



WORKING PLAN

PUNE FOREST DIVISION



VOLUME – I
2023-24 to 2032-33

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EXECUTIVE SUMMARY

I. INTRODUCTION

A) Vision Statement:

Forests are the lungs of nature and constitute the base of the living biota. They regulate the whole earth ecosystem by providing tangible and intangible benefits to all living organisms. Besides direct benefits that forests provide in the way of products, it has many indirect beneficial influences that are frequently overlooked and their value under-estimated. It includes the effects of forests on climate, soil, water, etc. In the past, timber production was traditionally regarded as the dominant function of sustainable forests. However, in recent years this perception has shifted to a more multi-functional and balanced view. Because of the increasing importance of forests and its resources in the general well-being of mankind, many international conventions and treaties contain provisions to regulate activities related to forests. Besides, many agreements at the global and regional level also aimed at the sustainable forest and environmental conservation.

The following vision statement is the vision statement of the Maharashtra Forest Department (www.mahaforest.nic.in)

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

B) Goals and objectives of management:

Goals:

- a) Ensure stability of the fragile Western Ghats & grasslands Ecosystem.
- b) Increase the forest & tree cover.

- c) Conserve the Gene pool and Biodiversity.
- d) Enhance the productivity of resources.
- e) Ensure the equity of the various stakeholders in using the forest resource. (Especially needs of local community)
- f) Increase the share of the forestry sector in the state's economy.

Objectives of Management:

Sectoral:

- To recommend to the State and Central government about the policies related to the greening of Maharashtra.
- To generate and disseminate knowledge and information relevant to the sector to various stakeholders and provide Research & Development support to the sector.
- To regulate the activities of various players involved in forestry sector development.
- To undertake coordinated planning, make attempts for proper convergence along with the other government departments and agencies.
- To develop a pro-active interface with political and executive arm of the government and public.
- To act as a nodal agency for Forestry related matters with different levels of administration

Institutional

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

Operational

- To maintain accurate and reliable data and information on forest resources and undertake periodic resource monitoring.
- To ensure effective and efficient management of forest estates under its control.
- Protect fragile land of Western Ghat by adopting effective soil and water conservation measures.
- To identify, map and conserve bio-diversity rich areas.
- To promote efficient harvesting and value addition of forest produce by adopting participatory approach.

C) SWOT analysis for prescription of strategies for achieving the goals and objectives:

The analysis of the Strengths, Weakness, Opportunities and Threats for Achieving the Goals and Objectives is very much needed. While formulating objectives and treatment of each of the Working Circle, the SWOT analysis is the basis. The SWOT analysis is done with

giving due weightage to the internal and external factors that would have the impact on the achievement of the goal of the Plan and also the factors that would have definite role in the success of the Plan like, Human and capital resources, Climatic factors, Human interference, etc

STRENGTHS	WEAKNESSES
✓ Compact forest area of division especially in western part ✓ No honey combing of area due to FRA ✓ Well-regimented administration ✓ Ability to maintain forest cover ✓ Quite good number of Sacred Groves. ✓ Well intended course of action in place ✓ GIS based stock maps prepared. ✓ Trained staff and increasing techno savvy staff. ✓ Finance improved over the last four-five years ✓ Great potential of medicinal plants and wild edible plants ✓ Nearness of market at Mumbai, Pune for medicinal plants ✓ Cordial relations of forest staff and villagers. ✓ Politically awarded area. ✓ Overall infrastructure of nurseries, offices, quarters in place. ✓ Well documented Working Plan	✓ Limitations to create/maintain dense Forests. ✓ Under SMC, Watershed management, ridge to valley principals is rarely followed. ✓ Shortfall of motivation and innovation in field. ✓ Inefficient record keeping about extraction of medicinal plants, wild edible plants ✓ Funds not released in time ✓ Deficient of legal awareness and implementation ✓ Agriculturally developed area, hence labour supply is uncertain and costly. ✓ Inability to tap local population Goodwill, most Joint Forest management is not upto the mark. ✓ Many RET species are untackled
OPPORTUNITIES	THREATS
✓ Cooperation from Social Forestry Division, Agriculture department, Distt Admin, another Department. ✓ Wide scope of greening newly handed over area from Revenue department and	✓ Lack of technology transfer on silvicultural improvements ✓ Drought conditions & poor soils hamper development of forests. ✓ Forest fire from fields, villages, out of

acquired private forests. ✓ Real time reporting and monitoring using latest technology. ✓ Funding for plantations from PSUs working in industrial areas of Hadapsar, Bhosari, etc. ✓ Sustainable harvesting, value addition, linkages to market for medicinal plants and promotion of wild edible plants amongst city dwellers. ✓ Training in new tech and exposure visits for staff. ✓ Funding from outside department ✓ Creation of legal cell ✓ Treatment of watersheds through Jalyukt Shivar, etc. ✓ Creation of assets and infrastructure from CAMPA ✓ Involvement of informed public and NGOs in documentation, conservation of Biodiversity ✓ Proper documentation of Biodiversity, especially of sacred groves, for socio-economic benefits to forest dependent communities.	vengeance proves disastrous ✓ Staff over-burdened with unproductive non-forestry works ✓ Shortfall of control over encroachment, Grazing, etc. ✓ Increasing man-leopard conflict ✓ Shortage in timely funding ✓ Pressure from influential persons to deviate from working plan prescriptions.

D) EXPECTED OUTCOME:

Some general and some specific prescriptions have been set for the treatment of the forests of the Division; some outcomes that are expected to be achieved during the period of the plan are as follows.

a) Forest:

- (i) **Consolidation:** At present acquired private forest areas are being taken in possession of department, so also forest area in possession of Revenue Department is taken over by Forest Department. During the implementation of the plan, these areas will be

demarcated on ground and form no. 1 of division will be updated regularly.

- (ii) **Extent of Forest Cover:** While it is our National policy to have least 33% of the geographical area under forest (in the plans), in the case of Pune division, out of the geographical area of 7831 sq. kms. only 983.116 sq. kms. (SFR of FSI 2019) is covered under forests. This works out to be 12.55 % of the geographical area, in order to achieve 33 % forest cover; there is a need to cover the whole area of forests (except identified grasslands)

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

- (iii) **Plantations:** It is expected that 50% areas under category of shrub, plantations, understocked area from Afforestation Working Circle and 20% areas under category of exotic species from Protection Working Circle will be regenerated during plan period. Thus, around an area of 2500 ha. from Afforestation Working Circle and another 975.86 ha. from Protection Working Circle, will be regenerated during this plan period. This will add to the forest cover of the Division, in near future.
- (iv) **Regeneration:** Because of implementation of the plan, the forests are expected to be healthier and have better regeneration by promoting natural regeneration supported by intensive Aided Natural Regeneration works. It is expected that 10% area under category of shrub, plantations, understocked area from Protection Working Circle and Afforestation Working Circle will be regenerated during plan period. Thus, around an area of 750 ha. and 1200 ha, respectively, will be regenerated. Also due to better protection from fire and grazing, the area will be revitalized.
- (v) **Fodder Development:** Because of implementation of the plan, the open grassland areas are expected to be healthier and having better quality fodder. It is expected that 80% area under category of grass from Grassland Management Working Circle will be replanted with palatable grass species and 10% area under category of shrub, exotic species understocked area will be regenerated by planting fodder tree species, during plan period. Thus, around an area of 1600 ha. and 200 ha, respectively, will be regenerated.
- (vi) **Health and vitality:** At the end of the plan period, it is expected that the forests of the Division are more vivacious and revitalized with better regeneration, better composition of the crop, lesser disturbance of fire, grazing, illicit felling etc. resulting in better healthy forests.

- b) Wildlife:** It is expected that at the end of the plan period the whole area of forests will be covered with sufficient number of waterholes in wildlife rich areas. The documentation and study of the faunal and floral diversity of the Division/District will have been done by then.
- c) Revenue:** As such felling is not prescribed, major revenue is not expected, but some revenue may be generated from selling of felled exotic tree species. However, there is wide scope of having some revenue through sustainable harvesting of NTFP, medicinal plants. This will also generate employment opportunities to local tribal.
- d) Biodiversity:** Because of the implementation of this Plan, Biodiversity appreciation and conservation will get a fillip in the Division. It is envisaged to have documentation and status study of medicinal plants, the lower life-forms (fungus, algae, ferns, moss & lichens), entomological study, herpetological mapping and documenting floral & faunal diversity of sacred groves, etc. during the course of the plan through projects to be designed by the Division. At the end of the plan, Biodiversity Committee in all JFM-implemented village in the Division through the PRIs, writing PBR, access benefit sharing, which the Forest Department will catalyze, are expected to be formed.
- e) Soil and Water Conservation:** Throughout the plan period an area of 12,850 ha. under different forms of regeneration and additional area as per site conditions are expected to be treated for soil and moisture conservation. All major dams/wetlands identified in the plan will have been treated on watershed management principles by the end of the plan period.

E) ABSTRACT OF PLAN PRESCRIPTIONS:

Chapter No. (Vol-I, Part-II)	Para No/Sub para No	Prescribed Activity
A	B	C
2 - Protection Working Circle	2.6.11.1	Demarcation, Treatment Map and Prescription * Demarcation and treatment map will be prepared one year in advance. * Treatment map would show A, B, C, D areas 'A'-type – Protection areas: include following areas i. Areas with steep slopes i.e., more than 250. ii. Eroded areas or areas liable to erosion. iii. Twenty meters wide strip on either side of the water courses. iv. Sacred Groves and high-altitude plateaus (sadas). 'B'-type: Understocked and Blank areas (density <0.4) (a) * C-type: old plantation areas * D-type: Well stocked areas (density >0.4)

	2.6.11.2	Marking: * A type area: No marking * B type: no marking * C type: Thinning marking * D type: No marking
	2.6.11.2	Silvicultural System: ‘C’ grade thinning in old successful teak plantations.
		Regeneration: * Natural Regeneration: NR of seed origin of valuable species to be preferred and managed through cultural operations in A and B type areas.
		* Artificial Regeneration: Only in B type area if site is suitable and grass cultivation in zone I & II areas. * Strict protection from fire and grazing * Tending of natural regeneration of valuable species in B Type area.
		SMC Works: * LBS, gabion and gully plugging will be carried out wherever essential. * Soil binders like Sisal (Agave sp.); local grasses etc. shall be planted as per the site requirement. * SMC Working are to be based on the requirement of site. While undertaking SMC works, raking of soil or SMC works requiring excavation should not be done
3 - Afforestation WC	3.6.11.1	Coupe Demarcation & Treatment Map: Demarcation and treatment map will be prepared one year in advance. * Treatment map would show A, B, C, D areas ‘A’ type – Protection areas: include following areas i. Areas with steep slopes i.e., more than 250. ii. Eroded areas or areas liable to erosion. iii. Twenty meters wide strip on either side of the water courses. ‘B’-type: a) Area with root stock as well as without root stock, suitable for taking up afforestation shall be marked on it. b) The areas which were earlier planted but the plantations have failed. * C-type: old plantation areas * D-type: Well stocked areas (density >0.4)
	3.6.11.2	Marking: * A type area: No marking * B type: no marking * C type: Thinning marking/ clear felling of exotic trees in

		designated grids only. * D type: No marking
		Silvicultural System: • ‘C’ grade thinning in old successful teak plantations. Clear felling in case of exotic plantations in designated grids only.
		Regeneration: * Natural Regeneration: NR of seed origin of valuable species to be preferred and managed through cultural operations in A and B type areas. * Artificial Regeneration: Only in B type area if site is suitable and grass cultivation in zone I & II areas. * Strict protection from fire and grazing * Tending of rooted stock of valuable species in B Type area.
		SMC Works: * SMC works, as described in the chapter of Miscellaneous Regulations are prescribed in A & B type area.
4 - Grassland Management WC	4.6.11.1	Coupe Demarcation & Treatment Map: * Demarcation and treatment map will be prepared one year in advance. * Treatment map would show A, B areas * A type: Protection areas - Areas with steep slopes i.e., more than 250. - Eroded areas or areas liable to erosion. - Twenty meters wide strip on either side of the water courses. * B-type: Under stocked areas: - Shallow Soil Areas - Include blank, rocky areas having shallow soils. - Deep Soil Areas- Small patches, strips having better soil depth. Roughly 2800 ha area comes under this category. * C-type: old plantation areas: include areas under old plantations. * D-type: Well stocked areas: include areas with crop density more than 0.4.

	4.6.11.2	Silvicultural System: * C' grade thinning in old successful teak plantations. Clear felling in case of exotic plantations in designated grids only.
	4.6.12	Regeneration: * Poly bag planting of grass species on 'V' shape furrows-distance between two furrows, two plants etc. should be fixed as per recommendations of Research Wing. * In 'B' type area, which are having better soil depth and are fit for raising trees, fodder species like Anjan, Neem, Ber, Apta, Khejdi, Nirbija (Subabhul variety having good foliage and less seed production as introduced by NARI, Phaltan), etc. will be planted.
	4.6.12	SMC Works: * The SMC works including LBS, gabion and gully plugging, Van tale, bandharas, nalla-bunding will be carried out wherever essential
5 – Improvement Working Circle	5.6.10	5.6.10 Coupe Demarcation & Treatment Map: * Demarcation and treatment map will be prepared one year in advance. * Treatment map would show A, B areas * A type: Protection areas i. Areas with steep slopes i.e., more than 25°. ii. Eroded areas or areas liable to erosion. iii. Twenty meters wide strip on either side of the water courses. * B-type: Under stocked areas: Teak and suitable miscellaneous species shall be promoted with tending of natural regeneration. Dead and malformed teak and important timber trees will be cut back. * C-type: – (a) GROUPS OF YOUNG POLES: - Silvicultural thinning shall be done as per stand table for Teak prepared by FDCM. Thinning shall be done in such a manner that epicormic branches do not come up. In the natural young crop, thinning marking will be done on the basis of weighted average gbh and site. (b) OLD PLANTATION: -Thinning of old Teak plantation will be carried out as per schedule. Exotics will be felled as per prescriptions in 'Old Plantation Management' chapter. * D-type: No planting will be done. Felling will be carried out as provided under Marking Rules.
	5.6.10.5:	SOIL AND MOISTURE CONSERVATION WORKS The SMC works including LBS, gabion and gully plugging, Van tale, bandharas, nalla-bunding will be carried out wherever essential and desilting shall also be done.

	5.6.11:	SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING • Cutting back • Cleaning • Weeding • Regeneration
6 - Wildlife Management		Prescription: * Standing Order of PCCF (WL) to be scrupulously implemented. * More area is brought under Fodder Management WC, this will revive habitat of herbivore and ultimately of hyena, wolf habitat, to some extent. *The existing grass lands, open areas in forest areas should be maintained and palatable grass species shall be improved. Unpalatable grass species shall be removed from such areas. * Some tree species are preferred by Shekru either as food or for nesting purpose. As prescribed in Protection Working Circle, these species should be planted for habitat development of Shekru. *Cleaning of perennial waterholes in month of January –February. * Emphasis for restoration of habitat for wolves. *At times, it is necessary to create artificial water holes at strategic locations for proper utilization of habitat and to avoid habitat overuse by congregations of herbivores at a few waterholes. * Vulture restaurants may be tried in areas outside the village * Regular Sensitization of staff * Compensation as per Govt. orders to be dispersed immediately and transparently. * Effective control on forest fires. Massive awareness creation in village communities, schools, colleges, civil society, public representatives etc.
7 – Private Forests (Acquired) Management Working Circle	7.6.9	* The DCF (T) Pune must get all private forest areas surveyed and demarcated in the field and complete possession of land should be taken by the Pune territorial Forest Division. *The encroachments if any should be removed at the earliest. Boundaries of Acquired forests are to be demarcated on priority within 5 years. *After demarcation of Private Forest is done a separate detail Working scheme/ Working plan of concerned forest has to be prepared by DCF (T) Pune in consultation with stakeholders and should be approved by concerned authorities.
8 - Urban Forest Management WC	8.6.11.2	Coupe Demarcation & Treatment Map: Demarcation and treatment map will be prepared one year in advance. * Treatment map would show A, B, C, D areas ‘A’ type – Protection areas: include following areas - Areas with steep slopes i.e., more than 250. - Eroded areas or areas liable to erosion.

		iii. Twenty meters wide strip on either side of the water courses. ‘B’-type: a) Area with root stock as well as without root stock, suitable for taking up afforestation shall be marked on it. * C-type: Old plantation areas especially exotics * D-type: Well stocked areas (density >0.4)
	8.6.11.3	Treatment: * A type area: No marking for felling. Only protection * B type: No felling & plantation in suitable areas * C type: Thinning marking/ clear felling of exotic trees in designated grids only. * D type: No felling
	8.6.12	General prescriptions * Demarcation and protection of urban forest from the nearby habitations by RCC/ masonry wall. * Protection against littering/ dumping. * Reclamation of mines * Ecotourism
9 – Joint Forest Management (Overlapping)	9.6, 9.7	Prescription: * JFM micro plans are to be dovetailed with broad prescriptions of approved working plan. * The focus of JFM would be on sustainable management of Non-Timber Forest Products (NTFPS) and this will also be the main source of earning for the beneficiaries * Linkages with different departments should be strengthened. As a matter of fact, such villages need to be given priority while taking up any individual beneficiary scheme or other schemes of different ministries/ departments of the Government. * Villages which have not received funds should also be accorded importance.
10 - Maintenance, Conservation and Enhancement Of Biodiversity	10.3	i. Sustainable harvesting of Medicinal Plants should be strictly adhered to. ii. Sensitization of the staff of Pune Division to the issues of biodiversity is of utmost importance. iii. Identification and Conservation of rare/ endangered indigenous species of plants in the division. v. As per biodiversity Act 2002, Biodiversity Management Committee through the Gram panchayat as per the norms decided by the Government needs to be established in all the JFM’s villages. vi. All JFM Committees should have Public Biodiversity Registers as part of the many records to be kept. vii. Protection of Sacred Groves as per management action plan.

11 - Old Plantation Management	11.2	The tending operations like cleaning; thinning required for the management of the old plantations should be done. • Glyricidia removal and planting by local species. • C' grade thinning in old teak plantations. • 50 % Prosopis crop shall be clear-felled to be regenerated by Babhul planting. • Decongestion of bamboo clumps.
15 - NTFP	15.6.10	Prescription: * Traditional felling is not expected but process of implementation of sustainable harvesting through participatory approach shall be followed for sustainable harvesting * Species selection of NTFP. * Implementation of sustainable harvesting through participatory approach. * Developing Good Collection Practices (GCPs) * JFMCs to be actively involved in NTFP collection and processing. * Regular trainings for JFMCs to be conducted for capacity building in NTFP collection and processing.
13 - Miscellaneous Regulation	13.1 to 13.16	Miscellaneous Regulation: * Boundary demarcation of all un-demarcated areas (Entire Acquired Private Forest & Non-Forest land taken over for C.A. & R.F taken over from Revenue department) to be accomplished in first five years of the Plan. * Boundary pillar which is not easily vulnerable to damage. * Five years Survey and Demarcation Programme * Boundary demarcation is necessary due to honeycombing. * Updation of area registers * Where claims are finally rejected, removal of such encroachments.

F) WORKS PRESCRIBED WITH ANNUAL TARGET

Chapter No.	Para No. / Sub Para-No.	Prescribed Activity	Year wise (year 1 to 10) distribution physical target (Ha.)										
(Vol-I, Part-II)			D										
A	B	C	1	2	3	4	5	6	7	8	9	10	
2 - Protection WC	2.6.11.1	Demarcation and marking	3505	3505	3505	3505	3505	3505	3505	3505	3505	3505	3505

		operations)										
		4th YO (Fourth year operations)					30	30	30	30	30	30
		5th YO (Fifth year operations)						30	30	30	30	30
		Total	30	60	90	120	150	180	180	180	180	180
3 - Afforestation	3.6.11.1	Demarcation and marking	695	695	695	695	695	695	695	695	695	695
	3.6.11.2	Nursing of naturally occurring seedlings, root stock and coppice management etc.	35	35	35	35	35	35	35	35	35	35
		Soil and moisture conservation works	695	695	695	695	695	695	695	695	695	695
		Teak Plantation (Polypot)										
		PPO/PYO	50	50	50	50	50	50	50	50	50	50
		FYO (First year operations)		50	50	50	50	50	50	50	50	50
		SYO (Second year operations)			50	50	50	50	50	50	50	50
		TYO (Third year operations)				50	50	50	50	50	50	50
		4th YO (Fourth year operations)					50	50	50	50	50	50
		5th YO (Fifth year operations)						50	50	50	50	50
		Total	50	100	150	200	250	300	300	300	300	300
		Mix Plantation (3x3 mt)										
		PPO/PYO	70	70	70	70	70	70	70	70	70	70
		FYO (First year operations)		70	70	70	70	70	70	70	70	70
		SYO (Second year operations)			70	70	70	70	70	70	70	70
		TYO (Third year operations)				70	70	70	70	70	70	70
		4th YO (Fourth year					70	70	70	70	70	70

		operations)										
		5th YO (Fifth year operations)						70	70	70	70	70
		Total	70	140	210	280	350	420	420	420	420	420
4 - Grassland Management	4.6.11.1	Demarcation of coupe	919	919	919	919	919	919	919	919	919	919
	4.6.11.2 & 4.6.12	Artificial grass plantation of 3 year model (Polypot)*										
		PPO/PYO	320	320	320	320	320	320	320	320	320	320
		FYO (First year operations)		320	320	320	320	320	320	320	320	320
		SYO (Second year operations)			320	320	320	320	320	320	320	320
		TYO (Third year operations)				320	320	320	320	320	320	320
		Total	320	640	960	1280	1280	1280	1280	1280	1280	1280
		Fodder Tree Plantation (6x6 mts)										
		PPO/FYO	80	80	80	80	80	80	80	80	80	80
		FYO (First year operations)		80	80	80	80	80	80	80	80	80
		SYO (Second year operations)			80	80	80	80	80	80	80	80
		TYO (Third year operations)				80	80	80	80	80	80	80
		4th YO (Fourth year operations)					80	80	80	80	80	80
		5th YO (Fifth year operations)						80	80	80	80	80
		Total	80	160	240	320	400	480	480	480	480	480
5 - Improvement W.C.	5.6.10.1	Demarcation and marking	503	503	503	503	503	503	503	503	503	503
	5.6.10.5	Soil and moisture conservation works	503	503	503	503	503	503	503	503	503	503
	5.6.10.3. & 5.6.10.4	Marking & Treatment	503	503	503	503	503	503	503	503	503	503
	5.6.11	Subsidiary	503	503	503	503	503	503	503	503	503	503

		Silvicultural Operations										
	5.6.10.6	Teak Plantation (Polypot)										
		PPO/PYO	60	60	60	60	60	60	60	60	60	60
		FYO (First year operations)		60	60	60	60	60	60	60	60	60
		SYO (Second year operations)			60	60	60	60	60	60	60	60
		TYO (Third year operations)				60	60	60	60	60	60	60
		4th YO (Fourth year operations)					60	60	60	60	60	60
		5th YO (Fifth year operations)						60	60	60	60	60
		Total	60	120	180	240	300	360	360	360	360	360
		Mix Plantation (3x3 mt)										
		PPO/PYO	150	150	150	150	150	150	150	150	150	150
		FYO (First year operations)		150	150	150	150	150	150	150	150	150
		SYO (Second year operations)			150	150	150	150	150	150	150	150
		TYO (Third year operations)				150	150	150	150	150	150	150
		4th YO (Fourth year operations)					150	150	150	150	150	150
		5th YO (Fifth year operations)						150	150	150	150	150
		Total	150	300	450	600	750	900	900	900	900	900
8 - Urban Forest Management W.C.	8.6.11.1	Demarcation and marking	388	388	388	388	388	388	388	388	388	388
	8.6.11.3	Soil and moisture conservation works	388	388	388	388	388	388	388	388	388	388
	8.6.11.3	Treatment	388	388	388	388	388	388	388	388	388	388
		Teak Plantation (Polypot)										
		PPO/PYO	30	30	30	30	30	30	30	30	30	30
		FYO (First year operations)		30	30	30	30	30	30	30	30	30

		SYO (Second year operations)			30	30	30	30	30	30	30	30
		TYO (Third year operations)				30	30	30	30	30	30	30
		4th YO (Fourth year operations)					30	30	30	30	30	30
		5th YO (Fifth year operations)						30	30	30	30	30
		Total	30	60	90	120	150	180	180	180	180	180
		Mix Plantation (3x3 mt)										
		PPO/PYO	50	50	50	50	50	50	50	50	50	50
		FYO (First year operations)		50	50	50	50	50	50	50	50	50
		SYO (Second year operations)			50	50	50	50	50	50	50	50
		TYO (Third year operations)				50	50	50	50	50	50	50
		4th YO (Fourth year operations)					50	50	50	50	50	50
		5th YO (Fifth year operations)						50	50	50	50	50
		Total	50	100	150	200	250	300	300	300	300	300
Private Forests (Acquired)	7.6.9.	Boundary Demarcation and marking	2303	2269	2196	2222	2464					

II – GLOSSARY OF TERMS

Injaili species	Miscellaneous species
Bandhara	Bund
Bidi	Handmade cigarette wrapped in Tendu leaf.
Bir	An area reserved to grow grass.
Burad	Person who makes mats, baskets etc. of bamboos
Charaibandi	Ban on grazing
Dholi	Hollow in tree trunk
Doh	A deep pond in a river or stream.
Gat No.	Serial number given to any portion of land entered in land records
Geru	Red ochre or red earth.
Ghat	A road with a steep gradient.
Gully	Channel
Kacha (roads)	Temporary (roads).
Kankar	Lime nodules.
Katha	Catechu.
Kharif	Monsoon crop.
Kurhadbandi	Ban on axe
Murum	A reddish hard soil.
Naka	Barrier on road for checking forest produce in transit.
Nala	A water courses.
Rab	Burning of rice nursery site
Sada	High altitude plateau
Samiti	Committee
Vaidu	Traditional healer
Vantale	Forest Pond
Vyavasthapan	Management

III. LIST OF FLORA

Sr. No.	Family	Botanical Name	Common Name	Endemism	IUCN status
I	MAGNOLIDS	-	-	-	-
1	Piperaceae	<i>Piper hookeri</i> Miq.	Miri	E	
2	Annonaceae	<i>Miliusa tomentosa</i> (Roxb.) J. Sinclair	Humb	E	
3	Lauraceae	<i>Actinodaphnae gullavara</i> (Buch. Ham ex Nees) M.R. Almeida	Pisa	E	
4	Lauraceae	<i>Litsea deccanensis</i> Gamble	Chikna		
II	MONOCOTS	-	-	-	-
5	Araceae	<i>Amorphophallus bulbifer</i> (Roxb.) Bl.	Sapkanda		
6	Araceae	<i>Amorphophallus commutatus</i> (Schott) Engl.	Sapkanda	E	
7	Araceae	<i>Arisaema murrayi</i> (Grah.) Hook.	Badadha	E	
8	Araceae	<i>Remusatia vivipara</i> (Roxb.) Schott & Endl.	Rukhalu		
9	Dioscoreaceae	<i>Dioscorea bulbifera</i> L.	Chava		
10	Dioscoreaceae	<i>Dioscorea oppositifolia</i> L.	Medwan		
11	Dioscoreaceae	<i>Dioscorea pentaphylla</i> L.	Ran-chai		LC
12	Colchicaceae	<i>Gloriosa superba</i> L.	Kal-lavi		
13	Colchicaceae	<i>Iphigenia indica</i> (L.) A. Gray ex Kunth	Markalai		
14	Smilacaceae	<i>Smilax zeylanica</i> L.	Ghotuli		
15	Orchidaceae	<i>Aerides maculosa</i> Lindl.	Amari	E	
16	Hypoxidaceae	<i>Curculigo orchiodides</i> Gaertn.	Kajuri		
17	Amaryllidaceae	<i>Pancratium parvum</i> Dalz.	Pachankand	E	
18	Amaryllidaceae	<i>Pancratium triflorum</i> Roxb.	Pachankand		
19	Asparagaceae	<i>Asparagus africanus</i> Lam.	Shatavar		
20	Asparagaceae	<i>Asparagus racemosus</i> Willd.	Shatavar		

21	Asparagaceae	<i>Chlorophytum glaucoides</i> Blatt.	Kolu	E	
22	Asparagaceae	<i>Chlorophytum glaucum</i> Dalz.	Kolu	E	
23	Asparagaceae	<i>Chlorophytum tuberosum</i> (Roxb.) Baker	Kolu		
24	Asparagaceae	<i>Dipcadi ursulae</i> Blatt. var. <i>ursulae</i>	Ran Lasun	E	
25	Asparagaceae	<i>Drimia indica</i> (Roxb.) Jessop	Ran-Kanda		
26	Arecaceae	<i>Caryota urens</i> L.	Bherli-mad		
27	Arecaceae	<i>Phoenix loureiroi</i> var. <i>pedunculata</i> (Griff.) Govaerts	Shindi		
28	Arecaceae	<i>Phoenix sylvestris</i> (L.) Roxb.	Shindi		LC
29	Commelinaceae	<i>Commelina benghalensis</i> L.	Kena		
30	Musaceae	<i>Ensete superbum</i> (Roxb.) Cheesm.	Rankel		
31	Zingiberaceae	<i>Curcuma pseudomontana</i> Grah.	Shilanda	E	
32	Zingiberaceae	<i>Zingiber neesatum</i> (Grah.) Ramamoorthy	Teva	E	
33	Typhaceae	<i>Typha angustifolia</i> L.	Pan kanis		
34	Poaceae	<i>Alloteropsis cimicina</i> (L.) Stapf	Sinri		
35	Poaceae	<i>Andropogon pumilus</i> Roxb.	Gondal		
36	Poaceae	<i>Apluda mutica</i> L.	Phuti		
37	Poaceae	<i>Aristida adscensionis</i> L.	Kusal		
38	Poaceae	<i>Aristida funiculata</i> Trin. & Rupr.	Kusal		
39	Poaceae	<i>Aristida redacta</i> Stapf	Kusal		
40	Poaceae	<i>Aristida stocksii</i> (Hook. f.) Domin	Kusal	E	
41	Poaceae	<i>Arthraxon villosus</i> C.E.C. Fischer	Turda	E	
42	Poaceae	<i>Bambusa bambos</i> (L.) Voss	Bamboo		
43	Poaceae	<i>Brachiaria reptans</i> (L.) Gard. & C.E. Hubb.	Chimanchara		

44	Poaceae	<i>Chloris barbata</i> Swartz	Gondvel		
45	Poaceae	<i>Chloris virgata</i> Swartz	Panda-gavat		
46	Poaceae	<i>Chrysopogon fulvus</i> (Spr.) Chiov.	Kahandol		
47	Poaceae	<i>Chrysopogon zizanioides</i> (L.) Roberty	Vala		
48	Poaceae	<i>Coix lacryma-jobi</i> L.	Kachor		
49	Poaceae	<i>Cymbopogon citratus</i> (DC.) Stapf	Gavaticaha		
50	Poaceae	<i>Cymbopogon martinii</i> (Roxb.) Wats	Surud-gavat		
51	Poaceae	<i>Cynodon dactylon</i> (L.) Pers.	Durva		
52	Poaceae	<i>Dichanthium annulatum</i> (Forsk.) Stapf	Marvel		
53	Poaceae	<i>Dichanthium caricosum</i> (L.) A. Camus	Marvel		
54	Poaceae	<i>Dichanthium foveolatum</i> (Del.) Roberty	Marvel		
55	Poaceae	<i>Dimeria stapfiana</i> C.B. Hubb. ex Pilger	Kotir		
56	Poaceae	<i>Echinochloa colona</i> (L.) Link	Sava		
57	Poaceae	<i>Glyphochloa forficulata</i> (C.E.C. Fisch.) Clayton	Marvel	E	
58	Poaceae	<i>Heteropogon contortus</i> (L.) P. Beauv. ex Roem. & Schult	Kusal		
59	Poaceae	<i>Heteropogon ritchiei</i> (Hook. f.) Blatt. & McC.	Patang	E	
60	Poaceae	<i>Ischaemum afrum</i> (Gmel.) Dandy	Kunda		
61	Poaceae	<i>Oplismenus burmannii</i> (Retz.) P. Beauv.	Kudak		
62	Poaceae	<i>Paspalum scrobiculatum</i> L.	Kodru		
63	Poaceae	<i>Saccharum spontaneum</i> L.	Padar		
64	Poaceae	<i>Sehima nervosum</i> (Rottl.) Stapf.	Pavanya-gavat		

65	Poaceae	<i>Sehima sulcatum</i> (Hack.) A. Camus	Shenda-gavat	E	
66	Poaceae	<i>Setaria italica</i> (L.) P. Beauv.	Rala		
67	Poaceae	<i>Setaria pumila</i> (Poir) Roem. & Schult.	Kolva		
68	Poaceae	<i>Setaria viridis</i> (L.) P. Beauv.	Rala		
69	Poaceae	<i>Themeda quadrivalvis</i> (L.) O. Ktze.	Kusal		
70	Poaceae	<i>Themeda triandra</i> Forssk.	Khondal-gavat		
III	DICOTS	-	-	-	-
71	Menispermaceae	<i>Cissampelos pareira</i> L.	Tannivel		
72	Menispermaceae	<i>Cocculus hirsutus</i> (L.) Theob.	Vasan-vel		
73	Menispermaceae	<i>Cyclea peltata</i> (Lam.) Hook f. & Thoms.	Pakar		
74	Menispermaceae	<i>Diploclisia glaucescens</i> (Bl.) Diels	Ramrakhi		
75	Menispermaceae	<i>Stephania japonica</i> (Thunb.) Miers.	Pahad-vel		
76	Menispermaceae	<i>Tinospora sinensis</i> (Lour.) Merr.	Gul-vel		
77	Ranunculaceae	<i>Clematis gouriana</i> Roxb. ex DC.	Morvel		
78	Ranunculaceae	<i>Clematis hedysarifolia</i> DC.	Morvel	E	
79	Ranunculaceae	<i>Clematis heynei</i> M. A. Rau & al.	Ranjai	E	
80	Ranunculaceae	<i>Delphinium malabaricum</i> (Huth.) Munz.	Ran-dongra	E	
81	Dilleniaceae	<i>Dillenia pentagyna</i> Roxb.	Karmal		
82	Crassulaceae	<i>Kalanchoe lanceolata</i> (Forssk.) Pres. var. <i>glabra</i> (C.B.Cl.) Srinivasan	Panphuti		
83	Vitaceae	<i>Ampelocissus latifolia</i> (Roxb.) Planch.	Nandana		
84	Vitaceae	<i>Cayratia trifolia</i> (L.) Domin	Ambat-vel		
85	Vitaceae	<i>Cissus elongata</i> Roxb.	Guduga-mul		

86	Vitaceae	<i>Cyphostemma auriculatum</i> (Roxb.) P. Singh & Shetty	Ambat-vel		
87	Vitaceae	<i>Leea asiatica</i> (L.) Ridsd.	Dinda		
88	Vitaceae	<i>Leea indica</i> (Burm. f.) Merr.	Handarfod		
89	Zygophyllaceae	<i>Balanites aegyptiaca</i> (L.) Del.	Hingan-bet		
90	Zygophyllaceae	<i>Tribulus terrestris</i> L	Sarata		
91	Fabaceae (Caesalpinioideae)	<i>Bauhinia racemosa</i> Lam.	Apta		LC
92	Fabaceae (Caesalpinioideae)	<i>Caesalpinia bonduc</i> (L.) Roxb.	Sagargota		
93	Fabaceae (Caesalpinioideae)	<i>Caesalpinia decapetala</i> (Roth.) Alst.	Chilhar		
94	Fabaceae (Caesalpinioideae)	<i>Cassia fistula</i> L.	Bahava		
95	Fabaceae (Caesalpinioideae)	<i>Chamaecrista absus</i> (L.) Irwin & Barneby	Tarvad		
96	Fabaceae (Caesalpinioideae)	<i>Chamaecrista mimosoides</i> (L.) Greene	Tarvad		
97	Fabaceae (Caesalpinioideae)	<i>Senna auriculata</i> (L.) Roxb.	Tarvad		
98	Fabaceae (Caesalpinioideae)	<i>Senna obtusifolia</i> (L.) Irwin & Barneby	Takla		
99	Fabaceae (Caesalpinioideae)	<i>Senna occidentalis</i> (L.) Link	Ran-takala		
100	Fabaceae (Caesalpinioideae)	<i>Senna sophora</i> (L.) Roxb.	Ran-takala		
101	Fabaceae (Caesalpinioideae)	<i>Senna tora</i> (L.) Roxb.	Takala		
102	Fabaceae (Caesalpinioideae)	<i>Tamarindus indica</i> L.	Chinch		
103	Fabaceae (Mimosoideae)	<i>Acacia catechu</i> (L. f.) Willd.	Khair		

104	Fabaceae (Mimosoideae)	<i>Acacia chundra</i> (Roxb. ex Rottl.) Willd.	Khair		
105	Fabaceae (Mimosoideae)	<i>Acacia farnesiana</i> (L.) Willd.	Dev-babhal		VU
106	Fabaceae (Mimosoideae)	<i>Acacia ferruginea</i> DC.	Pandara khair		
107	Fabaceae (Mimosoideae)	<i>Acacia leucophloea</i> (Roxb.) Willd.	Hivar		
108	Fabaceae (Mimosoideae)	<i>Acacia torta</i> (Roxb.) Craib	Chilar		
109	Fabaceae (Mimosoideae)	<i>Albizia lebbeck</i> (L.) Bth. var. <i>lebbeck</i>	Shirish		
110	Fabaceae (Mimosoideae)	<i>Albizia odoratissima</i> (L. f.) Bth.	Kala-shirish		
111	Fabaceae (Mimosoideae)	<i>Dichrostachys cinerea</i> var. <i>indica</i> Brenen & Brummit	Shami	E	
112	Fabaceae (Mimosoideae)	<i>Entada rheedii</i> Spreng	Garbi		
113	Fabaceae (Mimosoideae)	<i>Mimosa pudica</i> L.	Lajalu		
114	Fabaceae (Mimosoideae)	<i>Prosopis cineraria</i> (L.) Druce	Shami		
115	Fabaceae (Papilionoideae)	<i>Abrus precatorius</i> L.	Gunj		LC
116	Fabaceae (Papilionoideae)	<i>Aeschynomene indica</i> L.	Bhend		
117	Fabaceae (Papilionoideae)	<i>Alysicarpus bupleurifolius</i> (L.) DC.	Barka shevra		
118	Fabaceae (Papilionoideae)	<i>Butea monosperma</i> (Lam.) Taub.	Palas		
119	Fabaceae (Papilionoideae)	<i>Cajanus lineatus</i> (Wight & Arn.) Maesen	Ran-tur		
120	Fabaceae (Papilionoideae)	<i>Cajanus scarabaeoides</i> (L.) du-Petit-Thours	Ran-tur		

121	Fabaceae (Papilionoideae)	<i>Canavalia ensiformis</i> (L.) DC.	Abai		
122	Fabaceae (Papilionoideae)	<i>Clitoria ternatea</i> L.	Gokarn		LC
123	Fabaceae (Papilionoideae)	<i>Crotalaria hebecarpa</i> (DC.) Rudd.	Godhadi		
124	Fabaceae (Papilionoideae)	<i>Crotalaria juncea</i> L.	Tagada		
125	Fabaceae (Papilionoideae)	<i>Crotalaria medicaginea</i> Lam.	Ranghas		
126	Fabaceae (Papilionoideae)	<i>Dalbergia latifolia</i> Roxb.	Shisav		
127	Fabaceae (Papilionoideae)	<i>Dolichos trilobus</i> L.	Halandya		
128	Fabaceae (Papilionoideae)	<i>Erythrina stricta</i> Roxb.	Pangara		
129	Fabaceae (Papilionoideae)	<i>Erythrina suberosa</i> Roxb.	Pangara		
130	Fabaceae (Papilionoideae)	<i>Geissaspis cristata</i> Wight & Arn.	Barki		
131	Fabaceae (Papilionoideae)	<i>Geissaspis tenella</i> Bth.	Kaila Barki	E	
132	Fabaceae (Papilionoideae)	<i>Indigofera cassioides</i> Rottl. ex DC.	Chimnati		
133	Fabaceae (Papilionoideae)	<i>Indigofera cordifolia</i> Heyne ex Roth	Godhadi		
134	Fabaceae (Papilionoideae)	<i>Indigofera glandulosa</i> Wendl.	Borupdi		
135	Fabaceae (Papilionoideae)	<i>Indigofera trita</i> L. f.	Barbada		
136	Fabaceae (Papilionoideae)	<i>Melilotus indicus</i> (L.) All.	Ran-methi		
137	Fabaceae (Papilionoideae)	<i>Mucuna pruriens</i> (L.) DC.	Khaj-kuilee		

138	Fabaceae (Papilionoideae)	<i>Paracalyx scariosus</i> (Roxb.) Ali	Ran-ghevda		
139	Fabaceae (Papilionoideae)	<i>Pongamia pinnata</i> (L.) Pierre	Karanj		LC
140	Fabaceae (Papilionoideae)	<i>Pterocarpus marsupium</i> Roxb.	Bivala	E	
141	Fabaceae (Papilionoideae)	<i>Pueraria tuberosa</i> (Roxb. ex Willd.) DC.	Pitthana		
142	Fabaceae (Papilionoideae)	<i>Sesbania bispinosa</i> (Jacq.) W. F. Wight	Ransevari		
143	Fabaceae (Papilionoideae)	<i>Smithia bigemina</i> Dalz.	BarkaKoula		LC
144	Fabaceae (Papilionoideae)	<i>Smithia conferta</i> J. E. Sm.	Koula		
145	Fabaceae (Papilionoideae)	<i>Smithia purpurea</i> Hook.	Kaila	E	
146	Fabaceae (Papilionoideae)	<i>Smithia sensitiva</i> Ait.	Pivala Kaila		
147	Fabaceae (Papilionoideae)	<i>Smithia setulosa</i> Dalz.	Pivala kaila	E	
148	Fabaceae (Papilionoideae)	<i>Stylosanthes fructicosa</i> (Retz.) Alst.	Hamata grass		
149	Fabaceae (Papilionoideae)	<i>Tephrosia purpurea</i> (L.) Pers.	Unhali		
150	Fabaceae (Papilionoideae)	<i>Tephrosia tinctoria</i> (L.) Pers.	Nil		
151	Fabaceae (Papilionoideae)	<i>Teramnus labialis</i> (L. f.) Spreng.	Ran-udid		
152	Fabaceae (Papilionoideae)	<i>Vigna angularis</i> (Willd.) Ohwi & Ohashi	Mung		
153	Fabaceae (Papilionoideae)	<i>Vigna khandalensis</i> (Sant.) Raghavan & Wadhwa	Badmung	E	
154	Fabaceae (Papilionoideae)	<i>Vigna trilobata</i> (L.) Verdc.	Jangli math		

155	Fabaceae (Papilionoideae)	<i>Vigna vexillata</i> (L.) A. Rich. var. <i>stocksii</i> Benth. ex Baker	Halunda	E	
156	Fabaceae (Papilionoideae)	<i>Zornia diphylla</i> (L.) Pers.	Shevra		
157	Polygalaceae	<i>Polygala arvensis</i> Willd.	Phutani		
158	Polygalaceae	<i>Polygala erioptera</i> DC.	Nandi-bail		
159	Elaeagnaceae	<i>Elaeagnus conferta</i> Roxb.	Amboli		
160	Rhamnaceae	<i>Rhamnus virgata</i> var. <i>hirsuta</i> (Wight & Arn.) Y.L. Chen & P.K. Chou	Ragat-roda		
161	Rhamnaceae	<i>Ziziphus rugosa</i> Lam.	Toran		
162	Ulmaceae	<i>Holoptelea integrifolia</i> Planch.	Wavala		
163	Cannabaceae	<i>Trema orientalis</i> (L.) Bl.	Ghol		
164	Moraceae	<i>Artocarpus heterophyllus</i> Lam.	Phanas		
165	Moraceae	<i>Ficus arnottiana</i> (Miq.) Miq.	Payar		
166	Moraceae	<i>Ficus benghalensis</i> L.	Wad		
167	Moraceae	<i>Ficus exasperata</i> Vahl.	Bhui-umbar		
168	Moraceae	<i>Ficus hispida</i> L. f	Kala-umbar		
169	Moraceae	<i>Ficus microcarpa</i> L. f.	Nandruk		
170	Moraceae	<i>Ficus racemosa</i> L.	Umbar		
171	Moraceae	<i>Ficus religiosa</i> L.	Pimpal		
172	Urticaceae	<i>Boehmeria glomerulifera</i> Miq.	Aagya		
173	Urticaceae	<i>Boehmeria macrophylla</i> Hornem	Aagya		
174	Urticaceae	<i>Girardinia diversifolia</i> (Link) Friis	Bond Aagya		
175	Urticaceae	<i>Laportea interrupta</i> (L.) Chew.	Aagya		
176	Cucurbitaceae	<i>Corallocarpus epigaeus</i> (Rottl.) C.B.Cl.	Mungus kand		
177	Cucurbitaceae	<i>Cucumis melo</i> L.	Kadushenri		

178	Cucurbitaceae	<i>Cucumis setosus</i> Cong	Meki	E	
179	Cucurbitaceae	<i>Momordica dioica</i> Roxb. ex Willd.	Kartoli		
180	Cucurbitaceae	<i>Mukia madraspatana</i> (L.) Roem.	Chirati		
181	Cucurbitaceae	<i>Solena amplexicaulis</i> (Lam.) Gandhi	Gomati	E	
182	Cucurbitaceae	<i>Zehneria scabra</i> (L. f.) Sond.	Chirati		
183	Celastraceae	<i>Cassine glauca</i> (Rottb.) O. Ktze.	Bhutya		
184	Celastraceae	<i>Celastrus paniculatus</i> Willd.	Kanguni		
185	Celastraceae	<i>Gymnosporia senegalensis</i> (Lam.) Loes.	Yekal		
186	Celastraceae	<i>Maytenus rothiana</i> (Walp.) Lobreau- Collen	Yekal	E	
187	Oxalidaceae	<i>Biophytum sensitivum</i> (L.) DC.	Lajalu		
188	Oxalidaceae	<i>Oxalis corniculata</i> L	Ambushi		
189	Rhizophoraceae	<i>Carallia brachiata</i> (Lour.) Merr.	Phanshi		
190	Clusiaceae	<i>Garcinia indica</i> (Thouars) Choisy.	Kokam	E	
191	Malpighiaceae	<i>Aspidopterys cordata</i> (Heyne ex Wall.) A. Juss.	Bokadvel	E	
192	Malpighiaceae	<i>Hiptage benghalensis</i> (L.) Kurz	Yevata		
193	Salicaceae	<i>Casearia graveolens</i> Dalz.	Bokhada		
194	Salicaceae	<i>Casearia tomentosa</i> Roxb.	Bokhada		
195	Salicaceae	<i>Flacourtia indica</i> (Burm. f.) Merr.	Yenkhal		
196	Salicaceae	<i>Flacourtia latifolia</i> (Hook. f. & Thoms.) T. Cooke	Tambat	E	
197	Euphorbiaceae	<i>Acalypha brachystachya</i> Hornem	Khokali		
198	Euphorbiaceae	<i>Euphorbia antiquorum</i> L.	Sabar		
199	Euphorbiaceae	<i>Euphorbia fusiformis</i> Buch.-Ham. ex D.Don	Bhuiphod		
200	Euphorbiaceae	<i>Euphorbia rothiana</i> Spreng.	Dudhi		

201	Euphorbiaceae	<i>Euphorbia thymifolia</i> L.	Lahan-dudhi		LC
202	Euphorbiaceae	<i>Euphorbia tirucalli</i> L.	Sher		
203	Euphorbiaceae	<i>Falconeria insignis</i> Royle.	Hura		LC
204	Euphorbiaceae	<i>Homonoia riparia</i> Lour	Serni		
205	Euphorbiaceae	<i>Macaranga peltata</i> (Roxb.) Mull. Arg.	Chandada		
206	Euphorbiaceae	<i>Mallotus polycarpus</i> (Bth.) Kulju & Welzen	Petari		
207	Euphorbiaceae	<i>Mallotus philippensis</i> (Lam.) Mull. Arg.	Shendri		
208	Linaceae	<i>Linum mysurense</i> Heyne ex Bth.	Kadsur		
209	Phyllanthaceae	<i>Breynia retusa</i> (Dennst.) Alston	Kangli		
210	Phyllanthaceae	<i>Bridelia retusa</i> (L.) A. Juss.	Asana		
211	Phyllanthaceae	<i>Bridelia squamosa</i> (Lam.) Gehrm.	Asana		
212	Phyllanthaceae	<i>Flueggea virosa</i> (Roxb. ex Willd.) Royle	Petuni		
213	Phyllanthaceae	<i>Glochidion ellipticum</i> Wight	Bhoma		
214	Phyllanthaceae	<i>Phyllanthus emblica</i> L.	Avala		
215	Phyllanthaceae	<i>Phyllanthus fraternus</i> Webster	Dador		
216	Combretaceae	<i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guill. & Perr.	Dhawada		
217	Combretaceae	<i>Combretum albidum</i> G. Don	Piluki		
218	Combretaceae	<i>Getonia floribunda</i> Roxb.	Ukshi		
219	Combretaceae	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Behada		
220	Combretaceae	<i>Terminalia chebula</i> Retz.	Hirda		
221	Combretaceae	<i>Terminalia cuneata</i> Roth.	Arjun Sadada		
222	Combretaceae	<i>Terminalia elliptica</i> Willd.	Ain		LC
223	Lythraceae	<i>Lagerstroemia microcarpa</i> Wight	Nana	E	

224	Lythraceae	<i>Woodfordia fruticosa</i> (L.) Kurz	Dhayati		
225	Myrtaceae	<i>Syzygium cumini</i> (L.) Skeels	Jambhal		
226	Myrtaceae	<i>Syzygium zeylanicum</i> (L.) DC.	Jambuti		
227	Melastomataceae	<i>Memecylon umbellatum</i> Burm. f. var. <i>umbellatum</i> L. f.	Anjan		
228	Burseraceae	<i>Boswellia serrata</i> Roxb. ex Colebr.	Salai	E	
229	Burseraceae	<i>Canarium strictum</i> Roxb.	Ral-dhup		VU
230	Burseraceae	<i>Garuga pinnata</i> Roxb.	Kakkad		
231	Anacardiaceae	<i>Lannea coromandelica</i> (Houtt.) Merr.	Moya		DD
232	Anacardiaceae	<i>Mangifera indica</i> L.	Amba		
233	Anacardiaceae	<i>Rhus mysorensis</i> G. Don	Amboni		
234	Anacardiaceae	<i>Semecarpus anacardium</i> L. f. var. <i>anacardium</i>	Bibba		
235	Sapindaceae	<i>Allophylus cobbe</i> (L.) Raeusch.	Tipan		
236	Sapindaceae	<i>Allophylus rheedei</i> Radlk.	Tipan		
237	Sapindaceae	<i>Cardiospermum halicacabum</i> L.	Kapalphodi		LC
238	Sapindaceae	<i>Dimocarpus longan</i> Lour.	Umb		
239	Sapindaceae	<i>Lepisanthes tetraphylla</i> (Vahl) Radlk.	Lokhandi		
240	Sapindaceae	<i>Sapindus laurifolius</i> Vahl	Ritha		
241	Sapindaceae	<i>Schleichera oleosa</i> (Lour.) Merr.	Koshimb		
242	Rutaceae	<i>Aegle marmelos</i> (L.) Corr.	Bel		
243	Rutaceae	<i>Atalantia racemosa</i> Wight in Hook.	Makad limbu	E	VU
244	Rutaceae	<i>Chloroxylon swietenia</i> DC.	Halda		
245	Rutaceae	<i>Murraya koenigii</i> (L.) Spr.	Kadhipatta		
246	Rutaceae	<i>Murraya paniculata</i> (L.) Jack	Pandharpali		
247	Rutaceae	<i>Zanthoxylum rhetsa</i> (Roxb.) DC.	Tirphal		

248	Simaroubaceae	<i>Ailanthus excelsa</i> Roxb.	Maharukh		
249	Meliaceae	<i>Aglaia lawii</i> (Wight.) Sald.	Telya		
250	Meliaceae	<i>Azadirachta indica</i> A. Juss.	Neem		
251	Meliaceae	<i>Chukrasia tabularis</i> A. Juss.	Lal-devdar		
252	Meliaceae	<i>Soymida febrifuga</i> (Roxb.) A. Juss.	Rohan		
253	Meliaceae	<i>Toona hexandra</i> (Wall. ex Roxb.) <i>Roem. var. Hexandra</i>	Mahanim		
254	Malvaceae	<i>Abelmoschus manihot</i> (L.) Medik. ssp. <i>manihot</i>	Jagali bendi		
255	Malvaceae	<i>Abelmoschus manihot</i> (L.) Medik. ssp. <i>Tetraphyllus</i> (Roxb. ex Horn.) <i>Borss.</i>	Ran Bendi	E	
256	Malvaceae	<i>Abutilon indicum</i> (L.) Sweet. ssp. <i>indicum</i>	Madhu		
257	Malvaceae	<i>Bombax ceiba</i> L.	Kate-savar		
258	Malvaceae	<i>Bombax insigne</i> Wall.	Savar		
259	Malvaceae	<i>Corchorus capsularis</i> L.	Kaduchinch		
260	Malvaceae	<i>Corchorus trilocularis</i> L.	Kaduchinch		
261	Malvaceae	<i>Eriolaena quinquelocularis</i> (Wight & Arn.) Wight	Bothi	E	
262	Malvaceae	<i>Firmiana colorata</i> (Roxb.) R. Br.	Kaushil		
263	Malvaceae	<i>Grewia abutilifolia</i> Vent. ex A. Juss.	Chikna		
264	Malvaceae	<i>Grewia hirsuta</i> Vahl	Kirmid		
265	Malvaceae	<i>Grewia serrulata</i> DC.	Dhaman		
266	Malvaceae	<i>Grewia tiliifolia</i> Vahl	Dhaman		
267	Malvaceae	<i>Helicteres isora</i> L.	Murudseng		
268	Malvaceae	<i>Hibiscus caesius</i> Garcke	Ran-bhendi		
269	Malvaceae	<i>Kydia calycina</i> Roxb.	Varag		

270	Malvaceae	<i>Sida acuta</i> Burm. f.	Bala		
271	Malvaceae	<i>Sterculia guttata</i> Roxb. ex DC.	Kokeri		
272	Malvaceae	<i>Triumfetta rhomboidea</i> Jacq.	Thinjhira		
273	Malvaceae	<i>Urena lobata</i> L	Ranbhendi		
274	Thymelaeaceae	<i>Gnidia glauca</i> (Fresen.) Gilg	Rametha		
275	Capparaceae	<i>Cadaba fruticosa</i> (L.) Druce	Kalitakal		
276	Capparaceae	<i>Capparis grandis</i> L. f.	Pachunda		
277	Capparaceae	<i>Capparis decidua</i> (Forssk.) Edgew.	Nepti		
278	Capparaceae	<i>Capparis divaricata</i> Lam.	Pachunda		
279	Capparaceae	<i>Capparis rotundifolia</i> Rottl.	Kolisina		
280	Capparaceae	<i>Capparis spinosa</i> L.	Kabar		
281	Cleomaceae	<i>Cleome viscosa</i> L.	Pivli-Tilwan		
282	Cleomaceae	<i>Cleome gynandra</i> L.	Ghaneri		
283	Olacaceae	<i>Olax scandans</i> Roxb.	Sher		
284	Santalaceae	<i>Osyris lanceolata</i> Hochst. & Steud.	Popli		
285	Santalaceae	<i>Santalum album</i> L.	Chandan		
286	Santalaceae	<i>Viscum angulatum</i> Heyne ex DC.	Jaiunder		
287	Loranthaceae	<i>Dendrophthoe falcata</i> (L.f.) Ettingsh.	Bandgul		
288	Tamaricaceae	<i>Tamarix ericoides</i> Rottl. & Willd.	Sherni		
289	Plumbaginaceae	<i>Plumbago zeylanica</i> L.	Chitrak		
290	Polygonaceae	<i>Persicaria auriculata</i> (Meissn.) Dixit, Datt & G.P.Roy	Paral		
291	Polygonaceae	<i>Persicaria decipiens</i> (R. Br.) K. L. Wilson	Dhakta-sheral		
292	Polygonaceae	<i>Persicaria glabra</i> (Willd.) Gomez	Sheral		
293	Ancistrocladaceae	<i>Ancistrocladus heyneanus</i> Wall. ex Grah.	Kardal		

294	Amaranthaceae	<i>Achyranthes aspera</i> L. var. <i>aspera</i>	Aghada		
295	Amaranthaceae	<i>Amaranthus spinosus</i> L.	Katemath		
296	Amaranthaceae	<i>Celosia argentea</i> L. var. <i>argentea</i>	Kurdu		
297	Amaranthaceae	<i>Chenopodium album</i> L.	Chandanbatava		
298	Aizoaceae	<i>Trianthema portulacastrum</i> L.	Ghol		
299	Nyctaginaceae	<i>Boerhavia erecta</i> L.	Punarnawa		
300	Portulacaceae	<i>Portulaca oleracea</i> L.	Ghol		
301	Cactaceae	<i>Opuntia elatior</i> Mill.	Nivdung		
302	Balsaminaceae	<i>Impatiens balsamina</i> L. var. <i>balsamina</i>	Terda		
303	Lecythidaceae	<i>Careya arborea</i> Roxb.	Kumbh		
304	Sapotaceae	<i>Madhuca longifolia</i> (Koen.) Mc Bride. var. <i>longifolia</i>	Moha		
305	Sapotaceae	<i>Mimusops elengi</i> L.	Bakul		
306	Sapotaceae	<i>Xantolis tomentosa</i> (Roxb.) Raf.	Kumbal		
307	Ebenaceae	<i>Diospyros melanoxylon</i> Roxb.	Tembhurni		
308	Ebenaceae	<i>Diospyros montana</i> Roxb.	Kundal		
309	Primulaceae	<i>Embelia basaal</i> (Roem. & Schult) A. DC	Vavdinga		
310	Primulaceae	<i>Maesa indica</i> (Roxb.) A. DC	Atki		
311	Symplocaceae	<i>Symplocos racemosa</i> Roxb.	Lenda		
312	Icacinaceae	<i>Nothapodytes nimmoniana</i> (J. Grah.) Mabb.	Narakya		
313	Rubiaceae	<i>Catunaregam spinosa</i> (Thunb.) Tirveng.	Gel		
314	Rubiaceae	<i>Gardenia gummifera</i> L.f.	Dikemali	E	
315	Rubiaceae	<i>Gardenia resinifera</i> Roth	Dikemali		
316	Rubiaceae	<i>Haldina cordifolia</i> (Roxb.) Ridsd.	Haldu		

317	Rubiaceae	<i>Hedyotis corymbosa</i> (L.) Lam.	Pitapapada		
318	Rubiaceae	<i>Hedyotis herbacea</i> L.	Paripath		
319	Rubiaceae	<i>Hymenodictyon obovatum</i> Wall.	Kadavu	E	
320	Rubiaceae	<i>Ixora brachiata</i> Roxb.	Lokhandi	E	
321	Rubiaceae	<i>Ixora pavetta</i> Andr.	Lokandi		
322	Rubiaceae	<i>Meyna laxiflora</i> Robyns	Alu		
323	Rubiaceae	<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Kalamba		
324	Rubiaceae	<i>Morinda pubescens</i> J. E. Sm.	Bartondi		
325	Rubiaceae	<i>Pavetta crassicaulis</i> Bremek.	Asavel	E	
326	Rubiaceae	<i>Psydrax umbellata</i> (Wight) Bridson	Tupa		
327	Rubiaceae	<i>Rubia cordifolia</i> L.	Manjista		
328	Rubiaceae	<i>Spermadictyon suaveolens</i> Roxb.	Narkya		
329	Gentianaceae	<i>Centaurium meyeri</i> (Bunge) Druce	Luntak		
330	Gentianaceae	<i>Enicostema axillare</i> (Lam.) Raynal	Chota-Karait		
331	Apocynaceae (Apocynoideae)	<i>Anodendron manubriatum</i> Merr.	Lokhandi		
332	Apocynaceae (Apocynoideae)	<i>Holarrhena pubescens</i> (Buch.-Ham.) Wall. ex G. Don	Pandhara kuda		
333	Apocynaceae (Apocynoideae)	<i>Nerium indicum</i> Mill.	Kanher		
334	Apocynaceae (Apocynoideae)	<i>Wrightia tinctoria</i> R. Br. ssp. <i>tinctoria</i>	Kala kuda		
335	Apocynaceae (Asclepiadoideae)	<i>Asclepias curassavica</i> L.	Kurki		
336	Apocynaceae (Asclepiadoideae)	<i>Caralluma adscendens</i> (Roxb.) R. Br. var. <i>Fimbriata</i> (Wall.) Grav. & <i>Mayur</i>	Shindal makadi		
337	Apocynaceae (Asclepiadoideae)	<i>Ceropegia bulbosa</i> Roxb. var. <i>bulbosa</i>	Hamid		

338	Apocynaceae (Asclepiadoideae)	<i>Ceropegia bulbosa</i> Roxb. var. <i>lushii</i> (Grah.) Hook. f.	Hamid		
339	Apocynaceae (Asclepiadoideae)	<i>Ceropegia hirsuta</i> Wight & Arn.	Hamid		
340	Apocynaceae (Asclepiadoideae)	<i>Ceropegia media</i> (Huber) Ansari	Gavati-tanachi kharpudi	E	
341	Apocynaceae (Asclepiadoideae)	<i>Ceropegia sahyadrica</i> Ansari & <i>Kulkarni</i>	Kharpudi	E	
342	Apocynaceae (Asclepiadoideae)	<i>Ceropegia vincaefolia</i> Hook.	Kharpudi	E	
343	Apocynaceae (Asclepiadoideae)	<i>Cosmostigma racemosum</i> (Roxb.) Wight	Shendvel		
344	Apocynaceae (Asclepiadoideae)	<i>Frerea indica</i> Dalz.	Shindal-Makadi	E	
345	Apocynaceae (Asclepiadoideae)	<i>Gymnema sylvestre</i> (Retz.) R.Br. ex <i>Schultes</i>	Bedkicha-pala		
346	Apocynaceae (Asclepiadoideae)	<i>Hoya wightii</i> Hook. f.	Ambri		
347	Apocynaceae (Asclepiadoideae)	<i>Leptadenia reticulata</i> (Retz.) Wight & <i>Arn.</i>	Hirandodi		
348	Apocynaceae (Asclepiadoideae)	<i>Seshagiria sahyadrica</i> Ansari & Hem.	Khobar-doda	E	
349	Apocynaceae (Asclepiadoideae)	<i>Tylophora dalzellii</i> Hook. f.	Kavali	E	
350	Apocynaceae (Asclepiadoideae)	<i>Tylophora indica</i> (Burm. f.) Merr.	Kavali		
351	Apocynaceae (Asclepiadoideae)	<i>Wattakaka volubilis</i> (L. f.) Stapf.	Tan		
352	Apocynaceae (Periplocoideae)	<i>Cryptolepis buchanani</i> Roem. & <i>Schult.</i>	Kavali		
353	Apocynaceae (Periplocoideae)	<i>Cryptostegia grandiflora</i> R. Br.	Kavali		
354	Apocynaceae (Periplocoideae)	<i>Hemidesmus indicus</i> (L.) Schult. var. <i>indicus</i>	Anantmul		

355	Apocynaceae (Rauvolfioideae)	<i>Carissa spinarum</i> L.	Karvand		
356	Boraginaceae	<i>Cordia dichotoma</i> Forst. f.	Bhokar		
357	Boraginaceae	<i>Cordia gharaf</i> (Forssk.) Ehrenb. & Asch.	Gondani		
358	Boraginaceae	<i>Cordia macleodii</i> (Griff.) Hook. f. & Thoms.	Dahivan		
359	Boraginaceae	<i>Ehretia laevis</i> Roxb.	Datrangi		
360	Boraginaceae	<i>Paracaryopsis coelestina</i> (Lindl.) R. Mill.	Nisurdi	E	
361	Boraginaceae	<i>Paracaryopsis malabarica</i> (C.B.Cl.) R. Mill.	Nisurdi	E	
362	Boraginaceae	<i>Rotula aquatica</i> Lour.	Datrangi		
363	Boraginaceae	<i>Trichodesma indicum</i> (L.) Lehm.	Chota kaipa		
364	Convolvulaceae	<i>Argyreia cuneata</i> (Willd.) Ker-Gawl.	Maha-lungi	E	
365	Convolvulaceae	<i>Argyreia sericea</i> Dalz. & Gibs.	Mhasvel	E	
366	Convolvulaceae	<i>Argyreia strigosa</i> (Roth.) Roberty	Mhasvel		
367	Convolvulaceae	<i>Cuscuta campestris</i> Yuncker	Ambri		
368	Convolvulaceae	<i>Cuscuta chinensis</i> Lam. var.	Ambri		
		<i>chinensis</i>			
369	Convolvulaceae	<i>Cuscuta reflexa</i> Roxb.	Ambri		
370	Convolvulaceae	<i>Evolvulus alsinoides</i> (L.) L.	Vishnukranta		
371	Convolvulaceae	<i>Ipomoea turbinata</i> Lag	Garvel		
372	Convolvulaceae	<i>Ipomoea cairica</i> (L.) Sweet.	Garvel		
373	Convolvulaceae	<i>Ipomoea campanulata</i> L.	Tambarvel		
374	Convolvulaceae	<i>Ipomoea hederifolia</i> L.	Ganeshvel		
375	Convolvulaceae	<i>Ipomoea obscura</i> (L.) Ker-Gawl. forma	Pungali		

376	Convolvulaceae	<i>Ipomoea quamoclit L.</i>	Ganesh pushpa		
377	Convolvulaceae	<i>Merremia gangetica (L.) Cufod.</i>	Undirkani		
378	Convolvulaceae	<i>Porana racemosa Roxb.</i>	Bhauri		
379	Convolvulaceae	<i>Rivea hypocrateriformis (Desr.) Choisy</i>	Phangvel		
380	Solanaceae	<i>Datura inoxia Mill.</i>	Dhotra		
381	Solanaceae	<i>Physalis minima L.</i>	Ran popati		
382	Solanaceae	<i>Solanum anguivi Lam.</i>	Bhui-ringni		
383	Solanaceae	<i>Solanum virginianum L.</i>	Kate-ringni		
384	Solanaceae	<i>Withania somnifera (L.) Dunal</i>	Ashwagandha		
385	Oleaceae	<i>Jasminum malabaricum Wight</i>	Kusar	E	
386	Oleaceae	<i>Olea dioica Roxb.</i>	Karap		
387	Oleaceae	<i>Schrebera swietenoides Roxb.</i>	Makhiri		
388	Plantaginaceae	<i>Bacopa monnieri (L.) Wettst.</i>	Nira-bramhi		
389	Martyniaceae	<i>Martynia annua L.</i>	Vaghnakhi		
390	Pedaliaceae	<i>Sesamum orientale L.</i>	RantiTil		
391	Acanthaceae (Acanthoideae)	<i>Andrographis paniculata (Burm. f.) Wall. Ex Nees</i>	Kalmeg		
392	Acanthaceae (Acanthoideae)	<i>Eranthemum roseum (Vahl) R. Br.</i>	Dasamuli	E	
393	Acanthaceae (Acanthoideae)	<i>Haplanthodes verticillatus (Roxb.) R.B. Majumdar</i>	Jakara	E	
394	Acanthaceae (Acanthoideae)	<i>Hygrophila auriculata (Schumach.) Heine</i>	Talimkhana		
395	Acanthaceae (Acanthoideae)	<i>Hygrophila serpyllum T. And. var. serpyllum</i>	Rantewan	E	
396	Acanthaceae (Acanthoideae)	<i>Indoneesiella echioides (L.) Sreem.</i>	Pandhrafeda		
397	Acanthaceae	<i>Lepidagathis cristata Willd.</i>	Bhuigend		

	(Acanthoideae)				
398	Acanthaceae (Acanthoideae)	<i>Lepidagathis cuspidata</i> Nees	Bhuikata		
399	Acanthaceae (Acanthoideae)	<i>Nilgirianthus reticulatus</i> (Stapf) <i>Bremek.</i>	Karvi	E	
400	Acanthaceae (Acanthoideae)	<i>Rhinacanthus nasutus</i> (L.) Kurz.	Gajkarni		
401	Acanthaceae (Acanthoideae)	<i>Ruellia patula</i> Jacq.	Katmora		
402	Acanthaceae (Acanthoideae)	<i>Strobilanthes callosa</i> Nees	Karvi	E	
403	Bignoniaceae	<i>Dolichandrone falcata</i> (Wall. ex DC.) <i>Seem</i>	Medsing	E	
404	Bignoniaceae	<i>Heterophragma quadriloculare</i> (Roxb.) K. Schum.	Varas	E	
405	Bignoniaceae	<i>Oroxylum indicum</i> (L.) Kurz.	Tetu		
406	Bignoniaceae	<i>Radermachera xylocarpa</i> (Roxb.) <i>Roxb. ex Schum.</i>	Kharsingh	E	
407	Lentibulariaceae	<i>Phyla nodiflora</i> (L.) Greene	Gourkhumundi		
408	Lamiaceae	<i>Anisomeles heyneana</i> Bth.	Chandhara	E	
409	Lamiaceae	<i>Anisomeles indica</i> (L.) O. Ktze.	Gopali		
410	Lamiaceae	<i>Colebrookea oppositifolia</i> Sm.	Bhaman		
411	Lamiaceae	<i>Gmelina arborea</i> Roxb.	Shivan		
412	Lamiaceae	<i>Leonotis nepetiifolia</i> (L.) R. Br.	Dipmal		
413	Lamiaceae	<i>Leucas ciliata</i> Bth.	Bhurandi		
414	Lamiaceae	<i>Leucas stelligera</i> Wall. ex Bth.	Burandi		
415	Lamiaceae	<i>Ocimum gratissimum</i> L.	Ram-tulas		
416	Lamiaceae	<i>Ocimum tenuiflorum</i> L.	Kali-tulas		
417	Lamiaceae	<i>Plectranthus mollis</i> (Ait.) Spr.	Mainmul		

418	Lamiaceae	<i>Rothea serrata</i> (L.) Steane & Mabb.	Bharang		
419	Lamiaceae	<i>Tectona grandis</i> L. f	Sag		
420	Lamiaceae	<i>Vitex negundo</i> L. var. <i>negundo</i>	Nirgudi		
421	Lamiaceae	<i>Vitex trifolia</i> L.	Nirgudi		
422	Lamiaceae	<i>Volkameria inermis</i> L.	Takala		
423	Asteraceae	<i>Acanthospermum hispidum</i> DC.	Chubukata		
424	Asteraceae	<i>Ageratum conyzoides</i> L.	Bhurandi		
425	Asteraceae	<i>Artemisia japonica</i> Thunb.	Davana		
426	Asteraceae	<i>Artemisia nilagirica</i> (C.B. Cl.) Pamp.	Dhor-davana		
427	Asteraceae	<i>Blumea eriantha</i> DC.	Buradi	E	
428	Asteraceae	<i>Blumea malcolmii</i> (C.B.Cl.) Hook. f.	Buradi	E	
429	Asteraceae	<i>Eclipta prostrata</i> (L.) L.	Maka		
430	Asteraceae	<i>Goniocaulon indicum</i> (Klein ex Willd.) C.B.Cl.	Kadkusumba	E	
431	Asteraceae	<i>Kleinia grandiflora</i> (Wall ex DC.) N. Rani	Vandar roti		
432	Asteraceae	<i>Lagasca mollis</i> Cav.	Tharvad		
433	Asteraceae	<i>Lamprachaenium microcephalum</i> (Dalz.) Bth.	Bhurandi	E	
434	Asteraceae	<i>Nanothamnus sericeus</i> T. Thoms.	Burand	E	
435	Asteraceae	<i>Pentanema indicum</i> (L.) Ling	Sonkadi		
436	Asteraceae	<i>Senecio bombayensis</i> Balakr.	Sonaki	E	
437	Asteraceae	<i>Senecio dalzellii</i> C.B.Cl.	Sonaki	E	
438	Asteraceae	<i>Senecio edgeworthii</i> Hook. f.	Sonaki	E	
439	Asteraceae	<i>Senecio hewrensis</i> (Dalz.) Hook. f.	Sonaki	E	LC
440	Asteraceae	<i>Siegesbeckia orientalis</i> L.	Katampu		
441	Asteraceae	<i>Sonchus oleraceus</i> L.	Mhatari		

442	Asteraceae	<i>Sphaeranthus indicus</i> L.	Gorakhamundi		
443	Asteraceae	<i>Spilanthus calva</i> DC.	Akkalkara		
444	Asteraceae	<i>Spilanthus paniculata</i> Wall. ex DC.	Akkalkara		
445	Asteraceae	<i>Tricholepis amplexicaulis</i> C.B.Cl.	Dahan	E	
446	Asteraceae	<i>Tricholepis radicans</i> (Roxb.) DC.	Dahan	E	
447	Asteraceae	<i>Tridax procumbens</i> L.	Ekdandi		
448	Asteraceae	<i>Vernonia anthelmintica</i> (L.) Willd.	Kale-jire		
449	Asteraceae	<i>Vernonia cinerea</i> (L.) Less.	Bhurandi		
450	Asteraceae	<i>Vernonia divergens</i> (Roxb.) Edgew.	Bhurandi		
451	Pittosporaceae	<i>Pittosporum wightii</i> A. K. Mukherjee	Yekadi		
452	Apiaceae	<i>Centella asiatica</i> (L.) Urban	Brahmi		
453	Apiaceae	<i>Heracleum grande</i> (Dalz. & Gibs.) P. K. Mukh.	Baphali	E	
454	Apiaceae	<i>Pimpinella adscendens</i> Dalz.	Gajra	E	
455	Apiaceae	<i>Trachyspermum ammi</i> (L.) Sprague	Ranova		

Endemism: E – Endemic

IUCN Status: VU – Vulnerable, LC -Least Concerned, DD – Data Deficit

IV – LIST OF FAUNA (Animals, Birds, Reptiles, etc.)

