120.135	135 &	Total
									Above	
1998	171.97	167.74	140.44	77.19	37.83	7.69	3.78	1.82	0.52	608.98
2011	70.33	3643	35.10	25.05	13.60	8.60	5.40	2.09	1.12	197.77
Diffe- rence	-101.64	-131.27	-105.34	-52.14	-24.23	+0.91	+1.62	+0.27	+0.60	-411.21
Perce	-59	-78	-75	-68	-64	+12	+43	+15	+115	-68
ntage										

From the above table, it implies that overall stock has reduced by 68 percentage as compared to the stock survey carried out in year 1998-99.

From the above table it is also evident that there is a decreasing trend in lower girth class. The distribution of growing stock in girth class 15-90 cm. during the enumeration in 2011-12 has reduced by nearly 91.30 percent, but the growing stock above 90 cm girth class was observed to have increased by 8.70 percent. The analysis of the growing stock collected in year 2011, reveals the existing stocking is 197.77 trees/ha., for the entire

Division. The stocking of trees/ha. for each of the W.C. is as follows. 1) P.W.C. -142.005 trees/Ha. 2) I.W.C. -264.623 trees/Ha. 3) Casuarina Working .Circle. 113.877 trees/Ha. (Trees including poles). The detail statement showing W.C.wise enumeration results is given in following Appendices of Volume II. Statistical Analysis.

Appendix No. XXVII – Statement showing enumeration results of Protection Working Circle.

Appendix No. XXVIII – Statement showing enumeration results of Improvement Working Circle.

Appendix No. XXIX – Statement showing enumeration results of Casuarina Working Circle.

The field work of enumeration was carried out by the territorial wing of then Chiplun Sub-Division, under the statistical design given by Chief Forest Statistician, M.S. Nagpur. The data has been analysed and has been complied in Nagpur and is enclosed in Appendix No. **XXVII,XXVIII, XXIX** The sampling intensity was kept as 0.17% implying a high standard error.

86. The sampling design and overall technical guidance for the enumeration was provided by the Chief Forest Statistician, M.S. Nagpur. The statistical design adopted was "Systematic Line Plot Sampling with Random start for tree enumeration. The plot size of 30mx30m was found to be suitable, with the least standard error. Out of total 98 plot which were laid in the field, 41 plots laid in areas allotted to P.W.C., 49 plots in I.W.C. and 8 plots in Casuarina .Working .Circle.

In a total forest area of 5305.81 ha. sampling in 8.82ha. were carried out. The intensity of sampling arrives at 0.17 percent.

87. Growth regeneration equation by F.S.I.

F.S.I. has carried out a detailed study of relationship between volume and diameter for the different species in different regions of India. The species relevant to Chiplun (Ratnagiri) Forest Division, is reproduced bellow.

Sr.No.	Species Name	Volume Equation				
1	Tectona grandis	$V=0.2414+2.8458D-5.5816D^2+14.816D^3$				
2.	Terminalia tomentosa	√V=0.203947+3.159215D				
3.	Syzygium cumini	\sqrt{V} =0.30706+5.12731d-2.09870VD ²				
4	Artocarpus hirsute	V=0.076-1.31D+11.370D ²				

Sr. No.	Species Name	Volume Equation
5	Butea monosperma	√V=0.24276+2.95525D
6	Wrightia tinctoria	$V=0.028917-7.777047DS^3$
7	Boswellia serrata	$\sqrt{V} = 0.11629 + 2.4254D$

Similarly Southern Tropical Research Institute, Coimbatore has produced regression equation for <u>Casuarinas equisetifolia</u> which is produced as below.

$$\text{Log v} = -6.11502 + 1.71370 \log D + 1.56559 \log H.$$

Similarly by using the data of preservation plot, maintained by the Research Wing of Forest Department of Maharashtra State since 1933, and by using the formula provided in Silvicultural Research code vol. 3 for calculating the age of the plant, not having the ring formation and by using three consecutive diameter reading, at interval of five years, the following relationship between age-diameter has been found.

Tree species

Sr. No.	Scientific name	Local name	Age-Diameter
			Equation
1.	Butea monosperma	Palas	y=3E-05X3 -0.012X2 + 2.247X
			+0.059
2.	Terminalia tomentosa	Ain	y=2E-07X4 -8E-05X3 -0.001X2
			+1.903X-0.013
3.	Holarrina	Kuda	y=0.000X3 - 0.045X2 +3.521X +
	antidysentrica		7.699
4.	Acacia catechu	Khair	y=0.012X3 - 0.499X2 + 7.992 +
			0.708
5.	Terminalia bellerica	Behada	y=0.000X3 -0.092X2
			+5.627X+0.416
6.	Emblica officinalis	Awala	y=5E-05X3 -0.010X2+ 0.972X+
			2.821

SECTION -3: YIELD

88. It is not proposed to carry out systematic felling in any of the areas of the tract dealt with in this plan .Hence estimation of yield has not been done.

CHAPTER: IX: WILD LIFE PRESERVATION

SECTION: 1: DESCRIPTION OF HABITAT

89. Details regarding distribution of wild life in Ratnagiri district has not been mentioned anywhere in past, as the forest in the district was quite a meager. The Gazetteer for Ratnagiri district states that the district has few pockets of good forests exist, size of most of these are situated on the precipitous slopes of Sahyadry's range and from the sportsman point of view, it was essentially a poor district. Large game such as tiger, sambar, and bear were scarce and were difficult to spot. To spot a gaur, the boundary of the district must be over stepped out. However the sighting of panther and wild boar has been reported, but mostly out of the forest areas. Hare, jackals and foxes inhabit the steep, rocky hills. Barking deer (Muntijak vajinalis), sambar (Run unicolor nigra), neelgai (Boselaphus trago camehs), and mouse deer (Tragules meminna) are occasionally found. The ever-growing pressure of population, the development of roads and mechanized means of transport have an adverse effect on wildlife conservation, and needs to be address immediately.

SECTION: 2: MEASURES ADOPTED FOR PROTECTION

90. Poaching was not uncommon in forests, so the previous plan prescribed for a great vigilance to check the poaching and to save the wildlife from further destruction.

In Shri. Damle's plan, there was no separate working circle for wildlife conservation and for its promotion; but much emphasis was laid on vigilance to check poaching. Considering the population of wildlife in this tract, and an imperative need to preserve biological diversity, it is essential to make provision in the new plan for wild life conservation.

The Govt. has made a provision of compensation for damages to human life, by the wild animals. The copy of the Govt. Resolution is given in **Appendix No. XXX.**

SECTION: 3: STATISTICS OF WILDLIFE CAPTURED OR HUNTED IN LAST 10 YEARS.

91. The information regarding illegal hunting of big games, small games and captured big games and small games during the last 10 years i.e. 2001-02 to 2010-2011 is nil. However the information regarding attack on domestic animals by the wild animal is given in **Appendix No. XXXI.**

CHAPTER: X: THE ESTIMATE OF CAPITAL VALUE OF THE FORESTS

SECTION: 1: THE CAPITAL VALUE OF THE FORESTS.

92. Anticipated Annual Yield and Revenue:-

The present working plan emphasizes on development of forests and conservation of biodiversity in the ecologically Sensitive Western Ghat, coastal forests and mangrove forests of Ratnagiri Division. Therefore revenue generation is not prime objective. Annual yield of timber, pole, fire wood will be very negligible. Some small timber is expected from old plantation management, however anticipated yield and revenue is not calculated.

SECTION: 2: FINANCIAL IMPLICATION OF TEAK PLANTATIONS RAISED.

93. The financial implication of teak plantations raised.

Table No.21

Environmental Benefits derived from medium size.

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	Conservation to animal protein	0.20	01.80	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

Total Environmental value of Ratnagiri Forest Dn.-128.74 x 6705.50=Rs.863266.07 lakhs

PART – II FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED

PART II: FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED CHAPTER-I- BASIS OF PROPOSALS

SECTION 1: NATIONAL FOREST POLICY

94. In the year 1952 the Govt. of India, vide Ministry of Food and Agriculture, Resolution No. (Agri.) 13-1/52, dated 13.5.1952, declared the National Forest policy, in revision to its earlier Forest Policy of India 1885. Since then development of far reaching consequence in social, economic and political field have taken place and role played by forests in various spheres of national life came to be better understood. In 1988, thereafter National Forest Policy of 1952 was modified by Govt. of India vide No.3-/86-EP, in it's Ministry of Environment and Forest dated 7th December, 1988. It will be the guiding principle to deciding the general object of management.

The basic objectives governing the new National forest policy of 1988 are as under:

- i) Maintenance of environmental stability through preservation and where necessary restorations of ecological balance that has been adversely disturbed by serious depletion of the forests of the country.
- ii) Conserving the National heritage of the country by preserving the remaining natural forests with the vast variety of flora and fauna which represents the remarkable biological diversity and genetic resources of the country.
- iii) Checking soil erosion and denudation in the catchment areas of rivers, lakes, reservoirs in the interest of soil and water conservation for mitigating floods and droughts and for the retardation of siltation of reservoirs.
- iv) Increasing substantially the forest/tree cover in the country through massive afforestation and soil conservation programmes, especially on all denuded, degraded and unproductive lands.
- v) Meeting the requirements of fuel wood, fodder, non-timber forest produce and small timber of rural and tribal populations.
- vi) Increase the productivity of forest to meet essential national needs.

 Encouraging efficient utilization of forest produce and maximizing substitution of wood.

- viii) Creating a massive people's movement with the involvement of women for achieving these objectives and so minimize pressure on existing forests.
- ix) The derivation of direct economic benefit must be subordinated to environmental stability and maintenance of ecological balance.

Strategy and salient features of National Forest Policy of 1988 are as under:

- i) Bring one third of the total land area under forest or tree cover.
- ii) Severe restriction on schemes and projects which interface with forest that clothe steep slopes, catchments of rivers, lakes and reservoirs.
- iii) No working of forests without the Government of India having approved the Management Plan.
- iv) Non-introduction of exotic species without long-term scientific trials.
- v) The rights and concession including grazing, to always remain related to the carrying capacity of the forests.
- vi) Rights and concessions which cannot be met from the forests to be met by development of social forestry.
- vii) The rights and concessions enjoyed by the tribal should be protected. Their domestic requirements of fuel wood, fodder, non-timber-forest produce and construction timber should be the first charge.
- viii) Forest management plans to take special care of the needs of wildlife conservation.
- ix) Effective action should be taken to prevent encroachments on the forest lands and the existing encroachments should not be regularized.
- x) Forest based Industries should raise the raw material needed by themselves in arrangement with the private cultivators.
- xi) Survey of forest resources to be completed on scientific lines.
- xii) For domestic energy, fuel wood needs to be substituted as far as practicable with alternative sources like biogas, L.P.G. and solar energy. Fuel efficient "Chullahs" as a measure of conservation of fuel wood needs to be popularized in rural areas.
- xiii) Diversion of forest lands for non-forest purpose should be subjected to careful scrutiny.
- xiv) People should be made forest conscious through extension.

SECTION:2: MAHARASHTA FORESTRY POLICY, 2008.

95. Maharashtra State has prepared the "Maharashtra Forest Policy, 2008" with focus on 'Sustainable management of forests and wildlife in the State'. The policy also focuses on formulation of Districtwise plan for achieving 33 % of forest cover in the State.

Some of the Objectives of the policy include:

- To achieve sustainable development and conservation of forests through their scientific management, this will help in maintaining ecological balance and environmental stability.
- Afforestation on wastelands for soil and water conservation.
- To increase forest cover on available government, public and private lands through participation of women and unemployed people, with the help of Social Forest and Agricultural nurseries.
- Implementing long term plans and action plans for Conservation of wildlife and biodiversity.
- Management of Catchments areas for soil conservation
- Joint Forest Management.
- Eco-tourism policy
- Reduction in use of timber and other forest produce.
- Establishing Forest Development Corporation of Maharashtra (F.D.C.M.)

Working Strategies:

Afforestation through Social / Community Forestry:

Afforestation will be done on wastelands and saline soils. Tree for firewood, fodder and NTFP (Non Timber Forest Produce) will be planted. The work will be done through Social /Community Forestry with involvement of local people.

SECTION: 3: FACTORS AFFECTING THE GENERAL OBJECTS OF MANAGEMENT

96. The important factors which influence the objects of management are as follows.

- 1) The precipitous slopes are having sparse tree growth at places and it needs to be preserved.
- 2) A large forest area has a middle aged crop, which requires improvements through silvicultural operations.
- 3) Most of the topography is undulating with moderate to steep slopes. Erosion of soil is a major concerned in such area.
- 4) The wildlife habitat is under threat due to illicit felling, forest fire and encroachment.
- 5) Rab burning is very common practice in the area. Local people lop trees from the forest for burning of rab, in order to grow nursery or paddy crops.

SECTION: 4: GENERAL OBJECTS OF MANAGEMENT

- **97.** Taking into consideration the above fact and guidelines elaborated in National Forest Policy of 1988, the objects of management of these forests are set out as under.
- 1. Maintenance of ecological balance and conservation of national heritage by preserving the natural forests and biological diversity.
- 2. Checking soil erosion and denudation in the catchments areas of rivers, streams to protect them from siltation.
- 3. Increasing the productivity of the forests to meet the essential national needs.
- 4. Increase forest cover through afforestation wherever necessary /possible.
- 5. To motivate and actively involve the local people in development and protection of forests.

SECTION: 5: ANALYSIS AND EVALUATION OF CROP

98. <u>Stock Maps</u>- During the preparation of Working Plan the all compartments have been stock mapped and stock position have been shown on village maps.

The analysis of stock mapping is as bellows

Sr.	Semi	Well	Under	Blank area	Mangrove	Site
No.	Evergreen	stocked	stocked		area	quality
	Forest	mixed	area			
		forest				
1	3 %	31.04 %	20.80 %	32.99 %	12.17 %	IVa ,IVb

In this forest division, the major area is on the western side of the sahyadri and these slopes are very steep. The few area of the Dapoli range having medium slope and all

these area is covered by the crop. Due to this reason, the plantation programme is not regularly adopted. The area of creeks is covered by mangrove which is 12.17 % of the total forest area.

SECTION: 6: FUNCTIONAL CLASSIFICATION OF FORESTS (As per G.R. of 1968) (a) PROTECTION FORESTS.

99. These are the forests which occur on very steeps and precipitous hills viz. 25 degree and above, forming catchments of streams, rivers and irrigation projects and have depleted through maltreatment and further exploitation. This has further accelerated the soil erosion. These forests are confined to Sahyadri ranges in eastern and western part of the Division. These forests are important from soil and moisture conservation point of view. Protection forests are included under protection working circle of this working plan. The extent of forest area under this category is 4235.69 ha. which is 63.14 percent of the total forest area dealt with under this plan.

TREE FORESTS.

100. The forests capable of producing large size of timber and products of commercial importance are situated mainly in Dapoli tahsil and to some extent in Mandangad tahsil. The total area under this category is 1254.72 ha. which is 18.70 percent of the total forest area dealt with under this plan.

MINOR FORESTS.

101. These are the forests which can yield small timber, firewood, fodder and provide grazing but are incapable of providing big size timber. These forests have suffered a lot due to adverse biotic factors such as grazing, illicit cutting etc. Major portion of these forests are easily accessible. They include the few areas from Mandangad, Chiplun, Lanja, Rajapur and Sangamehwar tahsils and also area of conversion working circle of Shri. Damle's plan. The extent of forest area under this category is 1504.00 ha. which is 22 percent of the total forest area dealt with under this plan.

SECTION 7: GRAZING POLICY

102. The Government of Maharashtra by its R.F.& D. Resolution No.MFP-1368/132-(ii)Y, dated 6th Dec., 1968 formulated the grazing policy for the entire State, with an object to have a uniform grazing policy throughout the State. The policy aims at providing ideal pasturage within the available resources in the state forests without letting the

resources impair or deteriorate. In view of above, the Government of Maharashtra vide Revenue and Forest Department Resolution No.MFP-1371/237035-Z, dated November 03, 1973, promulgated the grazing rules to illustrate the regulatory character of the forest grazing. The important features of the grazing rules are as below.

- (i) All grazing in the forest (whether free or otherwise) would be on permit only.
- (ii) Each Forest Division will be divided into grazing units and the issue of license is subject to such definite allotment of villages to a particular grazing unit, to such limitation on the number of cattle grazed in any such units, as may have been ordered by the Government after special enquiry and also to such closure to grazing as may be enforced in accordance with the prescriptions of sanctioned working plans.
- (iii) For excess cattle, license at prescribed rates may be taken out for any grazing unit, provided, there is a room in the grazing units.
- (iv) For free grazing of cattle of cultivator family and others, licenses are limited to the period of June 15 to July 31 only.
- (v) A grazing license can be refused over a period of one year to any individual, who has been guilty of persistent illicit grazing, on the order of the Conservator of Forests. Government otherwise may refuse grazing license for a community, whose members have been guilty of persistent illicit grazing.
- (vi) Computation of cattle units are made as per the following:-

	Table No.22	
Age Group of	Equivalent	Grazing Fees
Cattle	Cattle unit	
Adult buffalo	2	2.00
Adult Cow Bull or bullock	1	1.00
Buffalo Calf (Less than a year, but	1	1.00
more than 6 months old.		
Cow Calf (less than 3 years, but	1/2	0.50
more than 6 months old)		

- (vii) Essential cattle, subject to a maximum of two plough units per cultivator family, should be allowed free grazing in forests. A plough unit shall mean 4 cattle units.
- (viii) The patwari/Talathis/Gram Sevaks shall issue a certificate on demand to all cultivator families entitled to graze cattle free.
- (ix) Each grazing unit and the villages served by it shall constitute a grazing circle.There will be a license Vendor to issue passes.

The following is the maximum permissible grazing incidence permitted in each category of forests as stated in the functional classification.

- (a) <u>Protection Forests</u>:- Because of steep and precipitous nature of terrain, grazing should altogether be prohibited here, except in exceptional cases, where to the incidence should not exceed one cattle unit for 4 hectares (10 Acre).
- (b) <u>Tree Forests:-</u> The grazing incidence of these forests should be one cattle unit for 1.2 ha.
- (c) <u>Minor Forests:-</u> The grazing incidence for these forests should be one cattle unit for 0.6 to 0.8 ha.

SECTION 8: RESERVE AND PROTECTED FORESTS.

103. The previous Working Plan dealt only with the Reserved Forest incharge of Chiplun Forest Division, and dealt them mostly under Improvement Working Circles and Protection Working Circle. This working plan includes all the area, incharge of and now Divisional Forest Officer, Ratnagiri). These Mangrove areas, right now catagorised as unclassed, an independent working circle has been created to provide a special treatment to these unique forests.

SECTION: 9: METHOD OF TREATMENT

104. In view of above consideration, the method of treatment to be proposed to the forests dealt with under this plan according to their functional classes is as under.

TREATMENT FOR PROTECTION FORESTS:-

105. Protection forests are the forest occurring on very steep and precipitous slopes and here the rain fall exceeds 2000 mm. These forests are confined to Sahyadri ranges and are important from soil and moisture conservation point of view and form a very delicate ecosystem. Due to its location, it is the area which is the origin of the numerous watersheds for various streams and rivers. Keeping these important facts in view, the areas

will be protected from felling; fire and grazing in order to prevent soil erosion and thus to avoid situation in the tank, and the adverse effects on productivity of agriculture land in the lower region. The area of this category of forests is 4362.48 ha.

TREE FORESTS

106. The forests capable of producing large size timber and products of commercial importance are situated mainly in Dapoli tahsil and partly in Mandangad tahsil. The total area under this category is approximately 1350 ha.

MINOR FORESTS

107. Forests producing firewood and some small timber are included in this category and are scattered all over the district. The area is approximately 1000.00 ha. These forests require sincere attempts of improvement, both in quality as well as in quantity. As a matter of fact, the primary treatment for these forests will be improvement of stock qualitatively and quantitatively by planting of good quality seedlings, singling out of congested and stunted coppice growth and soil and moisture conservation works. The material that will be obtained incidentally will cater the needs of local people. This area also includes mangrove forests.

108. The main criteria's for the formation of working circles are as under

- 1. Topography and accessibility of terrain.
- 2. Type and quality of the forests.
- **3.** Silvicultural requirements of the crop.

109. In view of the general objects of management and different methods of treatment required by different areas, as discussed in above para. The following working circles have been proposed.

	1 1		
1.	Protection working circle	Area-	4362.48 ha.
2.	Improvement working circle	Area-	1366.66 ha.
3.	Casuarina working circle	Area-	0153.00 ha.
4.	Mangrove Working Circle	Area-	0816.56 ha.
5.	Miscellaneous Working Circle	Area-	7.80 ha.
6.	Bamboo plantation (over lapping) working circle	Area-	1366.66 ha.
7.	Wild life (over lapping) working circle	Area-	6706.50 ha.

<u>Table No.23</u> Comparison of area under various working circles

Sr.No.	Name of working circle	Area of working circle	Area of working circle as
		as per Mr. Takalkar's.	per proposed working
		working plan	plan
		(Area in ha.)	(Area in ha.)
1.	Protection Working Circle	4730.74	4362.48
2.	Improvement Working	1220.55	1366.66
	Circle		
3.	Casuarina Working Circle	160.38	153.00
4.	Mangrove Working Circle		816.56
5.	Misc.working circle		7.80
	Total	6111.67	6706.50
6.	Bamboo Overlapping	172.50	1366.66
	Working Circle		
7.	Wildlife Overlapping	6111.67	6706.50
	Working Circle		
8.	Minor forest produce (over		
	lapping) working circle.		6706.50 ha

110. The National Forest Policy lays an importance on participation of local people through JFM mechanism. However in Ratnagiri Forest Division at Chiplun, the forest management through participatory mechanism, that is JFM, is difficult to implement due to reasons as bellow.

The extend of area being covered under working plan is only 6706.50 ha.

- a. Out of this, 962.23 ha. area of forest area is at Dapoli and is bestowed with an excellent forest, which needs a separate attention.
- b. The area on western slopes of Sahyadri is very steep and it is not possible to implement JFM for want of working in the area. The extent of such area is almost more than 60 %.
- c. Most of the forest patches are small in extent and are spread all over the entire district.

- d. The area along sea shore is mostly under mangrove forest, which needs basically protection. However, a participatory approach to conserve them, and harvest only minor forest produce can be done through Joint Forest Management.
- e. The privately owned forests exist in the area from which the local needs of timber and firewood are met with, by the local people; hence there is a less inclination for a participatory management.
- f. There is a continuous migration of younger generation to the metropolitan cities like Mumbai.

Joint Forest Management approach is needed for eco-tourism and for harvesting of biological products such as honey, clashing of shrimps from mangrove eco system.

SECTION: 10: FORMATION OF WORKING CIRCLES WITH AREA. FUNCTIONAL FORESTS ALLOTTED TO VARIOUS WORKING CIRCLE. RANGEWISE ALLOTTED TO VARIOUS WORKING CIRCLE

111. The following table gives a distribution of functionally classified area into various working circle.

<u>Table No.24</u> **Area Allotment as per New W.P. and old W.P.**

Sr.	working Circle	Old working	New working	Different in
No.		Circle	Circle	area
1.	Protection working circle	4730.74	4362.48	(-) 368.26
2.	Improvement working circle	1220.55	1366.66	(+) 146.11
3.	Casuarina working circle	160.38	153.00	(-) 7.38
4.	Mangrove working circle		816.56	(+) 816.56
5.	Miscellaneous Working circle		7.80	(+) 7.80
	Total	6111.67	6706.50	(+) 594.83

Note- In old working plan, total area included in protection working circle was 4730.74 ha. and casuarina working circle was 160.38 ha. The area of 368.26 ha. out of protection working circle (4730.74 ha.) is included in Mangrove working circle, & Improvement W.C. also area of 7.38 ha. out of casuarina working circle (160.38 ha.) is included in Mangrove working circle.

Thus the area newly added & above mentioned are included in Mangrove Working Circle area (816.56 ha.)

In working plan of period 2002.03 to 2011.12 (by shri. V.G.Takalkar,) total area of 6111.67 ha. is mentioned but after scrutinity of area total area is 6121.50 ha. In Lanja felling series the difference in total area is 9.10 ha.

Table No.25

RANGEWISE ALLOTTED TO VARIOUS WORKING CIRCLE

Sr.	Name	Prote	Improve-	Casua	Man	Mis.	Total	Bamboo	Wild-	Minor
No.	of	ction	ment	rina	grove	W.C.		(O.L)	life	Forest
	Range	W.C.	W.C.	W.C.	W.C.			W.C	(O.L)	Produce
									W.C	(O.L)
										W.C
1.	Dapoli	2462.31	1129.35	4.41	261.68	1.68	3859.43	1129.35	3859.43	3859.43
2.	Ratnagiri	1583.74	186.83	80.79	326.48	-	2177.84	186.83	2177.84	2177.84
3.	Chiplun	316.43	50.48	67.80	228.40	6.12	669.23	50.48	669.23	669.23
	Total	4362.48	1366.66	153.00	816.56	7.80	6706.50	1366.66	6706.50	6706.50

In accordance with the considerations detailed above the following working circles have been formed.

- (i) Protection Working Circle.
- (ii) Improvement Working Circle.
- (iii) Casuarina Working Circle.
- (iv) Mangrove Working Circle.
- (v) Miscellaneous Working Circle
- (vi) Bamboo (overlapping) Working Circle.
- (vii) Wildlife (overlapping) Working Circle.
- (viii) Minor forest produce (overlapping) Working Circle

SECTION: 11: BLOCKS AND COMPARTMENTS

- The forest area of Dapoli tahsil was earlier divided into 8 compartments in Shri. Damle's working plan, and now the rest of the area in-charge of Forest Department has been divided into compartments for the first time. All these compartments have now been given a new compartment number serially. The whole area covered under this plan has been divided into 60 compartments. The smallest compartment is about 7.59 ha. and the largest compartment is about 419.13 ha. The Dapoli forest block is the biggest block in Ratnagiri Forest Division.
- 113. Statement showing No. of compartments and area in hectares of different working circles is given below and a further details of working circle wise allotment of areas to ranges, rounds and beat wise is given in **Appendix No. XXXII**

Table No. 26

No. of compartments and area in hectares of different working circles.

Sr.	Name of	Compartments included	Total
No	Working Circle		area in
•			ha.
1.	Protection w.c.	15c,16,17,18, 19, 20, 21,22,23,24,25,26, 28a,	4362.48
		28b,29, 30c 35, 36a,36b, 37, 38, 41,50a,50b,51,	
		52,53a, 53b,54a, 54b, 59b,	
2.	Improvement w.c.	6a,6b,7,8,9,10a,10b,10c,11a,11b,12,13a,13b,14,15a,	1366.66
		27d,	
		30a,30b,31a,39a,39b,45,46a,46b,47a,47b,47c,47d,47	
		e,48,.49a,49b,49c,55a,55b, 60c.	
3	Mangrove w. c.	1a,1b,1c,2a,2b,3a,3b,3c,3d,3e,4a,4b,5a,5b, 27a 27b,	816.56
		27c, 32a,32b,32c, 32d,32e, 32f,32g, 32h,33a. 33b,	
		33c, 33d, 40,42pt,43a, 43b,44a,44b,56,57a, 57b. 57c,	
		58a, 58b, 58c, 59a,60a,60b,	
4	Casuarina w. c.	15b,34,41Pt.,42Pt,44c,	153.00
5	Misc. W.C.	15a, 31b, 32a.	7.80
	Total		6706.50
6	Bamboo plantation	6a,6b,7,8,9,10a,10b,10c,11a,11b,12,13a,13b,14,15a,	1366.66
	(over lapping) w. c.	27d,	
		30a,30b,31a,39a,39b,45,46a,46b,47a,47b,47c,47d,47	
		e,48,.49a,49b,49c,55a,55b, 60c.	
7.	Wild life (Over		6706.50
	lapping) w. c.		
8.	Minor forest produce		6706.50
	(over lapping)		
	working circle.		