Sl. No.	Scientific name	Common name
MAMMALS		
1	<i>Panthera pardus</i>	Panther
2	<i>Hyaena hyaena</i>	Striped Hyaena
3	<i>Canis aureus</i>	Jackal
4	<i>Vulpes bengalensis</i>	Khokad
5	<i>Felis chaus</i>	Jangle cat
6	<i>Canis lupus</i>	Wolf
7	<i>Semnopithecus entellus</i>	Common Langur
8	<i>Tetracerus quadricornis</i>	Chowsingha
9	<i>Muntiacus muntjak</i>	Barking deer
10	<i>Lepus nigricollis</i>	Sasa
11	<i>Hystrix indica</i>	Salu
12	<i>Funambulus palmarum</i>	Khar
13	<i>Cervus unicolor</i>	Sambar
14	<i>Canis lupus</i>	Landga
15	<i>Harpester edwardsi</i>	Mongoose
16	<i>Macaca mulatta</i>	Monkey
REPTILES		
1	<i>Naja naja naja</i>	Indian cobra
2	<i>Varanus inelicus</i>	Dhaman
3	<i>Bungurus caeruleus</i>	Common Krait
4	<i>Vipera russelli</i>	Russel viper
5	<i>Chaemeleon vulgatis</i>	Chamaeleon
6	<i>Varanus bengalensis</i>	Ghorpad
BUTTERFLIES		
1	<i>Castalius rosimon</i>	Common Pierrot
2	<i>Pareronia hippie</i>	Common Wanderer

3	<i>Neptis hylas</i>	Sailor
4	<i>Sarangasa dasahara</i>	Common small Flat
5	<i>Junonia aflites</i>	Grey Pancy
6	<i>Taica da nyseus</i>	Red Pierrot
7	<i>Euthalia aconthea</i>	Barron
8	<i>Junonia lemonias</i>	Lemon Pancy

BIRDS

Sl. No.	Scientific name	Common name
1	<i>Tachybaptus ruficollis</i>	Little Grebe
2	<i>Phalacrocorax carbo</i>	Great Cormorant
3	<i>Phalacrocorax niger</i>	Little Cormorant
4	<i>Ardea cinerea</i>	Grey Heron
5	<i>Ardea purpurea</i>	Purple Heron
6	<i>Egretta alba</i>	Large Egret
7	<i>Ardeola grayii</i>	Indian Pond Heron
8	<i>Bubulcus coromandus</i>	Cattle Egret
9	<i>Egretta intermedia</i>	Intermediate Egret
10	<i>Egretta garzetta</i>	Little Egret
11	<i>Egretta gularis</i>	Reef Heron
12	<i>Nycticorax nycticorax</i>	Black-crowned Night Heron
13	<i>Mycteria leucocephala</i>	Painted Stork
14	<i>Anastomus oscitans</i>	Open-bill Stork
15	<i>Ciconia episcopus</i>	White-necked Stork
16	<i>Threskiornis melanocephalus</i>	Black-headed Ibis/White Ibis
17	<i>Pseudibis papillosa</i>	Indian Black Ibis
18	<i>Plegadis falcinellus</i>	Glossy Ibis
19	<i>Platalea leucorodia</i>	Eurasian Spoonbill
20	<i>Anser indicus</i>	Barheaded Goose
21	<i>Phoenicopterus ruber</i>	Greater Flamingo
22	<i>Tadorna ferruginea</i>	Brahmini Duck (Ruddy Shelduck)
23	<i>Anas acuta</i>	Northern Pintail
24	<i>Sarkidiornis melanotus</i>	Nukta (Comb Duck)
25	<i>Anas crecca</i>	Common Teal
26	<i>Anas poecilorhyncha</i>	Spot-billed Duck
27	<i>Anas strepera</i>	Gadwall
28	<i>Anas querquedula</i>	Garganey
29	<i>Anas clypeata</i>	Northern Shoveller

30	<i>Aythya ferina</i>	Common Poachard
31	<i>Aythya fuligula</i>	Tufted Duck/Poachard
32	<i>Nattapus coronandelianus</i>	Cotton Teal
33	<i>Elanus caeruleus</i>	Black-shouldered Kite
34	<i>Pernis ptilorhyncus</i>	Oriental Honey Buzzard
35	<i>Milvus migrans</i>	Common Pariah Kite
36	<i>Milvus lineatus</i>	Black-eared Kite
37	<i>Haliastrus indius</i>	Brahmini Kite
38	<i>Accipiter vigatus</i>	Basera Sparrowhawk
39	<i>Accipter badius</i>	Shikra
40	<i>Ictinactus malayensis</i>	Black Eagle
41	<i>Hieraaetus fasciatus</i>	Bonellie's Eagle
42	<i>Butastur teesa</i>	White-eyed Buzzard
43	<i>Spizaetus limneatus</i>	Changeable Hawk Eagle
44	<i>Spilornis cheela</i>	Crested Serpent Eagle
45	<i>Falco tinnunculvs</i>	Common Kestral
46	<i>Francolinus pictus</i>	Painted Francolin
47	<i>Francolinus pondicerianus</i>	Grey Francolin
48	<i>Perdica asiatica</i>	Jungle Bush Quail
49	<i>Pavo cristatus</i>	Indian Peafowl
50	<i>Turnix suscitator</i>	Barred Button Quail
51	<i>Grus virgo</i>	Demoiselle Crane
52	<i>Porzana akool</i>	Brown Crake
53	<i>Amaurornis phoenicura</i>	White-breasted Waterhen
54	<i>Porphyrio poliocephalus</i>	Purple Swamphen
55	<i>Fulica atra</i>	Eurasian Coot
56	<i>Hydrophasinus chirurgus</i>	Pheasant-tailed Jacana
57	<i>Charadrius mongolus</i>	Lasser Sand Plover
58	<i>Vanellus malabaricus</i>	Yellow-wattle Lapwing
59	<i>Chadrius dubius</i>	Little Ringed Plover
60	<i>Venellus indicus</i>	Red-wattled Lapwing
61	<i>Limosa limosa</i>	Western Black-tailed Godwit
62	<i>Limosa lapponica</i>	Bar tailed Godwit
63	<i>Tringa nubularis</i>	Common Greenshank
64	<i>Philomachus pugnax</i>	Ruff
65	<i>Gallinago gallingo</i>	Common Snipe
66	<i>Rostratula benghalensis</i>	Painted Snipe
67	<i>Tringa glareola</i>	Wood Sandpiper
68	<i>Actitis hypoleucoa</i>	Common Sandpiper
69	<i>Himantopus himantopus</i>	Black-winged Stilt
70	<i>Glareols praticola</i>	Collared Pratincole

71	<i>Glareola lactea</i>	Small Pratincole
72	<i>Larus brunnicephalus</i>	Brown-headed Gull
73	<i>Chlidonias hybrida</i>	Indian Whiskered Tern
74	<i>Sterna aurantia</i>	River Tern
75	<i>Treron Phoenixopterus</i>	Yellow-footed Green Pigeon
76	<i>Columba livia</i>	Blue Rock Pigeon
77	<i>Streptopelia decacoccyto</i>	Eurasian Collared (Ring) Dove
78	<i>Streptopelia chinensis</i>	Spotted Dove
79	<i>Streptopelia senegalensis</i>	Little Brown Dove
80	<i>Psittacula eupatria</i>	Alexandrine Parakeet
81	<i>Centropus sinensis</i>	Greater Coucal
82	<i>Psittacula krameri</i>	Rose-ringed Parakeet
83	<i>Psittacula cyanocephala</i>	Plum-headed Parakeet
84	<i>Clamator jacobinus</i>	Pied Crested Cuckoo
85	<i>Hirococyx varius</i>	Common Hawk Cuckoo
86	<i>Eudynamys scolopaceus</i>	Asian Koel
87	<i>Cacomantis passerinus</i>	Gray-bellied Cuckoo
88	<i>Taccocua leschenaultii</i>	Sirkeer Malkoha
89	<i>Tyto alba</i>	Barn Owl
90	<i>Athene brama</i>	Spotted Owlet
91	<i>Apus affinis</i>	House Swift
92	<i>Ceryle rudis</i>	Pied Kingfisher
93	<i>Halcyon smyrnensis</i>	White-throated Kingfisher
94	<i>Alcedo atthis</i>	Small Blue Kingfisher
95	<i>Merops orientalis</i>	Little Green Bee Eater
96	<i>Caprimulgus asiaticus</i>	Indian Little Nightjar
97	<i>Upupa epops</i>	Common Hoopoe
98	<i>Ocyrceros birostris</i>	Indian Grey Hornbill
99	<i>Coracias benghalensis</i>	Indian Roller
100	<i>Magalaima viridis</i>	White-checked Barbet
101	<i>Magalaima haemacephala</i>	Coppersmith
102	<i>Jynx torquilla</i>	Eurasian Wryneck
103	<i>Dendrocopos mahrattensis</i>	Yellow-fronted Wood Pecker
104	<i>Mirafra erythroptera</i>	Indian Bush Lark
105	<i>Eremopterix griseus</i>	Black-bellied Finch Lark
106	<i>Ammomanes phoenicura</i>	Rufous-tailed Finch Lark
107	<i>Ptyonoprogne concolor</i>	Dusky Crag Martin
108	<i>Galerida malabarica</i>	Crested Lark/Malabar Lark
109	<i>Hirundo smithii</i>	Wire-tailed Swallow
110	<i>Hirundo rustica</i>	Barn Swallow
111	<i>Hirundo daurica</i>	Redrumped Swallow

112	<i>Lanius meridionalis</i>	Southern Grey Shrike
113	<i>Lanius vittatus</i>	Bay-backed Shrike
114	<i>Lanius schach</i>	Long tailed Shrike (Rufouse bayback)
115	<i>Oriolus oriolus</i>	European Golden Oriole
116	<i>Oriolus xanthornus</i>	Black Hooded Oriole
117	<i>Dicrurus macrocercus</i>	Black drongo
118	<i>Dicrurus leucophaeus</i>	Ashy drongo
119	<i>Temenuchus pagodarum</i>	Brahmini Maina
120	<i>Sturnus roseus</i>	Rosy Sterling
121	<i>Dicrurus caerulescens</i>	White-bellied drongo
122	<i>Acridotheres tristis</i>	Common Myna
123	<i>Acridotheres ginginianus</i>	Bank Myna
124	<i>Acridotheres fuscus</i>	Jungle Myna
125	<i>Corvus splendens</i>	House Crow
126	<i>Corvus culminatus</i>	Indian Jungle Crow
127	<i>Tephrodornis pondicerianus</i>	Common Woodshrike
128	<i>Coracina melanoptera</i>	Black-headed Cuckoo Shrike
129	<i>Pericrocotus cinnamameus</i>	Small Minivet
130	<i>Pericrocotus flammeus</i>	Orange Minivet
131	<i>Pericrocotus erythropygius</i>	White-bellied Minivet
132	<i>Dendrocitta vagabunda</i>	Rufous Treepie
133	<i>Aegithina tiphia</i>	Common Iora
134	<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul
135	<i>Chloropsis aurifrons</i>	Gold-fronted leaf Bird
136	<i>Pycnonotus cafer</i>	Red-vented Bulbul
137	<i>Iola indica</i>	Yellow-browed Bulbul
138	<i>Hypsipetes leucocephalus</i>	Black Bulbul
139	<i>Pomatorhinus horsfieldii</i>	Indian Scimitar Babbler
140	<i>Chrysomma sinense</i>	Yellow-eyed Babbler
141	<i>Turdoides caudata</i>	Common Babbler
142	<i>Turdoides malcolmi</i>	Large Grey Babbler
143	<i>Turdoides subrufa</i>	Indian Rufous Babbler
144	<i>Turdoides striata</i>	Jungle Babbler
145	<i>Muscicapada aurica</i>	Asian Brown Flycatcher
146	<i>Ficedula albicilla</i>	Red-throated Flycatcher
147	<i>Ficedula superciliaris</i>	Ultramarine Flycatcher
148	<i>Ficedula parva</i>	Red-breasted Flycatcher
149	<i>Eumyias thalassinus</i>	Verditer Flycatcher
150	<i>Cyornis pallipes</i>	White-bellied Blue Flycatcher
151	<i>Cyornis tickelliae</i>	Tickell's Blue Flycatcher
152	<i>Rhipidura albicollis(?)</i>	White-spotted Fantail

153	<i>Rhipidura albogularis</i>	White-throated Fantail
154	<i>Terpsiphone paradisi</i>	Asian Paradise Flycatcher
155	<i>Hypothymis azurea</i>	Black-naped Blue flycatcher
156	<i>Cisticola juncidis</i>	Fantailed warbler
157	<i>Prinia hodgsonii</i>	Gray-breasted Prinia
158	<i>Prinia buchanania</i>	Rufous-fronted Prinia
159	<i>Prinia inornata</i>	Plain Prinia
160	<i>Prinia socialis</i>	Ashy Prinia
161	<i>Prinia syivatica</i>	Jungle Prinia
162	<i>Acrocephalus dumetorum</i>	Blyth's Reed Warbler
163	<i>Orthotomussutorius</i>	Common Tailorbird
164	<i>Phylloscopusgriseolus</i>	Sulphur-belled Warbler
165	<i>Hippolais caligate</i>	Booted Warbler
166	<i>Sylvia curruca</i>	Common Lesser Whitethroat
167	<i>Sylvia communis</i>	Greater Whitethroat
168	<i>Phylloscopus tytleri</i>	Tytler's Leaf Warbler
169	<i>Phylloscop0us fuscatus</i>	Dusky Wabler
170	<i>Phylloscopus affinis</i>	Tickell's Leaf Warbler
171	<i>Phylloscopus trochiloides</i>	Greenish Warbler
172	<i>Luscinia svecica</i>	Bluethroat
173	<i>Oenanthe isbellina</i>	Isabellion wheatear
174	<i>Copsychus saularis</i>	Oriental Magpie Robin
175	<i>Phoenicurus ochruros</i>	Black Redstart
176	<i>Zoothera citrina</i>	Orange-headed Thrush
177	<i>Saxicola torquatus</i>	Common Stonechat
178	<i>Saxicola caprata</i>	Pied Bushchat
179	<i>Saxicoloides fulicatus</i>	Indian Robin
180	<i>Monticola solitarius</i>	Blue Rock Thrush
181	<i>Myiophonus horsfieldii</i>	Malabar Whistling-thrush
182	<i>Turdus merula</i>	Common Blackbird
183	<i>Parus major</i>	Great Tit
184	<i>Athus similis</i>	Long-billed pipit
185	<i>Anthus hodgsoni</i>	Olive-backed Pipit
186	<i>Anthus trivialis</i>	Tree Pipit
187	<i>Anthus rufulus</i>	Paddy-field Pipit
188	<i>Motacilla flava</i>	Western Yellow Wagtail
189	<i>Motocilla lmalanogrisea</i>	Black-headed Wagtail
190	<i>Motacilla cinerea</i>	Grey Wagtail
191	<i>Motacilla alba</i>	White Wagtail
192	<i>Motacilla moderaspatensis</i>	White-browed Wagtail
193	<i>Leptocoma zeylonica</i>	Purple-rumped Sunbird

194	<i>Cinnyris asiaticus</i>	Purple Sunbird
195	<i>Leptocoma minima</i>	Small Sunbird
196	<i>Petronia xanthocollis</i>	Yellow-throated Sparrow
197	<i>Zosterops palpebrosus</i>	Oriental White-eye
198	<i>Passer domesticus</i>	House Sparrow
199	<i>Ploceus philippinus</i>	Baya Weaver
200	<i>Amandava amandava</i>	Red Avadant/ Munia
201	<i>Dicaeum erythrorhynchos</i>	Pale-billed Flower-packer
202	<i>Euodice malabarica</i>	Indian Silverbill (White throated Munia)
203	<i>Lonchura punctulata</i>	Scally-breasted Munia
204	<i>Carpodacus erythrinus</i>	Common Rose Finch
205	<i>Emberiza buchanania</i>	Grey-necked bunting
206	<i>Melophus lathami</i>	Crested Bunting

V. OTHERS

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

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

CHAPTER-1

THE TRACT DEALT WITH

1.1 NAME AND SITUATION

1.1.1 Name of the Division

The area of Pune Forest division covered under the current working plan lie between $73^{\circ} 18.5''$ and $75^{\circ} 08''$ East longitudes and between $17^{\circ} 53''$ and $18^{\circ} 58''$ North latitudes. The total area of Pune Division is 7,831 km² area dealt with under this plan comprises 775.85 km² of the Reserved Forest, Protected Forests, unclassified forest area, etc. and reserve forest land vested with revenue department. The forest area spread over 6 talukas (Mulshi, Wadgaon Maval, Haveli, Daund, Baramati & Indapur) of Pune district and 8 forest ranges viz., Shirola, Vadgaon Maval, Paud, Bhamburda, Pune, Daund, Baramati and Indapur. It constitutes 8.44 % of the geographic area of the division.

Brief History:

Pune probably derived its name from the word 'Punya' or 'auspicious'. According to Hindu beliefs, the confluence or sangam of two rivers is auspicious. Since Pune is located at the confluence of the Mula and Mutha rivers, it is considered a Punya Vishaya (auspicious region). Some of its earlier names were Punaka wadi, Punaka Desh and Punya nagari. Although very little is known about Pune in prehistoric times, the earliest mention of the city was made in records of the Satvahana dynasty (235BC- 225AD), which set up its capital in Junnar, close to Pune. There are also references to Pune in sacred texts like Puranas (400 AD).

The Rashtrakutas were one of the earliest rulers of Pune. They were great patrons of art and architecture and built many famous structures in the region, including the Ellora temple near Aurangabad and the Pataleshwar caves in Pune. Later Pune came under the rule of the Yadava dynasty followed by the Mughals. The history of the city is very closely related to the rise of the Maratha Empire from the 17th–18th century. In the mid-seventeenth century, the Marathas emerged as a supreme power under the command of Shivaji. Founder of the mighty Maratha Empire, Shivaji spent his early childhood in Pune. During the 18th century, Pune became the political centre of the Indian Subcontinent; as the seat of the Peshwas, who were the rulers during the Maratha Regime. After the fall of Peshwa rule in 1818, the new British rulers made the city one of their major military bases.

Prior to the British takeover, the city was confined to the eastern bank of the Mutha River. Since then, the city has grown on both sides of the river. In the 19th and early 20th century, Pune was

considered by the British as the centre of political unrest against their rule. India's first indigenously run girls' school was started in Pune by Savitribai Phule and Fatima Sheikh.

PUNE is the 9th most populous city in India and the second-largest in the state of Maharashtra, after the state capital Mumbai. It has been ranked as "the most liveable city in India" several times. Pune district has two municipal corporation's – Pune Municipal Corporation & Pimpri Chinchwad Municipal Corporation. Along with the municipal corporation limits there are three cantonment areas of Camp, Khadki and Dehu Road. Pune forms the urban core of the eponymous Pune Metropolitan Region.

The post-independence period has also seen further growth in the higher education sector in the city. The post-independence era also saw Pune emerging as a major manufacturing center. The city has emerged as a major educational hub in recent decades, with nearly half of the total number of international students in the country studying in Pune. Research institutes of information technology, education, management and training attract students and professionals from India and overseas. It is known as the Oxford of the East with the presence of a wide range of educational institutions. Pune is widely regarded as the second major "IT Hub of India" and the top "Automobile and Manufacturing Hub of India". The Panshet flood of 1961 resulted in a huge loss of housing on the riverbank and spurred the growth of new suburbs.

1.1.2 Geographical Location

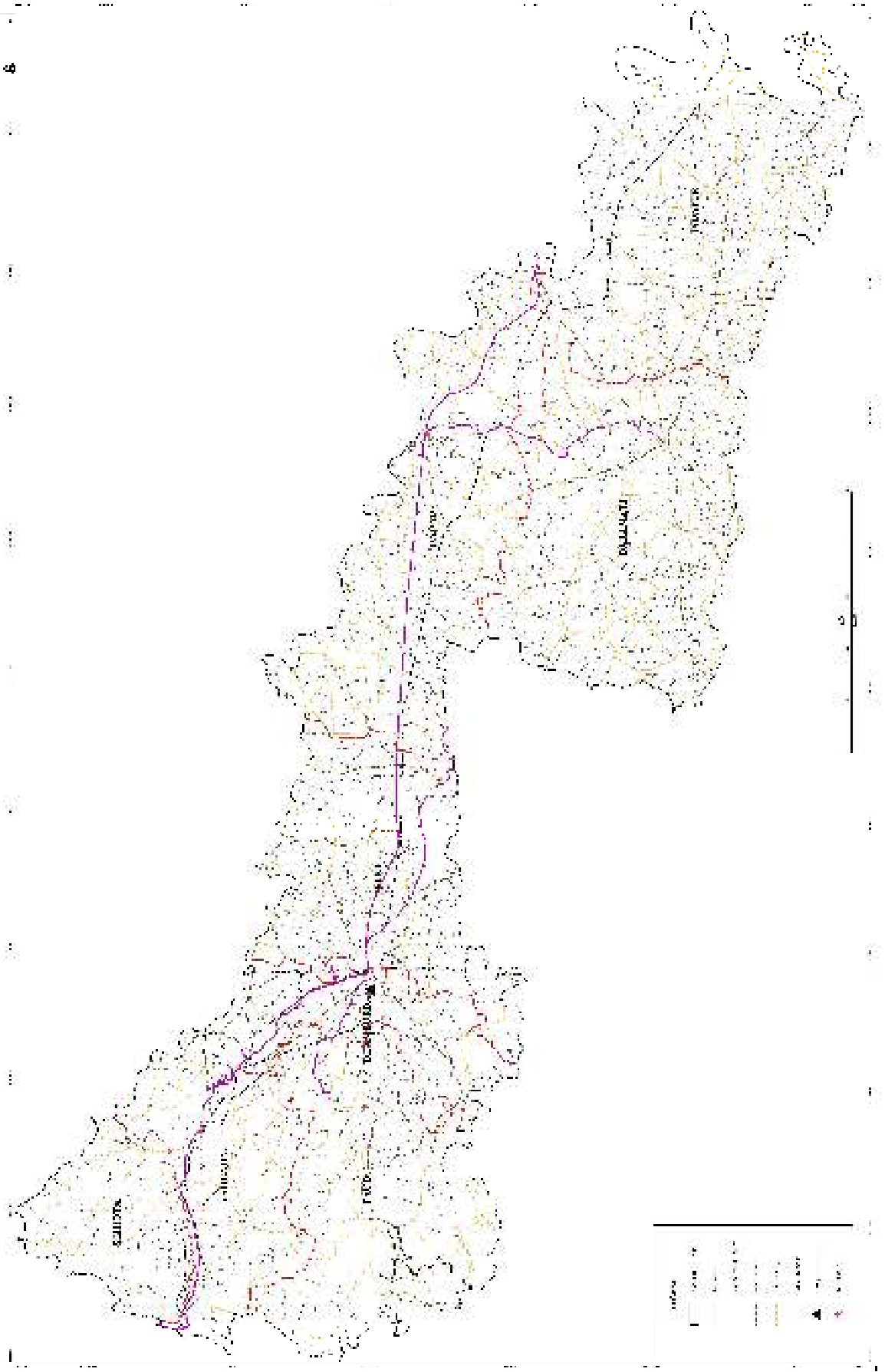
Pune forest division is situated in central part of the district with Junnar & Ahmednagar division on the North. Sub-division Bhore & Satara Forest division on the South of the division with Solapur Forest division in East. Thane, Alibaug & Roha division are situated on the Western part of the division.

1.1.3 Demographic details

According to 2001 & 2011 census, the total population of the six Talukas within Pune Forest division is as follows:

Taluka	POPULATION 2001	POPULATION 2011 TOTAL	NUMBER OF VILLAGES
Pune City	2,695,911	3,304,888	
Haveli	1,353,050	2,435,581	123
Baramati	372,852	429,600	117
Daund	341,388	380,496	103
Maval	305,083	377,559	186
Mulshi	127,385	171,006	147
Indapur	348,413	383,183	135

PUNE DIVISION - TRANSPORT MAP WITH RANGE HEADQUARTERS



1.1.4. Administrative details:

1.1.4.1. Ranges, Rounds & Beats

Pune forest division is divided in to eight Ranges. Details regarding ranges, rounds and beats and their headquarters are given in Appendix No. – I B. The forest area is unevenly distributed in the tract. Total forest area in charge of Forest Department is 661.30 sq.km, which is about 8.44 percent of total geographical area. Detail area statement is given in Appendix No. – I A

Range wise area statement is as under excluding private forest and area received from revenue department.

Sr. No.	Taluka	Range	Forest Village	RF (20)	RF (04)	PF (29)	UF	CA	Total
1	2	3	4	5	6	7	8	9	10
1	Maval	Shirota	66	12484.86	0.00	0.00	122.59	159.15	12766.60
2	Maval	Vadgaon	82	8914.52	1016.63	3.18	49.04	102.36	10085.73
3	Mulshi	Paud	128	8958.19	2442.87	0.00	70.60	28.23	11499.89
4	Haveli	Bhamburda	33	6224.73	0.00	0.00	102.41	0.00	6327.14
5	Haveli	Pune	51	3068.56	0.00	0.00	3.56	28.74	3100.86
6	Daund	Daund	63	800.01	0.00	0.00	58.17	0.00	858.18
7	Baramati	Baramati	49	97.42	89.62	0.00	120.38	0.00	307.42
8	Indapur	Indapur	66	364.53	0.00	0.00	283.63	0.00	648.16
Total			538	40912.82	3549.12	3.18	810.38	318.48	45593.98

The Range wise details of Rounds, Beats and Villages having forests is as under: -

Sr. No.	Range	No. of Rounds	No. of Beats	No. of Villages having Forest
1	Bhamburda	3	8	33
2	Pune	3	13	51
3	Vadgaon (Maval)	3	13	82
4	Shirota	3	14	66
5	Paud	3	12	128
6	Baramati	3	7	49
7	Indapur	3	9	66
8	Daund	3	11	63
	Total	24	87	538

1.1.4.2. List of Rest Houses: The detailed list of Buildings and Rest Houses in Pune division is given in Appendix No. II.

1.1.4.3. Buildings:

Pune is headquarters for many offices viz. APCCF (RET), CCF (T), CCF (Education & Training), CF (Silviculturist), CF (Social Forestry), CF (Wildlife), CF (Working Plan West) etc. All of these offices are located in Vanbhavan, building located in Gokhale Nagar, Pune. New office buildings are needed for division office and Daund Range office. Although many new quarters construction is under progress still, residential accommodation is not sufficient for the range officers, field staff and the ministerial staff. Few quarters and office buildings are constructed under different schemes but it is not sufficient to fulfill the requirement of the staff. At present there are 112no. of quarters, 39 no. of office and 38 other buildings. The list of building in the division is given in Appendix No. II.

1.1.4.4. Roads:

In the division around 8466 km length of roads passes through the forests. Nearly 1049 km of road network is of State Highway or National Highway. In plenty of the cases the land has been diverted under FCA. In some of the ranges minor stretch of roads leading to villages pass through forests e.g., road to Bharatpur village passes through forests in Compartment No. 572 A of Daund forest. Other minor roads passing to tourist's spots, nurseries, plantations, quarters, etc. in forests are being maintained by forest department.

1.2 CONFIGURATION OF THE GROUND

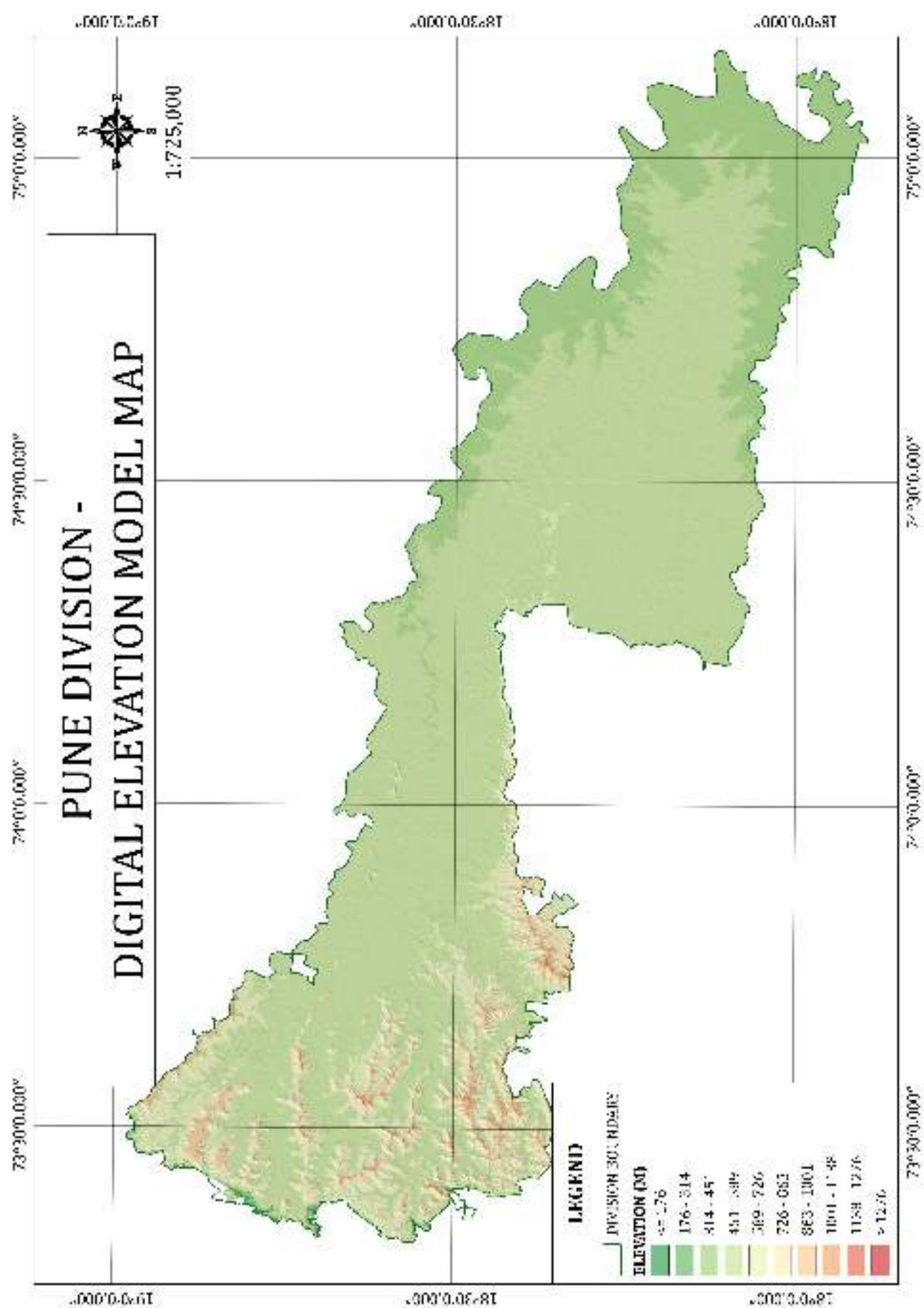
1.2. The region is mountainous in the West and rugged in the east. The Forests are mainly located on high hills, slopes of mountains in the West and central part, whereas they are very scattered throughout in very small patches in Eastern parts mainly because of land occupied for cultivation and habitation. The areas covered in the plan can be classified broadly into the following three areas.

- I. The Western Region:** The region forms a line of mountains of the Sahyadri running roughly North-South with its system of spurs and valleys thrust eastwards and producing an extremely rugged topography. It is spread across 15 to 32 km eastern part of Sahyadri's, in the local language known as 'Maval' or the 'sun-set land'. Most of the forests are located on the high slopes of the hills and they are scattered at places. In some parts on Western Ghats are table lands also known 'Sadas.' The western part of Shirola, Wadgaon & Paud Mountain ranges is mainly in Maval and Mulshi talukas.

- II. The Central Region:** The central region is flattening out parts of the spurs and broader mouths of the valleys. The region stretches for 16 to 30 kilometers East of the Western Ghats and has low mountain ranges that sink into the plains where the valleys become straight and wide. With a moderate certain and reasonable rainfall, rich soil, fair supply of water both from wells and from riverbeds, the valleys yield good tree crop. This region mainly comprises of the eastern part of Shirola, Vadgaon, Paud ranges of Maval and Mulshi talukas as well as Bhamburda and Pune ranges of Haveli taluka.
- iii. The Eastern Plateau:** On the East of 'Maval', remaining are of plain is called "Desh". It comprises of open plains and bare hillocks with boulders. The Eastern zone almost begins with the bare 'uplands' of the tract which in their Eastward progress rapidly sink into plains maintaining an average elevation of about around 500 m above MSL. This area covers basins of the river Bhima and its tributaries. The density of the forest is negligible. The region consists of open plains and open hills with rocky terrain. The tree crop is negligible and the forest area gives a bleak look except during the rainy season. The region consists mainly of Daund, Baramati and Indapur talukas.

Drainage:

1.2.1 The Sahyadri's which have an abrupt rise from Western Konkan side and have a gentler slope on the eastern flank. The spurs issuing from the main hill range maintain in the Eastward flight, their heights over some distance and the broad low valleys they enclose command a considerable catchment area which conserves the principal water supply of the district. The area is covered by the main rivers, Mula, Mutha, Pawna, Indrayani and Bhima, which divide the region into fixed basins. Mutha and Pawna River has few dams viz., Khadakwasla, Pawna, Warasgaon, Panshet and Temghar while Mula River has Mulshi Dam. Bhima River originates from the Bhimashankar hills and running



in South-east direction joins the Krishna River in Karnataka and forms Northern bank of Pune division. All other rivers form tributary of Bhima River. These rivers carry immense amount of water during monsoon and also floods the city but, during summer flow of water literally ceases or stagnates in natural channels or meanders.

1.3 GEOLOGY, ROCK AND SOIL

1.3.1 Geologically, the area is divided into following two parts i.e., Deccan Trap and Older Alluvium formation. This consists of basaltic rocks of volcanic origin which have suffered considerable disintegration in the ages past have given rise to soils of various grades, consistency and colour. The entire area of the district is underlain by the basaltic lava flows of upper Cretaceous to lower Eocene age. The shallow alluvial formation of recent age also occurs as narrow stretch along the major rivers flowing in the area.

Hard Rock (Deccan Trap Basalt): Basaltic lava flows occupies more than 95% of the area of the division. They belong to the type called plateau basalt and are extra ordinarily uniform in composition over wide areas and are generally dark grey to dark greenish grey in colour. Brownish to purple tints are also met with. Geological mapping and detailed petrographic studies of the fabric pattern of the various lava flows indicate that the basaltic flows met within this region are of two types' viz. the Pahoehoe flows and the Aa flows. The Pahoehoe flows weather easily and give rise to mature type of geography with smooth hill slopes and conical peaks and broad valleys. These flows are normally horizontally disposed over a wide stretch and give rise to table land type of topography also known as plateau. These flows occur in layered sequences ranging in thickness from 7 to 45 m and are represented by massive unit at the bottom and vesicular unit at the top of the flow. These flows are separated from each other by marker bed known as 'bole bed'. Such topographical features are well seen around Pune on way to Mumbai i.e., in the Pune- Lonavala area.

Fine grained altered Pahoehoe flows were utilized by the ancient craftsmen for carving of cave temples. Pataleshwar temple at Pune and Karla caves near Lonavla stand as examples of good pieces of architecture in basaltic rocks. The Aa flows include two sections which have different resistance to weathering. The basal dense rock is very resistant, whereas the upper part breaks down easily. Thus, large boulders are formed and released which accumulate at the base of the hills. Aa flows have given rise to plains and are met within the bed of Mula-Mutha river near Manjari. Because of their resistance to erosion, they give rise to cliffs looking like forts at the crests of many high peaks. Many forts of the earlier days are located on such inaccessible peaks.

The Laterites: It is a kind of vesicular clayey rock with characteristic red and brown color and is composed essentially of mixture of the hydrated oxides of alumina and iron. The iron oxide generally preponderates and gives to the rock its prevailing red colour. It caps the summit of some of the hills of high altitudes in the district.

Soft Rock (Alluvium):

Alluvium occurs in small areas along banks and flood plains which are several meters thick on banks of major rivers like Bhima, Mula, Mutha and their tributaries. This comprises pebble beds, sand and silt derived mainly from basaltic flows. In alluvium the granular detrital material like sand and gravel usually occurring as thin layer in the district yields water. Such blocks were utilized for raising Babul plantations in the past. Later, they were replaced by prosopis species.

1.3.2 Soils:

The soils in the Pune division are largely divided into three categories black, red and brown. In some places a class of soil is mixed in different proportions and in turn is modified by sand, gravel, lime, salts and other elements.

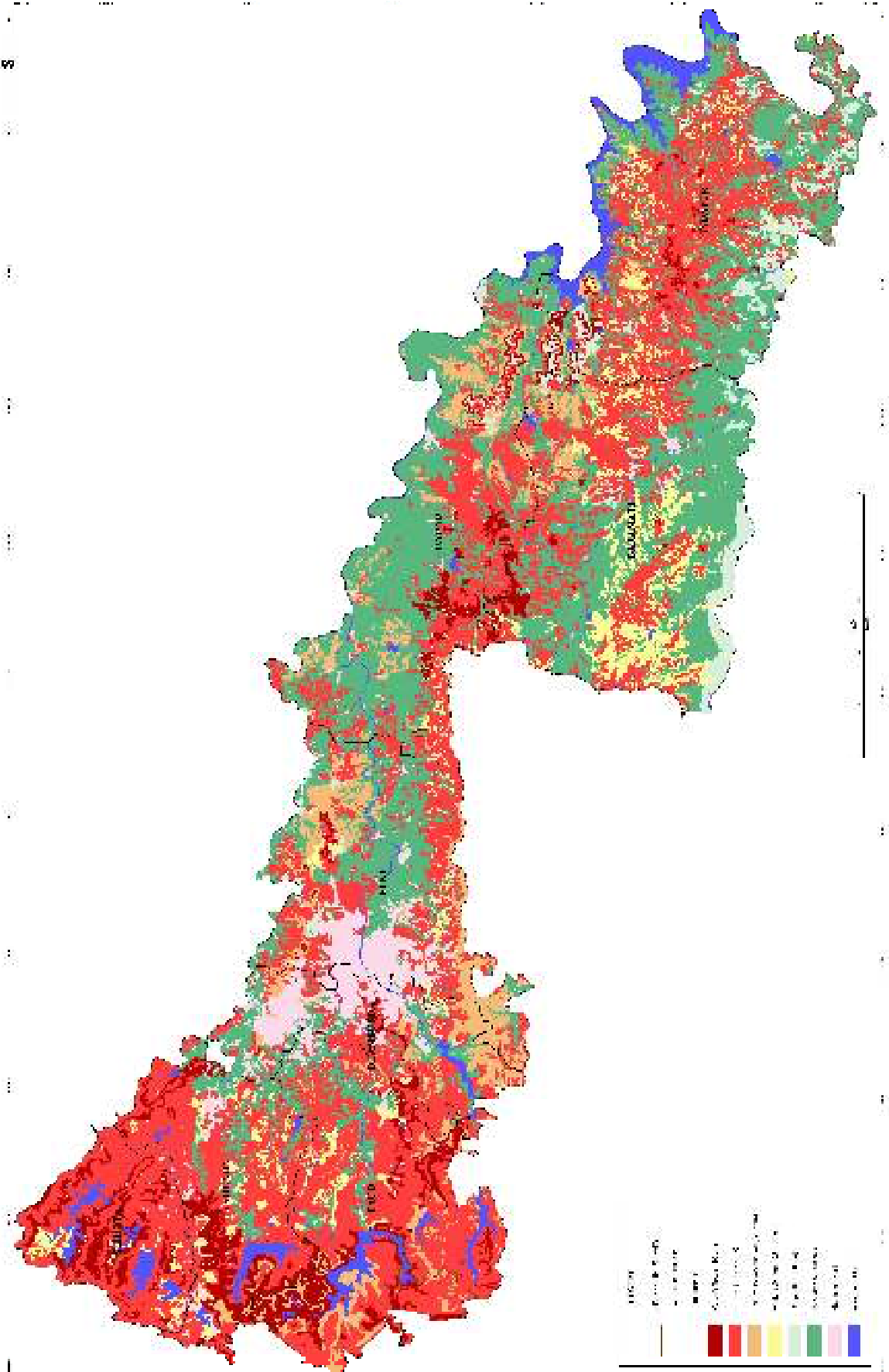
Black soil: This soil is black in colour mainly because they are formed by weathering of lava rocks and have high iron, alumina and magnesia content. Black soil is formed from the volcano eruption. Black soil is rich in Calcium, carbonate, variable Potash and hold moisture. Hence, it is found sticky when it is wet and cracks when it is dry. These soils are deficit in Nitrogen and Phosphorus. This type of soil is beneficial for afforestation due to its quality of holding and retaining moisture for a longer time inspite of being hardened by the sun. This type of soil is generally found in the eastern part of division mainly in Daund, Baramati, and Indapur.

Red Soil: These rocks are derived from weathering of ancient metamorphic rocks of Deccan Plateau. Its redness is due to iron composition. This type of soil is predominantly found in mid plains of Haveli, Mulshi, Maval taluka and its presence in other regions is also found. It is present on flat lands adjoining to forests. These soils are shallower and coarser than black soils.

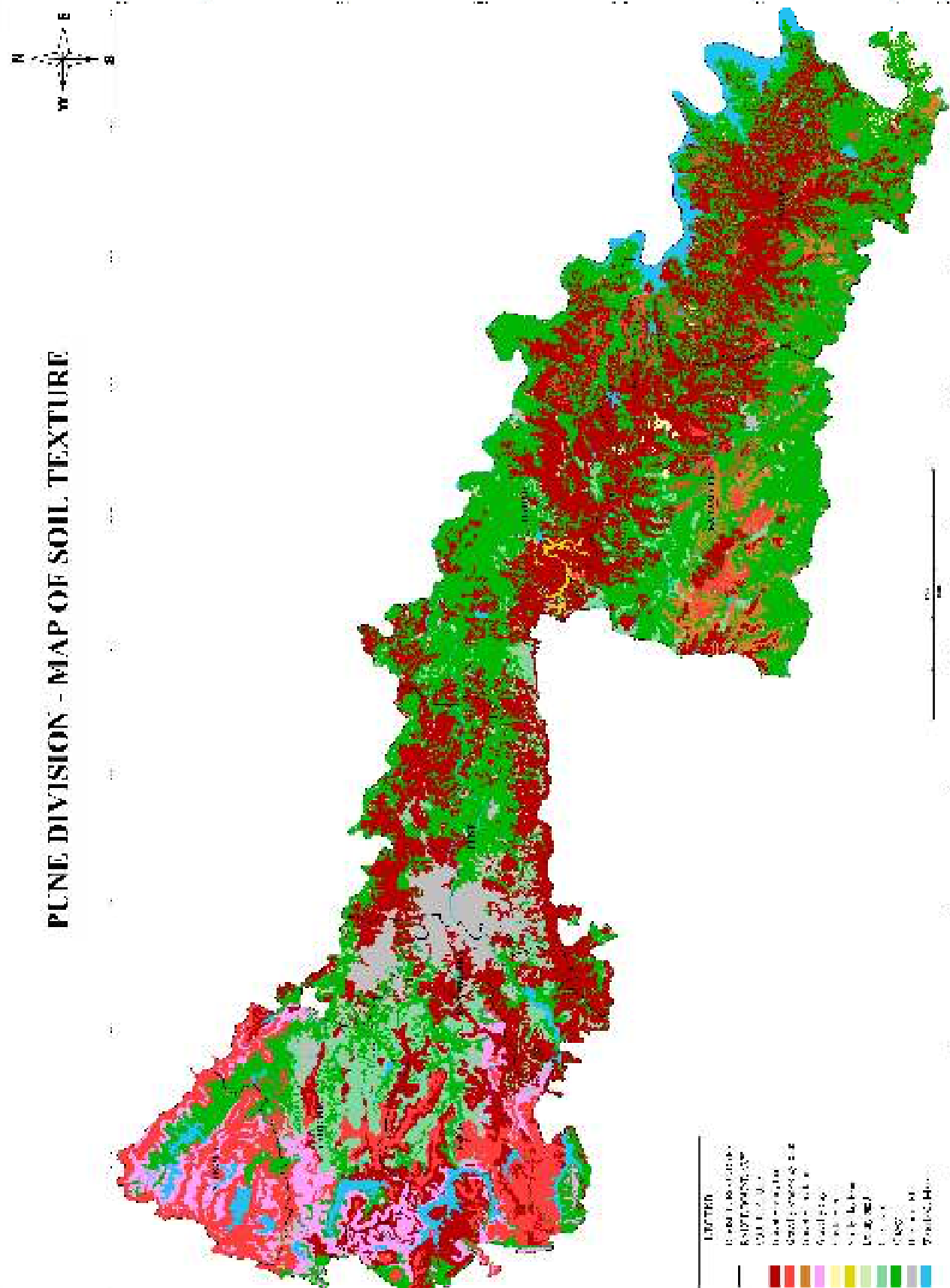
Laterite soils: - This type of soil is developed from Kaolinite base. Soils are formed due to intense leaching and are well developed on the summits of hills and uplands. This type of soil is generally found in Western Ghats where heavy rainfall exists with intense heat during summer.

The rich alluvial soil ranging in colour from pale yellow to dark brown is deposited along the river banks. The bottoms of valleys which hold deep soils are under cultivation. The effects of denudation and degradation by cattle grazing over the past few decades have left vast stretches of hill slopes devoid of tree growth with small green pockets here and there wherever the soil conditions are still favourable for plant growth. Along the hill slopes exposed outcrops of rocks are common sight.

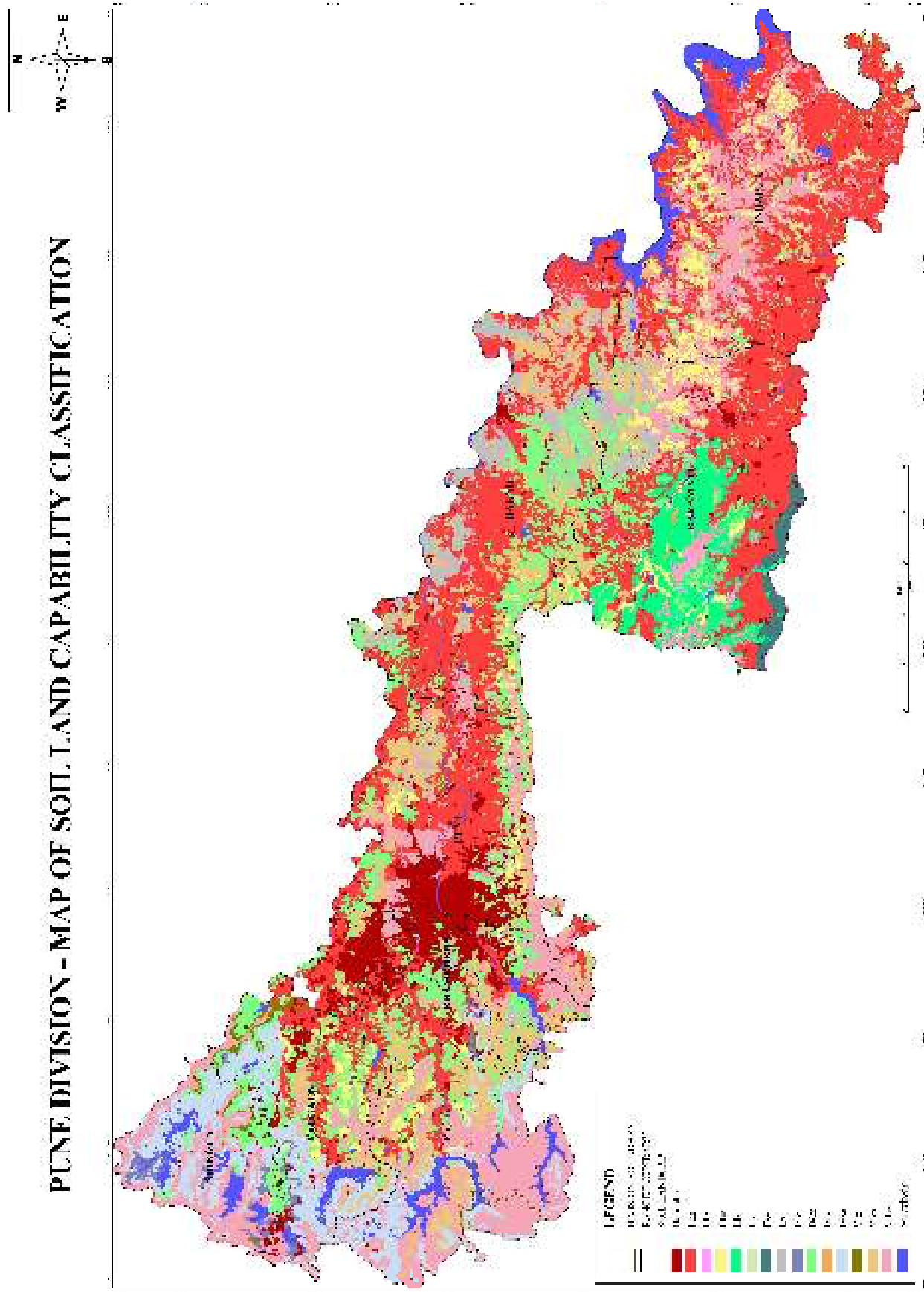
1.3.2.1 Soil Depth - Most of forest land is located on hill slopes or places where soil is of poor nature as other fertile lands are already being used for agriculture. Broadly the soil depth of 25 to 50 cm is present in majority of the forest area followed by soil depth less than 25cm. Deep soil of depth more than 50 cm is rarely found at the foothills of forest.



PUNE DIVISION - MAP OF SOIL TEXTURE



PUNE DIVISION - MAP OF SOIL LAND CAPABILITY CLASSIFICATION



1.3.2.2. Soil Texture - The soil in general is Gravelly in texture and mostly dominated by Gravelly Sandy loam in texture consisting of 32 % soil in entire forest area and followed by gravelly sandy clayey loam. They are rapidly permeable and are subjected to intensive leaching. Gravelly sandy loam soils have a high concentration of sand that gives them a gritty feel. These soils quickly drain away excess water so cannot hold significant amount of water or nutrients for plants. The colours of the soils are brown to reddish brown.

1.3.2.3. Soil Erosion – Heavy biotic interference in the form of unrestricted grazing has fast depleted the soil cover and accelerated the process of soil erosion in areas of heavy precipitation. The repeated annual fires and heavy grazing are retarding the process of natural regeneration. The trampling hardens the top soil. The result is that most of the forest areas have become denuded and susceptible to soil erosion. The site conditions have become unfavorable and refractory for normal and healthy plant growth due to unabated soil erosion. These facts have necessitated undertaking extensive soil and moisture conservation measures before attempting to go for afforestation or plantation measures

1.3.2.4. Land Capability Classification –

Land capability classification depicts the capability of the soil for producing crops on sustained basis. This is a system of grouping soils primarily on the basis of their capability to support production of crop. Land capability classification is subdivided into capability class and capability subclass. Capability class is the broadest category in the land capability classification system. Class codes I (1), II (2), III (3), IV (4), V (5), VI (6), VII (7), and VIII (8) are used to represent these classes and limitations are represented by subclass like e (erosion), c (climate) and s (stoniness). The soil resource interpretation (Land Evaluation) is based on the land capability classification and precedes land use planning. The soil that is not useful for crops can be used for grasses and forestry or for recreation or urban / industrial development. The soil in Pune division has dominant Land Capability Classification (LCC) of VII followed by VI which depicts that most of soil is just suitable to support trees with plenty of limitations hence vigorous forest cannot be expected.

1.4 CLIMATE PARAMETERS:

1.4.1 Pune has a tropical wet and dry climate. The Sahyadri, Bhima and its tributaries, watersheds, plateaus and plains mainly affect the climatic conditions in this region. The topography determines the moisture conditions, temperature, humidity, wind, etc. The climate in the hilly western region is generally favorable and pleasant. E.g. Maval, Mulshi and Haveli. The climate in Daund, Baramati, Indapur talukas and in the Eastern region is hot, dry and oppressive. Three different seasons are experienced in this division viz., rainy, winter & summer.

Rainy season extends from June to October. Rainfall varies from 2500mm in Western part to 400mm in Eastern part. The intensity of rainfall in the region is controlled by the south-West Monsoon, which receives most of the rainfall from June to October. Rainfall is not uniform throughout the region. The highest rainfall is in the western Sahyadri hills. The rainfall in central region decreases by about 1/3 of the western region, however, is quite stable and secure. In the Eastern region due to unpredictable rainfall, this eastern part is recognized as a drought prone area. The ranges in Western Pune have more rainy days and are wet throughout the rainy season. Whereas, the rain shadow areas of eastern part of division don't receive rain throughout the rainy season. Longer dry spell is evident in these regions. In the Sahyadri's, the hills are generally covered with clouds during the monsoon season. A detail of rainfall is mentioned in Appendix No.-III A.

Winter traditionally starts from November to February. Sometimes temperature drops to as low as 6°C and day temperature rises quite high around 24°C. Fog occurs occasionally in the valleys during the winter season. Fog occurs in the early mornings in September, October, November, December and January; but disappear by half past 9 in the morning. Fogs are rare in the eastern plains. They are generally visible in the valleys on the banks of rivers.

Summer months are from March to June often extending till 15th June, with maximum temperatures sometimes reaching 42 °C. The warmest month in Pune is between 20 April and 20 May; although summer doesn't end until May, often there are heavy dusty winds in May (and humidity remains high). Even during the hottest months, the nights are usually cool due to Pune's high altitude. A detail of Temperature is mentioned in Appendix No. III B.

CHAPTER - 2

THE EXTENT OF FOREST AND TREE COVER

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

Distribution of area:

The total forest area of the division as per Form no. I area register is 92074.33 hectares. It includes 14448.37 hectares of Reserve forests which were handed over by the Forest department (FD) to the Revenue Department (RD) in 1902 and are still in the possession of the RD.

This Working Plan therefore covers only 66133.39 hectares of area which is in actual possession of the FD and excludes 14448.37 ha forest area which is in the possession of the RD. Similarly, an extent 96.11 ha area transferred to FDCM are still in the possession of the RD. An area of 6432.77 hectares of RF notified to be part of Tamhini & Sudhagad wildlife sanctuary were still in the possession of the Pune Forest Division and were transferred recently in year 2022. Area of 11455 ha is acquired private forest which needs immediate survey and demarcation. Pune division has 8 ranges viz. Shirola, Vadgaon, Paud, Bhamburda, Pune, Daund, Baramati and Indapur.

2.2 FOREST AREA UNDER DIFFERENT WORKING CIRCLES

As per Vikas Gupta and DR.Y.L. P Rao's plan, there were five major Working Circles in the division. The present Working Plan also has Fire Working Circle with addition of new area as compared to previous working plan.

Sr. No.	Area of New Working Plan	Area (Ha)
1.	Protection Working Circle	35052.52
2.	Afforestation Working Circle	6942.73
3.	Improvement Working Circle	5033.12
4.	Grassland Management Working Circle	9181.41
5.	Urban Forest Management Working Circle	3888.94
6.	Private Forest Management Working Circle	11455.6
	Working Circle wise area as per Vikas Gupta and Dr.Y.L. P Rao's plan	
1	Protection Working Circle	38562
2	Improvement Working Circle	2831
3	Fuel Wood management Working Circle	2070
4	Afforestation	9903
5	Urban Forest Management	2194

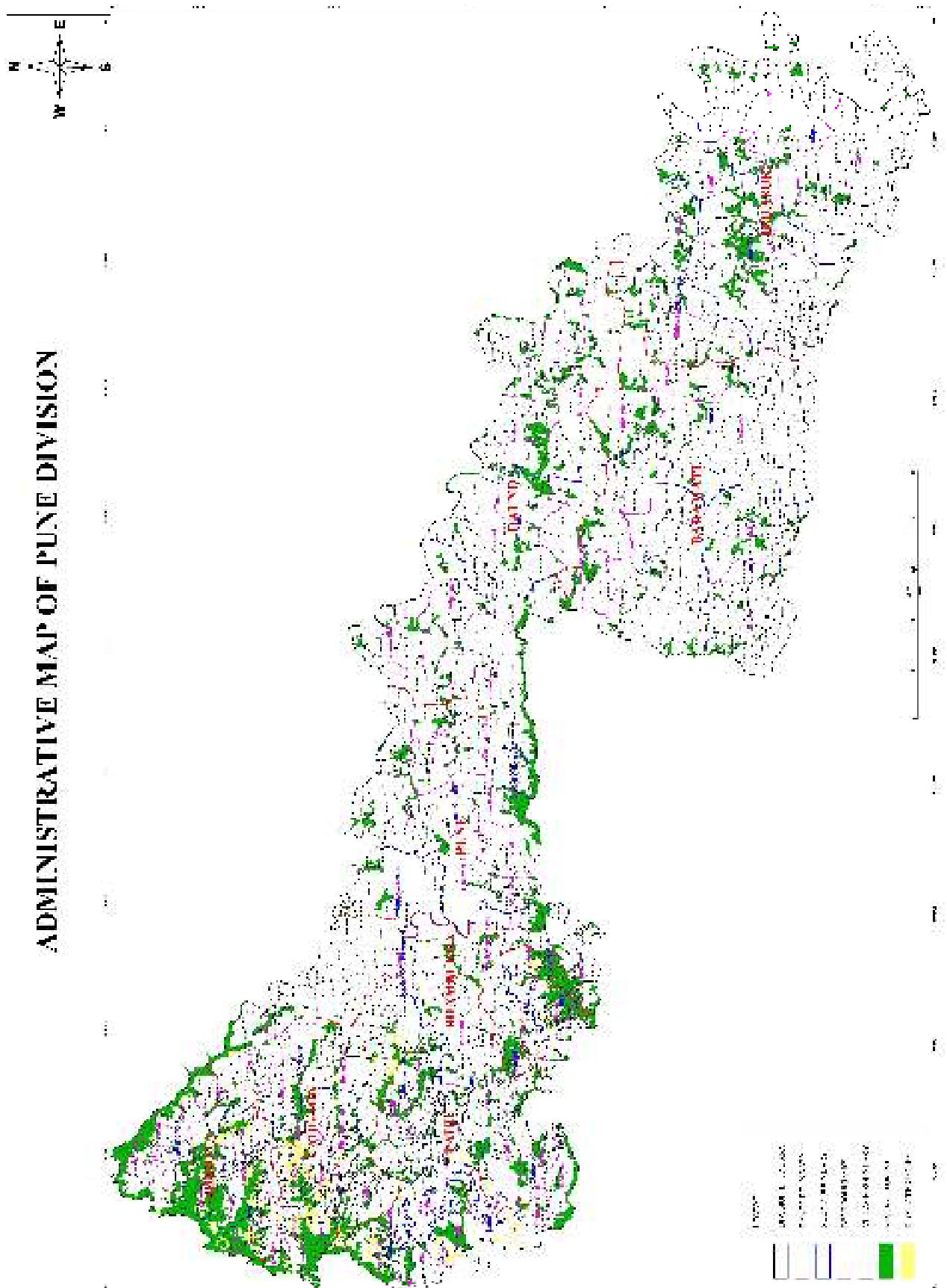
2.3 PERCENTAGE OF FOREST WITH SECURED BOUNDARIES

The Reserve Forest is demarcated in the usual manner with stone cairns as laid down in Section 123 of Bombay Forest Manual Vol. II, when the boundary is demarcated artificially. The cairns should be so arranged that the one on each side of it is visible from each of these. The demarcation line should be kept clean by cutting the bushy growth annually. The cairns should be annually painted with lime indicating the direction of the demarcation line on them. The areas closed to grazing should also be annually painted with red bands on peripheral trees.

Though Pune being most developed district since British era and has history of Forestry since 1847, onwards it is observed that boundary demarcation is most neglected part in this division. It has been over a century when Bombay Forest Sheets have been developed and as per Wagle's plan since 1949 preliminary demarcation was done during the British period. The method adopted during the earlier periods of British rule was to create 'Forest Preserves' which proceeded by choosing definite blocks of tree covered land. In doing so, the 'Kuran' areas preserved by the Maratha Government were maintained as such, and the demarcation work followed such reservations. The reservations mainly appear to have been confined at first to principally 'Teak' areas and the 'Babul Kurans', and the forest survey settlement proceeding simultaneously appears to have given the Revenue Officials a large hand in deciding which lands should constitute 'Forest Preserve'. It was not until about 1854 that Forest Preserves were created along the Western Ghats region covered mainly with 'Raiwal' species. The serious threat to forests in the Ghat region created by the opening up of railway communication through the Ghat, bringing in its wake a heavy demand for firewood, had incited reports from Dr. Gibson calling on Government to afford some protection to these forests of 'non-royal' species. Forest reservation gradually took effect in the Ghat region of the Presidency thereafter.

The gradual advance of forest conservancy brought in additional field staff under the Conservator, and an attempt was made towards putting a stop to the practice of shifting cultivation, which was found to be doing immense harm to the fuel forests. The forest conservancy had by 1860 when Dr. Gibson retired, made a steady advance. Later, after 1870, when Poona Forest Division became an independent management unit, additional areas were taken up and forest, demarcation proceeded with some speed. The allotment of areas to forests was even then entirely in the hands of Revenue officials. By 1879, an area of nearly 970 Square Miles came to be acquired under 'forests' and declared as 'Reserved Forest' under provisions of Indian Forest Act which came to be passed in 1878. By about 1893, the state of demarcation and mapping of the forest areas had almost reached its completion, no forest area was however declared as 'Protected Forest'. By about, 1893 and during subsequent years, a considerable amount of area under Reserved Forest which were veritable waste lands came to be transferred to care of Revenue Department. This effected a reduction in the areas placed under governance of 'Forest Department'.

ADMINISTRATIVE MAP OF PUNE DIVISION



In general, it has been observed that maintenance of permanent boundary marks of the RF and the PF is not satisfactory in the field. For the last few years, cement concrete pillars are being erected in place of stone cairns for demarcation of forest boundaries and are found to be more effective. But in the field, it was found that most of the cairns require maintenance. Cement concrete wall compound in urban areas is also effective for forest boundaries.

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

2.4.1. Area details-

2.4.1.1 As per Gupta Plan Forest area details are as under-

Sr. No.	Range	As Per Gupta & Rao Plan (Area in Ha.)			
		No. of Villages	Reserved Forest	Unclassed Forest	Total
1	Pune	51	7029.83	3.56	7033.39
2	Bhamburda	27	6412.19	102.41	6514.60
3	Vadgaon	82	9972.78	49.04	10021.80
4	Shirota	57	12484.86	122.59	12607.50
5	Paud	112	11671.16	70.60	11741.80
6	Daund	62	6781.73	58.17	6839.90
7	Baramati	49	4910.73	120.38	5031.11
8	Indapur	68	6470.04	283.63	6753.67
	Total	508	65733.32	810.38	66543.70

2.4.1.2 As per new plan total forest area of the division is 66133.39 ha. Range wise distribution of forest area in the division is as under.

Sr. No.	Taluka	Range	Forest Village	RF (20)	RF (04)	PF (29)	UF	CA	Total	Area Taken Back from RD
1	Maval	Shirota	66	12484.86	0.00	0.00	122.59	159.15	12766.60	0.00
2	Maval	Vadgaon	82	8914.52	1016.63	3.18	49.04	102.36	10085.73	38.45
3	Mulshi	Paud	128	8958.19	2442.87	0.00	70.60	28.23	11499.89	270.81
4	Haveli	Bhamburda	33	6224.73	0.00	0.00	102.41	0.00	6327.14	187.46
5	Haveli	Pune	51	3068.56	0.00	0.00	3.56	28.74	3100.86	3961.27
6	Daund	Daund	63	800.01	0.00	0.00	58.17	0.00	858.18	5249.79
7	Baramati	Baramati	49	97.42	89.62	0.00	120.38	0.00	307.42	4723.69
8	Indapur	Indapur	66	364.53	0.00	0.00	283.63	0.00	648.16	6105.51
Total			538	40912.82	3549.12	3.18	810.38	318.48	45593.98	20536.98

2.4.2. Change of Area:

The total forest area at the time of writing earlier plan was 102879.85ha. However, after reconciliation total notified forest area of Pune at the present moment, as per form no.1, is **92074.33** ha.

The details of the two areas are given in the following table:

CHANGE IN AREA	Area as per Earlier Working Plan		Area as per Present Working Plan	Remarks
Reserve Forest (RF) Section 20	44719.02		47925.33	RF to RF
		+	456.35	UF to RF
		-	360.56	Area transfer to Bhore Sub-division
		-	3620.46	Area transfer to Tamhini WLS
		-	2812.31	Area transfer to Sudhagad WLS
		-	675.53	Area transfer to FDCM
			40912.82	Area included in current WP
Reserve Forest Section 4	8753.75		4929.64	RF to RF
		+	488.58	UF to RF
		-	1869.1	Area transfer to Bhore Sub-division
			3549.12	Area included in current WP
Revenue Department (RD) to Forest Department	19944.68		20782.26	
		-	245.28	Area transferred to FDCM
			20536.98	Area included in current WP
Unclassed Forest (UF)	2156.24		1132.04	UF to UF
			1132.04	Area included in current WP
Acquired Private Forest	11455		11455.6	Included without change
Total Forest Area	87068.69		77625.96	

RF balance with RD	15811.16		14544.48	
		-	96.11	Area transfer to FDCM
			14448.37	Area balance with RD
Total Forest Area including RD area & Acquired Pvt. Forest	102879.85		92074.33	

2.4.3. Change in Land use, Land use change on basis if density classification

To compare the density of canopy, cover the FSI classified forest cover layer for year 2005, 2017 & 2019 was available and analysis was done based on these images but, recently year 2021 forest cover too was also made available after SLCC meeting. The details area as follows

(Area in hectares)

Year	Water	Non-Forest	Scrub	Open Forest	Moderate Dense Forest	Very Dense Forest	Trees outside Forest - Moderate Dense	Trees Outside Forest - Open Forest
2005	623.92	38585.98	3416.02	9248.21	14235.70	23.18	0.00	0.00
2017	479.05	35267.23	3016.55	12093.16	15277.01	0.00	0.00	0.00
2019	1058.07	33398.56	3679.94	11946.37	15560.08	0.00	56.63	433.34
2021	1244.10	38456.38	4516.98	14794.94	18157.07	0.00	0.00	0.00

In the Year 2005 canopy cover with Very Dense Forest existed which had gradually got converted into Moderate Dense Vegetation in the succession period. Amongst the Forest cover Moderate Dense Vegetation is most dominating class for year 2005 apart from non-Forest area. Later in year 2017 when canopy cover is analyzed, again Moderate Dense Forest is dominating class after non-Forest class. But there is a significant positive change from scrub class to open forest class.

During the year 2019 again the trend of canopy cover density has remained same. But area of trees outside forest class has been added in this year but, the said area is forest area only. This area was originally reserve forest vested with Revenue department which was later handed to Forest department. In the latest cycle of 2021, the compartments of forest area which was not included in earlier classification was included in this cycle. Here the earlier classified TOF-MDF & TOF-OF are all included in the reserve forest and are mainly classified into moderate dense forests and open forest. The same earlier trend of increase in Moderate dense forest is evidently seen in this period too.

2.4.4. Areas under Forest Rights Act 2006

In Pune Division individual claims for residence 19 proposals have been accepted. While Community Forest Rights are accepted mainly for NTFP collection and grazing. Abstract of claims and area sanctioned is as under -

Details of individual beneficiaries is given in Appendix No. IV

Besides these claims, 19 cases admeasuring area 0.147 ha. were sanctioned under section 3(2) of FRA 2006. Details of which are given in Appendix No. IV.

(Claims are still pending for scrutiny at various levels)

Specific register should be maintained for FRA as per Revenue and Forest Department Notification No. S-10/2016/C.R.133/F3, dated 1 August, 2019. Record should be maintained in schedule wise proforma which is given below;

1. **Schedule-F (see rule 30-C)** - Register of individual forest rights.
2. **Schedule-G (see rule 30-D)** - Register of community forest rights.
3. **Schedule-H (see rule 30-E)** - Register of use of forest rights of self-cultivation.
4. **Schedule-I (see rule 30-F)** - Register of rejected claims under the scheduled tribes and other traditional forest dwellers.
5. **Schedule-J (see rule 30-G)** - Document of forest rights.
6. **Schedule-K (see rule 30-H (3))** - Register of mutation of individual forest rights.
7. **Schedule-L (see rule 30- H (3))** - Register of mutation of community forest rights.
8. **Schedule-M (see rule 30- L))** - Register of forest land diverted for amenities under the scheduled tribes and other traditional forest dwellers.
9. **Schedule-N (see rule 30- M))** - Register of forest land diverted under the Forest Conservation Act, 1980(69 of 1980)

2.4.5. Areas diverted for non-forestry purposes under Forest Conservation) Act 1980-

Forest area diverted for non-forestry purpose is mainly for irrigation projects, wind mills and roads. Till 2020, total area finally diverted is 563.72 ha for 78 projects, the statement showing the project wise forest area diverted for non-forestry purposes under Forest (Conservation) Act 1980 is given in Appendix No. V.

2.5 THREATS TO THE FOREST

- **Encroachments-** It is the main threat to the forest area in the division. This problem is severe especially in and around Pune city and other newly developing towns due to high value of

land. This threat needs to be tackled with utmost priority. The problem becomes graver since many forest areas have not been surveyed and therefore, they are not properly demarcated in the field. Though in some places survey was done and encroachment was evicted but proper pillars were not constructed. So again, the areas are prone to encroachment.

For Reserve Forests areas vested with Revenue Departments area is not demarcated and records were not maintained properly. Moreover, the lands were also distributed for utility other than forest before 1980 and thereafter also. But this distributed land is not surveyed and demarcated in field so there is huge difference between actual area distributed and actual area occupied by land holders to whom land was allocated. So, surveying has to be done with absolute priority. More recently, since 2012, local bodies have been trying to persuade people to encroach on forest land under the pretext of FRA 2006. This trend is also needed to be checked urgently.

- **Forest Fires** - Fires are common in these forests. The forest fires constitute one of the main threats for sustainability of forests eco-systems and continuity of their multi-functional role. The main reasons for forest fires are
 - Intentional burning of grass in the forests on the high ridges so that the burnt material gets washed away by the rains and remnant ash shall get accumulates in the agricultural fields. This is a mistaken notion prevalent among the farmers adjoining to forests thereby causing huge damage to existing ecosystem.
 - Due to poor maintenance of forest boundaries.
 - Careless burning of rab in the cultivation's areas adjacent to forest areas.
 - Tourists visiting the places viz. Sinhgad, Lonavala, Khandala, Bhushi, Karle etc. and other camping sites.

The forest fires cause damage to the natural regeneration and young seedlings. The trees scorched or burnt by fire become hollow in due course of time. Repeated fires cause the loss of humus in the forest, erosion of soil, and environmental degradation. Forest fire is more evident in the Western part of division as compared to the Eastern part and that too mainly in grasslands. Forest fire destructs entire standing vegetation and thus paves way for encroachment also. Hence, strict fire protection is required for effective forest management. During the year 2012-13 to 2021-22, total of 1016 offence cases of forest fires involving 3592.5 hectares of burnt area and a loss of Rs. 853120/- were booked. A statement showing year wise details of forest fires is given in Appendix VI of Volume II.

- **Grazing** - Heavy uncontrolled grazing all over the forest areas has resulted in serious damage to the young natural regeneration of teak and its associates. The damage caused by the grazing is heavy in the forests due to large cattle population. Incidence of grazing resulted into highly compacted soil with little sub-soil moisture. All these factors adversely affect the

establishment of current recruits of teak and other valuable species. During the year 2012-13 to 2021-22, total of 131 cases of unauthorized grazing offence cases were booked and cattle is common in almost all ranges. Repeated trampling of the forest floor by cattle has been impounded. A statement showing year wise details of illegal grazing is given in Appendix VII of Volume II.

- **Illicit Cutting** -Illicit cutting of trees by the villagers for the fuel and their other domestic needs is common. The damage to forests is particularly more in easily accessible areas. The privilege to collect dead wood is abused by the people and the dead wood is manufactured at places adjoining villages and townships by deliberate hacking of trees and also by girdling. The material is brought by head-loads and sold in the adjoining townships. In the year 2012-13 to 2021-22, 481 cases involving illicit felling and loss of Rs. 6,71,036 were reported. Though currently there is a declining trend but still it prevails. A statement showing year wise details of illicit felling is given in Appendix VIII of Volume II.
- **Weeds:** Karvi grows very thick in forests of western part of the division and suppresses the natural regeneration of valuable species. Lantana, *Eupatorium odoratum*, Rantulas (*Hyptis suaveolens*) & Ranmodi (*Chromolaena odorata*) has also heavily invaded patches of Pune Forest Division. Apart from it recently in past few years blooming flowers of Cosmos are evidently visible which are invading the forests as weed.
- **Parasites, Insects & Fungi:** Loranthus, Cuscuta, Orobanche attacks are observed scattered throughout the division. It is mainly seen on the trees by the side of rivers and perennial streams. Loranthus attack is common on the branches of Mango, Ain, and Dhawada trees. Viscum spp., parasitism is observed on Jamun trees. Damage caused is not much since its occurrence is on a small scale.
- **Insect attack** - Cecidomyids & other species cause gall attack on variety of tree species. Holotrachea species - root grubs cause damage to plants. On Neem trees Tee -Mosquito attack is more evidently visible since last few years and this may be a combine effect of climate change also. *Batocera* species cause stem boring on variety of tree species. Teak is attacked by teak defoliator in Western parts of division by *Hyblaea pueria*. Leaf minor & gall attack is more noticeable on Karanj in parts of Maval.
- **Virus / Fungus attack** – Young naturally germinated seedlings are seen to be more prone to damping off and die back. Wilting caused due to *Fusarium* species is also evidently present in few areas of the division. On *Cassia fistula* Mosaic virus attack was seen in parts of Baramati & Indapur ranges.

2.6 DISTRIBUTION OF DIFFERENT FOREST TYPES

The Western Ghats region is known as one of the eight 'hottest' biodiversity hotspots of the 34 identified biodiversity hotspots worldwide. The region hosts a tremendous diversity of plant and

animal life. The diverse natural wealth of the region is an important source of livelihood for a number of ethnic communities inhabiting the region. For instance, local communities harvest nearly 150 uncultivated food plants and more than 500 medicinal plants from forests for food and medicine. The forests are also a source of varied NTFPs and industrial raw materials. The types of vegetation occurring in the different parts of Pune division are governed mainly by rainfall and altitude. The forests are mainly of three types, viz. Semi-Evergreen, Mixed Deciduous and Thorny. They represent and correspond to the Western, Central and Eastern Zones of high, medium and low rainfall varying from 1700 mm to 100 mm.

As per Champion and Seth's revised survey of forest types of India, the forests of this tract fall into five types described as under: -

The types of vegetation occurring in the different parts of Pune division are governed mainly by rainfall and altitude. The forests are mainly of three types, viz. Semievergreen, mixed deciduous and thorny. They represent and correspond to the western, central and eastern zones of high, medium and low rainfall varying from 3000 mm to 400 mm. The forests of Pune division can be grouped under the following forest types as per the 'Revised Classification of Indian Forest types' by Champion & Seth. Forest types.

Forest types

Sr. No.	Type	Forest Type Description
1.	8A/C ₂	Western sub-tropical hill forests
2.	3B/ C ₂	Southern moist mixed deciduous forests
3.	5A/ C ₃	Southern dry mixed deciduous forests
4.	6A/ C ₁	Southern thorn forests
5.	5/E ₃	Babhul forests

1. 8A/C₂ Western sub-tropical hill forests

This Forest type lies in the heavy rainfall tract in the West, occupying the higher elevations of the Sahyadri main ridge and extending to some distance on the out-lying spurs of the eastern flanks. The climatic conditions determine this forest type. It occurs as a strip between 650 to 1425 meters altitude. In its undisturbed state at the higher elevations, where soil and crop react to set up a stable composition, the formation assumes a truly climatic climax type. The crop conditions along the descending hill slopes appear to remain in a lower grade of succession, a 'seral' rather than a truly climax type, evident from the preponderance of sub dominants in the top canopy. The character of the

Evergreen is not one of the truly 'Rain forests'. The periodicity of the monsoons, the long dry spell of over 6 months and biotic factors determine their stature.

The forest crop is stunted and is under-stocked at places with numerous grassy blanks. Forest areas bearing adverse biotic pressure of uncontrolled grazing, the tree growth has disappeared and shrubby growth of thorny species viz. Pandhari, Lokhandi, Rametha, Gela, Asana along with bushy growth of Ain, Jambhul, Kuda etc. are struggling to establish themselves in areas infested with Ghaneri (*Lantana camara*) on the lower slopes and Karvi (*Carvia callosa*) on the middle and upper slopes. Part of the evergreen forest belt falls in the category of grassy blanks and under-stocked areas. It is highly susceptible to soil erosion due to heavy precipitation leading to formation of gullies and rills. The soil is moderately deep to shallow with a layer of humus. Site quality generally corresponds to IV with occasional patches of quality class III. Density varies from 0.2 to 0.8. The floristic composition in this type is as follows where incidence of major species is indicated by symbols in brackets viz. 'a' - for abundant, 'c' - for common, 'o' - for occasional and 'f' -for frequent

Floristic composition

Top canopy:- Mango (*Mangifera indica*) (f), Jambul (*Syzygium cumini*) (a), Pisa (*Actinodaphne hookeri*) (f), Shisham (*Dalbergia latifolia*) (c), Anjani (*Memecylon edule*) (a), Hirda (*Terminalia chebula*) (f), Baheda (*Terminalia belerica*) (o), Waras (*Heterophragma quadriculata*) (f), Asana (*Bridelia retusa*) (c), Wawala (*Holoptelia integrifolia*) (c), Bhoma (*Glochidion lanceolarium*) (o), Payar (*Ficus arnottiana*) (o), Lenda (*Symplocos racemosa*) (f), Kate-Kumbhal (*Xantolis tomentosa*) (c), Tambal (*Flacourtia latifolia*)(o).

Second storey :- Lokhandi (*Ixora nigricans*) (f), Pandari (*Murraya paniculata*)(f), Anjani (*Memecylon edule*) (f), Koshimb (*Schleichera oleosa*) (f), Karavati (*Ficus hispida*) (o), Shendari (*Mallotus philippinensis*) (o).

Bamboo :- Udha bamboo (*Dendrocalamus strictus*), Kalak/ Kanak (*Bambusa bambos*) Under storey Rametha (*Lasiosiphon eriocephalus*), Thor (*Eurphorbia ligularria*) (o), Khulkhula (*Crotalaria retusa*) (o), Dhaity (*Woodfordia fruticosa*) (o), Phangali (*Pogostemon purpuricaulis*) (o).

Shrubs

Sonki (*Senecio grahami*)(o), Rankel (*Musa superba*) (o), Karvi (*Carvia callosa*) (a).

Herbs

Dindi (*Leea macrophylla*) (o) Papadi (*Pavetta tomentosa*)(o).

2. 3B/C2 - Southern moist mixed deciduous forests

This type occurs in a narrow belt along the lower slopes of Sahyadri range, where the rainfall is between 1500 mm to 2000 mm. The forests attain their best form where the biotic influences are negligible. Teak is occasionally found and is indicative of secondary succession but its proportion is less than 5%. Predominant species are Ain (*Terminalia tomentosa*), Sawar (*Bombax malabaricum*), Moina (*Lannea grandis*), Dhaman (*Grewia tiliifolia*), and Nana (*Lagerstroemia lanceolata*). Proportion of evergreen species like Ficus species, Moha and Mango in the over-wood is more while under-wood is more or less absent. Undergrowth consists of Lokhandi, Karvand, Karvi and Lantana. Density varies from 0.3 to about 0.6. Regeneration in most of the area is poor and unreliable.

Floristic composition

Top canopy

Ain (*Terminalia tomentosa*), Kinjal (*Terminalia paniculata*), Teak (*Tectona grandis*), Sawar (*Bombax malabaricum*), Behada (*Terminalia belerica*), Hed (*Adina cordifolia*), Dhavada (*Anogeissus latifolia*), Nana (*Lagerstroemia lanceolata*), Siras (*Albizia lebbek*).

Second Storey

Dhaman (*Grewia tiliifolia*), Kumbha (*Careya arborea*), Waras (*Heterophargma quadriloculare*), Kadam (*Anthocephalus cadamba*)

Under storey

Kalakuda (*Wrightia tinctoria*), Awala (*Emblica officinalis*), Pangara (*Erythrina variegata*), Palas (*Butea monosperma*), Bahava (*Cassia fistula*), Al (*Morinda tinctoria*)

Shrubs

Atrum (*Flacourtia indica*), Karwand (*Carissa carandus*), Phangali (*Pogostomon parviflora*), Kevani (*Helicters isora*), Bharang (*Clerodendron serratum*), Dinda (*Leea microphylla*), Kuda (*Holarrhena antidysentrica*), Ranbhendi (*Thespesia lampas*), Wavding (*Embelia ribes*).

Grasses

Kusali (*Heteropogon contortus*), Marvel (*Andropogon annulatus*)

3. 5A/C3 Southern dry mixed deciduous forests

The dry deciduous forest type covers the broad western part of division. Here the forest characteristics take on a marked change from the evergreen in the western region to dry deciduous through the narrow moist deciduous belt. Teak (*Tectona grandis*) is the principal species; its proportion with other species however varies from place to place. Not more than 50 years ago, this

dry deciduous forest use to produce abundant small sized timber and poles. It formed the main timber bearing forest of this tract restricted mainly to Sinhgad and Paud ranges. Today due to gradual but continual deterioration in edaphic site factors and due to repeated unauthorized hacking of immature teak trees and saplings along with other non-teak species for fuel or sale, mature tree growth of teak and other tree species is hardly seen. A few remnants mature teak trees are observed here and there, standing alone. The natural regeneration is observed in some places. This natural regeneration gets damaged due to biotic pressure.

Floristic composition

Top canopy

Teak (*Tectona grandis*) (a) Dhavada (*Anogeissus latifolia*) (c) Tembhurni (*Diospyros melanoxylon*) (c), Ain (*Terminalia tomentosa*) (a), Kalamb (*Mitragyna parviflora*) (o) Mohwa (*Madhuca latifolia*) (o) Bibla (*Pterocarpus marsupium*(s), Mokha (*Schrebera switenioides*) (a) , Phasi (*Dalbergia paniculata*) (r), Shisam (*Dalbergia latifolia*) (r), Sawar (*Salmaliamalabarica*) (f), Kavat (*Feronia elephantum* (r), Salai (*Boswellia serrata*) (c), Hed (*Adina cordifolia*) (c), Dhaman (*Grewia tiliacifolia*) (c), Kuda (*Wrightia tinctoria*) (c), Khair (*Acacia catechu*) (o), Ghotbor (*Zizyphus xylopyra* (o), Tambat (*Flacourti areamontchi* (o), Bel (*Aegle marmelos*), Avala (*Emblica officinalis*) (c), Bahawa (*Cassia fistula*) (o), Apta (*Bauhinia racemosa*), Chandan (*Santalum album*).

Bamboos- Present but rare especially mes bamboo (*Pseudoxycanthus madhavii*) &more often found *Dendrocalamus strictus*.

Second storey

Kuda-kutaj (*Holarrhena antidysenterica*), Murodphal (*Helicterus isora*), Dhaiti (*Woodfordia fruticosa*), Kudarsi (*Bridelia hamiltoniana*), Kudmudi (*Gardenia gummiifera*) and Henkal (*Gymnosporia montana*) etc.

Under growth

Tarota (*Cassia tora*) and Shindi (*Phoenix sylvestris*).

Grasses

Bhuri (*Aristida paniculata*), Bhalekusal (*Andropogon triticus*) Gondvel (*Andropogon pumilus*), Marvel (*Andropogon annulatus*), Paunya (*Ischa emulsulcatum*), Sheda (*Ischaemum laxum*), Bhongrat (*Anthistria ciliata*) and Dongrigavat (*Andropogon monticola*)

Climbers

Chilhar (*Caesalpinia sepiaria*), Palasvel (*Butea superba*), Sakalvel (*Ventila gomaderaspatana*)

4. 6A / C1 Southern Thorn Forests: -

This type is found in the eastern part of the division, viz. Daund, Baramati and Indapur talukas. Forests here are scattered and are in isolated patches which are surrounded by villages and subjected to excessive grazing and browsing and is typical of the extremely dry condition of the eastern region which is also drought prone area. The vegetation is characterized by sparse stunted growth of Neem (*Azadirachta indica*), Babul (*Acacia arabica* / *Acacia senegal*), Prosopis (*Prosopis juliflora*), Ghatbhor (*Zizyphus xylopara*), Bor (*Zizyphus jujuba*), Hivar (*Acacia leucophloea*) and Khair (*Acacia catechu*). A thin sparse growth of grasses is present during the short moist season, otherwise the soil is bare, dry and barren.

5. 5/E3 Babul Forests

The areas along the banks of river Bhima which get inundated during floods in rainy season used to support good Babul (*Acacia arabica*) forests in the past. Here the soil is deep and fertile and Babul used to consist nearly 90% of the crop composition previously. The material spread of this species was governed by seed dispersal and direct sowing of seed. The best quality growth was on the deep alluvium immediately below the normal flood level, the second best was on the deep soil complex immediately above the normal flood level which attained good moisture effect under occasional flooding or through the porous soil absorbing moisture from inundated nallahs. The poor quality existed on the higher land surfaces away from the alluvial regions, the soil here being dry hard or even shallow. Other species found were Neem (*Azadirachta indica*), Chinch (*Tamarindus indica*) and Jambhul (*Syzygium cumini*) etc. Presently all such areas in Daund and Indapur talukas are thickly infested with impenetrable growth of *Prosopis juliflora* which has now become the major constituent of the tree composition of these riverine forests in these two talukas. In Haveli taluka on the other hand, riverine patches bearing good number of old mature babul trees can be seen along with other species like Karanj (*Pongamia pinnata*), Vilayati babul (*Prosopis juliflora*), Neem (*Azadirachta indica*), Chinch (*Tamarindus indica*) etc. Prosopis has not yet invaded these patches but its thick crop can be seen on their outer peripheries. The river banks of these babul stands are also being subjected to erosion by washing off of the river banks due to scouring action of fast and turbulent flow of water as a result of heavy precipitation in the Sahyadri hills.

2.7 TREE COVER OUTSIDE FOREST AREA

The total geographical area of the division is 7,831 sq. km. of which 661.30 sq. km. is forest. The Plantation/ Tree outside Forests (TOF) for State of Maharashtra according to the State of Forest Report (SoFR) 2021 is 12108 sq.km. constituting nearly 4% of geographical area of the State. According to SoFR 2021, Maharashtra is the leading state, with maximum Tree outside Forests (TOF) area cover in India. However, no specific figure for Pune District is available. The tree outside forests

in the Pune district has not been assessed yet, as per the requirement of the code given by the Forest Survey of India.

Details of plantations done by Social Forestry department Pune Division (2012-13 to 2022-23) is as below

Sr. No.	Plantation Year	BLOCK Plantation (Hectare)	Linear Plantation (K.M.)	No. of Trees planted
1	2012-13	5		4,550
2	2013-14		202	80,320
3	2014-15		15	6,104
4	2017-18	6	10	8,180
5	2018-19	21		23,331
6	2019-20	210		539,759
7	2021-22	83		84,437
8	2022-23	157	5	175,122
	Total	482	5	921,803

2.8 SHIFTING CULTIVATION (JHUMMING)

Shifting cultivation is not practiced in this Forest Division.

CHAPTER-3

MAINTENANCE, CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

3.1: FOREST COMPOSITION AND DISTRIBUTION

Based on the vegetation survey, forest inventory and compartment stock mapping, a summary floristic composition of Pune Forest division is prepared. Method of combining GIS with traditional practice has been adopted.

3.1.1 Methodology used

Initially, digitized blank forest area maps were distributed to beat guards. Training was imparted to field staff regarding how to fill up these maps as per existing stock in the field. Ground truthing and verification of these stocks maps was done by working plan staff and necessary corrections were made. In the later stage satellite imagery along with all remaining ancillary information viz. compartment history, stock maps prepared by field staff and working plan staff, plantation details, etc. were incorporated. Based on satellite image with temporal variation, entire stock was classified according to species composition and height or density. These classified images were checked with the help of field staff and corrections if any, were rectified. Final output was again verified with field survey by working plan officers and staff, for preparation of final maps. Standard symbology according to National Working plan code 2014 was adopted for representation in maps.

This method has plenty of advantages over existing traditional method and are as follows,

- Time saving, accurate and cost effective.
- Calculating area is much easier and corrections can be easily updated.
- Easy for storage, maintenance and reproduction of maps.
- Stock layer is being used as an important ancillary layer for other forest analysis and decision support system.

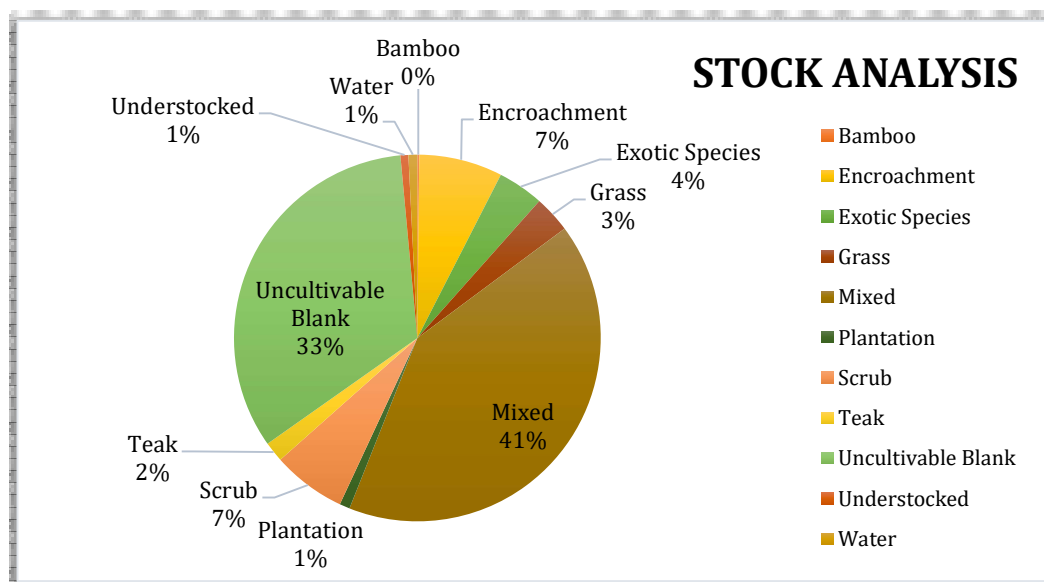
The forests of Pune division can be grouped under the following forest types as per the 'Revised Classification of Indian Forest types' by Champion & Seth.

3.1.2. Analysis & result

The details of stock analysis of Pune division are in the following table

Stock Analysis

Sr. No.	Stock Type	Area (Hectare)	Area (Percentage)
1	Bamboo	99.11	0.15%
2	Forest Blank	4869.06	7.36%
3	Exotic Species	2684.79	4.06%
4	Grass	2160.77	3.27%
5	Mixed	27250.57	41.21%
6	Plantation	587.98	0.89%
7	Scrub	4305.16	6.51%
8	Teak	1165.27	1.76%
9	Uncultivable Blank	22037.89	33.32%
10	Understocked	446.38	0.67%
11	Water	523.99	0.79%
Grand Total		66130.96	100.00%



I. Mixed forest

These are the forests areas with two or more predominant kinds of trees and with atleast 20% of the stand consisting of other than the most common tree. Mix forest type is subdivided into seven stock classes according to height of species.

Analysis of forest area shows that almost 41 % total area of Pune Forest division is under mixed forest type, out of which stock class type V-b i.e., species having height 3 to 6 mt. is dominantly prevails. As shown in density map, mix forest stock type is observed on western side of the Pune Forest division. Species found in this type are Jamun, Amba, Anjani, etc.

Stock class wise distribution: -

Sr. No.	Stock Type	Stock Class	% occurrence	Area Ha.
1	Mixed Forest	V-b 3 - 6 m	26.38	17443.23
2	Mixed Forest	V-a 6 – 9 m	10.37	6855.272
3	Mixed Forest	IV-b 9 – 12 m	2.92	1928.518
4	Mixed Forest	IV-a 12 – 15 m	0.83	550.1922
5	Mixed Forest	III 15 – 21 m	0.54	354.8192
6	Mixed Forest	II 21 – 27 m	0.18	118.5304
Total				27250.57

II. Forest Blank Areas

These are the areas devoid of vegetation. This is due to either they are rocky or eroded due to steep slope of Western ghats and also the Mahadeo & Balaghat Mountain ranges having basaltic lava flow. High altitude plateaus are also part of this stock class.

Analysis shows that 32% of forest area of Pune division falls under this class. Due to climatic and edaphic factors these areas are unworkable and plantation is not prescribed over these areas. These areas are mainly concentrated on the slopes of the mountains and plateau tops.

III. Exotic Species

This stock type represents areas earlier planted with the exotic species like Glyricidia, Prosopis, Subabul, Nilgiri and *Acacia auriculiformis*. Irrespective of their height, they are grouped into single stock class. In stock map these areas are shown in dark orange with slant cross lines.

Exotic Species here are mainly Glyricidia and in some locations Nilgiri, Prosopis, Acacia (*A. auriculiformis*), etc. are prominent. These spp. comprises around 5% of total stock. This stock was separately marked looking at the need of Glyricidia removal. Exotic Species occurrence is seen evenly distributed in the central part of division. These areas are mostly on gentle slopes.

IV. Under stocked areas

Some areas remain under stocked, which are suitable for carrying out new plantations. These areas include degraded forest areas or areas with failed plantation. These areas are shown in stock map with simple yellow fill.

Here, in Pune 1 % of Area is understocked; such areas are prescribed for Afforestation Working Circle. Distribution of understocked area is seen evenly throughout the division except the High dense areas of western side of division.

V. Plantations

Areas having plantations from year 2016 to 2021 and where the trees are currently less than 3 metres are included in this class. With the help of GPS polygons received from Pune Forest division and field observations, areas are marked on stock map with simple emerald green fill.

Analysis shows that 0.89 % of forest area of Pune division falls under this class. The distribution of this class is more towards eastern side of the division. Mixed species plantation is carried out in such areas, which will successively turn into mixed forest after good number of years.

VI. Teak

These are the forests areas which are dominated by Teak. Where occurrence of teak is more than 50 % and general height is more than 3 mt. such areas are included in this class. In stock map area is shown with Blue colour line pattern. Teak forest type is subdivided into seven stock classes according to height of trees.

Analysis of forest area shows that almost 2 % area of Pune Forest division is under teak stock type, out of which sub class type V-b i.e., species having height 3 to 6 mt. is dominant. As shown in density map majority of teak forest stock type is observed in Paud, Shirota, Bhamburda and Wadgaon ranges of Pune Forest division.

Stock class wise distribution: -

Sr. No.	Stock Type	Stock Class	Percent Occurrence	Area Ha.
1	Teak	V-b 3 - 6 m	1.11	735.40
2	Teak	V-a 6 – 9 m	0.20	133.16
3	Teak	IV-b 9 – 12 m	0.20	130.68
4	Teak	IV-a 12 – 15 m	0.25	162.34
5	Teak	III 15 – 21 m	0.01	3.65
	Total		1.77	1165.23

VII. Grass

Majority of area covered with good grasses with or without sparse vegetation is included in this stock type. In stock map it is shown with violet simple fill. Stock analysis shows that total 3.27 % of total area comes under this stock type, which is 2160.77 ha. These are exclusive patches of grasslands only. Apart from these, steep slopes of mountains also have good grass cover but it is included in Uncultivable Forest lands because human intervention for cultivation is very difficult. Considering this stock map and ground reality, it is proposed that all such areas to be allotted to Fodder Management Working Circle.

VIII. Scrub

Areas having dense and stunted growth of spiny shrubs and trees are classified under this type of stock. In stock map this area is shown with brown colour.

Stock analysis shows that 4305.16 ha. area is under scrub stock type which comprises 6.51 % of total forest area. Most of the scrub class is in central region. Predominant species are Karonda, Rametha, Lantana, Khair, Hivar, Ber etc.

IX. Forest Blank (Encroachment/ Cultivation)

Forest Blanks (Encroachments/ cultivations) were detected during field exercise and using satellite images. Such encroachments were shown in stock map with black dotted red colour. There is possibility that these areas were already disforested and distributed. This need to be verified and encroachments should be evicted by Pune Forest division as land in Pune is very valuable. Total area

detected under prima facie encroachment/ cultivation is 4869.06 ha., this comes to 7.36 % of forest area of division.

X. Bamboo

Areas with exclusive bamboo clumps are mapped according to density of clumps per Ha. But bamboo is also present as under crop in plenty of plantations which could not be segregated separately so it is not included here but, included under mixed stock type. Bamboo stock is divided into three classes as shown below. Area having Bamboo clumps is shown in stock maps, in emerald green colour with black line pattern. Total area under bamboo is 99.11 Ha. This comes to 0.15 % of forest area of division.

Sr No.	Stock Type	Stock Class	% Occurrence	Area Ha.
1	Bamboo-Well Stocked	Well stocked: 100 and above clumps/ ha	0.00	1.55
2	Bamboo-Moderately Stocked	Moderately stocked: 50 to 100 clumps/ ha	0.15	96.85
3	Bamboo-Under Stocked	Under stocked: Below 50 clumps/ ha	0.00	0.71
	Total		0.15	99.11

XI. Water Bodies

Some forest areas have been diverted for irrigation projects. Forest area under submergence is shown in stock map with dark blue colour. Total area under this category comes to 523.99 Ha. i.e., 0.79 % of total forest area

3.2 PLANT SPECIES DIVERSITY

3.1.2 Analysis and Results.

Based on the analysis of the IVI index three most dominant species found are Teak, Ain & Glyricidia are found in most of the division. The details of analysis are as follows.

Species Name (Local)	Total No. of Trees Counted in Sample Plots	Frequency		Species Present in No. of Plots	Density		Basal Area		Importance Value Index (IVI)
		% Frequency	Relative Frequency		Density	Relative Density	Sum of Basal Area of Species	Relative Basal Area	
A	B	C	D	E	F	G	H	I	J
Anjan	582	110.65	4.27%	82	0.156	2.75%	11.622	4.22%	11.24%
Anjani	85	16.16	0.62%	18	0.034	0.60%	1.503	0.55%	1.77%
Arjun	1	0.19	0.01%	1	0.002	0.03%	0.007	0.00%	0.04%
Mango	145	27.57	1.06%	71	0.135	2.38%	11.484	4.17%	7.61%
Aakuj	1	0.19	0.01%	1	0.002	0.03%	0.007	0.00%	0.04%
Accacia	133	25.29	0.98%	44	0.084	1.48%	4.432	1.61%	4.06%
Apta	177	33.65	1.30%	36	0.068	1.21%	1.869	0.68%	3.18%
Apti	12	2.28	0.09%	1	0.002	0.03%	0.061	0.02%	0.14%
Alu	33	6.27	0.24%	18	0.034	0.60%	0.559	0.20%	1.05%
Awla	86	16.35	0.63%	28	0.053	0.94%	1.059	0.38%	1.95%
Ashind	24	4.56	0.18%	8	0.015	0.27%	1.010	0.37%	0.81%
Asana	332	63.12	2.44%	113	0.215	3.79%	6.579	2.39%	8.61%
Others	14	2.66	0.10%	3	0.006	0.10%	0.387	0.14%	0.34%
Umber	294	55.89	2.16%	100	0.190	3.35%	16.315	5.92%	11.43%
Ukhumbi	1	0.19	0.01%	1	0.002	0.03%	0.010	0.00%	0.04%
Oudh	3	0.57	0.02%	2	0.004	0.07%	0.034	0.01%	0.10%
Ain	1278	242.97	9.38%	199	0.378	6.67%	22.198	8.06%	24.11%

Kans	4	0.76	0.03%	1	0.002	0.03%	0.018	0.01%	0.07%
Kadipatta	55	10.46	0.40%	13	0.025	0.44%	0.293	0.11%	0.95%
Kadunimb	28	5.32	0.21%	21	0.040	0.70%	0.635	0.23%	1.14%
Kadamb	27	5.13	0.20%	1	0.002	0.03%	0.055	0.02%	0.25%
Karanj	182	34.60	1.34%	61	0.116	2.04%	3.552	1.29%	4.67%
Karamb	36	6.84	0.26%	12	0.023	0.40%	1.030	0.37%	1.04%
Karvand	76	14.45	0.56%	40	0.076	1.34%	0.316	0.11%	2.01%
Kalamb	20	3.80	0.15%	7	0.013	0.23%	0.424	0.15%	0.54%
Kanchan	92	17.49	0.67%	25	0.048	0.84%	1.174	0.43%	1.94%
Kaju Amba	1	0.19	0.01%	1	0.002	0.03%	0.011	0.00%	0.04%
Kaju Maya	1	0.19	0.01%	1	0.002	0.03%	0.015	0.01%	0.05%
Kate Kambal	1	0.19	0.01%	1	0.002	0.03%	0.005	0.00%	0.04%
Kate Kambal	7	1.33	0.05%	7	0.013	0.23%	0.154	0.06%	0.34%
Kate Savar	2	0.38	0.01%	2	0.004	0.07%	0.043	0.02%	0.10%
Katekumbh	12	2.28	0.09%	12	0.023	0.40%	0.549	0.20%	0.69%
Katebabhul	2	0.38	0.01%	1	0.002	0.03%	0.037	0.01%	0.06%
Kate savar	133	25.29	0.98%	29	0.055	0.97%	3.139	1.14%	3.09%
Kadekudal	4	0.76	0.03%	1	0.002	0.03%	0.217	0.08%	0.14%
Katraj	2	0.38	0.01%	2	0.004	0.07%	0.000	0.00%	0.08%
Karvi	24	4.56	0.18%	7	0.013	0.23%	0.488	0.18%	0.59%
Kala Kuda	1	0.19	0.01%	1	0.002	0.03%	0.013	0.00%	0.05%
Kala kuda	5	0.95	0.04%	5	0.010	0.17%	0.070	0.03%	0.23%

Kalumbar	11	2.09	0.08%	10	0.019	0.34%	0.450	0.16%	0.58%
Kaval	11	2.09	0.08%	4	0.008	0.13%	0.022	0.01%	0.22%
Kashing	4	0.76	0.03%	1	0.002	0.03%	0.008	0.00%	0.07%
Kashid	42	7.98	0.31%	11	0.021	0.37%	1.008	0.37%	1.04%
Kasi	1	0.19	0.01%	1	0.002	0.03%	0.021	0.01%	0.05%
Kinjal	43	8.17	0.32%	5	0.010	0.17%	0.304	0.11%	0.59%
Kinnai	116	22.05	0.85%	21	0.040	0.70%	1.109	0.40%	1.96%
Kirnat	1	0.19	0.01%	1	0.002	0.03%	0.062	0.02%	0.06%
Lilwa	1	0.19	0.01%	1	0.002	0.03%	0.093	0.03%	0.07%
Kumbhal	3	0.57	0.02%	1	0.002	0.03%	0.091	0.03%	0.09%
Kumbhi	97	18.44	0.71%	32	0.061	1.07%	1.791	0.65%	2.43%
Kukhumbar	5	0.95	0.04%	1	0.002	0.03%	0.259	0.09%	0.16%
Kuda	31	5.89	0.23%	18	0.034	0.60%	0.946	0.34%	1.17%
Kubal	5	0.95	0.04%	1	0.002	0.03%	0.038	0.01%	0.08%
kurha	24	4.56	0.18%	7	0.013	0.23%	0.914	0.33%	0.74%
Kinjal	12	2.28	0.09%	2	0.004	0.07%	0.065	0.02%	0.18%
Kenhi	2	0.38	0.01%	1	0.002	0.03%	0.012	0.00%	0.05%
Keasr	2	0.38	0.01%	1	0.002	0.03%	0.021	0.01%	0.06%
Kombal	30	5.70	0.22%	7	0.013	0.23%	0.596	0.22%	0.67%
Kokam	26	4.94	0.19%	10	0.019	0.34%	1.119	0.41%	0.93%
Kodekudal	10	1.90	0.07%	3	0.006	0.10%	0.412	0.15%	0.32%
Kobal	2	0.38	0.01%	2	0.004	0.07%	0.032	0.01%	0.09%
Kolav	1	0.19	0.01%	1	0.002	0.03%	0.179	0.07%	0.11%

Kolamb	22	4.18	0.16%	10	0.019	0.34%	0.345	0.13%	0.62%
Kolab	1	0.19	0.01%	1	0.002	0.03%	0.014	0.01%	0.05%
Kharoti	2	0.38	0.01%	1	0.002	0.03%	0.006	0.00%	0.05%
Khirdi	1	0.19	0.01%	1	0.002	0.03%	0.016	0.01%	0.05%
Khair	467	88.78	3.43%	90	0.171	3.02%	4.794	1.74%	8.18%
Khokli	1	0.19	0.01%	1	0.002	0.03%	0.008	0.00%	0.04%
Gunj	1	0.19	0.01%	1	0.002	0.03%	0.037	0.01%	0.05%
Gulmohar	4	0.76	0.03%	2	0.004	0.07%	0.065	0.02%	0.12%
Gulab	1	0.19	0.01%	1	0.002	0.03%	0.011	0.00%	0.04%
Guli	3	0.57	0.02%	3	0.006	0.10%	0.100	0.04%	0.16%
Gela	87	16.54	0.64%	33	0.063	1.11%	1.458	0.53%	2.27%
Goti	24	4.56	0.18%	8	0.015	0.27%	0.216	0.08%	0.52%
Goy	1	0.19	0.01%	1	0.002	0.03%	0.045	0.02%	0.06%
Goyla	1	0.19	0.01%	1	0.002	0.03%	0.009	0.00%	0.04%
Govinda	23	4.37	0.17%	9	0.017	0.30%	0.729	0.26%	0.74%
Gliricidia	972	184.79	7.13%	67	0.127	2.25%	13.271	4.82%	14.20%
Ghatbor	1	0.19	0.01%	1	0.002	0.03%	0.009	0.00%	0.04%
Ghaywan	1	0.19	0.01%	1	0.002	0.03%	0.011	0.00%	0.04%
Ghutivor	7	1.33	0.05%	4	0.008	0.13%	0.047	0.02%	0.20%
Ghotawal	1	0.19	0.01%	1	0.002	0.03%	0.003	0.00%	0.04%
Ghoti	33	6.27	0.24%	12	0.023	0.40%	0.339	0.12%	0.77%
Ghoyna	4	0.76	0.03%	4	0.008	0.13%	0.332	0.12%	0.28%
Chandan	3	0.57	0.02%	2	0.004	0.07%	0.044	0.02%	0.11%

Chandjhad	5	0.95	0.04%	1	0.002	0.03%	0.245	0.09%	0.16%
Chanda	6	1.14	0.04%	6	0.011	0.20%	0.194	0.07%	0.32%
Chandada	2	0.38	0.01%	1	0.002	0.03%	0.016	0.01%	0.05%
Char	1	0.19	0.01%	1	0.002	0.03%	0.008	0.00%	0.04%
Charoli	1	0.19	0.01%	1	0.002	0.03%	0.006	0.00%	0.04%
Chink	1	0.19	0.01%	1	0.002	0.03%	0.019	0.01%	0.05%
Chinch	17	3.23	0.12%	4	0.008	0.13%	0.768	0.28%	0.54%
Chinchkokal	7	1.33	0.05%	3	0.006	0.10%	0.283	0.10%	0.25%
Chinchardi	3	0.57	0.02%	2	0.004	0.07%	0.016	0.01%	0.09%
Chilar	21	3.99	0.15%	8	0.015	0.27%	0.143	0.05%	0.47%
Jambhul	570	108.37	4.18%	94	0.179	3.15%	10.446	3.79%	11.13%
Tantani	3	0.57	0.02%	3	0.006	0.10%	0.005	0.00%	0.12%
Tehbhurni	20	3.80	0.15%	3	0.006	0.10%	0.235	0.09%	0.33%
Totolis	28	5.32	0.21%	17	0.032	0.57%	0.438	0.16%	0.93%
Denkal	1	0.19	0.01%	1	0.002	0.03%	0.004	0.00%	0.04%
Tartalis	17	3.23	0.12%	6	0.011	0.20%	0.248	0.09%	0.42%
Tarad	1	0.19	0.01%	1	0.002	0.03%	0.005	0.00%	0.04%
Tarwad	14	2.66	0.10%	1	0.002	0.03%	0.000	0.00%	0.14%
Talai	12	2.28	0.09%	2	0.004	0.07%	0.064	0.02%	0.18%
Tambat	55	10.46	0.40%	21	0.040	0.70%	0.637	0.23%	1.34%
Tabuti	4	0.76	0.03%	1	0.002	0.03%	0.095	0.03%	0.10%
Tamhan	33	6.27	0.24%	1	0.002	0.03%	0.056	0.02%	0.30%
Tupate	2	0.38	0.01%	2	0.004	0.07%	0.004	0.00%	0.08%

Toral	5	0.95	0.04%	5	0.010	0.17%	0.040	0.01%	0.22%
Tosinta	2	0.38	0.01%	1	0.002	0.03%	0.037	0.01%	0.06%
Dhaman	418	79.47	3.07%	102	0.194	3.42%	6.401	2.32%	8.81%
Dhayti	10	1.90	0.07%	6	0.011	0.20%	0.038	0.01%	0.29%
Dhawda	167	31.75	1.23%	19	0.036	0.64%	1.847	0.67%	2.53%
Dhyawan	4	0.76	0.03%	3	0.006	0.10%	0.029	0.01%	0.14%
Nana	89	16.92	0.65%	20	0.038	0.67%	1.459	0.53%	1.85%
Nim	74	14.07	0.54%	21	0.040	0.70%	0.593	0.22%	1.46%
Nirgud	1	0.19	0.01%	1	0.002	0.03%	0.003	0.00%	0.04%
Nirgudi	9	1.71	0.07%	8	0.015	0.27%	0.070	0.03%	0.36%
Nilgiri	173	32.89	1.27%	20	0.038	0.67%	6.152	2.23%	4.17%
Nivdung	35	6.65	0.26%	16	0.030	0.54%	0.581	0.21%	1.00%
Nival	2	0.38	0.01%	1	0.002	0.03%	0.002	0.00%	0.05%
Palas	38	7.22	0.28%	13	0.025	0.44%	0.526	0.19%	0.91%
Pangara	155	29.47	1.14%	71	0.135	2.38%	3.492	1.27%	4.79%
Pandharkadi	1	0.19	0.01%	1	0.002	0.03%	0.011	0.00%	0.04%
Pandharpali	1	0.19	0.01%	1	0.002	0.03%	0.004	0.00%	0.04%
Pandhri	7	1.33	0.05%	7	0.013	0.23%	0.180	0.07%	0.35%
Pakuda	1	0.19	0.01%	1	0.002	0.03%	0.029	0.01%	0.05%
Payar	20	3.80	0.15%	5	0.010	0.17%	0.281	0.10%	0.42%
Parang	3	0.57	0.02%	2	0.004	0.07%	0.089	0.03%	0.12%
Parjambhal	309	58.75	2.27%	86	0.163	2.88%	7.225	2.62%	7.77%
Paras	34	6.46	0.25%	4	0.008	0.13%	0.943	0.34%	0.73%

Pashi	1	0.19	0.01%	1	0.002	0.03%	0.056	0.02%	0.06%
Pimpran	15	2.85	0.11%	13	0.025	0.44%	0.027	0.01%	0.56%
Pimpal	70	13.31	0.51%	16	0.030	0.54%	1.057	0.38%	1.43%
Pivli	1	0.19	0.01%	1	0.002	0.03%	0.013	0.00%	0.05%
Piswa	90	17.11	0.66%	8	0.015	0.27%	1.481	0.54%	1.47%
Pisa	35	6.65	0.26%	3	0.006	0.10%	0.403	0.15%	0.50%
Pokhadi	3	0.57	0.02%	1	0.002	0.03%	0.113	0.04%	0.10%
Prosophus	157	29.85	1.15%	27	0.051	0.91%	0.482	0.18%	2.23%
Fanas	1	0.19	0.01%	1	0.002	0.03%	0.079	0.03%	0.07%
Fansand	9	1.71	0.07%	6	0.011	0.20%	0.403	0.15%	0.41%
Fansada	8	1.52	0.06%	7	0.013	0.23%	0.332	0.12%	0.41%
Fashi	17	3.23	0.12%	3	0.006	0.10%	0.234	0.08%	0.31%
Fapat	21	3.99	0.15%	3	0.006	0.10%	0.323	0.12%	0.37%
Fafti	45	8.56	0.33%	7	0.013	0.23%	0.277	0.10%	0.67%
Fafat	4	0.76	0.03%	2	0.004	0.07%	0.019	0.01%	0.10%
Fafti	1	0.19	0.01%	1	0.002	0.03%	0.020	0.01%	0.05%
Frutia	3	0.57	0.02%	1	0.002	0.03%	0.022	0.01%	0.06%
Bahawa	20	3.80	0.15%	12	0.023	0.40%	0.197	0.07%	0.62%
Batbor	2	0.38	0.01%	1	0.002	0.03%	0.005	0.00%	0.05%
Babhul	179	34.03	1.31%	60	0.114	2.01%	3.582	1.30%	4.63%
Bartondi	10	1.90	0.07%	4	0.008	0.13%	0.049	0.02%	0.23%
Bawad	3	0.57	0.02%	1	0.002	0.03%	0.022	0.01%	0.06%
Bilwa	23	4.37	0.17%	7	0.013	0.23%	0.428	0.16%	0.56%

Buda	1	0.19	0.01%	1	0.002	0.03%	0.004	0.00%	0.04%
Buya	3	0.57	0.02%	1	0.002	0.03%	0.105	0.04%	0.09%
Bel	33	6.27	0.24%	1	0.002	0.03%	0.063	0.02%	0.30%
Behda	204	38.78	1.50%	42	0.080	1.41%	4.584	1.66%	4.57%
Bondara	27	5.13	0.20%	11	0.021	0.37%	0.727	0.26%	0.83%
Boti	1	0.19	0.01%	1	0.002	0.03%	0.051	0.02%	0.06%
Bor	53	10.08	0.39%	32	0.061	1.07%	0.410	0.15%	1.61%
Borkoti	10	1.90	0.07%	1	0.002	0.03%	0.143	0.05%	0.16%
Bosur	1	0.19	0.01%	1	0.002	0.03%	0.007	0.00%	0.04%
Bhambat	2	0.38	0.01%	1	0.002	0.03%	0.039	0.01%	0.06%
Bhutiya	30	5.70	0.22%	9	0.017	0.30%	0.562	0.20%	0.73%
Bhokar	11	2.09	0.08%	4	0.008	0.13%	0.366	0.13%	0.35%
Makdi	13	2.47	0.10%	3	0.006	0.10%	0.420	0.15%	0.35%
Mahadung	2	0.38	0.01%	2	0.004	0.07%	0.040	0.01%	0.10%
Makad Limb	10	1.90	0.07%	2	0.004	0.07%	0.078	0.03%	0.17%
Makdi	1	0.19	0.01%	1	0.002	0.03%	0.016	0.01%	0.05%
Mad	7	1.33	0.05%	5	0.010	0.17%	0.230	0.08%	0.30%
Malwa	14	2.66	0.10%	11	0.021	0.37%	0.522	0.19%	0.66%
Murmuti	2	0.38	0.01%	2	0.004	0.07%	0.008	0.00%	0.08%
Murudsheng	9	1.71	0.07%	2	0.004	0.07%	0.183	0.07%	0.20%
Medgul	1	0.19	0.01%	1	0.002	0.03%	0.005	0.00%	0.04%
Mogir	149	28.33	1.09%	29	0.055	0.97%	2.462	0.89%	2.96%

Mohgani	37	7.03	0.27%	2	0.004	0.07%	0.088	0.03%	0.37%
Moha	36	6.84	0.26%	19	0.036	0.64%	0.972	0.35%	1.25%
Rajkati	1	0.19	0.01%	1	0.002	0.03%	0.007	0.00%	0.04%
Ranbhendi	14	2.66	0.10%	3	0.006	0.10%	0.171	0.06%	0.27%
Ramphal	1	0.19	0.01%	1	0.002	0.03%	0.014	0.01%	0.05%
Rameta	12	2.28	0.09%	7	0.013	0.23%	0.128	0.05%	0.37%
Raywal	2	0.38	0.01%	2	0.004	0.07%	0.012	0.00%	0.09%
Ruiti	3	0.57	0.02%	3	0.006	0.10%	0.010	0.00%	0.13%
Lalat	58	11.03	0.43%	3	0.006	0.10%	0.465	0.17%	0.69%
Limb	143	27.19	1.05%	64	0.122	2.15%	1.547	0.56%	3.76%
Lokhandi	45	8.56	0.33%	12	0.023	0.40%	2.379	0.86%	1.60%
Wad	54	10.27	0.40%	3	0.006	0.10%	0.374	0.14%	0.63%
Warang	1	0.19	0.01%	1	0.002	0.03%	0.022	0.01%	0.05%
Warangati	4	0.76	0.03%	2	0.004	0.07%	0.027	0.01%	0.11%
Waranga	1	0.19	0.01%	1	0.002	0.03%	0.016	0.01%	0.05%
Warak	56	10.65	0.41%	9	0.017	0.30%	1.915	0.70%	1.41%
Waras	135	25.67	0.99%	58	0.110	1.94%	3.551	1.29%	4.22%
Waru	1	0.19	0.01%	1	0.002	0.03%	0.056	0.02%	0.06%
Walwa	15	2.85	0.11%	12	0.023	0.40%	0.569	0.21%	0.72%
Wavding	1	0.19	0.01%	1	0.002	0.03%	0.001	0.00%	0.04%
Wilayticheri	2	0.38	0.01%	1	0.002	0.03%	0.004	0.00%	0.05%
Wekhal	2	0.38	0.01%	1	0.002	0.03%	0.015	0.01%	0.05%
Wedibabhul	11	2.09	0.08%	3	0.006	0.10%	0.025	0.01%	0.19%

Wela	34	6.46	0.25%	16	0.030	0.54%	2.423	0.88%	1.67%
Shindadi	30	5.70	0.22%	9	0.017	0.30%	0.361	0.13%	0.65%
Shindi	6	1.14	0.04%	3	0.006	0.10%	0.194	0.07%	0.22%
Shikekai	9	1.71	0.07%	8	0.015	0.27%	0.092	0.03%	0.37%
Shirad	9	1.71	0.07%	3	0.006	0.10%	0.277	0.10%	0.27%
Shirabh	1	0.19	0.01%	1	0.002	0.03%	0.007	0.00%	0.04%
Shiras	25	4.75	0.18%	12	0.023	0.40%	1.987	0.72%	1.31%
Shivan	157	29.85	1.15%	36	0.068	1.21%	3.298	1.20%	3.56%
Shisam	18	3.42	0.13%	7	0.013	0.23%	0.222	0.08%	0.45%
Shisav	17	3.23	0.12%	5	0.010	0.17%	0.163	0.06%	0.35%
Shisoo	105	19.96	0.77%	37	0.070	1.24%	2.246	0.82%	2.83%
Shendri	5	0.95	0.04%	5	0.010	0.17%	0.088	0.03%	0.24%
Sherad	8	1.52	0.06%	2	0.004	0.07%	0.268	0.10%	0.22%
Salai	24	4.56	0.18%	5	0.010	0.17%	0.178	0.06%	0.41%
Sagwan	1859	353.42	13.64%	52	0.099	1.74%	39.812	14.46%	29.84%
Sarang	1	0.19	0.01%	1	0.002	0.03%	0.005	0.00%	0.04%
Sarphal	15	2.85	0.11%	2	0.004	0.07%	0.311	0.11%	0.29%
Sarola	35	6.65	0.26%	6	0.011	0.20%	0.513	0.19%	0.64%
Savar	149	28.33	1.09%	72	0.137	2.41%	5.290	1.92%	5.43%
Sitafal	2	0.38	0.01%	2	0.004	0.07%	0.008	0.00%	0.08%
Subabhul	31	5.89	0.23%	14	0.027	0.47%	0.519	0.19%	0.89%
Surangi	16	3.04	0.12%	8	0.015	0.27%	0.375	0.14%	0.52%
Soyir	1	0.19	0.01%	1	0.002	0.03%	0.005	0.00%	0.04%
Sonchafa	1	0.19	0.01%	1	0.002	0.03%	0.029	0.01%	0.05%

Haldu	2	0.38	0.01%	2	0.004	0.07%	0.048	0.02%	0.10%
Hali	6	1.14	0.04%	6	0.011	0.20%	0.145	0.05%	0.30%
Hingan	1	0.19	0.01%	1	0.002	0.03%	0.004	0.00%	0.04%
Hingan	1	0.19	0.01%	1	0.002	0.03%	0.002	0.00%	0.04%
Hirda	578	109.89	4.24%	100	0.190	3.35%	15.407	5.59%	13.19%
Hivar	106	20.15	0.78%	34	0.065	1.14%	1.277	0.46%	2.38%
Henkal	3	0.57	0.02%	3	0.006	0.10%	0.011	0.00%	0.13%
Grand Total	13631	2591.44	100.00%	2983	5.671	100.00%	275.384	100.00%	300.00%

3.3: STATUS OF BIODIVERSITY CONSERVATION IN FORESTS

The forests of Pune division are rich in biodiversity. However, in some places this region is occupied by exotic species. While conserving the biodiversity here, it is necessary to pay attention to increase the overall forest biodiversity by protecting the biodiversity from frequent fires, encroachments etc.

Maintaining and enhancing plant diversity and animal richness in the area is essential through the sincere efforts of the department, public support, initiatives for setting up biodiversity committees, mitigation of wildlife threats, etc.

Biodiversity Conservation

As per information available from Maharashtra State Biodiversity Board office, total 1399 BMCs have been formed in Pune Forest division. The Biodiversity Management Committee, at Gram Panchayat or Municipal Council, Nagar Panchayat or Municipal Corporation as the case may be, may decide the terms on which it would permit access to biodiversity resources and associated knowledge to different parties for various purposes within their jurisdiction and levy charges by way of collection fees from any person for accessing or collecting any biological resource for commercial purpose from the area falling within its jurisdiction. The major share of levy charged for the material collected / cultivated from private land should be given to the owner /cultivator of the land / knowledge holder/s and the balance should be deposited in Local Biodiversity Fund of the Biodiversity Management Committee. The levy charged for the material collected / cultivated from the Government land should be totally deposited in Local Biodiversity Fund of Biodiversity Management Committee.

Establishment and maintenance of the People's Biodiversity Register is one of the BMC's very important functions. The Register shall contain comprehensive information on availability and knowledge of local biological resources like folk varieties and cultivars, domesticated stocks, breeds of animals, land races, etc. and their medicinal or any other use, and/or any other traditional knowledge associated with them. The maintained PBR would require validation by the community, BMC and the SBB. Besides this, the committee shall also maintain a register containing information about the details of the access to biological resources and traditional knowledge granted, collection of fees imposed, and benefits derived and the mode of their sharing.

The other functions of the BMC are to consult on any matter referred to it by the State Biodiversity Board or Authority for granting approval, and to maintain data about the local vaidu (traditional healer) and practitioners using the biological resources.

The National Biodiversity Authority (NBA) specified format(s) of the People's Biodiversity Register are to be used. The particulars include the format for electronic database. The NBA and the SBBs shall provide guidance and technical support to the BMCs for preparing People's Biodiversity Registers.

Communities need to be capacitated and empowered to address the biodiversity concerns of their respective villages and to take responsibility as is recommended within the Biological Diversity Act, 2002. As BMC's main function is to prepare the PBR in consultation with the local people, the committee members will need support and training on the concepts of biodiversity, conservation concerns, tools and methods for documentation including mapping, and the safety, security and maintenance of the Register.

3.4: STATUS OF SPECIES PRONE TO OVER EXPLOITATION

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

During last working plan period 47 cases of poaching were registered.

There is pressure on medicinal plants that are being exploited in the division. There is no record of amount of NTFP (medicinal plants) exploited from the forests. It is also a matter of concern that not all cases of illicit exploitation are actually detected, considering the covert nature of the crimes. Extra efforts need to be taken to protect species prone to exploitation.

3.5: CONSERVATION OF GENETIC RESOURCES

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

Currently the Research Wing has three research plots in Pune Division & details are as follows.

Sr. No.	Research Plot Location	Work Done
1.	Parwadi, Tal. Maval (10 ha.)	1. In year 2003-04 Shatavari was planted on 1 ha. plot 2. In year 2005-06 Aonla, Shivan, Chafa, Bel, Sonmukhi, Sandalwood, Kanchan, etc. medicinal plants were planted on 2 ha. plot

		3. In year 2009-10 SitaAshoka was planted on 0.25 ha. plot
2.	Pachgaon –Parvati (1 ha)	In year 2017-18 a 1ha Plot Miyawaki plantation method was adopted and was successful.
3.	Tamhini (5 ha.)	In year 2008-09 NR of species like Bilwa, Anjan, Jamun, Dhayati, etc. was studied by forming 41 grids of size 2 x 2 m and preservation of Genetic Resources was done.

3.5.1. Sacred Groves

Definition: “Sacredness” of a traditionally held space (often wild) by a community is behind the creation, protection and preservation of such spaces. Any management practice must thus respect and uphold for a sustained result, this value of sacredness, above anything else, of the site in question.

Sacred groves comprise of patches of forests or natural vegetation – from a few trees to forests of several acres – that are usually dedicated to local folk deities or tree spirits. These spaces are protected by local communities because of their religious beliefs and traditional rituals that run through several generations.

Often the Sacred Groves, existing like an island in a largely agrarian landscape, act as the repository of once prevalent biodiversity of the region. Thus, the people’s faith in the deity believed to reside in the sacred grove helps protect the native biodiversity as well.

3.5.2.1 Significance

Sacred groves carry important significance for the spiritual as well as material well-being of local communities. Thus, traditionally held do’s and don’ts govern their protection and preservation practices. The key significances of sacred groves are:

A) General sense of well-being amongst the local people in terms of favourable climate, food security, safety from outbreak of disease/s etc.

It is a commonly held belief that the village devta / devi (residing in the sacred grove) must not be offended if the community’s well-being is to be ensured.

B) Protection and preservation of local biodiversity

Local biodiversity in form of floral species of trees, shrubs, herbs, climbers as well faunal species of mammals, birds, reptiles, insects etc. find suitable habitat in wilderness provided by the

sacred groves. Often sacred groves on account of their antiquity would act as the depository of endemic species of plants and animals.

c) Protection and preservation of local water sources

Many of the sacred groves would either encompass a water body or a stream passing through it. These provide habitat to a varied form of aquatic and riparian biodiversity as well as protect springs and aquifers that feed these water bodies.

d) Provider of wood and herbs for religious and medicinal use

While in most cases, a harvest from within a sacred grove is frowned upon and considered a sacrilege (inviting retribution on the offender or even the community by the deity), herbs and other plant material (including wood) meant as raw material for performance of some religious activity or production of life saving traditional medicine by the local Vaidya (medicine man) are collected and used.

3.5.2.2 Common Threats

a) Modernization

With modernization through use of multimedia, formal education and urban influences making inroads into rural areas, there is a loosening of traditional beliefs and practices, with new generation showing little interest in things ‘traditional’. While such influences may have their positive aspects, the collateral damage could be in form of a loss of traditional spaces like sacred groves through disinterest and little care. This needs to be halted through sensible and logic-based interventions.

b) Fire, unauthorized removals and unregulated grazing

Tangible threats in form of outbreak of wild fires, indiscriminate removal (resulting from poor care, protection and upkeep) of vegetation and unregulated grazing by livestock could prove deleterious and these need to be addressed with a firm hand.

c) Non-Forestry use without adequate mitigation measures

Developmental projects (roads, mining, dams, canals, industries etc.) if not planned without adequate mitigation measures, they are resulting in physical destruction of such sacred spaces and hence, planning must take into account such potential or planned schemes.

d) Small size

Many sacred groves sites are small in size (less than 1 hectare). This fact should in no way be seen to diminish their importance, usefulness or relevance.

e) Invasive species

Many forests and wilderness areas in India are infested with invasive species and weeds like Lantana, Ranmodi (*Eupatorium repandum*), rantulas, cosmos, etc. Unless such invasive have on account of long period of time become naturalized and entered the local folk lore and use, the management planning may consider their exclusion from the site through active intervention.

The list of 65 sacred groves in Pune Division were identified during a study by BNHS under World Bank aided Maharashtra Forestry Project, 1999. All the groves in this division occur in Agro climatic zone 4 & 5. However, there are many more sacred groves which have not been mentioned in that plan and are needed to be checked.

List of Sacred Groves recorded in agro climatic zone 4 of Maharashtra

Agro Climatic zone 4 is “Transition zone I”. It is an Eastern strip running parallel to Sahyadri with average rainfall 1750-2000 mm. It includes western hilly parts of Pune, Satara, Kolhapur and eastern hilly part of Sindhudurg districts.

Sr. No.	District	Taluka	Nearest Village	Area (Ha)	Deity
1	Pune	Maval	Karla	3.40	
2	Pune	Maval	Sabalwadi	0.05	Bapujibuva
3	Pune	Maval	Somvadi	3.00	Somjai
4	Pune	Maval	Vahangaon	6.07	Mahadev
5	Pune	Maval	Vahangaon	20.23	Anjubai
6	Pune	Mulshi	Adagaon	0.20	Chowdai
7	Pune	Mulshi	Admal	4.05	Kalubai
8	Pune	Mulshi	Admal	0.03	Kalkai
9	Pune	Mulshi	Admal	0.02	Mhasoba
10	Pune	Mulshi	Admal	0.40	Bedjai
11	Pune	Mulshi	Ambegaon	0.01	Kalubai
12	Pune	Mulshi	Ambegaon	0.40	Bapujibuva
13	Pune	Mulshi	Ambegaon	0.80	--
14	Pune	Mulshi	Andhale	0.80	Umbrai
15	Pune	Mulshi	Avalas	0.10	Dongarai
16	Pune	Mulshi	Badhe	Unknown	Waghajai
17	Pune	Mulshi	Bhadaskhonda	0.40	Waghoba
18	Pune	Mulshi	Bhadaskhonda	0.20	Waghajai
19	Pune	Mulshi	Bhematmal	0.02	Vadajai
20	Pune	Mulshi	Bhuini	1.21	Amajaidevi

21	Pune	Mulshi	Bhuini	0.81	Somaji
22	Pune	Mulshi	Bhuini	0.02	--
23	Pune	Mulshi	Chandivali	0.40	Lokhare
24	Pune	Mulshi	Chandivali	2.20	Waghajai
25	Pune	Mulshi	Chikhalagaon	1.50	Waghajai
26	Pune	Mulshi	Dakahane	Unknown	Jakhanidevi
27	Pune	Mulshi	Dakahane	Unknown	Kamatjai
28	Pune	Mulshi	Dasave	0.41	Kalbhairai
29	Pune	Mulshi	Dasave	0.81	Samajai
30	Pune	Mulshi	Dasave	0.08	Kadtai
31	Pune	Mulshi	Dasave	0.01	Raghai
32	Pune	Mulshi	Dasave	5.50	Boreshwar
33	Pune	Mulshi	Dhadavali	1.62	Somjai
34	Pune	Mulshi	Dhadoli	0.04	Mariai
35	Pune	Mulshi	Dhamanovol	4.00	--
36	Pune	Mulshi	Donagargaon	0.81	Bhairoba
37	Pune	Mulshi	Donagargaon	0.81	Laxmidevi
38	Pune	Mulshi	Khamboli	0.20	Waghaji
39	Pune	Mulshi	Khamboli	0.20	Karanjubai
40	Pune	Mulshi	Kolavade	Unknown	Marai
41	Pune	Mulshi	Kule	0.20	Waghjai
42	Pune	Mulshi	Malkhed	0.01	Bapujibuwa
43	Pune	Mulshi	Nandivali	4.50	Waghjai
44	Pune	Mulshi	Nandivali	2.00	Waghjai
45	Pune	Mulshi	Nanegaon	0.02	Taljai
46	Pune	Mulshi	Padalghar	0.04	Somjaidevi
47	Pune	Mulshi	Palase	0.02	Mariai
48	Pune	Mulshi	Palase	0.03	Sonjai
49	Pune	Mulshi	Palase	0.61	Bhairoba
50	Pune	Mulshi	Palase	0.01	Namjai
51	Pune	Mulshi	Palase	0.50	Kalkai
52	Pune	Mulshi	Sambeve	0.20	Waghjai
53	Pune	Mulshi	Sandavaghar	1.21	Varadanidevi
54	Pune	Mulshi	Shedani	0.20	Dharjai
55	Pune	Mulshi	Shirawali	0.20	Dorjai
56	Pune	Mulshi	Siddheshwar	Unknown	Amjaidevi

57	Pune	Mulshi	Siddheshwqr	Unknown	Somajai
58	Pune	Mulshi	Vaduste	0.40	Ratnai
59	Pune	Mulshi	Valane	0.08	Bapujibuwa
60	Pune	Mulshi	Valane	0.81	Dhegai
61	Pune	Mulshi	Valane	0.80	Waghajai
62	Pune	Mulshi	Visakhar	Unknown	Waghajai
63	Pune	Mulshi	Wadwathar	0.40	Waghajai
64	Pune	Mulshi	Walen	0.20	Waghajai

List of Sacred Groves recorded in agro climatic zone 5 of Maharashtra

Agro Climatic zone 5 is “Transition zone II”. It is a belt running almost parallel to agro climatic zone 4 having trap soil with warmer summer and winter. It includes part of Dhule, Nashik, Pune, Satara & Kolhapur Districts.

Sr. No.	District	Taluka	Nearest Village	Area (Ha)	Deity
1	Pune	Mulshi	Ambavane	Unknown	Karadevi

3.6 FAUNA AND THEIR HABITATS

List of Mammals, Reptiles, Amphibians and Birds seen in the Pune Division

Sr. No	Local Name	Sr. No	Local Name
MAMMALS		REPTILES	
1	Leopard or panther	1	Cobra
2	Striped Hyaena	2	Grass Snake
3	Wolf	3	Green Tree Snake
4	Small Indian Civet	4	Monitor Lizards
5	Indian Palm Civet	5	Saw sealed viper
6	Sambar	6	Common Lizards
7	Barking Deer	7	Pit Viper
8	Mouse Deer	8	Rat Snake
9	Rhesus macaque		
10	Three striped palm squirrels		
11	Wild boar		
12	Common Langoor		
13	India Hare		
14	Wild cat		
15	Pangolin / Ant eater		
16	Porcupine		
17	Common Mongoose		
18	Rat		

- 19 Mice
- 20 Three striped palm squirrels
- 21 Indian fox

AMPHIBIAN

- 1 Frog (*Rana tigrina*)

BIRDS

1 Shama	30 Blue ringed Parakeet
2 Indian Black Robin	31 Yellow fronted woodpecker
3 Bush Chat	32 Black backed woodpecker
4 Common weaver bird	33 Coppersmith Barbet
5 Black Bellied finch lark	34 Green Barbet
6 Sykes's lark	35 Small green barbet
7 Common crested lark	36 India Koel
8 Blue rock pigeon	37 Crow pheasant
9 Ring Dove	38 Green bee eater
10 Peafowl	39 Chestnut headed bee eater
11 Grey jungle fowl	40 Red whiskered bulbul
20 Common pariah kite	41 Magpie Robin
21 Greet horned owl	42 Painted partridge
22 Brown wood owl	43 Grey Partridge
23 Spotted owl	44 Jungle bush quail
24 Jungle babbler	45 Rock bush quail
25 Brown headed Kingfisher	46 Painted bush quail
26 White breasted kingfisher	47 Waterhen
27 Common Indian Pied Kingfisher	48 White necked stork
28 Rose Ringed Parakeet	49 Purple Heron
29 Plum headed Parakeet	50 Egrets
	51 Pond heron

1. Carnivores

The Panther or Bibta Wagh (*Panthera pardus*) is found in the forests of Shirota, Vadgaon, Paud as well as Bhamburda ranges. Striped Hyena or taras (*Hyaena hyaena*) is a carrion eater which is found all over the scrub forest/ open grass pastures of Daund, Baramati and Indapur. It is often mistaken for a small tiger due to its striped coat by the local villagers, thereby causing panic when a Hyena is found in some village. The Wolf or Landga (*Canis lupis*) is also present in the eastern tract of the division especially in the grasslands. The Wild Cat or Ran Manjar (*Felis chaus*) is found in large number as it can thrive in open-grass pastures dotted with bushes, and in scrub jungle around human habitations. Locals feel it as a great menace to poultry business. The Indian Mongoose (*Herpestes edwardsi*) is common all over this region and is known for destruction of snakes both poisonous and non-poisonous. The Jackal or Kolha (*Canis aureus*) and Fox or Khokad (*Vulpes bengalensis*) are quite common in the division. Sometimes they take shelter in sugarcane fields. Jackals were earlier categorized as vermin as they predate upon Poultry, Lambs, Birds, Sickly Goats and Sheep and also damage sugarcane crop. Fox is, however, regarded as a friend of the farmer as it destroys rats, land scrubs and insects which are harmful to agricultural crops.

2. Herbivores / Omnivore: -

Barking deer or bhekar (*Muntiacus muntjak*) is found in small numbers in the Western Ghats. Indian Gazelle/ Chinkara are present in dry grasslands in large numbers as major herbivores. Wild pig or Ran dukkar (*Sus scrofa*) is also seen in large numbers in the hilly forests in Vadgaon, Paud and Sinhgad ranges. They damage the bamboo plantations and adjoining agricultural fields. Among the Antelopes, Black Buck or Kalvit (*Antelope cervicapra*) are found in Indapur range while Indian Gazelle or Chinkara (*Gazella gazella*) are found in Daund, Baramati and Indapur ranges. The Mouse Deer (*Tragulus meminna*) is reported to occur in higher reaches of Sahyadri's but is very rarely seen. The stray incidents of a bison and a Panther straying into Pune Municipal area have also been reported in the recent past, the reason being habitat destruction.

3.6.1 Habitat: -

3.6.1.1 Food: - Leopards (*Panthera pardus*), Wolves, Wild Cats (*Felice chaucer*), Civets (*Paradoxus hermaphroditus*), Jackals (*Canis circus*), Hyenas (*Hyena's Hyenas*) are the major carnivores in the Pune Forest division.

However, due to low density of herbivores, Leopards have migrated to sugarcane fields due to declining prey, and livestock, pigs, poultry and stray dogs from nearby villages are the main prey of Leopards. Water and fodder scarcity is the main reason for low herbivore density. Although there is sufficient rainfall in this area, hilly areas cause water scarcity in summer. Similarly, open grasslands are limited to hills and are small in size but in plains these grasslands have been encroached upon. Deforestation has reduced the density of herbivores in most of the Kuran lands.