The abstract of the talukawise & working circle wise distribution of the area is given in **Appendix No. XXXIII.** and a accordingly the management map has been digitally prepared and shown as **Appendix No. D.**

SECTION: 12: PERIOD OF THE PLAN

114. It is proposed to keep the period of this plan as 10 years from the date of sanction of this Plan by the Govt. of India.

CHAPTER : II WORKING PLAN FOR PROTECTION WORKING CIRCLE.



CHAPTER: II: WORKING PLAN FOR PROTECTION WORKING CIRCLE.

SECTION: 1: GENERAL CONSTITUTION OF THE WORKING CIRCLE

115. This working circle includes forests situated mostly on upper hill slopes, which are either on very steep or precipitous in nature; viz 25 degree (46.37 %) and more; and this working circle also includes the area, occurring on the slopes forming the catchments of streams and rivers. These are situated on the Western Ghats, which also forms the Eastern boundary of the area dealt with. Due to steepness of the mountainous slopes, the area is mostly devoid of tree growth or having a stunted and sparse tree growth, and the vegetation occur only in shelter valleys, which are practically inaccessible. The area falls in high rainfall zone and the most of the surface soil has been washed away due to lack of protective layer of vegetation. The only exception is the catchment of nallas and rivers, which are still wooded and are situated on moderate to steep slopes. These areas are included in this working circle, in order to give to them a complete protection. This working circle also includes steep to precipitous (>20°) slopes, and inaccessible forest areas of Khed, Chiplun, Sangameshwar, Lanja and Rajapur tahsils.

116. The area of this working circle is 4362.48 hectares, which is distributed in different ranges as below.

Table No.27
The Range wise area of protection W.C.

Sr.	Range	Forest Area	Protection	Percentage of	Percentage to the
No		ha.	Working	the forest area	forest Area of the
			Circle Area ha.	of the range	division.
1	Dapoli	3859.43	2462.31	36.72	56.44 %
2	Chiplun	669.23	316.43	4.71	7.25%
3	Ratnagiri	2177.84	1583.74	23.62	36.31%
	Total	6706.50	4362.48		65.06 %

117. The total area of this working circle is 4362.48 ha. and it excludes 816.56 ha. of mangrove area, which was initially in this working circle of earlier plan under revision

and now has been included in a separate working circle **Appendix No. XI.** The area of protection working circle is 4362.48 ha. which is about **65.06** percent of the total area dealt under this plan (6706.50 ha.). **Appendix No-XXXIV.**

SECTION: 2: SPECIAL OBJECTS OF MANAGEMENT

118. Observing the unique topography of the area, the following special objects of management are envisaged herewith.

To maintain the existing vegetal cover in order to prevent leaching out of salt and to prevent further laterization of soil, due to heavy rains and to prevent soil erosion in the area.

To improve the forest cover by gap planting of local tree species and bamboo in an under stocked forest areas, wherever possible.

To improve sub soil water regime.

To maintain water quality of the stream and river by preventing siltation.

To prevent siltation of dams by maintaining in their catchment areas.

SECTION: 3: GENERAL CHARACTERS OF VEGETATION

119. On account of the steep ness of the area, there is considerable soil erosion and the soil is therefore shallow in the area, devoid of tree growth. Almost half of the area is either blank or under the cover of some bushy growth. According to the revised classification of the forests types of India, by Champion and Seth, the forests generally belongs to 3B/C2 – "Southern Moist Mixed Deciduous Forest" with the small patches of 8A/C2 – "Western Sub Tropical Hill Forests" types, with tree growth mainly type IV b and crown density mostly 0.4. The main tree species are Payar (*Ficus arnottiana*), Ain (*Terminalia tomentosa*), Kinjal (*Terminalia paniculata*), Waras (*Heterophragma quadriloculare*), Umbar (*Ficus glomerata*), Amba, (*Mangifera indica*), Nana, (*Lagerstroemia Parviflora*), Behada (*Terminalia belerica*), Pisa (*Actino daphane lookeri*), Hadaka (*Rauwolfia densiflora*), Paarjambhul(*Olea dioica*), Anjani (*Memecylon edule*) etc. respectively.

The forests are generally under-stocked. On hill tops, in plateau region, forest type has been classified as 8A/C2, having density 0.4 to 0.6 (e.g. Wadi beldar in Khed tahsil). Along nallas in shelter portion, small patches having crown density upto 0.5 occur.

Exposed slopes are either covered with Karvi or are natural blank. Regeneration in plateau area is adequate and in rest of the area, it is insufficient. The crop is young to middle aged. Site quality is generally IV b. The areas included in this working circle are prone to landslide, hence wind fallen trees are noticed at few places.

SECTION: 4: ANALYSIS AND VALUATION OF CROP.

120. The forest area has been stock mapped on topo-sheets of 4": 1 mile scale and on village maps of different scales. The analysis of the stock map result is indicated as below.

<u>Table No.28</u> **Extent of Range wise area included in protection W.C.**

Sr. No.	Range	well stocke d	Under stocked	Eroded stocked	Blank	Total	Percent age to W.C. Area	Percentag e to total final Area
1	2	3	4	5	6	7	8	9
1	Dapoli	782	665.31	522	493	2462.31	56.44	36.72
2	Chiplun	92	126.79	34.86	62.78	316.43	7.25	4.71
3	Ratnagiri	523	324	570	166.74	1583.74	36.31	23.62
	Total	1397	1116.1	1126.86	722.52	4362.48	100	65.05
	Percentag							
	e to W.C.	32.03	25.88	25.83	16.56	100	100	65.05
		32	26	26	16	100	100	65.05

The crop in this working circle is generally appears to be young to middle aged. The upper hill slopes are either of poor density or of blank areas, while the density on the lower slope and in valleys varies from 0.4 to 0.6. Due to paucity of soil, the growth in the crop is retarded. The crop appears to be young, but may not be young in actual age.

ENUMERATION:

122. The enumeration of the growing stock has been done and is being analysed as below. Average total number of trees per hectare are found to be 142, out of which nearly 63 % fall within 31 cm girth class, while nearly 92 % fall within a larger girth class range of 16-60cm. It implies that the majority of the crop is young and is in pole stage. A detailed statement showing WC wise enumeration results is given in **Appendix No. XXVII.**

<u>Table No. 29</u> <u>Number of trees per hectare.</u>

6-60 61-75	76-90	91-	106-	121-	136-	Above	Total
		40=					
		105	120	135	150	150	
485 4.607	4.065	1.084	0.542	0.813	0.00	0.813	142.005
4	185 4.607	185 4.607 4.065	185 4.607 4.065 1.084	485 4.607 4.065 1.084 0.542	485 4.607 4.065 1.084 0.542 0.813	485 4.607 4.065 1.084 0.542 0.813 0.00	185 4.607 4.065 1.084 0.542 0.813 0.00 0.813

<u>Table No.30</u>

<u>Species having maximum number of trees/ha in descending order.</u>

Sr.	Species	Nos./ha.	Percentage
No.			
1	Ain	15.447	10.878
2	Teak	11.382	8.015
3	Shiras	1.897	1.336
4	Nana	1.084	0.763
5.	Others	112.195	79.008
	Total	142.005	100.00

Table No.31

STATEMENT - II

Estimated Growing Stock: No. of sound trees per hectare

Working Circle: Protection W.C. Division: Ratnagiri (Chiplun) Population area (ha): 2585.31

Period of Enumeration: Feb 2011 to Mar. 2011

As per Working Plan by Shri V. G. Takalkar IFS

Sample area (ha): 3.69

Intensity of sampling (%): 0.14

Group/					Girt	h classwis	e classificat	ion in cms			
Species	15U30	30U45	45U60	60U75	75U90	90U105	105U120	120U135	135U150	150 and above	Total
Group	A :- Sp	ecies of	General	•			•				
Utility	_										
Ain	5.691	7.588	1.355	0.000	0.000	0.271	0.271	0.000	0.000	0.271	15.447
Nana	0.271	0.271	0.000	0.542	0.000	0.000	0.000	0.000	0.000	0.000	1.084
Teak	6.775	4.607	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	11.382
Total	12.737	12.466	1.355	0.542	0.000	0.271	0.271	0.000	0.000	0.271	27.913
Group F	3 :- Specie	s of Speci	al Utility								
Sawar	0.542	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.542
Total	0.542	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.542
Group (:- Specie	s of Mino	r Forest P	roduce							
Amba	0.271	0.271	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.542
Shiras	0.542	0.271	0.542	0.542	0.000	0.000	0.000	0.000	0.000	0.000	1.897
Total	0.813	0.542	0.542	0.542	0.000	0.000	0.000	0.000	0.000	0.000	2.439
Group I	:- Other	Species									
Bahava	0.000	0.271	0.000	0.271	0.000	0.000	0.000	0.000	0.000	0.000	0.542
Others	75.881	17.073	7.588	3.252	4.065	0.813	0.271	0.813	0.000	0.271	110.027
Umbar	0.271	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.271	0.542
Total	76.152	17.344	7.588	3.523	4.065	0.813	0.271	0.813	0.000	0.542	111.111
Grand Total	90.244	30.352	9.485	4.607	4.065	1.084	0.542	0.813	0.000	0.813	142.005

SECTION: 5: METHOD OF TREATMENT

- **123.** Considering the topography and condition of crop under this working circle, any harvestating work will accelerate the pace of soil erosion and will lead to further deterioration of the forests and hence the following treatment is prescribed.
 - 1. No area shall be worked for felling of green trees of any kind, however, dead, dying diseased (tree with 1/3 of the top height as dead) and wind fallen trees are to be marked for felling and subsequent extraction. Four dead trees/ha.are to be retained in the forest as snags and den.
- 2. Soil conservation works such as a check dams, gabian bandharas, nalla bunding and gully plugging would be taken up in accessible areas. Gabian structure will be taken up in a slope less than 3 degree, while, nalla bunding will be done in the slope less than that.
- 3. Re-boisement of under stocked and blanks in accessible areas will be under taken by Aided Natural Regeneration i.e. by planting of 200 local species and by singling of 425 promising natural plants/ha. In this protection working circle the slop of area is above 45°, no felling is prescribed and there will be no plantation taken.
- 4. The minor forest produce such as hirda, shikekai etc. will be allowed to be extracted subject to the condition that no tree will be damaged or felled for this purpose.
- 5. Stump planting of few selected species will be carried out in the area with a good depth of soil.

Root suckers will be promoted by damaging their root system, i.e. by digging a CCT around it.

SECTION: 6: CHOICE OF SPECIES

124. Most of the areas are inaccessible, hence in order to improve the stock of the area in plantable blanks, and in areas below 0.4 density, planting of khair, mango, bamboo, suru, awala, hirda, behada, Jambh6ul and karvand etc. will be carried out. Shade tolerant species like Anjani (Mymocylon edule), Vet (Calamus rotang), Anantmul (Hemidesmkus indicu), Dalchin (Cinnamomum zylamcum), Dhaman (Grewia tiliefolia), Jambha (Xylia xylocarpa), Ambati (Trewia, polycarpa), Kharshing (Radermachera xylocarpa), Murudsheng (Helicters isora), Kapur bhendi (Turraea villasa), Goti (Zizyphus spp.), Pendgal (Ixora coccinea), Adulsa (Justicia adathoda) will be planted in a certain

proportion of the area with 0.4 density, while in blank areas, the light demander species shall be planted.

SECTION: 7: EXPLOITABLE GIRTH/HARVESTABLE GIRTH

125. No felling has been prescribed in this working circle, except for removal of dead, dying (dead upto 1/3 of the top height) and wind fallen trees.

SECTION: 8: FELLING CYCLE

126. The whole area of this working circle has been divided into 3 felling series viz. Khed, Lanja and Ratnagiri, each are containing 20 annual coupes. In general, one compartment normally corresponds to a coupe. A state;ment showing the allotment of compartments to different felling series and coupes is given in **Appendix No. XXXV** and the sequence of working of annual coupes in each felling series is given in **Appendix No. XXXV**.

XXXVI.

SECTION: 9: FORMATION OF FELLING SERIESES REDUCING FACTORS AND REDUCED AREA.-

The three felling series have been laid down, namely Khed, Lanja and Ratnagiri.

SECTION: 10: REGULATION OF YIELD:-

No yield has been stipulated.

SECTION: 11: AGENCY OF HARVESTING:-

All trees marked for removal shall be felled departmentally.

SECTION: 12: METHOD OF EXECUTION OF WORK

127. One year before the year of pre-monsoon, the coupe will be surveyed and demarcated. After survey and demarcation the treatment map of the area will be prepared by the Range Forest Officer. A probable treatment map will be prepared by using Geomedia Terrain and will be provided to Divisional Forest Officer Ratnagiri by Conservator of Forests Working Plan Division, Kolhapur. The work will be carried out in Geo-media cell in the office of Additional Principal Chief Conservator of Forest (W.P. West) office at Pune.

1. Preparation of treatment map.

The treatment map will be prepared on stock map sketch of the coupe. In this treatment map, the details of works to be carried out will be shown. In treatment map, following zones will be shown.

- **A)** Unworkable area Very steep and inaccessible areas, rocky out crops and natural open areas, unsuitable for raising plantation should be shown on this treatment map and demarcated on site where ever possible. No work except strict protection shall be done here.
- **B)** Well Stocked area The area having crown density more than 0.4 is to be shown on the treatment map and demarcated on site. In this area no work except protection shall be done.
- C) Under stocked areas and plantable blank Areas having density up to 0.4 with a minimum of 0.4 hectares shall be shown on the treatment map and demarcated on the ground. In this area, marking of 425 natural plants and planting of 200 seedlings of local species in 0.45x0.45x0.45 mtr; pit size should be taken up. Annually ten hactares will be planted in each coupe. Four hundred multiple coppice shoots shall be singled per hectare. Soil conservation works such as check dams, water holes, gabian structures, nalla bunding and gully plugging will be done. Root suckers will be promoted by digging a CCT around tree so as to damage the root system. The species like Shisam (Dalbergia latifolia), Bel (Aegle marmelos), Sawar (Bombax ceiba), Chandan (Samtalum album), Karanj (Pongamma pinnata), Awala (Emblica officinalis) produce root suckers when their roots are injured. The sowing of seeds of Hela, Hirada, Phanas, Jambhul etc will be carried out in annual coupes. and root shoot of species Awala, Aalwan, Shisam, Kalashiras etc.will be planted in two hectares wherever possible. The species which do not coppice, but pollard, shall not be dressed up, and allow to grow by its own.

MARKING RULES

- **128.** Since no felling has been prescribed in this working circle the marking rules are not necessary. However following works are prescribed simultaneously with treatment map and demarcation.
 - i) All climbers except shikekai, cane and medicinally valuable species will be cut at two places. (The list of climbers which are economically valuable is given below. **Appendix No XXXVII.**
 - ii) The stump of trees/poles, felled by illicit cutting shall be dressed to enable production of vigorous coppice shoots. However the species which do not coppice but pollard shall not be dressed.

SECTION: 13: SEQUENCE OF WORKING:-

129. Each felling series has been divided into 20 annual coupes and the sequence of working of coupes is given in **Appendix No. XXXVI.**

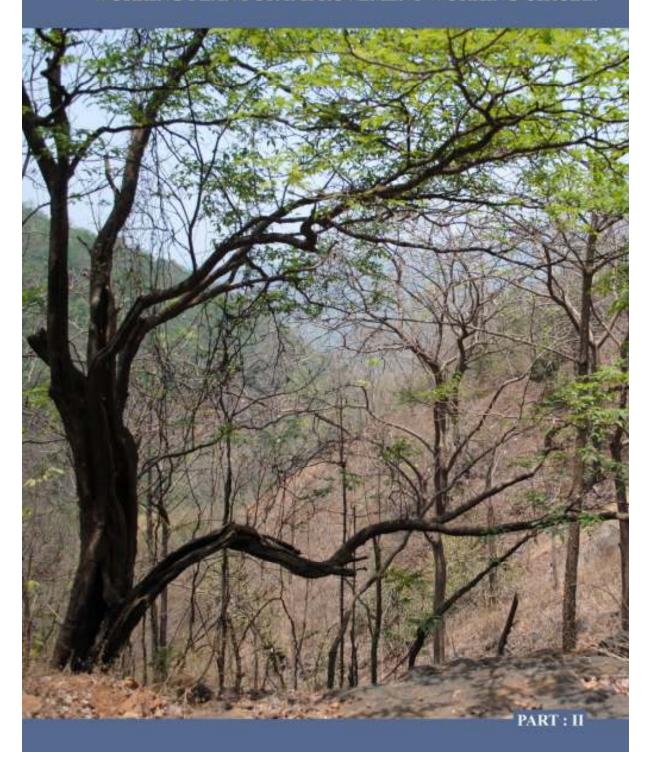
SECTION: 14: TECHNIQUE OF RAISING PLANTATION

130. The standard technique of raising plantation in high rainfall area shall be adopted. The plantation will be in pits of size 45 cm. cube.

SECTION: 15: MISCELLANEOUS REGULATIONS 131.

- (1) Fire Protection: The entire area will be fire protected.
- (2) Grazing:- The area of this working circle will be closed for grazing for all times.

CHAPTER : III WORKING PLAN FOR IMPROVEMENT WORKING CIRCLE.



CHAPTER: III: WORKING PLAN FOR IMPROVEMENT WORKING CIRCLE. SECTION: 1: GENERAL CONSTITUTION OF THE WORKING CIRCLE.

132. This working circle includes all the better quality areas situated on moderately steep to steep slopes. All workable areas situated on these slopes (slope < 36.39%) have been included in this working circle. This working circle includes all the areas of conversion working circle of Shri. Damle's plan i.e. relating to Dapoli tahsil and also few forest areas from Mandangad, Chiplun, Lanja, Rajapur and Sangameshwar Talukas of Ratnagiri District. The total area allotted to this working circle is 1366.66 ha. which is about 20.37 percent of the total forest area dealt under this plan. **Appendix No. XXXVIII**

Table No.32

The Range wise area of Improvement W.C.

Sr.	Range	Forest Area	Improvement	Percentage of	Percentage to
No		ha.	Working	the forest area	the forest Area
			Circle Area ha.	of the range	of the division.
1	Dapoli	3859.43	1129.35	29.27	16.83 %
2	Chiplun	669.23	50.48	7.54	0.75 %
3	Ratnagiri	2177.84	186.83	8.58	2.79 %
	Total	6706.50	1366.66		20.37 %

SECTION: 2: SPECIAL OBJECTS OF MANAGEMENT

- 133. The special objects of management of the forests allotted to this working circle are 1. To improve condition of existing growing stock by tending and carrying out Silvicultural operations.
- 2. To enrich the crop through plantation activities wherever necessary.
- 3. To improve hygiene of the forest by harvesting in the form of removal of dead, dying (1/3 top height is dead), and diseased trees, wind fallen trees.
- 4. To carry out silvicultural thinning in old teak plantations, wherever the canopy differentiation has started and the plantation is due for thinning. A lapse of ten years is required between two silvicultural thinning to allow teak pole to self prune its branches. Coupes have been laid down with the sequence that the oldest plantation due for thinning has been included in 1st coupe.

- 5. Removal of wind fallen trees.
- 6. To prevent soil erosion and improve the water regime leading to improvement in site quality.

SECTION: 3: GENERAL CHARACTERS OF VEGETATION

134. The forests allotted to this working circle fall largely under type 3B/C2. viz. "Southern Moist Mixed Deciduous Forest" of Champion and Seth classification, which has been described in detail in Chapter II of part I of Volume I of this plan. The site quality is mostly IVb to IVa Maharashtra type with patches of forest of site quality III, occurring locally on more gentle slope and in valleys. On ridges and flat tops with shallow soils, the site quality deteriorates to IVb. The density of the crop varies from 0.4 to 0.8 depending upon the conditions of soil and biotic influence. The most important species noticed are teak, khair, ain, kinjal, nana, sawar, beheda, hed, etc. The crop is mostly young to middle aged. Regeneration is by and large adequate. Series of old teak plantations exist in this area and these plantations require silvicultural thinning immediately, in most of the cases, as is evident from the table below:-

Table No.33

Statement showing the sequence of thinning in teak plantations in Ratnagiri division, Chiplun.

Year of	Name of	Comptt.	Area	Year of	Remarks
	the	No.		thinning	
plantation	Village	No.	in Ha.		
1	2	3	4	5	6
1975-76	Kogla	8	15	2012-2013	Silvicultural
					Thinning
1977-78	Bandh tivre	10,12pt	10	2014-2015	-do-
1978-79	Sakurde	12pt	2.6	2015-2016	-do-
1979-80	Sakurde	12	5	2016-2017	-do-
1979-80	Kandavan	6a	5	2016-2017	-do-
1980-81	Tadil	9	10	2017-2018	-do-
1980-81	Kandavan	6a	3	2017-2018	-do-
1980-81	Manjotri	30a	10	2017-2018	-do-
1981-82	Kandavan	6a	8	2018-2019	-do-
1981-82	Maldoli	31a	3.2	2018-2019	-do-

3..Working plan for I.W.C.

	Total		172.5		
1990-91	Kelavade	55a	5	2014-2015	
1989-90	Kilavade	55a	10	2013-2014	
1989-90	Sarang	11	20	2013-2014	
1987-88	Dalkhan	9	2.7	2012-2013	
1986-87	Manjotri	30a	2	2021-2022	
1986-87	Kogala	8	4	2021-2022	
1985-86	Bandh tivre	10,12pt	5	2021-2022	25th year thinning
1983-84	Bandh tivre	10,12	0.5	2020-2021	-do-
1983-84	Kherdi	13,14	3	2020-2021	-do-
1982-83	Bandh tivre	10,12	3.5	2019-2020	-do-
1982-83	Maldoli	31a	6	2019-2020	-do-

SECTION: 4: ANALYSIS AND VALUATION OF CROP.

135. The entire area of this working circle has been stock mapped on village map and partly on two topo-sheets of scale 4":1 mile. The result of the stock-mapping is given below. Most of the area is of IVa or IVb quality. Following table shows the details of area by each density class and its extent included in this working circle.

Table No.34

Extent of Range wise area included in Improvement W.C.

Sr. No	Range	Well stocked	Under stocked	Eroded scrub	Blank	Total	Percentag e to the W.C. Area	Percent age to the forest Area
1	Dapoli	556.8	452.76	50.8	69.59	1129.35	82.64	16.84
2	Chiplun	27.1	10.5	3.5	9.38	50.48	3.69	0.75
3	Ratnagiri	109.98	63.06	6.94	6.85	186.93	13.67	2.79
	Total	693.88	525.72	61.24	85.82	1366.66	100	20.38
	Percenta ge to W.C. Area	50.77	38.47	4.48	6.28	100	-	-

The crop in this working circle is general young to middle aged. The upper hill slopes have poor density crop or blank while the crown density on lower slopes and in valleys varies from 0.2 to 0.8.

ENUMERATION:

136. The enumeration of the growing stock has been done and it has been analysed by the Chief Forest Statistician, M.S., Nagpur and it is as below. Average total number of trees including poles, per hectare are found to be 264.623, out of which nearly 21% fall within 16-30 cm girth class, while nearly 66% fall within a larger girth class of 16-60cm. It implies that the majority of the crop is young and is in pole stage. A detailed statement showing WC wise enumeration results is given in **Appendix XIX C**.

<u>Table No.35</u>

<u>Number of trees per hectare.</u>

Girth (Girth Classes (cms)											
16-30	31-45	46-60	61-75	76-90	91- 105	106- 120	121- 135	136- 150	Abov e 150	Total		
56.46	45.57	63.49	46.03	23.13	15.64	10.20	2.94	0.90	0.227	264.62		

<u>Table No36</u>

<u>Species having maximum number of trees/ha in descending order.</u>

Sr.No.	Species	Nos./ha.	Percentage
1	Teak	57.369	21.680
2	Ain	41.270	15.596
3	Cashew	16.553	6.255
4	Nana	9.070	3.428
5	Sawar	3.400	1.285
6	Other	136.958	51.756
	Total	264.62	100

The crop in general is young to middle aged. The mature trees are scattered in the forest area. The forest in patches has a density as 0.4. Some patches of high crown density with 0.5 to 0.7 occur. Enumeration has been carried out and results are given in **Appendix No. XIX B**

Table No.37 STATEMENT - II

Estimated Growing Stock: No. of sound trees per hectare

Division : Ratnagiri

Amba	0.000	0.000	0.227	0.000	0.000	0.227	0.453	0.453	0.000	0.227	1.587
Amba	0.000	0.000	0.227	0.000	0.000	0.227	0.453	0.453	0.000	0.227	1.587
Amba	0.000	0.000	0.227	0.000	0.000	0.227	0.453	0.453	0.000	0.227	1.587
Amba	0.000	0.000	0.227	0.000	0.000	0.227	0.453	0.453	0.000	0.227	1.587
Amba	0.000	0.000	0.227	0.000	0.000	0.227	0.453	0.453	0.000	0.227	1.587
Amba	0.000	0.000	0.227	0.000	0.000	0.227	0.453	0.453	0.000	0.227	1.587
Amba	0.000	0.000	0.227	0.000	0.000	0.227	0.453	0.453	0.000	0.227	1.587
Behada	0.000	0.000	0.227	0.227	0.000	0.000	0.000	0.000	0.000	0.000	0.454
Behada	0.000	0.000	0.227	0.227	0.000	0.000	0.000	0.000	0.000	0.000	0.454
Chinch	0.000	0.000	0.000	0.000	0.000	0.000	0.227	0.000	0.000	0.000	0.227
Kaju	4.535	3.401	3.628	4.989	0.000	0.000	0.000	0.000	0.000	0.000	16.553
-											
Moha	0.227	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.227
Dalae	0.000	0.000	0.453	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Palas	0.000	0.000	0.453	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.453
Total	4.762	3.401	4.535	5.216	0.000	0.227	0.680	0.453	0.000	0.227	19.501
Crown D. Ot											
Group D :- Ot	her Species										
Bahava	0.227	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.227
Others	24.716	21.996	32.880	24.036	12.018	7.937	4.308	1.360	0.907	0.000	130.158
Umbar	0.000	0.000	0.680	0.227	0.227	0.227	0.000	0.000	0.000	0.000	1.361
											-
Total	24.943	21.996	33.560	24.263	12.245	8.164	4.308	1.360	0.907	0.000	131.746
Grand Total	56.462	45.578	63.491	46.031	23.130	15.646	10.204	2.947	0.907	0.227	264.623

SECTION: 5: METHOD OF TREATMENT

Considering the present condition of these forests, any treatment requiring clear felling of the area has to be ruled out, because it would accelerate soil erosion leading to a further degradation of forests. These forest areas require only a slivicultural rest. Only dead, dying and wind fallen trees shall be removed during the plan. Many old (total area172.50 ha.) have not been thinned so far and as such teak plantations silvicultural thinning has been prescribed to such plantations. No yield of considerable quantity is expected from thinning of old teak plantations. Wherever under stocked or blank areas occur, planting of valuable species such as teak, khair, Bambusa stocksii etc along with miscellaneous and fruit trees has been prescribed to enrich the area. As per prevailing planting technique, the teak will be planted on sloppy areas at a spacing of 2m x 2m. in the blank patches. Planting of fruit and miscellaneous trees such as mango, jambhul, kaju, awla and such other local species as khair, ain, kinjal, nana, jambhul and bamboos etc. is prescribed in 0.45x0.45x0.45 mt pit size and 200 seedlings/ha have been proposed. Specifically it is prescribed that specieswise patch planting should be done, instead of mix planting. Apart from this, 425 natural seedlings/ha will be marked as per aided natural regeneration plantation scheme, approved by local Chief Conservator of forests. Soil conservation works such as nalla bunding- gabian bandhara, gully plugging will also be carried out to improve moisture content of the soil.