3.6.1.2 Cover: -

The different composition of the geographical features of plants like caves, nala beds, rocks, bastions serve as a cover for wildlife. Dead, hollow and fallen trees also serve as cover for many species of birds, reptiles and micro-animals. The grasslands are home to many wildlife species such as antelope, Indian Wolf, Hyena, fox and laser florican, which are unique landscapes.

3.7 THREATS AND CHALLENGES TO WILDLIFE: -

3.7.1 Habitat fragmentation / Habitat loss: - The forest in the western part of Pune Forest Department is more or less intact still fragmented by roads and other linear projects. Forests in the eastern part are scattered due to civilization and agriculture. This leads to fragmentation of habitat.

3.7.2 Illegal trade and poaching: - Wild Rabbits, Wild Boar, Chinkara, Wild Birds, Peacocks, Quails and Partridges are widely hunted. Traps, traps power lines, guns and locally made grenades are commonly used for catching and hunting. There are also trained dogs that are

used to chase and hunt prey. Awareness of wildlife conservation has reduced the risk of poaching in recent decades.

- 3.7.3 **Road network And Dams:** - Currently, roads and dams are being built in the wild, which poses a threat to the wildlife population. The wide roads make it easy to enter the forest, thus endangering the wildlife. The road network encouraged changes in land use and absence of underpass or overpass is among major challenge to wildlife.
- 3.7.4 **Forest Fire:** - Wildlife is endangered due to large scale forest fires, especially birds and reptiles.
- 3.7.5 **Man-Animal conflict:** - Agricultural extension. Human habitation. Excessive grazing of livestock. Deforestation. Illegal collection of grass has endangered wildlife habitats. In winter, when forest grasses are coarse, wild animals roam the neighboring fields where they are more likely to hunt. In addition, crop damage caused by wild boar and Chinkara, human casualties and leopard attacks have created an atmosphere of resentment among locals and endangered wildlife.

3.8 PROTECTION AND MANAGEMENT OF FAUNA

Proving 'good wildlife management is the best forest management' is a challenge for forest managers and it is time to change the traditional approach to afforestation to a holistic approach. The law of ecology says that "everything is connected with everything else". Therefore, intervention is needed to improve the viability of wildlife habitat.

Following prescriptions are implemented to the possible extent.

1. Soil and moisture conservation works are taken up, wherever possible, in all coupes and additional measures like artificial waterholes, Salt licks, etc. are created under CAMPA.
2. Orientation of common people, public representatives and students about wildlife awareness is done on regular basis through programs like handling man-animal conflict, wildlife week celebration, film shows, posters, handbills.
3. Meadow development to some extent and waterholes are taken up on a big scale so that wild animals don't stray outside the forest area.
4. Boards (illustrative) on wildlife importance are exhibited at strategic points.
5. Transit treatment center for injured and permanently disabled wild animals is being set up.
6. A rapid response team is being formed to deal with wildlife in urban areas.

Following Steps are taken to tackle the man-animal conflict.

1. Increasing patrolling by deputing other staff and providing vehicles (Jeeps, Rescue van).
2. Giving veterinary aid.
3. Formation of local level rescue teams and giving them training.

4. At an administrative level also supports of the department such as ZP, Revenue, Police for take long term measures such as 100% toilets, leopard proof animal sheds (Gotha), and protective wall to wells etc. is in progress.

Financial Grant for the Loss of Livestock

These compensatory grants should be disbursed timely by the staff as it poses huge risk of revenge killing by the affected owners of livestock. The compensation to be granted should be as per the terms and conditions decided by government and shall be in line with orders of state and central government from time to time.

Financial Grant for the injury to and Loss of Human Life:

Introduced through GR dated 27.1.1986, the scheme covers death as well as injury including minor injury caused to any individual in an attack by a wild animal. Any such attack by Tiger, Panther, Sloth Bear, Bison, Wild Pig, Wolf, Hyaena, Jackal and Wild dogs is covered under the scheme.

Financial grant for injury & loss of human life has to be given as per the terms and condition mentioned in the Govt. Resolution from time to time.

CHAPTER - 4

MAINTENANCE AND ENHANCEMENT OF FOREST HEALTH AND VITALITY

4.1 STATUS OF REGENERATION: -

Data on regeneration status was collected by staff of Pune Territorial division during collection of enumeration data. The seedlings were enumerated in the following three categories as R1 upto 1 m height, R2 with 1 to 2 m height and R3 above 2 m height. The data is analyzed and used to devise prescriptions for natural and artificial regeneration of forest areas. The status of natural regeneration is extremely poor. The natural regeneration of teak and its associates is very poor and restricted to a few patches of selected sites. Whatever regeneration occurs in the rainy season, fails to establish owing to climatic as well as biotic factors. Moreover, the canopy is very dense in the ranges of Western Ghats hence regeneration doesn't survive due to dense cover. Heavy grazing by nomads in Daund, Baramati & Indapur ranges, heavy fire incidences, trampling due to cattle movement, human population pressure to meet their demands like firewood and small timber, poor site quality and erratic rainfall are major factors that influence the establishment of regeneration in this forest area. The regeneration data shows that there are 9 seedlings of up to 1 m height, 5 seedlings between 1 to 2 m height and 2 seedlings above 2 m height in a hectare in these forests. The total number of seedlings is 16/ha. The table of regeneration is given below.

Table - REGENERATION STATUS

Range	No. of Sample Plots	No. of trees / ha.			Total
		R1	R2	R3	
Baramati	85	3.53	1.41	0.12	5.06
Bhamburda	87	16.44	0.11	0.23	16.78
Daund	106	15.75	7.36	3.96	27.08
Paud	203	9.85	6.35	1.87	18.08
Pune	84	3.45	0.95	4.05	8.45
Shirota	243	11.60	9.47	2.76	23.83
Vadgaon	185	7.62	2.27	0.76	10.65
Indapur	148	1.62	0.81	0.00	2.43
Total	1141	8.90	4.49	1.74	15.13

The limitations of this data are that enumeration was started in month of January 2021 onwards where survival of regenerated saplings becomes difficult due to biotic pressure.

4.2 AREA AFFECTED BY FOREST FIRE

4.2.1 The forest fires cause damage to the natural regeneration and young seedlings. The trees scorched or burnt by fire become hollow in due course of time. Repeated fires cause the loss of humus in the forest, erosion of soil, and environmental degradation. This area has been distributed from the sub-tropical mountain forest of the Western Ghats to the grasslands to the east. Forest fires were pertinently visible in grasslands / plateaus areas of the division but over the period of time it is evidently seen that it is widespread even on hill slopes. The fire on hill slopes is resultant of false belied that burnt ash from hills when enters the farms below the crop yield increases. Apart from these areas adjoining to the highways and urban areas are frequently burnt. The incidences of forest fire are as bellows-

Sr. No.	Year	No. of Fire Incidences	Area burnt (Ha.)
1	2	3	4
1	2012-13	20	86.06
2	2013-14	24	114
3	2014-15	20	129
4	2015-16	31	191.3
5	2016-17	33	149.4
6	2017-18	38	139
7	2018-19	102	277.26
8	2019-20	100	324.94
9	2020-21	141	436.29
10	2021-22	65	212.51
	Total	574	2059.76

4.2.2 Fire: - Most of the reported incidents are ground fires. Their intensity and frequency are also moderate. Implementing an annual fire line program with public awareness of fire hazards is an effective way to control fires. Materials for fire control have also been distributed by the department. Also, participation of JFM committees is required to control the fire.

4.2.3 Role of FSI in forest fire monitoring - Forest survey of India has been assisting the forest department in many ways to deal with problems associated with forest fires by using the latest remote sensing and communication technology. Satellite based remote sensing technology and GIS tools have been effective in better prevention and management of fires through creation of early warning for fire prone areas, monitoring fires on real time basis and estimation of burnt scars.

4.3 AREA DAMAGED BY NATURAL CALAMITIES

4.3.1. As the areas of Western ghats receive heavy rainfall, area is prone to flash floods in Western part of division. In an incidence of flash flood in September 24 & 25, 2019-night Pune city received heavy rainfall of 16 cm in less than five hours. This caused flash flood in city of Pune and Baramati. Moreover, adding to it all the dams were full and excess amount of water was released which had invaded low-lying areas adjoining to the rivers and causing flood. In this incidence forest areas adjoining to rivers were affected causing minor loss especially in Pune, Baramati & Daund ranges. Minor incidences of landslides occurred in Western ghats but didn't affect forest as such. But such incidences cannot be left unnoticed as most of western hilly terrain part of division is prone to such calamity. Whereas areas in eastern part of division are prone to drought like conditions in areas away from rivers. The drought adversely affects forest areas causing mortality of seedlings in plantation. Prolonged spell of dry spell during monsoon hampers the natural regeneration. Young seedling may get damaged in their early stage itself. It has also adverse impact on wildlife. There is a scarcity of drinking water in summer to the Wildlife within the forest areas.

4.4 AREA PROTECTED FROM GRAZING

4.4.1 Only plantations and sacred groves areas are protected from grazing to some extent. The total cattle population of the division is 136761. A statement showing Taluka wise cattle population in the Division is given in the Appendix No. IX. Large cattle population causes heavy damage by grazing. The direct effect of grazing also includes alteration of plant physiology. It also affects the growth and reproduction of plant.

4.4.2 A statement showing year-wise details of illicit grazing offences are given in the Appendix No. VII. Total 162 offence cases have been booked and compensation of Rs.1,83,830 is recovered during 10 years. Palatable grasses like Dongri are available in some patches of forest area but there is urgent need to cover erstwhile pasture areas with good palatable grass species like Anjan, Sheda, Pawanya etc.

4.5 LOPPING PRACTICES

Rab is practiced in the paddy fields. It is a common practice to cut tree branches as firewood which is found mainly in the forest area adjacent to human settlements during the dry season.

4.6 AREA INFESTED BY INVASIVE WEED SPECIES IN FORESTS

Invasive species or exotic species are organisms that have been accidentally or intentionally identified by humans outside their geographical range. Some non-native species become aggressive and have a significant effect on endemic species. Many invasive species have replaced native grazing plants.

Plantation was done in most of the forest areas in Pune division. Among the cultivated species, *Glyricidia*, *prosopis* and Subabhul are the major species that have been successful. Abundant *Glyricidia* & *Prosopis* reproduction is found in some compartments, as is the case with Subabhul. Although *Glyricidia* has helped to improve forest density, its dominant nature has led to the absence or inadequate reproduction of main and other endemic tree species. It does not allow any other species to grow.

Many areas along Bhima, Mutha, Pawna River were clear felled in the past and were tried to be artificially regenerated by Babhul (*Acacia arabica*) along with dibbling of seeds of Vilayati Babhul (*Prosopis juliflora*) and other species. The AR of *Acacia arabica* somehow could not establish and as a result *Prosopis juliflora*, a much lesser valuable species invaded into the valuable Babhul forests, suppressing the growth and spread of Babhul. Now, nearly all such areas are thickly infested with impenetrable growth of *Prosopis juliflora* which has now become the major constituent of the tree composition of these riverine forests.

During the post-monsoon invasion of *Cosmos bipinnatus* has wreak havoc on local flora. They grow along the roadside and the hill slopes though seems to be beautiful but their growth hampers native grasses which are fodder species. The area under this weed is increasing every year in arithmetic progression which is needed to be controlled.

Parthenium hysterophores, *Lantana camara*, *Cassia Tora*, *Hyptis suaveolens*, etc. Invade flat land. This not only hinders the growth of native plants but also the habitat of the organism. In order to restore the former ecosystem, these species must be gradually replaced by endemic species.

In 2018-19, about ten-hectare area under *Glyricidia* cultivation in Bhamburda range in Pune division has been cleared and planting of tall saplings of local archipelago species has been undertaken.

Now planting of these exotics in plantation is stopped completely. Eradication of weeds like *Lantana*, *Parthenium*, etc. should also be taken along with introduction of local grass species.

4.7 INCIDENCES OF PEST AND DISEASES

Teak trees are normally infested with teak skeletonizer, which is caused due to *Eutectona machaeralis*. They feed only on the green matter, leaving all the veins intact, thus qualifying for the name, skeletonizer. It doesn't kill the teak trees but it hampers growth of tree thus, causing loss to increment. Its outbreak generally occurs at the end of growing season before leaf fall begins. However, in Pune division, incidences of outbreak of teak skeletonizer are not observed. Cecidomyids & other species cause gall attack on variety of tree species. *Holotrachea species* - root grubs cause damage to plants. On Neem trees Tee-Mosquito attack is more evidently visible since last

few years and this is a combine effect of climate change also. Bacopera species cause stem boring on variety of tree species. Leaf minor & gall attack is more noticeable on Karanj in parts of Maval.

4.8 FOREST DEGRADATION AND IT'S DRIVERS

4.8.1 Unregulated removal of forest produce – There is no exploitation of timber from forest area in recent past. Some Teak plantations are standing but thinning operations are not done. But some illicit felling of teak and other species is seen in field. Hirda, Jambhul, Ambulgi, Toran, karvand, aonla, etc. are the minor forest produce collected from the forest.

Whereas, there is no scientific data stating the quantity of collection or yield obtained from them. Hence, accountability is needed in this regard.

At present hirda fruits are collected by beating the trees, similarly medicinal plants are also extracted by using destructive methods, which leads to unsustainable yield and threat to its conservation. Scientific methods to exploit other fruits and MFP's should be adopted and over exploitation should be avoided. Usufruct sharing with JFM committees should be promoted to improve productivity.

4.8.2 Encroachment – As the population grows the need of people increases which further leads to deforestation. Forest shrinks to a great extent to meet the requirements like for construction of roads, development of houses. It is a serious problem which cannot be neglected. The area under encroachment/ cultivation is estimated to be 4869.06 ha. The details are given in Appendix No. X. These encroached areas are shown separately in each compartment, after verification of area, the areas which are legally distributed should be communicated to Working Plan Division for omission. Rest of the encroached areas should be freed from encroachment and should be treated as per prescription.

4.8.3 Overgrazing –Pressure of grazing is comparatively lesser in hills areas. But in plains, cattle are set free for grazing in forest which creates competition with herbivorous animals and hampers natural regeneration. Due to grazing on hill slopes by cattle, the soil becomes loose and run off along with the seeds during rainy season. This adversely affects seed germination.

4.9 POLLUTION CONTROL AND PROTECTION OF ENVIRONMENT

Pimpri-Chinchwad, Hadapsar, Kurkumb, Baramati & Talegaon are major industrial belts present within the limits of Pune Forest division. Discharge of heavy particulate pollutants in air and untreated effluents in river are major threats to existing biodiversity.

CHAPTER-5

CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCES

5.1: AREA TREATED UNDER SOIL AND WATER CONSERVATION MEASURES

The effective rainfall and run-off during the South–West monsoon have important implications on the forests in this division. The rainfall from the South–West monsoon on an average is computed to be around 1231 mm for entire division. Undulating terrain and heavy rainfall in Western Ghats are major contributors for erosion due to runoff. The run off takes away the fertile top soil, leading to severe soil erosion in the division. Soil erosion adversely affects the fertility status and land use.

Sheet erosion is noticed all over the forest areas of the division. The top layers of soil which stores organic matter and nutrients, on which plants feed, are lost in this process. It decreases soil fertility, lowers sub-soil water level and water holding capacity of the soil. The Organic Carbon content of the soil is negatively affected due to soil erosion. Laboratory studies of soil samples collected from all the ranges of Pune division has shown variation in Soil Carbon from 0.02 (Daund Range) to 5.84 (Pune Range) percentage.

In the Division, in the last 10 years 6520.00 hectares have been taken up for plantation and can safely be presumed that this area is treated for soil conservation. However, some SMC works were taken under Western Ghat Development Programme, District Plan. In the last three - four years, under Jalyukt Shivar project, large areas are being treated specifically for soil and water conservation.

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

Bhima, Mutha, Mula, Pawna are rivers with high surface water flow, whereas, other small rivers like Indrayani, Nira, Ramnadi, Devnadi, Ambi, Moshi are rivers with medium surface water flow and nallahs in forest areas hold water up to the end of February with stagnant pools persisting till the break of monsoon. There are 7 major, 1 medium and over 91 minor irrigation projects/tanks which are main source of irrigation (Source- Chief Engineer- Irrigation Department- Pune (2002)). The main source of water supply is through wells. In summer there is acute shortage of water leading to supply of drinking water to some villages by tankers and bullock carts.

5.3 WETLANDS IN FOREST AREAS

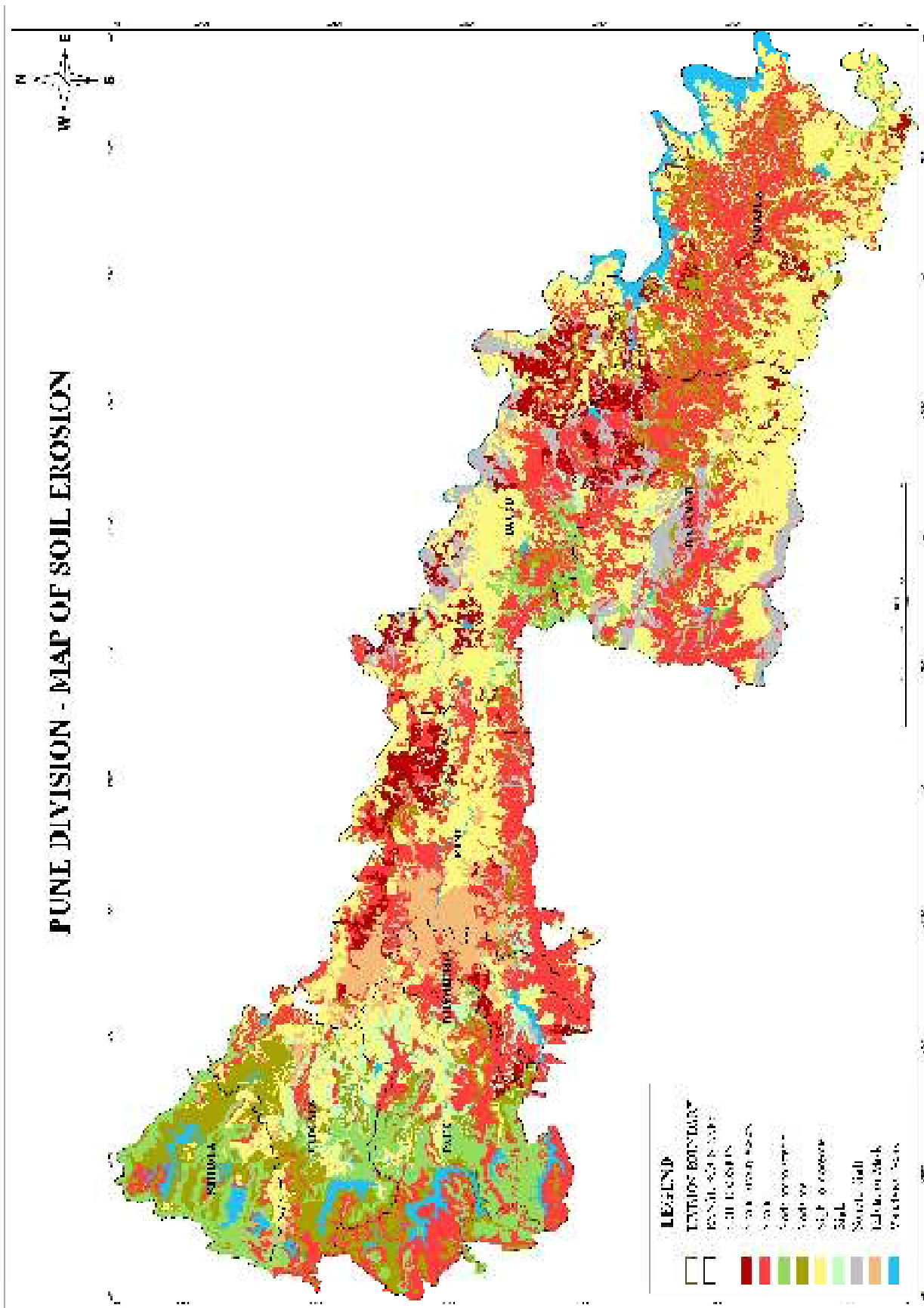
As per the information received from the division, the following are the major dams that are in or in the vicinity the forest areas of the Pune Forest Division. Most of these dams are outside the forest areas but the major chunk of their watershed areas is within the forest areas.

Major Dams in or in the Vicinity of the Forest Areas

Sr. No	Name of the Dam	Range
1.	Khadakwasla	Bhamburda
2.	Warasgaon	Paud
3.	Temghar	Paud
4.	Pawana	Paud
5.	Kasarsai	Shirota
6.	Andhra	Shirota
7.	Mulshi	Shirota
8.	Pawna	Wadgaon Maval
9.	Valwan	Shirota
10.	Shirota	Shirota
11.	Uksan	Shirota
12.	Bhigwan	Indapur
13.	Thokarwadi	Shirota

The status of the wetlands has not been studied by the division and there is a need for the ecological study and avi-faunal documentation of the areas. It may be mentioned that some of the areas like Bhigwan dam are known to be good habitat of birds which may even qualify for Important Bird Area status.

Space Applications Centre, Indian Space Research Organization, Ahmadabad has prepared National Wetland Atlas. The wetland mapping of Pune district done for this atlas shows that rivers/ streams contribute 19.28% to the total wetland area of Pune district. The reservoir/barrages contribute a major share of 48339 ha i.e., 70.94 % to the wetland area. Pune has the maximum area under wetland in Maharashtra state. The tanks/ponds contribute 6314 ha i.e., 9.27 %. The total area under wetland is 68137 ha with the water bodies less than the minimum mappable unit contributing to 348 ha to the wetland area. Aquatic vegetation is seen in both the seasons and changes from 1898 ha in post-monsoon to 1840 ha during pre-monsoon. Wetlands shrink considerably during pre-monsoon. Turbidity ranges from low to high and the shift in turbidity levels can be compared with the area under low turbidity level changing from 61047 ha to 33127 ha. Moderate turbidity level changes from 3392 ha to 6853 ha during pre-monsoon. Similarly, the high turbidity level changes



from 68 ha during post monsoon to 2 ha during pre-monsoon. The presence of water bodies with moderate and high turbidity is due to presence of water bodies along ridges.

Area estimates of wetlands in Pune District (From NWIA – Maharashtra- Atlas)

Sr. No.	Wet code	Wetland Category	Number of Wetlands	Total Wetland Area	% Of Wetland Area	Open Water	
						Post-monsoon Area	Pre-monsoon Area
1	2	3	4	5	6	7	8
	1100	Inland Wetlands-Natural					
1	1106	River/Stream	76	13136	19.28	12950	4347
	1200	Inland Wetlands-Man-made					
2	1201	Reservoirs/ Barrages	41	48339	70.94	46247	32045
	1202	Tanks/Ponds	531	6314	9.27	5310	3590
		Sub Total	648	67789	99.49	64507	39982
		Wetlands (<2.25 ha), Mainly Tanks	348	348	0.51	-	-
		Total	996	68137	100.00	64507	39982
		Area under Aquatic Vegetation				1898	1840
		Area under turbidity levels					
		Low				61047	33127
		Moderate				3392	6853
		High				68	2

The division may engage field experts to document and study the habitat and the biodiversity of the wetlands to develop base year data for future monitoring and necessary improvements.

5.4: WATER LEVEL IN THE WELLS IN THE VICINITY (UP TO 5KM) OF FOREST AREA

The Division has records of the water levels of the wells within forest area and some villages. The information is valuable but insufficient as there are no records for wells outside forest. It is also informed that the Division has records of the wells in the villages where JFM Committees have been established and those villages where special projects like Jalyukt Shivar, etc. is implemented for whose microplan have been prepared. Records can also be obtained from the

Groundwater Surveys Development Agency. This information needs to be submitted and to be formed as part of the Plan.

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

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

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

5.5: STATUS OF AQUIFERS

In Pune district Mulshi, Khadakwasla, Andhra, Pawna, Shirota and Temghar irrigation projects have been commissioned and have benefited the watersheds with WS No. 4D7F9, 4D7F8, 4D7F7, 4D7F6, 4D7F5, 4D7F4, 4D7F3, 4D7F2 and 4D7F1. This is responsible for the change in the category of these watersheds.

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

Table-8: Nature and Yield Potential of Aquifers.

S. No.	Taluka	Aquifer	Yield Potential	Type of wells suitable
1.	Pune City	Basalt	Medium	Dug wells and borewells
2.	Haveli	- do -	Medium to high	Dug wells and borewells
3.	Daund	- do -	Medium to high	Dug wells, DCB and borewells
4.	Indapur	- do -	Low to Medium	Dug wells, DCB and borewells
5.	Baramati	- do -	Medium to high	Dug wells, DCB and borewells
6.	Mulshi	- do -	Low to medium	Dug wells and borewells
7.	Maval	- do -	Low to medium	Dug wells and borewells

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

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

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

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

It would also be necessary to plan and control the use of groundwater under the prevailing conditions. Publication and distribution of annual reports and related programmes for creating awareness amongst the community and for educating them will have to be undertaken regularly. This will enable avoiding scarcity, as well as the hectic activity and excessive expenditure that have become characteristic of summer months. Unlike the land resource, groundwater is a dynamic resource. The groundwater flow cannot be measured like the flow through canals or pipe lines. The groundwater flows downward and spreads according to natural gradient and the permeability of the formations. Therefore, management of groundwater in facts involves management of a dynamic, immeasurable and uncontrollable entity. While managing the groundwater resource, it is necessary to consider it to be a common property resource and is required to be controlled appropriately with the assistance of the community. Concepts like Village level Watershed Water Account, Village level

Water Safety and Security, Basin/Sub-basin Water Auditing, Aquifer delineation and its management etc., will have to be popularized and made a basis for equitable distribution of ground water.

5.5.1: Groundwater Recharge

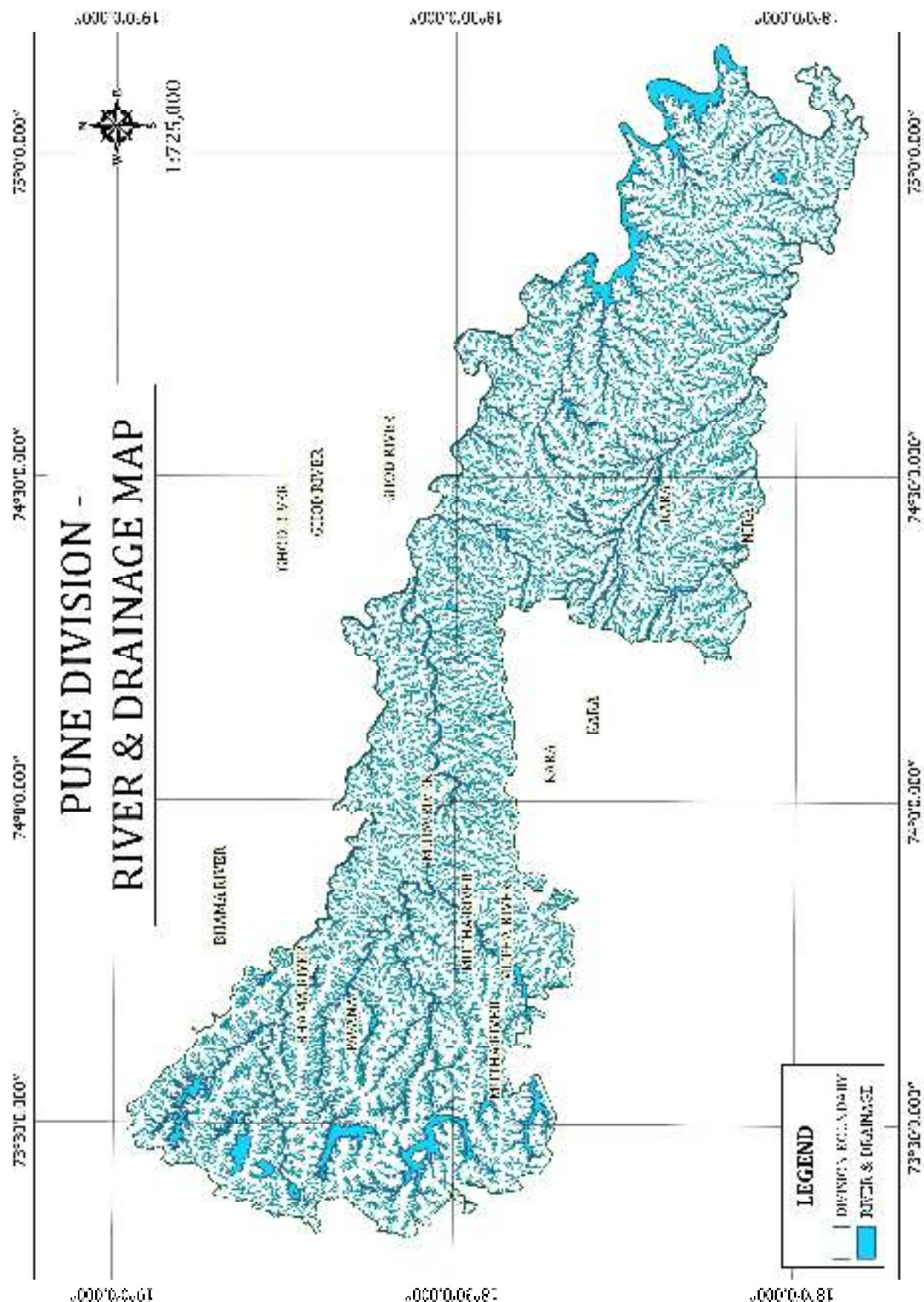
Compared to 2008-09 there is decrease in annual groundwater recharge. This is predominantly due to decrease in recharge due to water conservation structures. During the field visit it was observed that the water conservation structures are not being desilted annually throughout the State. This has directly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

5.5.2: Effect of Rainfall on Groundwater Availability

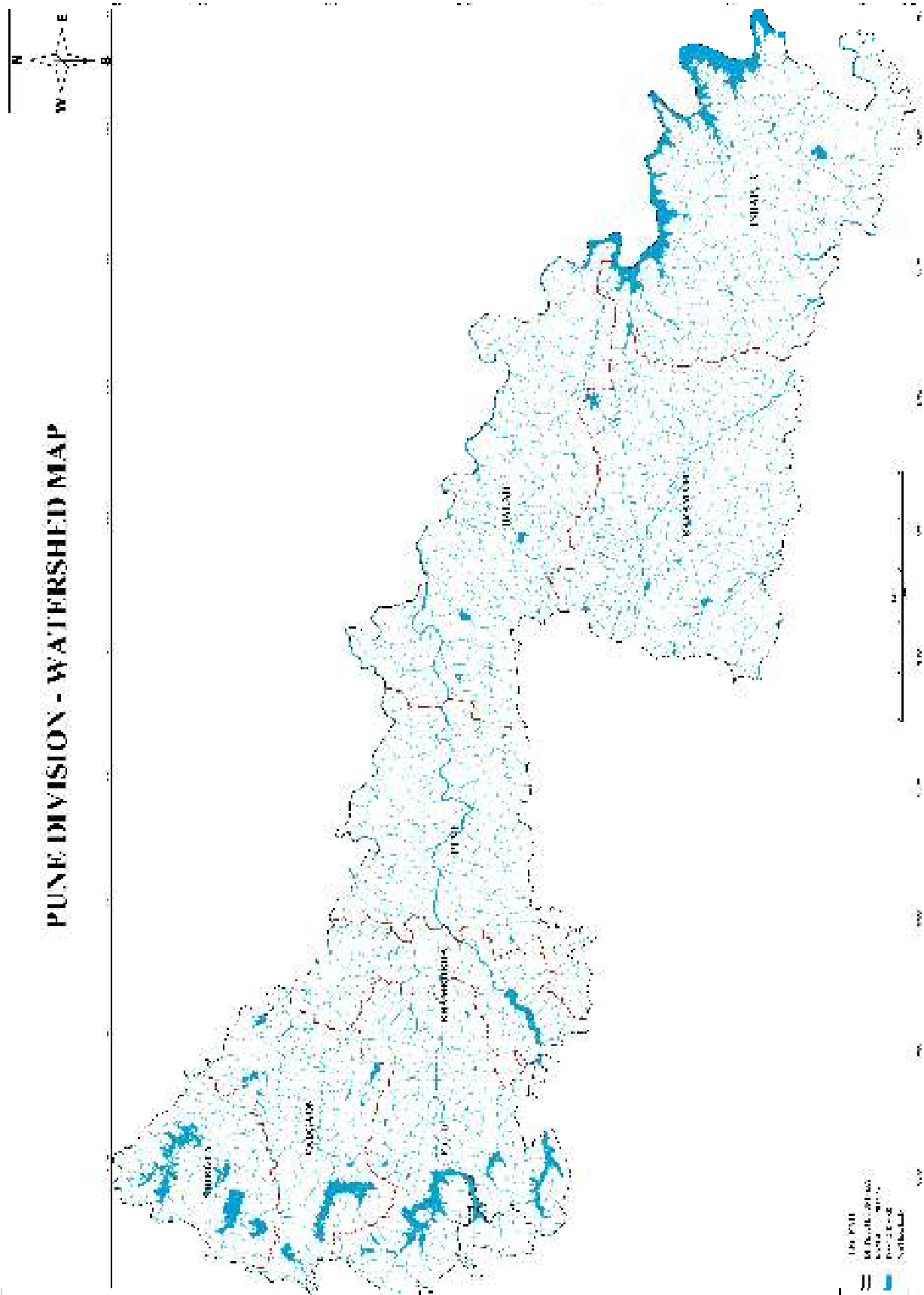
The rainfall is the primary source for the yearly replenish-able groundwater in the State and has a direct impact on groundwater recharge. The variability of rainfall is also reflected in the groundwater availability. The rainfall deficit and recharge of groundwater are in inverse proportion.

Table: Taluka wise Ground Water Resources of Pune District (2011-12)

Taluka	Net G.W. Availability (ha-m)	Existing G.W. Draft for all uses (ha-m)	Provision for domestic & Industrial requirement for next 25 years (ha-m)	G.W. availability for future Irrigation (Ha-m)	Stage of G.W. Development (%)	Category
1	2	3	4	5	6	7
Baramati	19049.27	18312.73	830.22	1451.31	96.13	Semi-Critical
Daund	13870.15	11289.09	762.69	2191.37	81.39	Safe
Haveli	11847.18	1521.67	1119.20	4814.85	54.90	Safe
Indapur	24819.00	11289.09	1879.84	5113.22	88.72	Safe
Maval	8687.74	13785.22	762.70	7120.06	13.51	Safe
Mulshi	7962.64	1038.23	799.17	6524.84	13.04	Safe
Total	86235.98	57236.03	6153.82	27215.65	347.69	



PUNE DIVISION - WATERSHED MAP



**Assessment of Dynamic Ground Water Resources of the Maharashtra Administrative Unit
Wise Categorization 2011-12**

Sr. No.	District	Administrative Unit	Stage of Ground Water Development %	Pre-monsoon		Post-monsoon		Category
				Water level Trend	is there a significant decline	Water level Trend	is there a significant decline	
1	2	3	4	5	6	7	8	9
1	Pune	Baramati	95.22	10.10	Yes	-6.50	No	Semi-Critical
2	Pune	Daund	74.61	5.23	No	-7.10	No	Safe
3	Pune	Haveli	53.76	-3.69	No	-3.97	No	Safe
4	Pune	Indapur	84.45	0.56	No	-8.11	No	Safe
5	Pune	Maval	19.60	-7.69	No	-1.66	No	Safe
6	Pune	Mulshi	13.87	-1.04	No	0.87	No	Safe

5.5.5: Ground Water Resources

Central Ground Water Board and Ground Water Survey and Development Agency (GSDA) of Maharashtra State have jointly carried out Taluka and Watershed wise estimation of ground water resources of Pune district for base year 2011-12 according to GEC methodology 1997. Ground Water Resource Estimation figures as a whole for Pune district indicates that Net Ground Water Availability is 1662.84 MCM and Existing Ground Water Draft for all uses is 1189.08 MCM. After making provision for Domestic and Industrial Supply for next 25 Years kept as 127.62 MCM, Ground Water Availability for future Irrigation is 466.21 MCM. Over all Stage of Ground Water development of the district is 71.51%.

Taluka wise Ground Water Resources of Pune Division (2011-12)

Taluka	Net G.W. Availability (Ha-m)	Existing G.W. Draft for all uses (Ha-m)	Provision for domestic & Industrial requirement for next 25 years (ha-m)	G.W. availability for future Irrigation (Ha-m)	Stage of G.W. Development (%)
Baramati	18155.22	17288.05	820.93	993.82	95.22
Daund	15300.14	11415.71	755.63	3503.34	74.61
Haveli	13415.81	7212.89	1119.20	5661.666	53.76
Indapur	26193.40	22120.92	1879.84	5334.87	84.45
Maval	8777.63	1720.61	762.70	6675.90	19.60
Mulshi	8703.51	1207.61	799.17	7096.32	13.87
Total District	90545.7	60965.8	6137.47	29265.9	341.51

As per the Ground Water Information Pune District of the CGWB Report of 2013, Central Ground Water Board and Groundwater Survey and Development Agency (GSDA) have jointly estimated the ground water resources of Pune district based on GEC-97 methodology as on 2009. Ground Water Resources estimation was carried out for 5340.14 sq. km. area of which 820.25 sq. km is under command and 4519.90 sq. km is non-command. Taluka wise ground water resources are shown below

Taluka wise Ground Water Resources of Pune Division (March 2009)

Taluka	Area Type	Net Annual Ground Water Availability (Ha m/yr.)	Existing Gross Ground water Draft for Irrigation (Ha m/yr.)	Existing Gross Ground Water Draft for Domestic & Industrial water Supply (Ha m/yr.)	Existing Gross Ground Water Draft for All uses (Ha m/yr.)	Allocation for domestic & industrial requirement supply up to next 25 years (Ha m/yr.)	Net Ground Water Availability for future irrigation development (Ha m/yr.)	Stage of Ground Water Development (%)
1	2	3	4	5	6	7	8	9
Baramati	Command	8936.61	9296.76	224.19	9493.95			
Baramati	Non Command	9218.61	7553.30	240.80	7794.10			
Baramati	Total	18155.22	16823.05	464.99	17288.05	820.93	993.82	95.22
Daund	Command	8051.39	6564.57	233.52	6798.09			
Daund	Non Command	7248.75	4471.27	146.37	4617.62			
Daund	Total	15300.14	11035.81	379.89	11415.71	755.63	3503.34	74.61
Haveli	Command	2504.33	1842.32	180.54	2022.86			
Haveli	Non Command	10911.48	4812.25	377.79	5190.04			
Haveli	Total	13415.81	6654.57	558.32	7212.89	1119.20	5661.666	53.76
Indapur	Command	20732.04	14674.85	1101.53	15776.38			
Indapur	Non Command	5461.35	6244.19	100.35	6344.54			
Indapur	Total	26193.40	20919.04	1201.88	22120.92	1879.84	5334.87	84.45
Maval	Command	447.83	86.06	28.37	114.43			
Maval	Non Command	8329.80	1252.52	353.66	1606.18			
Maval	Total	8777.63	1338.58	382.03	1720.61	762.70	6675.90	19.60
Mulshi	Command	634.78	163.26	22.97	186.23			
Mulshi	Non Command	8068.73	644.76	376.62	1021.38			
Mulshi	Total	8703.51	808.02	399.58	1207.61	799.17	7096.32	13.87
Total	Command	41306.98	32627.82	1791.12	34391.94			
	Non Command	49238.7	24978.3	1595.59	26573.9			
	Total	90545.7	57579.1	3386.69	60965.8	6137.47	29265.9	341.51

5.5.7: Water Conservation and Artificial Recharge

In Basaltic area, the artificial recharge structures feasible are check dams, gully plugs, percolation tanks, nalla bunds, etc. The structures like gully plugs, contour bunds are most favorable in hilly areas, particularly in parts of Shirola, Wadgaon Maval, Paud, and Bhamburda. Existing dug

wells can also be used for artificial recharge, however; the source water should be properly filtered before being put in the wells. The most feasible artificial recharge structure suitable for alluvial areas restricted along the banks of Bhima, Mula-Mutha, Pawna, Nira River and its tributaries, are shallow recharge wells on the river bed of the tributaries. Percolation tanks are also suitable, wherever source water availability is there.

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

5.5.8: Recommendations

1. The major part of the district is underlain by Deccan Trap Basalt, where dug wells are the most feasible structures for ground water development. The sites for bore wells need to be selected only after proper scientific investigation.
2. Bore wells generally tap deeper fractures and inter flow zones, which may not be sustainable. Besides, the bore wells should only be used for drinking water supply and not for irrigation.
3. The scope exists for construction of suitable artificial recharge structures in the district. The structures recommended for the hilly-Basaltic area in the northern part are: contour bunds, gully plugs, nala bunds and check dams. For other Basaltic areas, the nala bunds, and check dams are suggested. The existing dug wells may also be used for artificial recharge of ground water provided source water is free of silt and dissolved impurities.
4. The most feasible artificial recharge structure suitable for Alluvial areas restricted along the banks of Bhima, Mula-Mutha, Pawna and Nira River and its tributaries, are shallow recharge wells on the river bed of the tributaries. Percolation tanks are also suitable, wherever source water availability is there.
5. The existing village ponds need to be rejuvenated to act both as water conservation and artificial recharge structures.

CONCLUSION:

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

CHAPTER -6

MAINTENANCE AND ENHANCEMENT OF FOREST RESOURCE PRODUCTIVITY

6.1 GROWING STOCK OF WOOD

6.1.1 Precise information on growing stock is measure of substance of its tree wealth and includes distribution of stems in different diameter class, volume, biomass, carbon stock, etc. both within and outside forest area. It is required for strategic planning of forestry sector at various levels. Traditionally, growing stock is considered as an important indicator of forest health and productivity. The growing stock is estimated through forest inventory under which both qualitative and quantitative parameters are recorded to know overall health of growing forests. The calculation of growing stock has assumed greater importance as it provides a key input for deriving the amount of carbon sequestered in the forests.

6.1.2 Pune Forest division has most of forest stock dominated by mixed and exotic type of vegetation. Exotics like *Glyricidia* and *Subabul* have also been planted in large number of plantations. Along river bank *Prosopis juliflora* is also present at most of sites. These exotics have good coppicing power as well as they germinate profusely hence, they have replaced the existing indigenous vegetation. This vegetation has developed into middle aged crops, also as mature crop which needs to be replaced with indigenous vegetation. Growing stock determined vide forest resource survey sampling is given in Appendix No. XI to XV.

6.2 GROWING STOCK OF BAMBOO

6.2.1 Bamboo is sparsely distributed across the division. Most of the bamboo is present in plantations i.e., artificially planted. In very rare circumstances natural occurrence of bamboo can be found. *Pseudoxytenanthera madhavii* (Mes) bamboo which is endemic to North-Western Ghats is also present in Southern parts of Paud Range- Mulshi Taluka. This species of bamboo is typically propagated vegetatively and occurs mostly naturally. Mostly it is found in fields rarely in forest area. Its presence in forest is sparse and limited to Paud range only. Since, most of the bamboo is from manmade plantation, bamboo crop is mostly of very young age and in some cases of middle age but, congestion has also occurred in almost all clumps.

6.2.2 Areas with bamboo clumps are mapped according to density of clumps per Ha. Bamboo stock is divided into three classes as shown below.

Sr No.	Stock Type	Stock Class	% Occurrence	Area Ha.
1	Bamboo-Well Stocked	Well stocked: 100 and above clumps/ ha	0.00	1.55
2	Bamboo-Moderately Stocked	Moderately stocked: 50 to 100 clumps/ ha	0.15	96.85
3	Bamboo-Under Stocked	Under stocked: Below 50 clumps/ ha	0.00	0.71
	Total		0.15	99.11

Area having Bamboo clumps is shown in stock maps, in emerald green colour with black line pattern. Total area under bamboo is 99.11 Ha. This comes to 0.15 % of forest area of division. However, enumeration of bamboo crop in the tract has not been done during the course of enumeration and therefore results are not available. However, the areas having good bamboo growth are given below

Bamboo Dominated Areas

Range	Village
Bhamburda	Bahuli
Shirota	Pangloli
	Mundhavare
	Takva Kd
	Shilatane
	Nandgaon
	Vallahvan
	Kivale
Paud	Rihe
	Muthe

In year 2018 Paud Range had sold 7000 bamboos for Rs 65000/- after doing decongestion work. Similarly in year 2018-19 around 75,000 bamboos have been exploited from adjoining Khed Range of Junnar division. Bamboo had large scale demand for agriculture applications and was generally used as support for vegetable cultivation. On these lines bamboo clumps in adjacent range Shirota and Wadgaon should be freed from congestion.

6.3 INCREMENT IN VOLUME OF IDENTIFIED TIMBER SPECIES

Question of increment in volume of identified timber species does not arise since there is no commercial exploitation of timber species in Division.

6.4: EFFORTS TOWARDS ENHANCEMENT OF FOREST PRODUCTIVITY THROUGH QUALITY PLANTATION ACTIVITIES

To increase the quality of production, many plantations have been taken up. But all plantations have not yielded desired results. Still the existing crop is of middle age. Hence commercial production is not yet devised. So, these plantations are of inferior quality forming gloomy forest. In purview of past experience new plantations are aimed at increasing the productivity of forest by planting Teak to some extent and other indigenous tree species. Utmost priority is given to plantation of indigenous species like Neem, Hirda, Behada, Moha, etc. as it suits local physiographic condition and forms a base species for introduction of other higher valuable tree species.

6.5 CARBON STOCK

Total carbon stock of Pune Forest division is calculated as per calculations Carbon stock derived as per FSI guidelines is 5879.46 tonnes. Estimation of carbon stocks in carbon pools is carried out by applying the methods provided UNFCCC guidelines. While considering the carbon estimation for the division it was estimated for above ground level (AGL). The estimate of volume per hectare was used to calculate carbon in tons per hectare using the formula's prescribed by UNFCCC guidelines.

Pune Division Area (Sq. km.)	Above Ground Biomass	Below Ground Biomass	Dead Wood	Leaf Litter	Soil Organic Carbon	Total
661.33	1794.42	551.394	30.152	103.215	3400.28	5879.46

*Source – ISFR 2021

('000 in tonnes)

6.6 CARBON SEQUESTRATION AND MITIGATION

Carbon sequestration is the process involved in carbon capture and the long-term storage of atmospheric carbon dioxide or other forms of carbon to mitigate or defer global warming. It has been proposed as a way to slow the atmospheric and marine accumulation of greenhouse gases, which are released by burning fossil fuels. The amount of carbon dioxide in the atmosphere has increased since the beginning of the industrial age, and this increase is caused mainly by the burning of fossil fuels. Carbon dioxide is a very effective greenhouse gas that is, a gas that absorbs infrared radiation emitted from Earth's surface. As carbon dioxide concentrations rise in the atmosphere, more infrared

radiation is retained, and the average temperature of Earth's lower atmosphere rises. This process is referred to as global warming.

Reservoirs that retain carbon and keep it from entering Earth's atmosphere are known as carbon sinks. For example, deforestation is a source of carbon emission into the atmosphere, but forest regrowth is a form of carbon sequestration, the forests themselves serving as carbon sinks. Carbon is transferred naturally from the atmosphere to terrestrial carbon sinks through photosynthesis; it may be stored in aboveground biomass as well as in soils. Beyond the natural growth of plants, other terrestrial processes that sequester carbon include growth of replacement vegetation on cleared land, land-management practices that absorb carbon and increase growth due to elevated atmospheric carbon dioxide levels and enhanced nitrogen deposition. It is important to note that carbon sequestered in soils and aboveground vegetation could be released again to the atmosphere through land-use change or climatic changes. For example, combustion (which is caused by fires) or decomposition (which results from microbe infestation) can cause the release of carbon stored in forests to the atmosphere. Both processes combine with oxygen in the air with carbon stored in plant tissues to produce carbon dioxide gas.

If the terrestrial sink becomes a significant carbon source through increased combustion and decomposition, it has the potential to add large amounts of carbon to the atmosphere and oceans. Globally, the total amount of carbon in vegetation, soil, and detritus is roughly 2,200 gigatons (1 gigaton = 1 billion tons), and it is estimated that the amount of carbon sequestered annually by terrestrial ecosystems is approximately 2.6 gigatons. The oceans themselves also accumulate carbon, and the amount found just under the surface is roughly 920 gigatons. The amount of carbon stored in the oceanic sink exceeds the amount in the atmosphere (about 760 gigatons). Of the carbon emitted to the atmosphere by human activities, only 45 percent remains in the atmosphere; about 30 percent is taken up by the oceans, and the remainder is incorporated into terrestrial ecosystems.

Carbon dioxide (CO₂) is naturally captured from the atmosphere through biological, chemical, and physical processes. Artificial processes have been devised to produce similar effects, including large-scale, artificial capture and sequestration of industrially produced CO₂ using subsurface saline aquifers, reservoirs, ocean water, aging oil fields, or other carbon sinks. Forest plays important role in carbon sequestration.

Reforestation is the replanting of trees on marginal crop and pasture lands to incorporate carbon from atmospheric CO₂ into biomass. For this process to succeed the carbon must not return to the atmosphere from mass burning or rotting when the trees die. To this end, land allotted to the trees must not be converted to other uses and management of the frequency of disturbances might be necessary in order to avoid extreme events. Alternatively, the wood from them must itself be sequestered, e.g., via biochar, bio-energy with carbon storage (BECS), landfill or 'stored' by use in e.g., construction and house hold furniture.

CHAPTER -7

OPTIMIZATION OF RESOURCE UTILIZATION

Forest is one of the largest renewable resources available on Earth. It provides a variety of goods and services including food, fodder and fuel. Wood is used to make furniture in houses. These substances should be harvested sustainably so as to increase the long-term resource value of the forest. However, the use of these resources and the manners of their removal from the forest has been a serious problem when considering sustainability. Over-exploitation hampered sustainability, efficient utilization of forest resources would lead to sustainable resource use in forest management and agricultural production. The result would lead to constant supply of needed resources. Forest resources refers to all products from the forest and its values could be quantified in relation to their benefits to man.

A forest is a natural, self-sustaining community characterized by vertical structure created by presence of trees. Forest can exist in many different regions under a wide range of conditions, but all true forests share these physical characteristics.

Forest is a natural community. No forest is static in time. That is, because forest communities respond to outside influences. Most forests are in a state of constant flux. Depending upon the systems within which forest communities exist, such factors might include rainfall, fire, wind, seismic activity, flooding, animal activity, insulation, and so on. At any time, a forest is a collection of past responses to outside influences and internal competitive interactions. Therefore, the present status of any forest, indeed of any natural community, reflects what has gone on before.

In the above background, the assessment of forest resources and its removal need to be studied before providing prescriptions for future management.

7.1 RECORDED REMOVAL OF TIMBER

During the past plan period no felling was prescribed because of which Pune Forest Division has not harvested any timber. But since year 2012-2021 total number of cases were 481 total sums of Rs.4,82,670/- was recovered from these cases of timber of miscellaneous species in forest offences.

7.2 RECORDED REMOVAL OF FUEL WOOD

During the past plan period no felling was prescribed because of which Pune Forest Division has not harvested any fuel wood. But some quantity of fuel wood recovered in forest offences was extracted. The quantity and revenue obtained from fuel wood is given as under-

Recorded Removal of Fuel Wood

Sr. No.	Year	Quantity (Cu.M.)	Revenue (Rs.)
1	2020-21	62.00	20,000/-

7.3 RECORDED REMOVAL OF BAMBOO

In previous plan, Bamboo (overlapping) Working Circle was prescribed. In the previous plans, either raising pure bamboo plantations or bamboo planting was done. The survival of bamboo is not satisfactory, therefore scientific bamboo working is much needed to improve the quality of bamboo. As on today, good but scattered bamboo crop is available in some villages of Paud, Bhamburda, Shirola, and Wadgaon ranges of Pune Forest division. Certain quantity of bamboo has been extracted; but no official reporting of the quantity is reported by division.

7.4: RECORDED REMOVAL OF LOCALLY IMPORTANT NTFPs INCLUDING

MAPs

The species of NTFP for the Division are Grass, Shikekai pods, Kadhipatta leaves (*Murraya koenigii*), Jambhul (*Schyzigium cummini*), Hirda (*Terminalia chebula*) Behada (*Terminalia bellerica*), Karonda, Ambulgi, Honey, Toran (*Ziziphus rugosa*), Karvi (*Strobilanthes callosus*) etc., based on report of NGO 'Medicinal Plants Conservation Centre & Trust.' However, there are no proper records of extraction/ consumption of these NTFPs.

The NTFP crop is in degraded status due to uncontrolled and unscientific harvesting by local people. There is good potential especially of Hirda (*Terminalia chebula*), Shikekai, Vavding, Nirgudi (*Vitex nigundo*) and Jambhul (*Schyzigium cummini*) in western part of Pune forest division. To improve the potential of NTFP, NR treatment of the crop is necessary. The scientific harvesting and processing for value addition through Joint Forest Management Committees will be beneficial for forest as well as local communities.

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

In the past years timber is mainly used for construction of houses, huts, daily needed agricultural equipment, other shelter as well as daily needed fuel wood, as there is no substitute for these requirements.

According to the forest policy, forest management through coupe working the conservation and improvement of forests was managed by forest department which results in extraction of timber and fire wood from forest area, because of which revenue generated and partly fulfill the daily needs of locals. The illicit tree cutting was also done by local population for their house hold and agricultural needs, which has resulted in degradation of forest in the division.

After 1985, the coupe working (tree felling) was restricted in Western Ghat region for Bio-Diversity Conservation and to restrict the degradation of hill top hill slope areas. Also, forest department has taken initiative in supplying non-conventional energy resources like Bio-gas, L.P.G., Vanjyoti / chulhas, Surya chulhas to minimize the dependency on fuel wood. People are using cement concrete frame for doors, windows and constructing R.C.C. houses. Metal agricultural equipment's are generally used which results in reduced illicit tree felling. Local needs of fire wood are met out from agriculture produce or wood derived from private lands to large extent. This has resulted in reducing illicit tree felling. The details of use of wood as firewood and timber is as follows :

7.5.1: PUNE DIVISION POSITION OF FUEL CONSUMPTION BY TYPE

Sr. No.	Taluka		Total Number of Households	Fire-wood	Crop Reside	Cow dung Cake	Coal / Lignite / Charcoal	Kerosene	LPG / PNG	Electricity	Bio-Gas	Any Other	No Cooking
1	2		3	4	5	6	7	8	9	10	11	12	13
1	Mawal	Total	71,330	16,824	341	2,687	45	4,581	45,789	23	304	112	624
		Rural	39,455	15,023	259	2,649	34	2,683	18,062	16	258	102	369
		Urban	31,875	1,801	82	38	11	1,898	27,727	7	46	10	255
2	Mulshi	Total	35,409	12,287	310	787	30	3,828	17,466	34	125	53	489
		Rural	29,380	11,943	267	773	26	2,638	13,236	30	122	41	304
		Urban	6,029	344	43	14	4	1,190	4,230	4	3	12	185
3	Haveli	Total	5,55,012	36,815	2,492	1,437	515	77,902	4,22,445	177	1,046	323	11,860
		Rural	1,24,272	19,709	1,082	874	120	11,453	89,520	40	344	103	1,027
		Urban	4,30,740	17,106	1,410	563	395	66,449	3,32,925	137	702	220	10,833
4	Pune City	Total	7,69,047	21,992	1,853	977	510	65,110	6,63,729	206	1,827	533	12,310
		Rural	7,360	711	19	8	1	961	5,494	-	17	2	147
		Urban	7,61,687	21,281	1,834	969	509	64,149	6,58,235	206	1,810	531	12,163
5	Daund	Total	75,001	39,119	981	444	147	4,848	28,604	47	251	46	514
		Rural	63,199	37,708	913	424	130	2,994	20,322	46	230	37	395
		Urban	11,802	1,411	68	20	17	1,854	8,282	1	21	9	119
6	Baramati	Total	90,206	43,019	2,549	442	136	4,106	38,080	145	654	202	873
		Rural	74,584	41,654	2,474	348	122	2,277	26,112	134	647	186	630

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		Urban	15,622	1,365	75	94	14	1,829	11,968	11	7	16	243
7	Indapur	Total	79,089	52,755	2,360	423	181	3,112	18,835	52	656	120	595
		Rural	73,684	52,038	2,307	416	179	2,145	15,291	51	653	78	526
		Urban	5,405	717	53	7	2	967	3,544	1	3	42	69
Pune Division Total		Total	16,75,094	2,22,811	10,886	7,197	1,564	1,63,487	12,34,948	684	4,863	1,389	27,265
		Rural	4,11,934	1,78,786	7,321	5,492	612	25,151	1,88,037	317	2,271	549	3,398
		Urban	12,63,160	44,025	3,565	1,705	952	1,38,336	10,46,911	367	2,592	840	23,867

Reference – Pune District Census 2011

The above table shows that 43% of rural households are using firewood for their daily cooking, out of which most of the fire wood is derived from their private land and some quantity is imported from adjacent districts. (*Source: Pune district Census 2011*)

7.6: IMPORT AND EXPORT OF WOOD AND WOOD PRODUCTS

As such there are no major wood-based industries in Pune division. However, there are 53 saw mills which use Babhul, subhabul, Neem, Nilgiri and Teak from private land and to some extent timber brought from other areas. The list of Saw Mills is given in Appendix No. XVI.

The report of Timber received & its source as per survey done by Indian Wood Science and Technology for year 2019 & 2020 is as follows.

	Timber – Government Forest					Private Land									
						Tribal				Non-Tribal					
	Teak		Non-teak		Firewood	Teak		Non-teak		Teak			Non-teak		
Year	No. of logs	Qty. m ³	No. of logs	Qty. m ³	m ³	No. of logs	Qty. m ³	No. of logs	Qty. m ³	No. of logs	Qty. m ³	Firewood m ³	No. of logs	Qty. m ³	Firewood m ³
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2019	0	0	0	0	0	0		0	0	8205	603.436	0.27	71308	5450.42	10541.073
2020	186	32.75		11.938	16000	0	00	0	0	84519	102.482	0.058	151422	3603.99	924.227
Total	186	32.75	0	11.938	16000	0	0	0	0	92724	705.918	0.328	222730	9054.41	11465.3

Interstate timber import from neighboring states of Karnataka, Telangana, M.P., Gujrat, etc. is present and mainly for non-teak timber and details are as follows.

Year	Teak	Non-Teak No. of logs	Qty m ³	Non-Teak Firewood m ³
2019	0	-	2339.21	64.52
2020	0	20000	1372	66.41
Total	0	20000	3711.21	130.93

7.7 IMPORT AND EXPORT OF NTFPS

Hirda fruits are the main NTFP of Pune Forest division which is exported mainly to Mumbai and Pune market. The other NTFP like Jambhul, Shikekai, Amla, Toran, Tendu leaves are also collected by local people for the domestic use only and for sale in local markets. Other than this there is no import or export of NTFP from Pune Forest division.

7.8 REMOVAL OF FODDER

In Kanwarjit Singh plan an area of 4000 ha. was earmarked for Fodder Working Circle. Subsequently in Rao & Gupta plan (current plan) entire area of Pasture Working Circle was distributed between Afforestation and Fuelwood Working Circle. Prescriptions of these Fodder Management Working Circles were not followed in true sense. Therefore, proper grasslands are not developed, however fodder is removed from plantations. Villagers are not much dependent on fodder from forest areas as they get it from their fields. Whatever fodders removed from forest areas is not recorded properly. There is wide scope for raising fodder plantations and exporting it to other areas, having scarcity of fodder.

7.9 VALUATION OF THE PRODUCTS

There are no details of valuation of products hence there is scope to increase this valuation by value addition of these NTFP by way of processing it. As proper record of collection of other NTFPs is not done, it is very difficult to value it.

CHAPTER-8

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

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

Pune Forest Division alike other forest divisions in the State has adopted Joint Forest Management as one of the tools of forest management as early as the mid-nineties. Ever since, the people/ community participation in conservation and management of forest & wildlife resources has been an integral part of the management. In Pune division, 342 JFMCs have been constituted as per Govt. Resolution MSC/2000/Cases/ 143/F-2 Dated 25 April 2003. All the areas adjoining villages have been covered under JFM. These Committees cover an area of 66,130.96 hectare.

These JFM Committees have undertaken plantations on 478 ha. Under FDA 280 ha. Plantations under various State / District schemes during last plan period in all 342 villages.

JFM programme involve the following broad aspects of forest management:

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

8.2: STATUS OF EMPOWERMENT OF JFMCS

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

The Range wise distribution of JFMCs & area allotted to them

Sr. No.	Range	No. Of Villages in each Range	NO. of JFMCs	Area (Ha)
1	Pune	52	16	7033.39
2	Bhamburda	34	13	6514.60
3	Vadgaon	82	51	10021.80
4	Shirota	66	35	12607.50
5	Paud	128	79	11741.80
6	Daund	63	83	6839.90
7	Baramati	49	36	5031.11
8	Indapur	66	29	6753.67
Total			342	66543.70

DETAILS OF LPG, BIOGAS, DISTRIBUTION IN PUNE FOREST DIVISION

Also, the Committees which are fit and active as per Govt. Resolution dated 10th July 2012 (Convergence G.R.), supply of LPGs, Biogas and supply of milk cattle for replacing Scrub Cattle and payment for plant protection were provided to JFMCs. The details are as follows.

Details of Cooking Gas supply & Beneficiaries

Division	Year	No. of Cooking gas supply	No. of beneficiaries
Pune	2021-22	1097	1097

8.3: LABOUR WELFARE

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

8.4: USE OF INDIGENOUS KNOWLEDGE

As the Pune Forest Division is situated in Western Ghats and has plenty of biodiversity, the locals and tribals have knowledge of various medicinal plants. The hilly areas of western part which have limitation in sufficient medical facilities, the rural population are dependent on various plants to cure different ailments and diseases. They use different plants and their parts for the treatment of various disorders like Skin Diseases, Diarrhoea, Gynaecological Disorders, etc. They also use this indigenous knowledge for fishing and cattle rearing.

The Department has also made its effort in documenting the indigenous technical knowledge of the people in the Division. The Pune Division, Pune Municipal Corporation and Modern College

of Arts, Science & Commerce had organized and participated in important workshop and exhibition regarding medicinal & edible plant resources and their uses in the year 2018 & 2019.

Rajiv Gandhi Science and Technology Commission have handed over responsibility of Digitized Inventory of Medicinal Plant Resources of Maharashtra to Agharkar Research Institute, Pune. Under this project quantitative assessment of species is done for Pune division. Attempts should be made to use this information in promoting Medicinal Plant conservation.

It may be seen that different Vaidus use a variable number of plants and they have been co-operative enough to share with the Forest Department the names of the plants, the parts used and the disease for which they are used for.

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

8.5: EXTENT OF CULTURAL/SACRED GROVES

Under World Bank aided Maharashtra Forestry Project, BHNS has enlisted 65 sacred groves in Pune Division, which are included in this plan. All the groves in this division occur in Agro climatic zone 4 & 5. However, there are many more sacred groves which have not been mentioned in that plan. The possibility of getting a greater number of sacred groves in critical survey of the region in future cannot be ignored.

At present none of these Sacred Groves are properly managed. Management action plan for conservation of Sacred Groves is given in detail in chapter of 9 of part II.

List of sacred grooves is attached in Appendix No. XVII.

8.6: ECOTOURISM AREAS AND ACTIVITIES

Pune division is blessed with many forts like Sinhagad, Lohgad, Tunga, Tikona, Visapur, etc. The Division has identified important and potential area to be developed for eco-tourism in the division. During last working plan period, different activities have been undertaken at 34 locations spread over all the division. There is a need to develop tourist circuit by inclusion of these sites. On these lines documentation of the ecological, cultural, religious significance of each of the area should be done and formulate a plan by which these sites could become places for forestry extension in the future. List of eco-tourism sites is as follows –

Table about eco-tourism places

Sr. No.	Range	Name of eco-tourism Place	famous for
1	2	3	4
1.	Pune	Ramdara, Loni kalbhor	Religious Place Eco-tourism spot
2.		Mastani Lake Wadki	Historical Place Eco-tourism spot
3.		Lohagaon	Religious Place Eco-tourism spot
4.		Wade Bolhai	Religious Place Eco-tourism spot
5.		Kesnand	Religious Place Eco-tourism spot
6.		Koregaon mul	Religious Place Eco-tourism spot
7.		Alandi mhatoba	Religious Place Eco-tourism spot
8.		Khed-shivapur	Religious Place Eco-tourism spot
9.		Kalyan	Religious Place Eco-tourism spot
10.	Bhamburda	Mamurdi	Religious Place Eco-tourism spot
11.		Pashan	Urban Eco-tourism spot
12.		VetalTekadi Bhamburda	Religious & Urban Place Eco-tourism spot
13.		Hanuman Tekadi	Religious Place Eco-tourism spot
14.		Hingane	Religious Place Eco-tourism spot
15.		Warje	Urban Eco-tourism spot
16.		Nandoshi	Religious Place Eco-tourism spot
17.		Khadakwasala	Dam in Pune city
18.		Dhayari	Religious Place Eco-tourism spot
19.		Bhamurda Vanudhyan	Urban Eco-tourism spot
20.		Taljaitekadi	Urban Eco-tourism spot
21.		Kille Shinhagad	Historical Place Eco-tourism spot
22.		Agalambe	Religious Place Eco-tourism spot
23.	Paud	Bawdhan	Urban Eco-tourism spot
24.		Saiv	Urban Eco-tourism spot
25.	Baramati	Kanheri	Religious Place Eco-tourism spot
26.		Tandulwadi	Urban Eco-tourism spot
27.	Indapur	Kadbanwadi	Urban Eco-tourism spot

28.		Bharnewadi	Urban Eco-tourism spot
29.	Daund	Dalimb	Religious Place Eco-tourism spot
30.		Mergalwadi	Urban Eco-tourism spot
31.		Varwand	Religious Place Eco-tourism spot
32.	Vadgaon	Talegaon	Urban Eco-tourism spot
33.	Shirota	Tungarli	Religious Place Eco-tourism spot
34.		Karla	Religious Place Eco-tourism spot

8.7: SOCIAL CUSTOMS

Some temples like Theur, Morgaon, Dehu, Ekvira devi, etc. are visited by local people. Other than this no specific social customs relevant to the forest or its conservation are noticed or known to the Department.

8.8: STATUS OF COMPLIANCE OF FOREST RIGHT ACT (FRA)

Individual/ Common Rights settled.

In Pune Forest Division 19 individual claims have been accepted. Common rights of honey, grass, NTFP (Gum, Hirda fruits, Wild Edible Plants) are given, below. The detail enclosed in Appendix No. IV.

Sr. No.	Eligible Cases	Total claims	Area sanctioned in ha
1	Individual	19	0.073

The process of finalization of individual claims and community forest rights is still under progress at Village Level, Sub Divisional Level and District Level Committees. Hence the forest area to be recognized under this Act is bound to change with time until there is fixed deadline for making application for such claims.

8.9 OTHER RIGHTS AND CONCESSIONS

The forest is not burdened with any rights except that of the right of way, annual fairs for specific villages and water. The privileges, granted to the villagers consist of collection of small deadwoods, thorns, grass, grazing leaves, fruits, Moha (*Madhuca indica*) flowers etc. The details of which are given in part V (vide articles Nos.132 and 137) of the Bombay Forest Manual volume III.

Special privileges for Pune district are as under.

1. Removal of Karvi (*Strobilanthus callosus*) by head loads for agricultural purposes.

2. Removal of Moha (*Madhuca indica*) fruit for the gatherers own use or for sale.
 3. No other shrubs except those mentioned below should be removed or damaged viz. Tarwad, Dhaiti, Ramati, Dhasai, Kekai, Kharmati, Dawaka, .Rangal, Tipna, Chimati, Karvi, Dhomal, Bhogade, Aswala, Kudali, Lohtol, Chingac, Taran, Chilar, Nirgudi & Lantana
- ✓ No axe should be carried in to the forest.
 - ✓ Only deadwood and fallen twigs and branch wood should be removed as fuel for domestic purposes only.
 - ✓ No damage should be done to any forest growth.
 - ✓ The forest of each village shall be divided in to areas by the forest department for the collection of deadwoods each year.

The grant of the above concession will be controlled by the issue of individual permits which will be subject to the condition that.

- i) The licensee must help the forest department in the prevention and detection of forest offences and
- ii) That the villagers will be held responsible for any damage done to the forest of the villages.

Failure to observe any of these conditions will entail forfeiture of these privileges and will in addition make the privilege holder liable to punishment.

Even though the concessions are conditional and are to be controlled by issue of individual permits, due to extensive and fast developing tendency of law-breaking amongst the villagers, it has extreme pressure and it's difficult to control the removal of the privileged produce. This has resulted into further deterioration of the standing growth. It is therefore, very necessary to forfeit all such concessions in the forest settlement. Due to sparse to very sparse tree growth the coupes are deleted from working and no felling of any types is being carried out. As such the question of "Nistar distribution" does not arise.

8.10: DEPENDENCY OF LOCAL PEOPLE ON NTFPS

There are no significant number of people/community dependent on the forests and forest produce. There are some tribal families in Shirot, Paud, Maval, Bhamburda Ranges, who collects NTFPs like Hirda, Honey, Beheda, Shikekai, etc. as a supportive financial activity.

8.11 OTHER ASPECT:

There are few transhumant populations of grazing community found in the Eastern Pune Forest Division especially in grasslands of Baramati, Indapur & Daund ranges. Moreover, in rainy

season, seasonal migration of cattle from lowlands to midland areas is noticed at some places in Western part of Pune division to some extent.

The migratory labour of sugar factories also collects and store fodder for their cattle, but this collection is not recorded at village level. The information of such grass collection should be recorded and monitored by respective JFMCs.

Natural regeneration is found adversely affected in areas wherever rotational grazing system is not followed properly. Likewise, proportion of non-fodder grasses is slowly increasing in such area. Therefore, grazing in such areas needs to be managed properly to avoid adverse effect on quantity and quality of fodder species.

CHAPTER-9

ADEQUACY OF POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

9.1 EXISTING POLICY AND LEGAL FRAMEWORK AND THEIR COMPLIANCE

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

9.1.1. National Wildlife Action Plan (2002-2016):

Ministry of Environment and Forests, Government of India formulated the Wildlife Action Plan (2017-2031). This is the 3rd Plan which replaces the earlier Action Plan of 2002-2016. The salient features of this Plan area as below:

- i. The Plan is based on the premise that essential ecological processes that are governed, supported or strongly moderated by ecosystems, are essential for food production, health and other aspects of human survival and sustainable development and maintenance of these ecosystems which can be termed as '*Life Support Systems*' is vital for all societies regardless of their stage of development.
- ii. It also emphasizes on other two aspects of living resource conservation viz., preservation of genetic diversity and sustainable utilization of species and ecosystems which has direct bearing on our scientific advancements and support to millions of rural communities.
- iii. The Plan adopts landscape approach in conservation of all uncultivated flora and undomesticated fauna that has ecological value to mankind irrespective of where they occur.
- iv. It accords special emphasis to rehabilitation of threatened species of wildlife while conserving their habitats which include inland aquatic, coastal and marine eco-systems.
- v. It also takes note of concern relating to climate change on wildlife by integrating it in to wildlife management Planning.
- vi. It underlines the fact that despite being one of 12 mega biodiversity countries of the world, national planning has not taken serious note of adverse ecological consequences of reduction and degradation of wilderness areas from the pressures of population, commercialization and development projects. Accordingly, the plan has brought to focus the alarming erosion of our

natural heritage comprising of rivers, forests, grasslands, mountains, wetlands, coastal and marine habitats, arid lands and deserts.

- vii. The Plan underscores the increasing need for people's support for conservation of wildlife and to this effect recommends strengthening the 'core buffer multiple use surround' structure with higher inputs for Eco development, education, innovation, training, extension, conservation awareness and outreach programs.
- viii. Wildlife health is yet another area which receives attention in this Plan.
- ix. Management of tourism in wildlife areas with related plough back mechanism, development of Human resource and Staff welfare has undergone reorientation in the Plan.
- x. The plan is alive to communities, inhabiting forest lands and other wilderness areas, to be treated appropriately in the light of Forest Rights Act and their inadequacy of resources and strong dependence on natural biomass resource.
- xi. The Plan takes note of and addresses rising human animal conflict owing to shrinkage, fragmentation and deterioration of habitats generating animosity against wild animals and protected areas.

The strategy for action to be adopted under wildlife action plan include following points which are partly being followed in this Plan:

- Strengthening and improving the Protected area network
- Landscape-level approach for wildlife conservation
- Integrating climate change in wildlife planning
- Management of tourism in wildlife areas
- People's participation in wildlife conservation
- Conservation awareness and outreach
- Conservation of threatened species
- Control of poaching and illegal trade in wildlife
- Wildlife health management
- Mitigation of Human-Wildlife conflict
- Conservation of Inland aquatic ecosystems
- Conservation of Coastal and Marine Ecosystems
- Development of Human resources

- Strengthening research and monitoring
- Improving compliances of domestic legislation and international conventions
- Ensuring sustained funding for wildlife sector
- Integrating National Wildlife action plan with other sectoral programmes
- Restoration of Degraded Habitats outside Protected Areas
- Control of Poaching, Taxidermy and Illegal Trade in Wild Animal and Plant Species
- Monitoring and Research
- Human Resource Development and Personnel Planning
- Ensuring People's Participation in Wildlife Conservation
- Conservation Awareness and Education

9.1.2. National Forestry Action Plan:

Introduction: Having about 2.5% of world's geographic area, India at present is supporting 16% of world's human population and 18% of cattle population. About 41% of forest cover of the country has already been degraded and dense forests are losing its crown density and productivity continuously. A large number of India's livestock population graze in the forests causing serious damage to soil, ground flora, including regeneration, and productivity of the forests. The use of forests beyond its carrying capacity and encroachments are the main cause of continuous degradation of forests.

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

- 1) Protect Existing Forest Resources.
- 2) Improve Forest Productivity.
- 3) Reduce Total Demand of Forest Produce
- 4) Strengthen Policy and Institutional Framework
- 5) Expand Forest Area

Strategies: -

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

- iii. Efforts are to be made to bring one-third geographic area of the country under forest and tree cover by plantations on all categories of wastelands and agroforestry.
- iv. Plantations on non-forest wastelands to be done mostly with fuel wood species as 70% of the wood produced from forests are used as fuel wood. Species of pulpwood and other industrial wood may be encouraged in farm forestry.

9.1.3. Honorable Orders of Supreme Court of India:

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

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

Following the directions of Hon'ble apex court in their order dated 22.09.2000 in IA No 424; a core group was constituted to decide the extent of felling. As per these Orders, fellings are to be carried out by the State Governments only after obtaining the permission from core group constituted by the Ministry of Environment and Forests, New Delhi, which is complied with by the Department.

9.1.4. Forest Rights Act, 2006:

After the enactment of this Act, the administration of the forest will be greatly influencing, as this act recognizes several individual as well as the community rights over the forest land and its produce. All the provisions of this Act will have to be taken into consideration while managing the forest.

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

9.1.5. Biological Diversity Act, 2002:

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

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

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

As of now 28 Biodiversity Management Committees have been formed in the District of Kolhapur. There is a need to establish Village Biodiversity Management Committees atleast in all the Gram panchayats where JFM is being implemented.

9.1.6. National Agroforestry Policy 2014

Agroforestry is defined as a land use system which integrates trees and shrubs on farmlands and rural landscapes to enhance productivity, profitability, diversity and ecosystem sustainability. It is a dynamic, ecologically based, natural resource management system that, through the integration of woody perennials on farms and in the agricultural landscape, diversifies and sustains production and builds social institutions.

Agro forestry can become an important tool to build the resilience of farmers and rural people against threats of climate change and natural calamities. This can also help in greening the rural employment and rural development opportunities by providing agroforestry tree produce based economic opportunities.

The major policy goals are:

- i. Setting up a National Agroforestry Mission or an Agroforestry Board to implement the National Policy by promoting coordination, convergence and synergy among various elements of agroforestry scattered in various existing, missions, programmes, schemes and agencies pertaining to agriculture, environment, forestry, and rural development sectors of the Government.
- ii. Improving the productivity; employment, income and livelihood opportunities of rural

- households, especially of the smallholder farmers through agroforestry
- iii. Meeting the increasing demand for timber, food, fuel, fodder, fertilizer, fibre, and other agroforestry products; conserving the natural resources and forest; conserving the environment and providing environmental security; and
 - iv. Increasing the forest/tree cover, there is a need to increase the availability of these from outside the natural forests.

Basic Objectives are:

The primary objectives of the National Agro-forestry Policy are to:

- Encourage and expand tree plantation in complementarities and integrated manner with crops and livestock to improve productivity, employment, income and livelihoods of rural households, especially the smallholder farmers.
- Protect and stabilize ecosystems, and promote resilient cropping and farming systems to minimize the risk during dire climatic events. iii. Fulfil the raw material requirements of wood-based industries and reduce the import of wood and wood products to save foreign exchange.
- Supplement the availability of agro-forestry products (AFPs), like the fuelwood, fodder, non-timber forest produces and small timber of the rural and tribal populations, thereby reducing the pressure on existing forests.
- The complement achieving the target of increasing forest/tree covers to remote ecological stability, especially in the vulnerable regions. Develop capacity and strengthen research in agroforestry and promote a massive people's movement for achieving these objectives and to minimize pressure on existing forests.

POLICIES

9.1.7. National Forest Policy 1988

The Indian National Forest Policy of 1988 emphasized the protective role of forests in maintaining ecological balance and environmental stability.

(a) Basic objectives:

- i. Maintenance of environmental stability through preservation and, where necessary, restoration of the ecological balance that has been adversely disturbed by serious depletion of the forests of the country.

- ii. Conserving the natural heritage of the country by preserving the remaining natural forests with the vast variety of flora and fauna, which represent the remarkable biological diversity and genetic resources of the country.
- iii. Checking soil erosion and denudation in the catchment areas of rivers, lakes and reservoirs in the interest of soil and water conservation, for mitigating floods and droughts.
- iv. Checking the extension of sand dunes in the desert areas of Rajasthan and along the coastal tracks.
- v. Increasing substantially the forest/tree cover in the country through massive afforestation and social forestry programmes, especially on all denuded, degraded and unproductive lands.
- vi. Meeting the requirements for fuelwood, fodder, minor forest produce and small timber of the rural and tribal populations.
- vii. Increasing the productivity of forests to meet essential national needs.
- viii. Encouraging efficient utilization of forest produce and maximizing substitution of wood.
- ix. Creating a massive people's movement with the involvement of women, for achieving these objectives and to minimize pressure on existing forests. The principal aim of Forest Policy must be to ensure environmental stability and maintenance of ecological balance including atmospheric equilibrium which is vital for sustenance of all life forms, human, animal and plant. The derivation of direct economic benefit must be subordinated to this principal aim.

(b) Essentials of Forest management

- i. Existing forests and forest lands should be fully protected and their productivity improved. Forest and vegetal cover should be increased rapidly on hill slopes, in catchment areas of rivers, lakes and reservoirs and ocean shores and on semi-arid, and desert tracts.
- ii. Diversion of good and productive agricultural lands to forestry should be discouraged in view of the need for increased food production.
- iii. For the conservation of total biological diversity, the network of national parks, sanctuaries, biosphere reserves and other protected areas should be strengthened and extended adequately.
- iv. Provision of sufficient fodder, fuel and pasture, especially in areas adjoining forest, is necessary in order to prevent depletion of forests beyond the sustainable limit. Since fuelwood continues to be the predominant source of energy in rural areas, the programme of afforestation should be intensified with special emphasis on augmenting fuelwood production to meet the requirement of the rural people.

- v. Minor forest produce provides sustenance to tribal population and to other communities residing in and around the forests. Such produce should be protected, improved and their production enhanced with due regard to generation of employment and income.

(c) Area under forests

The national goal should be to have a minimum of one-third of the total land area of the country under forest or tree cover. In the hills and in mountainous regions, the aim should be to maintain two-third of the area under such cover in order to prevent erosion and land degradation and to ensure the stability of the fragile eco-system.

(d) Other salient features

- i. A massive need-based and time bound programme of afforestation and tree planting, with particular emphasis on fuel wood and fodder development, on all degraded and denuded lands in the country, whether forest or non-forest land, is a national imperative.
- ii. It is necessary to encourage the planting of trees alongside roads, railway lines, rivers and streams and canals, and on other unutilized lands under State/corporate, institutional or private ownership. Green belts should be raised in urban/industrial areas as well as in arid tracts. Such a programme will help to check erosion and desertification as well as improve the microclimate.
- iii. Village and community lands, including those on foreshores and environs of tanks, not required for other productive uses, should be taken up for the development of tree crops and fodder resources.
- iv. Land laws should be so modified wherever necessary so as to facilitate and inspire individuals and institutions to undertake tree-farming and grow fodder plants, grasses and legumes on their own land.
- v. Schemes and projects which interfere with forests that clothe steep slopes, catchments of rivers, lakes, and reservoirs, geologically unstable terrain and such other ecologically sensitive areas should be severely restricted. Tropical rain/moist forests, particularly in areas like Arunachal Pradesh, Kerala, Andaman and Nicobar Islands, should be totally safeguarded.
- vi. No forest should be permitted to be worked without the Government has approved the management plan, which should be in a prescribed format and in keeping with the National Forest Policy. The Central Government should issue necessary guidelines to the State Government in this regard and monitor compliance.

- vii. To meet the growing needs for essential goods and services which the forests provide, it is necessary to enhance forest cover and productivity of the forests through the application of scientific and technical inputs.

9.1.8. Forest Policy of Maharashtra State-2008

Primary Objectives

- Conservation and sustainable development of natural and manmade forests through the application of appropriate scientific and management techniques for restoration of ecological balance and maintenance of environmental stability.
- Reforestation on all degraded, denuded and unproductive wastelands for soil and water conservation on watershed basis.
- Increasing substantially the tree cover on all available public, community and private lands through social forestry and agro forestry with the involvement of people and especially those who are landless, from weaker sections and women.
- Checking soil erosion in the catchment areas of rivers, lakes and reservoirs by undertaking water and soil conservation for mitigating floods and droughts and for reduction of siltation of reservoirs.
- Increasing the productivity of forest lands and forest trees.
- Meeting the basis of domestic requirements of fuel wood, fodder, non-timber forest produces and small timber of the rural poor and tribal population and reducing gap between demand and supply of the forest produce.
- Reducing biotic pressure on forests by maximizing substitution of wood and wood products and encouraging efficient utilization of forest produce.
- Conservation and development of wildlife and biodiversity through formulation of long-term strategic plans and action programmes.

Important Principals of Forest Management

By fully protecting all existing forests and forest areas their productivity shall be improved. The harvesting of forest produce shall be done by following the principle of its sustained yield. Forest and vegetal cover shall be increased on hill slopes and in the catchment areas of rivers, lakes and reservoirs, sea shores and on all denuded and degraded wastelands on watershed basis.

For the conservation of total biological diversity, the network of national parks, sanctuaries and other protected areas shall be extended and the areas which are not adequately represented in term of species and extent shall be strengthened. Rationalization of boundaries of some protected areas

shall also be done so as to avoid conflicting issues arising out of local developmental priorities. However, this shall be done only after ensuring that purpose of biodiversity conservation is not lost. Management Plans of such areas shall be made to reduce man animal conflict in the protected areas.

Special efforts shall be made to increase tree cover in those parts of the State, where area under forest cover is meagre, through massive Social Forestry and agro forestry initiatives with people's participation.

Biotic factors having adverse impact on forests shall be identified and efforts shall be made to control the same through involvement of people, which would comprise beneficiaries including women as stakeholders living in and around forests, in participatory forest management. At the same time elements with mala fide intentions causing damage to forest wealth shall be dealt with strictly under the law.

To meet the daily domestic needs of the rural and tribal populations living in the vicinity of forests, afforestation programme with special emphasis on augmenting production of fuel, fodder, non-wood forest produce and small timber shall be taken up.

Through non-timber forest products (bamboo, medicinal plants and grass etc.) to meet daily needs of the tribal population and the other communities residing in and around forests. Such produce shall be protected and qualitatively improved. Similarly, their production shall be enhanced so as to increase generation of employment and income. For this purpose, issue of creation of appropriate quality institutions shall be seriously deliberated.

GOI Orders / GOM Resolutions, Circulars etc.

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

9.1.2 LEGAL FRAME WORKS

Conservation of biodiversity includes the preservation of all species, flora and fauna, the enhancement of wildlife habitat, the control of wildlife problems and the sustainable use of forests and wildlife. The rapid rate of extinction of many species of animals remains an increasing concern. Habitat preservation and enhancement are critical to the existence of wildlife in an area. Animals cannot live in an area that does not provide proper food, cover, water and other needs. People's activities alter many habitats, which acts as a detriment to wildlife. Conservation and sustainable use of biological resources based on local knowledge systems and practices are ingrained in the Indian ethos and way of life. Formal policies and programmes for conservation and sustainable use of

biodiversity resources date back to several decades. The concept of conservation of biodiversity is enshrined in the Indian Constitution in Article 48(A and 51A (g)). Major

Central Acts relevant to biodiversity are the Indian Forest Act, 1927; the Wildlife (Protection) Act, 1972; the Forest (Conservation) Act, 1980; and the Environment (Protection) Act, 1986. The various Central Acts are supported by a number of State Laws and Statutes concerning forests and other natural resources.

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

9.1.2.1 Indian Forest Act, 1927

The first codification, which came on the statute book in relation to the administration of forest in India, was the Indian Forest Act 1865. Thus, the history of forest law in India is more than a century prior. The Act of 1865 was amended from time to time and ultimately it was repealed and replaced by the Indian Forest Act 1927 which not only consolidated but also defined the law relating to forests. The said Act of 1927 was also amended from time to time.

To make forest laws more efficient and to improve the Forest Act 1875, a new comprehensive Forest Act was passed in 1927 with the following objectives; to consolidate the laws relating to forests; regulation of and the transit of forest produce; to levy duty on timber and other forests produce.

9.1.2.2 Forest (Conservation) Act, 1980

Deforestation causes ecological imbalance and leads to environmental deterioration. Deforestation had been taking place on a massive scale in the country and it had caused widespread concern. The Government passed the Forest (Conservation) Act, 1980 which is a landmark in the history of the protection of Forests. The Act was passed to eliminate the difficulties of the Forest Act, 1927 and to conserve the vegetation cover of the nation. This historical Act consists of five sections but has proved very effective and successful in the conservation of the forests. The main Objective of the Act is to provide for the conservation of forests and for matters connected thereto. Conservation of forests is necessary as deforestation cause ecological imbalance and leads to environmental deterioration.

The Act deals with the restriction on the de-reservation of forests or use of forestland for non-forest purposes. It provides that notwithstanding anything contained in any other law for the

time being in force in a State, no State Government or other authority shall make, except with prior approval of the Central Government, any order directing:

- 1) That any reserved forest declared under any law for the time being in force in that State or any portion thereof, shall cease to be reserved;
- 2) That any forest land or any portion thereof may be used for any non-forest purpose; that any forest land any portion thereof may be assigned by way of the lease or otherwise to any private person or to any authority, corporation, agency or any other organization not owned, managed or controlled by Government;
- 3) That any forest land or any portion thereof may be cleared of trees which have grown naturally in that land or portion, for the purpose of using it for reafforestation.

9.1.2.3 Wild Life (Protection) Act, 1972

The Wild Life (Protection) Act 1972 passed by the Parliament under article 252 of the Constitution at the request of eleven States, was intended to provide a comprehensive national legal framework for Wild Life protection. The Act adopts a two-pronged conservation strategy; specified endangered species are protected regardless of location, and all species are protected in specified areas. The Act has been amended by amendment in 2002-03. The core objective of the Act is to provide protection to the wild animals, birds and plants. The Act empowers the Central Government to declare certain areas as Sanctuaries or National Parks. The object of the Wildlife Act has been properly explained by the Supreme Court in the following words:

“The policy and object of the wildlife laws have a long history and are the result of an increasing awareness of the compelling need to restore the serious ecological imbalances introduced by the depredations inflicted on nature by man. The State to which the ecological imbalances and the consequent environmental damage have reached is so alarming that unless immediate, determined and effective steps were taken, the damage might become irreversible. The preservation of the fauna and flora, some species of which are getting extinct at an alarming rate, has been a great and urgent necessity for the survival of humanity and these laws reflects a grave situation emerging from a long history of callous insensitiveness to the enormity of the risk to mankind that goes with the deterioration of the environment”.

This Act has been enacted for the two prime purposes: to provide for the protection of wild animals, birds and plants and for matters connected therewith or ancillary or incidental thereto and; to ensure the ecological and environmental security of the country.

9.1.2.4 The Biological Diversity Act, 2002

The primary aim of the Act is to provide for Conservation of Biological Diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters, connected therewith or incidental thereto. Moreover, India is a party to the UN Convention on Biological Diversity signed at Rio de Janeiro in June 1992. The Act consists of 65 sections and is divided into twelve chapters. It is applicable to the whole of India. The Act aims to regulate the access to Biological diversity under Sections 3 to 7. To achieve its aim, the following prohibitions have been imposed:

- No person (Citizen of India, NRI and body Corporate) shall undertake Biodiversity-related activities without the approval of the National Authority.
- No person shall transfer to a foreigner/NRI/body corporate not registered in India, any result of any research relating to any biological resources.
- Application for intellectual property rights not to be made without the approval of the National Biodiversity Authority inside India or outside India.
- Prior intimation must be given to the State Biodiversity Board for obtaining a biological resource for commercial utilization.

The Act has constituted a “National Biodiversity Authority” at the Centre with its head office at Chennai, consisting of fifteen members and one Chairman who shall be an eminent person in the field of conservation and sustainable use of Biological Diversity. The National Biodiversity Authority is authorized to constitute other committees to deal with agro-biodiversity and other committees for the efficient discharge of its duties. The Board shall advise the Central Government in matters relating to conservation of biodiversity, its sustainable use and equitable sharing of benefits. It shall also advise the State Governments in the selection of areas of Biodiversity importance.

9.1.2.5 The Scheduled Tribes and Other Forest Dwellers (Recognition of Forest Rights) Act, 2006

After acrimonious national debate for more than a year since tabling in the parliament on 13th December 2005, the Scheduled Tribes (Recognition of Forest Rights) Bill, 2005 which was re-christened as “The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 was passed in the parliament on 13th December 2006.

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 consists of various Provisions. One of the Provisions of the Act states, “Where the forest rights recognized and vested by the sub-section (1) are in respect of land mentioned in clause (a) of

the subsection (1) of section 3, such land shall be under the occupation of an individual or family or community on the date of commencement of this Act and shall be restricted to the area under effective occupation and shall in no case exceed an area of four hectares.

One of the most significant rights in the Act remains the right to protect traditional forests. The community possesses the following rights over community forest resources to protect and/or conserve them; to manage them; to regenerate them; to sustainably utilize these resources. To be specific, the functions of the Gram sabha (or any other village institution or even individual forest rights holders) are to protect wildlife, forest and biodiversity; protect adjoining water sources and “catchment areas”; protect the habitat and “cultural and natural heritage” (e.g., sacred groves, religious sites, mountains, water bodies, etc.) of their community from destruction.

The Act additionally provides certain rights under different sections like any land claimed by an individual or a community under any part of this Act should have been under their occupation since before December 13th, 2005, and should still be in their possession at the time of making the claim. Forest dwellers can claim rights over minor forest produce under the Act. Minor forest produce includes “bamboo, brushwood, stumps, cane, tussar, cocoons, honey, wax, lac, tendu or tendu leaves, medicinal plants and herbs, roots, tubers” and so on.

Statement showing individual and common eligible cases under The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Rights) Act 2006 in Pune division as on 4 Oct 2015 is as follows:

Individual/ Community Rights settled.

Sr. No.	Eligible Cases	Total claims	Area sanctioned in ha.
1	Individual	19	0.147
	Total		

The process of finalization of individual claims and community forest rights is still under progress at Village Level, Sub Divisional Level and District Level Committees. Hence the forest area to be recognized under this Act is bound to change with time until there is fixed deadline for making application for such claims.

9.1.2.6 Environment (Protection) Act, 1986

The Environment (Protection) Act, 1986 (hereinafter referred as EPA) was enacted under Article 253 of the Constitution which empowers the Parliament to formulate any law for the whole or any part of the territory of India for implementing any treaty, agreement or convention or any decision made at any international conference, association or other body. The purpose of EPA is to implement the decisions of the United Nations Conference on the Human Environment, 1972

(Stockholm Conference) in so far as they relate to the protection and improvement of the human environment and the prevention of hazards to human beings, other living creatures, plants and property. The statement of objects and reasons for the enactment of this law amply demonstrates the anxiety of the legislature to undertake immediate action post-Bhopal Gas Tragedy to prevent environmental harm and safeguard the environment.

The EPA is a general and comprehensive legislation designed to provide a framework for Central Government co-ordination of the activities of various Central and State authorities established under previous laws like Water and Air Act. It is also an "enabling law", which articulates the essential legislative policy on environment protection and delegates wide powers to the executive to enable bureaucrats to frame necessary rules and regulations. Since the time it has entered the statute book, the Act has served to back a vast body of subordinate environmental legislation in India.

9.1.2.7 Hon'ble Supreme Court of India:

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

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

Following the directions of Hon'ble apex court in their order dated 22.09.2000 in IA No 424; a core group was constituted to decide the extent of felling. As per these Orders, fellings are to be carried out by the State Governments only after obtaining the permission from core group constituted by the Ministry of Environment and Forests, New Delhi, which is complied with by the Department.

9.2 STATUS OF APPROVED WORKING PLAN AND COMPLIANCE

The working plan written by Shri. S. K. Pathak was in operation from 2007-08 till 2016-17. Prescriptions were implemented partially due to various factors like non availability of funds at right time and for right works.

Area of Pune working plan division has been divided into five Working Circles. Further each Working Circle is divided into working series and twenty coupes. Within 10 years of working plan

period only first 10 coupes from each working series are proposed to be treated and rest of the coupes are not proposed for treatment in plan period. Number of untreated coupes in Protection Working Circle are 100 coupes, Afforestation Working Circle 140 coupes, Natural Catchments and Special Water Supply Catchment Area Treatment Working Circle 80 coupes, and Old Plantation Management Working Circle 90. Total area of 410 coupes remains unworked for treatment in past working plan. In 50 crore plantation programme, plantations have been taken outside the due annual coupes. Though this is deviation but it has been done for afforestation of the blank areas, which will have beneficial effects in future.

9.3 NUMBER OF FOREST OFFENCES

The details of the cases booked under IFA, Wildlife (Protection) Act such as illicit cutting, encroachment, fire, wildlife crime, illegal transport, grazing etc. from 2012 to March 2021 are as follows:

Sr. No	Type of offence	No of offence cases
1	Illicit cutting	481
2	Encroachment	2254
3	Illegal Transport	47
4	Wildlife crime	282
5	Fire	1016
6	Grazing	131
7	Other	1279
	Total	5490

9.4 STATUS OF RESEARCH AND DEVELOPMENT

Wildlife division Pune, some individuals, institutes like Agharkar institute, BAIF, NGOs like ELA foundation have done some research on status of sacred groves, wild edible plants, vultures, Wolf, study of vegetation in high altitude plateau. Till research-gap needs attention and a systematic plan for conducting resource inventory and its analysis need to be done.

CCF (T) Pune has entrusted work of mapping and documenting floral and faunal diversity of selected Sacred Groves of Pune District (excluding Pune Taluka) to Agharkar Research Institute. Some selective sacred groves in Pune division should be taken up for study by research wing declaring them as research plots or Biodiversity Heritage Sites. A comparative statement of all floras, fauna and its change over the time period need to be recorded. In addition, the details of the collection of medicinal plants and information about the traditional knowledge need to be recorded.

9.5 HUMAN RESOURCE CAPACITY BUILDING EFFORTS

For efficient utilization of human resource, various training programme for capacity building of staff at all levels were carried out like Mid-career Training program, Workshop for ICT Application, Computerization of Forest Dept-PDA Orientation course, Wildlife awareness, IWMP, NR works, Evaluation, Survey, Village Forest, orientation training for newly appointed Forest Guard etc. by the State Government.

9.6 FOREST RESOURCE ACCOUNTING

In the previous plan except for the removal of dead, dying and diseased trees, no felling was prescribed. So, not much of the forest resource was harvested. Still whatever the revenue collected, it is mainly through the sale of material recovered from offence cases and some NTFP sale. The details of timber & fuel wood which was recovered in offence cases is as follows.

Statement - Timber recovered

Financial Year	Timber Recovered (Rs.)
2012-13	33750
2013-14	82043
2014-15	53652
2015-16	59885
2016-17	32077
2017-18	107500
2018-19	9100
2019-20	24305
2020-21	34864
2021-22	45494
Total	482670

Fuel wood recovered

Sr. No.	Year	Quantity (Q.M.)	Revenue (Rs.)
1	2018-19	0.8	2000/-

Bamboo Harvested

Sr. No.	Year	Range	Quantity (Nos)	Revenue Generated (Rs.)
1	2018-19	Paud	7200	65296/-

9.7 BUDGETARY ALLOCATION TO THE PUNE DIVISION.

The Budget provision, funds available & expenditure incurred during execution of Working Plan of Pune Division is given below.

It is quite evident from the figures that as per the prescriptions given in the Working Plan, works could not be done completely due to shortage of funds. The details of fund availability are as follows.

Statement Showing Fund Received under various schemes

Sr. No.	Year	Fund Received (lakhs)		
		Non Plan	Plan	CAMPA
1.	2017-18	4.63	12.30	119.80
2.	2018-19	11.94	11.14	383.93
3.	2019-20	456.68	2911.08	21.23 (MREGS)
4.	2020-21	162.28	4131.98	0
5.	2021-22	43.84	138.97	151.87
	Total	679.37	7205.47	676.83

9.8 EXISTENCE OF MONITORING, ASSESSMENT AND REPORTING MECHANISM

As per Government Resolution dated 29/09/2011 primary responsibility of implementation of working plan lies with Chief Conservator of Forests (T) Pune and Deputy Conservator of Forests (W.P.) Pune. Deputy Conservator of Forests (W.P.) Pune is supposed to take regular meeting of Deputy Conservator of Forests (T) for taking review of Working Plan implementation. Chief

Conservator of Forests (T) Pune should invite Conservator of Forests (W.P., West) Pune, in their regular meetings for implementation of Working Plan.

9.9 PUBLIC AWARENESS AND EDUCATION

General awareness is carried out by the Pune Division and the Social Forestry Wing of the Department. As per information from the DFO (Social Forestry), a total of 78 schools in division have Eco-Clubs as part of the National Green Corps Scheme of the Government of India. In each of the club, there are around 40-60 members. In these schools, regular year-round programmes are held and all-important days related to the Environment and Forests are celebrated enthusiastically. Regular field visits, projects, etc., are also taken up. The Division also celebrates Van Mahotsav and Wildlife Week on an annual basis. During this period various programmes like Essay/Drawing/Extempore Speech Competitions are held at schools.

From 2016-17 onwards, Maharashtra Forest department has taken a massive Greening of Maharashtra programme where a plantation of 50 crore plants from during the period 2016-17 to 2019-20. This programme has generated a massive social movement for Greening of Maharashtra. Under this movement registration of Green Army is done. These green army members are involved in tree planting programme. This momentum needs to be continued in future also.

9.10 ADEQUATE MANPOWER IN FOREST DIVISION

9.10.1 Staff: In Pune division total strength of staff is 305; detailed staff position of the Pune division is given in Appendix No. XVIII. The current staff of Pune division is not adequate looking at the total extent of division as it is widespread and in eastern part of division though forest area is less but is spread in small fractions over large extent.

9.10.2 Labour Supply

The primary activities of the forest department in Pune division are afforestation works, soil and moisture conservation work, forest protection, wildlife habitat management, handling man animal conflict issues, eco-tourism management. Out of these activities, afforestation and soil and moisture conservation works provide more employment to labors. On the whole, as most of the area of Pune division lies in agriculturally progressive belt or nearer to industrial area availability of labour for forestry activities is unsatisfactory except in the tribal belt. Prevailing (as on 01.01.2021) wage is 420 Rs/day.

CHAPTER - 10

FIVE YEAR PLANS

10.1 INTRODUCTION:

After India gained independence in 1947, it basically had to rebuild its economy from scratch. The leaders of those times had to pick the type of economy India would be and also outline the economic planning as well. This is where the five-year plan was born. An economic plan allocates the resources of a nation to fulfill the general and specific goals as planned by the government for a specified period. In India, these plans are made for five years and hence are known as five-year plans. These five-year plans are ultimately a short-term plan for a perspective plan. A perspective plan outlines the long-term goals of a nation, spanning twenty years.

In India, after the independence, the government set up a Planning Commission in 1950. This commission would be responsible for framing and implementing the five-year plans of the country. They began their efforts with the first five-year plan in 1950. Every five-year, plan is developed with a specific goal in mind. But there is never one solitary objective of the plan. The plan is supposed to work towards the perspective plan and must cover a few important objectives. However, it is not possible or practical to give equal importance to all aspects of a plan. Details of five-year plans with information in concern with forest are as follows.

10.2 ELEVENTH FIVE YEAR PLAN (2007-12)

The strategy of the Eleventh Plan for forestry sector development was to create an environment for achieving sustainable forestry and wildlife management with specific focus on the socio-economic targets. Accordingly, the plan initiated various programmes for developing forestry and improving the status of green cover. In order to meet the target of increasing forest cover by 5% of total geographical area, the plan emphasized on the rehabilitation of degraded forests through joint forest management committees by linking forests to livelihood and increasing the participatory process through National Afforestation Program. An intensive management of existing commercial plantations with scientifically designed inputs was emphasized in the plan for optimum productivity. In order to build sustainable forest management capacity of the states, two programmes of Ministry of Environment and Forests viz. Integrated Forest Protection and Strengthening Forestry Divisions were proposed to be reoriented during the Eleventh Plan. The plan has also initiated various programmes for preservation of wildlife and forest biodiversity. These include initiatives for mitigation of wildlife-human conflicts, involving and compensating local communities, management of habitats outside protected areas, rehabilitation of displaced communities and strengthening and protection of indigenous knowledge while improving research and monitoring system (The Eleventh Five Year

Plan, 2007-12). A sum of Rs 15583.02 crores was tentatively envisaged in the Plan (in Centre and State budgets) for forestry and wildlife conservation programmes.

10.3 TWELFTH FIVE YEAR PLAN (2012-2017)

The vision of 12th Five year plan is *“Managing Environment, Forests, Wildlife and challenges due to Climate Change for faster and equitable growth, where ecological security for sustainability and inclusiveness is restored, equity in access to all environmental goods and ecosystem services is assured through institutionalization of people’s participation; AND A future in which the nation takes pride in the quality of its environment, forests, richness of its biodiversity, and efforts by the State and its people to protect, expand and enrich it, for intra and inter-generational equity and welfare of the local and global community”*.

- Three “Core Indicators” identified in the Plan for the sector on “Environment and Sustainability” are; (1) Increase in green cover (as measured by satellite imageries) by 1 million ha every year during the Twelfth Five Year Plan, (2) Addition of 30,000 MW of renewable energy capacity in the Twelfth Plan and (3) Reduction in emission intensity of GDP in line with the target of 20 to 25 per cent reduction over 2005 levels, by the year 2020.
- Forest cover has been given a weightage of 7.5 per cent in the devolution formula. This may motivate the States to enhance not only the extent but also the quality of forest cover, as the weightage is for moderate dense and very dense forests.
- The MoEF & CC may take the initiative to set up a high-powered body called the National Environment and Forestry Council (NEFC), with the Prime Minister as Chairperson, the Minister of Environment, Forest and Climate Change as Vice Chairperson, aided and advised by a group of experts. This body may also have representation from the Ministries of External Affairs, Science and Technology, Agriculture, Commerce, Urban and Rural Development, Tribal Affairs and so on. Such a high-powered body would provide useful and valuable guidance for environmental sustainability. Similarly, State Environment and Forestry Councils (SEFCs) may also be set up in each State to align the working of different departments with that of the Environment and Forest department, so as to ensure environmental sustainability while implementing various development projects.
- Several steps have been taken by the MEF&CC for streamlining the process of granting Environment Clearances (ECs) and Forest Clearances (FCs).
- A National Environment Restoration Fund (NERF) may be created by the MoEF & CC from voluntary contributions and user fees for access to specified natural resources. Penalties levied for violation of environment-related Acts may also be deposited in the NERF. The NERF may

be used for cleaning up of polluted rivers and sites contaminated with toxic and hazardous waste.

- The principles of “Participatory Forest Management” being practiced in various States and UTs may be strengthened further by taking up suitable capacity-building measures. Emphasis may be given on improving the socio-economic status of village level Joint Forest Management Committees (JFMCs) through value addition to sustainably-extracted forest produce and marketing of value-added forest products – in particular, NTFPs (Non-Timber Forest Products). Increase in the share of value-added NTFPs, particularly bamboo-based products, in the national and international markets may bring substantial economic benefits to many members of village-level JFMCs.

10.4 FIVE YEAR PLANS –

The list of plantations taken up during last working plan is given in Appendix No. XIX. Total plantation carried out from 2012 to 2021 is on 6517.8 ha of land. RDF, CAMPA, JFM, wildlife nature conservation, ecotourism, 13th Finance, MAP, AR, CAP, AFSC are schemes under which these plantations are carried out. Apart from this deep CCT, Nalla bunding, Earthen and cement nalla bunds are the works carried out under different schemes. The details of cement and earthen nalla bund and other structures are mentioned in Appendix No. XX. Works carried out are mainly of plantations, soil and moisture conservation.

Currently the Five-Year Plans have been replaced by NITI Aayog since January 1, 2015. The Government of India, in keeping with its reform agenda, constituted the NITI Aayog to replace the Planning Commission instituted in 1950. This was done in order to better serve the needs and aspirations of the people of India. Hence, from year 2015 forest working is not being carried out according to Five Year Plan.

CHAPTER-11

PAST SYSTEMS OF MANAGEMENT

Study of past systems of management helps to understand today's management theory and practice. Moreover, it assists us to perceive what did and did not work in the past. It will give us a road map for prescribing subsequent management.

11.1 GENERAL HISTORY OF THE FOREST

11.1.1 Before the advent of British rule, rulers in this area had maintained control over the forest. Teak and Blackwood trees were notified as the “Royal trees” i.e., the property of the Government. They had also taken steps to preserve the forest around the hill forts and in valleys below in particular, with a view to prevent easy approach for invasion by enemy.

11.1.2 After the downfall of the Maratha Government and prior to the British undertaking consolidation of their new acquisitions, there was no control on the forests and as a result, surreptitious occupation of forest lands for agricultural cultivation ruined the forests to a considerable extent. In 1840, the British Government appointed Dr. Gibson the Superintendent of the Botanical Gardens to inspect the forest areas of Deccan region (including this tract) for assessing the quality and quantity of timber that could be available from these forests with a view to supplement the depleted teak supplies to the dock yard from Kanara and Malabar. His report indicated that teak in the Deccan region was of little account (i.e., importance) for external commercial purposes, though capable of being turned to profitable use of petty local requirements of Government and consumption for the construction of houses, hutments and agricultural implements etc.

11.1.3 In 1870 the exploitation was combined with a regeneration scheme for teak areas through direct sowing. The first working plan titled as the ‘Working Plan for Poona Teak’ was drawn up by J. Dodgaon and implemented by about 1903. The teak forests were worked under the “coppice with standard system” with a rotation of 40 years for the coppice growth. The coppice regeneration was supplemented with artificial regeneration by pit planting of seed and transplants of teak. Ten standards per acre of the sound and well-grown teak trees were retained in felled coupes.

11.1.4 Later on, the general revision on the working of all types of forests in Pune division (including this tract) was undertaken by D.A. Thomson. However, this working plan never came to be written up though the field work and mapping etc. were complete. The working as per this unwritten plan continued to be applied till 1931-32. This plan was revised by Garland and his plan was in operation from 1932-33 to 1951-52. The same was replaced by S. M. Wagle plan for “Poona Division Forest Reserves” which was under implementation since 1952-53.

11.2 PAST SYSTEMS OF MANAGEMENT AND THEIR RESULT

11.2.1 Dr. Gibson adopted, “The Improvement Feelings”. The working plan by J. Dodgaon was introduced by about 1903. The working under this plan was replaced by the working of unwritten plan by D.A. Thomason. The details of results of working the forests under the above plans are not available.

11.2.2 Garland’s plan:

The prescriptions of the unwritten plan of D.A. Thomson were revised by Garland. Garland’s plan was in force from 1932-33 to 1951-52. He had constituted four Working Circles viz. Main Working Circle, Protection Working Circle, Pasture Working Circle and Fuel Working Circle for management of the forest. The results of the management of forests allotted to each Working Circle as described by Wagle in his plan for Poona division are as under: -

(i) Main Working Circle

This Working Circle mainly covered the deciduous forests under the prescriptions of “the clear-felling system with artificial regeneration. The rotation was fixed at 40 years. The system was later on changed over to ‘The coppice with Reserves’ with reservation of 25 reserves of teak and injali species per acre. The growing stock was further supplemented through ‘rab’ plantations of teak and injali species. As the reservation of 25 reserves per acre could not be done in many places due to poor and sparse growth, the working on the whole had the appearance of ‘Simple coppice’, and the crop did not improve substantially.

(ii) Protection Working Circle

Protection Working Circle included ‘the sub-tropical evergreen forests’ situated on Bhimashankar hills. The working aimed at a conservative removal of stems of over mature trees without exposing much soil cover under 30 years felling cycle. The felling was of the nature of ‘Improvement cum thinning’. However, this turned into almost clear felling with destructive results of creating grassy open land and accelerated soil erosion.

In 1949, the working was totally suspended, giving a complete protection to these areas.

(iii) Pasture Working Circle:

Pasture Working Circle covered the grasslands or grass producing areas, which were divided into 23 blocks for exploitation of the shrubby growing stock under a ten years cycle. Each block was further divided into ten annual compartments for the purpose of exploitation. No definite improvement measures were suggested nor was any extent of closure applied. As a result, there was a considerable loss of the soil cover and consequently, the area was much denuded.

(iv) Fuel Working Circle:

This Working Circle included babhul areas. The clear-felling system was prescribed with artificial regeneration of babhul with suggestions to try out species like *Prosopis Juliflora* on soils which naturally evade good babhul growth. The system of regeneration was to be on the lines of taungya plantation. Through the system was found to give good results, as the essentials of timely planting and soil conservation were over looked, due to sheet and gully erosion and by flood waters the soil has been washed off exposing the sheet rock underneath.

11.2.3 The Working Plan for Poona Division Forests Reserves by S.M. WAGLE:

From 1952-53 onwards, the forests were being managed under Wagle's plan. He constituted six Working Circle viz Main Working Circle, Fuel Working Circle, Protection Working Circle, Kuran Working Circle, Pasture Working Circle, and Minor Working Circle (over lapping). The results of the management of the forest allotted to each Working Circle are as follows: -

i. Main Working Circle: -

Main Working Circle covered all deciduous forest areas. The silvicultural system adopted was the modified clear felling, with a rotation of 40 years, planting work was expected to be confined to open patches as would be available after excluding the young growth up to 30 cm (12") girth at b.h. Steep slopes were to be excluded from working. Two thinning were prescribed, the first being in the 15th year and the second in the 25th year of the formation of the crop. The main felling coupes and thinning coupes indicate that the same are neither worked nor are being worked as per the prescriptions of the working plan (i.e., as per modified clear-felling system). Attempts of improving the growing stock through artificial regeneration as per the plan prescriptions seem to be much limited and where attempted are not successful on an average, most probably due to adverse biotic factors, such as illicit cutting, excessive grazing etc., as well as the improper planting efforts, comprising of undersize planting stock and untimely planting operations etc. As a result, the crop was poor, sparse (Open) with few patches of under stocked areas of low quality (i.e., IV b quality).

ii. Fuel Working Circle: -

This Working Circle included mainly babhul areas and thorny scrub areas contiguous to babhul areas. Only a few patches of about 250 ha are included in this plan of Ghod project division. As proper attention was not paid by the cultivators to raise babhul along with the field crop, major portion of the area got thickly infested by impenetrable growth of *Prosopis juliflora*. Sporadic occurrence of babhul is noticed struggling under the thickets of *Prosopis juliflora*.

iii. **Protection Working Circle: -**

Protection Working Circle comprised of the sub-tropical evergreen forests along the crests of the Western Ghats. These forests were to be maintained for their protective influence and as such, no treatment amounting to major felling operations was suggested. Emergency felling, consisting of removal of dead and dying trees, in selected areas were permitted, if necessary, under special circumstances. Plantations of evergreen species were prescribed to reboise the areas depleted by over felling during Garland's plan period. It was observed that the area, once opened up due to adverse biotic factors erode rapidly and it is difficult to re clothe the same due to poor, shallow and impoverished soil conditions combined with the heavy rainfall in the area.

iv. **Kuran Working Circle: -**

This Working Circle covered mainly pasture areas which were in excess of the normal grazing requirements of local population. The areas are maintained as grass reserves. However, the prescriptions of these areas were not in force as per the Conservator of Forests, working plans circle Pune's No. B/XXX/5707, dated 15-12-1952. This situation occurred due to problem of non-appointment of additional staff (for want of funds etc.) for management of the areas of this Working Circle

v. **Pasture Working Circle: -**

Poorer areas of mainly pastoral value were included in this Working Circle.

Following three working schemes were prescribed for these areas.

- a) Pasture rotational grazing scheme
- b) Improvement scheme, imbibing two working programmes of 'Land improvement' and "Afforestation".
- c) pasture periodic grazing scheme.

However, these prescriptions were not in force. As a result, the areas have, therefore, denuded due to excessive influence of adverse biotic factors such as excessive grazing, annual fire etc. and are mostly blank and barren.

(iv) **M.F.P. (Overlapping) Working Circle: -**

An overlapping Working Circle for exploitation of the Minor Forest Produce such as Hirda fruits, gum, tarwad bark and tendu leaves etc., was constituted. Since the reboisement programme in the main Working Circle as also in other Working Circles was not paid due attention to, the scope of this overlapping Working Circle which is dependent upon the above Working Circles, became limited.

11.2.4. KANWARJIT SINGH's PLAN (1982-83 to 2001-02)

A combined Working Plan was prepared for Pune division and Bhore sub division by Kanwarjit Singh. The Plan period was from 1982-83 to 2001-02. This Working Plan covered forest areas of Pune division excluding the newly acquired private forests and a few reserved forests taken over from Revenue Department. Following Working Circles were formed.

Table: Working Circles as per KJ Singh's Plan

Sr.No.	Working Circle	Area (ha.)
1	Protection Working Circle	33,250.17
2	Timber Working Circle	1,171.72
3	Fuel Working Circle	2,012.36
4	Soil and Moisture Conservation Working Circle	13,907.63
5	Kuran Working Circle	2,937.95
6	Nature conservation and wildlife preservation (overlapping) Working Circle	215.29
7	The Minor Forest Produce (overlapping) Working Circle	0
	Total	53,495.12

The prescriptions and results for each Working Circle are discussed below:

- Protection Working Circle:** This Working Circle consisted of the sub-tropical hill forests in the entire western zone of Pune division and included all forest areas that were part of the 'Protection Working Circle' of Wagle's Working Plan. It also included all isolated wooded areas of the 'Main Working Circle' of Wagle's Plan which were located on steep slopes and were having negligible occurrence of inferior teak. Most of the areas included in this WC formed the catchments of series of dams in the western part. The total area under this Working Circle was 33,250.17 ha. All those areas were to be given complete rest from exploitation of timber or fuel, etc. Only collection of NTFP was permitted. A systematic reboisement programme by seed dibbling of species like Amba, Karanj and Jambhul, by planting stumps of Sawar, Maharukh, Shiwan and by planting bamboos in heavy to moderate rainfall areas was prescribed to improve the stocking and density of the forest cover. In addition, SMC works like gully plugging, nallah bunding and planting of soil binders like Agave, Nirgudi (*Vitex negundo*), and Ipomoea species etc. were also prescribed. The areas were to be protected from grazing and fires.

Results: Prescriptions regarding reboisement of areas by undertaking seed dibbling or by planting stumps etc. were not followed. Similarly, prescriptions regarding planting of soil binders were also not carried out. Instead, mixed species plantations were taken at places on the moderate

slopes which were found to be partially successful. Nallah bunding works were taken up. Bamboo Plantations have shown moderate results due to damage made by wild life especially wild boars. The sequence of coupes as given in the WP was not followed while undertaking development works. The majority of the area being on the steep slopes is naturally well protected. There are very few incidents of illicit felling though the area is prone to fires. However, areas prone to fire damage were protected regularly by cutting fire lines.

2. **Timber Working Circle:** This Working Circle comprised of all the areas which were allotted to the 'Main Working Circle' of the Wagle's Working Plan for Pune forests. The areas are gently undulating and flat. These sites were considered to be capable of producing medium sized timber of Teak and valuable miscellaneous species like Shivan, Sissoo, Ain, etc. Majority of the teak crop was malformed and was of coppice origin. The silvicultural system of 'Clear Felling followed by planting' was prescribed. The rotation of 40 years was fixed for Teak as well as Shiwan and Sissoo. Felling cycle was of 20 years duration. A Treatment map showing Workable areas including blanks or under-stocked areas or areas containing old failure plantations or plantations having stunted growth, Un-workable areas and Areas bearing advance growth including old successful plantations was prescribed to be prepared one year before the coupe was due for working. All existing tree growth except healthy and vigorous living trees of edible fruit bearing species like Mango, Jamun, Hirda, Mohwa and Chinch were to be clear cut and removed over an area of 25 hectares. All bushy growth was to be cut and burnt and site prepared for raising plantations of Teak, Shiwan or Sissoo. In patches of 1 hectare and over, containing advance growth of teak and other valuable species, over-mature trees were to be marked for felling. Trees with more than 90 cm. girth at breast height were to be considered as over-mature. Malformed advance growth was to be cut back. In dense congested patches, thinning and pruning of branches was prescribed to be carried out in favour of Teak and valuable species like Shisham, Shiwan, Tiwas, Bibla, Apta, Tembhurni and Kalamb. A spacing equivalent to 1/3rd the average height of the crop was to be used as a guide. In old teak plantations, thinning and pruning was to be carried out retaining the spacing equal to 1/3rd the average height of the crop. Teak and Shiwan were to be planted at a spacement of 2x2 metres in alternate lines in areas bearing natural growth of Teak while Sissoo was to be planted at 2x2 metres spacement where Teak did not exist naturally. Three Weedings and CBO were prescribed. Cleaning in the 5th year and Thinnings in the 10th, 20th and 30th year were prescribed. Areas were to be closed to grazing and protected from fires for a period of 10 years. The area included under this Working Circle was 1,171.72 ha.
- Results: The prescription of felling was however not followed even before the issue of this order as well. Therefore, the results of this main prescription could not be seen in the field. In the under-stocked areas, however, plantations of Eucalyptus, Glyricidia and miscellaneous species etc. were planted and some nallah bunding works were carried out under various schemes at different places. In many sites the plantations raised are partially successful. But the plantations

of Teak, Shiwan and Sissoo as prescribed were not given a try. The sequence of coupes as given in the WP was also not followed even in this Working Circle while undertaking development works.

3. **Fuel Working Circle:** This Working Circle included narrow strips of forests along the Mula, Mutha, Bhima and Indrayani rivers located in the eastern part of Pune division viz. Haveli, Daund and Indapur ranges. These areas are in isolated pockets on 78 river side alluvium, occasionally extending in land. All areas allotted to 'Fuel Working Circle' during Wagle's Plan were included in this Working Circle. The crop mainly consisted of Babul (*Acacia arabica*) which formed more than 90% of the tree composition. Other species met with, were Neem, Chinch and Bor. Vilayati Babul (*Prosopis juliflora*) was also found to be coming up in all such areas naturally. Area included was 2012.36 ha. Under this Working Circle, two types of plantations were prescribed.

1. **Un-irrigated plantations-** The system of clear felling and whole-sole regeneration with babul (*Acacia arabica*) and Neem (*Azadirachta indica*) was prescribed for raising the main crop of babul and neem to be removed in the 25th year. To utilize the entire growing space to the maximum extent for the production of maximum quantity of fuel wood during the interim period, Subabul was recommended for planting in two rows of the main species (Babul and Neem), which was to be coppiced and harvested in the 7th, 13th, and 19th year as it was known to be fast growing and good coppicer. It was to be finally felled in the 25th year along with babul and neem. Subabul being leguminous species it was expected to improve the site conditions and being a prolific seeder, it was expected to regenerate naturally and keep the growth of *Prosopis* under check.

2. **Irrigated plantations-** In areas having the facility of lift irrigation but having sparse growth of vilayati babul (*Prosopis juliflora*), irrigated plantations of eucalyptus or teak and bamboo were prescribed after clear felling the existing tree growth. In areas having dense growth of *Prosopis juliflora*, irrigated plantation of *Prosopis juliflora* were prescribed to be raised after clear felling the existing growth. For irrigated plantation of Eucalyptus or teak and bamboo a regeneration period of 25 years with a coppice rotation of 6 years was suggested with a view to obtain intermediate yield and for convenience of working. Eucalyptus is a good coppicer, hence, after harvesting in the 7th, 13th and 19th year the coppice crop was recommended for final harvest in the 25th year and planted afresh in the subsequent year. Bamboo after maturity was recommended for working on a 4 years cycle as per standard practice. For *Prosopis* the regeneration period recommended was 25 years with a coppice rotation of 6 years i.e., to harvest in 7th, 13th, 19th and 25th year and to plant afresh in the subsequent year. The entire area was divided into 2 felling series out of which felling series 1 was for un-irrigated plantations with 25 coupes and felling series 2 was for irrigation plantations with 25 annual coupes. For un-irrigated plantations 350 plants of babul and 350 plants of neem and 2000 plants of Subabul were

recommended for planting. For irrigated plantations 3000 eucalyptus and 300 bamboo plants recommended for planting. No thinnings were prescribed.

Results: The areas after the removal of babul trees in Daund and Indapur ranges were invaded by the surrounding *Prosopis juliflora* through wind broadcasting of their seeds from the nearby trees of their species which did not allow the babul and neem plantations to succeed. As a result, the babul forests along the river banks got converted into Vilayati babul forests in Daund and Indapur ranges. Other species are negligible. Babul is hardly seen. However, in a few coupes along Bhima River in Daund range irrigated plantation were raised with little success. In Pune range, Haveli taluka, however, patches of mature babul crop are still seen along the banks of Bhima and Indrayani rivers. Other species like Karanj, Prosopis, Chinch etc. are also seen. NR of babul is not found.

4. ***Soil & Moisture Conservation Working Circle:*** This Working Circle comprised of denuded areas where soil conditions had deteriorated due to heavy grazing and frequent fires in the past. The total area allotted under this Working Circle was 13907.63 ha. The areas allotted to this Working Circle were classified into three different rain fall zones viz. Zone-A: zone of heavy rainfall; 1500 mm to 3000mm, Zone-B: zone of moderate rainfall; 750 mm to 1500 mm, Zone-C: zone of inadequate rainfall; 350 mm to 750 mm. Soil and moisture conservation measures like gully plugging, nalla bunding, contour trenching, bush sowing, agave planting coupled with afforestation by planting the following suitable species were prescribed. Zone A: Amba, Shisham, Shivan, Karanj, Maharukh and Glyricidia; Zone-B: Sissoo, Shiras, Khair, Semal, Shivan, Subabul and Glyricidia; Zone-C: Neem, Sissoo, Shiras, Subabul, Vilayati babul, Chilhar and Shisham. 16 Working Series with 20 annual coupes were formed. It was prescribed to prepare a treatment map showing following areas viz. Type I- areas where afforestation works could not be undertaken, Type II Successful old afforestation areas (survival more than 60%), Type III- areas covered under old afforestation programme but which have totally failed and need to restocked again (survival below 33%), Type IV- areas covered under the old afforestation programme and having medium survival of planted species (survival 33% to 60%) and Type V- Any other areas fit for tree planting. On Type I areas, only soil and moisture conservation work such as gully plugging, nallah bunding, check dams, and planting of soil binders were recommended. On type II areas, nallah bunding, contour trenching, gully plugging, planting of agave and fodder grasses were recommended. In patches where the crown density is high very light thinnings were recommended. On Type III, IV and V areas, Soil conservation works with afforestation was recommended. The choice of species recommended varied according to the rainfall. Trench-cum-mound fence planted with Agave and Chilhar was recommended. Areas were to be fire protected and closed to grazing for 10 years.

Results: Afforestation and SMC works were taken up in this WC under different schemes. The sequence of coupes and schedule of working was not followed. In few forest areas especially in

Baramati and Indapur ranges Neem, miscellaneous and Glyricidia plantations were raised successfully.

5. **Kuran Working Circle:** This Working Circle comprised of Kuran areas worked on cutting terms in the previous Plan as well as some additional areas considered suitable for creation of new Kurans which were located in the vicinity of the townships having large number of cattle populations. The areas were almost blank with a few Under-stocked patches of tree growth in sheltered spots. Some of the areas supported a moderate growth of Sheda (*Ischaemum laxum*), Paunya (*Ischaemum sulcatum*), Dongri gavat (*Andropogon monticola*), Kati-Kusal (*Heteropogon contortus*) and Kunda (*Ischaemum pilosum*) etc. The total area included in this Working Circle was 2,937.95 ha. Seven Working Series with 20 annual coupes were formed. It was prescribed to permanently close the Kurans to grazing by suitable type of fencing either with barbed wire or with Trench cum mound. Intensive sowing of Chilhar (*Caesalpinia decapetala*) was to be carried out to develop continuous impenetrable live fence. A treatment map showing following types of areas was to be prepared: Type I areas with steep slopes and exposed rocks unfit for planting, Type II areas fit for raising tree fodder species, Type III area fit for raising grasses and legumes. In type I areas, only SMC works were to be carried out. In type II areas, apart from the SMC works, tree fodder species like Subabul, Anjan, Shiras and Sissoo etc. were prescribed to be planted at 4x4 meter spacement. In type III areas, it was prescribed to plant tussocks of good quality indigenous grasses such as Marvel, Dongri-gavat, Paunya and Sheda. Obnoxious weeds and coarse unpalatable grasses were to be eradicated. Soil conservation measures like nallah-bunding and gully-plugging works were also to be carried out. Areas were to be strictly fire protected. Cutting of grasses was allowed only after the seed fall from November onwards.

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

6. **Minor Forest Produce (over lapping) Working Circle:** The division had following important MFPs viz. Hirda (*Terminalia chebula*) fruits, Shikekai (*Acacia concinna*) pods, Tendu (*Diospyros melanoxylon*) and Apta (*Bauhinia racemosa*) leaves, Sisal (*Agave*) leaves, babul gum (*Acacia arabica*) and Kadai gum (*Sterculia urens*), Karanj (*Pongamia glabra*) and Subabul (*Leucaena leucocephala*) seeds, Fruits like Sitaphal, Bor and Ritha etc. and Bamboos. All climbers interfering with the growth of Hirda trees should be cut. Mature and fruit bearing Hirda trees were to be freed of overhead and lateral shade. To stimulate the development of root suckers, soil working was prescribed to be done around Tendu trees. All MFP species were to be taken up in the afforestation programme to increase their number.

Results: NTFP species like Hirda, Baheda, Apta etc. were introduced in the miscellaneous plantations though more species could have been introduced. Agave suckers have been planted

on TCM in afforestation schemes and appeared to have come up well at places. More vigil needed to be kept on the destructive harvesting techniques employed by the contractors.

7. ***Nature Conservation & Wildlife Preservation (over lapping) WC:*** This Working Circle included selected pockets of forests which held potential for development as nature reserves, Wild life Preserves and Biosphere reserves. The area included in this Working Circle was 215.29 hectares. It was prescribed to develop forest areas like Ambavane, Khandala, Karla, Sinhgad, Katraj, Panchgaon Parvati and Bhambhurda as 'Nature Reserves' by carrying out bio-esthetic planting of ornamental and shade tree species and by providing suitable amenities like drinking water, camping sites, parking places, roads, paths, toilets etc. for visitors for their healthy outdoor recreation amidst natural environs. Similarly, areas which formed good habitats for Wild-life like Ambavane (Deer and Antelopes), Mula-Mutha (birds), Pedgaon (Antelope and Bustard) and Rajegaon and Malthan (Black buck) were to be developed as 'Wild-Life Preserves'. Various improvement activities like rigid fire protection, erection of illustrative boards, providing salt licks, retention of fruit bearing trees and intensive sowing of seeds of Bor, Vilayati babul, Subabul and fodder legumes etc. were prescribed. It was also prescribed to develop 'Bio-sphere reserves' by complete protection of pockets of virgin forests in their pristine glory for the purpose of study and research for future generations. Identification of such virgin forest areas was recommended for scientific study.

Results: At Sinhgad, Pachgaon Parvati and Bhamburda planting of shade giving trees, nesting trees for birds and ornamental trees were planted. Sign boards were displayed at some places. Some virgin forest areas at Tamhini and Rajmachi having rich biodiversity were identified with the help of Wildlife Institute of India. Most other prescriptions were not followed; hence no beneficial effects were noticed.

11.2.4. Vikas Gupta & Y.L.P. Rao Plan (2012-13 to 2021-22)

A Working Plan was prepared for Pune division by Vikas Gupta & Dr. Y.L.P. Rao for period of 2012-13 to 2021-22. This Working Plan covered forest areas of Pune division consisting of 327 compartments excluding the newly acquired private forests and a few reserved forests taken over from Revenue Department. Following Working Circles were formed.

Sr. No	Working Circle	Area allotted (ha.)	Percentage of area allotted
1.	Protection Working Circle	38.561.82	44.29
2.	Improvement Working Circle	2831.36	3.25
3.	Fuel-Wood Management Working Circle	2070.40	2.38
4.	Afforestation Working Circle	9902.53	11.37
5.	Urban Forest Management Working Circle	2193.88	2.52
6.	Wildlife Management Working Circle	87068.69 (OL)	
7.	Old Plantations Management (O.L.) Working Circle	2463.27 (OL)	2.83
8.	Bamboo Management (O.L.) Working Circle	9864.59 (OL)	11.33

9.	NTFP Management (O.L.) Working Circle	87068.69 (OL)	
	Others		
	Miscellaneous area	31508.70	36.19
	Total	87068.69	

The prescriptions and results for each Working Circle are discussed below:

1. ***Protection Working Circle*** -This Working Circle includes the forests areas situated on steep and precipitous hill slopes of Western Ghats in the western part of the Pune division. It also includes the catchment areas of Bhushi, Valvan, Pavna, Panshet, Temghar, Varasgaon, Khadakvasala reservoirs. The water from these reservoirs is mainly used for hydro electricity generation, drinking water supply and for irrigation. The rainfall in these areas during monsoons is heavy. The total area allotted to this Working Circle is 38,561.82 hectares constituting nearly 44% of the total area of the Plan.

Result – Soil and Moisture Works were done along with dibbling of seeds and plantation of native species as well as bamboo was done during the plan period. Total 1236.75 ha of land was tackled during the plan period.

2. ***Improvement Working Circle*** - This Working Circle includes teak bearing deciduous forests carrying young to middle-aged crop which require improvement through silvicultural operations. The areas have gentle to moderate slopes. The total area allotted to this Working Circle is 2,831.36 hectares constituting nearly 3.25% of the total area of the Plan. Improvement felling was prescribed for this Working Circle.

Result - Soil and Moisture Works were done along with dibbling of seeds and plantation of native species as well as bamboo was done during the plan period. Tending operations like NR was also done. But as per prescription improvement felling was not done anywhere in the division. Total 553.23 ha of land was tackled during the plan period.

3. ***Fuel-wood Management Working Circle*** - This Working Circle includes isolated forest patches of Babul/ Prosopis located on the rich alluvial deposits along the banks of Mula and Mutha in Haveli taluka and mainly Prosopis patches along the banks of Bhima River in Daund and Indapur talukas. The total area allotted to this Working Circle is 2,070.40 ha. constituting 2.38% of the total area of the Plan. Clear Felling of Prosopis and replacing with Babul plantation was prescribed for this Working Circle.

Results – Only Soil &Moisture Conservation Work was done in this Working Circle. Clear felling of Prosopis was not done. During the plan period Area of 1016.92 ha of forest land was transferred to FDCM, Pune in Year 2019-20.

4. ***Afforestation Working Circle*** - This Working Circle includes open blank areas in degraded forests having sparse vegetation. The areas allotted to the “Kuran Working Circle” in the previous Plan are also included in this WC. The areas are mostly barren. Intensive soil

and moisture conservation measures will be taken up in these areas in the first year while afforestation will be done only in the next year in these areas. The total area allotted to this Working Circle is 9,902.53 hectares constituting nearly 11% of the total area of the Plan.

Results - Soil and Moisture Works were done along with dibbling of seeds and plantation of native species as well as bamboo was done during the plan period. Tending operations like NR was also done. Total 792.71 ha of land was tackled during the plan period.

5. ***Urban Forest Management Working Circle*** - This Working Circle includes the forest areas falling within the corporation limits of Pune Municipal Corporation (PMC). The total area allotted to this Working Circle is 2,193.88 hectares constituting 2.52% of the total area of the Plan. Here removal of Glyricidia in 1 ha block each was proposed during the plan period.

Results - Extraction of Glyricidia was not done in the initial phase but later it was done in last four years of the plan. Other works like SMC and developing Eco-tourism spots, etc. was done. Wall compound running to 139 km was constructed in sensitive areas adjoining to city which are prone to encroachment.

6. ***Wild Life Management (Overlapping) Working Circle*** - This overlapping Working Circle covers the entire forest area of this Plan. Habitat improvement works, strengthening corridors along its Western Ghats, reduction of man animal conflict and strengthening of the infrastructure to handle wild life emergencies will be aimed at in these areas.

Results – Two Wildlife sanctuaries were declared during the plan period viz., Tamhini & Sudhagad WLS. Separate Rapid Rescue team was constituted during the plan period. Many animals from urban areas were rescued successfully with some casualties. Many habitat improvement works like creating waterhole's, erecting watch-towers, improving grasslands, etc. were done. More than 18 successful traps for curbing wildlife trade were also done. Training programme to field staff was imparted for wildlife management.

7. ***Old Plantations Management (Overlapping) Working Circle***: This WC includes areas containing successful old plantations of miscellaneous species and teak which are scattered throughout the division in small patches. This overlapping Working Circle covers 2,463.27 hectares area of this Plan. Improvement felling in teak was proposed along with removal of 1 ha block of Glyricidia.

Results – Only Glyricidia was clear felled and planted with native tall species. Teak was not treated during the plan period.

8. ***Bamboo Management (Overlapping) Working Circle***: This overlapping Working Circle covers the 9,864.59 hectares area of this Plan. Bamboo is found mainly along the hilly slopes and along the nallahs in scattered patches in Shiota, Vadgaon, Paud and Sinhgad ranges. Old bamboo plantations and naturally occurring bamboo are included in this WC which are

proposed for decongestion. These bamboo clumps have never been worked before and were required immediate management interventions.

Results – Bamboo decongestion was not done during the plan period. Only plantation was done in this as well as other Working Circles.

9. *Non-Timber Forest Produce (Overlapping) Working Circle:* This overlapping Working Circle covers the entire forest area of this Plan. It deals with the management of the NTFP resource base on sustainable basis.

Results – NTFP extraction is not done departmentally. There are no details of NTFP collected from the department. But as per research done by Agharkar institute around 85 species NTFP is collected from the forest.

11.3 SPECIAL WORKS OF IMPROVEMENT UNDERTAKEN

Use of advanced technology of fire alert by FSI has been instrumental for controlling forest fire more effectively. Regions of western ghats which were more prone to frequent forest fire are controlled by categorizing into highly sensitive compartments, moderately sensitive compartments and non-sensitive compartments with respect to forest fire.

New residential quarters about 12 have been built during last plan period and plenty of new infrastructures viz., offices, quarters, protection huts are being built for staff across division for effective protection of the forest and welfare of the staff.

11.4 PAST YIELD, REVENUE AND EXPENDITURE

Special emphasis for felling was not mentioned exclusively and only improvement felling was prescribed during the last plan period. Improvement felling was not done during the last plan period due various reasons namely not having clear demarcation of boundaries in field, lack of funds, lack of trained staff for demarcation, etc. Only plantation activities were done especially during the special drive of 50 plantations. Since no felling was done on large scale so revenue generated was meagre and details of revenue and expenditure are already mentioned in Para 9.6, 9.7 & 9.8.

CHAPTER – 12

STATISTICS OF GROWTH AND YIELD

12.1 GROWTH:

There is no felling in forest area of Pune division, so the question of volume /yield tables does not arise. Most of the stock is below exploitable girth that is nearly 65 %, of which more than 14 % of growing stock is of dominant species which are exotics like Glyricidia, Subabhul, Prosopis, etc. According to field enumeration number of trees per unit hectare is about 238.

12.2 GROWING STOCK:

Forest survey of India has surveyed growing stock of wood in each physiographic zone. Pune forest division comes under North Deccan physiographic zone. The growing stock in forest of North Deccan physiographic zone is estimated to be 293.740 cu.mt and in non-forest it is 106.076 cu.mt. Thus, total stock is 399.816 cu.mt. According to field enumeration the volume per hectare of forest area of division is 46.37cu.m.

Though most of vegetation is of young age still, over period of time there shall be no suitable timber to be extracted as most of species is non-valuable and growing stock is also dominated by these species.

The volume equations of predominant tree species prescribed by FSI in its 2017 report are as under

Dhavda (<i>Anogeissus latifolia</i>)	Volume= $0.061856 + 7.952136 \times D^2$
Teak (<i>Tectona grandis</i>)	Volume = $0.032011 - 0.995474xD + 9.91129xD^2$
Salai (<i>Boswellia serrata</i>)	Volume = $0.050452 - 1.228748xD + 9.123381xD^2$
Palas (<i>Butea monosperma</i>)	Volume = $0.18573 - 2.85418xD + 15.03576xD^2$
Tendu (<i>Diospyros melanoxylon</i>)	Volume = $0.033867 - 0.975148xD + 8.255412 + D^2$
Lenda (<i>Symplocos recemosa</i>)	Volume = $0.06466 - 1.371984xD + 9.629971xD^2$
Mowai (<i>Lannea coromandilica</i>)	Volume = $0.093318 - 1.531417xD + 9.01159xD^2$
Moha (<i>Madhuca indica</i>)	Volume = $0.074069 - 1.23002xD + 7.726902xD^2$
Ain (<i>Terminalia tomentosa</i>)	Volume = $0.060344 - 1.569539xD + 12.090296xD^2$

12.3 STATISTICAL ANALYSIS: Based on current trend of available growing stock nearly 68 % growing stock is of very young age. Amongst which more than 15 % is of dominant species and rest are of other species.

PART - II

CHAPTER-1

BASIS OF PROPOSALS

1.1: OBJECTIVES OF MANAGEMENT

Introduction:

This Working Plan is prepared for the scientific management of the Forests and Wildlife of Pune Forest division. The forests of Pune division cover varied topography and rainfall pattern, which ranges from hilly terrain to plain areas and high rainfall (2500 mm) to low rainfall (400 mm). The primary management objective for the Forests of Pune Division is to treat forests as per the requirement of site so as to optimize growing stock, conserve the bio-diversity, soil and water regime, optimize production of forest products.

1.1.1: Factors Influencing the General Objectives of Management:

Working Plans are technical documents prepared to manage a particular area of forest land on a sustainable basis, with an objective to conserve the bio-diversity, soil and water regime, optimize production of forest products to meet the market needs and also bonafide needs of local people. Various standard scientific treatments, suitable for a particular area, are prescribed to conserve and improve the quality and productivity of the forest to meet the national and global needs in general and the bonafide needs of the local people in particular. While preparing and implementing the plan it is necessary to examine the National Forest Policy and all relevant Laws, Rules, Court orders and various administrative orders issued by the Government of India and Maharashtra, so that all the prescriptions are brought under the umbrella of existing policy framework.

1.2: METHOD OF TREATMENT TO BE ADOPTED

1.2.1: Functional Classification of Forests:

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

- a. Protection Forests:** It includes forests on steep slopes (25° and above), along river banks and the forests that have become depleted through maltreatment and further exploitation of which will accentuate soil erosion and adversely affect the productivity of agricultural lands in the region. The management should aim at conserving these forests, through soil and moisture conservation measures, so that they may exert beneficial influence on the soil, water regime, the physical and climatic factors of the locality.

- b. **Tree Forests:** These forests are situated in remote tracts that are mainly capable of growing large sized timber and other products of commercial value.
- c. **Minor Forests:** It includes forests that are interspersed with cultivated lands and are capable of producing small timber, fuel wood and providing grazing which are indispensable needs of adjoining agricultural population.
- d. **Pasture Lands:** These are openly stocked forests or scrub lands that have ceased to yield even the small timber but are conveniently situated for providing grazing to the cattle used for agricultural works.
- e. **Miscellaneous Forests:**
 - **Grass Reserves:** These are small blocks of forests situated amidst cultivated tracts carrying scrubby growth and capable of producing good fodder grasses.
 - **Remaining Areas** needed for other purposes.