The cost of plantation at current rates works out to be Rs. 94887/-/ha. for five years.

SECTION: 6: CHOICE OF SPECIES

138. The local valuable species like teak, khair, hirda, shisam, bamboo, etc. and miscellaneous and fruit trees as given above shall be planted.

SECTION: 7: EXPLOITABLE GIRTH/HARVESTABLE GIRTH

No harvesting on basis of exploitable girth has been proposed only dead, dying and wind fallen trees have been envisaged for harvesting from these forest.

SECTION: 8: FELLING CYCLE

140. From the management point of view, a felling cycle of 20 years has been fixed. The working circle is divided into 2 felling series. Each felling series is divided into 20 annual coupes. The sequence of annual coupes is given in **Appendix No. XXXIX**

Moreover, it will also commensurate with 10 years cycle of the silvicultural thinning of teak plantation. The annual coupes have been laid with the sequence of coupe starting from the area having the oldest teak plantation, due for thinning.

SECTION:9: FORMATION OF FELLING SERIESES:-

Two felling series have been formulated.

SECTION:10: REGULATION OF YIELD.

No regular yield had been_prescribed.

SECTION:11: AGENCY OF EXPLOITATION:-

All felling shall be done departmentally.

SECTION:12: METHOD OF EXECUTING FELLING:

The sequence of working has been provided in **Appendix- No. XXXIX**

SECTION:13: TECHNIQUE OF RAISING PLANTATION:-

The standard method of raising plantation will be done. As the area falls in high rainfall zone, the plantation will be carried out by digging pits.

SECTION: 14: METHOD OF EXECUTING THE WORK

- i) Preparation of Treatment map-
- 141. A treatment map will be prepared by the Range Forest Officer (territorial) or any Gazetted Officer concerned, showing the following details. A model treatment map, prepared by the GIS Cell in office of the Additional Principal Chief Conservator of Forests (Working Plan-West) Pune, will be provided to the Divisional Forest Officer, Ratnagiri showing workable and unworkable area. This will act as a guide to him for preparing the detail treatment map. The area will be thoroughly inspected by the Range Forest Officer concerned and the following details will be shown.

A) Un workable Areas.

- i) Area with slope more than 25 degree (60%) which will include steep slopes and precipitous hills.
- B) Under stocked areas (i.e. area with crown density <0.4 %). The area having crown density less than 0.4 will be marked here. Further the area suitable for raising plantations upto 2 ha. and above in extent, at each place, having deep well drained soil with gentle slope and capable of growing teak shall be marked. In slightly inferior areas which are not suitable for raising teak plantation but fit for plantation of hardy miscellaneous species, mentioned above should be marked. This type of area will be chosen for plantation. Moreover in order to improve the crop, the singling of the

coppice shoot (CBO), will be carried out, which may limit upto 200 such stools per hectare. High stump will be flushed 30 cm above the ground so as to promote side shoots. Climbers retarding the growth of coppice shoots will be cut at two places.

- C) <u>Old plantations</u> Patches of old successful plantations more than 0.5 ha. in extent and area with adequate advance growth of teak, ain, shisum, nana, khair, tiwas, siras, bibla will be shown in treatment map separately.
- i) Old Teak plantation: The old teak plantations to the extent of 172.50 ha. have been raised in this division. However, till today no thinning operation has been carried out and as the canopy differentiation has already set in, these plantations need to be silviculturally thinned. A thinning regime of 10, 15,25,35,45 years and so on shall be followed. A thinning cycle of 10 years will be maintained. As the plantations have not been thinned earlier, these will be thinned for the regime one before for which these are due i.e. an eighteen year plantation will be thinned for 15th year thinning cycle, as per Yield and Stand table F.R.I. publication Vol.9, No.4 F.R.I, by maintaining its basal area. The subsequent thinning will be done after 10 years when the coupe will be due for working. A ten year thinning cycle will be maintained, so as to allow teak plant, to self prune its branches. There should be no growth of epicormic branches and that shall be the index of a satisfactory thinning. For thinning, the standard rule shall be followed and it will be controlled though basal area. The natural congested pole crop will be thinned for a spacing of 1/3 of the height of the plant.

Other plantations: These may be thinned to maintain a distance of 1/3 of the height of the plant from its adjacent poles. Since majority of these species do not have the capacity of self pruning its branches, a thinning for a clear bole is of less relevance.

The area with the crown density will be dealt with soil and moisture conservation works, like gully plugging and nalla bunding. Over matured trees of girth of 135 cm at breast height, which are not likely to survive till next felling cycle will be removed.

D) Area with density more than 0.4 - No felling has been_envisaged and only dead, dying (1/3 of the height as dead) and diseased tree shall be felled. The crop with the multiple poles may be reduced to one.

SECTION:15: SUBSIDIARY SILVICULTURAL OPERATRIONS, WEEDING, SOIL WORKING AND CASUALITY REPLACEMENT..

- **142**. Cutting back operations will be carried out immediately after coupe working as mentioned below.
- i) All badly damaged trees will be felled.
- ii) All malformed teak growth will be cut back.
- iii) Cleaning will be carried out in 6th year from the year of formation of plantation. The following operations will be carried out.
- i) All climbers will be cut.
- ii) Coppice shoots will be reduced to two well grown shoots per stump.
- iii) Inferior trees interfering are likely to interfere with the growth of young crop of teak and other valuable species will be removed.
- iv) Damaged and malformed poles will be cut back.

Thinning:- The first thinning will be carried out in the 15th year, from the year of formation of plantation. The thinning timetable is given in **Appendix No. XL**

The following works will be carried out.

- i) All malformed trees will be felled without creating a permanent gap.
- ii) All inferior trees interfering with growth of teak and other important timber species will be felled.

CHAPTER: IV WORKING PLAN FOR CASUARINA WORKING CIRCLE.



PART: II

<u>CHAPTER: IV: WORKING PLAN FOR CASUARINA WORKING CIRCLE.</u> SECTION: 1: GENERAL CONSTITUTION OF WORKING CIRCLE.

143. This working circle covers the entire forest area along the seashore and is inclusive of old casuarina plantations raised and it is confined to Dapoli, Guhagar and Ratnagiri Talukas. The Casuarina plantations have been raised since 1978-79 over 58.5 ha. only in scattered patches of forests **Appendix No. XLI.** The total area included in this working circle is about 153.00 ha., which is about 2.28 percent of the area of the division **Appendix No. XLII** The soil is coastal sandy type, with high degree of salinity but with a high water table. The soil is mostly quartzite with less moisture retention capacity. The area is not visited by sea water even during high tide. Because of high nitrogen content in leaves, Casuarina species is the most suited for planting in nutrient deficient soils. The species harbours nitrogen fixing actinomycete frankie and phosphorous fixing VAM and hence improves the quality of the soil. The area detail is as below:-

Table No.38
The Range wise area of Casuarina W.C.

Sr. No	Range	Forest Area ha.	Casuarina Working Circle Area ha.	O	Percentage to the forest Area of the division.
1	Dapoli	3859.43	4.41	0.11 %	0.07 %
2	Chiplun	669.23	67.80	10.13 %	1.01 %
3	Ratnagiri	2177.84	80.79	3.71 %	1.20 %
	Total	6706.50	153.00		2.28 %

SECTION: 2: SPECIAL OBJECTS OF MANAGEMENT

- **144.** The special objects of management of this area are.
 - To convert otherwise barren, unproductive sandy areas into productive one by planting casuarina species, and maximally utilizing the barren forest land. Casuarina is tolerant to deficit water and nutrients conditions and is the most suited for this type of soil.
 - 2. To minimize sea erosion and to protect the inland cultivation, from shifting sand, due to winds and storms, and to act as a wind break.
 - 3. To meet the local demand of firewood and fishing stakes to the extent possible.

- 4. To get the revenue from its subsequent sales.
- 5 To obtain Casuarina poles that are used in scaffolding and as props in agricultural field and in mining.
- 6 To be used as pulp in paper industries as a blend with bamboo as individually it is not suited for pulp due to its highly thick cell wall.

SECTION: 3: GENERAL CHARACTERS OF VEGETATION

145. The areas included in this working circle are those which are all along the sea coast and part of which have been planted with Casuarina, with all age gradations from 2 to 34 years. Only 58.5 ha. out of 153.00 ha. have been covered under plantation and remaining area is available for planting. The crop is young to mature.

The first raised casuarina plantation is more than 34 years old, and is available for felling. It is necessary to undertake clear felling of such matured plantations, to be replaced by artificial regeneration, in order to have a regular crop. Other associate species present is <u>Ipomea peseaprae</u>. Spiniphex species,

SECTION: 4: ANALYSIS AND VALUATION OF CROP.

146. The crop in this working circle varies between young to matured stage. Some pockets of blank areas are also available. Plantations are having density more than 0.6. The height and the girth measurement recorded during stock mapping are as under:-

Table No.39

Sr.No	Year of planting	Area in ha	Age in 12 years	Measurement	
				Girth (cm)	Height (mtr)
1	1978.79	7.00	34	190	32
2	1979.80	3.00	33	180	32
3	1980-81	5.00	32	175	32
4	1981-82	N.A.	N.A.	N.A.	N.A.
5	1982-83	N.A.	N.A.	N.A.	N.A.
6	1983-84	N.A.	N.A.	N.A.	N.A.
7	1984-85	4.00	28	114	19
8	1985-86	2.00	27	107	18

In this division the plantation programme was not carried out regularly.

The enumeration of the growing stock has been done and it has been analyzed by the Chief Forest Statistician, M.S., Nagpur and it is as below. Average total numbers of trees including poles, per hectare are found to be 113.877, out of which nearly 1% fall

within 16-30 cm girth class, while nearly 27 % fall within a larger girth class of 16-60cm. It implies that the majority of the crop is young and is in pole stage. A detailed statement showing WC wise enumeration results is given in **Appendix XXIX.** Majority of trees in this working circle are from larger interval of girth 45-105cm nearly about 73 %

Table No.40

Statement - II

Estimated Growing Stock: No. of sound trees per hectare

Working Circle: Casuarina Working Circle Division: Ratnagiri [Chiplun] Population area (ha): 249.91

Period of Enumeration : Feb 2011 to Mar. 2011 Sample area (ha): 0.72

As per Working Plan by Shri V.G.Takalkar IFS

Intensity of Sampling(%): 0.29

Group/	Girth classwise classification in cms										
Species	15U30	30U45	45U60	60U75	75U90	90U105	105U120	120U135	135U150	150 and above	Total
Group D :-	Other Spec	cies									
Anjan	0.000	4.165	2.777	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.942
Karanj	0.000	1.388	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.388
Pangara	1.388	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.388
Suru	0.000	4.165	16.666	29.166	18.054	16.666	8.335	6.942	4.165	0.000	104.159
Total	1.388	9.718	19.443	29.166	18.054	16.666	8.335	6.942	4.165	0.000	113.877
Grand Total	1.388	9.718	19.443	29.166	18.054	16.666	8.335	6.942	4.165	0.000	113.877

SECTION: 5: METHOD OF TREATMENT

147. Casuarina equisetifolia plantation will be worked on a 15 year rotation as retaining them beyond it, does not produce any further advantages. As all the plantation of 58.5 ha. are more than 15 years old. These are required to be removed through clear-felling. The entire area has been divided into 10 annual coupes in two-felling series, so as to work 2/3 of the area during this plan period only. A 15 year cycle will be maintained. The coupes have been laid down so as to include the oldest Casuarina equisetifolia plantation in the initial coupes. The annual coupe due shall be clear-felled and will be planted with a mixture of Casuarina equisetifolia (50% and) Casuarina Junjhuna (50%). The latter species has been planted extensively in Tamil Nadu and unlike Casuarina equisetifolia, it is a good coppicer, and produces root suckers when roots are injured. Thus the subsequent crop can be produced at low cost. As Casuarina equisetifolia does not regenerate under its own canopy, a clear-felling and planting the entire area, is the only alternative for regenerating the crop. The species will be planted at spacing of 1.85 M x 1.83 M. with a single thinning at the age of 7th year. As Casuarina species is a poor self pruner, an as artificial pruning in plantation upto a height of 2.25 meters is necessary, to make the plantation accessible, for general maintenance. As much of the biomass (80%) apportionment is to the stem, the species is amenable for a close spacing and it is a useful pole producing species. The blank areas shall be planted with Casuarina equisetifolia and Casuarina Jhunjhuna on equal proportion. Both the species will be worked on 15 year rotation. However, two trees/ha will be left retained for vultures and hornbills to nest. The retention will on the west side of the coupe. The area is also visited by Olive Ridley Turtle for laying of eggs. However such area is somewhat confined to a belt of 2 km only and this area left untreated. No seedling will be planted in this area and this area, will be marked at time of preparation of treatment map. The treatment prescribed is on the basis of Tamilnadu State working plan.

SECTION: 6: CHOICE OF SPECIES

148. Due to edaphic conditions, verging on salinity, it is proposed to plant <u>Casuarina equisetifolia</u> and <u>Casuarina Jhunijhuna</u> in equal proportion. These species are also known as a wind breakers and suited best in soil with ph greater than seven (7). Because of low canopy density, it can be planted closely. Casuarina Jhunjhuna has a high foliar nitrogen content, and it suits well to these nutrient deficient soils.

SECTION: 7: EXPLOITABLE GIRTH/HARVESTABLE GIRTH

No harvestable girth has been presented. A 15 year rotation has been prescribed.

However at the age of 15 year, it has an approximate girth of 107 cm.

SECTION: 8: FELLING CYCLE

149. The unplanted area of this working circle is expected to be covered under this plan in the plan period, also the old plantations about age of 15 year are to be clear felled and replanted during the plan period. The statement showing sequence of felling and annual planting of coupes is given in **Appendix No. XLIII**, for all the area of working circle

SECTION :9: FORMATION OF FELLING SERIESES

Considering the area of working circle all area to be felled and planted is covered in plan period.

SECTION:10: REGULATION OF YIELD.

The yield is by the area. The coupe area will be clear-felled and will be planted. As equiproductive coupes have not been laid, no stipulation of yield has been done.

SECTION:11: AGENCY OF HARVESTING:-

All harvesting will be done by the departmental agency.

SECTION:12: METHOD OF EXECUTING FELLING

150. As <u>Casuarina equisetifolia</u> does not coppice, the tree shall be felled as near to the ground level as possible and wherever possible, the stumps shall be uprooted. This will remove hurdles in the way of planting.

SECTION:13: SEQUENCE OF FELLING

The sequence of felling is given in **Appendix No. XLIII.**

SECTION:14: TECHNIQUE OF RAISING PLANTATION:

151. (a) Nursery technique:- The quality seeds should be collected from identified seed stand/seed production area and should be extracted from ripen fruits. A fresh seed of Casuarina equisetifolia can give 40-50 % germination. The pre treatment of seeds include a the hot water treatment, chilling treatment, soaking seeds either in KNO3 solution or in 7.5% calcium chlorates for 36 hours and soaking of seeds in running water for 24 hours etc. Stored seeds are viable upto 1-2 years. Pre-treated seeds are sown in raised sand beds and are covered with planting material like straw, to prevent washing off of the seeds during

watering. Nursery beds are then watered regularly and are kept free of weeds and insects. Germination starts in 8-10 days after sowing and seedlings are allowed to grow in same beds, for the next three months and if the seedlings are to be retained after three months, then these are transplanted into new sand beds or into polythene bags. Retention of seedlings beyond 75 days is known to lower the seedling quality. The optimum size of the polythene bag to be used in transplanting is 15x20 cm.

Control over Root Growth:-

152. A good secondary root development ensures a high survival and growth in the field condition. This is achieved in the bare rooted nurseries by insertion of a barrier about 10-13 cm below the surface of nursery bed. A branched root system nodulates well and is able to utilize the available moisture more effectively. Profused secondary root formation in polythene bag seedlings is achieved through frequent shifting and wrenching. In forest nurseries using root trainers, the secondary roots are obtained through aerial pruning of roots.

Mixture:-

153. The potting mixture consists of decomposed straw, and sand in a ratio of 1:2 and it gives the best result in terms of high seedling quality index, volume index, rooting potential etc.

Biofertilizer:-

154. Seedlings of <u>Casuarina equisetifolia</u> are required to be inoculated with Frankia, a nitrogen fixer, to show better survival and growth rate. <u>Frankia</u> inoculation is recommended 20 days before germination. A combined treatment of <u>Frankia</u> and <u>Pisolithus tinctorius</u> results in a 50 % increase of biomass production. Seed treatment with <u>Azospirillum</u> has also been reported to increase shoot growth, roots and seedling weight.

Disease and Pest Control:-

155. Dumping of is the most serious disease in seedling of <u>Casuarina equisetifolia</u> in nursery. The dumping is caused by <u>Rhizoctoria solani</u> and is controlled by the application of PCNB (Pentachrolo nutrobenzone) powder. The other method includes the (i) application of Zinc oxide in nursery beds (ii) application of copper fungicide (iii) application of mixture of sulphuric acid H2 So4 (1/80), formaldehyde (1/75) and acetic acid. Aphids, mealy bugs and bugworms are the major pest of <u>Casuarina</u> equisetifolia in the nursery, and it can occur throughout the year. It is treated with

chemical insecticide like Monocrotophos and Dimethoate at 0.05% concentration at a

interval of 15 days.

<u>Vegetative Reproduction :-</u>

156. It is done through the rooting of cladodes. Cladodes are trimmed to a length of 10cm length and are treated with 0.05% mercury chloride for 30 seconds to avoid fungal attack. The cut end is then treated with IBA (2000 ppm). Rooting can be done in a mist chamber with relative humidity at 70-80%, with misting for 6-10 seconds at every 20 minutes, during the day time or alternatively it can be done in poly-tunnel placed over sand beds 30 cm depth. Sand is well watered. Sand beds are then sprayed with 0.1% Bavistein solution. The entire thing is covered with polythene sheet of 400 Swg thickness. The rooted cladodes are then transported to nursery and maintained as normal seedlings, but before shifting, these are hardened for a month. Stem and root disease, which is caused by Rhizoctorica solane, can be controlled by Emisan (0.01%) as foliar spray. The black root rot is controlled by Bavistein solution (0.1%).

(b) Field Planting:-

157. Planting is usually done by digging the pits of 30 cm x 30 cm or 60cm x 60cm, but in a normal sites, which is a sandy coast, planting is done after ploughing, the area and then by scooping the sandy soil to a depth of 10 cm or to the size of the polythene bag.

After putting the seedling, the soil is packed around it. It has been empirically found, that a seedling of height 40 cm gives the best result for survival. The planting period is usually before February

Plantation technique-

158. For raising Casuarina Plantation standard technique should be adopted. The technique of raising Casuarina including nursery technique is given in **Appendix LXI**. The soil specification values for different species adopted need to be studied in order to decide on the best spacing.

The figures are worked out and given below.

Table No.41

Spacing	Thinning	Soil expe	ectation value (p	er hectare)	Difference		
adopted or	cycle						
likely to be					Col.4		
adopted		At rotation	And	At rotation	Col.5		
		age of 15	capitallsed	age of 20			
			value to 20	years			
			year				
12 x12	7 th & 14 th for	Rs.	Rs.	Rs.	Rs.		
(3.66x3.66	20 years	1809	2201	1892	309		
meters)	rotation						
9x9	6 th ,11 th	7150	8700	6413	2287		
(2.74x2.74	years						
meters)							
6x6	4 th & 8 th	9836	11170	9842	1378		
(1.83x1.83)	12 years						
meters)							

It is evident from the above that the soil expectation value is maximum for the spacing 6x6 or 1.8 meters x1.8 meters for the rotation 15 years or 20 years. Hence it will be advisable to adopt a spacing of two meters by two meters. Besides, there is heavy damage to these plantations due to cyclones, winds etc. Hence a closer spacing is always advisable.

SECTION:15: SUBSIDIARY SILVICULTURAL OPERATRIONS, WEEDING, SOIL WORKING AND CASUALTY REPLACEMENT..

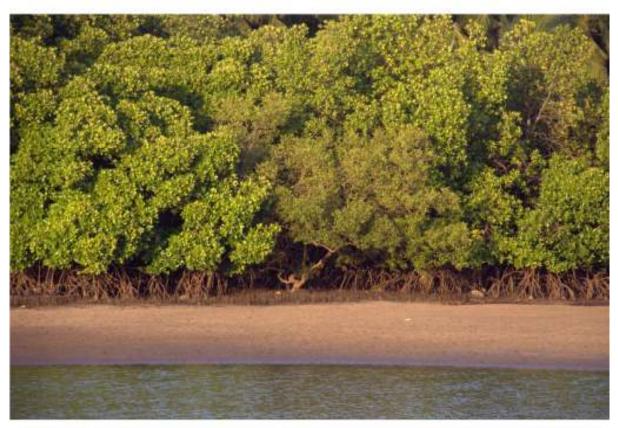
159. Subsidiary Cultural Operations

Weeding in Plantations – There is very little growth of weeds in the area, No weeding will, therefore, be ordinarily necessary. If however, Divisional Forest Officer fells it necessary he may carry out the same under instructions of the Conservator of Forests, Thana Circle, Thana.

Cleaning in Plantations – There is no need to space out the plants. There is no weed growth and there is also no damage by climbers, No cleaning is therefore necessary.

. **Thinning-** Casuarina is a strong light demander. If is also a very fast growing species. The thinning will be carried out in the fourth and tenth years from the year of planting. The growth is vigorous and congestion starts earlier. Hence, the crop should be examined in the third year and thinning may be carried out under instructions from the Chief Conservator of Forests, Kolhapur Circle, Kolhapur in that year. Otherwise, It should be carried out in the 4th year. The first thinning will be a mechanical thinning in which alternate diagonal lines, will be removed, However care should be taken to see that poles to be retained are not unsound malformed, crooked or suppressed. In case such poles to be retained to be retained then they should be marked for felling retained adjoining healthy poles from the line in which they are to be marked for removal, In the First thinning 50 % of the remaining crop will be removed.

CHAPTER : V WORKING PLAN FOR MANGROVE WORKING CIRCLE







CHAPTER-V- WORKING PLAN FOR MANGROVE WORKING CIRCLE

SECTION-1-GENERAL CONSTITUTION OF THE WORKING CIRCLE-

160. This Working Circle includes all the estuarine area, in Ratnagiri Forest Division, which support mangrove forests, consisting of mangrove species and its halophytic associates. These are all halophyts which survive in saline conditions through adaptations of primarily of three types mainly salt exclusion at root level, at leaf level or an accumulation of soil in a leaf gland. Besides that there are other associates, which are not mangroves, but have adopted to saline conditions. The area belongs to classification, Swamp Forest consisting of mangrove scrubs. (4BTSI), which may be a degradation stage set in due to biotic interference or caused due to restrictive inclusion of fresh water in the estuarine, because of construction of reservoirs, or may be due to chemical discharge in the water. The area is capable of producing a good size mangrove trees, but it is supporting scruby mangrove species only because of restrictive conditions. The swamp zone can be grouped according to its salinity as oligonaline zone (0.5 to 5 %), mesohaline zone (5 to 18%) and polyhaline zone (18 to 30%). The first zone is facing the river, while the last zone is interfacing sea. The area includes the zones which are inundated daily, weekly, fortnightly, monthly or rarely. These zones support a different type of vegetation according to salinity conditions. The soil here is an alluvial deposit, rich in sodium and calcium. The zone exhibits aneorabic condition.

During the previous plan (from 2002-2003 to 2011-2012), these areas were managed under Protection Working Circle, with no specific prescription provided to manage them, except a strict protection. The total area covered in this Working Circle is 816.56 ha. **Appendix No. XI.** The allotment of area in each range is as given below:-

<u>Table No.42</u>
The Range-wise area of Mangrove Working Circle

Sr.	Range	Forest Area	Mangrove	Percentage of	Percentage
No.		ha.	Working	the forest	of the forest
			Circle Area ha.	area of the	area of the
				range	Division
(1)	Dapoli	3859.43	261.68	6.78	3.90 %
(2)	Chiplun	669.23	228.40	34.12	3.41 %
(3)	Ratnagiri	2177.84	326.48	14.99	4.86 %
	Total	6706.50	816.56		12.17%

SECTION-2-SPECIAL OBJECTS OF MANAGEMENT-

- **161.** The following are the special objects of management:-
 - (i) To maintain mangrove in perpetuity in its natural composition.
 - (ii) To increase the composition of tree species by raising its plantation.
 - (iii) To increase biomass production, which is needed for fish and shrimp cultivation?
 - (iv) To obtain the M.F.P. like honey etc. from the forest in perpetuity.

SECTION-3-GENERAL CHARACTER OF THE VEGETATION.-

162. The forest is generally of scruby in nature with sporadic tree growth here and these are not uniformly distributed. The forest is basically on alluvial deposits and it has been grouped as Coastal Alluvium in soil classification, with halophyts present everywhere. The zonation of the species is as per salinity percentage.

The most prominent among the species is <u>Rhizophora mucronata</u>, <u>Avicinnia marina</u> and <u>Avicinnia officinalis</u> and this general is marked by the present of stilt root, which contains numerous pores called aerechyma for inhaling oxygen inside: These forests are mostly on flat surface affected by the tide of amplitude of 0.6 to 1.0 meters at peak and inundate the plain area. Because of topography of Western Ghat, the tide water is limited to few meters to kilometer only. The zonation-wise distribution of species is as below:-

- **Zone-I**: Toward sea- The area is inundated daily and it contains the species Rhizophora/Avicennia marina.
- **Zone-II**:- Less saline- This area is also daily inundated, but effect of fresh water is prominent.
- **Zone-III**:- Less salinity and area is inundated twice or thrice a week. Species present are cariops/Aegicaras/Excoecria, Bruguicera, Cylindrica, Xylocarpus, Cyriometra, Cerbera.
- **Zone-IV**:- Very less salinity, and inundation is once in 15 days during spring tide or neap tide species present are salvadores, Cleroden-drum, Pongamia, Derris, Dolichandrine and others.