Based on the functional classification of Forests, the various types of forests will be treated as follows:

- A. **Protection Forests:** These forests can be categorized into two types viz.
 - (i) the area in which no work of any kind is possible due to steep and precipitous slopes
 - (ii) the area where it is essential to preserve, improve and maintain the existing vegetal cover for maintenance of physical and climatic factors of the locality (i.e., for protective influence) they will be managed to protect the area from soil erosion and to minimize the siltation of water bodies. Soil and Moisture Conservation measures will be taken to protect the erosion prone lands and to improve the underground water table. The commercial felling will not be carried out since the primary object of the management of these forests is to ensure their protective influence. These prescriptions have been included for treatment of **‘A’ type areas of Protection & Afforestation Working Circle.**
- B. **Tree Forest:** This type of forest includes the better-quality sites which have the potential of producing medium to large-sized timber. Though these sites were not having good growing stock of desired quality at present but can be developed through better management interventions. Steep slopes will be excluded from harvesting operations, but will be covered for soil and moisture conservation works. In other areas only hygiene fellings are allowed and the natural regeneration will be tended and areas having inadequate natural regeneration will be planted with suitable valuable species. The main objective of these forests is to develop a growing stock with better composition of teak and other valuable miscellaneous species. These areas are included in **old plantation management of different Working Circles (Type ‘C’ Areas).**
- C. **Minor Forest:** These areas will be managed to meet the local need of small timber, poles and fuel wood. The density varies from 0 to 0.4 and natural regeneration is deficient in open areas. These

forests have been worked under Afforestation Working Circle/ Fuel-wood WC in the previous plan. The main object of management is to maintain the soil cover and to reclothe the areas in blanks with suitable forests crop and to create conditions for the establishment of natural reproduction of valuable species supplemented by artificial regeneration. Large scale soil and moisture conservation works are proposed to be taken in open and eroded areas. Natural Regeneration and rootstock will be tended and supplemented with Artificial Regeneration of suitable species. The forests will be managed mainly under **Afforestation Working Circle** and **“B” Type areas of other Working Circles**.

D. Pasture Land: The areas are almost open and devoid of any tree growth. Some areas have been encroached upon for purpose of cultivation irrespective of their being fit or unfit for permanent cultivation. The areas are already refractory as the deterioration has set in long ago and cannot possibly be remedied now to the extent necessary by any amount of human effort. They are not capable of producing even small timber and fire-wood to any appreciable quantity. Efforts will however be made to establish good fodder grasses and to some extent tree fodder species. These areas are included in the **Fodder Management Working Circle**.

E. Miscellaneous Forests: These include the small scattered patches which are handed over by Revenue Department and some areas which were vested with revenue department and handed over back to forest department but has been distributed for cultivation before 1980 are included here. Many of these patches are not demarcated or surveyed on ground. Hence, it is prescribed to demarcate these areas and ensure territorial integrity.

1.2.2 Treatments Prescribed:

- Management treatments will depend upon requirements of environmental stability, protection of topography, biodiversity conservation, and characteristics of growing stock in the forest and the objectives of management.
- Existing protection forests will be preserved. Soil and moisture conservation works should improve the moisture content; prevent soil erosion and siltation of the water bodies.
- Suitable tending and soil working operations will be carried out to stimulate the growth of the naturally regenerated seedlings and rootstock.
- Small timber poles will be extracted from the old teak plantations on sustained basis.
- Open forest areas and traditional pastures will be managed with active participation of village communities for improving the productivity of the land to meet the local domestic needs of fodder and fire wood.
- Uncontrolled grazing, fire and encroachment, the major threats for sustainable growth of forest, shall be curbed.

1.2.3: The General Approach of the Treatments:

- i. The entire forests on steep and precipitous slopes will be protected from harvesting. 20-meter-wide strips on either side of streams and water-courses will also be protected from

harvesting in the similar manner. Deep excavation for any kind of treatment also shall be avoided in this type of area.

- ii. Special habitat management for wildlife conservation will receive high priority. Riparian zones and mesic sites, important for wildlife management, will receive added protection and treatment. Snag, den trees and down logs shall be sufficiently protected, to meet the habitat requirement of birds and small animals. Wildlife requirements shall be the most important consideration for water body management in forest areas.
- iii. The forests of Pune division especially of Pune, Daund, Baramati, Indapur ranges are extremely important from grassland ecosystem wildlife management point of view as they are adjacent to Mayureshwar Wildlife Sanctuary and Important Bird Area of Bhigwan dam.
- iv. Preference will be accorded to natural regeneration and rootstock management. Natural regeneration and promising coppice growth will receive suitable tending and soil working to stimulate growth and development. Due to poor natural regeneration, aided NR has to be carried out. Areas treated under natural regeneration shall be protected from fire and grazing. Artificial regeneration will be used as supplementary activity, at places, where natural regeneration is inadequate or is not likely to succeed.
- v. Management of forests close to villages will be given priority for meeting demands of local people for small timber, poles, firewood, fodder, non-wood forest produce, etc. Local people will be actively involved in forest management, forest protection, plantations and development of natural resources in the village. Management of forests close to villages shall primarily be done through JFM committees.
- vi. As such there is little dependence of local people on NTFP collection; however tribal from some pockets in Shirota, Paud, Wadgaon Maval and Bhamburda ranges are involved in collection of Hirda, Karonda, Shikekai pods, Vavding. Non-Timber Forest Produce (NTFP) has limited potential for sustainable economic development of local communities with conservation of forest resources. Sustainable Hirda, Shikekai pods, Vavding collection and value addition will be given high priority in the forest management.
- vii. Forest areas of Pune division are rich in medicinal plants and wild edible plants, therefore sustainable harvesting will be given priority.
- viii. Sustainable use of forest resources will remain the guiding principle for managing the demands of forest produce and services. Various government and non-government agencies will be engaged in identification and promotion of ecologically sound and economically feasible alternatives like wood saving technology, stall-feeding, population control of cattle and livestock improvement.
- ix. Involving local people in managing forests and generating awareness in rural and tribal areas is considered indispensable for the forest conservation.

- x. Reducing biotic pressure on forests, particularly unsustainable grazing, fire and encroachment near villages will be considered on priority basis.
- xi. Old plantation of teak capable of producing medium sized timber will be harvested and similarly bamboo shall be managed under the old plantation management.
- xii. Recognition of rights under provisions of the Scheduled Tribes and other Traditional Dwellers (Recognition of Forest Rights) Act 2006 has been recognized on very less area. However, efforts to be taken to finalize all claims in time-bound manner and proper demarcation of these areas both on ground as well as on division/range maps for better protection and regulation of forests.
- xiii. Boundary demarcation will be carried out in time-bound manner for ensuring territorial integrity of forests.
- xiv. Issues pertaining to private forest management, its demarcation and usufruct sharing shall be given priority.

1.3: CONSTITUTION OF WORKING CIRCLES

1.3.1: Analysis and Valuation of the Crop:

The analysis of forest crop is carried out after enumeration of the crop. The species and tree girth distribution from the enumeration data and density distribution from satellite imageries and stock maps prepared by the staff of Pune division & GIS Cell Pune has been used for preparing this Working Plan.

- Forest areas situated mostly on the upper hill slopes that are very steep to precipitous (25° and more slopes); high land plateaus, sacred groves as well as catchment areas of major and medium irrigation and hydro electrical projects in Pune division are included in Protection Working Circle.
- Areas having sparse tree crops, open areas without tree growth, isolated small forest patches and areas with soil depth more than 30cm are included in the Afforestation Working Circle (AWC). In such areas the focus would be upon tending of existing NR and rootstock; in natural regeneration management, the seedlings of seed origin of desirable species will be given preference over the coppice. If NR is insufficient then it will be supplemented by seedling plantations, wherever necessary. Involvement of the local community is considered focal for management of such areas as well as afforestation of open areas and isolated patches.
- The compartments close to the habitations which are unsuitable for raising timber crops due to their refractory nature, low, scattered, erratic rainfall, soil depth less than 25cm, areas with very less number of trees per hectare have been proposed to be managed under Fodder Management Working Circle to cater the needs of local people to some extent and mainly for soil & moisture conservation.

- The area under encroachment/ cultivation is estimated to be 4870 ha. These encroached areas are shown separately in each compartment, after verification of area, the areas which are legally distributed should be communicated to Working Plan Division for omission. Rest of the encroached areas should be freed from encroachment and should be treated as per prescription.

1.3.2 Stock Map Process

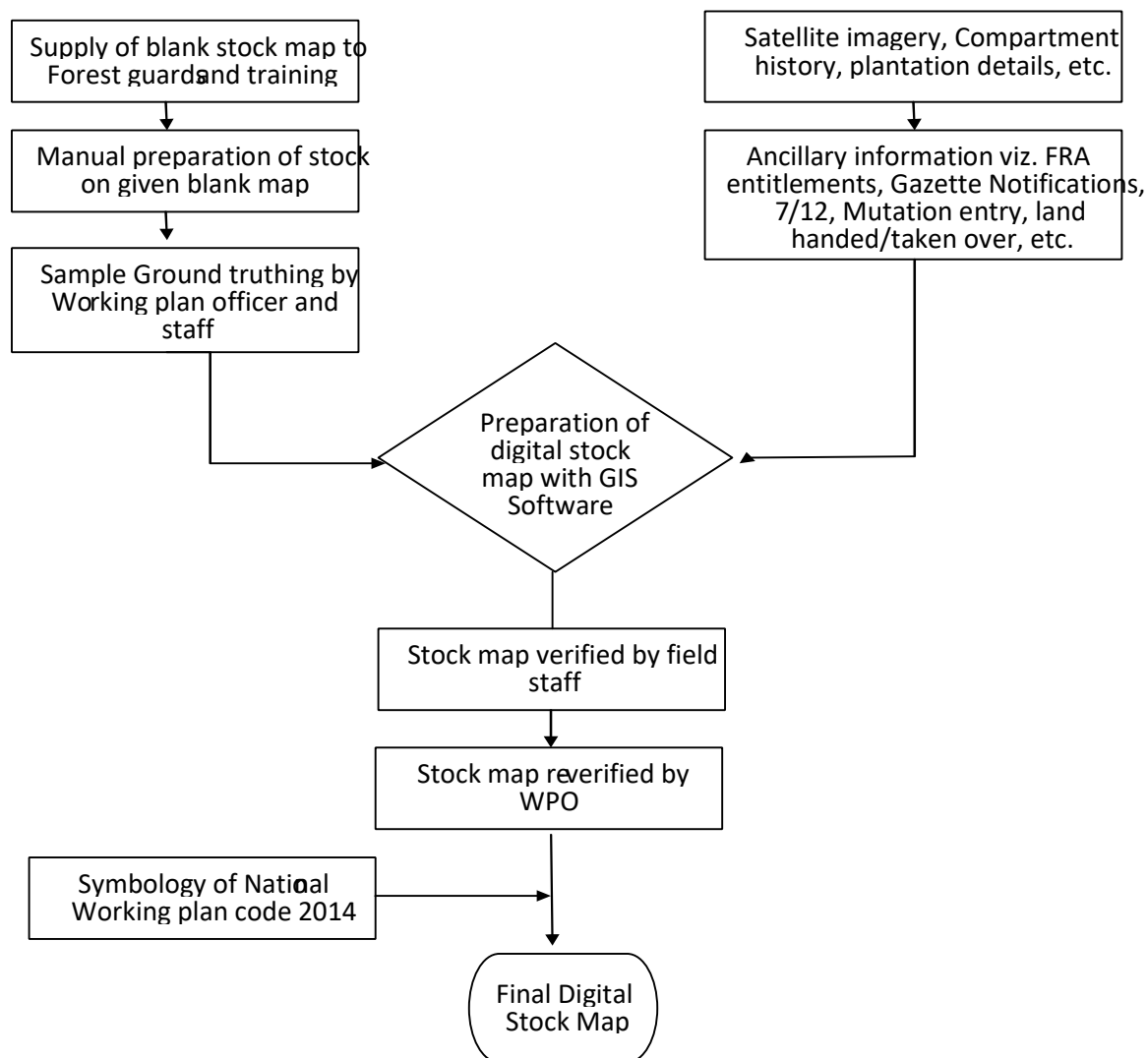
During earlier period, preparation of stock map was a tedious, time consuming and laborious process. To overcome the hurdles of manual works, advanced digital method of combining GIS with traditional methods has been adopted while preparation of this working plan.

Initially, digitized blank compartment maps were distributed to beat guards. Training was imparted to field staff regarding how to fill up these maps as per existing stock in the field. Ground truthing of some of the samples of these stocks maps was done by working plan staff and necessary corrections were made. In the later stage satellite imagery along with all remaining ancillary information viz. compartment history, stock maps prepared by field staff and working plan staff, plantation details, FSI classified forest cover etc. were incorporated. Based on satellite image with temporal variation, entire stock was classified in every compartment. These classified images were later re-verified with the help of field staff and corrections if any, were rectified. Final output was again verified with field survey by working plan officers and staff, for preparation of final maps. Standard symbology according to National Working Plan Code 2014 was adopted for representation in maps.

This method has plenty of advantages over existing traditional method and are as follows,

- Time saving, accurate and cost effective.
- Calculating area is much easier and corrections can be easily updated.
- Easy for storage, maintenance and reproduction of maps.
- Stock layer is being used as an important ancillary layer for other forest analysis and decision support system.

Digital Stock Map Workflow



1.3.3 Working Circles and their distribution:

For the scientific management of forests, compartment has been used as a unit for distribution. The allocation of compartments is based on preponderance of suitability to specific Working Circle. In PWPR of Pune division though all five area specific Working Circles of earlier plan were proposed to be continued. However, topography, forest cover, composition of area under Afforestation Working Circle and Fuelwood Working Circle are almost similar. Hence, they require similar prescriptions, therefore, merging such areas in Afforestation Working Circle is proposed in this Plan.

Separate Old Plantation Management Working Circle was proposed in earlier plan; however, treatments proposed were not implemented. As such there are some patches of old plantations scattered all over division, instead of constituting it as a separate Working Circle, these areas are denoted as 'C' type areas having old plantation areas. Separate management prescriptions are given under Old Plantation Management chapter overlapping in all the Working Circles.

In Kanwarjit Singh's plan separate Working Circles for grassland management - Kuran Working Circle was constituted for fodder management. However, in Gupta & Rao plan areas under Kuran Working Circle were distributed to Afforestation Working Circle. Some of the areas of Pasture Working Circle diverted to other Working Circles are devoid of sufficient soil depth to support tree growth, still during last plan period in some of these areas, plantations were raised. However, due to less soil depth, low, late and erratic rains these plantations were unsuccessful. Therefore, to avoid this in future, such areas are proposed to be maintained under Fodder Management Working Circle.

Due to increase in urban sprawls adjoining to forests areas and heavy biotic pressure on forests, they need utmost protection. Hence, separate Urban Forest management Working Circle has been proposed.

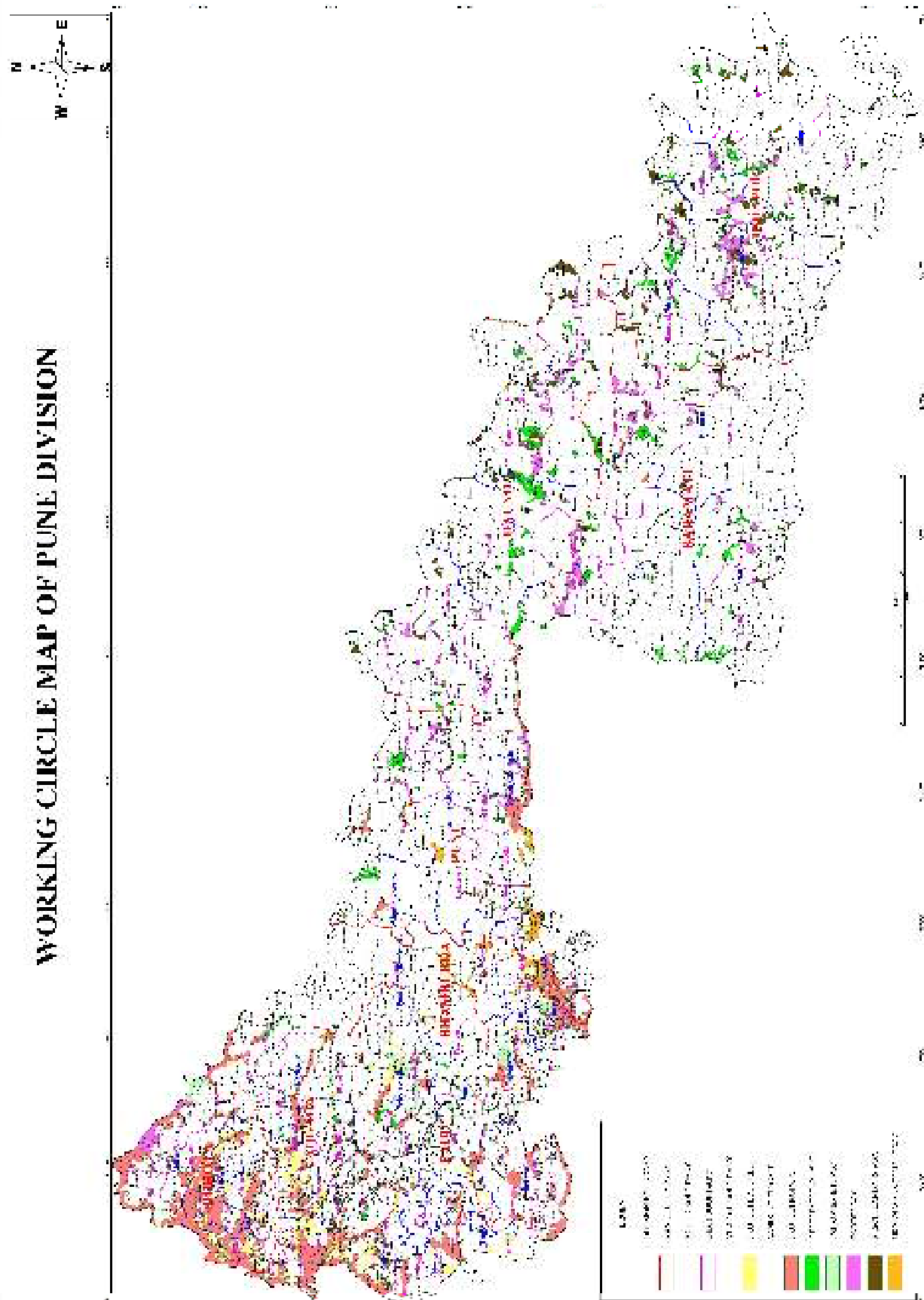
For improvement of existing forest vegetation where growth of inferior quality or growth of invaluable species are present then silvicultural operations are prescribed for improving the vegetation cover under the Improvement Working Circle. Under this WC replacement of *Gliricidia* with native species is also prescribed.

Thus, five area specific Working Circles are prescribed. Overlapping Working Circles are not prescribed separately; however, special chapters regarding important subjects like soil and water conservation, Biodiversity and Wildlife Conservation, NTFP management, Old Plantation Management etc. have been prescribed in this working plan, which will cover whole of area of the division. Abstract of allotment of compartments to various Working Circles is as under:

Sr. No	Working Circle	Total Area		
		Nos. of Compartment		Area in ha.
		Full	Part	
1	Protection (PWC)	67	109	35052.50
2	Afforestation (AWC)	4	37	6942.73
3	Grassland Management (GMWC)	2	41	9181.41
4	Improvement Working Circle (IWC)	9	21	5033.12
5	Urban Forest Management Working Circle (UMWC)	9	13	3888.94
6	Misc.	1	9	6034.67
	Total	92	230	66133.392

The statement showing the compartment-wise stock details is given in Appendix No.XXI.

WORKING CIRCLE MAP OF PUNE DIVISION



Comparison between earlier and present plan - Working Circle wise distribution:

There is discrepancy between area mentioned in volume I and Working Circle wise area mentioned in volume II of Gupta & Rao Plan. However, for comparison purpose area mentioned in volume I is considered right.

Sr. No.	As per old Plan	Total Area (Ha.)	As per proposed Plan	Total Area (Ha.)
1	2	3	4	5
1	Protection Working Circle	38,561.82	Protection Working Circle	35052.52
2	Improvement Working Circle	2,831.36	Improvement Working Circle	5033.12
3	Afforestation Working Circle	9,902.53	Afforestation Working Circle	6942.73
4	Urban Forest Management	2,193.88	Urban Forest Management	3888.94
5	Fuel Wood	2,070.40	Fodder Management Working Circle	9181.41
			Private Forest (Acquired) management Working Circle	11455.6
			Miscellaneous	6034.67
	Total	55,559.99		77588.99

1.4: PERIOD OF WORKING PLAN AND NECESSITY FOR INTERMEDIATE REVISION

Period of the Plan: This plan will be implemented for a period of 10 (Ten) years from the year 2023-2024 to 2033-2034. However, the mid-term review shall be carried out as per Standing Consultative Committee Meeting Minutes No. Desk-14/WP/SCC Meeting (16.03.2016)/95/2016-17, Dt.03.05.2016 held on 16.03.2016. Chief Conservator of Forests (Territorial), Pune should come forward with a proposal for review.

CHAPTER - 2

PROTECTION WORKING CIRCLE

2.1: PROTECTION WORKING CIRCLE:

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

2.2: GENERAL CONSTITUTION OF THE WORKING CIRCLE

This Working Circle includes forest areas situated mostly on the mountain slopes that are very steep to precipitous (25° and more slopes). The very steep slopes are mostly devoid of tree growth and vegetation occurs only in sheltered valleys and on steep to moderate slopes which are normally inaccessible. The basaltic lava flow are exposed rocks which are also devoid of vegetation. These mountains also have high land plateaus, locally known as ‘Sada’ forming a unique ecosystem, and are also included in this Working Circle. Apart from the areas mentioned above numerous Sacred Groves also constitute to be part of protection Working Circle. These above areas are catchment areas of major and medium irrigation and hydro electrical projects in Pune division. These mountain regions are part of Northern part of Western Ghats which is biodiversity hotspot.

The mean annual rainfall in these areas ranges between 250 mm to as high as 3500 mm. Many monsoon tourist locations like Lonavala, Khandala, forts like Rajmachi, Tungarli, Lohgad, etc. are also present in these regions which has high biotic pressure on ecosystem. These areas are therefore, highly vulnerable areas where retention of tree and vegetation cover is essential to protect the soil from erosion due to heavy rainfall. Protection and soil conservation treatments in these forests are necessary for site protection, preserving the steep and precipitous slopes and reducing silt load to the major dams or water bodies in the division.

Though majority of the area is hilly and with rugged terrain, the areas in Daund, Baramati, Indapur & part of Pune Range are plain. The forest patches in these plains form a fragile ecosystem on the river banks of Mula-Muttha, Indrayani, Pawna, Nira & Bhima River and are also included in this Working Circle. The plots of forests lie in rain-shadow region but, are flooded frequently due to heavy rainfall in upper ridges where the river originates and are exposed to erosion periodically.

The criteria considered for the allocation of forest areas, compartments to this Working Circle are:

- The compartments having more than half of its areas on the steep slope or in the stream buffer.
- The compartments which are in the catchments of the major dams and water bodies in the Shirota, Wadgaon Maval, Mulshi and Haveli tehsils.

The catchment areas of Pawna, Mulshi, Panshet, Temghar, Khadakwasla, Shirola, Uksan, Andhra reservoirs etc. fall within this WC. The water from these reservoirs is mainly used for hydro electricity generation, drinking water supply and for irrigation.

The Areas belonging to ‘**Protection WC**’ of the previous Plan are allotted to this Working Circle. In addition, some areas previously belonging to Improvement WC are also allotted to this Working Circle. The area included in this Working Circle is 37399.26 ha that is nearly 56.55 % of the total area being dealt in this Plan.

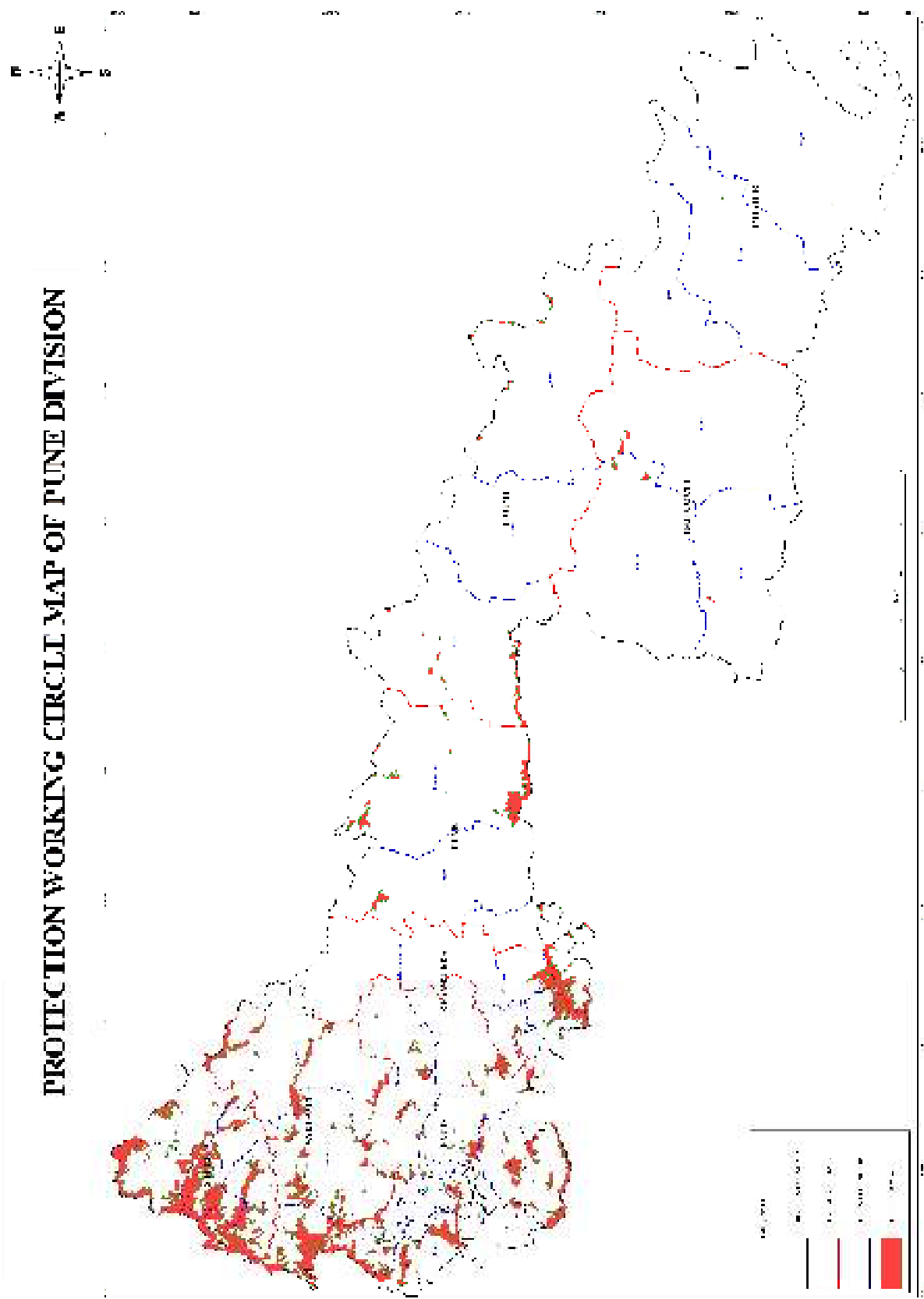
Table : Allotment of area

Sr. No	Range	Area of the Range (in ha.)	No. of compartments		Area allotted to the WC	% To area of the range	% To area of the W.C.
			Full	Part			
1	2	3	4	5	6	7	
1.	Wadgaon Maval	10124.18	10	32	8678.57	85.72	24.55
2.	Shirola	12766.60	19	23	9545.97	74.77	27.01
3.	Paud	11770.701	11	36	8817.33	74.90	25.15
4.	Bhamburda	6514.60	15	7	3715.97	57.04	10.50
5.	Pune	7062.128	10	7	2922.98	41.38	8.27
6.	Daund	6110.40	2	3	984.93	16.11	2.78
7.	Indapur	6753.67	--	--	0	0	0
8.	Baramati	5031.11	0	1	386.77	7.68	1.09
	Total	66133.392	67	109	35052.52	53.43 %	100%

2.3: - GENERAL CHARACTER OF THE VEGETATION

The vegetation belongs to ‘**Western Sub-Tropical Hill Forests**’ which corresponds to group 8A/C2 of Champion and Seth’s revised classification of forest types. The areas occurring on very steep and precipitous slopes are almost blank with isolated shrubby growth of Karvi (*Carvia callosa*), Lokhandi (*Ixora nigricans*), Pandhari (*Murraya exotica*), Rametha (*Lasiosiphon eriocephalus*) and *Euphorbia* species. Tree-growth is almost absent over vast stretches of exposed rocks which have little or no soil cover. On gentle and moderate slopes, the tree-growth with fair density is seen in patches. The quality in sheltered patches and valleys is better as compared to the areas exposed to high velocity winds, mist and foggy atmosphere during the monsoon, where it is stunted and malformed. Evergreen species such as Jambhul (*Syzygium cumini*), Amba (*Mangifera indica*), Hirda (*Terminalia chebula*), Waras (*Heterophragma quadriloculare*), Karanj (*Pongamia pinnata*), Anjani (*Memecylone dule*) and Gela (*Randia dumetorum*) occur in the upper canopy while Rametha (*Lasiosiphon eriocephalus*), Shendri (*Mallotus philippinensis*), Karvi (*Carvia callosa*), Karvand (*Carissa carandas*), Lokhandi (*Ixora arborea*) and Pandhari (*Murraya exotica*) are existing as undergrowth. Isolated forest areas having occurrence of Teak are also noticed at places. Bamboos are found in some areas on slopes. The evergreen species, in general show stunted growth with trees reaching up to 5-8 meters in height. The vegetation on the lower slopes of Sahyadri’s belongs to

PROTECTION WORKING CIRCLE MAP OF PUNE DIVISION



‘Southern Moist Mixed Deciduous Forests’ corresponding to group 3B/C2 of Champion and Seth’s revised survey of the forest types of India.

In the Western Ghats, there are many lateritic flat formations called ‘Table lands’ or ‘Sada’ which have grassy patches with isolated trees on the top while bearing sub-tropical hill forests on the slopes. Many of the endemic and endangered plants are found on such plateau areas and are full of ephemeral plants during monsoons. The nearest well known ‘Kas Plateau’ falls in Satara division and such formations like plateau above Bhaje caves, Kolehafser, etc. plateau are there in Pune division as well, which need to be identified.

Table: No. of sound trees per ha in Protection Working Circle

Name of Working Circle	Total	General utility species	Special utility species	Minor forest produce species	Other species
Protection W.C.	128.03	26.39	7.84	63.77	30.03
% of stock to total stock	100	20.61	6.12	49.80	23.45

Table: Species and Girth- class wise Distribution (Per Ha.) in Protection Working Circle

Group & Species	Girth Class Wise Classification in cm										
	15 U 30	31 U 45	46 U 60	61 U 75	76 U 90	91 U 105	106 U 120	121 U 135	136 U 150	Above 150	Total
Group - A: Species of General Utility											
Ain	4.13	5.05	2.79	1.70	0.90	0.35	0.05	0.11	0.08	0.02	15.17
Shisam	0.03	0.13	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
Teak	2.41	4.15	2.15	1.29	0.55	0.30	0.13	0.03	0.02	0.00	11.03
Total - A	6.58	9.32	4.97	3.00	1.45	0.65	0.17	0.14	0.09	0.02	26.39
Group - B: Species of Special Utility											
Chandan	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Kate Sawar	0.38	0.33	0.19	0.08	0.03	0.08	0.02	0.00	0.00	0.05	1.15
Khair	1.40	1.62	0.46	0.24	0.14	0.08	0.02	0.02	0.00	0.00	3.97
Salai	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Sawar	0.25	0.28	0.28	0.25	0.08	0.08	0.05	0.05	0.06	0.09	1.48
Shivan	0.06	0.33	0.38	0.14	0.14	0.08	0.03	0.00	0.00	0.02	1.18
Total - B	2.11	2.59	1.32	0.71	0.39	0.32	0.11	0.06	0.06	0.16	7.84
Group - C: Species of Minor Forest Produce											
Aashind	0.11	0.05	0.03	0.05	0.02	0.05	0.02	0.03	0.00	0.02	0.36
Aawala	0.21	0.35	0.14	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.84
Amba	0.22	0.30	0.32	0.22	0.25	0.27	0.09	0.09	0.05	0.19	2.00
Anjan	0.90	1.32	0.85	0.65	0.43	0.39	0.14	0.06	0.00	0.06	4.81
Apta	1.44	1.10	0.24	0.03	0.03	0.03	0.03	0.00	0.00	0.00	2.90
Asana	1.31	1.29	0.71	0.58	0.22	0.11	0.05	0.05	0.00	0.03	4.35

Babhul	0.68	0.24	0.14	0.02	0.13	0.03	0.06	0.00	0.00	0.08	1.37
Bahawa	0.08	0.11	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Bartondi	0.11	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14
Behada	0.95	0.77	0.58	0.36	0.13	0.11	0.03	0.05	0.00	0.05	3.03
Bhokar	0.02	0.05	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.14
Bhutiya	0.17	0.39	0.11	0.13	0.05	0.00	0.02	0.00	0.00	0.00	0.87
Bibwa	0.06	0.06	0.02	0.05	0.00	0.02	0.00	0.00	0.00	0.00	0.21
Bondara	0.05	0.13	0.11	0.08	0.06	0.02	0.02	0.00	0.00	0.00	0.46
Bor	0.22	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32
Chinch	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.03
Dhaman	2.00	2.35	0.96	0.39	0.14	0.06	0.06	0.02	0.00	0.00	5.99
Dhawada	1.72	1.45	0.46	0.24	0.13	0.05	0.00	0.00	0.00	0.00	4.04
Dhup	0.02	0.08	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.17
Fanas	0.02	0.02	0.06	0.03	0.06	0.05	0.00	0.00	0.00	0.02	0.25
Ghatbor	0.24	0.27	0.08	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.65
Haladu	0.00	0.03	0.06	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.13
Hing	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Hirda	2.00	1.94	1.29	0.80	0.43	0.25	0.09	0.08	0.02	0.08	6.99
Hiwar	0.55	0.27	0.06	0.03	0.05	0.00	0.00	0.00	0.00	0.02	0.98
Jambhul	1.28	1.51	0.62	0.60	0.27	0.21	0.03	0.05	0.08	0.05	4.68
Kadipatta	0.41	0.06	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.50
Kala Kuda	0.00	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
Kalamb	0.05	0.06	0.06	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.25
Kanchan	0.21	0.25	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.49
Karanj	0.39	0.33	0.44	0.27	0.13	0.05	0.05	0.02	0.00	0.00	1.67
Karvand	0.66	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85
Kokam	0.00	0.05	0.03	0.14	0.13	0.03	0.03	0.00	0.00	0.00	0.41
Kuda	0.14	0.25	0.06	0.03	0.14	0.08	0.03	0.02	0.02	0.00	0.77
Mogir	0.49	0.63	0.41	0.17	0.03	0.00	0.00	0.00	0.00	0.00	1.74
Moha	0.06	0.08	0.00	0.06	0.02	0.05	0.02	0.00	0.00	0.02	0.30
Murudshing	0.00	0.05	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Neem	0.63	0.49	0.16	0.03	0.05	0.02	0.00	0.00	0.00	0.00	1.37
Nilgiri	0.21	0.47	0.43	0.66	0.22	0.16	0.03	0.06	0.02	0.09	2.35
Nirgudi	0.05	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16
Palas	0.02	0.02	0.03	0.06	0.05	0.00	0.00	0.00	0.00	0.00	0.17
Pangara	0.39	0.41	0.25	0.21	0.17	0.06	0.03	0.03	0.00	0.02	1.58
Ranbhendi	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
Shikekai	0.06	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14
Shindi	0.11	0.11	0.08	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.32
Sitaphal	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Subabhul	0.11	0.11	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.25
Tembhurni	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
Tiwas	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Toran	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
Umber	0.68	0.76	0.54	0.80	0.32	0.32	0.16	0.21	0.02	0.25	4.04
Vilayati Cheri	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Total - C	19.20	18.71	9.72	7.02	3.79	2.41	0.99	0.76	0.19	0.99	63.77

Group - D: Other Species											
AakuJ	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Aalu	0.22	0.09	0.08	0.11	0.03	0.00	0.00	0.00	0.00	0.00	0.54
Accacia	0.11	0.22	0.33	0.63	0.24	0.06	0.02	0.03	0.00	0.03	1.67
Batbor	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Bawad	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
Bhabat	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Boti	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02
Chandan	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Chilar	0.11	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Dhayati	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
Fashi	0.11	0.19	0.08	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.46
Gela	0.24	0.24	0.17	0.09	0.06	0.03	0.02	0.02	0.00	0.00	0.87
Giradoli	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Gliricidia	0.62	0.82	0.28	0.13	0.02	0.05	0.00	0.00	0.00	0.00	1.91
Goti	0.02	0.05	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Govinda	0.05	0.08	0.05	0.03	0.09	0.00	0.02	0.02	0.00	0.00	0.33
Gulmohar	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02
Hekal	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Kalumbhar	0.00	0.00	0.05	0.08	0.03	0.00	0.02	0.00	0.00	0.00	0.17
Kanas	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Karamb	0.11	0.14	0.08	0.06	0.13	0.03	0.02	0.00	0.00	0.00	0.57
Karavi	0.19	0.06	0.13	0.08	0.05	0.02	0.00	0.00	0.00	0.00	0.52
Kashid	0.08	0.11	0.17	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.41
Kate Kudal	0.02	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.06
Kate Kumbhak	0.02	0.03	0.02	0.00	0.09	0.02	0.00	0.02	0.00	0.00	0.19
Kharoti	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Khiradi	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Khokali	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Kinai	0.69	0.55	0.13	0.06	0.00	0.00	0.00	0.00	0.00	0.00	1.44
Kinjal	0.30	0.30	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63
Kode Kudal	0.02	0.03	0.00	0.03	0.05	0.02	0.02	0.00	0.00	0.00	0.16
Kolav	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
Kombal	0.05	0.05	0.03	0.02	0.02	0.00	0.02	0.00	0.00	0.00	0.17
Kumbal	0.09	0.21	0.13	0.03	0.06	0.03	0.00	0.00	0.00	0.00	0.55
Kumbhi	0.35	0.35	0.32	0.11	0.00	0.05	0.06	0.00	0.00	0.00	1.23
Lalat	0.38	0.47	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88
Lendi	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Lokhandi	0.05	0.00	0.03	0.17	0.19	0.21	0.06	0.00	0.00	0.00	0.71
Mad	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.11
Mahadung	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Makad Limb	0.05	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Makadi	0.02	0.05	0.05	0.05	0.05	0.02	0.00	0.00	0.00	0.00	0.22
Malwa	0.03	0.03	0.02	0.09	0.00	0.02	0.00	0.00	0.00	0.02	0.21
Medgul	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02

Mohgani	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Nana	0.24	0.47	0.22	0.06	0.03	0.02	0.03	0.00	0.00	0.02	1.09
Nivdung	0.33	0.19	0.06	0.00	0.00	0.02	0.03	0.02	0.00	0.00	0.65
Other	0.06	0.14	0.11	0.03	0.06	0.03	0.02	0.00	0.00	0.00	0.46
Pandhari	0.03	0.00	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Parang	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.05
Paras	0.06	0.11	0.05	0.03	0.08	0.02	0.02	0.00	0.02	0.00	0.38
Parjambha I	0.58	0.49	0.35	0.35	0.17	0.39	0.08	0.03	0.00	0.06	2.51
Payar	0.16	0.09	0.03	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.33
Phapat	0.43	0.38	0.16	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.99
Pimpal	0.05	0.06	0.09	0.03	0.05	0.09	0.02	0.00	0.00	0.00	0.39
Pimparan	0.00	0.00	0.11	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.19
Pisawa	0.73	0.52	0.35	0.19	0.06	0.08	0.00	0.00	0.00	0.00	1.92
Pokhadi	0.02	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.05
Prosopis	0.02	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.11
Rameta	0.19	0.08	0.05	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.33
Sarola	0.00	0.02	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.08
Shajir / Shahagir	0.09	0.03	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.16
Sherad	0.00	0.00	0.05	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.13
Shindri	0.02	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Shirad	0.06	0.02	0.02	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.16
Shiras	0.02	0.03	0.00	0.03	0.03	0.02	0.00	0.00	0.00	0.02	0.14
Sisoo	0.02	0.08	0.08	0.11	0.03	0.05	0.02	0.00	0.00	0.00	0.38
Soyar	0.03	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Surangi	0.02	0.11	0.03	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.19
Suru	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Talai	0.11	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16
Tambat	0.21	0.13	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.43
Tantani	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Tortolis	0.02	0.03	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.06
Vekhal	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Vela	0.05	0.14	0.16	0.03	0.03	0.00	0.02	0.02	0.00	0.02	0.46
Warak	0.16	0.19	0.16	0.08	0.19	0.02	0.05	0.03	0.02	0.00	0.88
Waras	0.32	0.41	0.25	0.30	0.16	0.17	0.06	0.00	0.02	0.00	1.69
Wavala	0.05	0.16	0.11	0.05	0.05	0.02	0.00	0.00	0.00	0.02	0.44
Total - D	8.17	8.33	4.98	3.71	2.30	1.51	0.58	0.17	0.08	0.19	30.03
Grand Total	36.06	38.94	20.99	14.43	7.93	4.89	1.86	1.14	0.43	1.36	128.03

2.4 FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

Working series and annual coupes: The area of this Working Circle is divided into 33 working series with average area of 1070.93 ha. Each working series is further divided into 10 coupes with average coupe size of 106.88 ha. Details of felling series and coupes in given in Appendix No. XXII

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

The details of compartments in this Working Circle have been provided in the Appendix No. XXIII.

2.6: - SPECIAL OBJECTS OF MANAGEMENT

- 1) To conserve and maintain bio-diversity in the ecologically sensitive Western Ghat areas, *Sada* falling within Pune forest division
- 2) To adopt standard anti-erosion and moisture conservation techniques on watershed basis for preservation of physiographical conditions and amelioration of environmental climatic factors.
- 3) To protect, improve and maintain the existing vegetation in the Western subtropical hill forests with a view to minimize the soil erosion in these vulnerable catchment areas of important rivers viz. Bhima, Pawna, Mula, Mutha and Indrayani.

2.6.1: - ANALYSIS OF THE CROP

2.6.1.1 Stock Mapping-

Conventional stock mapping has been done by the staff of the working plan division with the help of territorial division. Working Plan division has used satellite imageries and done ground truthing for verification. Stock analysis results shows that this Working Circle constitutes of 52.35 % mixed forest area and 37.72 % forest blank (rocky, steep slope, erosion prone areas and table top). Therefore, this area has been allotted to Protection Working Circle.

Table: Protection Working Circle

Sr. No.	Stock Type	Area (Hectare)	Area (Percentage)
1	Bamboo	88.345	0.25
2	Forest Blank	422.144	1.19
3	Exotic Species	424.090	1.20
4	Grass	482.933	1.37
5	Mixed	18500.668	52.35
6	Plantation	288.970	0.82
7	Scrub	880.054	2.49
8	Teak	755.404	2.14
9	Uncultivable Blank	13331.906	37.72
10	Understocked	93.561	0.26
11	Water	72.876	0.21
Grand Total		35340.94	100.00%

2.6.1.2 Age and density- The crop in this WC is having preponderance of low girth classes. The upper hill slopes have poor density or blank areas while the density on the lower slopes and in valleys varies from 0.5 to 0.8.

2.6.1.3 Enumeration: Enumeration has been carried in 634 plots by the staff of the territorial division as per the procedure laid down in National Working Plan Code, 2014.

2.6.2 SILVICULTURAL SYSTEM

Since felling is not prescribed, standard silvicultural system is not applicable. But, proposed treatment is on the pattern of watershed management viz., ridge to valley treatment approach. Soil and moisture conservation works to prevent soil erosion, siltation of reservoirs and to enhance the vegetation cover and ground water table.

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

2.6.3 ROTATION PERIOD: No felling is prescribed so no rotation period is fixed for this Working Circle. Though Working plan period is spread over span of 10 years. There is no production prescribed.

2.6.4 HARVESTABLE DIAMETER: Not Applicable

2.6.5 REDUCING FACTORS AND REDUCED AREAS: Not Applicable

2.6.6 FELLING CYCLE: Treatment cycle is fixed at 10 years.

2.6.7 DIVISION INTO PERIODS AND ALLOTMENT TO PERIODIC BLOCK (PB): Not Applicable.

2.6.8 CALCULATION OF THE YIELD: Not Applicable.

2.6.9 TABLE OF FELLING: Not applicable.

2.6.10 METHOD OF EXECUTING THE FELLING: Not Applicable.

2.6.11: SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING:

2.6.11.1: Demarcation, Treatment Map and Prescription

The annual coupes shall be demarcated one year in advance.

The Range Forest Officer shall prepare a treatment map with the help of stock map as prepared by WPO, major focus should be on soil and moisture conservation works keeping in view the principles of watershed management.

2.6.11.2: Treatment Map:

A treatment map should show the following areas:

I. **Area 'A' - Protection areas:** include following areas Roughly 14108.38 ha area comes under this category.

i. Areas with steep slopes i.e., more than 25°.

- ii. Eroded areas or areas liable to erosion.
- iii. Twenty meters wide strip on either side of the water courses.
- iv. **Sacred Groves and high-altitude plateaus (*Sada*).**
- v. The forests in plains along the perennial river banks of Bhima, Indryani, Pawna, Mula-Mutha, etc. are also included under this area.

II. Area 'B' - Under stocked areas: include areas with crop density less than 0.4. Roughly 100 ha area comes under this category.

Laying of grids shall be done only in “B type” areas. In B areas where NR and ANR is prescribed, grids of 0.5 (100 x 50 metres) hectare size shall be laid. RFO shall maintain grid wise record of various operations.

III. Area 'C' - Old plantation areas: include areas under old plantations. It mainly includes mixed species forest areas around water reservoirs and plantations of exotic species like Glyricidia, Subabhul, etc. in other areas. Roughly 700 ha area comes under this category.

IV. Area 'D' - Well stocked areas: include areas with crop density more than 0.4. Roughly 19578.18 ha area comes under this category.

All prominent nallahs, perennial sources of water, water bodies etc. shall also be shown in the treatment map and numbered.

2.6.11.3 Treatment:

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

1) Area 'A':

- i. The SMC works including brushwood dam, LBS, gabion and gully plugging will be carried out wherever essential. Sites with perennial sources of water should be tackled appropriately as explained under ‘general prescriptions’. While undertaking SMC works, **raking of soil or SMC works requiring excavation should not be done** as this may accelerate soil erosion. Area treatment like continuous contour trench, etc. must be strictly avoided.
- ii. Soil binders like Sisal (*Agave sp.*), Sabar (*Euphorbia*), local grasses like Dongri, Marvel, Pavnya, Sheda, Gholi, etc. shall be planted in areas prone to sheet erosion.
- iii. In the accessible under stocked areas having good soil depth, seed-dibbling of local species like Hirda, Gela, Ain, Behada, Jambhul, Amba, Karap, Arjun, Karwand etc. shall be done to suitably clothe the area.
- iv. Bamboo and other suitable species shall be planted in accessible under stocked areas, within 20 meters wide strip on either side of water courses. ‘Mes’ bamboo may be preferred in high rainfall areas.
- v. Artificial regeneration by plantation should be strictly avoided on steep slopes and **high-altitude plateaus**.
- vi. Felling is not prescribed even in plains.

- vii. For plantations in plains adjoining to major perennial rivers endemic species must be planted which are of amphibious nature like *Terminalia arjuna*, *Pongamia pinnata*, *Ficus racemosa*, *Ficus hispida*, etc. and shrubs like *Commelina specis* *Polygonum specis*, *Cyperus* species, etc. may be planted which can tolerate submergence due flood water for shorter period of time. Plantation can be done only in riparian zone and in upland area.

2) Area 'B':

- i. The SMC works like nalla-bunding, gully plugging, Gabion etc. will be carried out as per the site suitability. Sites with perennial sources of water should be tackled appropriately as explained under 'general prescriptions'.
- ii. All existing natural regeneration of Hirda, Amba, Ain, Kadai, Awala, Jambhul, etc. will be tended. Interfering undergrowth will be cleared and seedlings will be freed of suppression if any, by judicious removal of some over wood under strict guidance of RFO.
- iii. In this area if number of seedlings/saplings is less than 400, then DCF should take up Assisted Natural Regeneration (ANR) by planting local species. 625 seedlings are prescribed to be raised by ANR in such areas. As the number of regenerations varies from 0 to 350 or more, the treatment should be such that the total number of naturally occurring seedlings and ANR seedlings should be 625 in numbers. It shall be necessary to ensure that the soil working and mulching is carried out meticulously to ensure that whatever natural regeneration exists is nurtured properly.

This is an important step to help the forest regain its health and vitality which has been under much stress from biotic interference and managerial neglect. Reference to the Planning Department GR No.2011/ CNO.130 /EGS-10A dated 28.12.2011 for carrying out ANR in the forest areas may be made for preparing estimates. **Deep excavation shall be strictly avoided on steep slopes.**

- iv. Wherever soil depth is less than 15 centimeter and slope are gentle, instead of planting tree species, grass seedlings raised in polythene bags may be tried. Marvel, Dongri, Pavnya, Sheda grass species are recommended. In such areas medicinal plants Waghathi, Bilimbi, Kandvel, etc. occurring on shallow soils, wild edible plants like Kartole, Chichurdi etc., which normally don't require more soil depth may be tried.

3) Area 'C' :

Old successful plantations shall be treated as per the prescriptions given in the 'Old Plantations Management' chapter.

4) Area 'D':

- i. The SMC works like nalla-bunding, gully plugging etc. will be carried out as per the site suitability. Sites with perennial sources of water should be tackled appropriately as explained under 'general prescriptions'.

- ii. No planting shall be done in these areas.
- iii. Felling is not prescribed but removal of dead trees after retaining two snag trees is prescribed.

2.6.11.4 General Prescriptions

- i. Seedlings of endemic species viz. *Glochidion ellipticum* (Bhoma), *Artocarpus hirsutus*, etc. and critically endangered spp. like *Dicliptera ghatika*, *Ceropegia evansii*, *Neonatis sahyadrica*, *Frerea indica* (Shindalmakadi) etc. and other RET species should be raised and seedlings so developed should subsequently be planted at suitable plantation sites.
- ii. Accessible under-stocked areas with good soil-depth and more than 2 hectares in extent in a compact block shall be planted with suitable local native species including endemic and endangered plant species. In smaller areas, seed-dibbling of local species like Pangara, Medshing, Shatavari, Karwand shall be done to suitably clothe the area.
- iii. NR of native species with a special focus on the endemic and RET species in an area not less than 2.0 hectare within a coupe should be properly spaced out and tended.
- iv. Management of run-off water will be of utmost importance as most of the villages suffer from water scarcity for few months during summers. All major nallahs, perennial sources of water, water bodies etc. shall be shown prominently in the treatment map. All prominent nallahs shall be numbered and a plan shall be chalked out to treat all these nallahs, gullies from ridge towards valley. Each selected nalla shall be treated completely with series of loose boulder structures (LBS) at the top to arrest the speed of the run off along with the fertile soil being washed away. In addition, various soil moisture conservation works like gully plugging, gabion structures, brushwood dams, contour bunding (stone wall) etc. shall be done as per suitability and requirement of the area. Ridge to valley concept shall be followed while treating the watershed. Water level in the village wells shall be monitored regularly by the forest staff and raised water level in the village wells during the scarcity period or raised ground water level and resulting changes in land use pattern, and increased productivity of crops and vegetables shall be taken as indicators of success.
- v. The Pune division should get sites with perennial sources of water within the forest areas identified with their locations marked on the map of each Range. These sites should be outside *sada* and steep slopes. These sites shall be tackled appropriately through various means like manual desilting of recognized *doh*, diverting small trickles into dug out troughs adjacent to nallahs. This will ensure availability of water sources for wild animals and reduce straying of those animals into agricultural fields thus reducing conflict situations.
- vi. Any felling in these areas will enhance the soil erosion and landslides. It is also not feasible to work these areas systematically and economically due to their remoteness and inaccessibility. Hence, other than old successful plantations, no felling is prescribed in this Working Circle. All areas included in this Working Circle shall be given complete protection.

- vii. The DCF Pune in consultation with the CF (WL) Pune and other notable wildlife experts should explore possibilities for developing continuous corridors for Shekru (Indian Giant Squirrel), of contiguous blocks of tree cover and ensuring connectivity right from Pune Division forests in the Western Ghats in the southern portion of the division up to Bhimashankar Wildlife Sanctuary.
- viii. Wind fallen material shall be removed from the accessible areas retaining 2 snag trees per hectare and appropriate financial provision shall be made for the same.
- ix. Harvesting of Non-Timber Forest Produce (NTFP) including bamboo shall be permitted. Care shall be taken not to damage the plants while collecting NTFP.
- x. Each village in a watershed shall be taken as a unit of holistic development. The DCF should endeavour to integrate forestry management interventions with development schemes of other departments under JFM, etc. for socio-economic upliftment of the village communities. The objective should be to develop clusters of villages in various watersheds. Proper linkages shall be developed with other departments like Animal Husbandry, Fisheries, Horticulture, Minor Irrigation, Social Forestry, MEDA, PWD, MSEDCL etc. for convergence of various developmental schemes of different agencies in the same village to develop cluster of villages into model villages.
- xi. The JFMCs should be actively involved in managing and sharing the forest resources in and around their villages under J.F.M.

2.6.11.5 Conservation of Table Lands or ‘Sadas’ in the Western Ghats

The DCF Pune should undertake a detailed survey of the fauna and flora of the area with a special attention on the identified ‘Table lands’ with the help of an expert agency and with a specific focus on the Rare, Endangered and Threatened (RET) and endemic species of the area, their occurrence, status and required conservation strategies. A database shall be prepared identifying all RET and endemic species of flora and fauna, their location, surveying their environs and habitats to establish the current level of security and the nature of threats. Unauthorized removal of rare botanical species should not be allowed as it may lead to extinction of the species. Periodic reviews of fauna and flora species status should be conducted and the same should be correlated with the IUCN Red data list of this region every three years.

The flat formations called ‘Table lands’ or ‘Sadas’ in the Western Ghats are known to be rich in biodiversity of ephemeral plants. Such table lands do not bear many trees but more of herbs, grasses and ephemeral plant species and become alive during rains with variety of colorful flowers. The DCF Pune should get such sites identified and surveyed in the ranges falling in the Western Ghats for eco-restoration of such sites. They should be strictly protected from fires and unauthorized removals of any kind. **Since such sites represent unique eco-systems, plantation on such lands should be strictly avoided.**

2.6.11.7 Conservation of Wild Edible Plants.

Area of Pune Forest Division is rich in wild edible plants. List of such wild edible plants is given in Appendix No. XXIV. Efforts should be made to propagate and conserve these wild edible plants; JFMCs should be involved in this.

2.6.12: REGENERATION:

All existing natural regeneration of Hirda, Amba and Jambhul will be tended if occurring in sufficient quantity and in sizable patches. Such patches will be cleared of interfering undergrowth only and the naturally regenerated seedlings will be freed of suppression.

Assisted Natural Regeneration (ANR) based on status of natural regeneration may be done as per guidelines prescribed by PCCF (HoFF) office.

2.6.13: ASSOCIATED REGULATIONS AND MEASURES

Fire Protection: These areas are quite susceptible to fires. Effective protection against fire for the period from February 15th to June 15th is a must to ensure survival and establishment of natural regeneration of all species for developing them into future growing stock. Fire lines shall be provided and they should be cleared annually.

In place of overhead electric line, special fire lines should be made for restricting poaching of wild animals by electrocution and also to restrict the fire incidences by fluctuation / tripping of electricity. The fire lines measuring three-meter width should be made under all electric lines passing through the forest area. The details of electric lines passing through forest area are given in Appendix No.XXV.

Firewatchers shall be appointed during the summer season. JFMC's shall be actively involved in the fire protection works.

Closure to Grazing: The plantation area shall remain strictly closed to grazing. **Protection Measures:** The area will be strictly protected from illicit felling and encroachments including seasonal encroachment for the purpose of agriculture with the help of JFMCs.

CHAPTER -3

AFFORESTRATION WORKING CIRCLE

3.1: AFFORESTRATION WORKING CIRCLE:

The area of this Working Circle has been clearly marked on the GIS based map which is appended as management map in the plan and a copy of the same is given on a smaller scale of A4 size here.

3.2: GENERAL CONSTITUTION OF THE WORKING CIRCLE

This Working Circle includes all the degraded forest areas having density less than 0.4 with sparse vegetation, shrubby growth and inadequate natural regeneration, which are considered suitable for rehabilitation by undertaking afforestation works. It includes the un-tackled area of the Afforestation / Natural Catchments and Special Water Supply Catchment Working Circle of earlier plan and drought prone areas of Eastern side of Pune Forest division. It also includes unsuccessful plantation areas which fulfils criteria of Evaluation Code for reboisement.

The forest areas from all eight ranges are included in this Working Circle. The mean annual rainfall in these areas, ranges between 2500 mm to as low as 400 mm.

Following criteria have been considered for the allocation of forest areas or compartments to this Working Circle:

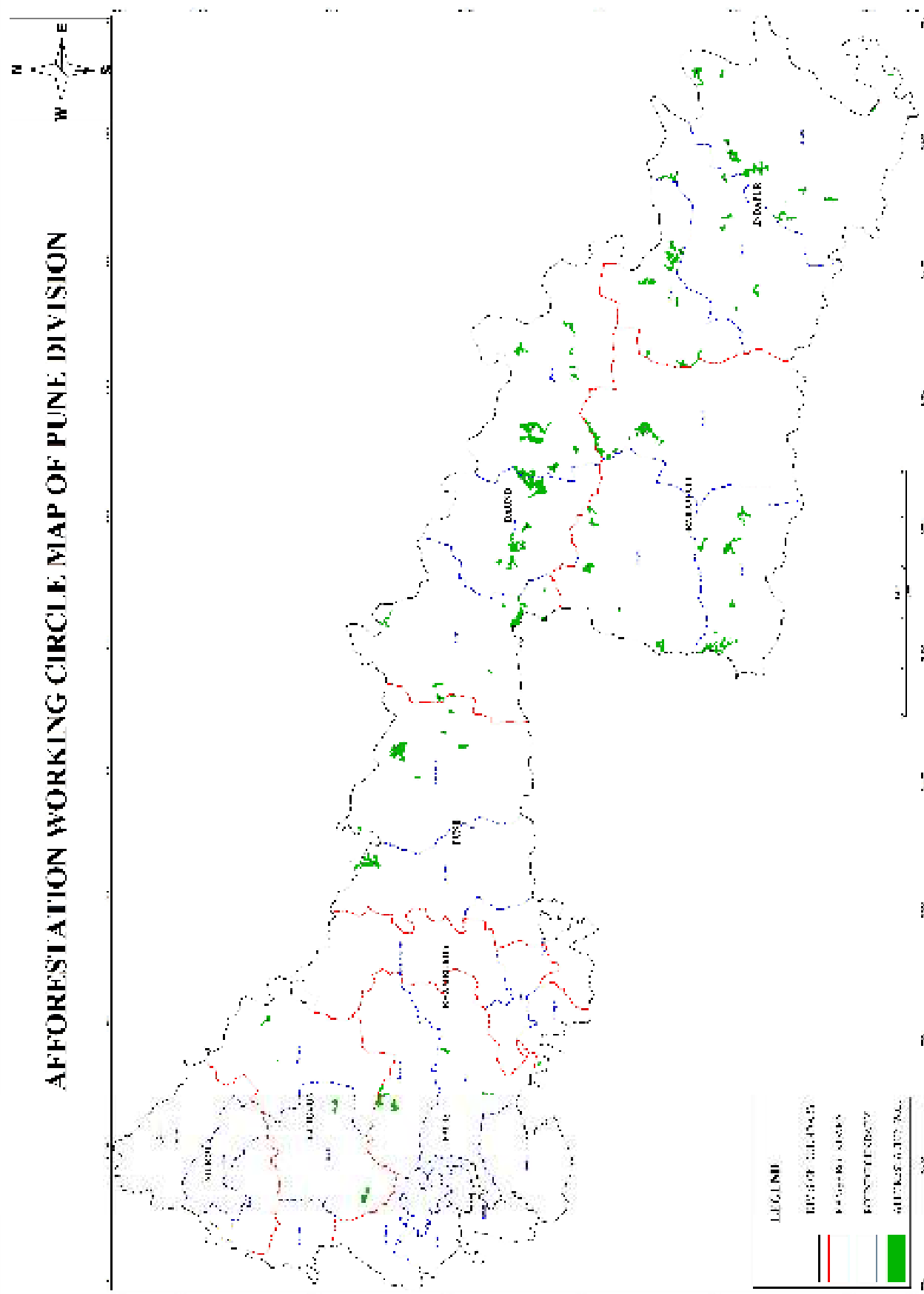
- Compartments with more than half of its area having density less than 0.4 with sparse vegetation, shrubby growth and inadequate natural regeneration.
- Compartments having poor quality open forests, which need to be afforested.

Areas belonging to Afforestation Working Circle of the previous Plan are allotted to this Working Circle. In addition, some areas previously belonging to Fuelwood WC, Improvement Working Circle are also allotted to this Working Circle. The area included in this Working Circle is 6942.73 ha. that is nearly 10.5 % of the total area being dealt in this Plan.

Table: Allotment of area

Sr. No	Range	Area of the Range (In ha.)	No. of compartments		Area allotted to the WC	% To area of the range	% To area of the W.C.
			Full	Part			
1	2	3	4	5	6	7	8
1.	Wadgaon Maval	10124.18	0	3	162.85	01.608	2.346
2.	Shirota	12766.60			00.00	00.00	00.00
3.	Paud	11770.701	0	2	345.62	02.936	4.978
4.	Bhamburda	6514.60			00.00	00.00	0
5.	Pune	7062.128	0	2	917.92	12.997	13.221
6.	Daund	6110.40	1	10	2213.20	36.234	31.880
7.	Indapur	6753.67	1	13	1682.11	24.906	24.228
8.	Baramati	5031.11	2	7	1621.03	32.22	23.349
	Total	66133.392	4	37	6942.73	10.498%	100%

AFFORESTATION WORKING CIRCLE MAP OF PUNE DIVISION



3.3: - GENERAL CHARACTERS OF THE VEGETATION

The majority area is under stocked and blank with crop density varying from less than 0.1 to 0.4, though patches of well stocked forests are also met within parts of some compartments. Well stocked forests are either due to natural crop in sheltered pockets or due to partially successful plantations. Majority areas are degraded to the extreme condition and lay bare without any significant tree crop.

Crop consists of bushy, thorny scrub forest with a predominance of unpalatable grasses and other weed species. Grasses of lesser nutritional value like Kusali, Kunda are usually found growing in these areas. The principle tree species found are Glyricidia, Subabhul, Bor (*Zizyphus jujuba*), Neem (*Azadirachta indica*), Palas (*Butea monosperma*), Hivar (*Acacia leucophloea*), Sisoo (*Dalbergia sissoo*), Dhawda (*Anogeissus latifolia*), Khair (*Acacia catechu*). Heavy grazing has resulted into compaction of the soil. The area of Baramati, Daund and Indapur ranges is target area of encroachers especially for agriculture. Several encroachments were done when forest area was vested with revenue department. At that time the revenue department had allotted a particular parcel of land for farming but, the adjoining area has been encroached. Thus, reducing the extent of forest area. Every year attempts were made to encroach new areas and territorial staff is always behind it for its evacuation.

No. of sound trees per ha in Afforestation Working Circle

Name of Working Circle	Total	General utility species	Special utility species	Minor forest produce species	Other species
Afforestation W.C	48.00	7.22	2.70	23.13	14.96
% of stock to total stock	100	15.04	5.62	48.19	31.16

Species and Girth- class wise Distribution (Per Ha.) in Afforestation Working Circle

Group & Species	Girth Class Wise Classification in cm										
	15 U 30	31 U 45	46 U 60	61 U 75	76 U 90	91 U 105	106 U 120	121 U 135	136 U 150	Above 150	Total
Group - A : Species of General Utility											
Ain	0.17	0.96	0.87	0.52	0.00	0.00	0.09	0.00	0.00	0.00	2.61
Shisam	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Teak	0.17	0.87	0.43	0.96	1.22	0.43	0.09	0.17	0.09	0.09	4.52
Total - A	0.43	1.83	1.30	1.48	1.22	0.43	0.17	0.17	0.09	0.09	7.22
Group - B : Species of Special Utility											
Chandan	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Kate Sawar	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Khair	0.52	1.83	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.43

Shivan	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Total - B	0.70	1.83	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	2.70
Group - C : Species of Minor Forest Produce											
Aawala	0.35	0.78	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.22
Amba	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.17
Asana	0.09	0.35	0.17	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.70
Babhul	0.61	1.57	0.17	0.00	0.00	0.00	0.09	0.09	0.00	0.00	2.52
Bahawa	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Bor	0.52	0.78	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.39
Chinch	0.00	0.35	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52
Dhaman	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
Dhawada	0.09	0.09	0.43	0.17	0.09	0.09	0.00	0.00	0.00	0.00	0.96
Ghatbor	0.17	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52
Hirda	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Hiwar	0.17	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61
Jambhul	0.17	0.35	0.17	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.78
Kanchan	0.00	0.96	0.61	0.09	0.00	0.00	0.00	0.00	0.00	0.00	1.65
Karanj	0.35	0.52	0.70	0.09	0.00	0.00	0.00	0.00	0.00	0.09	1.74
Karvand	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26
Maharuk	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Mogir	0.00	0.17	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43
Neem	4.35	1.91	0.78	0.35	0.17	0.26	0.00	0.00	0.00	0.00	7.83
Neptad	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Nilgiri	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
Shindi	0.00	0.00	0.00	0.17	0.00	0.09	0.00	0.00	0.00	0.00	0.26
Sonchapha	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Subabhul	0.00	0.26	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52
Umber	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.09	0.17
Wad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09
Total - C	7.13	9.48	4.00	1.13	0.35	0.52	0.09	0.17	0.00	0.26	23.13
Group - D : Other Species											
Aalu	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Accacia	0.17	0.35	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.61
Dhayati	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Ghaypat	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Gliricidia	1.83	2.52	2.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	6.52
Gulmohar	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Kalumbhar	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Kashid	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Kombal	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.09
Lalat	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
Murmuti	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
Other	0.09	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26

Pandhari	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Prosopis	0.52	0.43	0.35	0.09	0.00	0.00	0.00	0.00	0.00	0.00	1.39
Ruiti	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Shiras	0.00	0.09	0.17	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.43
Sisoo	0.35	1.13	0.70	0.09	0.00	0.00	0.00	0.00	0.00	0.00	2.26
Tambat	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Tortolis	0.61	0.35	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.13
Vedi Babhul	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87
Waras	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Wavala	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.17
Total - D	4.78	5.65	3.83	0.43	0.09	0.09	0.00	0.00	0.00	0.09	14.96
Grand Total	13.04	18.78	9.22	3.13	1.65	1.04	0.26	0.35	0.09	0.43	48.00

3.4 FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

Treatment series and annual coupes: The area of this Working Circle is divided into 12 treatment series with an average area of 578.76 ha. Each treatment series is further divided into 10 coupes with average coupe size of 56.35 ha. Details of felling series and coupes are given in Appendix No. XXVI.

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

The details of compartments in this Working Circle have been provided in the Appendix No. XXVII.

3.6: - SPECIAL OBJECTS OF MANAGEMENT

- i. To increase vegetal cover and to increase productivity of the land.
- ii. To arrest soil erosion and to recharge ground water supplies.
- iii. To improve quality and quantity of fuel and fodder resources, bamboo and small timber in suitable areas.
- iv. To improve regenerative capacity of the forests by tending of natural regeneration and rootstock, supplementing it with plantations, wherever necessary.
- v. To replace existing plantations of exotic species with indigenous species.
- vi. To involve JFMCs in raising and protecting plantations in and around their villages under J.F.M.

3.6.1: - ANALYSIS OF THE CROP

3.6.1.1 Stock Mapping-

Conventional Stock Mapping has been done by the staff of the Working Plan Division with the help of territorial division. Working Plan division has used Satellite imageries and done ground truthing for verification. Stock analysis shows that there is 3.31% area is under-stocked area, 5.98 % area is under exotic species and 26.94 % area is under plantation; hence these areas are allotted to Afforestation Working Circle.

Afforestation Working Circle

Sr. No.	Stock Type	Area (Hectare)	Area (Percentage)
1	Bamboo	0.00	0.00%
2	Forest Blank	990.47	14.27%
3	Exotic Species	414.97	5.98%
4	Grass	784.08	11.29%
5	Mixed	1832.55	26.40%
6	Plantation	37.62	0.54%
7	Scrub	1683.08	24.24%
8	Teak	0.31	0.00%
9	Uncultivable Blank	943.54	13.59%
10	Understocked	229.76	3.31%
11	Water	26.34	0.38%
Grand Total		6942.73	100.00%

3.6.1.2 Age and density:

The main crop seen in this WC is due to the plantations raised in the past and is young. The natural crop is young to middle aged. The upper hill slopes have poor density or blank areas, while the density on the lower slopes and in valleys varies from 0.2 to 0.4.

3.6.1.3 Enumeration:

Enumeration has been carried for 115 plots by the staff of the territorial division as per the procedure laid down in National Working Plan Code, 2014.

3.6.2 SILVICULTURAL SYSTEM

As felling is not prescribed, no particular silvicultural system is prescribed. However, for selective removal of exotic species to replace with indigenous species and 'C' grade 'Ordinary thinning' in old teak plantations "selection system" is prescribed.

3.6.3 ROTATION PERIOD: No Rotation period is fixed for this Working Circle though working plan period is spread over span of 10 years; as there is no production prescribed.

3.6.4 HARVESTABLE DIAMETER: Not Applicable

3.6.5 REDUCING FACTORS AND REDUCED AREAS: Not Applicable

3.6.6 FELLING CYCLE: Treatment cycle is fixed at 10 years.

3.6.7 DIVISION INTO PERIODS AND ALLOTMENT TO PERIODIC BLOCK (PB): Not Applicable.

3.6.8 CALCULATION OF THE YIELD: Not Applicable.

3.6.9 TABLE OF FELLING: Not applicable.

3.6.10 METHOD OF EXECUTING THE FELLING: Not Applicable.

3.6.11: SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING:

3.6.11.1: Demarcation, Treatment Map and Prescription

- The annual coupes shall be demarcated one year in advance.
- The Range Forest Officer shall prepare a treatment map with the help of stock map as prepared by WPO, major focus will be on afforestation and SMC works.

3.6.11.2: Treatment Map:

A treatment map should show the following areas:

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

- i. Areas with steep slopes i.e., more than 25°.
- ii. Eroded areas or areas liable to erosion.
- iii. Twenty meters wide strip on either side of the water courses.

Roughly 1200 ha area comes under this category.

II. **Area 'B' - Under stocked areas:**

- a) Area with root stock as well as without root stock, suitable for taking up afforestation shall be marked on it.
- b) The areas which were earlier planted but the plantations have failed.

Roughly 1800 ha area comes under this category.

Laying of grids shall be done only in B type areas. In B type areas where plantations are prescribed, grids of 0.5-hectare (100 x 50 metres) size shall be laid. The RFO shall maintain grid wise record of various operations.

III. **Area 'C' - Old plantation areas:** include areas under old Plantations. It includes mainly plantations of exotic species like Glyricidia, Subabul and to some extent Sisoo, Neem, etc.

Roughly 600 ha area comes under this category.

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

Roughly 1900 ha area comes under this category.