The other mangrove species present includes <u>Rhizophora mucronata</u>, <u>Rhizophora apiculata</u>, <u>Bruguiera gymnorrhiza</u> (L.), <u>Bruguiera cylindrica</u>, <u>Kandelia candel</u>, <u>Ceriops tagal</u>, <u>Avicennia alba</u>, <u>Avicennia marina</u> Var. acutissima, <u>Avicennia marina</u>, var. resinifera, Avicennia marina, Avicennia officinalis L, Sonneratia alba, Sonneratia

apetala, Sonneratia caseolaris, Lumnitzera racemosa, Xylocarpus granatum, Excoecaria agallocha, Cynometra iripa, Cerbera odollam, Aegiceras corniculatum (L.) Acanthus ilicifolius, Salvadora persica Linn., Barrigtonia racemosa, Spr. Syst., Derris heterophylla, Halophila beccarii Aschers, Porteresia coarctata, Takeoka, Aeluropus lagopoides, Sporobollus virginicus (L.) Sesuvium portulacastrum, Suaeda nudiflora, Acrostichum aureum (L.), Cyperus sp.(L.), Stenophyllus barbata, Ipomoea pes-caprae (L.).

Similarly the other halophyts associated with mangrove are:- <u>Caesalpinia nuga</u>, <u>Clerodendrum inerme</u> (L.) Gaertn., <u>Dolichandrone spathaceae</u>, <u>Pongamia pinnata</u>, <u>Peirree</u>, <u>Premna coriacea</u> C.B.Clarke, <u>Premna integrifolia</u>, <u>Tamarix gallica</u>. Thespesia populnea, Vitis pallida (L.).

these associates do not have the mechanism of saline exclusion, from their system and are just tolerant of saline conditions. Herbes associated with mangroves are:-<u>Ceriops tagal</u>, <u>Avicennia marina</u>, <u>Avicennia officinalis</u>, <u>Agiceras corniculatum</u>, <u>Acanthus ilicifolius</u>, <u>Brugaiara of Kandelia candel</u>, <u>Lumnitzera racemosa</u>, <u>Derris heterophylla</u>, <u>Halophile becarii</u>. The canopy-wise distribution of the mangrove forest may be described as:-

Top Canopy:- It contains the species <u>Rhizophora mucronata</u>, <u>Rhizophora apicuculata</u>, <u>Sonneratia alba</u>, <u>Sonneratia apetala</u>, <u>Sonneratia caseolaris</u>, <u>Avicennia marina</u>, <u>Avicennia officinalis</u>, <u>Bruguiera gymnorrhiza</u>. Similarly middle canopy includes <u>Bruguiera cylindrica</u>, <u>Excoecaria agallocha</u>, <u>Ceriops tagval</u>, <u>Lumnitzera racemosa</u> and the low canopy includes <u>Aegiceras corniculatum</u>, <u>Avicennia marina</u>, <u>Acanthus ilicifolius</u>

SECTION-4-ANALYSIS AND EVALUATION OF THE CROP:No enumeration of the growing stock of mangrove forest has been carried out, due to prevailing aquatic conditions.

SECTION-5-METHOD OF TREATMENT-

163. These mangrove forests prevailing here are basically of inferior and open type. It is also evident from the past managerial records, that mere providing a silvicultural rest to these forest is not sufficient to record any significant change in the composition of forest and raising of mangrove plantation of tree species either in open patch, or by clearing certain scruby areas, is required to enrich these forests. The planting will be done mostly of species which either vivipary or cryptopary as mangroves species are very slow

growing, due to salinity condition and the seedling planted in October must have achieved a seedling height of minimum 60 cm., before planting, which can be achieved only by raising a nursery raised through a vivipary or cryptovivipary mangrove species, as in these plants, the growth of cotyledens has already started. A seed grown polythene plant will be required to keep in the nursery for a longer times to achieve same height. Vivipary plants Bruguiera gymnorrhiza, like *Rhizophora* mucronata, Kandelia candel Cryptovivipary like Avicennia marina, Avicennia officinalis, Bruguiore cylindrica and <u>Caviopstagal</u> achieve this height in a much less time, say within three months. A seedling of minimum 60 cm. is required so that the seedling is not submerged totally under sea during spring or neap tide. The mature propagules appear in the month of June and July and once nursed in polythene bag these achieve the required height in 3 months. The planting will be done in month of October, say 5 days before full new moon, when there is a maximum retreat of sea water for at least 4 to 6 hours i.e. say from 08-00 a.m. to 02-00 p.m.

SECTION-6-FELLING CYCLE-

164. A working cycle of 10 years has been proposed. The entire area will be worked in ten years.

SECTION-7- FELLING SERIES-

165. Three felling series have been formulated. Appendix No. XLIV.

SECTION-8- CHOICE OF SPECIES-

166. Mangrove Tree species of <u>Sonneratia alba</u> and <u>Sonneratia apetala</u> and <u>Sonneratia apetala and Sonneratia apetala and Sonneratia apetala and Sonneratia apetala and <u>Sonneratia apetala and Sonneratia ap</u></u>

SECTION-9- IMPLEMENTING AGENCIES-

All works will be done departmentally.

SECTION-10- METHOD OF EXECUTION OF WORK.

167. The treatment map of the coupe will be prepared showing the following details:-

- (a) **Zone-I**:- The area which is inundated daily and this area is directly facing the sea.
- **(b) Zone-II**:- The area which is daily inundated, but the salinity is less due to effect of fresh water.

The area will be further divided into area:- (i) area with good tree growth (ii) area with scruby growth.

- © **Zone-III**:- The area which is inundated twice or thrice a week and has a less salinity. The zone will be further divided into area with tree growth and without tree growth, just as in Zone-II.
- (d) **Zone-IV**:- The area is inundated once in a 15 days and has a less salinity even below brakish level.

Treatment:-

Zone I:- No treatment is prescribed. The area will be protected strictly against illicit cutting.

- **Zone-II**:- (a) Area with tree growth. The trees of the species <u>Sonneratia alba</u> and <u>Sonneratia apetala</u> and <u>Sonnerata caseolanis</u> with girth at the breast height more than 25 cm., being good coppicers, will be removed for meeting the local requirement. Only one in three standing pole will be removed.
 - (b) The area with the shruby growth/blank area- The area will be planted with polythene bag seedlings of species *Rhizophora muorenata*, *Bruguiera gymnorrhiza*, *Kandelia candel*, *Avicennia marina*, *Avicennia officinalis*, *Bruguinera cylindrica*, *Cariop tagal* by removing/cutting shrubs, from its wherever possible. All planting will be done only through propagules, and only of species, which produce propagules. Tree species will be preferred.

Zone-III:- Same as Zone-II.

Zone-IV:- No treatment is prescribed. However if the area is blank, the other halophyts of mangrove associates, like *Pongama pinnata*, *Dolichandra falcata* etc. can be planted in the area.

This will cover the area. In all only 10 coupes of mangrove land (**Appendix No. XLV**) shall be planted annually by following the plantation technique as elaborated below:-**Plantation Technique**:- The following technique of plantation shall be followed.

.Nursery Technique:-

- **168.** Two methods of raising seedling are being prescribed:-
 - (i) By germinated seeds (or through propagules)- like vivipary and ryptovivipary.
 - (ii) By vegetative propagation- which includes air layering and stem cutting.
- **(i) By Seeds**:- Due to presence of excess chloride in the plant, the protective seed coat, which promotes dormancy in the seed, is not constituted with the result cotyledens continue to grow into a tuber structure called propagules, and these are reproductive seeds, which can be sown directly into polythene bags, to obtain the tall seedlings. Two types of phenomenae are observed.
- (i) <u>Vivipary</u>: Here the cotyledens grow into a cylindrical like structure called propagules. The radicles are at the base of the propagules, and when propagules are cut in two pieces horizontally mid way, the lower portion develop immediately a root and the upper portion of the propagules produces leaves in due course and roots here are developed later, under the treatment of root promoters like IBA.
- (ii) <u>Crytovivipary:</u> The cotyledens here are confined into fruit itself and these grow into a small tubular structure. The radials are on the top of the structure and hence while sowing the entire fruit with the propagules, the fruit is only superficially kept on the polythene bag soil so that roots are developed instantaneously. These fruits are not cut, but sown in the nursery as a whole. These propagules easily develop into a seedlings.
- **(i)** <u>Collection of Propagules</u>:- It is important to collect mature propagules, which are fleshy, shining with red colour collar. The propagules are collected in the month of June and July.
- (ii) <u>Cutting of propagules:</u> The collected propagules are cut into 2 to 5 cm pieces, using a clean and sharp knife. The entire propagules can also be used, but two pieces cut horizontally are preferred, as these achieve required height early. There is no scarcity of propagules in the forest.

(iii) Removal of phenolic Compound:-

169. The phenolic compounds are present in the bark and wood of almost all mangrove species. These chemicals help in survival of the mangrove plants in saline conditions. However, in vegetative propagation, these phenolic compounds act as an inhibitor, in formation of roots and shoots and hence need to be removed before propagules are sown in polythene bags.

(a) Preparation of Stock Solution:-

- **170.** Take 20 gms. of sodium carbonate (Na₂Co₃) and 20 gms. of sodium tungstate (Na₂W04 2H20), and dissolve it successfully in 80 ml of distilled water, which makes 100 ml and it is 20% stock solution.
- (b) It is now to be reduced to 10% stock solution, take 50 ml from 20% stock solution and add 50 ml of distilled water. This gives 10% working solution.
- © <u>Treatment:</u>- Take 10% solution in a small cup. Keep basal portion of the cutting immersed in the solution for 5 to 10 minutes and then, wash the cutting in distilled water two to three times. Now the propagules cuttings are ready for harmone treatment. It is then treated with Indole Butyric Acid (IBA) or Naphthalene Acitic Acid to promote root and for preparing a 10% solution, take 1 gm of IBA, add little drops of NaoH, until it dissolves and add 100 ml of distilled water. Now it is 10,000 ppm.
 - (v) Dip the propagules in 1BA for 10-30 minutes.

<u>Table No.43</u>

Optimum concentration of root promoting hormones for maximum root initiation

Species	Growth	Concentration	Rooting
	Hormone	(ppm)	(%)
Bruguiera cylindrica	IBA	500	83
Bruguiera gymnorrhiza	IBA	700	75
Bruguiera parviflora	IBA	500	90
Bruguiera sexangula	IBA	500	93
Ceriops decandra	IBA+NAA	500+200	79
Kandelia candel	IBA+NAA	1000+500	95
Rhizophora apiculata	IBA	1500	93
Rhizophora mucronata	IBA	2000	89
Rhizophora xhybrid	IBA	1500	75

(vi) After harmone treatment, the cuttings are planted in polythene bags containing sand and clay in a ratio of 2:8, and then kept in a mist chamber at 28+2⁰ with 70-80% humidity. Roots are formed in 20 to 25 days and it is followed by the hardening for 3-4 months. Before 25 days of field transferring, it is served with saline water of level 20 ppt. of diluted sea water or alternatively, the polythene bags are filled with mangrove soils and

these bags are allowed to be filled by a high tide water. One propagule (or piece) is kept in each bag. The field nursery of mangrove should preferably be located in inter-tidal area.

Plantation Technique:-

171. The plantation is done by scooping the soil, and the polythene bag with cover removed is kept inside the soil and then it is pressed manually so that the seedling is not uprooted in a tide.

Preservation of Propagules:-

172. Propagules are available upto June and July, while the plantation is done after monsoon. So sometime there is a necessity to preserve them. The method of preservation is simple. The propagules are collected from the field and a batch of 20-30 propagules are placed in a blotting paper or in a rough cloth, so that 1/3 of the lower end is covered by wrapping. The propagules are kept like that with wrap always kept moist. In this way, it can be preserved upto 6 month. Such method can ensure germination percentage upto 90%.

Air-layering:-

- (i) Select the branch and remove the outer bark of the selected branch. Always select semi hard woody branch and avoid branches, which have much twigs, and is drooping and young.
- (ii) The removal of the bark of the selected branch, should be at 2 to 5 cm below the node. It is called wounded portion. Make a bridge of bark of 2 to 4 mm, thickness to connect the upper-end of the mother plant and the lower end of the daughter plant to be developed.
- (iii)Apply harmone all around the wounded portion, with IBA and NAA, to get rooting.
- (iv)Prepare a mixture of sand and clay at 3:7 ratio, and mix it with nearby mangrove water. This forms the first layer of rooting medium and this layer is followed by Sphagnum mass (to retain moisture) and then it is finally covered with the polythene cover. Water is provided, periodically through injection.
- (v) After roots have been developed, the branch is cut with a sharp knife, and it is kept in mist chamber at 28°C at 70% humidity for 1 to 3 months. It is hardened therein polythene bags, and then treated with saline water 20% ppa. and planted in the field.

Stem-cutting:- This is another vegetative reproductive technique where the twigs are collected with following specifications.

- (i) Collect narrow/straight twigs from plus trees.
- (ii) Select and cut stems of different types such as soft wood, semi-hard wood and hard wood, the length of the cut stem may vary from 15 to 20 cm.

(iii) Removal of phenolic Compounds:-

- **173**. The following method describes the preparation of solution and the treatment method to remove the phenolic compounds.
- (a) <u>Preparation of stock solution</u>:- Take 20 gms. of sodium carbonate and 20 gms. of sodium tungstate, dissolves successively in 80 ml of distilled water and make to the final volume to 100 ml. It is a 20% stock solution.
- **(b)** <u>Preparation of Working Solution</u>:- Take 50 ml from 20% stock solution, and add 50 ml of distilled water. This gives a 10% of a working solution.
- © <u>Short-term Treatment</u>:- Take 10% solution in small cup and keep the basal portion of the stem cutting, immersed in the solution for 5-10 minutes. Wash the treated cutting, two to three times in distilled water.
- (d) <u>Long Term Treatment</u>:- Dip cutting for 20-30 minutes in 5% working solution.
- **(e)** <u>Apply Harmones</u>:- Indole Acidic Acid Indole Butyric acid (IBA) and Nephthaline Aceta Acid (NAA) are commonly used as root promoters.
- (f) After the roots have been evolved, seedlings are dealt in same way as in above case. The method described above is basically applicable to the following species:-

Acanthus ilicifolius, Amoora cucullata, Avicinnia marina, Cerbera manghas, Excoecaria agallocha, Heritiera fornas, Heritiera littoratis, Intsia bijuga, Lumnitzera racemosa, Sonneratia apetala, Xylocorpus granatum.

Planting Period: The mangroves are in the month of October, when the tidal water recedes that is from 8 am to 2 pm on 5^{th} day before the full new moon in the month of October and the plant will be done at a close spacing say of $1.83 \,\mathrm{M} \times 1.83 \,\mathrm{M}$.

Subsidiary Silvicultural Operations:

- **174.** (A) <u>Weeding</u>: No weeding is required, as aquatic condition does not permit this operation.
- (B) Removal of Algae:- The tidal water from the ocean oftenly brings algae, which encircles the plant superficially and need to be removed mechanically, lest the seedling will be killed.

(C)Removal of any natural/artificial blockage of brakish fresh water- if any sand blockage has been created artificially, due to movement of water, it should be broken in part to prevent degradation of mangroves. Similar operation for fresh water is also required.

J.F.M. Activities:- The local people will be involved in preservation of these mangroves, as these are the store-house of many eco-systems to the human advantage like growth of shrimps, collection of honey, bark for tanning etc.

<u>Mangroves as medicinal plant</u>:- Mangroves are considered to be the plants with medicinal properties and according to the people practicing ethno-botany, the following uses has been accepted.

Sr.	Name of the Species	Uses
No.		
(1)	Acanthus ilicifolius	Fruit pulp used for blood purified
(2)	Avicennia alba	Bark used for skin diseases and wounds
(3)	Avicennia marina	Bark used for skin diseases and wounds
(4)	Avicennia officinalis	Bark used for skin diseases and wound
(5)	Bruguiera cylindrica	Fruit used for dysentery, Pneumatophores used for
		perfumes
(6)	Bruguiera gymnorrhiza	Fruit used for dysentery. Pneumatophores used for
		Perfumes.
(7)	Ceriops decandra	Bark stops hemorrhage
(8)	Rhizophora mucronata	Bark used for haematuria, Diarrhoea, Dysentery,
		Leprosy, inflammation etc.
(9)	Sonneratia apetala	Leaf juice stops hemorrhage and also used for
		Increase eye power.
(10)	Xylocarpus granatum	Seed paste used for breast tumor and bark for cholera.

CHAPTER: VI: MISCLLENEOUS WORKING CIRCLE.

SECTION: 1: GENERAL CHARACTERS OF VEGETATION

175. This under circle includes the area which has been used for construction of building, roads, nursery or any of the non-silvicultural works.
The survey / Gut number miscellaneous area details is given in Appendix

No. XLVI. The area statement is as below.

Table No.44
The Range wise area of Miscellaneous W.C.

Sr.	Range	Area of the	Percentage of the	Percentage of the area of
No		working circle	forest area of the	the division.
		ha.	range	
1	Dapoli	1.68	0.04 %	0.03 %
2	Chiplun	6.12	0.91 %	0.09 %
3	Ratnagiri			
	Total	7.80		0.12 %

SECTION: 2: GENERAL DESCRIPTION OF VEGETATION

176. The area is divided as per tree growth.

Silvicultural cycle-

No silvicultural cycle has been prescribed.

Method of Treatment-

177. No silvicultural treatment has been prescribed and the area will be maintained as it and will be kept in that same use.

CHAPTER: VII WORKING PLAN FOR BAMBOO PLANTATION (OVERLAPPING) WORKING CIRCLE.



CHAPTER:VII: WORKING PLAN FOR BAMBOO (OVERLAPPING) WORKING CIRCLE.

SECTION: 1: GENERAL CONSTITUTION OF THE WORKING CIRCLE.

178. This is an overlapping working circle, which includes the entire area of Improvement Working Circle of this Plan. Edaphically these areas are the most suited for rising of bamboo plantation. Occurrence of natural bamboo has not been noticed in the forest area, during the stock-mapping, however, the plantations of bamboo raised in the past forest areas, show that wherever a good planting stock was used, and timely silvicultural operations were provided, bamboo clumps have established well. Successful bamboo planting is observed around house precincts and farm bunds in entire Ratnagiri district. Planting of bamboo on co-operative basis is being practiced in Sangameshwar taluka (Ratnagiri District), where regular harvesting of bamboo is being done for past 20 years.It is therefore, essential to include Managa (Dendrocalamus stockii), Chiva (Oxythenathera monostigma), Kanak (Bambusa bamboo), Kalak/Meskati (Dendrocalamus strictus), species of bamboo as few of the important species fit for planting in this area.

Priority will be given to plant bamboo seedlings in old teak plantation area, which will be silviculturally thinned in the coming years. The old plantations are of the extent of 133.50 hectares. Teak constitutes an excellent associate with bamboos to its advantage.

The Range wise area of Bamboo (O.L.) W.C.

Table No.45

Sr. No	Range	Forest area ha.
1	Dapoli	1129.35
2	Chiplun	50.48
3	Ratnagiri	186.83
	Total	1366.66

The statement showing compartment number and area are allotted to

Bamboo overlapping working circle is given in Appendix No. XLVII.

SECTION: 2: SPECIAL OBJECTS OF MANAGEMENT

179. Following are the special objects of management.

- 1. To regenerate bamboo artificially with a view to enrich the forests and increase its productivity.
- 2. To increase the yield of bamboo for meeting the bonafide needs of the local people.

SECTION: 3: GENERAL CHARACTERS OF VEGETATION

180. The forests allotted to this working circle fall largely under type 3B/C2 of Champion and Seth classification. Viz. Southern moist mixed deciduous forests, which have been described in Chapter II of part I of Volume I of this Plan. Maharashtra site quality is mostly IVb to IVa., with patches converging to even site quality III. The forest is occurring mostly on gentle slopes and in valleys. On ridges and flat tops with shallow soil, the site quality deteriorates to IVb and the density of the crop varies up to 0.7, depending upon site conditions and biotic influence. The important species present in the forest are sisam, kakad, Dhaman, teak etc. The crop is mostly young to middle aged. Regeneration state of ain, kinjal, dhawada, nana, teak, sawar, beheda, hed, biba, siras is in general adequate. Series of teak plantations exist in this area and these plantations require a silvicultural thinning immediately in most of the area.

SECTION: 4: ANALYSIS AND VALUATION OF CROP.

181. Bamboo does not occur naturally in this forest. However, if the proper care is nurtured, a good plantation can be achieved. The list of old teak plantation exiting in the division is given in **Appendix No. XLVIII.**

SECTION: 5: METHOD OF TREATMENT

182. No teak plantations were carried out during the last 10 years. However old teak plantations after thinning bamboo plantations will be carried out.

On the farm bunds and in house precinct in private areas, planting of bamboo by the cultivator has shown an excellent result. Polypot seedlings from nursery have also been successfully tried in private areas. The bamboo will be planted through polythene bags.

Inter planting of bamboo will be taken up in old teak plantations immediately after thinning. Such planting will be done at a spacement of 6 mtr x 6 mtr in a pit of size 0.45 x 0.45 x 0.45 m. A total of 278 seedlings will be planted per hectare. Statement showing the annual coupes to be planted with bamboo is given in **Appendix No. XLVIII..** In addition to that, other suitable areas will also be planted and in all 200 ha. will be planted annually. One year old seedling will be planted, preferably with a culm formation within the seedlings.

SECTION: 6: CHOICE OF SPECIES

183. Depending upon suitability, the following bamboo species shall be planted. Managa/Meskati – *Oxythenthra monostigma* . *Bambusa bamboo*, *Dendrocalamus stocksii*.

SECTION: 7: SILVICULTURAL SYSTEM

184. The silvicultural system adopted shall be coppice selection system.

SECTION: 8: FELLING CYCLE

185. A felling cycle of three years shall be followed in clump that has completed eight years of its formation.

SECTION: 9: FORMATION OF FELLING SERIESES

186. Two planting series corresponding to two felling series of Working Plan for Improvement Working Circle have been formed.

ECTION: 10: REGULATION OF YIELD:-

187. It will be by area, however, as only the first two plantations raised under this Plan, will be due for working, no yield has been stipulated.

It has not been anticipated in this plan period and hence has not been dealt herewith otherwise it will be as per area.

SECTION: 11: AGENCY OF HARVESTING:-

The bamboo will be harvested departmentally.

SECTION:12: METHOD OF EXECUTING FELLING (EXPLOITATION) OF BAMBOO

- **188.** The bamboo clump is mature for harvesting in 8th year and first two plantations of bamboo raised in the plan shall be due for harvesting. The following **harvesting rules** shall be followed.
- i) Bamboo extraction will not be permitted during the monsoon period that is from 15th June to 30th September, as this is the period of formation of new culms.
- ii) As far as possible, the cutting of bamboo should end by March, that is by the end of winter, when the culms are almost devoid of starch and attract less insect borer.
- 8 mature (more than one year old) culms. The clumps having culms less than 8 will not be harvested. Only broken, dead, dry badly damaged or over mature bamboo will be felled. A failure to do that will cause congestion in the clump. Clear felling of clump is never advisible. A minimum of eight culms should be there wherever possible.

- iv) In a mature clump, the following types of culms (green & living) will be retained.
- a) All current years. i.e. less than one year.
- b) From the rest, culms equal in number to the current year (less than one year) culms or eight which ever is more.
- v) If mature culms are available for retention, as per rule iv (b) in a mature clump, the following culms will be removed otherwise not.
- a) Culms where the growing shoots have been cut to a length of more than 1/3 of the normal length or the culms which are badly damaged.
- b) Twisted, bent or otherwise malformed culms
- vi) Culms to the extent available for exploitation as per rule (iv), above should be harvested in such a manner that the clump is evenly worked through out and that the bamboo culm to be retained are evenly spaced out in the clump. The clump is worked in a horse-shoe manner.
- vii) Culms on the periphery of the clump will not be removed except where absolutely necessary to facilitate working in the interior portion of the clump.

The leading exterior culms may not be cut under any circumstances, even if are malformed, as their retention is in the interest of outward growth of rhizome, the clump and to support new culms.

In order to make all portion of the clump accessible for marking, the clear felling in the form of a wedge may be permitted, so that the opening of the wedge shall not be more than one meter wide. The depth and width at the narrow end of the wedge should be less than 2 meter wide all around. Working in this belt will be strictly according to the above rules.

- viii) Height of cutting is of no importance for the further culms formations in culms. However, the height at which the culms shall be cut must not be lower than 15 cm. and more than 45 cm. from the ground level. Two culms in each clump should be cut at 3rd to 4th internode to provide forage to wild animals.
- ix) A clump should be clean of debris before leaving it.
- x) In case of flowering clumps, exploitation should be deferred till the seeding is completed. Gregariously or sporadic flowered clump should be clear-felled.

- xi) The following acts will be strictly prohibited.
 - a) Digging of rhizomes.
 - b) Cutting the tops of bamboos for fodder.
 - c) Use of tender bamboos.
 - d) No grazing to be permitted during the rains in bamboo forests, which have been worked in the previous open season.
- xii) A clump will be distinguished as an independent clump where its periphery is easily discernible from the adjacent clumps, irrespective of its distance from other. Only when such a distinction is not possible, the clumps within one meter will be considered as one.
- xiii) The exposed bamboo or rhizome on the periphery should be covered with the slash and earth to provide nourishment to spreading rhizomes and for promoting the peripheral growth of culms.
- xiv) Oftenly soft flexible, imperfectly lignified, less than three years shoots are to be supplied to burads for basket weaving much against the silvicultural norms. But in that case and equal number of old culms, which would otherwise be cut, must be preserved as a set off in that working clump.
- xv) All climbers infesting the bamboo clump will be removed
- xvi) The sharp edge weapon shall be used for harvesting bamboo to avoid splitting of bamboos.
- xvii) For reducing congestion, cleaning will be done to open up to the clump, to such an extent, that it is possible.
- xviii) Water bound contour trenches will be dug around the bamboo clumps, with soil deposited on the clumps, to promote more culms.

SECTION:13: SEQUENCE OF FELLING:-

189. No sequence of felling has been laid down in the Plan except that the first and second plantations will be harvested in 9^{th} and 10^{th} year.

SECTION: 14: TECHNIQUE OF RAISING PLANTATION

190. 1. One year before the pre monsoon works, the coupe will be surveyed and demarcated. After survey and demarcation, the treatment map of the area will be prepared by the gazetted officer preferably Range Forest Officer. At the time of preparation of treatment map all the details be shown as indicated in para.

In case of inter planting of bamboo seedlings in the area as indicated in treatment map, pits of size 0.45 x 0.45 x 0. 45 m.. will be dug in the month of October and November and will be refilled in April or May. Planting will be done at the advent of rainy season. One year old seedling containing two years old rhizome, will be planted in pits, and before planting, pits will be filled with good soil and with farm yard manure in a good preparation. The standard nursery as plantation technique shall be followed.

SECTION:15: METHOD OF EXECUTING THE WORK

191. The bamboo clump will be matured for harvesting in 8 years from the year of plantation of bamboo. The harvesting rules should be followed as stated above.

SECTION:16: MISCELLANEOUS REGULATIONS

- 192.. 1. Fire protection: The planted areas will be completely fire protected for the period of 10 years.
 - 2. Grazing: The coupes will be closed to grazing from year of planting for the period of 10 years.

CHAPTER: VIII WORKING PLAN FOR WILD LIFE (OVER LAPPING) WORKING CIRCLE.









Ratnagiri Division

- 1. Vultures
- 2. Olive Ridley Turtle
- 3. Olive Ridley Turtle
- 4. Marsh Crocodile

CHAPTER: VIII: WORKING PLAN FOR WILD LIFE (OVER LAPPING) WORKING CIRCLE.

SECTION: 1: GENERAL CONSTITUTION OF THE WORKING CIRCLE.