All prominent nallahs, perennial sources of water, water bodies etc. shall also be shown in the treatment map and numbered.

Treatment:

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

1) **Area 'A':**

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

- ii. Soil binders like Sisal (*Agave* sp.); local grasses like Dongri, Marvel, Pavnya, Sheda etc. shall be planted as per the site requirement.
- iii. Cuttings of *Ficus*, bulbils of *Agave*, *Euphorbia* (*Sabar*) etc., shall be planted for binding the soil wherever possible.
- iv. In the accessible under-stocked areas having good soil depth, seed-dibbling of local species like Khair, Apta, Awala, Bor, Chinch, Shivan, Neem, Anjan shall be done to suitably clothe the area.
- v. Bamboo and other suitable species like Karanj, Babhul, Arjun and other local species shall be planted in accessible under-stocked areas within 20 meters wide strip on either side of water courses.

2) Area 'B':

These areas shall be treated as follows:

Initially prepare the site for the planting activity by improving its soil moisture content. The area of the annual working unit shall be protected completely from biotic interference by digging a T.C.M. on outer boundaries of forest, stone walls/ live hedge on boundaries within forest areas. All the works should be done as soon as monsoon is over.

- i. TCM must be dug immediately after rains as soil is not compact. Preparation of the T.C.M. and/ or live hedge around the working area: Preparation for the live hedge should be started before the next rains set in so that the seeds/ cuttings/ seedlings of suitable local species should be sown/ planted at the onset of the rains.
- ii. Species like Chilhar, Sagargota, *Agave*, *Euphorbia*, Bamboo, Karvand and other suitable local species should be grown on the mound of TCM or as a live hedge.
- iii. Contour trenches of size 2 x 0.60 x 0.30 mt should be dug for miscellaneous species, while for Teak plantation pits of 30 x 30 cm or 45 x 45 cm should be dug. Water logged area should be strictly avoided for Teak plantation.
- iv. The SMC works like nalla-bunding, gully-plugging etc., will be carried out as per the site suitability before the rains set in.
- v. Singling and cutting back of the rooted stock.

The planting activity shall be taken in the same annual working unit only after ensuring that the area is fully protected and treated with SMC works and then following operations must be done.

- i. Rooted stock shall be properly tended (coppice singling).
- ii. Suitable local miscellaneous species including fuel wood species like Babhul, Dhawda, Maharukh fodder tree species like Anjan, Bor, Apta, NTFP species like Hirda, Shikekai, Awala and medicinal plant species like Vavding, Murudsheng will be planted in the under-stocked areas having good soil depth. In low rainfall areas for better moisture conservation, instead of pits, planting in contour trenches should be done.

- iii. Economically important species that occur locally shall be planted. No exotic species shall be planted.
- iv. As per draft National Forest Policy 2018, increasing productivity of the forest plantations is one of the essential principals of forest management. Therefore, increasing forest productivity shall be given emphasis rather than creating mere green cover. This will be addressed by intensive scientific management of forest plantations of commercially important species like teak, ain, khair, bamboo, etc. Teak plantations were taken in 1970s but for want of proper silvicultural operations expected growth was not achieved. For last many years Teak planting is not at all done, to increase productivity **teak plantations (polypot planting) should be done in suitable areas**, especially in Pune, Bhamburda, Paud, Wadgaon Maval, and Shirola ranges. Teak plantation should be done on minimum 5 ha contiguous area patch.
- v. Grass Plantation in Zone I / II area. In this type area, some areas are having soil depth less than 20 cm. In such patches tree species should not be planted, instead polythene bag grass seedlings/ tussocks should be planted. This will serve the purpose of soil and moisture conservation as well as provide fodder for wildlife and local villagers. In such areas medicinal plants, wild edible plants, which normally don't require more soil depth may be tried.
- vi. In every plantation, it shall be ensured that about 5 seedlings of Vad, Pimpal, Umbar, Bor, Behada, Kawath, Jambhul, Amba etc. are planted. These species provide food and shelter to birds.
- vii. Polybag/ seedling tray seedlings of superior fodder grasses like Dongri, Sheda, Pawanya, Marvel, etc. should be planted on the freshly excavated and heaped soil bund on the lower side of the contour trenches/ old WATs and other plants like Davna which was native in Baramati & Daund may also be planted in the suitable areas. One weeding will be done. Other suitable models for raising fodder grasses may also be used after getting prior approval from the CCF (T), Pune.
- viii. Erstwhile Kuran/Pasture areas of previous Plan are planted with tree species; still these areas are having good growth of grasses. So also, other areas suitable for growth of grasses and natural grass lands shall be identified and closed to grazing. All obnoxious weeds, thorny shrubs and bushes shall be uprooted from these identified areas.

3) Area 'C':

- i) Old successful plantations shall be treated as per the prescriptions given in the 'Old Plantations Management' chapter.

Area ‘D’:

- i. The SMC works like van tale, bandharas, nalla-bunding, gully plugging etc. will be carried out as per the site suitability. Sites with perennial sources of water should be tackled appropriately as explained under ‘general prescriptions’.
- ii. No planting shall be done in these areas.
- iii. Felling is not prescribed but removal of wind fallen trees and dead trees after retaining two snag trees is prescribed.

3.6.12: REGENERATION:

Natural Regeneration- The young recruits of Ain, Dhawada, Teak, Karvand, Kuda, Dhaman, Neem, Ber, etc. appear profusely after first few showers of the season but do not survive to establish later due to fires and unregulated grazing. Nearly 75% of the young recruits are found to be less than 1 metre in height and are therefore not fully established. So, to help the young recruits of above-mentioned species to establish and to further induce the NR, the following prescriptions shall be followed:

- i. The areas not less than 0.5 hectare in compact patch containing promising NR shall be identified inside the coupe.
- ii. The undesirable undergrowth which is preventing or likely to prevent the development of seedling regeneration of the desired species like Khair, Ain, Anjan, Teak shall be removed.
- iii. Congested NR seedlings in identified patches shall be properly spaced out and tended.
- iv. Soil working should be done so as to loosen the top soil up to 1 meter diameter around the plants.
- v. Coppice shoots interfering with the development of young seedlings shall be removed.
- vi. Such patches should be rigidly protected from fires and grazing.

Assisted Natural Regeneration (ANR) based on status of natural regeneration may be done as per guidelines prescribed by PCCF (HoFF) office.

Artificial Regeneration and Choice of the Species

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

- i. Timely plantation targets.
- ii. Selection of suitable plantation sites.
- iii. Choice of species as per the sites and in consultation with JFMCs.
- iv. Analysis and eradication of reasons for previous failures and adoption of suitable correct and appropriate techniques.
- v. Timely release of budgetary grants.
- vi. Seed procurement from known sources.
- vii. Healthy and hardy nursery stock.

Choice of the Species

Use of exotic ornamental species like, Spathodia, Gulmohar, Jacaranda, Peltophorum, Parkinsonia, Bakan, Shiris, Sisoo, etc is discouraged. Preference shall be given to the following species: Sitaphal, Charoli, Chinch, Biba, Babhul, Khair, Kawath, Moha, Ain, Bhokar (*Cordia myxa*), Dhawda, Shisam, Kalam, Wawla, Apta, Aonla, Chandan, Tendu, Anjan, Bartondi, Dhaman, Kadam, Medshing (*Dolichandrone falcata*), Pangara, Bondara, Kakad, Haldu, Kahandole (*Sterculia urens*), Ghatbor, Kumbha, Makadlimbu (*Atalantia racemosa*), Dikemali (*Gardenia resinifera*), Tambat, Umbar, Pimpal, Wad, Pimpran, Waras, Hirda, Neem, Bor, etc and other suitable NTFP species, medicinal plants. For drier parts of Baramati, Daund, Indapur -Saundad/ Khejdi/ Shami (*Prosopis cineraria*) may be tried.

3.6.13: ASSOCIATED REGULATIONS AND MEASURES

Fire Protection: These areas are quite susceptible to fires. Effective protection against fire for the period from February 15th to June 15th is a must to ensure survival and establishment of natural regeneration of all species for developing them into future growing stock. Special fire lines shall be provided and they should be cleared annually.

Firewatchers shall be appointed during the summer season. JFMC's shall be actively involved in the fire protection works.

Weed Eradication: Weeds like *Lantana camara*, *Chromolena odorata*, Rantulas, etc., must be uprooted completely and eradicated safely. Care must be taken such that these areas are not infested again by these weeds in forest lands.

Closure to Grazing: The plantation area shall remain closed to grazing completely for a period of 5 years from the 1st year of its working.

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

CHAPTER - 4

GRASSLAND MANAGEMENT WORKING CIRCLE

4.1: GRASSLAND MANAGEMENT WORKING CIRCLE:

The area of this Working Circle has been clearly marked on the GIS based map which is appended as management map in the plan and a copy of the same is given on a smaller scale on A4 size here.

4.2: GENERAL CONSTITUTION OF THE WORKING CIRCLE

Some of the forest areas which were maintained during the K. J. Singh plan under Kuran Working Circle are included in this Working Circle. Also, some areas which were included in the Afforestation / Soil and Moisture Conservation Working Circle of earlier plan are also included in this Working Circle. Areas of Kuran Working Circle which were tackled under afforestation programme in the earlier plan period are excluded from this Working Circle, some areas e.g. at the foothills of Sinhagad Fort, which were erroneously included in Kuran Working Circle are also excluded from this Working Circle.

The forest areas mainly from Baramati, Daund & Indapur ranges and some areas of Pune, Wadgaon, Bhamburda, Shiota and Paud ranges are included in this Working Circle. In Wagle's plan two separate Working Circles viz. Pasture Working Circle and Kuran Working Circle were constituted for fodder management. However, in K. J. Singh plan areas under Kuran Working Circle were retained but areas under Pasture Working were amalgamated into another Working Circle. But in Working Plan by Gupta and Rao area of Kuran & Soil and Moisture Working Circle was distributed in Afforestation Working Circle, which are devoid of sufficient soil depth to support tree growth. During last plan period, in some of these areas, plantations were raised. However, due to less soil depth, meagre, late and erratic rains few of these plantations were unsuccessful. Therefore, this activity should be avoided in future and these areas should be strictly maintained under Grassland management areas only.

In earlier plans works like seed sowing on raised beds, tussock planting of good quality indigenous grass species and so also broadcasting of top soil collected from very good grass growing areas before the onset of monsoons were prescribed. However, due to infertile seeds, late, erratic, less rainfall, long dry spells germinated grass saplings could not establish. Hence good quality kurans could not be developed.

The mean annual rainfall in majority of these areas ranges between 1200 mm to as low as 300 mm. The areas are almost blank with a few under stocked patches of tree growth in sheltered spots. Good growth of fodder grasses can be achieved in these areas. Moreover, invasive species like Prosopis, etc. have encroached these grasslands in some areas.

Following criterion has been considered for the allocation of forest areas or compartments to this Working Circle:

- The compartments having more than half of its areas blank and devoid of sufficient soil depth to support tree growth.
- For better management, though some areas are having good soil depth or patches of old successful plantations are also included, they have been included as they are part of whole compartment.
- Even plateau tops devoid of soil but supporting growth of good grass is also included in this Working Circle.

The area included in this Working Circle is 9181.41 ha that is nearly 13.88 % of the total area being dealt in this Plan.

Table - Allotment of area

Sr. No	Range	Area of the Range (In ha.)	No. of compartments		Area allotted to the WC	% To area of the range	% To area of the W.C.
			Full	Part			
1.	Wadgaon Maval	10124.18	--	5	321.00	3.17	3.5
2.	Shirota	12766.60	--	6	591.78	4.63	6.444
3.	Paud	11770.701	1	2	210.14	1.78	2.288
4.	Bhamburda	6514.60	--	--	0.00	0.00	0.0
5.	Pune	7062.128	--	2	915.74	12.96	9.974
6.	Daund	6110.40	--	9	1948.98	31.90	21.227
7.	Indapur	6753.67	1	9	2988.67	44.25	32.55
8.	Baramati	5031.11	--	8	2205.10	43.82	24.017
	Total	66133.392	2	41	9181.41	13.88%	100%

4.3: - GENERAL CHARACTER OF THE VEGETATION

These areas are almost barren and devoid of any tree growth. Thorny shrubs like Lantana, Henkal, Ran Tulas and Euphorbia are seen scattered. At present most of the areas are devoid of good grass growth. However, they are supporting a moderate growth of grass species like Sheda, Pawanya, Dongri, and Kalikusal etc. Unlimited and uncontrolled grazing during the past has damaged these areas to an irreparable stage with compaction and erosion of soil. The soil is very poor, the fertile top layer has been washed off and erosion is progressing very fast. Blanks and rocky out-crops are common.

Table: No. of sound trees per ha in Fodder Management Working Circle

Name of Working Circle	Total	General utility species	Special utility species	Minor forest produce species	Other species
Grassland W.C.	18.36	0.65	1.70	10.72	5.29
% Of stock to total stock	100	3.56	9.25	58.36	28.83

Table: Species and Girth- class wise Distribution (Per Ha.) in Grassland Management Working Circle

Group & Species	Girth Class Wise Classification in cm										
	15 U 30	31 U 45	46 U 60	61 U 75	76 U 90	91 U 105	106 U 120	121 U 135	136 U 150	Above 150	Total
Group - A : Species of General Utility											
Ain	0.33	0.20	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.59
Teak	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Total - A	0.39	0.20	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.65
Group - B : Species of Special Utility											
Chandan	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Khair	0.52	0.33	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98
Sawar	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Shivan	0.07	0.20	0.26	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.59
Total - B	0.59	0.65	0.39	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.70
Group - C : Species of Minor Forest Produce											
Amba	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.07
Apta	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Asana	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.07	0.20
Babhul	1.24	0.65	0.20	0.07	0.00	0.00	0.00	0.00	0.00	0.00	2.16
Bartondi	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Bor	0.52	0.20	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78
Hing	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Hirda	0.26	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39
Hiwar	0.20	0.72	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05
Jambhul	0.07	0.00	0.00	0.07	0.20	0.13	0.00	0.00	0.00	0.00	0.46
Kala Kuda	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Karanj	0.13	0.20	0.26	0.13	0.07	0.00	0.00	0.00	0.00	0.00	0.78
Karvand	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Mogir	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Neem	1.18	1.24	0.20	0.13	0.07	0.00	0.00	0.00	0.00	0.00	2.81
Nilgiri	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Pangara	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.13
Shindi	0.46	0.13	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65
Sitaphal	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07

Sonchapha	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Subabhul	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26
Toran	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Umber	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.13
Wad	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Total - C	4.77	3.46	1.11	0.52	0.33	0.33	0.00	0.07	0.00	0.13	10.72
Group - D : Other Species											
Accacia	0.07	0.13	0.33	0.07	0.20	0.13	0.00	0.00	0.00	0.00	0.91
Gliricidia	0.33	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65
Gulab	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Kashid	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Kinai	0.00	0.13	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.39
Lalat	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Nivdung	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Other	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Parjambhal	0.26	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46
Pimpal	0.00	0.07	0.00	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.20
Prosopis	0.13	0.20	0.13	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.59
Salphal	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Sisoo	0.20	0.13	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.39
Tarwad	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Tortolis	0.26	0.59	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98
Waras	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Total - D	1.63	1.76	1.05	0.39	0.33	0.13	0.00	0.00	0.00	0.00	5.29
Grand Total	7.39	6.08	2.55	1.05	0.65	0.46	0.00	0.07	0.00	0.13	18.36

4.4 FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

Treatment series and annual coupes: The area of this Working Circle is divided into 13 treatment series with average area of 706.26 ha. Each treatment series is further divided into 10 coupes with average coupe size of 68.23 ha. Details of felling series and coupes is given in Appendix No. XXVIII

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

The details of compartments in this Working Circle have been provided in the Appendix No. XXX.

4.6: - SPECIAL OBJECTS OF MANAGEMENT

Grassland is one of the special habitats in this division covering maximum area in eastern part of division. Role of grasslands in soil and moisture conservation need not be emphasized. Grasslands are important to wild animals as well as local people, especially as it provides fodder for the livestock for the pastoralist as well as local villagers. Grasslands are important for wild herbivores and carnivore's species like Black buck, Chinkara, Hares, and Indian Wolf, Indian Fox, Indian Jackal, Stripped Hyena, etc.

- i. To maintain the habitat for wild herbivores as feeding and breeding cover.
- ii. To meet the local demand of fodder and thereby reduce heavy grazing pressure on the forests.
- iii. To improve the quality and quantity of fodder in the forest by introducing better & indigenous varieties of grasses.
- iv. To protect the productive areas from the hazard of soil erosion by maintaining adequate vegetative cover in the form of grasses as soil binders and to promote conservation of moisture.
- v. To protect grasslands as a unique ecosystem.
- vi. Enriching fodder and soil by growing associated legumes that enrich nitrogen in the area.

4.6.1: - ANALYSIS OF THE CROP

4.6.1.1 Stock Mapping:

Conventional stock mapping has been done by the staff of the working plan division with the help of territorial division. Working Plan division has used satellite imageries and done ground truthing for verification. Stock analysis shows that total 764.31 Ha i.e., 8.32% area is under grass cover.

Grassland Working Circle

Sr. No.	Stock Type	Area (Hectare)	Area (Percentage)
1	Bamboo	0.04	0.00%
2	Forest Blank	960.54	10.46%
3	Exotic Species	406.58	4.43%
4	Grass	764.31	8.32%
5	Mixed	2204.36	24.01%
6	Plantation	123.74	1.35%
7	Scrub	1252.15	13.64%
8	Teak	0.00	0.00%
9	Uncultivable Blank	3355.87	36.55%
10	Understocked	95.10	1.04%
11	Water	18.73	0.20%
Grand Total		9181.41	100.00%

4.6.1.2 Age and density:

Areas are mostly open and blank and density ranges from 0 to 0.2

4.6.1.3 Enumeration: Enumeration has been carried out for 153 plots by the staff of the territorial division as per the procedure laid down in National Working Plan Code, 2014.

4.6.2 SILVICULTURAL SYSTEM

For grassland management no specific silvicultural system was prescribed.

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

- i. Artificial grass plantation
- ii. Regulating seeding, grass cutting and complete closure to grazing in identified Grass land.

4.6.3 ROTATION PERIOD: - No Rotation period is fixed for this Working Circle though working plan period is spread over span of 10 years; as there is no production prescribed.

4.6.4 HARVESTABLE DIAMETER: Not Applicable

4.6.5 REDUCING FACTORS AND REDUCED AREAS: Not Applicable

4.6.6 FELLING CYCLE: Treatment cycle is fixed at 10 years.

4.6.7 DIVISION INTO PERIODS AND ALLOTMENT TO PERIODIC BLOCK (PB): Not Applicable.

4.6.8 CALCULATION OF THE YIELD: Not Applicable.

4.6.9 TABLE OF FELLING: Not applicable.

4.6.10 METHOD OF EXECUTING THE FELLING: Not Applicable.

4.6.11: SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING:

4.6.11.1: Demarcation, Treatment Map and Prescription Demarcation

The annual coupes shall be demarcated one year in advance.

The Range Forest Officer shall prepare a treatment map with the help of stock map, major focus will be on restoration of grasses keeping in view the principles of minimum raking of soil.

4.6.11.2: Treatment Map:

A treatment map should show the following areas:

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

- i. Areas with steep slopes i.e., more than 25°.
- ii. Eroded areas or areas liable to erosion.
- iii. Twenty meters wide strip on either side of the water courses. Roughly 3400 ha area comes under this category.

II. Area 'B' - Under stocked areas:

- a) Shallow Soil Areas - Include blank, rocky areas having shallow soils.
- b) Deep Soil Areas- Small patches, strips having better soil depth.
Roughly 100 ha area comes under this category.

Laying of grids shall be done only in B type areas. In B type areas where plantations are prescribed, grids of 0.5 hectare (100x 50 mtrs) size shall be laid. The RFO shall maintain grid wise record of various operations.

III. Area 'C' - Old plantation areas: It includes areas under old plantations. It includes mainly plantations of exotic species like Glyricidia, Prosopis and to some extent Teak, Bamboo, Neem etc. Roughly 600 ha area comes under this category.

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

Roughly 2200 ha area comes under this category.

Treatment:

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

1) Area 'A':

- i. The SMC works including LBS, gabion and gully plugging will be carried out wherever essential. Sites with perennial sources of water should be tackled appropriately as explained under 'general prescriptions'.
- ii. Soil binders like Sisal (*Agave sp.*); local grasses like Dongri, Marvel, Pavnya, Sheda, dhaman, etc. shall be planted as per the site requirement.
- iii. Bamboo and other suitable species like, Babhul, Karanj, Neem, Apta, Arjun and other local species shall be planted within 20 meters wide strip on either side of water courses.

2) Area 'B':

a) Shallow Soil Areas -

- i. Poly bag planting on 'V' shape furrows- distance between two furrows, two plants etc. should be fixed as per recommendations of Research Wing.
- ii. The SMC works including LBS, gabion and gully plugging will be carried out wherever essential in stream course. In other areas Water Absorption Trenches (WAT), Staggered contour trenches may be done increase the water regime in the soil.
- iii. Seed dibbling of wild leguminous plants like *Vigna indica* (Ran moong), *Indigofera cordifolia* (Gokharu), *Crotalaria hebecarpa* (Godhadi), *Tephrosia strigosa* (Sharpunkha), *Alysicarpus tetragonolobus* (Lal Shevra), *Stylosanthes Species*, *Themedaquarivalvis*, *Themedatriandra*, (Hamata)etc. may be done on the accumulated soil of SMC structure.

b) Deep Soil Areas- In area, which are having better soil depth and are fit for raising trees, fodder species like Anjan, Neem, Ber, Apta, Khejdi, Hivar, Babhul, etc. will be planted along with the standard soil and moisture conservation works of gully plugging and nalla bunding.

To maintain the grassland ecosystem only 20 fodder trees per hectare may be planted. Otherwise, irrational plantation drives in such areas shall alter the existing grasslands which would create irreparable damage as it was done during earlier plan period.

Observation of Grass plantations.

Since last 6 years Solapur Forest Division has tried poly bag planting of grass species instead of tussock planting/ broadcasting seed. 'V' shape furrows (20 x 20 cm) at an interval of 2 meters and 0.50-meter-deep trenches at an interval of 20 meters were dugged out. Seedlings



of Anjan, Kala Dhaman, Ginni, Dongri, Sheda in poly bag were planted on 'V' shape furrows at an interval of 1 meter, while 3 rows of grass seedlings were planted on mounds of deep trenches. While planting bags were dipped into solution of Hing (Asafoetida), kapoor (Camphor) which was found to be useful in case of long dry spells of rains. The overall survival percentage of plants is 55-60 % and there is good growth of grass through natural regeneration.

Research wing has been undertaking different performance trials for efficacy of different species on parameters like, distance between two plants, comparative performance of tussocks / polybag / polytube planting, effect of dipping polybag seedling into solution of Hing (Asafoetida), kapoor (Camphor). Depending on the results of this research trial efficient technique with necessary modification, should be adopted in consultation with CF Research.

3) Area 'C':

Old successful plantations shall be treated as per the prescriptions given in the 'Old Plantations Management' chapter.

4) Area 'D':

- i. The SMC works like nalla-bunding, gully plugging etc. will be carried out as per the site suitability. Sites with perennial sources of water should be tackled appropriately as explained under 'general prescriptions'.
- ii. No planting shall be done in these areas.

4.6.11.3 General Treatment

- These grasslands are unique ecosystems hence large-scale plantations should be strictly prohibited.
- Considering this important area as wasteland unnecessary diversion of these lands should be avoided.
- Soil and Moisture conservation works should be done depending upon average rainfall of the area and water holding capacity of land. Extensive SMC structures would disturb this unique and vital ecosystem.

- Dumping of carcasses and poultry wastes in these grasslands is seen and has caused threat to wildlife. So, such dumping should be disallowed as such an act has claimed life of 4 Wolves in year 2021 due to disease from these domestic cattle to wildlife.
- Wildlife census of these grasslands may be done exclusively for these areas.
- Grazing in grassland by nomads must be controlled.

4.6.12: REGENERATION

Prominently regeneration of Neem and Babhul are seen in tree species where as in grasses which are annuals regeneration is present.

4.6.13: ASSOCIATED REGULATIONS AND MEASURES

Fire Protection: These grassland areas are regularly prone to fires. Effective protection against fire for the period from January to June is a must to ensure survival of tussocks of grass as well as protect further natural regeneration of grass species. Special fire lines shall be provided and they should be cleared annually.

Areas which are frequently prone to fire must be strengthened by installing fire watch towers and firewatchers shall be appointed during the summer season. JFMC's shall be actively involved in the fire protection works and creating awareness. Special drive must be taken in forest fringe villages to create awareness amongst villagers to educate them against the misconception of 'rab' or fire inducing grass growth & ill-effects of forest fire.

Closure to Grazing: The plantation area shall remain closed to grazing completely.

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

CHAPTER-5

IMPROVEMENT WORKING CIRCLE (IWC)

5.1: IWC WORKING CIRCLE (CLEARLY MARKED ON GIS BASED MAPS OF SCALE 1:50000) –

The area of this Working Circle has been clearly marked on the GIS based map which is appended as management map in the plan and a copy of the same is given on a smaller scale of A4 size here.

5.2 GENERAL CONSTITUTION OF THE WORKING CIRCLE

5.2.1.1. The area has potential to improve and yield commercial size timber of Teak and other miscellaneous species on sustained basis in future, if improved. The area is mostly under stocked but contains sizeable patches of well stocked forests. These forests are surrounded by villages and are subjected to biotic pressure. Apart from this, the forests having Glyricidia that can be replaced by native species is also included in this Working Circle.

In previous working plan (Gupta and Rao 2012-13 to 2021-22), a total of 2831.36 ha. was prescribed to be worked under IWC. After taking into consideration various aspects and learnings gathered from field inspections, interactions, topography, analysis of satellite imageries and enumeration data, and areas under pervious working plan and some new areas are allotted to Improvement Working Circle and some areas are diverted to other Working Circles. Based on above considerations, it is decided to give the crop a better chance of gradually getting itself established into an even aged forest.

Forest areas capable of producing medium to large-sized timber but not considered fit for harvesting due to preponderance of young to middle aged crop has been included in this Working Circle.

5.2.1.2: The range wise distribution of area under this Working Circle is given as follows:

TABLE NO. 2.1
RANGE WISE DISTRIBUTION OF AREA UNDER THIS WORKING CIRCLE

Sr. No.	Range	Area of the Range (In ha.)	No. of compartments		Area allotted to the WC	% To area of the range	% To area of the W.C.
			Full	Part			
1.	Wadgaon Maval	10124.18	-	-	807.29	07.973	16.040
2.	Shirota	12766.60	-	-	568.09	04.449	11.287
3.	Paud	11770.701	-	1	1819.071	15.454	36.142

Sr. No.	Range	Area of the Range (In ha.)	No. of compartments		Area allotted to the WC	% To area of the range	% To area of the W.C.
			Full	Part			
4.	Bhamburda	6514.60	6	8	1108.80	17.020	22.030
5.	Pune	7062.128	3	4	13.56	0.192	00.269
6.	Daund	6110.40	-	-	232.21	03.802	04.614
7.	Indapur	6753.67	-	-	66.17	00.980	01.314
8.	Baramati	5031.11	-	-	417.93	08.307	08.304
	Total	66133.392	9	13	5033.121	07.611%	100%

5.3.: GENERAL CHARACTER OF VEGETATION

5.3.1.1. The Forests are ‘Southern Dry Deciduous Teak bearing Forest’ i.e., 5A/C3 as per Champion & Seth’s Forest types. Prevalent Site Quality is IV and density varies from 0.4 To 0.6. Some dense patches are also interspersed. Strips of forests mostly along water courses also have better density. Number of open patches and scrubby growth are also common. The associate crop consists of mainly, *Ain*, *Dhawda*, *Heda*, *Tiwas*, *Sawar*, *Hella*, etc. Teak appears in sizeable patches over better soil. Undergrowth is scanty due to heavy grazing, illicit felling, encroachment, etc. Unsound trees are common. Natural Regeneration of all species is patchy and poor. Due to biotic pressure, establishment of seedlings is hampered.

Table: No. of sound trees per ha in Improvement Working Circle

Name of Working Circle	Total	General utility species	Special utility species	Minor forest produce species	Other species
Improvement W.C.	497.14	241.55	32.62	110.95	112.02
% Of stock to total stock	100	48.5	6.56	22.32	22.53

Table: Species and Girth- class wise Distribution (Per Ha.) in Improvement Working Circle

Group & Species	Girth Class Wise Classification in cm										
	15 U 30	31 U 45	46 U 60	61 U 75	76 U 90	91 U 105	106 U 120	121 U 135	136 U 150	Above 150	Total
Group - A: Species of General Utility											
Ain	8.93	16.43	6.31	3.69	0.48	0.48	0.24	0.00	0.00	0.00	36.55
Shisam	0.48	0.48	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	1.31
Teak	25.48	81.90	45.60	36.79	7.38	4.40	0.83	0.36	0.48	0.48	203.69
Total - A	34.88	98.81	51.90	40.83	7.86	4.88	1.07	0.36	0.48	0.48	241.55
Group - B: Species of Special Utility											
Kate Sawar	0.12	0.24	0.12	0.24	0.00	0.24	0.12	0.00	0.00	0.00	1.07
Khair	4.40	8.69	3.10	1.07	0.00	0.00	0.00	0.00	0.00	0.00	17.26

Sawar	1.19	2.86	0.83	1.19	0.12	0.24	0.00	0.00	0.00	0.00	6.43
Shivan	2.38	2.74	1.43	1.31	0.00	0.00	0.00	0.00	0.00	0.00	7.86
Total - B	8.10	14.52	5.48	3.81	0.12	0.48	0.12	0.00	0.00	0.00	32.62
Group - C: Species of Minor Forest Produce											
Aashind	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Aawala	0.00	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48
Amba	0.12	0.00	0.00	0.12	0.00	0.00	0.12	0.12	0.00	0.12	0.60
Apta	0.24	0.60	0.36	0.12	0.00	0.12	0.00	0.00	0.00	0.00	1.43
Arjun	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Asana	0.95	1.79	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	3.21
Babhul	0.12	0.24	0.24	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.71
Bahawa	0.24	0.36	0.24	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.95
Behada	0.00	0.24	0.48	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.95
Bhokar	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Bhutiya	0.36	1.31	0.24	0.12	0.00	0.00	0.00	0.00	0.00	0.00	2.02
Bibwa	0.00	0.24	0.12	0.71	0.12	0.00	0.00	0.00	0.00	0.00	1.19
Bondara	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Bor	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
Charoli	0.48	0.36	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	1.07
Chinch	0.24	0.00	0.00	0.12	0.24	0.24	0.00	0.00	0.00	0.00	0.83
Chinchardi	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Dhaman	4.40	6.90	2.62	1.67	0.36	0.36	0.00	0.00	0.00	0.00	16.31
Dhawada	5.95	8.21	2.50	1.19	0.60	0.00	0.24	0.00	0.00	0.00	18.69
Dhup	0.48	0.48	0.83	0.36	0.48	0.00	0.00	0.00	0.00	0.00	2.62
Fanas	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Ghatbor	3.10	1.19	0.83	0.24	0.00	0.00	0.00	0.00	0.00	0.00	5.36
Gunj	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Haladu	0.00	0.00	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.24
Hirda	0.48	0.60	0.83	0.60	0.36	0.00	0.00	0.00	0.00	0.00	2.86
Hiwar	0.12	1.19	0.48	0.48	0.00	0.00	0.00	0.00	0.00	0.00	2.26
Jambhul	1.31	0.48	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.02
Kalamb	0.36	0.48	0.24	0.60	0.00	0.00	0.00	0.00	0.00	0.00	1.67
Kanchan	1.19	2.26	0.60	1.07	0.00	0.00	0.00	0.00	0.00	0.00	5.12
Karanj	1.55	1.55	0.83	1.19	0.00	0.00	0.00	0.00	0.00	0.00	5.12
Karvand	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Kate Babhul	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Kuda	0.36	0.12	0.12	0.36	0.12	0.00	0.00	0.00	0.00	0.00	1.07
Mogir	2.86	4.76	2.26	1.55	0.48	0.24	0.00	0.00	0.00	0.00	12.14
Moha	0.12	1.31	0.48	0.24	0.00	0.00	0.00	0.00	0.00	0.00	2.14
Murudshing	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Neem	0.24	0.36	0.83	0.12	0.00	0.00	0.00	0.00	0.00	0.00	1.55
Nilgiri	0.83	1.67	0.24	1.19	0.71	0.24	0.00	0.00	0.00	0.00	4.88

Nirgudi	0.12	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.24
Palas	0.00	0.00	0.12	0.24	0.24	0.12	0.12	0.00	0.00	0.00	0.83
Pangara	0.36	2.02	1.19	0.71	0.00	0.00	0.00	0.00	0.00	0.00	4.29
Ranbhendi	0.12	0.48	0.36	0.12	0.00	0.00	0.00	0.00	0.00	0.00	1.07
Shindi	0.00	0.00	0.12	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.36
Subabhul	0.00	0.12	0.12	0.36	0.12	0.00	0.12	0.00	0.00	0.00	0.83
Toran	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Ud	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
Umber	0.24	0.95	0.83	0.95	0.00	0.00	0.00	0.24	0.00	0.00	3.21
Total - C	27.14	41.90	19.76	15.48	4.29	1.31	0.60	0.36	0.00	0.12	110.95
Group - D: Other Species											
Aalu	0.48	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.60
Accacia	0.12	0.36	1.07	1.19	0.00	0.48	0.00	0.00	0.00	0.00	3.21
Chilar	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Dheywan	0.36	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48
Fashi	0.00	0.24	0.00	0.12	0.12	0.12	0.00	0.00	0.00	0.00	0.60
Furtiya	0.12	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
Gela	0.24	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83
Gliricidia	17.38	35.83	5.83	5.95	0.60	0.12	0.00	0.00	0.00	0.00	65.71
Goti	0.24	0.83	0.36	0.24	0.00	0.00	0.00	0.00	0.00	0.00	1.67
Govinda	0.12	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Hekal	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
Karavi	0.00	0.00	0.00	0.12	0.00	0.12	0.00	0.00	0.00	0.00	0.24
Kashid	0.48	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.60
Kilawa	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.12
Kinai	0.24	0.48	0.60	0.12	0.00	0.00	0.00	0.00	0.00	0.00	1.43
Kirnat	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.12
Kombal	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Kumbal	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
Kumbhi	0.24	0.60	0.71	0.36	0.00	0.00	0.00	0.00	0.00	0.00	1.90
Lendi	0.48	0.24	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83
Nana	0.95	1.55	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	2.86
Nivdung	0.12	0.24	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48
Other	0.36	0.00	0.24	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.71
Pakuda	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Paras	0.36	0.36	0.24	0.12	0.00	0.00	0.00	0.00	0.00	0.00	1.07
Parjambhal	0.00	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.19
Petari	0.00	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Pimpal	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Prosopis	1.43	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67
Rameta	0.00	0.00	0.00	0.00	0.24	0.00	0.24	0.00	0.00	0.00	0.48
Ramphal	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Salphal	0.12	0.60	0.12	0.83	0.00	0.00	0.00	0.00	0.00	0.00	1.67

Sarola	0.48	2.38	0.48	0.12	0.12	0.00	0.00	0.00	0.00	0.00	3.57
Shajir / Shahagir	0.00	0.24	0.24	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.60
Shiras	0.00	0.24	0.60	0.83	0.24	0.00	0.00	0.12	0.00	0.00	2.02
Sisoo	0.48	1.31	0.83	0.83	0.36	0.00	0.00	0.00	0.00	0.00	3.81
Soyar	0.12	0.00	0.12	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.36
Tambat	2.02	1.31	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.57
Tantani	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Vela	0.48	0.60	0.00	0.00	0.24	0.36	0.00	0.00	0.12	0.00	1.79
Warak	0.36	0.12	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71
Waras	1.07	0.36	1.79	0.00	0.00	0.00	0.00	0.00	0.00	0.12	3.33
Wavala	0.12	0.48	0.36	0.48	0.12	0.00	0.00	0.00	0.00	0.00	1.55
Total - D	29.52	51.31	14.64	11.79	2.62	1.31	0.36	0.24	0.12	0.12	112.02
Grand Total	99.64	206.55	91.78	71.90	14.88	7.98	2.14	0.95	0.60	0.71	497.14

5.4: FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

The total number of felling series carved out of the area allotted to Improvement Working Circle after taking into consideration enumeration and silvicultural requirements are 9 with average size of 559.23 ha. The present plan report contemplates to work from coupe number I to X with average coupe size of 56.13 ha. The list of the felling series, felling series wise compartments and coupe wise details of areas has been given in Appendix No. XXX & XXXI of volume II

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

The distribution of the compartments allotted to this Working Circle has been represented on map.

5.6: SPECIAL OBJECTIVES OF MANAGEMENT

- i. To maintain and improve the density, composition and condition of the growing stock through silvicultural practices.
- ii. To help natural regeneration of various species to establish and supplement the same by taking up afforestation works in under stocked areas.
- iii. To get maximum sustained outturn of small sized Timber and firewood which are in local demand.
- iv. To convert the existing uneven aged crop containing large percentage of inferior species into an even aged Teak Forest.
- v. To obtain maximum sustained yield of Teak Timber of commercial value.
- vi. To check soil erosion by creating and maintaining proper vegetative cover for preserving the site and thus increasing the productive capacity of the soil.

5.6.1: ANALYSIS AND VALUATION OF THE CROP

5.6.1.1. A 0.016% systematic sampling of the growing stock of the area had been carried out by division staff during 2020-21. The result has been computed range wise and compartment wise. Compartment wise results have been given in Volume II of this plan. Stock analysis results shows that this Working Circle constitutes of 29.96 % mixed forest area and 51.88 % forest blanks (rocky, steep slope, erosion prone areas and table top). Category wise percentage of species to total growing stock in this Working Circle is given as below-

Improvement Working Circle

Sr. No.	Stock Type	Area (Hectare)	Area (Percentage)
1	Bamboo	5.59	0.11%
2	Forest Blank	42.82	0.85%
3	Exotic Species	487.63	9.69%
4	Grass	15.69	0.31%
5	Mixed	1507.98	29.96%
6	Plantation	57.76	1.15%
7	Scrub	64.80	1.29%
8	Teak	227.01	4.51%
9	Uncultivable Blank	2610.95	51.88%
10	Understocked	10.50	0.21%
11	Water	2.38	0.05%
Grand Total		5033.12	100.00%

5.6.2: SILVICULTURAL SYSTEM:

Based on the objectives of management and general conditions of the crop, no specific silvicultural system is prescribed for Teak management. However, in case of Glyricidia clear felling in blocks is prescribed.

5.6.3 ROTATION PERIOD

The Rotation period is as per standard silvicultural practices of teak prescribed in yield table prepared to FDCM.

5.6.4 HARVESTABLE DIAMETERS: Not applicable

5.6.5 REDUCING FACTORS AND REDUCED AREAS: Not applicable

5.6.6: FELLING CYCLE:

Felling cycle has been fixed as 40 years same as that in previous working plan.

5.6.7: DIVISION IN TO PERIODS AND ALLOTMENT TO PERIODIC BLOCKS: Not Applicable

5.6.8: CALCULATION OF THE YIELD:

As the felling prescribed in this Improvement Working Circle is only improvement felling, no yield calculation has been worked out.

5.6.9: TABLE OF FELLING:

The Table of felling is given in Appendix No. XXX of Volume II

5.6.10: METHOD OF EXECUTING THE FELLING:

5.6.10.1 Demarcation of coupe and marking of trees for felling will be carried out departmentally as per the silvicultural and technical requirements. Felling of trees and haulage of the felled material will be worked as per the directives issued by the Government. Cut back operations and other regeneration activities will be done departmentally. Felling shall be carried out as per the rules prescribed in the plan. It should be preferably done departmentally. However, protection and plantation works may be done as per the Government guidelines under Joint Forest Management and duly sanctioned Micro Plans. Micro Plan prescriptions should be in consonance with the silvicultural prescriptions given in this plan.

5.6.10.2: DEMARCATIONS OF COUPES, PREPARATION OF TREATMENT MAPS AND MARKING TECHNIQUES-

DEMARCATIION: Except for 1st coupe in the sequence of working of this plan period, coupes will be demarcated one year in advance of the main felling as given in the chapter – ‘Other Important Regulations of the plan’. But 1st coupe (i.e., coupe number I) will be demarcated in the first year of operation and main felling work will be done in the same year whereas, in other coupes, felling will be in the following year. (Appendix XXX & XXXI)

PREPARATION OF TREATMENT MAP: - After demarcation of coupe is over, Range Forest Officer will inspect the area and will prepare a treatment map for the same and it shall be verified by the Assistant Conservator of Forests/ Deputy Conservator of Forests after thorough inspection of the area. The treatment map thus prepared will be submitted to Deputy Conservator of Forests in charge of division, he will do sample checking and then will give sanction to it. The treatment maps will show the following areas:

TYPE – A: PROTECTION AREAS: - It will include following areas:

- (a) The area having steep slopes i.e., more than 25°
- (b) Eroded areas or areas liable to erosion
- (c) 20-meter-wide strip on either side of water courses
- (d) Riparian Zones
- (e) Sacred Groves

TYPE – B: UNDERSTOCKED AREAS: - It will include the forests having density less than 0.4 densities are included in this category.

In these areas, marking shall be done in the following manner:

- (1) All dead trees will be marked for felling and
- (2) All live high stumps above height of 75 cm will be marked for felling.

TYPE – C: (a) GROUPS OF YOUNG POLES: - All the areas having young poles should be marked separately on treatment map.

(b) OLD PLANTATION: - The treatment map shall show separately old Teak plantation as well as Glyricidia plantations.

TYPE – D: WELL STOCKED AREAS: - The areas having forests more than 0.4 densities are included in this category.

5.6.10.3 TREATMENT: -

Following types of treatment will be given to areas as classified above. If necessary, nala bunding and gully plugging shall be done over the complete area of the coupe as per treatment map. The area-wise treatments proposed are as follows.

Type A - Protection Area. Felling is not prescribed.

Type B – Under stocked Area- *Teak* and suitable miscellaneous species shall be promoted with tending of natural regeneration. Dead and malformed teak and important timber trees will be cut back.

Type C – (a) GROUPS OF YOUNG POLES: - Silvicultural thinning shall be done as per stand table for Teak prepared by FDCM. The patches of not less than 1 (one) hectare shall be identified having advance growth of any species and it shall be spaced out to one third of the top height, while retaining the vigorous and straight poles. The thinning shall be done in such a manner that epicormic branches do not come up. In the natural young crop, thinning marking will be done on the basis of weighted average girth at breast height and site.

(b) OLD PLANTATION: -Thinning of old Teak plantation will be carried out as per schedule. Glyricidia felling shall be done as per prescriptions in ‘Old Plantation Management’ chapter.

Type D - Well Stocked Areas- No planting will be done. Felling will be carried out as provided under Marking Rules.

The following operations will be carried out:

- (i) All dead trees except two per ha will be marked and felled.
- (ii) All high live stumps shall be cut back at 150 cm height to ensure healthy shoots at appropriate height.
- (iii) Where natural regeneration through seedlings is deficient, coppice shoots shall be reduced to one per stool. Otherwise, coppice shoots shall be cut off to have high forests in future.
- (iv) The over matured trees of girth over breast height more than 120 cm (half the number of trees), shall be marked for removal, and provided it does not create a permanent gap in the canopy.

5.6.10.4. MARKING RULES AND MARKING TECHNIQUES:

Marking will be done in the same year in which demarcation will be done. Soon after the receipt of approved treatment map, marking will be done. The marking technique is described in

detail in the chapter Other Important Regulations of this plan. Following marking rules are laid down for general guidance:

- (i) Climbers which are not of high medicinal values will be cut and inhibiting growth of valuable timber.
- (ii) All pollarded trees will be cut back to appropriate height so that healthy coppice emerges and are able to establish.
- (iii) All stumps of illicitly cut trees still alive will be dressed to produce strong coppice shoots, if natural regeneration is deficient and coppice regeneration is supplementing it.

The marking rules for each type of area, besides unwanted climber cutting will be as follows:

TYPE A: PROTECTION AREA: - No trees will be marked for felling.

TYPE B: UNDERSTOCKED AREA: All edible fruit and flower yielding trees will be reserved from felling. The following trees will be marked for felling:

- (i) All dead and malformed trees after retaining two dead trees/ha.
- (ii) All but one vigorously growing coppice shoots per stool. (If it is essential to retain the coppice shoot.)
- (iii) All live high stumps shall be cut to appropriate height so that healthy coppice are to emerge and establish.

TYPE C: (a) GROUPS OF YOUNG POLES: - Silvicultural thinning shall be done as per yield table for Teak. For other species also, table for Teak will be used assuming that growth pattern of other species also follows the same as in case of Teak. (Though it is not the case in the nature but to have control in thinning, it is necessary.) The thinning shall be done in such a manner that epicormic branches do not come up. In the natural young crop, thinning marking will be done on the basis of weighted average girth at breast height and site.

(b) OLD PLANTATION: Teak plantation will be worked as per the schedule. Glyricidia shall be completely uprooted in designated grid.

TYPE D: WELL STOCKED AREA: - All edible fruit and flower yielding trees such as *Moha*, *Char*, *Tendu*, *aonla*, *Chinch*, *Bel*, *Sitafal*, etc. will be reserved from felling. The following trees will be marked for felling:

- (i) All dead and malformed trees. A tree will be treated as malformed if it does not have a clean bole up to at least 2 m above the breast height.
- (ii) All live and dead high stumps shall be cut to appropriate height so that healthy coppice is to emerge and establish.
- (iii) All but one vigorously growing coppice shoots per stool where the stem density is less and natural Regeneration through seedling is inadequate. Otherwise, coppice shoots should be marked for felling.
- (iv) Bamboo working will be done as per the prescriptions given in Bamboo (Overlapping) Working Circle and rules there under.

Verification of Marking:

- (i) RFO shall carry out marking and should also certify the marking abstract.
- (ii) ACF concerned shall verify 20% of the marking work. He shall inspect all the coupes to verify marking and shall record his findings and give corrective written instructions.
- (iii) DCF shall inspect 10% of the coupes to verify marking and take corrective measures.
- (iv) CCF (T) shall check 2% coupe marking work randomly.

5.6.10.5: SOIL AND MOISTURE CONSERVATION WORKS:

The soil and moisture conservation works shall be taken up along with marking operation and completed before onset of monsoon in the next financial year. The soil and moisture conservation works shall include gully plugging, area treatment and nala bunding. Wherever, there are nalas or forest ponds, desilting works will be carried out and fertile soil be used for nursery works. These works must be done in combination with Toposheet map, GIS maps and preparation of a detailed treatment map of the area.

5.6.10.6: METHOD OF PLANTING

In the area where planting is done, well-spaced natural regeneration seedlings and rooted stock is expected to be taken advantage of. The intention is to have an overall plant population of 2500 plants per ha. Hence the whole area of these category should be marked with line transects at 2 m x 2 m. This marking should be done on the map too. Thereafter each of the marked points should be examined as to whether a pit is to be dug there or not.

5.6.11: SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING

5.6.11.1. These works shall be carried out in the subsequent years of the main felling. These works will be carried out departmentally.

5.6.11.2: CUTTING BACK OPERATION (CBO).

Cutting Back Operations will be carried out in the next year of the main felling in the area.

- (a) All badly damaged trees not likely to recover will be cut.
- (b) All Climbers which are not of ecological and economical values will be cut.

5.6.11.3: CLEANING:

Cleaning will be carried out during the fifth year of the main felling operations as follows:

- (a) All Climbers which are not of ecological and economical values will be cut.
- (b) Coppice shoots, if required, will be reduced to one per stool.
- (c) Inferior growth which may interfere with the Teak or miscellaneous species of choice will be removed.
- (d) Damaged and malformed poles will be cut back.

5.6.11.4: WEEDING: - Weeding will be carried out in the plantation in order to boost the growth of natural and planted seedlings as per the model sanctioned by the competent authority.

5.6.12: REGENERATION

Regeneration is achieved in two ways.

- (1) Natural
- (2) Artificial

5.6.12.1 NATURAL REGENERATION:

Area containing good natural regeneration will be identified in the coupe and marked on the treatment map. Silvicultural operations as required will be carried out and the regeneration will be given protection.

5.6.12.2 ARTIFICIAL REGENERATION AND CHOICE OF SPECIES:

Areas which are deficient in natural regeneration shall be supplemented with artificial regeneration. The choice of species will mainly depend upon local demand and suitability of the species for the site. Species like Teak not more than 50%, *Ain*, *Bija*, *Shisham*, *Aonla*, *Ran-Amba*, *Char*, *Khair*, *Chinch*, *Tiwas*, *Hirda*, *Beheda*, *Bamboo* etc. may be raised as per the site suitability and local requirement. As these areas are near to human habitation and are prone to biotic pressure, it is recommended that local people as stake holders should be actively involved in regeneration of the forest through the instrument of Joint Forest Management. Otherwise, the deteriorating conditions will change and success of natural or artificial regeneration of the area will get jeopardized as in earlier efforts. The plantations will be raised using standard planting techniques and duly approved by the competent authority.

5.6.13 ASSOCIATED REGULATIONS AND MEASURES

The protection is of paramount importance for obtaining natural regeneration. Natural regeneration is badly damaged due to fire. Fire causes annihilation of natural or artificial seedlings. Hence, such areas will be rigidly protected from fire. It will be worthwhile to get the fire protection done from JMFCs and pay them the amount in lieu of the area protected. Grazing causes severe damage to establishment of regeneration. Due to grazing, young succulent, leading shoots are grazed/browsed or trampled by the animals. The areas after main felling shall remain closed to grazing for a period of five years. The closed areas shall clearly be mentioned in grazing licenses and people shall be made aware about closure of the coupes. In order to increase the carrying capacity of the area, palatable grasses shall be sown and villagers will be motivated to harvest the fodder for stall feeding. After removal of closure of grazing, rotational grazing will be followed based on the carrying capacity of the area. The local people shall be made aware of the importance of protection to the forests from fire, illicit grazing, illicit cutting and encroachment. Participation of local people shall be encouraged in protection and afforestation of Forests through Joint Forest Management as far as possible. For this purpose, regular awareness campaigns shall be arranged to explain the importance and benefit of regeneration and protection of forests. Village Forest Protection Committees shall be formed and a comprehensive Forest Protection Scheme shall be undertaken under JFM.

CHAPTER – 6

WILDLIFE MANAGEMENT

Development in world has improvised human civilization but, simultaneously it has unfolded the risk of conflict between human and wildlife. These conflicts are inevitable and can be reduced by sustainably managing wildlife. Sustainable wildlife management is the sound management of wildlife species to sustain their population and habitat over time, taking into account the socioeconomic needs of human populations. A review of scientific research on large fields in India revealed that most of the research is conducted within protected areas and locates these animals in ‘pure’ biological landscapes (Ghosal *et al.*, 2013). National Wildlife Action Plan proposed in 2016, although recognizes the need of looking outside protected areas, still claims that protected areas should be the focus of all conservation efforts (MoEF, 2016). Protected areas are often also hubs of better patrolling regimes, equipment provisioning and training for the staff when it comes to protection. But these inputs are more or less absent outside protected areas in spite of large areas being used by carnivores. Human-use landscapes have the potential to maintain connectivity amongst different populations of large mammals (Chapron *et al.*, 2014) and hence, their conservation in these landscapes is as valuable as that in protected areas.

In view of its ecological, social and economic value, wildlife is an important renewable natural resource, with significance for areas such as rural development, landuse planning, tourism, scientific research and cultural heritage. If sustainably managed, wildlife can contribute considerably to the alleviation of poverty as well as to safeguarding human and environmental health. The prescriptions in this chapter are applicable for whole of Pune Division.

6.1 ANALYSIS OF THE WILDLIFE IN THE DIVISION

In comparison to rich wildlife in Vidarbha forest area, Pune Division has limited number of faunal wildlife species with less population and that too restricted to certain areas but huge diversity in floral wildlife. Prominent wild animals found in Pune division are as under-

i) Leopard: The Western Ranges in Pune Division provides a good habitat for Leopards owing to its location in the Western Ghats, availability of water, forest cover, the sugarcane belt providing good cover and food subsidies aided by humans (feral dogs, domestic pigs and garbage). As a result, Leopards thrive in this landscape and have unfortunately given rise to human-leopard conflicts to the extent that in few incidences leopard has been rescued from heart of the city.

ii) Wolf: One of the iconic wild carnivores that inhabit this ecosystem is the Indian Wolf. Most of their ranging is outside Protected Areas in India and around half of their diet is known to consist of domestic animals. There is also evidence of the Indian grey Wolf is stemming from an ancient lineage which has not mixed with the Wolf-dog, making them genetically ancient and different from all other

Wolves of the world due to which it is one of the most endangered carnivores in this division. This gives all the more reason to prioritize conservation efforts for the Indian Wolf.

Three factors are crucial for Wolf persistence; habitat, prey and humans who allow them to live. Persecution by humans was the main reason for Wolf populations to disappear from many parts of Europe and North America and it is only recently, with increased conservation and protection that Wolves are colonizing parts of their historical ranges in these areas.

Even today Wolves occur predominantly in human use landscapes in India. Fortunately, they are not associated negatively in Indian culture and society as they have been in the Americas and Europe and although they are persecuted, populations still occur throughout the Deccan plateau. Wolves are social animals that live in packs and because of large pack ranges of around 300 sq km, Wolves require large landscapes. Their wide ranging and social nature also implies that conservation and management that is restricted to only within Protected Areas cannot be applied to Wolves.

Although wild prey such as Blackbuck, Chinkara are important for the Wolves, their landscapes are also home to dense populations of Sheep and Goats which also form important proportion of Wolf diet, as much as 50% in many cases. This also implies that local herders face losses to Wolf depredation and are known to destroy Wolf dens.

Wolves have an important role to keep the population of Blackbucks and Chinkaras in check. Reduction in population of Wolves means reduction in natural predator of these herbivores. Hence, the Wolves are needed to be protected.

Very little is known about their interactions with humans in the human use landscapes in India. To a large extent the focus of eco-logical studies on interaction has been on the “conflict” aspect.

In one study project done by Wildlife Division Pune, BNHS, Anthra and Wildlife Conservation Society, it was found that, Wolves seem to have a widespread presence with very few sites. Their presence was detected in the drier agro-pastoral landscape which spans a large part of the Pune Division. This was expected because Wolves have been known to have a wider presence in this landscape since before large-scale irrigation came to these areas, these areas were primarily dry grasslands which are known to support Wolves (Karanth et al., 2010).

iii) Hyena: Hyena presence is detected in the semi-arid region of eastern parts in Pune Division. It was observed that shrubs and burrows were used for denning by Hyena. Hyena areas have a high overlap with areas where leopard presence was detected, whereas it is patchy in the lower half of the Pune Division. Thus, Hyenas seem to have been detected from areas of denser vegetation as well as from the agricultural plains which are less hilly and have shrub-lands. It could be speculated that since Hyenas occupy the scavenging niche in an ecosystem, human-use landscapes could provide such species to an extent where they adapt and thus reside even in slightly varying environments.

iv) Avifauna: A total of 206 bird species have been identified in Pune division. Among the migrants observed 56 are long distance migrants and 21 spp. migrate locally / attitudinally. Some of

the species' endemic to Western Ghats occurs in the western ranges of Pune division. The endemic species of the bird of the Western Ghat found in Pune division, are Nilgiri wood pigeon, Blue winged parakeet, Malabar Grey Hornbill, Small green barbet, Malabar crested lark, Yellow Browed Bulbul, White bellied Blue Flycatcher, Small Sunbirds and Loten's sunbird.

Nilgiri Wood Pigeon, Malabar Grey Hornbill and Loten's sunbird is nationally threatened. The most conspicuous fruit eating birds are the Malabar grey hornbill, Black birds. The commonest are Parakeets, Doves, Quaker, Babbler, Ground Thrushes, Drogo's, Swifts, Mortems and nocturnal Nightjars. The Black eagle and Crested serpent eagle prey during the day and the Great Horned Owl and the Brown Fish Owl is active at night. In the grassland, crested larks, pipits and chats are common. A number of species of snake viz. the Rock Python and Banded Krait also occur. The tree frog species are numerous. The insect fauna is very rich and varied.

Some wild animals are noticed in and around the water reservoirs. Due to increasing number of irrigation and percolation tanks, the number of migratory water birds is on an increase. Regular arrival of 'Flamingo's during October to March is reported around Bhigwan (Ujani Dam) in the center corner of this division.

6.2 SPECIAL OBJECTIVES OF MANAGEMENT

- I. To ensure conservation of wildlife (animals and plants found in wild) in the forests of Pune Division.
- II. To ensure scientific management of wildlife by undertaking measures like habitat management and monitoring population of the wild animals.
- III. To ensure protection of ecologically sensitive and special habitat sites for wildlife conservation, such as riparian zones, mesic sites (natural water seepage sites), perennial water holes, natural grasslands, sacred groves, high altitude plateaus, natural resting, breeding and nesting sites (Caves, Snags, Overhangs, Groves of old Ficus trees, thick Bamboo groves).
- IV. To check wildlife poaching and habitat destruction.
- V. To promote and encourage ecotourism without disturbing and damaging wildlife.
- VI. To reduce man animal conflict through integrated management strategies.
- VII. To identify dens of Wolves/ Hyena and to monitor them.

6.3 THREATS AND CHALLENGES TO WILDLIFE

6.3.1 Habitat fragmentation / habitat loss

In western region of the Pune Forest Division, there are continuous patches of forest but towards eastern side due to civilization & industrialization there is drastic change in land use pattern which has resulted into habitat fragmentation and loss of habitats. The three ranges in Western Ghats have more-or less larger patches of forests, although size of forest area is comparatively large still it also fragmented due to roads, dams/reservoirs, canals, etc. In recent years the concept of nature

tourism has given rise to resorts, villas, etc. in areas abutting to forest land and is slowly proving to be a threat to wildlife habitat due to their pollution in form of air, soil, noise and light. These places were rather peaceful prior to the tourism boom.

The landscape on lower terrains in eastern regions of the divisions are generally of grassland nature. These grasslands are maintained by anthropogenic pressures in the Deccan plateau where transhumant people as well as resident shepherds have used these areas since historical times. These areas are typically in the rain shadow regions of Sahyadri requiring the pastoralists to migrate based on fodder availability

Grasslands because of their unique characteristics are also home to a host of endangered wild species that are adapted to the arid conditions. Species like the Indian Wolf, Indian Gazelle, Blackbuck, Indian fox, Stripped Hyena occur in the grasslands most of which occur outside the Protected Area matrix. These areas therefore cannot be viewed or managed in the traditional “Protected Area” method because of the extensive spread of this ecosystem as well as the presence of dense human populations that have traditionally used these areas posing a challenge to the conservation of grasslands.

Reserve forest area which amounts 5.2 % of total geographic area although remain static, quality of habitat has reduced drastically. Increased population, dependency on forest for grazing, fuel wood are the external factors to reduce quality of habitat. Total grassland area of Pune Forest division was reduced, as more and more area was brought under plantations. Reduction in availability of grasses reduced carrying capacity of forest area with respect to herbivore and consequently carnivores.

Stock map analysis shows that 5 % of total forest area is under exotic plantations of Subabul, Prosopis, Glyricidia, Accacia, etc., where there is meagre undergrowth. These areas do not fulfil the habitat requirements of herbivores.

Apart from above mentioned illegal grazing is also major threat for wildlife. The details of illegal grazing cases are as follows:

Year	No. Of Cases	Value of Loss
2012-13	24	17500
2013-14	18	6900
2014-15	13	8980
2015-16	6	6200
2016-17	16	54500
2017-18	14	8300
2018-19	18	12950
2019-20	24	18300
2020-21	29	50200
Total	162	183830

6.3.2 Illegal trade and Poaching

Area was known for good population of wild herbivores; however, the hunting with the help of domestic dogs was one of the reasons for the decline in the population of wildlife. In recent decades menace has been reduced. Still in past few years Pune city has become a market for illegal trade of wildlife parts as nearly 47 cases have been registered and traders were booked.

6.3.3 Road network and dams

Construction of dams and large number of roads across the habitat, poses threat to wildlife population. Road network has encouraged change in land use, road accidents, and fragmentation of forests. Incidences of Leopards accidentally falling in open wells are often noticed in this area.

6.3.4 Forest fires

It is now well known that wild fire is one of the important reasons of destruction of forests and wildlife. One single uncontrolled fire in the summer season is capable of wiping off the fruitful results of several decades of hard labour and scientific forest and wildlife management. Hilly areas are prone to surface fires. Heavy frequency of forest fires is a great threat to wildlife especially birds and reptiles. Annually numerous fire incidences are evidently seen in western ghats and ranges of mountains running west to east. Fire incidences recorded in Pune forest division during last plan period is given below-

Sr. No.	Year	No. of Fire Incidences	Area burnt (Ha.)
1	2012-13	20	86.06
2	2013-14	24	114
3	2014-15	20	129
4	2015-16	31	191.3
5	2016-17	33	149.4
6	2017-18	38	139
7	2018-19	102	277.26
8	2019-20	100	324.94
9	2020-21	141	436.29
10	2021-22	65	212.51
	Total	574	2059.76

6.3.5 Man-animal conflict

Crop raiding by wild animals is quite common especially, by Chinkara, Wild boar in patches of Daund, Baramati, Indapur & Eastern Pune range. The carnivores, particularly Leopards, Wolves and

Hyenas frequently kill domestic cattle, sheep & goats. There are several incidences of human injury and even death due to attacks from leopard which causes rage among local communities resulting in a serious threat to wildlife. Dumping of poultry remnants in forest area had given rise to Canine distemper disease in wildlife especially Wolf and nearly 4 Wolves had lost life to this disease in Baramati Range.

Compensation sanctioned due to Wild animal attack are as follows:

Financial Year	Human Affected				Livestock Affected			Crop Affected			Total Sanctioned Compensation
	Dead persons	Paid Compensation	Injured Persons	Paid Compensation	No. of Cases	Dead/ Injured Animals	Paid Compensation	No. of Cases	Hectare	Paid Compensation	
1	2	3	4	5	6	7	8	9	10	11	12
2011-12	0	0	0	0	6	15	32525	0	0	0	32525
2012-13	0	0	0	0	26	132	183744	5	0.9	14300	198044
2013-14	0	0	2	70500	16	33	75500	10	21.1	69800	215800
2014-15	0	0	0	0	32	56	246750	7	7.61	18300	265050
2015-16	0	0	0	0	28	57	202500	17	3.70	56600	259100
2016-17	0	0	0	0	26	74	274850	11	11.11	53625	328475
2017-18	0	0	0	0	19	44	192250	23	11.12	98300	290550
2018-19	0	0	0	0	21	36	186000	12	5.68	75800	261800
2019-20	0	0	1	100000	52	74	464000	14	5.74	61900	625900
2020-21	0	0	0	0	59	107	398400	34	20.04	120400	518800
2021-22	0	0	0	0	19	76	255000	2	0.410	4100	259100
Total	0	0	3	170500	304	704	2511519	135	87.41	573125	3255144

6.3.6 Forest Blanks (Encroachments)

The Pune division is located in heart of Industrial and Agricultural hub of Maharashtra and Pune is second most populated city of Maharashtra. Here land is highly valuable so frequent attempts are made by locals to encroach forest lands. During the last plan period 438 ha. of encroachment was evicted.

6.4 STRATEGIES

6.4.1 Habitat management

- A lot of wildlife management practices outside Protected Area often involve ‘translocation’ or ‘directing’ the animals to its ‘natural habitat’. Imposing social concepts of wilderness onto animals without realizing that residing in human-use landscape is often and deliberate attempt by animals.

- ii. Engaging with local people to devise more inclusive ways of conservation is likely to be the way forward in human use landscapes. In view of loss of habitat and paucity of prey base, the Leopards have taken a refuge in sugarcane fields for breeding.
- iii. Entire area under Kuran Working Circle of Kanwarjit Singh Plan was allocated to either Afforestation WC or Fuel wood Working Circle in Gupta & Rao plan. However, considering site specific conditions, 9181.41 ha area has been allocated to Fodder Management WC. This will revive habitat of herbivore and ultimately of Hyena, Wolf habitat, to some extent.
- iv. Out of total 2684.79 ha. of area under exotic species plantation, areas on mild slope, possibility should be explored to uproot and replant these areas with local species having forage value and fruit bearing species as explained in old plantation management chapter.
- v. JFMC authorized grazing control to be promoted.
- vi. In remote forest areas cattle are taken to graze in forest areas or released free for grazing in forest by the owners, such a practice is detrimental to forest especially for survival of new regeneration or seedlings. Therefore, such uncontrolled grazing needs to be stopped and cattle needs to be impounded and legal action initiated.
- vii. Cleaning of perennial waterholes in month of January –February. At times, it is necessary to create artificial water holes at strategic locations for proper utilization of habitat and to avoid habitat overuse by congregations of herbivores at a few waterholes. For providing artificial sources of water, saucer shaped cement ponds with rock debris at center, along with use of half cut cement pipes sealed at one end; bore well with hand pump to supply water can be created.
- viii. Bore wells can also be provided with Solar pumps for pumping water at a desired location. One such example is in Mendhapur in Solapur Division, where in one fodder plantation, solar pump provided on bore well is utilised to provide water to water holes.
- ix. Thus, it fulfils basic requirements of wild herbivore, like fodder, water and space at one place only. Such interventions meet the essential requirements of wild animals within the habitat and within the forest areas and avoid straying of wild animals outside forest areas in search of water thereby avoiding man-animal conflict. List of waterholes is given in Appendix No. XXXII.
- x. It is observed that Indian vultures prefers cliffs for nesting while other species prefer big trees (>220 cm GBH) of Behada, Hirda, Mango, Vad and Pimpal, so these should be protected.
- xi. If the artificial water hole is created, the necessary budgetary provisions must be done to fill it regularly, especially in summer when the water in natural sources dries up. Once the water hole is made, it must be filled and availability of water in artificial water-holes must be ensured meticulously. To avoid evaporation of water and unnecessary filing of more water in



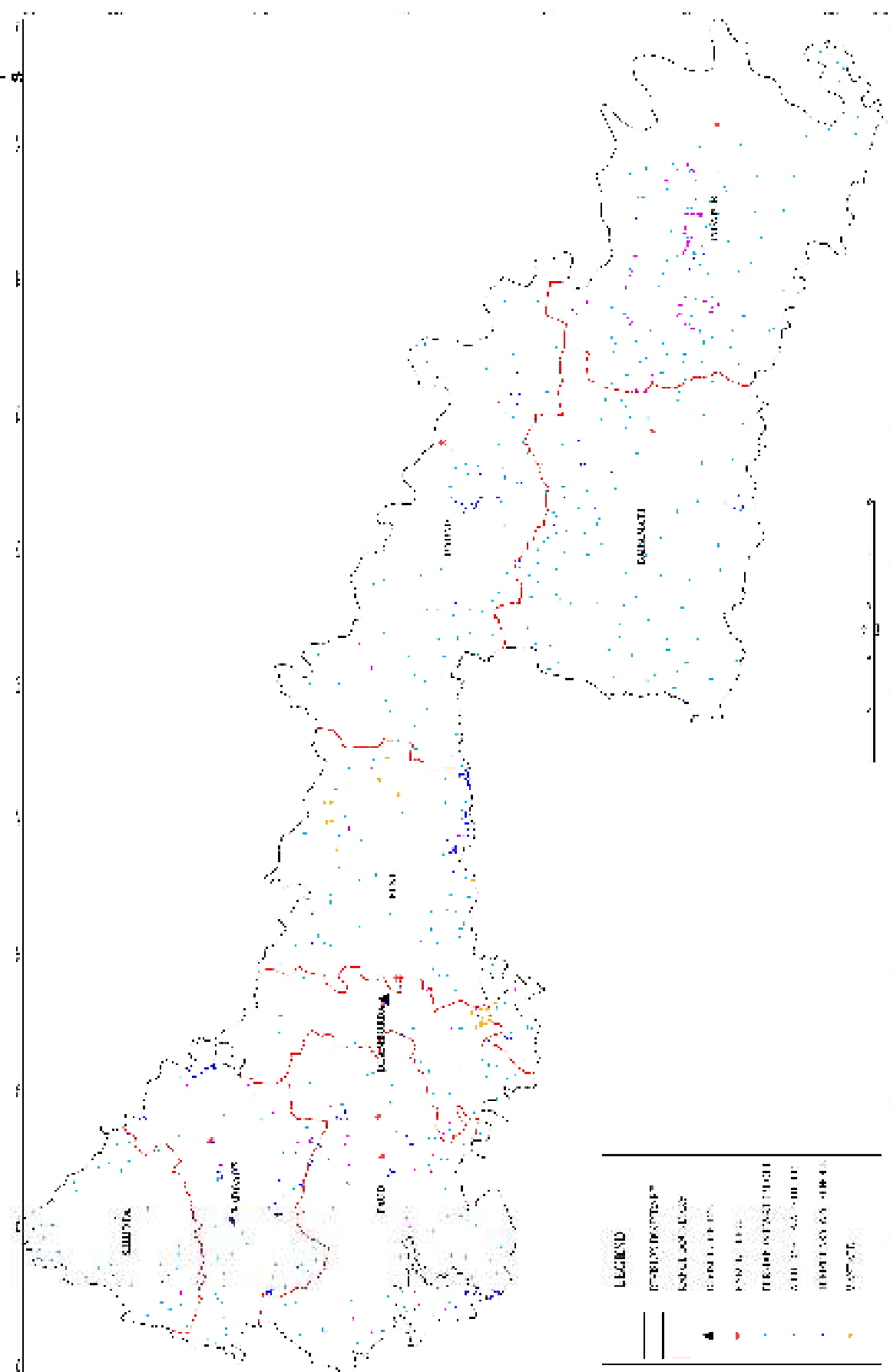
saucer shape waterhole rocks may be installed in central part of structure. This would also reduce chance of fatal injury to wildlife caused by slippery surface or drowning.

- xii. Deep trenches of 1m. wide and 1 m. deep should be avoided in areas of Deer and Chinkara. In other areas at least one end of deep trench should have ramp so that small animals can able to climb up from trench.
- xiii. Management (conservation/ retention) of woodland patches (up to 1Ha.) and tall grassland used by Wolves for breeding and dens.
- xiv. Identification of denning sites and providing them appropriate protection by retaining the vegetation cover & water availability.
- xv. Areas of Forest which were given for construction of dam and lands which are above high flood level should be managed by department. These areas are subject to encroachment and are used for agriculture during dry season. Instead, separate estimate may be prepared for seed sowing/ planting of water tolerant species like Arjun, Babul, etc. by seeking prior approval of CCF (T), Pune. Separate small mound of soil may be created where plantation can be done and unique island eco-system can be developed. These trees were earlier present especially in Bhigwan dam backwater and were acting as aviary/ heronry. But off late these trees have been cut and land is being used for agriculture. But if these lands are restored by growing trees or aquatic plants it would play important role for conservation of wildlife as a whole especially for avifauna.
- xvi. All such lands parcels can be amalgamated together and protected area may be declared like Conservation reserve, etc. and other private areas which are necessary for conservation of important species like Indian Grey Wolf, etc. may be after proper consultation with locals be declared as Community reserve.