193. This working circle comprises of the entire forest area covered under this working plan constituting Protection, Improvement and Casuarina Working Circles. The total area included in this working circle is 6706.50 ha.

SECTION: 2: SPECIAL OBJECTS OF MANAGEMENT

- **194.** The special objects of management are:-
- 1. To conserve the wild life found in the areas and also to improve their habitat.
- 2. To manage, protect and multiply the wild life by providing protection and shelter to them
- 3. To preserve the bio-diversity of the area.
- 4. To bring awareness among the people about the wild life prevailing in the area.

SECTION: 3: WILDLIFE SPECIES AVAILABLE IN THE RATNAGIRI FOREST

- 195. The species available in the Ratnagiri forest as are given below.
- **1. Monkeys:** The langur or monkeys seen in this forest area are the representatives of the order Primates of class Mammalia. The different types of monkeys found in the region are;
- **2.** <u>Bonnet monkey</u> makad (<u>Maccaca radiata</u>): IUCN status lower risk-II. These are more common in both high ranges and plane areas of Ratnagiri Division. The troops of as many as 20 to 30 animals may be found feeding on the ground or on trees. In some places they are abundant and become bold enough to get in to human habitations and make themselves a nuisance.
- **3.** <u>Leopard bibat (Panthera pardus)</u>: IUCN -status lower risk-I (declining). They belong to the cat family Felidae of order Carnivore in class of Mammalia. They are found in all types of forests as well as in open country among rocks and scrubs. They can kill and feed on anything they can over power with safety and are particularly fond of domestic dogs which is the reason for their frequent sighting in and around human habitations.

- **4. Tiger wagh–** (*Panthera tigris*): IUCN status Endangered-I (declining). Tiger is the top predator in the food pyramid of forest ecosystem and belongs to family Felidae. It is usually found in the moist deciduous and dry open jungle and maintains its territory. The Division is adjacent to different Protected Areas and hence there is a continuity of geographical area through which different animals move around and forage freely. Abundance of herbivorus animals is an indication of healthy habitat.
- **5. Jungle Cat Ran manjar** (<u>Felis chaus</u>): IUCN status Lower risk- II. It has long legs and comparatively short tail and pale green eyes. At times it is a menace to poultry and can attack smaller cattle also.
- **6.** Jackal's Kolha (<u>Canis aureus</u>): IUCN status Lower risk-II. The jackals, wild dogs and sloth bears all belong to the family Canidae, order Carnivora. The jackal's long drawn eerie howling at dusk or before dawn in the forest is very familiar to people living in the vicinity. It roams over the hills and the low country and is known as for stealing poultry.
- **7. Wild dog Ran kutra** (*Cuon alpinus*): IUCN status Vulnerable-II. These animals are similar to domestic dogs with long body and short legs. They lead a social life with prolonged association between parents and young. The pack is a union of two or more families or some times of several families. They hunt in packs within the forest and their favored prey is sambar.
- **8.** Sloth bear Aswal *(Melursus ursinus)*: IUCN status Vulnerable-I. They are found in Ratnagiri Division. Usually they come out shortly before sunset, hunt for food all night and retire in the morning. They climb trees for collecting honey and dig termatorium for feeding on termites.
- **9. Mangoose Mangoose (Herpestes edwardsii)**: The mangoose belongs to family Herpestidae, order carnivora. They are very adept in killing snakes and rats. There are other species of mangoose. The common grey mangoose (*Herpestes edwardsi*) is seen in forest as well as in the plains of the Division. It has long coarse fur with uniform Rufus color darker on the legs. The stripe necked mangoose (*Herpestes vitticollis*) and the ruddy mangoose (*Herpestes smithy*) are the other species present.

- **10. Porcupines- Salinder**-(*Hystrix indica*): These animals belong to the order rodentia. Their chisel like upper and lower incisor teeth grow continuously and is kept in shape by continuous gnawing. The continuous growth of the incisors is the most distinct feature and it is well adapted to its feeding habit.
- **11. Squirrels-Khar:** Squirrels are the easily recognized rodents by their slender build and long body. Palm squirrels *(Funambulus palmarum)*, and Indian giant squirrel *(Ratufa indica)*, are common types of squirrels found in this Division.
- **12.** Indian Bison Gava (<u>Bos gaurus</u>): They belong to family Bovidae, order Artiodactyla of class Mammalia frequently, seen in the forests of this Division. It is the biggest oxen in the world with weight of the gaur about 1000 kg.
- 13. Sambar Sambar (Cervus unicolor): It inhabits the thickly wooded area of the Division. Its upper portion has dark color and is pale on the under parts. Hair is coarse and wiry i. e longer on neck and throat forming an erectile mane. Its tail is small and thick. Weight is around 225 to 300 kg. It is nocturnal in habit and rarely seen in large herds. It is main prey base for tiger and wild dogs.
- **14. Barking Deer Bhekar (Muntiacus muntijak):** It stands 75 cm at the shoulder and have stubby little antlers with two prolongs. The jaws have V shaped ridges with, the arm of V continue into a freely projecting columns. Its canine teeth are projecting. Its call resembles that of a barking dog and hence is also known as barking deer.
- **15.** Wild Boar Ran dukkar- (<u>Sus scrofa</u>):- It is a single stomached artiodactyls coming in family Suidae. They are courageous and determined to fight. It is seen all over the Division. It is also a major pest for all types of agricultural crops. Tiger, leopard and wild dogs control their population.
- **16. Scaly anteater- Khavale manjar-** (*Manis crassicaudata*): The little known and curious member of the smaller mammals Pangolin comes in order Pholidota of mammelian class. They have pointed head with small eyes, long and broad tail, long tongue and no teeth. They feed on termites and ants. The body is covered with long overlapping scales and hence called Scaly anteater.

BIRDS & MAMMALS OF RATNAGIRI DIVISION-BIRDS.

- **196. 1. Tree pie-** called is one of the common birds found in both Division areas. They are named 'Olaenjaly' due to the habit of hanging in leaflet of coconut. They feed on small insects. The common tree pie found in this area are Indian tree pie (<u>Dendrocitta</u> <u>leuicogastra</u>) and White bellied tree pie (<u>Dendrocitta</u> <u>leuicogastra</u>).
- 2. The Drongos –Kotwal-(*Dicrurs*)- These are seen in the plains feeding on small insects. It has glossy black plumage, turked tale and often seen in high ranges. They belong to the family sescruridae. The common Drongos found in this Division are 'Black Drongo' (*Dicrurus adsimillis*), Grey drongo (*Dicrurus leucophaeus*), White bellied Drongo (*Dicrurus caeruescens*), Bronze drongo (*Dicrurus aeneus*) and Racket tailed drongo (*Dicrurus paradiseus*).
- **3. Babblers** Babbler are locally called Satbhai' and are found in this Division in abundance. They belong to the family Timalidae. They are characterized by short wings with soft and fluffy plumage. They are noisy birds and seven sisters are unique. They are seen in groups of seven or more and have the capacity to imitate other birds. The common Babbler found in the Division areas are Spotted babbler (*Pellorneum ruficeps*), Scimitar babbler (*Pomatrohinus horsfieldi*), Rufous babbler (*Turdoides subrufus*), Jungle babbler (*Turdoides striatus*), and Poff throared Babbler.
- **4. Bulbuls** The different varieties of Bulbuls locally called Red whiskered bulbulshipai Bulbul, Red vented Bulbul Lalbudya bulbul, Yellow browned Bulbul Haldi bulbul, this is due to significant shape and appearance of their head.
- **5. Flycatchers-** The forest of this division is abundant with different varieties of flycatchers. Due to the presence of fantail and there restless dancing pose they are locally called as 'Nartak'. The common visible fly catchers are Tickellis blue flycatcher (*Muscicapa tickelliae*), Black napped monorch (*Hypothymis azurea*) Asian Paradise flycatcher (*Terpsiphone paradise*),
- **6. Tailor birds-** The tailor birds are famous for their ability to make their nests by sewing the leaves of plants. The stitches are separate and made with wool, silk or spider web.

They fall in the family Syluidae. It keeps its tail wagging up and down. They are commonly seen in bushy areas hunting for insects.

- **7. Golden oriole-** These most beautiful and bright yellow colored birds are seen in this area. They are locally called 'Haladya'. The different varieties of this type of birds are Golden Oriole (*Oriolus oriolus*), Blacknapped Oriole (*Oriolus chinensis*) and Black headed Oriole (*Oriolus xanthornus*). These are common in the area.
- **8. Myna-** The common Myna is commonly seen in this Division. The Mynas have the ability to mimic speech. They rest at night in large numbers and are known for their cacophony in the morning and evening. The other common Mynas in these areas are Grey headed Myna (<u>Sturnus malabaricus</u>), Brahmini Myna (<u>Sturnus pagodarum</u>), and Jungle Myna (<u>Acridothers fuscus</u>).
- **9. Thrushes-** The bird Thrushes make whistling sounds. The Malabar whistling Thrush (<u>Myiophonus horsfieldii</u>) makes whistling sound of an idle school boy and it is found in high elevated areas of the Division. The other whistling thrushes is orange headed Rock thrush (<u>Zoothera citrina</u>)
- **10.** Wagtails- The wagtails (*Dhobi*) are common in this Division. The common Wagtails are Forest wagtail (*Motacilla indica*), Grey wagtail (*Motacilla cinerea*) and the large pied wagtail (*Motacilla maderaspatensis*).
- **12. Sunbirds-** The forest areas contain different types of Sunbirds which are small and conspicuous by their diverse colour and active habits. The common sunbirds present in this Division are Purplerumped Sunbird (*Nectarinia zeylonica*), Small Sunbird (*Nectarinia minima*), and Purple Sunbird (*Nectarinia asiatica*).
- 13. Woodpeckers- The different varieties of woodpeckers present in these forests belong to the family Picidae. They feed on wood boring beetles and grubs that damage the tree. The beetles and grubs are taken with its chisel like bill and long protractible bar tipped tongue. Their feet are with two toes pointing backward and two toes pointing forward to hold and climb vertical trees. The different varieties of woodpeckers found are Rufous Woodpecker (Micropternus brachyurus), Black rumped Flameback (Dinopium benghalence).

- **14. Barbets-** These are small tropical birds and are found in different varieties. They are grass green in colour with yellow throat and green streaked yellowish under parts. They feed on fruits and are practically arboreal. The common Barbet found in this area are small green barbet (<u>Megalaima virdis</u>), Large green Barbet (<u>Megalaima zeylonica</u>) and Crimsonthroated barbet (<u>Megalaima rubricapilla</u>)
- **15. Kingfisher** The Kingfisher is seen abundantly in these areas. They are short tailed with large head with a long and strait bill. They commonly predate on fish. The varieties of kingfisher present in these areas are Pied kingfisher (<u>Ceryle rudis</u>), Common Kingfisher (<u>Alcedo atthis</u>) and White breasted kingfisher (<u>Halcyon smyrnensis</u>).
- **16. Parakeets** The Parakeets present in these forest are colourful birds with large pointed tail. They have strong legs with two toes pointing backward and two pointing forward. The common Parakeets found in this area are Indian hanging parakeet (*Loriculus vernatis*), Plum headed parakeet (*Psittacula* passerinus) and Blue winged parakeet (*Psittacula columboides*) They are popular cage birds but as flock they turnout as pests for fruit growers.
- **17. Bee eaters-** The brilliantly colored bee-eaters are found in this area. Since they feed on bees, they are called so. The common Bee eaters are Chestnut headed bee eater (<u>Merops leschenaulti</u>), Small green bee eater (<u>Merops orientalis</u>), and Bluebeard bee eater (<u>Nyctyornis athertoni</u>).
- 18. Warblers- The different types of small Warbler birds present in this division areas are Streaked fantail warbler (<u>Cisticola juncidis</u>), Franklin's wren warbler (<u>Prinia hodgsonii</u>), Plain wren warbler (<u>Prinia subflara</u>), Ashy wren warbler (<u>Prinia socialis</u>), Jungle wren warbler (<u>Prinia syivatica</u>), Great reed warbler (<u>Acrocephalus stentoreus</u>), Blyth's reed warbler (<u>Acrocephalus dumetorum</u>), Thick billed warbler (<u>Acrocephalus aedon</u>), Tickellis leaf warbler (<u>Phylloscopus affinis</u>), Large crowned leaf warbler (<u>Phylloscopus occipitalis</u>), Large Billed leaf Warbler (<u>Phyilloscopus magnirostris</u>), Greenish leaf warbler (<u>Phyilloscopus trochiloides</u>), Tytlers leaf warbler (<u>Phyilloscopus tytler</u>), Weastern crowned

warbler (<u>Phyilloscopus occipitalis</u>), Plain prinia warbler (<u>Prinia inornata</u>), Broad tailed grass warbler (<u>Schoenicola platyura</u>), Paddyfield warbler (<u>Acrocephalus agricola</u>), Blyth's Reed-Warbler (<u>Acrocephalus dumetorum</u>) and Thick-billed Warbler (<u>Acrocephalus aedon</u>).

- 19. Pigeons and Doves- This division area has different varieties of pigeons and doves which have different color and look. The common varieties of Pigeon present in these areas are Yellow legged Green pigeon (<u>Treron phoenicoptera</u>), Grey fronted Green Pigeon (<u>Treron pompadora</u>), Green imperial Pigeon (<u>Ducula aenea</u>), Jerdon's Imperial Pigeon (<u>Ducula badia</u>), Blue rock pigeon (<u>Columba livia</u>) common Doves are Indian ring dove (<u>Streptopelia decaocto</u>), Spotted dove (<u>Streptopelia chinensis</u>), Little Brown dove (<u>Streptopelia senegalensis</u>), Emerald dove (<u>Chalcophaps</u> indica), Red tuttie dove (<u>Streptopelia tranquebarica</u>)
- **20. Sparrows-** The common sparrows are House sparrow (<u>Passer domesticus</u>) and Yellow Throated Sparrow (<u>Petronia xanthocollis</u>).
- **21. Crows** The crows are seen close to the human inhabitation. The common species are crow (*Corvus splendens*), Jungle crow (*Corus macrorhynchos*) and Indian tree pie (*Dendrocita vagabunda*). The biggest among this group is also found in the lower elevation.
- **22. Hornbills** The Hornbills are another spectacular family of birds, which inhabits the mature forests. The largest of the hornbill family is the Great Indian hornbill, (*Buceros bicornis*) Hornbills are normally more than one metre in length, with boldly marked black and white wings and tail. In flight, its very broad wings make a distinctive singing note. Malabar gray hornbills (*Ocyceros griseus*) is also present in these area.
- 23. Insects and Butterflies: The animals with truncated body, jointed legs and compound eyes are classified under class insecta of phylum Arthropod. They are represented by largest number of species and they contribute to the biodiversity of the region significantly. They are economically classified as beneficial and harmful insects. A few examples of beneficial insects are pollinators like bees and wasps; producers like honey and wax like

honey bees; predators like dragonflies and wasps; parasites like ichneumonids; and of aesthetic values like moon moths etc. There are harmful insects like pests of crops like teak defoliators, borers, gallmidges root feeders etc. The common type of butterflies present in this areas are Tawny coster (<u>Acraea violae</u>), Blue tiger (<u>Tirumala limniace exoticus</u>), Dark blue tiger (<u>Tirumala septentrionis exoticus</u>), Glassy blue tiger (<u>Parantica aglea aglea</u>).

SECTION: 4: HABITAT CONSERVATION STRATEGY OF IMPORTANT WILDANIMALS IN RATNAGIR DIVISION.

197. Ratnagiri district have endangered species like leopard, crocodile, Vulture, Olive ridley etc. Due to loss of habitat and fragmentation the animals faces threats from the human. So it needs to be conserve the forest area as well as adjoining private forest area. Due to reduced habitat of wild animals especially leopards has increases instances of human leopard conflict. So it needs to corridor for the leopards and other animals.

The crop damage by other animals like monkey, Sambhar etc. has become common in many parts of Ratnagiri Forest Division. It is suggested that farmers should be get damage immediately. So that they will not harm the animals.

Some more points suggested for conservation and protection of wildlife-.

- 1. The Wild Life (Protection) Act 1972 should be strictly followed.
- 2. Adequate publicity be given to the Act and about wild life in general and to create awareness among the local inhabitants regarding protection of wild life through various activities.
 - Wildlife is having habitat in private forest area also. So emphases to protect the wildlife in private area should be given. Awareness has to be orated to Private Forest owners.
- 3. Providing water, shelter and salt licks where ever required and major precaution should be shelter preservation of wildlife.
- 4. Plantation of fruit trees should be aimed at each planting site.
- 5. Special attention to be given to protect the area strictly against fire, grazing by domestic

animals and poaching.

- **6.** Major emphasis should be given to develop water resources in the vicinity of habitat for this purpose for more waterholes should be created and SMC works to be taken. And it should be regularly cleaned and deepened
- 7. The strong set of relationship and partnership has to develop with state and local Govt. authority, civil society organization and community groups in the region.
- 8. New water holes, ancients to be created at the selected sites. A water hole should be created, if not available, within 5 kilometers of the existing water hole.

Ratnagiri division is already conducting the programme for Olive ridley, turtle and vulture and vulture conservation and breading programme,.

On going activities

A) Olive Ridley Turtle Conservation and breeding Programme

The geographically entire area of Ratnagiri District is situated between Sahyadry hill ranges and Arabian sea coast. Out of 7 species of Ridley turtles, 5 species occur in Indian's territorial water and 4 species out of it, breed in this area. The Olive Ridley turtles Lepidochelys olivacea) nest sporadically on entire sea coast, followed by Green turtle Chelonia mydas. Breeding of Hawksbill and Leatherback has not been reported on this coast. According to the report of the Forest Department, number of turtle nesting places, on the sea coast of Ratnagiri District, in the month of January, 2012 is as below:-

Table No.46

Sr.No.	Location	Nesting Places
1	Velas	06
2	Kelshi	01
3	Dabhol	01
4	Kolthare	01
5	Guhaghar	03

Local N.G.O. Sahyadry Nisarg Mitra had successfully implemented all its programme under "Sea Turtle Conservation Project", in year 2010-2011, 82 nests were protected and 3482 hatchling were released into the ocean. The project was implemented across 36 villages along the coast of Maharashtra. Awareness campaigns were also arranged as a part of this project. It is estimated that till today nearly, 681 nests have been protected and more than 30,564 hatchlings have been safely released.

Table No.47

Sr.No.	Name of village	No. of nests	No.of eggs	No.of hatchings realeased
1	Velas	23	2737	1316
2	Kelshi	07	819	297
3	Anjarla	02	208	34
4	Kolthera	11	In situ	In situ
5	Dabhol	07	754	364
6	Guhaghar	02	238	34

B) Translocation of isolated Crocodiles and habitat Improvement Programme.

In Ratnagiri district, rivers like Vashisti, Jagbudi, Joganadi, Anjarle Khadi & Narangi have provided an excellent habitat for Crocodiles-(<u>Crocodilus palustres</u>) The water of these rivers are mainly used for agriculture purpose, by using lift irrigation, for drinking purpose and for other domestic uses. The people residing in the nearby villages, are dependent on these rivers, and they unknowingly come in contact with crocodiles, leading to man animal conflict. Very oftenly these crocodiles move into existing agricultural field, and to the village ponds. In the recent past, there has been a 7 cases of crocodiles sighting in Dapoli, Chiplun & Sangameshwar talukas..

Local villagers have demanded two crocodile conservation centers, one at Chiplun & another at Khed, in Ratnagiri districts and these have also been proposed by the local Forest Department on experimental basis.

C) Vulture Conservation and Breeding Programme.

White-rumped vultures, Gyps bengalensis is classified as critically endangered by IUCN and its population is also declining rapidly and it is estimated that it has already reduced by 95% throughout India. Use of Diclofenac in veterinary sector leading to renal failure, high breeding mortality of this species and scarcity of food are the main causes of its depletion drastically. The local forest officials have started monitoring it in nesting colony. After three years of observation, it has been observed that due to paucity of food a false incubation takes place, which acts as inhibiting factor for breeding. The vultures mainly feed on carcasses, especially of livestock which is not available now to them, as these are now buried under. To overcome this limiting factor, the local officials have started arranging a diclofenac free carcass in a fenced area called vulture restaurant, for these vultures in Anjarla colony. As per their report the result of the above experiment is positive. False incubation has declined to 13% from 45%, and breeding success rate has increased to 40% from a meager of 16%. Most of these nests are on coconut (Cocus *nucifera*) trees. In order to promote the cause of vulture conservation, the Government has issued a direction vide G.R. No. WLP-10-08/C.No.270/ F1 dated 2-7-2010, to give compensation benefit to coconut growers, whose crop has been adversely affected due to nesting. Appendix No. XXX.

SECTION: 5: METHOD OF EXECUTING THE WORK

- 198. Strict implementation of Wild Life (Protection) Act 1972 should be done. Wide publicity should be given for awareness among local people regarding protection of wild life by placing hoarding at important places, depicting important provision of Wild Life Act 1972. Information regarding the importance of wild life to the eco-system should be displayed. Visits of nature clubs, school children etc. to the forest, having natural beauty and wild life should be arranged.
- 1. Soil and moisture conservation works should be carried over the area wherever possible.
- 2. If natural salt licks is present, it should be protected and if not present, artificial salt lick should be provided near water hole. Existing water hole should be cleaned, deepened and access to water should be created.
- 3. Where ever possible in absence of natural water hole, new water hole should be created at a radial distance of 5 kms.
- 4. Plantation of fruit tree species such as Jambhul, Amba, Umbar, Bor etc. should be raised in the area.
- 5. No suru plantation should be taken up in the area, which is a breeding ground for Olive Ridley turtle. The belt should be avoided.
- 6. Detail census should be done in the area periodically.

SECTION: 6: DISTRIBUTION OF WILD LIFE

199. The area is rich in Wild life and flourishes well in the eastern part of the sub division, that is along the Eastern portion of the Western Ghats, due to inaccessibility provided by these Ghats, and relatively less human population. In this part, animals found are panther, sambar, wolf, hyena, bear, bhekar, wild boar, nilgai, kolha, hare, porcupine, grey mungoos, jungle cat, languor, monkeys etc. The result of wild life census is given in **Appendix No. XLIX.**

Among birds, snipe, whistling teal, painted partridge, the gray partridge, gray quail, rainsquall, bustard quail, jungle bush quail, pea foul, gray jungle foul, blue rock pigeon, pale harrier horn bill and vultures etc. are occasionally seen and are mostly found in the eastern part of this sub-division. Ridley sea turtles comes frequently in the month of January along the sea coast in a patch of three kilometers. Site of breeding is such that it is not submerged under sea water, even during the spring tide.

SECTION: 7: MISCELLANEOUS REGULATIONS

200. 1. Grazing:

The cattle grazing should be strictly prohibited at the selected sites.

201. 2. Compensation:

Man-animal conflicts are noticed in this district. The detailed information of compensation is given in **Appendix No. XXX.**. In order to seek the co-operation of the people it is necessary that the compensation should commensurate with the damage counted, It will then create a favourable climate for wild life & for the Forest Department as a whole. The amount of compensation for various wildlife attack is given in **Appendix No. XLIXA.**

The nesting site will be declared close for human interference, during the period of nesting.



PLATE NO.: 6 BREEDING OF OLIVE RIDLEY TURTLE



PLATE NO.: 7 CROCODILE IN ANJARLA CREEKS

4. Working plan for C.W.C.

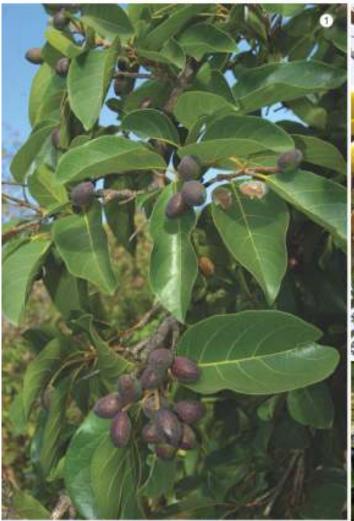


PLATE NO.: 8 VULTURE CONSERVATION PROGRAMME



PLATE NO.: 9 VULTURE RESTAURANT

CHAPTER: IX WORKING PLAN FOR MINOR FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE.









Ratnagiri Division:

- 1 Terminalia chebula
- 2 Emblica officinalis
- 3 Nothapodytes nimmoniana
- 4 Syzygium cumini

CHPTER-IX- WORKING PLAN FOR MINOR FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE

SECTION -1- GENERAL CONSTITUTION OF THE WORKING CIRCLE:-

202. This is an overlapping Working Circle covering the entire forest area, dealt under this Working Plan. The area abundance in minor forest produce like hirda, shikekai, apta, kadipatta, awla, canes etc. These minor forest produce may not have contributed substantially to the state exchequer, but have played a significant role in economic upliftment of the local people. People practice both Ayurvedic system of medicine and as well as ethno botanical system, usually based on traditional knowledge of the tribals. Many of these practicised medicines do not found place in pharmacopeia of India. Similarly mangrove forest contributes heavily for shrimp cultivation and honey production. India's herbal industry is very well developed and contributes substantially towards G.D.P. The local people depend on this local medicine for their treatment.

Forestry mean that environmental functions, wild fruits, nuts, NTFPs, grasses, leaves and twigs become the main intended products from forest lands and timber a by – product from large trees like teak. The reverse has been the policy for the last 100 years. Although after the advent of the new forest policy in 1988 there have been great efforts to involve forest communities in management, more though should be given to make necessary changes in the technology which will be suitable to meet the hanged objectives.

Policy change is also required in terms of the species that are planted in forests. Forest programmes need to consider seriously how to regenerate trees that produce valuable NTFPs, such as tamarind,mahua,chaar (Buchanania latifolia),and medicinal trees like aonla, karanj (Pongamia pinnata),etc. This could also be built into various afforestation programmes being taken up extensively with GOI funds or by several bilateral and multilateral agencies. At the moment, forestry species taken up for plantation generally give preference to commercial species. If one could also plant improved varieties of tamarind, mahua, chaar, medicinal trees like aonla, karanj, etc. and ensure that states promoted these in their plantation programmes, than it would help regenerate the forests, while providing support for the forest dwellers economy in the long run.

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.

SECTION 2 IMPORTANT NTFP SPECIES:-

203. The area of Ratnagiri Forest Division has been enumerated and the following table indicates the distribution of NTFP and medicinal plants per hectare in the forest area.

Table No.48

The c	The distribution of NTFP and Medicinal Plants per hectere													
Sr No	Species	Botanical Name	Part Used	16- 30	31- 45	46- 60	61- 75	76- 90	91- 105	106- 120	121- 135	136- 150	150 abov e	Total Trees / ha.
1	Anjan	Memocylon umbelltem	Leaf	11	5	2	0	0	0	0	0	0	0	9.00
2	Pangara	Erythrina indica	Root, Bark, leaves	4	2	4	1	3	0	0	0	0	0	7.00
3	Alu	Vangueria spinosa	fruit	10	5	1	0	0	0	0	0	0	0	8.00
4	karanj	Pongamia pinnata	Root, Bark, Leaves Flowers	0	1	0	0	0	0	0	0	0	0	1.00
5	kaju	Anacardium occidentale	Root, Bark, Leaves Flowers fruits	20	15	16	22	0	0	0	0	0	0	73.00
6	Apata	Bauhinia tomentosa	Bark of root Flowers fruits	2	0	2	0	0	0	0	0	0	0	4.00
7	Asana	Bridelia retusa	Bark leaves	3	2	1	0	0	0	0	0	0	0	3.00
8	Chinch	Tamrinds indica	Bark flowers fruits leaves	0	0	0	0	0	0	1	0	0	0	1.00
9	Dhavada	Anogeissus latifolia	Bark of root fruits	1	1	1	1	1	0	0	0	0	0	5.00
10	Hela	Terminalia belarica	Bark root Flowers seed	3	0	0	1	1	2	0	0	0	0	7.00
11	Jambul	Syzygium cumini	Bark fruits seed	0	3	0	0	0	0	1	0	0	0	2.00
12	Kalakuda	Holarrhea puberstens	fruit	6	5	2	0	0	0	0	0	0	0	6.50
13	Karvand	Carrisa carandas	Leaves fruit	45	2	0	2	0	0	0	0	0	0	24.50
14	Khair	Acacia catechu	Bark Heartwo od	0	0	4	2	0	0	0	0	0	0	6.00
15	Kokam	Garcinia indica	Bark leaves fruit seed	0	1	0	0	0	0	1	0	0	0	2.00

16	Moha	Madhuc a indica	Bark leaf fruit flower	1	0	0	0	0	0	0	0	0	0	1.00
17	Murudsh eng	Helicter es isora	Root bark fruit	1	0	0	0	0	0	0	0	0	0	1.00
18	Palas	Butea monosp erma	Seed root gum	0	0	2	0	0	0	0	0	0	0	2.00
19	Sawar	Salmalia malabari ca	Bark	4	4	3	3	1	2	0	0	0	0	8.50
20	shivan	Bombax ceiba	Root, Leaves, Bark	0	0	2	0	1	0	1	0	0	0	4.00
21	Teak	Tactona grandis	Root bark seed	98	65	54	29	21	15	13	0	0	0	147.50
22	Trifala	Xanthor glum retura m rhetsa	Bark Leaves seed	1	0	1	1	0	1	0	0	0	0	4.00
23	Umbar	Ficus racemosa	Root Bark fruit	1	0	0	3	1	1	1	0	0	0	4.00
24	Amba	Mangifer a indica	Bark leaf fruit	1	1	1	0	0	1	2	2	0	1	4.50
25	Bahava	Cassia fistula	Leaf Fruit seed	0	1	0	1	0	0	0	0	0	0	2.00
26	Gela	Cafunare sam spinosa	Bark fruit	9	0	0	0	0	0	0	0	0	0	9.00
27	Karambal	Justica procumb ens	All tree part	2	1	2	5	3	0	0	0	0	0	6.50

SECTION 3 IMPORTANT MINOR FOREST PRODUCE PRODUCTS OF THE AREA:-

204. The following are the MFP forest produce that occur commonly in Western Ghat:-

- (1) Apta leaves (Bauhinia racemosa)
- (2) Tembhurni (Diospyros melanoxylon)
- (3) Pisa fruits (Actinodaphne angustifolia)
- (4) Hirda (Terminalia chebula)
- (5) Shikekai (Acacia concinna)
- (6) Kadi Patta (Murraya Koenigii)
- (7) Arrow-root (Hitchenia caulina)
- (8) Tamalpatra
- (9) Kokam
- (10) Honey
- (11) Awala
- (12) Karanj
- (13) Biba
- (14) Variety of grasses
- (15) Canes
- (16) Karvi
- (17) Narkya
- (18) Gum and Resins

SECTION 4 SPECIAL OBJECTIVES OF MANAGEMENT:-205.

- (i) To identify and conserve the forest areas rich in MFP
- (ii) To build up database of MFP
- (iii) To promote sustainable methods of harvesting MFPs
- (iv) Identification of Medicinal Plants Conservation Areas (MPCA) for long term in-situ gene pool conservation of rare and endemic medicinal plants.
- (v) To improve the socio-economic condition of the local communities by generating employment.

SECTION: 5: DESCRIPTION OF SOME IMPORTANT SPECIES :- 206.

1. Terminalia chebula (Hirda):-

Hirda trees are quite common on hill slopes of western ghat 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. Hirda can easily be regenerated in the nursery, by putting its seed in cow-dung or running water for few days, when radical comes out, and its is planted in nursery directly. It should be included in afforested programme, with a minimum of 5% of the seedling planted.

2. Acacia concinna (Shikekai):-

It is prickly, scandent shrub occurring commonly in the western ghat forests. Leaves are bipinnata; flowers are yellow, globoose, 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 sol in the market as soap nut powder.

3. Cinnamomum tamala (Tamala Patra, Tej Patta)

<u>Cinnamomum tamala</u> is a moderate sized evergreen tree attaining a height of 8m, 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 upto 100 years, and they continue bearing in old age. Leaves are collected every year from vigorous plants. 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.

4. Murraya koenigii (Kadi Patta):-

Murraya koenigii or Kadi-patta tree is 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 upto 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.

5. Nothapodytes nimmoniana (Narkya/Amruta):-

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 is dried in the shade. The seeds are required to be stored in airtight containers under ordinary room conditions. Such storage may give 100% viability of seeds upto 45 days which may decrease upto 50% in 120 days.

6. 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 around in Chiplun. Seeds and seed oil are used in ayurvedic medicines. Oil cakes are used as manure and keeps off white ants. It is also a bio-diesel of great potential.

7. Garcinia indica (Kokum, Amsul):-

Trees are with conical crown usually buttressed at the base. Fruits are spherical, purple red and the pulp is white, acidic and flesh. Fruits are eaten and are also used for making syrups. The dried fruit skins i.e. Amsul is used in the curries.

8. 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. 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.

9. Asparagus racemosus (Shatawari):-

It is spiny climbing shrub with leaf like rudimentary branchlets arranged in whirls. 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 must 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.

10. Cymbopogon citratus (Lemon Grass):-

It is a tall grass that grows into about 2 meters 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.

11. 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 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.

12. Embelia ribes (Vavding):-

It is a large spreading shrub. Leaves are 2 to 4 inches long. Fruits are globosa and turn black when ripe. Seeds are used against the flat worms' infestation of the humans.

13. Gum:-

Dhaoda (Anogeissus latifolia), Ain and Kulu (Sterculia urens) are three main species found in these forests which produce edible gum.

SECTION 6: AYURVEDIC FORMULATION OF PLANT

Sr.	Plant Name	Latin Name	Local	Endangered	Ayurvedic			
No.			Name	Species/	Formulation			
	~		~	Demanding				
1	Guduchi	Tinospora	Gulvel	Demanding	1.Amrutarishta			
		Cordifolia			2.Amruta Tail			
					3.Amrutadi Loh			
					4.Kaishor Guggul			
2	Patha	Cacculus	Pahad Vel	Demanding	1.Shaddharan			
		Hirsutus			2.Gangadhar			
					Churna			
					3.Kutajashtak			
					Kwath			
3	Darvi	Berberis	Daruharidra	Demanding	1.Rasanjan			
		Aristata			2.Phaltrikadi			
					Kwath			
					3.Mahamanjishtadi			
					Kwath			
4	Amalki	Ambelica	Aavla	Demanding	1.Chawanprash			
		Officinalis			2.Triphala churna			
					3.Moravala			
5	Chandan	Sentalum	Chandan	Demanding	1.Chandanasav			
		Album			2.Chandanandi			
					Vati			
					3.Chandanandi			
					Tail			
6	Gambhari	Gmelina	Shivan	Demanding	1.Dashmulasav			
		Arborea			2.Dashmularishta			
					3.Bruhatpanchamul			
					Kwath			
7	Bharngi	Clerodendru	Bharangi	Demanding	1.Bharagyadi			
		m			Kwath			
		Serratum			2.Bharngiavleha			
8	Agnimanth	Premna	Takali	Demanding	1.Dashmulasav			
		Mucronata			2.Dashmulrishta			
					3.Agnimantha			
		_			Kwath			
9	Patala	Stereosperm	Padal	Demanding	1.Dashmulasav			
		um			2.Dashmularishta			
		Suaveolens			3.Bruhatpanchamul			
4.5					Kwath			
10	Shonak	Oroxylum	Tetu	Demanding	1.Dashmulasav			
		Indicum			2.Dashmularishta			
					3.Bruhatpanchamul			
					Kwath			
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11	Ashwagandha	Withania Somnifera	Ashwagandha	Demanding	1.Ashwagandharisht a 2.Ashwagandhasav 3.Ashwagandha Grita
12	Bruhati	Solanum Indicum	Dorali	Demanding	1.Dashmulasav 2.Dashmularishta 3.Bruhatyadi Kwath
13	Kantkari	Solanum Xanthocarpus	Bhuiringani	Demanding	1.Dashmulasav 2.Dashmularishta 3.Kantakari Grita 4.Kantakari Avleha
14	Kirat Tikta	Swertia Chiraita	Kadechirayta	Demanding	1.Mahasudrarshan Kwath 2.Bhunimbadi Kwath 3.Kirat Tikta tail
15	Kutaj	Holarrhena Antidysentrica	Kuda	Demanding	1.Kutajarishta 2.Kutajasav 3.Kutajghan Vati
16	Bhrungaraj	Eclipta Alba	Maka	Demanding	1.Bhrungaraj Tail 2.Bhrungaraj Grita 3.Shadbindu Tail
17	Prushniparni	Uraria Picta	Pithavan	Demanding	1.Dashmulasav 2.Dashmularishta
18	Shaliparni	Desmodieum Gangeticum	Salvan	Demanding	1.Dashmulasav 2.Dashmularishta 3.Shaliparnyadi Kwath
19	Nirgundi	Vitex Nirgando	Nirgundi	Demanding	1.Nirgundi tail 2.Nirgundi Grita 3.Maharasnadi Kwath
20	Vasa	Adhatoda Vasica	Adhulsa	Demanding	1.Vasavleh 2.Vasasyrup 3.Vasarishta 4.Vaskasav

SECTION 7-INDIAN MEDICINE IN WESTERN/MODERN SYSTEM OF MEDICINE:-

207. In addition to the Indian plant species being used in Indian System of medicine ayurvedic, as many as 192 Indian indigenous species have found their usage in allopathic system of medicine and the list of eight species that are used in allopathic system is listed below in the Table 3 which according to Botanical Survey of India, are found in Chiplun Sub-Division.

(Source-Bangalore). Many of the plants usage has now being replaced by synthetic chemicals.

Table No.50

Sr.No	Botanical Names of the trees
1	Acorus calamus L
2	Anamirta cocculus (L) WIGHT & ARN.
3	Brassica nigara (L) KOCH.
4	Capsicum annuum L
5	Datura metel L.
6	Rauvolfia serpentina (L) BENTH. EX KURZ
7	Santalum album L
8	Sesamum indicum L.

SECTION-8- HARVESTING

208. Harvesting of NTFPs should be done very carefully. The method of harvesting must be non-destructive and scientific. The leaves and bark of plants shall be taken in such a way that it does not cause any damage to them. The branches of Tendu and Apta trees shall not be broken for collection of their leaves. Seeds and fruits of the plant shall be harvested when they are fully mature. Burning of the site for collection of Moha flowers and other seeds shall not be allowed as it spreads to the adjoining forest area and causes heavy damage. Harvesting of roots must be avoided as it may kill the plants. Felling of trees or shrubs and uprooting of herbs shall not be allowed in any circumstances. Tapping of gum from the tree such as Dhawda, Kandol and Babool shall be done as per the rules prescribed by FIR, Dehra-Dun. Scientists of Central Arid Zone Research Institute (CAZRI), Jodhpur had carried out certain experiments regarding tapping of gum from Babul trees and have found that gum exudation from most of trees can be increased by injecting two drops or 2 ml of the plant hormone ethephone (2-chloroethyl Phosphoric acid) into the tree. While using ethephone injection, it is not necessary to scar the tree trunk. The exudation starts due to abscission of cellulose tissues of various sites of the tree. Increase in exudation of gum when ethephone is injected, suggests that the gum is a

normal metabolic product in certain plants, which is already present as sap in gum ducts. When cellulose cells are broken due to ethephone, creating abscission of gum ducts at several points, gum ooze out at such points.

It has been observed that this method causes minimum injury to the tree and exudation is not confined to a particular site (e.g. place of blazing of the stem) as in the case of conventional method of gum tapping.

SUSTAINABLE HARVESTING TECHNIQUE:-

TIFR, Jabalpur has empirically standardized the harvesting technique of few of the species, four of which is listed below:-

- (a) Rauvolfia sperpentina:- The harvesting of roots should be done from mature plants(18 to 30 month) and it should be done in the month of December or January. All plants in nature should not be harvested and 30 to 40% of the plant in nature should be left undisturbed. Roots must be harvested from matured plants by digging up the soil and by uprooting roots and leaving 2-3 small roots having at least 2 nodes for care should be taken not to damage roots while uprooting, as root bark contains the maximum amount of active ingradients: The harvested roots are dried in sun to minimize moisture and then in shade till it is completely dried off. Reserpine is the major alkaloid present in the roots.
- (b) <u>Wtihania somnifera:</u> The seedling is planted in rainy season in the month of August-September and it is harvested after 150-170 days of sowing, in the month of December-February. It is harvested when its fruit turn red and leaves dries off. The harvesting roots of Withania somnifera (Ashwaganda) is done by uprooting the plant completely. The roots are separated from the stem with the help of knife/sickle. The plant is long, brown tuberous roots, which can be used for medicinal purposes. The plant is used in preparation of Aswagandharista chavan prash.
- Terminalia bellerica:- (Baheda)- Baheda fruits should be harvested after maturity in the month of December-January, because only mature fruits produce viable seeds and there is a significant increase in the quality and fruit size from October to January. 5-10% seeds should be left on the tree for natural regeneration. The pulp from baheda seeds is extracted immediately after harvesting and it is dried in sun for a day to minimize moisture and then in shade till it dries off completely. Extracted pulp is graded according to its maturity, colour and pulp content of the fruit. The dried baheda pulp should be packed in poly, cloth, gunny bags and stored in clean and dry place. Baheda pulp is a good source of gallic acid and its kernel contains fatty acid. It is used for liver

disorder anti oxidant etc. Baheda is used in the preparation of Elanir kujambu and Baheda churna.

Asparagus racemosus:- (Shatavari) -The dried roots are used in the medicinal (d) plant. The first harvesting advisable after one & half to 2 years of field planting and if the plants (tuber) is harvested sustainably. Tuber can still be obtained from the same plant for 5-10 years. Tubers are harvested from the fully grown, mature and healthy plants and is done in the month of December to January. While harvesting, all plants should not be harvested, 20-30% plants should be left untouched to maintain sustainability. The entire tuber of the plant is not harvested, 3-4 tubers along the disc should be left in the ground for regeneration to maintain sustainability. For harvesting tubers, soils should be dug out from 30 cm radius of the plant to minimize damage to the tubers. After harvesting, small and big tubers are separated and while the big tubers are washed and are processed the small tubers are stored as such in a cool place, without washing, to be used as a planting material next year. The harvested tuber is washed with water and is packed off with a sharp knife immediately as later it becomes difficult to do it. Tubers are cut transversely into small pieces and dried in shade. The tuber contains steroid saponins and it is used in preparation of Shatavarikalpa, Phalaghrita and Vishnutaile.

Arjuna [Terminalia arjuna]: For sustainable harvesting 1/4 or 1/3 of the nature trunk barks of the trees is extracted. Only the outer and middle bark is removed leaving the inner bark for regeneration. The length of the blaze may vary depending upon the girth of the tree. Sustainable bark harvesting may be done after two years by removing opposite quarters of trunk bark rather than girdling of the trees. Barks of the old branches can also be harvested from a mature tree (about 20 years onward). About one quarter of the bark has to be removed alternately to the upward direction from the main trunk. The equal portion of the bark may be harvested in the next year. This alternate removal helps the tree in maintenance of translocation of organic solutions. The bark recovery by this technique is approximately 42% in one year. The younger tree shows a faster recovery and the recovery is fast in moist area, than in dry area. The recovery (re-growth) is faster if the cut is sharp and in unsharped blaze, the recovery is slow. The cut should be limited to cambium layer only and when it extends beyond into wood, it may not heal at all. No fungal attack is noticed, if the harvesting is in month of February and March. The arjuna bark can be obtained on sustainable basis if the bark is harvested through non-destructive

harvesting techniques in proper season, and a sufficient time is allowed between two successive harvest, for the plant to regenerate its new bark. Trunk bark contains maximum Tannin and oxalic acid.

<u>Maida [Litsea Chinensis]</u> The bark is used for making agarbatti. It has a use in pharmaceutical industry. The current harvesting technique is destructive and the collector basically goes for girdling and removes every things up to the branch. This has led to near depletion from the forest.

For sustainable harvest only 1/4 or 1/3 of the mature trunk bark of the tree should be extracted. In Maida is very difficult to find out mature trees having GBH more than 60cm. Strip harvesting is a superior method in comparison to making blazes on the trunk, as only young trees are available.

The regeneration of bark in young is faster in comparison to the older trees. In older trees, the regeneration of bark takes more than two years. In older trees with GBH greater than 90cms, the thickness of the bark is more than in younger trees with girth less than 40cm. However, mucilage and tannin content is less in older trees in comparison to younger trees. 82% recovery of bark is seen in trees with GBH less than 40cm in first year. The best time to harvest is from December to March. Sustainable bark harvesting is done after one year, by extracting the opposite quarter of the trunk bark.

Aonla [Phyllenthus emblica]- For sustainable harvesting, only 80% of the fruits on maturity should be removed and 20% should be left for regeneration. If it is difficult to leave 20% fruit, then 10% trees should be left for regeneration purpose. The fruit should be harvested during December to January when they become dull greenish yellow. The amount of gallic acid is more in the fruits harvested in the month of November.

Baividang [Embelia tsjeriam-cottam]- It is a woody climber. Sustainable harvesting technique includes collection of fruit at appropriate time after maturity. Maturity comes when colour of the fruit change from green to pink or red. Fruit should be plucked by hand instead of cutting the branches. It the population of Baividang is more than 20 fruits plant per 100 Sq.m. then 5 to 10% fruits are enough to maintain sustainability and if between 10 plants to 20 plants per 100 m2, 20% fruits should be left to achieve sustainability and if still less, 30% seeds should be left in situ for regeneration.

<u>Gudmar [Gymnema Sylvestre]</u>- It is a medicinal climber and is woody. Leaves and roots are the useful part of the plant. To maintain sustainability, selective harvest is done without harvesting the main plant. All leaves should not be harvested at a time. Only

mature leaves (60%) should be plucked by hand in the month of October. Young immature leaves should be left on the plant. The second harvest should be taken in June and at this time also, the mature leaves should be harvested. The leaves left at the time of first harvest matures by April, and is due for second harvest. By leaving leaves, the growth is not affected. On an average 1446 leaves should be harvested per year from a two years old plant.

Kalmegh [Andrographis painiculata]- It is a bitter annual herb. The fresh and dried leaves of Kalmegh and the juice extracted from the herb is used in drug making. It contains an active chemical called androgarphotide. Best harvesting period is found between 100 to 120 days after planting, as it contains maximum androgarphotide (2-21%) Out method is adopted for sustainability, as it improves natural regeneration of the herb. The present method is just uprooting of it.

Giloe [Tinospora Cordifolia]— It is a succulent climbing shrub. The whole plant is used as a medicinal plant. The present practice is just to uproot the entire plant. The sustainable harvesting includes cutting of Giloe stem 15cm above the ground level at different time of the year. The stem should be harvested from two year old plants and cut up to small pieces and dried under sun. The size of the cut is 1 to 1.25cm. It is seen that if Giloe is not cut in small sizes, it will not dry for month together.

Nagar motha [Cyperus scariosus]- Its tuber is used for medicinal purposes. The sustainable harvesting includes removal of 90% of the plants with rhizomes and 10% to 15% plants are left well distribute for better growth and multiplication and to ensure sustainability. The next harvesting is done after 6 months. Tillers left in the soil multiply and grow into a rhizome.

<u>Treatment:</u>- In annual plantation target, nearly 10% of the species planted should be of medicinal importance.

(f) Important Medicinal Plants in the Area:-

The following some important medicinal plants occur in Ratnagiri division.

Sr.No.	Botanical Name	Local Name
	Trees	
1	Anthocephalus cadamba	<u>Kadamb</u>
2	Saraca Asoca	Sita Ashok
3	<u>Ailanthus excelsa</u>	<u>Maharuk</u>
4	Caesalpinia Bonducella	Sagargota
5	Mimusops elengi L.	Bakul
6	Careya arborea Roxb.	Kumbha
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		1. W OIKING Plan for C
7	Semecarpus anacardium L. f.	<u>Biba</u>
	<u>HERBS</u>	
1	<u>Helicteres isora L.</u>	Muradsheng
2	Mesua ferrea L.	<u>Nagkeshar</u>
3	Leea indica (Burm. f.) Merr.	<u>Dinda</u>
4	Carissa carandas L.	<u>Karvand</u>
5	Vitex leucoxylon L. f.	Kali nirgudi
6	Morinda pubescens Sm.	<u>Noni</u>
	<u>SHRUBS</u>	
1	Embelia ribes.	Wavding
2	Ventilago maderaspatana Gaertn.	<u>Kanvel</u>
3	Eranthemum roseum R. Br.	<u>Ran Aboli</u>
4	Mallotus philippensis (Lam.) Müll. Arg.	Rohini / Shendri
5	Caallicarpa tomotosa	<u>Kalwai</u>
	CLIMBER	
1	Paramignya monophylla Wight	Kokani Vaghati/ Karvi
		<u>Vaghati</u>
2	Cyclea peltata Hook. f. & Thomson	Morvel /Pahadvel
3	Hiptage bengalensis	<u>Halad vel</u>
4	Cissus pallida Salisb.	Chandwadvel
5	Tali minor	<u>Wakeri</u>
6	Ventilago maderaspatana Gaertn.	<u>Kandvel</u>
7	Canscora diffusa (Vahl) R. Br. ex Roem. &	<u>Kadkada</u>
	<u>Schult.</u>	

CHAPTER: X: ESTABLISHMENT AND LABOUR

SECTION: 1: ESTABLISHMENT

209. Though the geographical area of Ratnagiri Revenue District is 8164 sq.km, the area in charge of Forest Department is 67.06 sq.km.only. Out of this, 1.05 sq.km. area of Gothane village in Sangameshwar tahsil has been transferred to Chandoli Wild Life Sanctuary and has been excluded from this plan. The existing forest areas in charge of Forest Department are as under.

Table No. 51

Sr.No	. Range	Round	Forest area	No. of beats
1.	Khed, Dapoli	Dapoli	9.62	2
	_	Khed	25.94	4
		Mandangad	3.02	4
		Total	38.59	10
2	Chiplun	Chiplun	2.19	2
		Savarda	1.53	2
		Guhagar	2.97	3
		Total	6.69	7
3.	Sangameshwar	Sangameshwar	2.67	4
	_	Ratnagiri	3.34	2
		Lanja	12.76	2
		Rajapur	3.00	1
		Total	21.77	9
		Grand total	67.06	26

210. Looking at the nature of work and area to be supervised under Maharashtra Tree Felling Act1964 and to tackle offences under Wild Life Act, 1991, the number of posts of beat guards will have to be increased, from the above sanctioned strength. The protection of this forest is of prime important. Further details of the existing organization is given in **Appendix No. XXI**. The list of officers in charge of the Division is given in **Appendix No. L** and list of ranges, rounds and forest beats is given in **Appendix No XXII**.

SECTION: 2: LABOUR SUPPLY.

211. With the increased face of developmental work, under taken during the various Five Year Plans by the various line departments, and due to rapid industrialization in this area, the problem of procuring labours in sufficient number for different forestry operation has become increasingly difficult. The main factor which has contributed to this problem is that, more and more labours are being attracted towards industrial establishments rather than to agricultural operations, because of comparatively lighter nature of works, and better wage structure.

CHAPTER: XI: MISCELLANEOUS REGULATIONS.

SECTION: 1: DEMARCATION

212. Following instruction for demarcation of coupe has been laid down for the guidance. They may however, be modified under the written instructions from the territorial Chief Conservator of Forest, Kolhapur, specifying reasons under intimation to the Conservator of Forests, Working Plans. The coupe will be demarcated in the year as specified in the respective working circles. The coupe demarcation will be verified by the Range Forest Officer on the ground. He shall furnish a certificate in the format.

Signature of R.F.O.

With date.

- **213.** The method of demarcation of coupes, sections, unworkable areas protection areas and other areas, protected area, other area in coupe is given below. No tree bearing demarcation bands will be marked for felling.
- i) Demarcation of Coupe: Annual coupe will be demarcated by cutting and clearing 3 mtr. wide line and erecting stout durable pillars of about 2 mtr.in length in the middle of the line at suitable intervals (One pillar should be visible from the other), except where the coupe boundary runs along permanent features such as a big nalla, a fire line or a road. The pillars will bear coupe number, name of felling series and working circle on the side away from the area of the coupe.

Trees above 45 cms. in girth, selected at suitable intervals along the coupe boundary will be given two coal tar bands and geru band in between. Before giving bands, the loose dead bark will be scrapped. These tree bands will be 50 cm. apart, the lowest coal

tar band being at breast height. Just below the lower coal tar band, coupe number, name of felling series and working circle, will be given on the side away from the area of the coupe.

ii) Demarcation of Section:- Normally each coupe will be divided into four sections to facilitate control over felling and extraction. The sections will be demarcated by 1.5 m. wide cut lines by clearing brush wood unless the section line runs along a permanent natural feature e.g. nalas.

Trees above 45 cm. in girth, selected at suitable intervals on the inner edge of the 1.5 m. wide cleared section line will be given two coal tar bands 15 cm. apart the lower coal tar band being at breast height. Just below the lower coal tar band section no.will be given on the side away from the area they would denote.

- **iii) Demarcation of Unworkable area**:- Trees above 45 cm. in girth selected on the periphery of the areas to be excluded from working will be given two geru bands and a cross mark in between on the side of a tree away from the unworkable area. The lower band will be at the breast height and the other geru band at 15 cm.above it. Just below the geru cross mark, the serial number of the patch will be given if the area contains more patches.
- v) Demarcation of Bamboo coupes:- The bamboo coupes will be demarcated by giving 3 geru bands, 15 cm. apart, the lowest being at the breast height, on trees above 45 cm. in girth, selected at suitable intervals on the periphery of the coupe boundary.
- vi) Demarcation of Protection Areas: The protection areas in the coupe will be demarcated by giving two geru bands on selected trees above 45 cms girth. The lower band will be at gbh. In addition to this, a geru cross(X) will be given in between two geru bands in the direction facing away from protection area. The trees will be given the serial number just below the geru band in the direction of cross. If the number of PAs is more than one in a coupe, then all the trees standing on the periphery of each PA will be numbered in Arabic. For example, trees on periphery of PA number one will bear the number I/1, I/2 etc where as trees on PA number two, will bear the number II/1, II/2 etc.

vii) Demarcation of Other Areas in Coupe: All the other areas in the coupe will be demarcated by giving one geru band at gbh and one coal tar band 5 cms above it. The coupe demarcation shall be certified by the RFO.

SECTION: 2 : MARKING TECHNIQUE 214.

i) All trees dead or dying to be felled for marking will be given a geru band at B.H. after removing the bark and will be bear marked with hammer mark, at B.H. and at the base on a clear blaze of size 10 cm. x 10 cm.

All digital marked trees will be recorded as below:-

a) All trees bearings digital numbers will be individually recorded in marking book, giving:-

Serial No.	Species	Girth at b.h.o.b.in cm.	Remarks
Digit			
(1)	(2)	(3)	(4)

(e) Abstract of trees marked for felling shall be made in 15 cm.girth classes. Timber poles and firewood trees shall be shown separately.

SECTION: 3: HARVESTING AND DISPOSAL OF FOREST PRODUCE

The following shall be the procedure for the disposal of the forest produce.

<u>Timber and firewood</u>- All timber shall be brought to the nearest government timber depot depending upon the quality. It will be put at the disposal of Deputy Conservator of Forests (Transport and Marketing) for the auction or by any other mode as stipulated in the government orders in vogue, like disposal at the schedule of rates to jails, school or cooperative societies. The quantities of timber and pole to be given on nistar at concessional rates shall be kept separately in these depots. Firewood can also be disposed off to Ashram Schools.

According to the Government of India's resolution No.G-21/39 F DOE & F , dated only surplus fuel wood after meeting local requirement shall be disposed of.

A) NON TIMBR FOREST PRODUCE

The important non timber forest produce are apta leaves, hirda, shikekai, cashew fruit, kadipatta leaves, chillar barks and grasses. Statement showing the annual outturn of NTFP. is given in **Appendix No. XVII**. The list of medicinal plants and their parts used is given in **Appendix No. LI**.

1. Apta leaves:

The collection and disposal of Apta leaves is regulated under Maharashtra Minor Forest Produce (Regulation trade) Act 1969 and Maharashtra Minor Forest Produce (Regulation trade) in Apta leaves rule 1971.

2. Hirda fruits:

These are sold by open auction on annual contract.

1. Shikekai

Shikekai pods are also sold in range wise open auction on annual basis.

2. Cashew fruits:

These are sold by open auction for lease period of 1 year.

3. Grasses:

Disposal of grass from close coupes shall be done as per instruction contained in Govt. Resolution No. MFP-1165/118931 –(6)- F2, Dated – 29-10-1976, that is grass from close coupes will annually be permitted on cutting terms, to the gram panchayats or public bodies in the neighbouring areas, at a reasonable price to be fixed by the Department, considering the availability of the grass and current market trend. If the concerned gram panchayat or the other public bodies are not coming forward to take those bids, then grass may be disposed of either by public auction or may be sold on rated passes.

SECTION: 4: IRREGULAR EXPLOITATION -

- **215.** Irregular harvesting: Irregular harvesting of timber, fire wood and other minor forest produce is prohibited except in the following cases.
- 1. Removal of dead fallen fire wood, fuel trees and timber trees, uprooted by wind or storm from all parts of forest, except the coupes due for working in the current year, will be done. Every year in the month of October, each beat guard will report the availability of dead fallen firewood trees in each compartment, to the concerned RFO. The same will be

reported to DFO by the RFO.DFO will compile this information and fix the number of trees to be removed latest by mid of November. After permission of DFO, harvesting of such trees will be done and material will be collected at one place. This material will be first offered to the Gram Panchayat or Forest protection committees. If no such demand comes from Gram Panchayat or JFM committees, the material will be brought to the sale depot and sold in open action. A proper record of the material extracted from each compartment and the number of beneficiaries will be maintained and entered in the compartment history forms. The remnants of illicit cut material can be removed from the forest by an order by DFO. The timber from windfallen, dead trees will be brought to the depot for sale.

- 2. Petty felling carried out with permission of competent authority like trees dangerous to human existence.
- 3. The felling of trees on fire lines may be carried out if necessary without making a reference to the Principal Chief Conservator of Forest (Production & Management).
- 4. The felling of trees under electric and telephone lines will be carried out by the DFO in a manner as permitted under Forest (Conservation) Act 1980 and the guidelines issued by the Govt. of India from time to time.
- 5. Felling of trees on forest land, required by other departments such as Irrigation, PWD etc, will be under taken after the proposal for the use of such forest land for non-forestry purpose has been approved by the Govt. of India, under the provisions of Forest (Conservation) Act.1980.
- 6. Forest produce required for departmental works may be removed on the orders of the Divisional Forest Office, Ratnagiri (Chiplun) under the provisions contained in A 256 of Bombay forest Manual Vol..1. A-147 and Bombay Forest Manual Vol. III respectively up to the limit of his powers. 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 year. Never the less, felling of fruit trees will be excluded and fellings in a radius of 40m.from the perennial water-holes, nalas and springs will be prohibited.
- 7. Irregular harvesting of scattered bamboo clumps shall be permitted, provided the culms removed in such irregular harvesting is more than three years old and age of clump is exceeding eight years.

- 8. Tree dangerous to human existence buildings/structures shall be permitted to fell by Divisional Forest Office, Ratnagiri (Chiplun) and felling shall also include its debranching.
- 9. High stumps of illicit cut trees from any part of the forest can be removed by the permission of Divisional Forest Office; Ratnagiri (Chiplun) after a due panchnama has been drawn.
- 10. Removal of minor forest produce from the forest shall be permitted as per rules and the collection of grasses from any part of the forest shall not constitute any deviation.
- 11. Any thing done in exercise of rights and concessions shall not constitute a deviation and shall be a part of irregular harvesting.
- 12. Trees of semal, Moyen and maharukh will permitted to be removed from the worked coupe on demand. The exploitable girth will depend on market demand. In no case it should be less than 90cms, girth at breast height. The removal will not constitute a deviation.
- 13. Felling of trees for research purpose/stem/stump analysis shall be permitted after a due permission has been obtained from Divisional Forest Office, Ratnagiri (Chiplun)
- 14. Clearing of bushes and grasses in exercise of any scheme/plan duly sanctioned shall not constitute deviation and shall be done after a due sanction has been granted by Divisional Forest Office, Ratnagiri (Chiplun)
- 15. Any silvicultural thinning due earlier but not done when due, shall not constitute a deviation when done later and shall be a part of an irregular harvesting.

SECTION: 5: MAINTENANCE OF BOUNDARIES.

216. The condition of the forest boundaries is highly unsatisfactory. Cairns on the boundaries of reserved forest in Dapoli tahsil exist, however these have not been maintained properly. The external and internal boundaries of Reserved forest, Unclassed forests and Protected forests will be maintained under the Five Year Demarcation Scheme, which is given in **Appendix No. LII.** Similarly the instructions carried by the P.C.C.F., M.S. Nagpur regarding the erection of pillars, contained in his letter No.: FP/LR/68/2000-01, Nagpur, dt. 29-5-2001, is included in **Appendix No. LII.** The mangrove areas have not been completely demarcated, and the work need to be taken up on priority basis. The work of maintenance of boundary line and repairs of pillars should be done departmentally at the rates sanctioned by the Chief Conservator of forests (Territorial).

The boundaries of the forest should be maintained as below.

- (1) A special forest-mark is to be built at every survey mark.
- (2) If the survey boundary-marks are far apart and that the special forest boundary mark cannot be seen owing to the distance, or due to physical configuration of the ground, then intermediate special forest boundary-marks must be created between the two points, so as to make the entire line clearly visible.
- 3) To avoid erecting more special forest boundary-marks, that are absolutely necessary for vision, and also to define to clear line of the boundary, bushes and undergrowth between two boundary-marks should first be removed.
- 4) This clearing of line should consist of cutting down only all the undergrowth that impeds the view, preventing one forest boundary-mark being seen from its neighbouring one, or when there is crossing of the boundary-lines at any point, two boundary-marks, one on the right hand to each other should be clearly visible.
- 5) The breadth of the clearance, in no case should exceed six feet or two meters unless the line-constitutes a fire-line or the special condition indicate that there is a need of clearance up to a maximum limit of 12 feet.
- 6) Nothing is to be cut growing outside of the true forest boundary-line.
- 7) Trees on the boundary line should not be cut down so long as these do not abstract the view of the boundary-marks from each other, unless for clearing a fire-line.
- 8) Where there is little to cut, the beat guard can clear the boundary-line with his own effort if his other duties permit him and if not, the work should be done with as little cost to the Government as possible under the special sanction of the D.F.O. in each case, and subject to the provision of availability of the fund.
- 9) But where the undergrowth is heavy the work may be undertaken at the Government cost, provided to budget is available.
- 10) The beat guard must, after the boundary once has been cleared, keep down all the growth of vegetation.

RULES FOR THE INSPECTION AND MAINTENANCE OF FOREST BOUNDARY MARKS.

217.

- 1. The forest guard of the beat will be responsible for maintenance and protection of all the boundary marks in forest of his beat. He will himself colour washes them annually after rains and will make a special report of having performed this work. Each forest boundary mark in his beat will be inspected by the beat guard at least once in every three months and record of his inspection will be entered into his diary.
- 2. The Round Officer will be responsible for the maintenance and protection of the boundary marks in the forests of his round and he will ensure that these are maintained properly and colour washed by the beat guard regularly as directed. The round officer will check all boundary marks in a year which come up for maintenance and repair as per five years boundary demarcation scheme under non plan. A mention of this will be made by him in his diary. The round officer will annually submit to the Range Forest Officer, a certificate in the following form.

SECTION: 6: FIRE PROTECTION.

218. Provision of Maharashtra Forest (Protection of forest from fire)Rules-1982. Provision contained in Bombay Forest Manual Vol. II, Part-IV. Provision given in Wildlife Act 1972. Provisions contained in Maharashtra Tree felling Act.1964.

The forests are valuable and need careful fire protection over the entire area. Due to fire, a considerable damage is caused to the timber, besides causing long term effect on soil fertility, regeneration and young crops. The special and determined efforts are needed to enforce proper fire protection which has undoubtedly slackened in recent years. The forests that are to be completely fire protected will include all plantations, all forests of protection and improvement working circle.

To reduce the possibilities of forest fires, following schedule should be observed.

i) Cutting and cleaning of fire lines should be completed by the end of December/January and burning should be completed before the end of February.

ii) The dry leaves and other dry material on the fire lines must be collected from time to time and deposited along the edge of the fire lines and burnt before fire season starts. However burning of such material on a fire line is strictly prohibited after on set of hot weather season.

Legal provisions that are available is given bellow.

219. Following are the legal provision under Indian Forest Act 1927 in case of reserved forest and areas notified under section 4 of I.F.A. 1927.

- 1. Section 26 (I) b
- 2. Section 26 (I) c
- 3. Section 26 (I) f
- 4. Section 26 (I) g
- 5. Section 26 (3)

Provisions contained in the Maharashtra Forest (Protection of forests from fire) Rule 1982.

The Govt. of Maharashtra vide Notification No. 1074/252, 359/F6 dated: 14/10/1982 under section 32 (6) and 76 (I) (d) of I.F.A. 1927 made the rules for the protection of Protected forests from fire called "The Maharashtra Forest (Protection of forest from fire) Rules 1982". The various provisions are under rules 3 to 7. Provisions contained in the Bombay Forest Manual Vol – II, part IV.

The rules are 152, 153, 157, 158, 160 and 162.

Provisions in the Wild Life (Protection) Act, 1972, - 27 (2) and (e) 30, 32 and 35 (8) of the wild life (Protection) Act, 1972, the provisions are made for the protection of forests from fires.

SECTION: 7: GRAZING CONTROL..

220. As per Govt. Resolution mfp 2103 /CR-35 /F-1 R & FD, Mantralaya Mumbai dt.6.-5-2008. Govt. has given sanction to the grazing settlement of report of Ratnagiri Division and in this regard, grazing of sheep is totally prohibited on forest land, as per Government directives. The carrying capacity of the area has been calculated as per classification of the forest, such as protection forest, tree forest, minor forest and pasture forest and the admissible limit will be as per Govt. of Mahashtra order dated 6-12-1968.

The details of the provisions given under this G.R. is given in **Appendix No. LIV.**

SECTION: 8: GRAZING AND FODDER

221.

- ix. **Grazing** Non Forests areas are in plenty, and hence the local people are not exclusively dependent on the Govt. forests for grazing their cattle. The incidence of illicit grazing is negligible. Statement showing cattle population of Ratnagiri district is given in **Appendix No. XVI.**
- x. **Fodder** Thatching grass is of considerable importance in villages. Now a days use of tiles is more common, but poor people still depend on grass, which is available in remote areas of the forests. Compared to geographical area of the district, the forest area is very meagre and is not the main source of thatching grass. However a very small quantity of grass is available from forest for stall feeding the cattle. Other minor forest produces such as apta leaves, gum, shikekai, fruits of moha, awala, jambhul etc. are also collected and exported to Mumbai and near by districts.

SECTION: 9: SAW MILLS-PROVISIONS GIVEN IN BOMBAY FOREST RULE-1942 AND UPDATED TILL DATE.

SAW MILLS

222. There are only 198 saw mills in Ratnagiri Division. The following are the rules regarding Saw Mill given in the Bombay Forest Rule 1942 and revised upto date.

Prohibiting conversion of timber within certain distance of Forests -1 (i) Within the limits of any reserved or protected forest (whether in charge of the Forests or Revenue Department) or of any land in respect of which a notification under section 4 declaring that it has been decided to constitute such a land reserved forest has been issued, and within one mile of such limits, no person shall establish a saw pit for the cutting or conversion of timber or manufacture charcoal without the previous sanction in writing of the Range Forest Officer: or

(ii) Within the limits of any reserved or protected forest, or of any land referred to in clause (i) and within 80 km. of such limits, no person shall erect or operate any machinery or saw mill for cutting or converting of timber, without obtaining a licence in that behalf.

(2) Any person desiring to establish saw-pit or to manufacture charcoal under clause (i), or to erect or operate any machinery or saw-mill under clause (ii), of sub-rule (1) shall make an application in that behalf to the Range Forest Officer and Divisional Forest Officer, respectively.

Provided that where within a period of one month from the date of application the applicant fails to receive the sanction under clause (i) of sub-rule (1), the applicant may proceed to establish the saw-pit or to manufacture charcoal, but not so as to contravene any of the provisions of the Act or any rules made there under.

- (3) On receipt of an application under sub-rule (2) the Range Forest Officer, or as the case may be, the Divisional Forest Officer shall make such inquiry as he deems fit and after satisfying himself on the question whether or not there would be any objection to granting the sanction or licence applied for having regard to safeguarding the timber in any reserved or protected forest or in any land referred to in sub-rule (1), may grant the sanction or licence in the form in Schedule-E subject to the conditions set out therein, or refuse to grant the sanction or licence.
- (4) Every licence granted or renewed under this rule shall, subject to the provision contained in this rule regarding cancellation, be effective for a period not beyond the 31st day December next following the date of its issue or renewal.
- (5) The Divisional Forest Officer may, on application made to him, renew the licence issued under sub-rule (3) with effect from the date of its expiry.
- (6) An application for renewal of a licence shall be made before the expiry of the period of the licence: and failure to renew will render the licensee liable to punishment for operating the saw mill without a licence.
- Notwithstanding anything contained in the foregoing sub-rules, the Divisional Forest Officer may, where he has reason to believe a licensee is operating the saw mill in contravention of the provision of these rules and conditions of the licence or the licensee is including in activities prejudicial to the interests of forest conservancy, at any time, revoke the licence granted under this rule.
- (8) Where a Divisional Forest Officer refuses to issue, or renew, or revokes, a licence granted under this rule, he shall do so by an order communicated to the applicant or holder, as the case may be, giving reasons in writing for such refusal or revocation.

- (9) Any person aggrieved by an order made under sub-rule (8), may, within thirty days of the service on him of the order, appeal to the Chief Conservator of Forests who shall decide the appeal after giving such person and Divisional Forest Officer making the order, an opportunity to being heard, and the decision of the Chief Conservator of Forests shall be final.
- (10) Nothing contained in this rule shall apply to the ordinary operations of domestic carpentry or to other similar work on a small scale.

The subsequently government issued amendments from time to time vide notification No. 335 date **16 th 1991**. The State Government put a ban on issue of new license, However if the applicant has already spent the money and completed the formalities, the licenses can be issued. Vide SWM-1081/106836 (A) /F6 Dated 18 th August 1981, the licence of saw mill can be suspended for three months. Saw Mills are required to maintain three registers by the Government Order No. SWM-1082/CR-20/F-6 / R & F.D. dated 22nd February -1984 F I, intake, F 2, outturn, F-3, disposal vide SWM-1082/2590/CR-95/F-6 DATED 17 th December-1986,no saw mill can operate after sunset to sunrise without the written prior permission of Divisional Forest Officer. Govt. vide letter no. TRS 1081/102380/F-2 R & F.D. dated 18th July 1981, has laid down the inspection norms of saw mills by the various rank of officer. Range Forest Officer to inspect – twelve, Asstt. Conservator of Forests -6, Divisional Forest Officer-3 and Conservator of Forests-1 Saw Mill in a month.

Sanction 129 Bombay Forest Rule 1942 states that who so ever contravenes the provision of rule 88, shall be punishable with imprisonment for a term which may extend to six month or with fine which may extend to five hundred rupees or both.

SECTION: 10: ENCROACHMENT.

The problem of encroachment is not serious in this division mainly because most of the good areas are already under cultivation. There is a need to take it seriously. The government has already recognized the encroachment on the forest land between 1972 to 1978 vide two resolution R. & F.D. LEN-1078/3483-G-I dated 27th December 1978 and R.7 F.D. FLD-1079/1366-F-3 dated 12th September-1979. The present Government policy is very clear vide two resolution, R.& F.D.No.FLD-1078/144074-F-3 dated 5th March1980, by which any illegal construction of hut on the forest land should be removed

immediately and FLD-1087/PK 397/ F-3 dated 14th July 1987, stating that encroachments not likely to be regularized and taken place after 31st March 1978, should summarily be removed.

There is a need for stringent measures against the encroachers.

SECTION: 11: FOREST RIGHT ACT

224. There is no application received in this division under the Forest Right Act. 2006.

SECTION: 12: DEVIATION PROCEDURE FOR OBTAINING SANCTION FOR MINOR & MAJOR DEVIATION.

- 225. The following works will constitute a deviation from the working plan:-
- (i) All other deviations can be classified into following two categories as per draft amendment to article 191 and 192 of working plan code vide Agriculture and Forest Department Govt. Resolution No. FWP 1062/5625(II)-J, dated 25.5.1962.
- (A) Deviation which would seek to alter the schedule of working given in the working plan, the examples of which are:
 - (i) Both non-working of a coupe in the prescribed year of working the coupe in the year not prescribed by the plan.
 - (ii) Changes in the areas of coupes on account of disforestation or undertaking areas for execution of any special scheme under plan-programme: and
- (B) Deviations which would involve alteration in the silvicultural treatment, for example:-
- (i) Stopping or curtailing clearfellings for planting because of shortage of labour, funds, material for plantation work, or unsuitability of terrain and soil for undertaking plantation to the extent prescribed by the working plan.
- (ii) Extensive felling of dry trees killed by fire, fungus, insect attack or other natural calamities.
- (iii) Felling of unusual size and extent for special departmental works.
- (iv) Special fellings to meet a sudden new demand of a particular industry.
- (v) Fellings involving modifications in the prescribed marking rules.

The sanction to all these deviations should be obtained. Application for sanction to such deviation should be submitted sufficiently in advance, so that such may be received as far as possible before the deviation occurs and without fail before the annual list of deviation is submitted along with the control forms.

Deviation from Working Plan:

There are two types of deviations as per National Working Plan Code-2004.

- A) Deviations which do not change the basis of management permanently.
- 1. The non working of a coupe in the prescribed year or working of a coupe in the year not prescribed by the plan.
- 2. Changes in the areas of the coupe due to disforestation or execution of any special scheme.
- B) Deviations changing the basis of management permanently.
- 1. Changes in the silvicultural systems.
- 2. Formation for new felling series.
- 3. Clear felling of natural forest.
- 4. Large scale felling due to natural calamities.

The sanctions to all the deviations will be obtained well in advance. Application for sanction to such deviations will be submitted timely so that the permission is received before deviations occur.

Procedure for Obtaining Sanction of Deviation:

- 1. For deviations of type 'A' above, the territorial Divisional Forest Officer should submit the proposal of deviation to Additional Principal Chief Conservator of Forest, (Working Plan-West), Pune through Conservator of Forest, Working Plan, Kolhapur. The Additional Principal Chief Conservator of Forest, (Working Plan-West), Pune will give the necessary sanction for deviation.
- 2. For deviations of type 'B' above, the territorial Divisional Forest Officer, Ratnagiri will submit the deviation proposal to Chief Conservator of Forest (Territorial) through Conservator of Forest, Working Plan, Kolhapur. The Conservator of Forests, Working Plan, Kolhapur will scrutinize the proposal and send to Chief Conservator of Forest (Territorial), Kolhapur with his opinion. The Chief Conservator of Forests (Territorial) will submit the proposal to Principal Chief Conservator of Forest, through Additional Principal Chief Conservator of Forests, (Working Plan) West, Pune. The necessary orders for grant of deviation will be issued by the PCCF, Office.

SECTION: 13: ILLICIT CUTTING

226. The problem of illicit cutting in forest area is not severe in the Ratnagiri Division. There is very low percentage of the illicit cutting and there is an equally dense forest on the Malki lands. The illicit cutting is very negligible.

The illicit cutting cases in the forest area of the Ratnagiri Division from 2002 to 2011 are as following.

Table No.52

Sr. No.	Year	Illicit cutting case No.	Illicit cutting tree No.	Compensation amount Rs.	Details of cased material
1	2002	23	69	82333	Un-fashioned Timber wood
					No. 231/9.427 Fuel -0.200
2	2003	17	68	15142	Un-fashioned Timber wood
					No85/5.100
3	2004	13	83	19138	Un-fashioned Timber wood
					No88/2.746
4	2005	29	137	48772	Un-fashioned Timber wood
					No128/6.364 Fuel -1.000
5	2006	39	128	754626	Un-fashioned Timber wood
					No851/39.458
6	2007	8	19	32191	Un-fashioned Timber wood
					No55/3.365
7	2008	9	23	17354	Un-fashioned Timber wood
					No32/1.852
8	2009	8	21	10515	Un-fashioned Timber wood
					No29/1.694
9	2010	10	17	1629	Un-fashioned Timber wood
					No6/0.251
10	2011	10	50	21749	Un-fashioned Timber wood
					No49/4.061

The Government vide letter No. TRS1087/102380/F-2 R & F.D. dated 18th June 1981 has stated that all illicit cutting valueing above Rs.25000/should immediately be reported to government. All illicit cutting above Rs.5000,000/ should be inspected by Chief Conservator of Forest (Territorial) within 7 days and between 100,000 to 500,000 by Divisional Forest Officer within 3 days of the reported cutting. Further vide letter no.

TRS-1082/36/F-6 Dated 8th September -1982, the government has stated that offence above Rs.2000/- should be necessarily be brought to the court for prosecution, unless the prosecution is difficult to succeed (TRS-1082/36 F-6 dated 30 October -1984) for want of evidence.

SECTION: 14: ROADS

There is good net work of various types of roads in the tract dealt with and hence there is no need of taking up any further road construction programme by the Department. However there is a 0.5 Km. long forest road existing in the campus of D.F.O. and R.F.O. office and residential area, which is being maintained every year. The statement of forest road is given in **Appendix No. LV.**

SECTION: 15: BUILDINGS

228. There is an immense shortage of housing accommodation in the division. It is therefore essential to construct quarters for the field staff, clerical staff etc at their respective headquarters, as it has become extremely difficult to get suitable accommodation at a rent which is admissible to them. The details of existing buildings are given in **Appendix No. LVI.**

SECTION: 16: WATER SUPPLY.

229. The large number of streams and rivers mentioned in para 4 above form the main source of fresh water supply. But very few of them are perennial. The Vashisti is perennial in nature since it gets discharge of water from Koyana Hydro-Electrical work station. The chief source of water supply in the tract is South West monsoon. The water supply is critical in the month of March, April and May. The rivers and irrigation projects are shown on reference map (Appendix No. A.) The statement showing the water level in important wells in Ratnagiri district is given in Appendix No. IV. and list of percolation tanks in Ratnagiri district is given in Appendix No. V.

SECTION: 17: SOIL CONSERVATION

230. Soil erosion is a serious problem due to heavy rainfall, medium to precipitous slopes, latertic soil, grazing, etc. in this division. The soil conservation works like Nala bunding, gully plugging, check dam, deep C.C.T., brushwood dams, cement bandhare etc. should be taken as per requirement of soil erosion in the forest areas. The awareness in local people regarding importance of soil conservation works is necessary.

SECTION: 18: PRIVILEGES AND CONCESSIONS FOR FOREST PRODUCE

- 231. Rights & privileges for the villagers adjacent to reserved and protected forests has been briefly elaborated in Govt. publication of Govt. of Maharashtra "MAHARASHTRA RAJYAT VAN VISHAYAK SAWALATI"in which it is mentioned that, the villagers are eligible for availing rights and concessions only when:-
- (i) They will assist the forest officers in extinguishing forest fire,
- (ii) They will assist forest officers in detecting forest offences.
- (iii) They will give information of forest offences to forest personal and will take necessary precautionary measures for offences in the forest area

Following rights & privileges as stated in Bombay Forest Rules Part-3 in sec.132 to 146 are listed as below.

Ratnagiri District-

- (i) No one will be prohibited from drawing water obtainable in forest, in cases where it is not, procurable from a reasonable distance.
- (ii) No charges can be levied for drawing water from stream, bandhara and tank and all natural resources of water in forest area, on which no expenditure has been increased by the Government.
- (iii) Permission will be given freely for clearance of choked up tanks and channels in the forest area.
- (iv) Villagers will have a free access to water resource.
- (v) Free grazing will be permitted for the cattle, other than sheep and goats, in forest areas where there is no presence of tiger or leopard.
- (vi) Villagers are permitted to collect dead or wind fallen wood from the floor of the forest, except the dead wood belonging to species like teak, khair and shisum, only and for their bonafide domestic purpose and not for sale/barter.
- (vii) Villagers may use twigs/branches of tree species not exceeding15cms.(6") in dia. from annual coupes.
- (viii) The villagers are entitled of getting small wood for agricultural implements, such as plough etc. free of cost.
- (ix) The villagers are entitled to utilize fallen leaves, fallen wood and twigs free of cost for agriculture purpose.

(x) for extracting water for domestic use, and to visit temples, the villagers are entitled to use the existing footpaths in the forest areas.

SECTION: 19: TRANSIT OF FOREST PRODUCE

There are only three Forest Check Nakas in this division at Barne, Tal.Khed, Pophali Tal.Chiplun and Sakharpa Tal.Sangmeshwar. These Nakas have proved to be quite effective.

The Government of Maharashtra vide notification No. TRS/1083/91882 (ii) CR-87 F-6/ dt.31 May 1985 has amended section 61 of Indian Forest Act 1927, making the law far more stringent. It has authorized certain officers to be called as authorized officer for the purpose of this Act, who will be competent to confiscate the vehicle involved in offence related to the illicit removal of timber and fuel wood.

To facilitate the issuing of passes, the government vide TRS/1089/PK 267/89/F-6, dated 14th May 1990 has stated that the decision regarding the issue of passes, to an applicant should be taken within 45 days of the submission.

SECTION: 20: ABOUT PROTECTED FOREST AND ITS RULE.

233. There are 2.75 ha. of Protected forests in this division. It is suggested that as soon as possible Divisional Forest Officer should notify this area under section 4 of Indian Forest Act.1927. The mangrove forest of 816.56 hectare approximately in-charge of the Forest Department is not to be notified as Protected Forest. The Protected Forest notification of the year 2001, enlists only 66 species from Western Maharashtra and does not include any mangrove species. Divisional Forest Officer, Ratnagiri will send the proposal to include (i) Rhizophora mucronata (ii) Rhizophora apiculata (iii) Bruguiera gymnorrhiza (iv) Bruguiera cylindrica (v) Kandelia candel (vi) Avicennia alba (vii) Avicennia Dwarf marina or acutissima (viii) Avicennia marina or resinifera (ix) Avicennia marina. Dwarf (x) Avicennia officinalis (xi) Sonneratia alba, of the timber mangrove species.

SECTION: 21: SAMPLE PLOTS, PRESERVATION PLOTS, RESEARCH PLOTS.

In this division there is no sample plots, preservation plot and research, however, there is a need to one such plot for casuarina species, to record its growth.

SECTION 22: MANGROVES WITH REVENUE DEPARTMENT:-

234. There is 2819.20 hectares of mangrove area with the Revenue Department and will be transferred to the Forest Department, as per Government order. After receipt of the

area, this area will be divided into 10 equal parts by Working Plan Officer (Conservator of Forest, Working Plan Division, Kolhapur) and will be dealt as per the provision of Working Plan to Mangrove Working Circle.

SECTION: 23: MAINTENANCE OF MAP:-

235. The old topo-sheet on scale 2":1 mile, 4":1 mile and 8":1 mile were not prepared for this division, however, the new topo-sheet of scale 1:250,000 are 12 in number and are available.

There are only two toposheets of scale 1:40000 which are available but not in stock right now. It is suggested that the toposheets all the division should be made available and be kept in custody and also soft copy of the toposheets should be maintained.

SECTION: 24: REORGANIZATION OF RANGE, ROUND & BEATS.

In 2008 the reorganization of range, round, beat was done for whole Kolhapur Circle, during this reorganization the forest area of this division was taken into consideration and no changes in range and rounds was proposed. But considering geographical area, and the wildlife habitat in Malki land, there is need of strengthening of forest staff. DFO has asked to enhance the staffs, accordingly it is recommended during plan period.

SECTION: 25: ANNUAL REQUIREMENT OF FOREST PRODUCE FOR THE LOCAL PEOPLE. 237.

i. Timber - Timber is required for building purposes, agricultural implements, furniture etc. Teak is preferred but due of its prohibitive cost, other miscellaneous species are also used as an alternative. The timber is used for buildings, huts, cattle shed etc. and requirement is mostly small size timber of species like ain, kinjal, dhaman etc.

Similarly agricultural implements are also made out of above species. It is estimated that annual demand of timber is about 11321cum. (377366 families x 0.03 cum). Timber is exported to nearby districts like Kolhapur and even to Mumbai. Much of the timber is produced from the private holdings.

xi. Firewood – The dead and fallen wood was allowed to be removed on head loads for their domestic needs. The privilege is abused occasionally as many a time, the green wood is cut in grab of a dead wood, or tree is girdled to make it dead. There is a great demand for fire wood throughout the district. The annual demand for firewood is estimated to be 815110 mt. (377366 families x 2.16 cu. mt.) The fire wood is also exported to Kolhapur and even to Mumbai.

- xii. **Bamboo** Bamboo is present to some extent in the private areas. The requirement of the people is either met with by importing bamboos from the adjacent district or from local cultivators, growing them in the private land. Within the district, bamboos are used for basket making and house building. Planting of bamboo in the private area is done through rhizomes.
- xiii. **Grass** Thatching grass is of considerable importance in villages. Now a day's use of tiles is more common, but poor people still depend on grass, which is available in remote areas of the forests. Compared to geographical area of the district, the forest area is very meager and is not the main source of thatching grass. However a very small quantity of grass is available from forest for stall feeding the cattle. Other minor forest produces such as apta leaves, gum, shikekai, fruits of moha, awala, jambhul etc. are also collected and exported to Mumbai and near by districts.
- xiv. **Grazing** Non Forests areas are in plenty, and hence the local people are not exclusively dependent on the Govt. forests for grazing their cattle. The incidence of illicit grazing is negligible. Statement showing cattle population of Ratnagiri district is given in **Appendix No. XVI.**
- xv. **Tahal** Agriculturists depend much on tahal for burning of soil (rab burning) for preparing seed beds. The pressure of tahal cutting is on increase in view of the fact that it is difficult for a common cultivator to obtain tahal from private land.
- xvi. **Thorns** The local people require thorny shrubs for fencing their fields. They mostly use branches of Karvand, for this purpose and it is invariably brought from the forest.
- xvii. Other Minor Forest Produce This includes variety of products. Among fruits which are collected by them, the most important are edible fruits like amba, karvand, jambhul, kokam, char, toran, awala, moha, alu, kaju fruits Pods of shikekai, hirda, behada, garambi, karanja are also collected and the bark of chillar and ain are collected for the purpose of tanning. Apta leaves are collected for bidi making. Some medicinal plants are also locally collected. The statement showing annual out turn of Non Timber Forest Produce is given in Appendix No. XVII.

SECTION: 26: FOREST WITH REVENUE DEPARTMENT.

Some of the areas notified as reserved forests are yet to be transferred to the Forest Department by Collector Ratnagiri. Such areas need to be verified by D.F.O.

Ratnagiri and action needs to be taken to take possession of such land. Statement showing such areas are shown in **Appendix No. VIII.**

SECTION: 27: ECO-TOURISM

239. There is wide scope for eco-tourism in this area. The area has been identified in villages Aare, Shirgaon ,Kathawade Murud which are along the sea coast and are very near from Ratnagiri and Dapoli and on way to, well-known religious place Ganpatipule.

Temporary structures like providing tents, hammocks; to local visitors may facilitated the interest of local people.

Similarly natural areas including old forts like Rasalgad, Sumaragad, etc. in Khed tahasil are also identified for eco-tourism. In Rasalgad fort, there is scope to renovate two tanks under Shivkalin panawatha. Nearby nature trail in forest area, erection of view- points by constructing temporary pagodas, watch towers for sighting of wildlife may be taken up. In addition to that, it is very necessary to give information of forestry species and their uses for educational institutes, hence it is proposed to establish arbotorium in this area. Local villagers can be engaged as guide person in these activities.

Detailed scheme is to be worked out by concern local officer for implementation of eco-tourism aspect.

SECTION: 28: RAINGUAGE AND TEMPERATURE RECORDING STATION.

240. There are only three rain-gauge and temperature recording stations are like Nachane Tal. Ratnagiri, K.K.V. Dapoli and Agriculture Department Lanja, Tal. Lanja present in this division.

SECTION: 29: M.R.E.G.S. WORKS

241. In this division, under M.R.E.G.S. Scheme the work is started on forest areas in 2011.12 year. The details of this work expenditure and its mandage created as below.

Table No.53

Sr.No.	Details of work	Expendi	ture (Rs. In lakh)	Created	
		Wages	Material	Total	mandage
			supply		(In lakh)
1	Other works (Nursery)	29.10	15.86	44.96	0.23156
	- 39 Nurseries				
2	C.C.T. (2) Works	0.42	0.03	0.45	0.00315
3	Fire line / Forest fire	3.40	0.25	3.65	0.02679
	protection works- 16 works				
	Total	32.92	16.14	49.06	0.2615

CHAPTER: XII: CONTROL FORMS AND RECORDS

SECTION: 1: CONTROL FORMS

242. There is no felling proposed in the natural forests in this working plan, except of man made Casuarina plantation provided under Working Plan for Casuarina equisetifolia working circle. All prescribed control forms are given in Appendix No. LVII. Required control forms should be used for recording cultural operations and regeneration works carried out, according to the prescriptions of the plan. Control forms for plantations and cultural operations will be same for all working circles. The set of control forms for each working circle should be kept in separate control book, which will have separate pages for each felling series. Two sets of control forms should be prepared as per Article No. 219 of the Working Plan Code of Maharashtra State. One set will be flying set for the use of the Conservator of forests, working plans. The flying set, will be sent annually by the Conservator of forests, working plan to the Divisional Forest Officer, (Territorial), concerned who will return it to the C.F. Working Plan, not later than 1st October each year, after making the necessary annual entries. All entries which show that the prescriptions have been deviated will be underlined in red ink. The C.F. working plan should scrutinize the entries mentioned in control form and will offer his remarks. On receipt of replies from concerned D.C.F. he will submit his report to the territorial Chief Conservator of forests by 1st of December, who will forward this report with his remarks to the Additional Principal Chief Conservator of Forests, Working Plans not later than 1st February of the following year for filing and obtaining Principal Chief Conservator of forests (HOFF) approval when deemed necessary. Filling of control forms will be the exclusive activity of the gazatted assistants with the objects of correct maintenance and timely submission.

Control forms for fire protection works, $1/5^{th}$ boundary verification and demarcation, $1/5^{th}$ maintenance and verification of boundary lines will be kept as per control forms. These control forms will also be maintained and scrutinized as per details given in the above para.

SECTION: 2 : COMPARTMENT HISTORIES

243. Sample compartment history form Nos. 1 to 5 to be maintained are given in **Appendix No. LVIII**. Each compartment should have a separate file for its records. Form no. 1 has been written up for each compartment during the preparation of this plan and typed copies in duplicate have been supplied to the D.F.O. Ratnagiri Forest Division, (Chiplun.) Other forms from 2 to 5 will be prepared and maintained by them. One copy of the Compartment History file should be kept in the D.F.O., office and the other in the Range office, with a view to bring the compartment history files up to date. The details in the prescribed forms from 2 to 5 are sent by the Range Forest Officer to the D.F.O. annually in the month of July. These forms will be scrutinized by the D.F.O., typed and signed. One copy of the form will be filled in the Compartment History file in the division office, and another copy will be returned to the respective Range forest officer, so as to bring their copies upto date. The treatment map of the coupe is prepared after demarcation of the coupe area and therefore marking details will also be filed in the respective compartment history files. Inspection notes by Gazetted Officers should be typed and inserted in compartment history files as and when such inspections are made. The latest stock map should be attached to Compartment History file.

SECTION: 3 : DEVIATION

244. Operation not prescribed in the working plan will constitute a deviation. The two categories of deviations have been indicated vide article 1919 for obtaining sanction to the deviation are as under.

In case of deviation is of type I, the D.F.O. Ratnagiri Division, (Chiplun) should submit the proposals in duplicate to Additional. Principal Chief Conservator of forests, (W.P.West), Pune through the Conservator of Forests, Working Plan Division, Kolhapur, as mentioned in Conservator of Forests, Working Plan circle's standing order No. 51 dt 29th September 1972. The Conservator of Forests, Working Plans Division, Kolhapur will scrutinize the proposals and submit them to Additional. Principal Chief Conservator of forests, (W.P.West) Pune, for issue of necessary sanction orders.

In case the deviation is of type II, D.F.O. Ratnagiri Forest Division, (Chiplun) will submit the proposals in quadruplicate in the prescribed proforma to Chief Conservator of forests, (T.) Kolhapur, through the Conservator of Forests, Working Plans,

Kolhapur who after scrutiny of the proposal shall transmit them to the Chief Conservator of forests, (T) Kolhapur with his remarks. The Chief Conservator of Forest, (Kolhapur) will then submit the proposal to Principal Chief Conservator of forests, (Production & Management) Nagpur through Additional. Principal Chief Conservator of forests, (W.P.West) Pune with his remarks.

The D.F.O. Ratnagiri Forest Division, (Chiplun) should furnish the detail under the following heads for sanction to the deviation.

- 1. Name of the working plan
- Nature of deviation stating clearly the present prescriptions and changes involved. The type of deviation, para number and appendix number of working plan should also be quoted.
- 3. Proposals for the future if any should be indicated.
 Proposals for sanction should be submitted sufficiently in advance before the deviation occurs and without fail before the annual list of deviation is submitted along with the control forms.

SECTION: 4: PLANTATION AND NURSERY REGISTERS

245. Plantation registers should be maintained for all areas regenerated artificially in form Nos. 1 to 9, samples of which are given in **Appendix No. LIX.** Nursery registers should be maintained in form nos. 1 to 10 samples of which are given in **Appendix No. LX.** These registers should be maintained up to date and it will be the personal responsibility of the Gazetted Assistants, to demand the registers during the course of their tour and insist upon to maintain in the prescribed forms upto date.

SECTION: 5: OTHER RECORDS

- **246.** The following records also be maintained.
- i) list of amendments
- ii) list of area changes
- iii) Fire, maps These will be prepared and filed with the respective compartment histories together with final fire reports.

SECTION: 6: DIVISIONAL JOURNAL

- 247. This is an important record for the use of the D.F.O. showing matters of division and information pertaining to the individual compartment. Notes should be made in the journal under the following headings.
- i) Record of seed year for various species and also year of gregarious flowering of bamboo.
- ii) Insect or fungus attacks or other serious injuries to the forest
- iii) Fires in regenerated areas
- iv) New buildings constructed and in old buildings special repairs carried out
- v) Grazing
- vi) Auction results
- vii) Plantations.

CHAPTER: XIII: FINANCIAL FORECAST AND COST OF THE PLAN

SECTION: 1: FINANCIAL FORECAST

248. At present the revenue from the main coupes is nil, as felling of tree has been banned since 1987 by the Govt. of India, Besides frequent fluctuation in market rates of forest product, it is difficult to forecast reliable figures of revenue Similarly due to constant increase in the daily wages rates and piece work rates for various forestry operations, it is equally difficult to forecast reliable figure of expenditure. However the figures reported for the year 2009-10 by Divisional Forest Officer, Ratnagiri division, (Chiplun) of revenue and expenditure are as under.

Revenue: Rs. 42.60 lakh.

Expenditure: Rs.125 lakh. (Inclusive of salary expenditure)

Thinning is prescribed in old teak plantations and felling of matured crop of suru will have notable effect on revenue of Ratnagiri Division. The overall revenue from thinning, suru harvesting and NTFP disposed etc. is expected to the tune of Rs. 450 lakhs in plan period.

SECTION: 2 : COST OF THE PLAN

249. The total expenditure incurred on the preparation of this plan is Rs. 100.69 lakh. The cost of preparation of the plan works out to Rs. 1501.50 per ha. In this plan, it is expected to take unnatural aided regeneration works in P.W.C., Mangrove W.C. & I.W.C. The rate structure for these works is based on aided natural Regeneration programme sanctioned by the Govt. of Maharashtra(Rs.208.69 Per day). In P.W.C. its expected that the work will be carried out in 40% of coupe area & blank in I.W.C. 40% of the coupe area which is under stocked as per stock mapping reports of field staff is likely to be worked under this plan and in Mangrove W.C. 30% of coupe area is expected for regeneration. The planting rate per hectare upto five year may go upto Rs.94887/-. The total costs for plan period works out to be Rs.1613 lakh as given in Appendix No. LXI. Looking at the rising trend of the market price, the revenue expected from various activities during plan period is about Rs. 450 lakh. from thinned material, NTFP. and from felling of suru trees.

SECTION: 3: ANNUAL REQUIREMENTS OF FUNDS FOR PLAN PERIOD.

250. The annual requirement funds for various activities is given in **Appendix No. LXI**. for the plan period.

CHAPTER:XIV: SUMMARY OF PRESCRIPTIONS

A short summary of the important prescription of the plan is as under.

chapter	Working circle	Particular of prescription	Prescription in brief	Para No.
1	2	3	4	5
I (Part-II)		Period of plan	10 years	114
II	Protection W.C. (4362.48 ha)	Method of treatment	Coupe will be demarcated one year in advance. No area should be worked for felling of trees of any kind, however, removal of dead, dying and wind fallen trees to be marked for felling and extraction. Soil conservation works such as a check dams, gabian bandharas, nalla bunding and gully plugging would be taken up in accessible areas Reboisement of under stocked and blanks in accessible areas will be undertaken by aided natural regeneration	123
		Choice of species	Khair, Mango, Bamboo, Suru, Awala, hirda, behada, jambhul, and karvand etc. is proposed.	124
		Rotation	No Rotation is fixed.	125
		Felling cycle	20 years	126
		Method of execution of work	The treatment map will be prepared on stock map sketch of the coupe. In this treatment map the details of works to be carried out will be shown. In treatment map unworkable area, well socked area, under stocked area, mangrove area, will be shown. Areas having density up to 0.4 with minimum of 0.4 hectares should be shown on map and demarcated on the ground. In this area marking of 425 natural plants and planting of 200 seedlings of local species in 0.45x0.45x0.45 mt: pit size should be taken up Specifically it is prescribed that patchwise planting should be done, instead of mix planting Soil & water conservation works such as check dam, Water holes, Gabian structure, Nala banding & Gully plugging should be done.	127
			178	

4	1 4	2	4.Working plan for C	
1	2	3	4	5
		Subsidiary	All climbers except Shikekai, cane and	128
		Silvicultural	medicinally valuable species should be cut.	
		operatations	The stump of trees felled by illicit cutting	
			should be dressed to enable production of	
		3.6' 11	vigorous coppice shoots.	101
		Miscellaneous	Fire protection: The entire areas should be	131
		regulations	protected from fire rigidly.	• 1 0
			Grazing: The area under this working	218
			circle should be completely closed for	220
	_	25.1.1.0	grazing.	
III	Improvement	Method of	No area should be worked for felling of	137
	W.C.	treatment	trees of any kind, however, removal of	
	(1366.66 ha.)		dead, dying and wind fallen trees to be	
			marked for felling and extraction.	
			Soil & Water conservation works such as	
			a check dams, gabian bandharas, nalla	
			bunding and gully plugging would be taken	
			up in accessible areas	
			Reboisement of under stocked and blanks	
			in accessible areas will be undertaken by	
			aided natural regeneration Thinning will be	
			carried out in old teak plantations.	
		Choice of	Teak, Khair, Hirda, Shisam and fruit trees	138
		species	Mango, Awala, jambhul, and Cashew etc	
		Datation	No Dotation is fixed	120
		Rotation	No Rotation is fixed.	139
		Felling cycle Method of	20 years	140
			Coupe will be demarcated one year in	141
		execution of	advance. The treatment map will be	
		work	prepared on stock map sketch of the coupe.	
			In this treatment map the details of works	
			to be carried out will be shown. In	
			treatment map unworkable area, well	
			stocked area, under stocked area, mangrove area, will be shown.	
			,	
			Areas having density up to 0.4 with minimum of 0.4 hectares should be shown	
			on map and demarcated on the ground.	
			Soil & Water conservation works such as check dam, Water holes, Gabian structure,	
			Nala banding & Gully plugging should be	
			done. Specifically it is prescribed that	
			species wise patch planting should be	
			done, instead of mix planting.	
			Old teak plantations will be thinned with C	
			grade thinning.	

1	2	3	4	5
		Subsidiary Silvicultural operations	Coppies shoots will be reduced to 2 well grown should per stump. Cleaning will be carried out during fifth years of plantation. Malformed and damaged poles will be cut back.	142
		Miscellaneous regulations	Fire protection: The entire areas should be protected from fire rigidly. Grazing: The area under this working circle should be completely closed for grazing.	218 220
IV	Casuarin a W.C. (153.00 ha.)	Method of treatment	Strong winds and waves the trees from matured crop are uprooted many times. Ten trees evenly distributed per ha. in existing plantations will be retained for nesting to vultures & hornbills. Other inland rows will be clear felled and planted with polypot causarina and other species seedlings at a spacement of 2 m x 2 m. Also the remaining area of this w. c. is taken for planting as per prescribed timetable	147
		Choice of species	Casuarina species, Undil, Bhendi, Cashew etc	148
		Rotation	Rotation is fixed of 15 years.	Sect.
		Demarcation of coupes & marking technique.	Coupe will be demarked one year in advance. Boundaries of coupe will be demarcated by fixing stout wooden posts. Trees at boundary marked with 3 tar bands at B.H. Coupe number will be written on the posts. Marking of trees will be done serially. Trees should be felled as close to the ground as possible.	213
		Subsidiary Silvicultural operations	In general no weeding and no cleaning is necessary. Watering is provided.	159
		Plantation technique.	Standard planting technique should be adopted. Planting should be done in January – Feb. every year at 2x2 mt. Watering should be done for first 2 years.	151
		Miscellaneous regulations	No fire tracing required. Area should be protected by barbed wire fencing. Grazing: It is seen that very little grass is there since the area is all sandy.	218 220

1	2	3	4. Working plan for C. W.C.	5
V	Mangrove	Method of	The coupe area will be marked one year in advance.	163
	W.C.	treatment	Dead, dying, disease plants can be removed.	
(816.56			Reboisement of under stocked and blank areas will be	
	ha.)		taken up for plantation. The planting will be done	
			mostly of species either vivipara or cryptopary	
			mangrove species.	
		Choice of	Vivipary plants : Rhizophora mucronata, Brusuiera	166
		species	tymnorrhiza, Kandelia candel	
			Cryptopary Plants : Avicennia marina, Avicennia	
			officinalis, Bruguiore cylindrica, etc.	
		Felling cycle	10 years	164
		Method of	Good quality proposals are collected in the month of	167
		execution of	June-July. Nursery will be raised & minimum 60cm.	
		work	plants will be planted. The plantation is done by	
			scooping in the soil. The detailed planting technique is	
			discussed in the chapter.	
		Subsidiary	No weeding is required. The tidal water from ocean	174
		Silvicultural	often brings algae which encircles the plant and need	
		operations	to be removed.	
			Removal of any natural/artificial blockage of brackish	
			fresh water if any sand blockage has been created	
			artificially, due to movement of water, it should be	
			broken in parts to prevent degradation of mangroves.	
			Similar operations for fresh water is also required.	
		Miscellaneous	Protection & observation of plantation is most	174
		regulations	important.	
VI	Misc.	Method of	As the areas included in this working circle is in small	177
	W.C.	treatment	patches & being used as residential & office building	
	(7.80 ha.)		purpose there is no treatment is prescribed. The area	
			should be treated as per timely suggestions of	
			Divisional Forest Officer Ratnagiri.	

1	2	3	4	5
VII	Bamboo overlapp ing W.C.	Method of treatment	Inter plating of bamboos will be taken up in old teak plantations immediately after thinning. Planting will be done at 6x6 mtrs. Spacement in 0.45x 0.45 x 0.45 mtrs. size pits. Total no.to be planted: 278 plants per ha.	182 213
		Choice of species	Managa/ Meskati, Katas and Kanak Bamboo species will be planted.	183
		Felling cycle	From management point of view the felling cycle will be akin to improvement working circle. General felling cycle of 3 years	185
		Rotation	Regular bamboo exploitations is out of question at this stage. It takes seven to ten years to form clump and only there after the yield will be available. Bamboo thinning cum cleaning to be under taken at 7 th year. There after 4 th	188
		Method of execution of work	Coupe will be surveyed and demarcated by Gazetted officer one year in advance. In case inter planting pits of 0.45x 0.45 x 0.45 mtrs. be dug in the month of Oct. and Nov. and refilled in April, May, Planting to be done as soon as rainy season starts.	188
		Subsidiary Silvicultur al operatatio ns	Three weedings and one thorough soil working in 1 st year, two weedings cum soil working in 2 nd year and one weeding cum soil working in 3 rd year. To avoid damaged by wild boar Napthalene balls to be attached to the plants for 1 st two years to achieve greater success.	190
VIII	Wild life (over lapping) W.C.	Method of treatment	Adequate publicity be given to the Act. And wild life in general to create awareness among the local people. Provide water holes Shelter, salt licks wherever required. Planting of fruit trees should be aimed at each planting sites.	197
		Method of execution of work	Strict implementation of Wild Life Protection Act (1972). Hoarding to be placed depicting important provisions of wild life Act and information regarding Wild life. Visits of nature clubs, school children to the forests with natural beauty and wild life be arranted. At least 100 ha. patch in each range should be developed as a wild habitat of refuge. Vulture nests should be protected and the idea of vulture restaurant is to be implemented.	198
			182	

1	2	3	4. Working plan for C.		
1		3	Soil and moisture conservation works will be	5	
			carried out all over. Plantations of fruit species		
			such as Jambhul, Amba, Umbar, Bor etc. to be		
			raised in the areas. Detailed census to be done		
			periodically.		
		Miscellan	Grazing: The area under this working circle	200	
		eous	should be completely closed for grazing.	200	
		regulation	should be completely closed for grazing.		
		S			
IX	Minor forest	Non-	Collection and disposal of Apta leaves is	208	
121	Produce	timber	regulated under Maharashtra Minor Forest	200	
	(OL)W.C	forest	Produce (Regulation trade) Act 1969 and		
	(OL) W.C	produces.	Maharashtra Minor Forest Produce (Regulation		
		produces.	Trade) in Apta leaves rules 1971. Hirda fruits,		
			Shikekai pods, Cashew fruits are sold by open		
			auction on annual contract. Grasses to be		
			disposed off as per instructions contained in		
			Govt. Resolution No.MFP-1165/118931-(6)-F-		
			2,Dated-29/10/1976		
			,		
X	Establishment	Establish	The details of existing organization are given in	209	
	and labour	ment and	Appendix No. XXI. It has been suggested to		
		labour	import labour from outside.	211	
XI	Misc.	Irregular	Irregular harvesting of timber, firewood and	215	
	regulation	harvesting	other non timber forest produce is prohibited		
			except removal of dead, fallen fire wood with		
			the permission of DFO. In charge of division.		
			Felling of trees on fire lines under electric and		
			telephone lines may be permitted under the		
			Forest Conservation Act 1980, and the guide		
			lines issued by the Govt. of India.		
		Maintenan	External and internal boundaries of the forest	216	
		ce of	l E		
		Boundary	demarcation scheme prescribed in the plan.		
		Fire	The forests are valuable and need careful fire	218	
		protection	protection for the entire area. Cutting and		
		1	cleaning of the fire lines should be completed		
			by DecJan. and burning before the end of		
			February. Fire lines to be kept clean regularly.		
			Rules given in the plan should be followed		
			strictly.		
183					

1	2	3	4	5
XII	Control forms and	Control forms	Control forms: separate control forms	242
	records	and records	have been prescribed for each working	
			circle as per Appendix No. LVII for	
			academic interest as no exploitation is	
			proposed. Control forms for planation	
			cultural operations will be same for all	
			working circles. One set of forms will	
			be kept in the office of D.F.O. in	
			charge division and other will be send	
			to C.F.working plan annually not letter	
			than 1 st October. The C.F.working plan	
			will scrutinize the entries and consider	
			replies to remarks and then submits the	
			report together with territorial Chief	
			Conservator of forests, not letter than	
			1 st December. The territorial Chief	
			Conservator of forests will forward the	
			report with his remarks to the Principal	
			Chief Conservator of Forests,	
			M.S.Nagpur through the Additional	
			Principal Chief Conservator of forests	
			(working plan-west), Pune for	
			approval not letter than 1 st February in	
			the following year.	
		Compartment	Compartment history form numbers 1	243
		Histories	to 5 should be maintained as per	
			Appendix No LVIII	
		Plantation	This should be maintained in form no.	245
		and Nursery	1 to 9 as given in Appendix No. LIX &	
		register	LX Respectively.	
XX	Financial forecast	Cost of the	The estimated revenue and expenditure	249
	and cost of the	plan	are as under.	
	plan		Revenue: 450 Lakh.	250
			Expenditure: Rs.1613 Lakh.	
			(excluding salary)	