6.4.2 Tamhini & Sudhagad Eco Sensitive Zone (ESZ)

Tamhini & Sudhagad Wildlife Sanctuary lies on the west side of Pune division. Proposal of Eco Sensitive Zone of Tamhini & Sudhagad Wildlife Sanctuary in under process of final submission to Government of India, however final notification is awaited. Reserve Forest as well as some private areas from Mulshi, Alibaug & Roha talukas have been proposed under this proposed Eco Sensitive Zone. Brief details are as follows –

Sr. No.	Division	Reserve Forest Area (Ha)	Protected Forest Area (Ha)	Private Forest Area (Ha)	Private Area (Ha)	Total Area (Ha)
1	Pune	--	--	297.73	2723.32	3021.05
2.	Roha	--	121.609	--	2142.89	2264.499
	Total	--	121.609	297.73	4866.21	5285.549



Once final notification is issued, prohibited, regulated and promotional activities will be strictly followed.

6.4.3 Protection against poaching and illegal trade-

The forest staff shall develop an intelligence system with the help of local people, especially with Joint Forest Management Committee, to gather information about any activities related to poachers and traders of wild life.

- i. Regular patrolling especially during summer, when these animals become more vulnerable due to shortage of water in the forest areas.
- ii. The forest staff shall also be vigilant in the weekly market where at times birds like Parakeets, Partridges, Quails, Water-Birds, monitor lizards, Tortoise, etc. are brought for sale.

6.4.4 Road Network and Dams

Network of roads and dams constructed already should be used positively for wildlife management.

In the forest areas falling within the Full Tank Level (FTL) 2–4-meter level of major and medium irrigation projects, planting of good fodder grass species shall be taken to increase the grazing facilities for the wildlife. Signage's regarding wildlife awareness should be raised on the roads passing through forest areas. On the western side of Shirola and Wadgaon Maval ranges areas which are adjoining to Junnar Forest Division, there is occurrence of Indian Giant Squirrel. In such forest areas continuous forest cover should be maintained for movement of Squirrel. Cutting of trees for widening of roads in such forest areas should not be permitted. Road network can be effectively used to establish and feed artificial waterholes with tankers.

6.4.5 Plan for Fire Management

Fire is a good servant but a bad master. If used judiciously fire can work wonders by way of controlled burning as a good management tool. This theme plan prescribes for managing fire for betterment of forest and wildlife. The important objectives of fire management are viz.

- i. To use fire as a management tool for controlled burning.
- ii. To maintain fire lines.
- iii. To detect and fight fires promptly.
- iv. To involve local people in fire protection.

The proposed measures for reducing forest fires are:

➤ Indirect Preventive Measures

- i. Involvement of the local people needs to be taken. MOU with the villagers should be done before the fire season.
- ii. Awareness programs through workshop, meetings, posters, handouts, boards and other media like short films shall be taken up.

- iii. Forbidding collection of minor forest produce especially honey during the fire season.
- iv. Action against dereliction of duty and reward for conscientious work in preventing forest fire.
- v. Putting up notices prohibiting kindling, keeping and carrying of fire.

➤ **Direct Preventive Measures:**

- i. Forecasting of fire prone areas based on fire history of last five years, availability of combustible material. Based on previous records, other factors, a fire sensitivity map will be prepared and special attention will be provided for preventing fire in sensitive areas especially the wildlife habitats.
- ii. Organization of training and briefing of staff for fire control activity.
- iii. Firefighting equipment's like rakers, blowers, cutters will be provided.
- iv. Registration of all staff for fire alerts from FSI.
- v. Establishing good network of Fire lines & Watch towers to locate forest fires.
- vi. Deployment of staff and fire watcher at vantage points / **Watch towers** to locate and extinguish fire. The list of existing **watch towers** is given in Appendix No. XXXIII.
- vii. Strengthening the communication system.
- viii. Efficient patrolling.
- ix. Hazard reduction by clearing camping sites and areas along paths and roads. The dry leaves fallen on fire lines need to be cleaned to avoid crossing of fires over fire lines.

➤ **Post fire management.**

- i. All the fire incidences will be recorded meticulously.
- ii. The burnt areas will be mapped by taking GPS track.
- iii. The cause of fire and extent of area will be enquired and recorded.
- iv. The damage due to fire will be assessed and responsibility will be fixed.

6.4.6 Man-Animal Conflict.

Man, animal conflict can be reduced through well planned integrated management strategies. Resorting only upon reimbursement will yield pessimistically so it needs combination of strategies viz. Retention, restriction, reimbursement, and realization (4R of conflict reduction). Emphasis should be given on retention strategy without which it will be a nightmare if we plan for restriction strategy. It is a challenge for the forest managers to prove that 'good Wildlife management is good forest management' and to meet this challenge, it is high time to change the traditional forestry outlook to the holistic view.

Retention - The laws of ecology say that "everything is connected to everything else". Therefore, the need for interventions to improve the habitats for wildlife. Habitat management should be done in order to cater all the needs of wildlife within forest areas. This will help to retain wild animals in forest areas which will in turn reduce the conflict.

Restriction - Restricting entry of wildlife in human habitats. Including fences like Solar fencing, Barbed wire fencing and chain link fencing will help in reducing the conflicts. In Protected areas, the Solar fencing and Chain-link fencing schemes are being implemented under Shyamaprasad Mukherjee Jan Van Yojana. This scheme needs to be extended to vulnerable territorial areas of Pune Forest division.

Reimbursement- Paying compensation promptly. Effective and timely payment of compensation is crucial for reducing the negative effects on wildlife by humans. Details of wildlife compensation paid is given in Appendix No. XXXIV.

Realization- Generation of awareness among the public and staff is highly important. Public representatives should be involved in various forestry activities and gifted with conservation literature. Awareness of public through mass media and eco-tourism through JFMCs will be helpful. Staff should be well trained to handle the situation.

Books related to Wild animals' diseases, tranquilization, wildlife management etc. should be supplied to the field staffs to improve their management skills. Short duration training for tranquilization of wild animals, to the forest staff and Veterinary Doctors, shall be imparted.

6.4.6.1 Leopard Conflict in Pune Division

Pune forest division is conspicuously known for leopard conflict in city limits. Mostly Leopards reside outside forest areas, especially in sugarcane fields, as they get better habitat in sugarcane fields. Therefore man-animal conflict is severe in the division especially in Mulshi, Haveli talukas. Since, year 2011 total 5 human injured have been occurred in leopard attacks. There is no scientific or official information about exact count of Leopards in this area. Many leopard incidents are occurring outside the forest area. No census has been taken place outside the forest area. So, the basic data such as leopard number, their sex, territories are unavailable.

6.4.6.2 Following Steps to be taken to tackle the man-animal conflict.

I. Large Scale Awareness Measures

A large scale, continuous awareness programme has to be carried out using newspaper, TV and even local natya groups to provide information on this issue. Publicity through pamphlets, Ghadipatrika distribution and Audio circulations in these areas. Awareness material has to be distributed schools in the area, the children need to be explained the do's and don'ts so that they can disseminate the information to their parents.

II. Assisting local people in the leopard regions to lead safer lives. Creating awareness among them for use toilets to avoid leopard attack incidences.

III. Training Of Forest Department staff for Conflict Management

Training/capacity building programme should consist of public relations skills as well as skills in handling leopard emergency situations.

IV. Formation Of Village Rapid Response Teams

In each of these villages, the Gram Panchayat should be requested to choose people who can be inducted into the rapid response village teams. They need to undergo training at the Pune Rescue Centre.

V. Preventing Livestock Losses Due to Leopards

100% subsidy has to be given for livestock sheds. In some cases, attacks on children have occurred when the leopard was sitting near the entrance of the cattle shed but attacked the child which was nearby. The public has to be made aware to build the secure cattle shed as far away from the house as possible. If not, then the secure cattle shed's entrance should be in the opposite direction of the entrance of the house.

VI. Dealing With Open Wells.

It must be made mandatory that all new wells or existing wells inside the forest or in the adjacent private area should be fenced either using Chain link or masonry wall. This will prevent Leopards and other wildlife falling into the wells. The list of existing wells in forest area is given in Appendix No. XXXV.

VII. Increasing patrolling by deputing other staff and providing vehicles (Jeeps, Rescue van).

VIII. Use of signage's should be mandatory, speed limit for vehicles, speed breakers or rumble strips to slow down in identified areas is recommended, and the local PWD need to be taken into confidence.

Besides this setting up control room, prompt payment of compensation, seeking supports of the department such as ZP, Revenue, Police for taking long term measures such as 100% toilets, stall feeding, leopard proof animal sheds (Gotha) and protective wall to wells for which model is approved under MGNREGS, etc.

(Reference- Action Plan for dealing with Leopards in human use landscapes in Pune district, Maharashtra by committee formed by PCCF (HoFF), Maharashtra).

6.4.7 Standing Order PCCF (WL) MS No. 001.

The PCCF (WL) MS, Nagpur has issued a standing order. This order prescribes duties and lists measures for the protection and conservation of the wildlife outside PA's. Following are the general prescriptions, majority of which are based on the guidelines under this Standing Order, for the protection of wildlife in the areas outside the Protected Areas. The territorial staff of the division shall scrupulously implement these prescriptions.

Duties of Forest Guard, Forester, RFO and ACF include-

- Keeping information of waterholes, particularly in summer and watch on the same, that is, special vigilance at all the water holes in the Division is prescribed.
- Keeping a watch on the electric lines passing through forests.
- Ensuring registration of arms licenses as required under Wildlife (Protection) Act 1972.

- Cognizance of cases of injury due to wild animals as per govt. orders from time to time with speedy and transparent disposal of cases.
- Keeping a track of animals like Tiger, particularly Tigress with cubs and a watch on such vulnerable animals.
- Proper disposal of carcass of wild animals found dead or killed.
- Local staff shall maintain record of sensitive wildlife areas such as areas with heavy wild animal concentration.
- Establishing a network of informers with the aid of Secret Service Fund.
- There shall be regular short-term training/ workshops in anti-poaching activities and legal requirements in dealing with wildlife offence cases.

6.4.8 Capacity Building:

Books related to Wild animal's disease, treatment, tranquilization, wildlife management etc. should be supplied to the field staffs to improve their management skills. Short duration training for tranquilization of wild animals, to the forest staff and Veterinary Doctors, shall be imparted.

6.4.9 Creation of Data Base:

The Division will carry out survey of *riparian zones, mesic sites, perennial water holes, saltlicks, natural wallows, resting places, breeding and nesting sites, etc.* and map them (with GIS) for the purpose of their protection and management. The staff will also identify the areas where these sites are under potential threat. The Division will also maintain a meticulous record of these sites on a register the "Register of the Special

Wildlife Habitat" and update it annually by an officer not below the Range Forest Officer.

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

CHAPTER – 7

PRIVATE FORESTS (ACQUIRED) MANAGEMENT WORKING CIRCLE

7.1: PRIVATE FORESTS (ACQUIRED) MANAGEMENT (PFM) WORKING CIRCLE –

The area of this Working Circle has not been clearly marked on the GIS due to various reasons as mentioned below in chapter.

7.2 GENERAL CONSTITUTION OF WORKING CIRCLE

This Working Circle includes forest areas which are declared as private forests by the state government of Maharashtra under the Maharashtra Private Forests (Acquisition) Act, 1975. These forests are mainly concentrated in Western Ghats and are spread across six ranges viz. Shirola, Wadgaon Maval, Paud, Bhamburda, Pune & Daund.

For conserving the Forests, natural resources and protecting them from destruction or over-exploitation by their owners and for promoting systematic and scientific development and management of such forests the state government of Maharashtra enacted the Maharashtra Private Forests (Acquisition) Act, 1975.

The Maharashtra government had acquired large areas of privately owned forest lands pursuant to passing the Maharashtra Private Forest (Acquisition) Act, 1975 (MPFA Act). Thereafter, in 1978, there was an amendment in the said act wherein section 22A was incorporated, which states, *inter alia*, that for the piece of land which was acquired by the state which is less than 12 hectares in total, the collector has the power to decide whether whole or part of such land is to be restored / reverted to the original owner. In view of this newly inserted provision, an enquiry was made and several privately owned lands (which were not more than 12 hectares in area) were restored/ reverted to the original owners after seeking approval of central government. All such restorations were done on paper only, and demarcation was not done on field and maps for the same were not issued. Only for few instances such details are available.

Details of documented forest areas are as follows

RANGE WISE DISTRIBUTION OF PRIVATE FOREST AREA

Sr. No.	Range	Area of Range in Ha.	Area Allotted to the Private Forest WC	Percentage of the forest Area of the Range	Percentage of the Area of the Private Forest WC
1	Vadgaon Maval	14271.2	4147.02	40.96	36.20
2	Shirola	16371.66	3605.06	28.23	32.70

3	Paud	14416.231	2645.53	22.45	23.09
4	Bhamburda	7138.449	623.849	6.57	5.44
5	Pune	7411.458	349.33	4.71	3.04
6	Daund	6192.8	84.83	1.36	0.74
7	Indapur	6753.67	0	0	0
8	Baramati	5031.11	0	0	0
	Total	77586.578	11455.619	17.32%	100%

7.3 GENERAL CHARACTERISTICS OF VEGETATION

These forests are mostly distributed on hill slopes, adjacent to reserved forests and consists of forest types of 3B/C2 - Southern moist mixed deciduous forests, 5A/C3 Southern dry mixed deciduous forests and 6A / C1 Southern Thorn Forests.

7.4 FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

Felling is not prescribed in this working circle. Entire area is divided into treatment areas for demarcation over a period of five years and details are mentioned in Appendix No. XLV.

7.5 BLOCKS, COMPARTMENTS AND JFM AREA

The details of area included in this working circle are mentioned in Appendix no. LIII. The area is not divided into compartments or blocks as they are not demarcated in field.

7.6 SPECIAL OBJECTIVES OF MANAGEMENT

1. To conserve and maintain bio-diversity in the ecologically sensitive Western Ghat region.
2. To protect, improve and maintain the existing vegetation that play a significant ecological role of providing green cover, conserving soil and biodiversity, landscape connectivity for wildlife and regulate water flow of the many rivers that originate in the Western Ghats.
3. To demarcate area for preparation of future management plans.

7.6.1 ANALYSIS OF THE CROP

The area of this working circle is not demarcated due to which enumeration was not done in the field, as a result crop analysis is scheduled to be done after demarcation is done in the area. Crop analysis would be included in separate scheme that would be prepared for further management of the area.

7.6.1. SILVICULTURAL SYSTEM

Since felling is not prescribed, standard silvicultural system is not applicable.

7.6.2. ROTATION PERIOD

No felling is prescribed so no rotation period is fixed for this Working Circle. Though Working plan period is spread over a span of 10 years and demarcation of entire area is scheduled to be done in first 5 years only. There is no production prescribed as of now.

7.6.3. HARVESTABLE DIAMETERS: Not Applicable

7.6.4. REDUCING FACTORS AND REDUCED AREAS: Not Applicable

7.6.5. FELLING CYCLE: Treatment Cycle is fixed for first five years.

7.6.6. DIVISION INTO PERIODS AND ALLOTMENT TO PERIODIC BLOCKS (PB) : Not Applicable

7.6.7. CALCULATION OF THE YIELD: Not Applicable

7.6.8. TABLE OF FELLING: Not Applicable

7.6.9. METHOD OF EXECUTING THE TREATMENT:

- i. These areas acquired under Private Forest (Acquisition) Act, 1975 are deemed to be RF but are not yet fully demarcated in the field inspite of clear prescriptions during the last plan period in miscellaneous chapter.
- ii. The DCF (T) Pune must get all these areas surveyed and demarcated in the field and complete possession of land should be taken by the Pune territorial Forest Division. The encroachments if any should be removed at the earliest. Boundaries of Acquired forests are to be demarcated on priority within 5 years. A statement showing details of year wise villages due for boundary demarcation programme is given in Appendix No. XXXVIII. If the activity of demarcation is not done during the given time period, then a separate deviation proposal for the same must be submitted stating reasons for non-compliance.
- iii. After demarcation of Private Forest is done a separate detail Working scheme/ Working plan of concerned forest has to be prepared by DCF (T) Pune in consultation with

stakeholders and should be approved by concerned authorities. The working prescriptions should be in consonance with prescriptions of this plan.

- iv. Most of such areas lie in a state of neglect as no developmental schemes could be taken in these areas. The inquiries in the said areas by the Collector have already been delayed by over 40 years. The DCF must pursue the matter with the Collector to get the inquiries completed in the shortest possible time.

7.6.10. SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING: Post demarcation during preparation of new working plan/ scheme depending upon the physiographic conditions and vegetation subsidiary silvicultural operations may be prescribed.

7.6.11. REGENERATION: Since enumeration is not done so regeneration has not been calculated.

7.6.12. ASSOCIATED REGULATIONS AND MEASURES:

The following prescriptions are applicable after area is demarcated and separate plan is prepared.

Fire Protection: Effective protection against fire for the period from December to June is a must to ensure survival of naturally regenerated vegetation as well as protect further natural regeneration of grass species. Special fire lines shall be provided and they should be cleared annually. Areas which are frequently prone to fire must be strengthened by installing fire watch towers and firewatchers shall be appointed during the summer season. JFMC's shall be actively involved in the fire protection works and creating awareness. Special drive must be taken in forest fringe villages to create awareness amongst villagers to educate them against the misconception of 'rab' or fire inducing grass growth & ill-effects of forest fire.

Closure to Grazing: The plantation area shall remain closed to grazing completely.

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

CHAPTER – 8

URBAN FOREST MANAGEMENT WORKING CIRCLE

8.1: URBAN FOREST MANAGEMENT WORKING CIRCLE:

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

8.2: GENERAL CONSTITUTION OF THE WORKING CIRCLE

This Working Circle includes forest areas situated mostly in city limits and areas of urban sprawls expanding up-to outer ring roads, forest areas bordering major MIDC's and talukas. The forests in this Working Circle are all part of Urban Forest Management which is a specialized branch of forestry and has its objective of cultivation and management of trees for their present and potential contribution to the Physiological, Sociological, Environmental and Economic well-being of urban society. The health of this urban forest is a mosaic of the planted landscape and the remnant native forest. It is a reflection of the city's health, well-being and livability. These trees and other plants are a vital part of the city character, giving it a special sense of place. Urban forests provide many environmental and social services that contribute to the better quality of life in cities. Apart from their aesthetic appeal, these forest patches have a great multiple use value for the city dwellers, planners and civic authorities. People use these forest areas for morning and evening walks, for jogging and trekking, for bird watching, for outings and picnics and as resting places.

These islands of greenery and serenity which are surrounded by cement concrete jungle from all around, act as green lungs to the Pune city. Though all green islands don't vest with Forest department but are also vested with Defense, and Municipal Corporation of Pune and Pimpri – Chinchwad. The forest areas of varying shapes and sizes (varying between 1.00 ha. and 717.19 ha.) are scattered at different places within the municipal limits of the PMC & PCMC and areas adjoining to major MIDC's & talukas like Baramati, Indapur, Wadgaon etc. Some important forest areas are located at Pachgaon- Parvati, Bhamburda, Vadki, Bavdhan Khurd, Warje, Kothrud, Katraj, etc. The areas allotted to this Working Circle were previously included mainly in the 'Urban Forest WC' & 'Protection WC' and also from another Working Circle. A statement showing village and compartment no. wise details of area included in this WC is given in Appendix No. XXXVI of Vol. II.

Coordinated management of the urban forest occurs because city agencies, businesses, civic organizations and residents have formed unified approach and partnered to make a place for forests in the city. Numerous residents recognize trees as a vital, functioning part of the city's infrastructure and ecosystem and provide adequate, whole hearted support to maintain and enhance the urban forest. The department has achieved a healthy, sustained urban forest, carefully managed and cared for, which

contributes to the economic and environmental well-being of the city. Although these forests are being protected and nurtured yet they face relentless pressure of biotic and abiotic form.

Table: Allotment of area to the WC

Sr. No	Range	Area of the Range (In ha.)	No. of compartments		Area allotted to the WC	% To area of the range	% To area of the W.C.
			Full	Part			
1.	Wadgaon Maval	10124.18		1	51.59	0.510	1.327
2.	Shirota	12766.60			0.00	0	0
3.	Paud	11770.701		1	266.93	2.268	6.864
4.	Bhamburda	6514.60	6	8	1614.97	24.79	41.527
5.	Pune	7062.128	3	4	1955.45	27.690	50.282
6.	Daund	6107.97			0	0	0
7.	Indapur	6753.67			0	0	0
8.	Baramati	5031.11			0	0	0
	Total	66130.9615	9	14	3888.94	5.881%	100%

The following table shows the extent of all such urban forest areas falling within the Corporation limits of Pune (PMC) & Pimpri-Chinchwad Municipal Corporation (PCMC).

Table: List of villages bearing urban forest areas

Pune Municipal Corporation			Pimpri-Chinchwad Municipal Corporation		
Sr. No.	Village Forest Area (Ha.)	Area in ha.	Sr. No.	Village Forest Area (Ha.)	Area in ha.
1.	Pachgaon-Parvati	239.68	1.	Dighi	134.71
2.	Parvati	8	2.	Nirgudi	227.02
3.	Pashan	43.51	3.	Dudulgaon	63.2
4.	Dhanori	71.66	4.	Kiwale	7.90
5.	Warje	118.58	5.	Mamurdi	44.67
6.	Bhamburda	99.84	6.	Mahlunge	36.62
7.	Kothrud	127.99	7.	BavdhanKh.	102.46
8.	Nandoshi	619.34			
9.	Katraj	774.82			
10.	Dhayari	186.87			
11.	Wadki	543.24			
12.	Kondhava bk	144.6			
13.	Narhe	52.53			
14.	Pisoli	26.51			
15.	Wadgaon Sheri	3.23			
16.	Ghorpadi	10.83			
17.	Mohmadwadi	99.77			
18.	Undri	80.94			
19.	Wanawadi	29.37			
20.	KondwaKh.	13.02			
21.	Hadapsar	80.93			

22.	ManjriKh.	40			
23.	Manjri Bk.	7.60			
24.	Kharadi	3.27			
25.	Lohagaon	16.11			
26.	Wagholi	39.12			
27.	Khadawasla	120.22			
28.	Hingane Bk.	8.10			
29.	Bopodi	8.37			
30.	Bavdhan Khurd	102.46			
31.	Khanapur	44.82			
	Total	3765.33		Total	616.58

8.3: GENERAL CHARACTERS OF VEGETATION

A few forest patches within the municipal limits bear good vegetation which are green lungs of Pune city. Pachgaon- Parvati, Bhamburda, Katraj, and many others were afforested under ‘Green Pune’ campaign implemented by the State Government in the early nineties. Areas were fenced for effective protection against biotic interference. Irrigated plantations were undertaken within the fenced areas for early establishment of seedlings and their faster growth. Most of such urban forests are now covered with successful mature *Glyricidia*, *Subabul* plantations. The Katraj Forest block is very rich in biodiversity. University students and research scholars study these areas for acquiring scientific knowledge.

It has been observed that the top and the gentle slopes of the plateau of many such spots especially Pachgaon-parvati and Bhamburda bear good soil depth and the soils varying between red lateritic soil to black cotton soil. Miscellaneous species plantations were raised in the years 2009 and 2010 in blank areas / small patches after removal of *Glyricidia* (‘a’ areas) and as under-planting in the old *Glyricidia* plantations only (‘b’ areas) at Pachgaon-parvati and Bhamburda. Tall plants were used as the planting stock and were being artificially irrigated. The miscellaneous plants in ‘a’ area had shown good growth in comparison to the ones in ‘b’ Mixed sp. Plantations on Pachgaon-Parvati hillock one year old Irrigated mixed spp. Plantation with tall plants at Bhamburda after partial removal of *Glyricidia* have also shown promising results during the last plan period.

Table 8.3 No. of sound trees per ha in Urban Forest Management Working Circle

Name of Working Circle	Total	General utility species	Special utility species	Minor forest produce species	Other species
Urban Forest Management W.C.	268.58	54.90	18.98	78.57	116.12
% Of stock to total stock	100	20.44	7.07	29.26	43.24

Table 8.4 Species and Girth- class wise Distribution (Per Ha.) in Protection Working Circle

Group & Species	Girth Class Wise Classification in cm										
	15 U 30	31 U 45	46 U 60	61 U 75	76 U 90	91 U 105	106 U 120	121 U 135	136 U 150	Above 150	Total
Group - A : Species of General Utility											
Ain	5.71	6.12	2.86	1.02	0.20	0.00	0.00	0.00	0.00	0.00	15.92
Shisam	0.41	1.63	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.45
Teak	4.90	13.06	8.16	6.12	2.24	1.02	0.61	0.41	0.00	0.00	36.53
Total - A	11.02	20.82	11.43	7.14	2.45	1.02	0.61	0.41	0.00	0.00	54.90
Group - B : Species of Special Utility											
Khair	10.00	2.65	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.67
Salai	2.24	1.22	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.88
Sawar	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.41
Shivan	0.41	0.20	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	1.02
Total - B	12.65	4.08	1.43	0.82	0.00	0.00	0.00	0.00	0.00	0.00	18.98
Group - C : Species of Minor Forest Produce											
Aawala	0.20	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.82
Amba	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.20
Anjan	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41
Apta	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Asana	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Babhul	0.20	1.02	1.22	0.61	0.00	0.00	0.00	0.00	0.00	0.00	3.06
Bel	3.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.67
Bhutiya	0.41	0.82	0.82	0.20	0.00	0.00	0.00	0.00	0.00	0.00	2.25
Bibwa	1.43	1.22	0.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	3.06
Bor	0.61	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02
Charoli	0.20	0.41	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02
Chinch	0.20	0.00	0.00	0.61	0.41	0.82	0.20	0.00	0.00	0.00	2.25
Dhaman	1.43	1.02	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.65
Dhawada	3.27	3.88	0.82	0.00	0.20	0.20	0.00	0.00	0.00	0.00	8.37
Dhup	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Ghatbor	4.49	2.24	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.94
Hirda	0.41	0.41	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02
Hiwar	0.00	0.61	0.20	1.02	0.00	0.00	0.00	0.00	0.00	0.00	1.84
Jambhul	0.00	0.00	0.00	0.41	0.61	0.20	0.20	0.00	0.00	0.00	1.43
Kadamb	5.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10
Kalamb	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Kanchan	0.61	1.22	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.24
Karvand	0.82	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02
Kuda	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61
Medhsing	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41
Mogir	0.20	0.61	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02

Moha	0.41	0.61	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	1.43
Neem	3.47	1.63	1.43	0.82	1.02	0.00	0.00	0.00	0.00	0.00	8.37
Nilgiri	0.00	0.41	0.61	0.41	0.00	0.00	0.00	0.00	0.00	0.00	1.43
Palas	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Pangara	0.82	0.61	0.00	0.61	0.00	0.00	0.00	0.00	0.00	0.00	2.04
Subabhul	0.82	1.22	0.41	0.41	0.00	0.00	0.00	0.00	0.00	0.00	2.86
Tembhurni	0.82	1.02	1.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.27
Tiwas	0.00	0.82	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	1.02
Umber	0.00	0.00	0.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.41
Wad	6.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.33
Total - C	37.35	20.61	9.80	5.71	3.27	1.43	0.41	0.00	0.00	0.00	78.57
Group - D : Other Species											
Accacia	0.00	0.00	0.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.41
Borkati	0.41	1.02	0.41	0.20	0.00	0.00	0.00	0.00	0.00	0.00	2.04
Chandan	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Char	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Chilar	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Fashi	0.61	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Gela	0.00	0.61	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Gliricidia	20.41	22.45	12.24	6.53	4.69	1.84	0.00	0.00	0.00	0.00	68.16
Goti	0.61	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02
Kashid	0.00	0.82	1.02	1.22	1.22	0.00	0.00	0.00	0.00	0.00	4.29
Kinai	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41
Kini	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41
Kinjal	0.61	0.61	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.43
Kombal	0.61	1.63	0.61	0.41	0.20	0.00	0.00	0.00	0.00	0.00	3.47
Kumbal	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61
Mohgani	6.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.73
Nana	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41
Pachar	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.20
Patang	0.61	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Pimpal	6.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.94
Salphal	0.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41
Sisoo	0.00	1.43	1.02	1.43	0.20	0.20	0.00	0.00	0.00	0.00	4.29
Surangi	0.00	0.82	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02
Tambat	2.04	1.63	0.20	0.82	0.00	0.00	0.00	0.00	0.00	0.00	4.69
Tamhan	2.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.24
Tortolis	0.00	0.00	0.41	0.82	0.41	0.00	0.00	0.00	0.00	0.00	1.63
Vela	0.82	0.61	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.63
Waras	0.20	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.41
Wavala	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
Total - D	44.08	33.67	17.14	12.04	6.94	2.25	0.00	0.00	0.00	0.00	116.12
Grand Total	105.10	79.18	39.80	25.71	12.65	4.69	1.02	0.41	0.00	0.00	268.58

8.4 FELLING SERIES, CUTTING SECTIONS AND JFM AREAS

Working series and annual coupes: The area of this Working Circle is divided into 10 working series with average area of 388.89 ha. Each working series is further divided into 10 coupes with average coupe size of 32.40 ha. Details of felling series and coupes in given in Appendix No.XXXVII

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

The details of compartments in this Working Circle have been provided in the Appendix No. XXXVI.

8.6: - SPECIAL OBJECTS OF MANAGEMENT

- i. To protect the forest areas from encroachments, illegal felling and fires etc.
- ii. To rejuvenate the forests falling within the corporation limits and replace old plantations of exotic species with native species of plants.
- iii. To create awareness and to educate urban dwellers regarding forests, wild life and environmental issues.
- iv. To help mitigate the effects of severe air pollution in the Pune city area.
- v. To provide recreational facilities to the people by adopting eco-tourism.
- vi. To protect and conserve endemic biodiversity of Pune city and improve carbon sequestration.

8.6.1: - ANALYSIS OF THE CROP

8.6.1.1 Stock Mapping-

Conventional stock mapping has been done by the staff of the working plan division with the help of territorial division. Working Plan division has used satellite imageries and done ground truthing for verification. Stock analysis results shows that this Working Circle constitutes of 6 % which are either within city limits, adjoining to urban sprawls or near to areas which are prone to encroachment. Therefore, this area has been allotted to Urban Forest Management Working Circle. Nearly 56% area is well stocked and about 23% area is under plantations mainly of Glyricidia and Subabul.

Urban Forest Management Working Circle

Sr. No.	Stock Type	Area (Hectare)	Area (Percentage)
1	Bamboo	0.00	0.00%
2	Forest Blank	45.17	1.16%
3	Exotic Species	876.17	22.53%
4	Grass	1.88	0.05%

5	Mixed	1818.96	46.77%
6	Plantation	29.05	0.75%
7	Scrub	161.81	4.16%
8	Teak	138.55	3.56%
9	Uncultivable Blank	815.25	20.96%
10	Understocked	0.00	0.00%
11	Water	2.12	0.05%
Grand Total		3888.94	100.00%

8.6.1.2 Age and density- The crop in this WC is having preponderance of Glyricidia which are not clearly divided into classes but, other allied species are divided into classes. These plantations are mainly more than 25 years old and forms mature crop. These forest which have vegetative cover are generally very dense in monsoon and winter whereas during summer only main stems are present.

8.6.1.3 Enumeration: Enumeration has been carried in 49 plots by the staff of the territorial division as per the procedure laid down in National Working Plan Code, 2014.

8.6.2 SILVICULTURAL SYSTEM

Here selection felling silvicultural system is being prescribed. It is mainly prescribed for replacing Glyricidia with indigenous plantations.

8.6.3 ROTATION PERIOD: Rotation period is fixed for this Working Circle though working plan period is spread over span of 10 years; as there is no production prescribed.

8.6.4 HARVESTABLE DIAMETER: Not Applicable

8.6.5 REDUCING FACTORS AND REDUCED AREAS: Not Applicable

8.6.6 FELLING CYCLE: Treatment cycle is fixed at 10 years.

8.6.7 DIVISION INTO PERIODS AND ALLOTMENT TO PERIODIC BLOCK (PB): Not Applicable.

8.6.8 CALCULATION OF THE YIELD: Not Applicable.

8.6.9 TABLE OF FELLING: Not applicable.

8.6.10 METHOD OF EXECUTING THE FELLING: As per prescriptions of felling of Glyricidia mentioned in Old Plantation Management Chapter.

8.6.11: SUBSIDIARY SILVICULTURAL OPERATIONS CLEANING AND THINNING:

8.6.11.1: Demarcation, Treatment Map and Prescription

The annual coupes shall be demarcated one year in advance. The Range Forest Officer shall prepare a treatment map with the help of stock map as prepared by WPO, major focus should be on Soil and Moisture Conservation works keeping in view the principles of watershed management.

8.6.11.2: Treatment Map:

After demarcation of the coupe, a treatment map shall be prepared by the field staff and shall be verified by a gazetted officer emphasizing the suitability of sites for SMC as well as other improvement works.

A treatment map should show the following areas:

- I. **Area 'A' - Protection areas:** include following areas
 - i. Areas with steep slopes i.e., more than 25°.
 - ii. Eroded areas or areas liable to erosion.
 - iii. Twenty meters wide strip on either side of the water courses.

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

V. **Area 'C' - Old plantation areas:** include areas under old plantations. It mainly includes mixed species forest areas around on slopes of hillocks and plantations of exotic species like Glyricidia, Subabhul, etc. in other areas. Roughly 900 ha area comes under this category.

VI. **Area 'D' - Well stocked areas:** include areas with crop density more than 0.4. These areas are also having mainly Glyricidia and also mixed plantations. Roughly 1800 ha area comes under this category.

All prominent nallahs, perennial sources of water, water bodies etc. shall also be shown in the treatment map and numbered.

In B areas where plantations are prescribed, grids of 0.5 (100x 50 m) hectare size while in C and D areas, grids of 1 ha. size (100 x 100 m) shall be laid. The RFO shall maintain grid wise record of enumeration and marking in the marking register. In remarks column of the register, reasons for marking such as mature, dead, malformed, live high stump, singling of coppice shoots etc. will be recorded. Grid wise record of operations mentioned under NR e.g., tending, root stock management, singling of coppice, weeding etc. shall also be maintained by the RFO.

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

- I. **Area 'A':**
 - I. The SMC works including brushwood dam, LBS, gabion and gully plugging will be carried out wherever essential. Sites with perennial sources of water should be tackled appropriately as explained under 'general prescriptions'. While undertaking SMC works, **raking of soil or SMC works requiring excavation should not be done** as this may accelerate soil erosion. Area treatment like Continuous Contour Trench, etc. must be strictly avoided in high rainfall areas. Sites with perennial sources of water should be tackled appropriately.

- II. Soil binders like Sisal (*Agave* sp.), Sabar (*Euphorbia*), local grasses like Dongri, Marvel, Pavnya, Sheda, gholi, etc. shall be planted in areas prone to sheet erosion.
- III. In the accessible under stocked areas having good soil depth, seed-dibbling of local species like Hirda, Gela, Ain, Behada, Jambhul, Amba, Karap, Arjun, Karwand etc. shall be done to suitably clothe the area.
- IV. Bamboo and other suitable species shall be planted in accessible under stocked areas, within 20 meters wide strip on either side of water courses. 'Mes' bamboo may be preferred in high rainfall areas.
- V. Artificial regeneration by plantation should be strictly avoided on steep slopes and **high-altitude plateaus.**
- VI. Felling is not prescribed.
- VII. For plantations in plains adjoining to major perennial rivers endemic species must be planted which are of hydrophilic nature like *Terminalia arjuna*, *Pongamia pinnata*, *Ficus racemosa*, *Ficus hispida*, etc. and shrubs like *Commelinaspecis Polygonum specis*, *Cyperusspecies*, etc. may be planted which can tolerate submergence due flood water for shorter period of time. Plantation can be done only in riparian zone and in upland area.

II. Area 'B':

- i. The SMC works shall be carried out as per the site suitability.
- ii. Accessible under-stocked areas having good soil depth and more than 0.5 hectares in extent in a compact block shall be planted with suitable local miscellaneous species while in areas less than 0.5 ha. in extent, seed-dibbling shall be done. Irrigated plantations with tall plants should be raised at suitable sites.
- iii. All existing natural regeneration of Hirda, Amba, Ain, Kadai, Awala, Jambhul, etc. will be tended, interfering undergrowth will be cleared and seedlings will be freed of suppression if any, by judicious removal of some over wood under strict guidance of RFO.
- iv. Wherever soil depth is less than 15 centimeter and slope is gentle, instead of planting tree species, grass seedlings raised in polythene bags may be tried. Marvel, Dongri, Pavnya, Sheda grass species are recommended. In such areas medicinal plants Waghathi, Bilimbi, Kandvel, etc. occurring on shallow soils, wild edible plants like Kartole, Chichurdi etc, which normally don't require more soil depth may be tried.
- v. No tree shall be marked for felling.

III. Area 'C':

- i. SMC works shall be carried out as per the site suitability.
- ii. Old successful plantations shall be treated as per the prescriptions given in the 'Old Plantations Management' chapter.

IV. Area 'D':

- i. SMC works shall be carried out as per the site suitability.
- ii. No planting shall be done in these areas but removal of dead trees after retaining two snag trees is prescribed.
- iii. No tree shall be marked for felling.

8.6.12. GENERAL PRESCRIPTIONS

Forests have dampening effect on city temperature due to both shading and evapotranspiration. Urban forests ameliorate climate through shading, which reduces the amount of radiant energy absorbed, stored and radiated by built surfaces. Forests mitigate the air pollution generated in the city by absorbing gaseous compounds and intercepting air borne particulate matter. They also mitigate noise pollution. The trees facilitate the soil water infiltration and lower surface run off and act as an important mediator in urban hydrological cycle. To gain these benefits following general prescriptions are needed to be followed.

- I. *Demarcation and protection of urban forest from the nearby habitations by RCC/ masonry wall.*
This will include areas which though survived under the shade of Glyricidia plantations but did not show appreciable growth. Such forest patches are not well demarcated in the field and therefore are highly susceptible to encroachments and unauthorized usage from the surrounding population. It has been observed in the past that the Barbed wire or Chain-link fencing could not prove to be effective for demarcation purpose since miscreants could easily cut and sell it in the market. On the other hand, forest areas at Pachgaon-parvati, Bhamburda and Warje falling within Bhamburda range have been partly fenced with RCC walls through funding from PMC and those have been found to be very effective for protection against encroachments, illicit felling, illegal grazing/ trampling of seedlings, fires from adjoining areas.

Before creating RCC walls / masonry walls area must be thoroughly surveyed properly by using modern tools and construction must be initiated only after boundary is fixed by surveyor of the division. DCF Pune territorial should chalk a proper plan as per felling series and coupes mentioned in this plan for survey and demarcation of these areas. Active involvement of DILR and revenue department must be ensured by DCF Pune territorial. The DCF Pune should try to complete the entire activity as per prescriptions of this plan else deviation must be submitted for the same.

This RCC/ masonry wall should be built only in places which shall be prone to encroachment and on other sides traditional demarcation by pillar and TCM must be done. Under no circumstances the boundary can be altered. The existing height of boundary is efficient only to prevent encroachment but, it is not sufficient to prevent fire by miscreants if height is increased then probably the effect of fire may be reduced.

- II. *Protection against littering/ dumping* – It is being observed that forest areas near the city or urban sprawls are nowadays becoming dumping ground for garbage and debris of construction. Strict action has to be taken against miscreants and dumped garbage has to be cleared with the help of local administration. Necessary sign boards may be erected at areas highly prone for such activities.
- III. *Reclamation of mines* – Old mined areas in forest which are exposed rocks or hard refractory soil or water bodies are needed to be treated with the help of local administration and reclaim such mines e.g., near Warje, Hingne, etc. A proper committee of representatives from local administration department, forest department and mines department may be formed and necessary treatments must be taken unanimously by the committee for the welfare of the forest. All such treatments must be in sync with policies of the government as taken from time to time. For treatment of mine the treatment plan must be approved by the CCF (T) Pune and CCF – Research jointly to study the impact of reclamation over period of next working plan period. Under no circumstances for reclamation purpose materials hazardous to forest health should not be used.
- IV. *Ecotourism* - The lush green urban forest patches afford city dwellers an opportunity to understand nature. The FD can help them interpret nature by showcasing its various activities at such centers. Therefore, the DCF Pune should prepare proposals as eco-tourism projects as per the prescriptions given in the chapter on Eco-tourism to develop such urban forest areas into 'Bio-diversity Parks cum Nature Interpretation Centres'. Such BDP cum NIC shall promote native indigenous tree/ plant species over exotics and shall develop eco-friendly structures and public utilities for recreation of the city dwellers and for holding awareness camps, for providing forum for discussing various environmental issues, for arranging training workshops for enhancing skills of the members of self-help groups, forest staff and others at regular intervals with the active participation from the NGOs and various stake holders. More emphasis should be given of school children to BPD/ NIC. The programme could be called "Nisarg Anubhav".

8.6.13: OTHER REGULATIONS

- i. **Fire Protection:** These forest areas shall be fire-traced and rigidly fire-protected every year. The area shall be cleared-off of all the dry and cut remains of bushes, leaves etc. by end of February to avoid fire hazards to standing crop as well as to NR. Effective protection against fire for a period between Feb.15 to June 15 is a must to ensure survival and establishment of regeneration of all species for developing it into the future growing stock. 'Joint Forest Management committees' shall be formed and a comprehensive firefighting scheme shall be chalked out, the details of which are given in the 'Miscellaneous Regulations'.
- ii. **Closure to grazing:** These forest areas shall remain closed to grazing.

- iii. **Protection Measures:** The area will be strictly protected from illicit felling and encroachments with the help of JFMCs/ BMCs.
- iv. **Resolving conflict with Micro Plans made under JFM/ FDA:** If any conflict is noticed between the prescriptions given in this WC and the Micro Plan written under JFM, FDA etc. for the same area, then the said area shall be treated in accordance with the special objects of management pertaining to this W.C. and suitable amendments shall be made in the Micro Plan, if necessary.
- v. **Training Workshops:** The DCF Pune with the help from the CCF, Education, Pune should organize Workshops in the division to sensitize and train the field staff in implementing the prescriptions of this WP. The induction training of the field staff should be organized on priority by the CCF, Education Circle which will help in effective implementation of various WP prescriptions.
- vi. **Forest area reconciliation:** It has been observed during the course of forest area reconciliation work that the boundaries of few newly constituted forest gut numbers from the old forest survey numbers after 'consolidation' show large variations at places and do not coincide in many villages thereby reducing or changing the RF area. The notifications of disforestation of such RF areas could also not be traced and therefore such discrepancies in the forest areas remain unresolved. The DCF Pune should undertake the forest area reconciliation work on top most priority to be followed by survey and demarcation in the field to resolve all such issues. Old village maps bearing survey nos. should only be used for the survey and demarcation purpose in the field till the time all such issues pertaining to forest area get resolved.

CHAPTER – 9

JOINT FOREST MANAGEMENT

Joint Forest Management (JFM) is a symbiotic relationship in forest management among forest department and local communities for sustainable management and development of natural resources. Joint Forest Management (JFM) has become the keyword in the present management of forestry sector. People's participation in overall protection of forest is primary necessity for management of forests. JFM has been recognized as an important tool and strategy for ensuring sustainable development of forest ecosystem. This chapter provides prescriptions for whole of Pune Forest division regarding JFM activities. Villages that are adjoining to the forest areas are the focal areas for practicing Joint Forest Management.

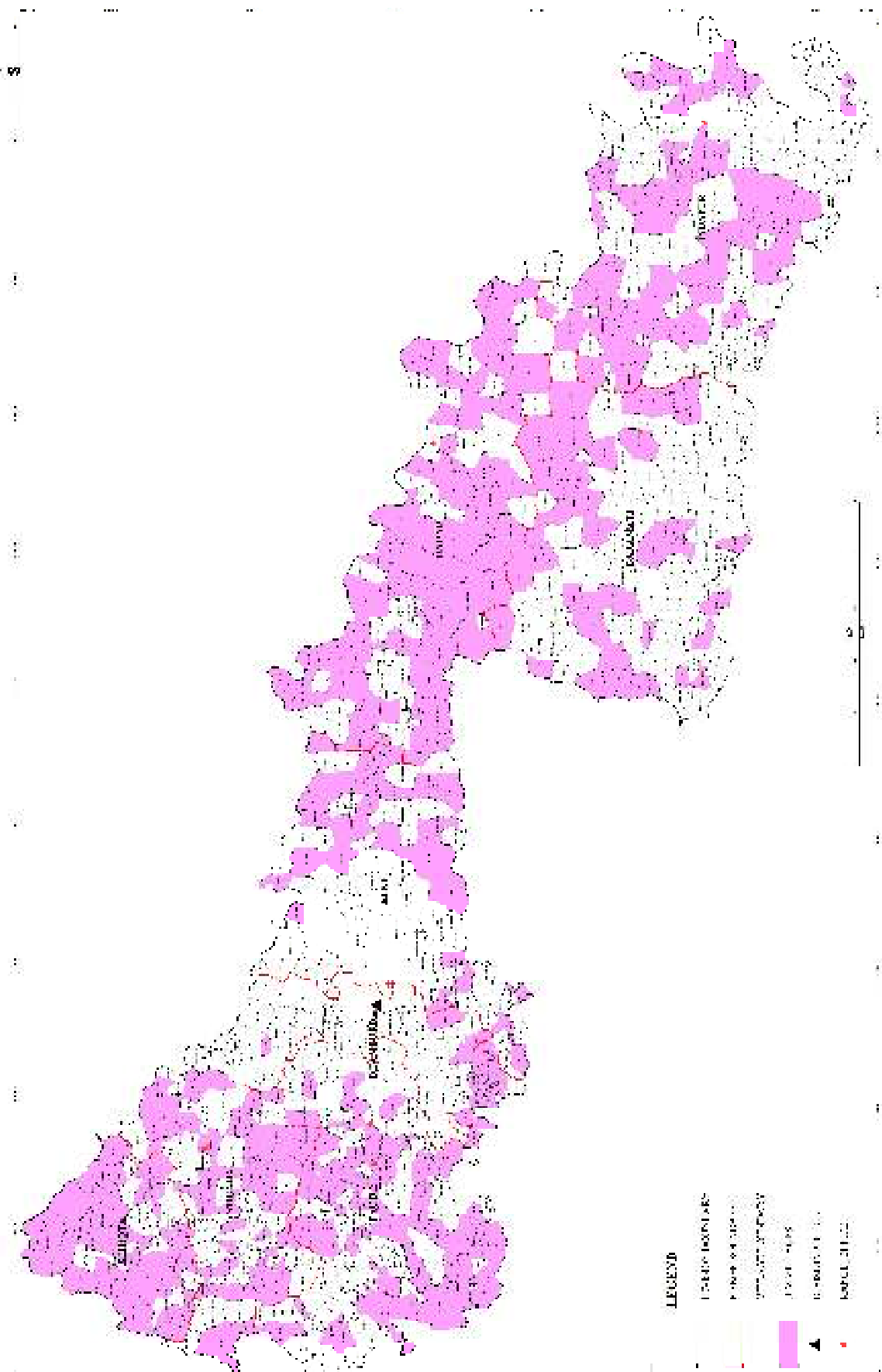
9.1 SPECIAL OBJECTIVES OF MANAGEMENT

- To ensure effective coordination between the Forest department and other Government departments, and local communities who are dependent on forests.
- To strengthen and empower local institutions for protection and conservation of forest and wildlife resources through people's participation.
- To develop the degraded forest and maintaining existing resources by promoting natural and artificial regeneration along with site specific soil and moisture conservation works with the active participation of the villagers.
- To explore and evolve strategies to generate sustainable employment to local people.

9.2 RANGE WISE FORMATION OF JFMCS:

Pune Division had 885 villages of which 366 villages are having forest area, and JFM committees were formed in 348 villages. Range wise distribution is as follows-

Sr. No.	Name of Range	Number of Joint Forest Management Committees
1.	Wadgaon Maval	51
2.	Shirota	35
3.	Paud	85
4.	Bhamburda	13
5.	Pune	16
6.	Daund	83
7.	Indapur	29
8.	Baramati	36



Range, Round, Beat, Village wise list of JFMCs is enclosed in Appendix No. XXXVIII.

These JFMCs are categorized into 4 classes as per their performance vide letter No: Desk - 1/Plan/EA/C.R.No.17/15-16/1976 dated – 22/01/2016; this classification is as follows-

DIVISION	CLASSIFICATION				
	A	B	C	D	TOTAL
PUNE	14	94	63	176	348

The detail list of village wise A, B, C, D classification is enclosed in Appendix No.XIX.

9.3 BACKGROUND OF THE JOINT FOREST MANAGEMENT

The National Forest Policy, 1988 emphasized that domestic requirements of the tribal and other poor people living within and near the forest for fuel wood, fodder, NTFP and construction timber should have the first charge on forest produce. The holders of customary rights and concession in forest areas should be motivated to identify themselves with the protection and development of forest from which they derive benefits. In pursuance to the National Forest Policy, the Ministry of Environment and Forests advised the state governments to adopt the Joint Forest Management (JFM) approach for the protection and rehabilitation of degraded forest. The Government of Maharashtra vide Resolution No.SIF-1091/199/F-11, dt.16th March 1992 adopted JFM approach for degraded forest areas. Thereafter, the State Government vide Resolution dt. 25/4/2003, expanded the scope of JFM to Good quality forests also. On 5th October 2011, the JFMCs were provided legal backing by bringing them under the umbrella of Mumbai Gram Panchayat Act 1959. Similarly, to further strengthen the institution of JFM, special schemes have been introduced to reduce the biotic pressure on forest and to improve the success of plantations viz., distribution of LPG/Biogas, distribution of improved cattle in lieu of scrub cattle, protection of plantations, etc.

Villagers themselves are required voluntarily to participate in the program. Forest Protection Committee (FPC) is to be formed in each village through the resolution of Gram Sabha. Each Forest Protection Committee constitutes a Managing Committee consisting of members elected from general body and with local Forest Guard /Forester as the member secretary. The managing committee is responsible to implement the decisions of general body with regard to the execution of JFM works in partnership with Forest department. A Memorandum of Understanding (MOU) is signed between Forest department and managing committee clearly specifying the duties and responsibilities of both parties. Entitlement of FPC members to the share in forest produce is subject to the fulfilment of conditions of MoU.

The members of the FPC will help in protection and development of forests and in turn they will receive share in the usufructs from the forest areas assigned to such committee. The JFM area

will be managed as per the micro plan prepared by the JFMC and approved by the DCF. These micro plans shall contain the details of forest and village development works. This has to be sustainable, should cater to needs of local communities and at the same time, the silvicultural requirements of the forest are to be factored properly.

Govt. of Maharashtra vide Resolution dated 5th October 2011 and 10th July 2012 has issued revised guidelines for implementation of JFM programme. *Important provisions of these Govt. Orders are summarized below:*

- JFMC will be constituted by the Gram Sabha through a Resolution under the provisions of Section 49 of Mumbai Gram Panchayat Act, 1958. It would consist of 12 to 24 members, of which, at least 50% are women. Representation to SC, ST, and VJNT will be as per prevailing Govt. norms.
- The ex-officio member secretary of JFMC would be Forest Guard/Forester if the village population is less than 1000 or more than 1000 respectively.
- The forest area to be assigned to JFMC would be decided based on parameters such as production potential, available eco-tourist sites etc. through consultative process. In general, forest areas within 3 KM of *Gaothan* would be identified for assignment. Apart from degraded forest areas, even dense forest areas can also be assigned to JFMCs.
- Memorandum of Understanding (MoU) will be signed in prescribed format by DCF (T) and JFMC.
- Micro plan will be prepared by the JFMC and would be approved by the DCF. All JFM activities should be taken up as per the approved micro plan. The micro plans are to be dovetailed with the broad prescriptions of the approved Working Plan of the division.
- JFMC is authorized to promote Eco-tourism activities in their assigned areas and can levy Entry Fee & Nuisance Tax from eco-tourists to preserve these sites sustainably and also generate livelihoods to local people.
- JFMC is authorized to impose penalties on persons involved in forest and wildlife crimes.
- RFO and JFMC have to submit an annual performance report jointly to the DCF w.r.t. the responsibilities assigned and achievements of the committee.
- The JFMC would be eligible for usufruct sharing from intermediate and final fellings as per working plan if the responsibilities thrust on the committee are executed for a period of five years. However, in case of Bamboo, yield from dense areas/degraded areas, the same would be available to JFMC soon after execution of MoU and upon protection of Bamboo for 3 years respectively. All removals would be as per the provisions of approved Working Plan.
- In case, the JFMCs do not perform the responsibilities assigned to them, DCF is authorized to dissolve such committees by applying the principles of natural justice.
- Non forest land available in the village can be included in the JFM programme if the Gram Panchayat agrees to do so.

- To reduce the biotic pressure on forests for fuel wood, Govt. of Maharashtra vide Resolution dated 10th July 2012 has launched schemes for distribution of LPG/Biogas connections on 75% subsidy. Similarly, to reduce grazing pressure, distribution of improved breed of cattle in lieu of disposal of scrub cattle has been introduced on 50% subsidy. To improve the performance of plantations, scheme for plantation protection through financial incentive has been launched.

9.4 CRITICAL ANALYSIS OF JOINT FOREST MANAGEMENT IN GENERAL

Any approach or strategy for the protection, conservation and development of forest resources and forest ecosystem involves the participation of local people in the entire management process. However, the JFM methodology currently being applied all-round the state is not generating much confidence.

Need of JFM - The starting point of JFM has to be the realization of the need of JFM both by Forest Department and the local people. Generally, the scarcity of forest products such as fuel wood, fodder etc. as a result of degradation of forest on which the local communities depended, forces the people to think of steps for the protection and improvement of degraded forests. The people are usually reluctant to participate in JFM where sufficient forest areas are still available to meet their requirements. On the part of Forest Department, the challenge to effectively protect forests with limited resources is enormous. The JFM program succeeds where the initiative comes from the people's side and it usually fails where it is forced from FD side as it would only be a Govt. driven and target oriented program.

Approach in implementation of JFM as a management committee and not as a scheme - Experiences in many places have emphasized the need to have a fresh look at the whole approach. It has been noted that if a village is approached with an entry point activity and an investment package in the name of JFM, people start losing interest in the whole process once that input package is over. This ultimately reflects on the sustainability of the entire programme. If the villagers are themselves not ready for a change, then sustainability of any rural development programme or poverty alleviation programme cannot be ensured only by pumping in fund in the name of development projects or schemes, etc. If people are to develop a genuine interest in the whole development process, the initiative should come from within the village itself. The expectations of the villagers should be kept low. At the same time, they should be encouraged to take decisions themselves for the improvement of the entire village. Also, conscious efforts should be made to introduce accountability as well as transparency in the whole system at each stage

The experience of implementation of JFM in Maharashtra state reveals that the whole concept still remains to be institutionalized. The essence of the programme is the empowerment at the grass root level. Entry point activities have not been able to stimulate the local villagers to participate fully in the developmental activities. In many areas, people have been found to demonstrate withdrawal

system once entry point activities have been completed and the periodic input intervention by the Department is either withdrawn or made irregular.

They need to be given input at regular interval in the form of some employment generation schemes, plans etc. by the Forest Department. Absence of clear-cut relationship between JFM committee and the existing village panchayat has made the smooth progress of entire JFM process quite difficult in many places. Because of absence of productive functional relationship between the JFM bodies and Panchayats in the wake of increased decentralization of power to the Panchayat Raj institutions through the 73 Constitutional amendments, lot of problems are coming to the fore. Poor marketing linkage of Forest Protection Committee (FPC) has adversely affected the sustainability of the entire programme. Concept of voluntary labour (shramdan) is found to be missing in many villages. The problem of landless laborer's/villagers is not being focused properly making their overall involvement in the entire development process quite unsatisfactory. Monitoring and evaluation mechanism have to be evolved to get regular feedback so as to ensure remedial measures in between. The linkage of this programme to different departments/ organizations has to be institutionalized in line with exiting clear-cut guidelines/ directives from State Government.

9.5 POTENTIAL AREAS FOR JFM

The following areas will be suitable for JFM program;

- Areas prescribed under the Afforestation Working Circle and Fodder Working Circle are the potential areas to be taken under JFM programme to improve the vegetation and the socio-economic conditions of the local people.
- Regeneration and protection of NTFP areas and collection, grading, value addition and marketability of various NTFPs in the division are proposed to be given focus for working under JFM program.
- Villages which are adjoining to potential Ecotourism sites are proposed to be included in JFM programme.
- All potential wildlife areas are to be included in either JFM or EDC programme as per provisions contained in Government Resolution.

9.6 MANAGEMENT OPTIONS FOR FOREST SHOULD INCLUDE THE FOLLOWING POINTS:

The concept of Joint Forest Management is to be accepted as important strategy for ushering in an era of sustainable rural development. The present on-going approach needs to be modified in such a way that local villagers develop a sense of “belongingness” to the existing forest and other natural resources. Overall management of the natural resources should be directed towards raising the general standards of the common masses, which would ultimately lead to the sustainable community

development. The following measures need to be incorporated to bring fresh air in JFM and, this kind of timely appropriate remedial measures shall make forest management more effective;

- i. **Entry point activity:** The entry point activity shall wholly contain the distribution of plants to be grown in kitchen garden or agricultural fields like *Moringa olifera* (drumstick), *Mangifera indica* (mango), *Emblica officinalis* (amla), *Citrus limon* (lemon), *Psidium guajava* (guava), *Murraya koenigii* (kadipatta), etc. The main objective of this intervention is to provide nutritional supplements to family members through these plants. Other EPA which suits local requirement and meets the need of village and fulfil the spirit of forest management may be permitted. It has been noted that if a village is approached with an entry point activity and an investment package in the name of JFM, people start losing interest in the whole process once that input package is over. This ultimately reflects on the sustainability of the entire programme. If the villagers are themselves not ready for a change then sustainability of any rural development programme or poverty alleviation programme cannot be ensured only by pumping in fluid in the name of development projects or schemes, etc. If people are to develop a genuine interest in the whole development process, the initiative should come from within the village itself. The expectations of the villagers should be kept low.
- ii. **Soil and moisture conservation works:** Soil and moisture conservation works shall be taken up as per the 'Ridge to valley' concept. The essential principle will be to conserve the entire rainwater within the village itself to enhance the groundwater table. Villagers must be educated and motivated to participate for conserving soil and moisture with help of JFM.
- iii. **Afforestation on forest lands:** The Afforestation activities on forest lands will include:
 - a) Natural Regeneration:
 - b) Artificial Regeneration:
 - c) Bamboo plantation:
 - d) Grass and fodder plantation:

These afforestation programmes should be done with help of JFMC as per prescriptions of Working Plan to maintain ecology and also for gaining economic gains for benefit of village by means of planting NTFP species.
- iv. **Plantation on outside forest area:** JFMC can vibrantly participate to increase vegetation cover not only in forests but also outside the forests. In this activity Social Forestry wing of the Forest department will give necessary assistance for plantation.
 - Block plantation on village common land: The preference shall be indicated for raising combination of short and long rotation forestry species of NTFP values like Tamarind (*Tamarindus indica*), Jamun (*Syzygium cumini*), Bamboo, Kadipatta (*Murraya koenigii*), Triphala species (Hirda, Behada, Amla), etc. So that these plantations will provide sustained revenue to the village panchayat.

- Linear plantations: All roads within the village and other connecting roads shall be planted under the Roadside plantation program. In conjunction with roadside plantation other linear features like canals, streams, rivers, railway line, etc. plantations should be done with co-ordination of concern department. Involvement of social forestry department along with JFM will prove to be a booster for these plantations.
 - Bamboo plantation on agriculture land: There are two schemes that are implemented by the Maharashtra Bamboo Development Board. They are Atal Bamboo Samruddhi Yojana (a state scheme) and Plantations under National Bamboo Mission (a CSS scheme). More beneficiaries from the selected JFM villages should be included under these two schemes.
- v. **Distribution of LPG**: One of the important reasons for forest degradation is the dependence of local people for firewood from forests. Therefore, to reduce such dependence, GoM vide resolution of 10th July 2012 decided to distribute LPG connections to forest fringe villages. JFMC's have played a key role in implementing this scheme. Efforts should be made to extend this scheme to all JFM villages. The JFM villages should also be covered with other source of efficient fuel management like Improved Chulhas with help from the Maharashtra Biodiversity Board. Detailed planning should be made to include beneficiaries in the JFM village through the convergence of the Government of Maharashtra scheme with the Ujwala yojana of Government of India. Priority should be given for villages which are remotely located from urban sprawls like villages along the crest and mid-ranges of western ghats.
- vi. **Monitoring and evaluation**: One very important dimension of this JFM programme is that suitable mechanism needs to be developed for monitoring and evaluation of the JFM programme at regular interval. This periodic monitoring and feedback mechanism would pave way for corrective/ remedial measure in between, which is very much required for sustainable forest management. The parameters selected should be quite simple so that even local villagers can go on implementing and assessing their impact from time to time. The JFM program will be monitored annually through certain indicators/benchmarks, which are given by Government from time to time. The online monitoring of the JFM program using advanced technology is needed to be developed. The use of this application helps in avoiding duplication of work as maximum information is required to be filled merely once and any updates can be made on an annual basis. This will not only help in reducing effort, time and stationery but also improve work efficiency and transparency
- vii. **Conflict resolution**: In the process of sustainable management of forests and natural resources, one can't deny the role of local and dependent communities upon them for their livelihood. These communities have been managing these resources in their own traditional and indigenous ways. This day, the collaborative management of natural resources has increased the number of stakeholders in this sector, which is not limited to the foresters and the villagers. There are many other stakeholders. This has increased the possibilities of

conflicts. These conflicts can be divided into two major types; Human-Human conflict and Man-Wildlife conflict. The JFMC level conflict can be resolved by the JFMC executive body. If the conflict happened between two forest committees or between two different panchayats and JFMCs then the concerned Range Forest Officer would be responsible for the resolution of the conflict. If the conflict is between the JFMCs of two varied ranges then the Deputy Conservator of Forests, Pune should resolve the conflicts. The appeal, for all decisions mentioned, should be made to Chief Conservator of Forests (Territorial) Pune. In regulating the Human-Wildlife conflict, the empowerment of the communities to handle conflict situations and creating awareness about the importance of wildlife and its conservation is necessary. The communities need to be exposed to precautions and safety measures to protect themselves and also the wildlife.

- viii. **Maintenance and corpus fund:** A majority of forest development activities in the State are undertaken with the support of externally or internally supported projects. After the completion of the Project, necessary arrangements for maintenance of assets created under the Project are unavailable. It is, therefore, necessary to establish a fund that can be used in the post-project period for the maintenance of project assets, and also help in the implementation of the statutory working plans including micro plans.
- ix. **Self Help Groups (SHGs):** JFMC can decide for several income generation activities for alternative livelihood to particularly low-income groups of the community. They can form SHGs and the front-line staff of the forest department can assist them to establish the groups.
- x. **Training on livelihoods:** Once the JMFC is formed, they should be exposed to diverse training programs to enhance the skill and capacity of the members for the holistic development of the area. The different capacity building training programs which the JFMC members should undertake, would be; Hands-on training on cultivation of NTFPs, medicinal plants, enhancing agriculture productivity through rainwater harvesting, Introduction of alternative energy sources, pasture development for fodder, and plantation of fruit trees/orchards, Training on Animal husbandry and poultry farming, etc. and other government schemes from time to time.
 - a) **Convergence:** To make the JFM program successful, a well-planned convergence of various schemes under CSS, State plan, District plan, etc., need to be carried out. These convergence plans need to be implemented in a time-bound manner. Exposure visits enable the JFMC members to interact with and learn from other successful examples of JFMC. It allows them to view practical examples of successful integration of sustainable practices in JFM like their own. They are integral to sensitizing the JFMC members to practices of sustainable forest management.

9.7 VILLAGE FORESTS

“Village forests” or “*Gram Van*” means such part of reserved forests or protected forests in the village as assigned to the Village Panchayat under the Indian Forest Act, 1927 and the Village Forest Rules 2014 and also under the Maharashtra Village Panchayats Act 1959 for management through Joint Forest Management Committee. The JFMC shall manage its village forests on behalf of the Village Panchayat with due reference to the relevant provisions of the Panchayats (Extension to the Scheduled Area) Act, 1996, the Maharashtra Minor Forest Produce (Regulation of Trade) (Amendment) Act, 2006, the Indian Forest Act, 1927, the Wildlife (Protection) Act, 1972, the Biological Diversity Act, 2002, the Maharashtra Village Panchayats Act and rules made there under and any other law in force as applicable to the State of Maharashtra.

9.8 MAHARASHTRA VILLAGE FOREST RULES, 2014

In exercise of the powers conferred by sections 26, 28, 30, 32, 34 and 76 of the Indian Forests Act, 1927 (Act No. XVI of 1927), and all other powers enabling it in that behalf, the Government of Maharashtra has notified the Village Forest Rules on 13th May, 2014. The salient aspects of these rules are mentioned below:

- JFMCs fulfilling the criteria of zero encroachment, positive rate of natural regeneration, effective control of forest fire (area burnt not more than 5 % in last three years), Over 60% survival in plantations raised in the said area at the end of fifth year, effective implementation of “*charaibandi*” and “*kurhadbandi*” are eligible for assignment of Village Forests if at least three criteria are fulfilled.
- The village forests assigned to the village community or the Village Panchayat shall be managed by a committee called as the “*Van Vyavasthapan Samiti*” or the Village Forest Management Committee.
- “*Van Vyavasthan Samiti*” has to prepare “Ten Year Micro plan” by dovetailing with the Working Plan of the landscape and, an “Annual Implementation Plan” every year for managing the village forests and place the micro plan before the Gram Sabha for ratification and its approval by the ACF or Sub-DFO in charge of independent sub-division and revise it periodically.

OTHER GENERAL PRESCRIPTIONS

- Utmost care needs to be taken for identification of suitable villages. As a matter of fact, all such villages where people’s response to developmental schemes/plans particularly with reference to forest and environment is quite forthcoming and positive, where expectation level of the villagers is not high and people are prepared to take up voluntarily “*shramdan*” whenever required, should be identified. Regular meeting / discussion with the villagers

would help identify and prioritize such villages for JFM. In this way, entire programme would be need based and to be clear-cut departure from target-oriented approach. Cluster approach should be applied so that group of villages are tackled in a certain period. This approach will ensure visible impact of works on landscape level.

- Simultaneously, a time bound, programme for sensitization/ orientation of the field officials should be taken up. This should be continuing activity at least during the initial phase. Wherever required, NGOs may be involved for creating awareness programmes.
- One of the important points which is a definite departure from the existing pattern is that no commitment of any sort should be given to the villagers for usufruct sharing. Villagers' sans any expectation can only be expected to contribute towards sustainability of any programme. No entry-point activity needs to be taken in any such village contrary to the system being adopted presently. Instead, a system of reward/ incentive should be introduced in all JFM villages based on the performance of the JFM committee during first two-three years. Quantum of reward / incentive should be commensurate with the response level of the villagers. Village which does not subscribe to the concept of voluntary shramdan should in no case be identified for JFM works.
- Preparation of "micro-plan" on the basis of PRA exercise should be done by the villagers and not by the forest officials. Forest Department should rather act as facilitator in preparation of plan and its implementation. Forest department should take assistance from Agriculture Universities and other organisations in preparation of micro plans. The Department should give all necessary inputs for preparation of scientific management plan to ensure sustainable management of entire forest area belonging to the village. The management options for such forest should have a vision which are concurrent with working plan prescriptions. The works depicted in the Micro plans should be reflected in the planning process of the Gram Panchayat.
- The focus of JFM would be on sustainable management of Non-Timber Forest Products (NTFPs) and this will also be the main source of earning for the beneficiaries. One of the important responsibilities of the forest department should be to develop harvesting and marketing linkages with the consumer industries. This will also ensure local storage and improvement in processing.
- Linkages with different departments should be strengthened. As a matter of fact, such villages need to be given priority while taking up any individual beneficiary scheme or other schemes of different ministries/ departments of the Government. While taking up any development scheme in that village the main target group should be "landless villagers" because it is this group, which poses great threat to the environment and sustainability of the entire programme.

- Silvicultural management, maintenance of forest boundary, removal of forest encroachment and control over illicit cutting, illicit grazing and fire should receive high priority. Forest protection cannot be viewed in isolation. Wherever illicit grazing due to sheep& goats by migratory shepherds (from June to December) are proving to be a menace and disrupt the availability of fodder for local cattle's the concern JFM should proactively participate and stop flock from entering the forests. JFM should also help forest department in checking other injuries being caused to forest resources.
- Documentation of successful initiatives under the JFM approach must receive importance at the Range and Division level. A compilation of works undertaken in JFM villages in a financial year should be done at division level and published. This work should be given wide publicity in print and electronic media.
- JFM programme should be implemented with complete transparency. The accounts of JFMCs shall be annually audited as per Govt. instructions and a copy of such audited statement shall be shared with Gram Panchayat. All payments to JFM members shall be made either through A/c payee cheques or RTGS transfer or depositing directly into respective bank accounts. Payments through Cash shall be strictly discouraged.
- As far as possible, all works are to be executed by JFM members only. Monitoring of JFM activities by supervisory cadres (ACF to CCF) is the key for effective implementation of JFM programme. Periodic reviews at various levels will aid in good implementation.
- Often, there is thinking in the grassroots level functionaries that, JFM has to be implemented only if funds are allotted to a village. This notion is detrimental to the core values of JFM. Therefore, the supervisory officers should strive to bring suitable awareness among the grass root functionaries (FG to RFO) to change attitudes and mind-set.
- The Division should make all efforts to ensure that all JFM Committees have People Biodiversity Registers as part of the many records to be kept. The State Biodiversity Board should be consulted for the same.

CHAPTER - 10

MAINTANANCE, CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

10.1: INTRODUCTION

This chapter on Maintenance, Conservation and Enhancement of Biodiversity deals with the important threats and steps to mitigate those threats to biodiversity in Pune division.

Biodiversity is the variety of all forms of life. It is the variability among living organisms and their habitats, including the diversity within species, between species and within ecosystems.

Traditionally, biodiversity is defined as the sum of genes, species and ecosystems over a landscape. Genetic diversity is considered the building block of biodiversity, facilitating fitness, adaptation and evolution. Species diversity is the variety of genetically dissimilar organisms present in the region. Ecosystem diversity is the variety of distinct landscape patterns in a given region. Biodiversity also encompasses multiple and often conflicting and sometimes irreconcilable sociocultural values. Cultural aspects are important in the context of an ecosystem approach. However, in the definition of biodiversity, generally the beliefs, customs, practices and unique ways of communities and cultures that are so connected to their natural environment, are overlooked. The conventional definition of biodiversity delinks humans from nature. When the cultural perspective is acknowledged, it recognizes the important bond between humans and their environment, where culture and nature are mutually intertwined, each affecting the other.

10.2 BIODIVERSITY AND ECOSYSTEM SERVICES

There are 5-30 million distinct species on the Earth; most are microorganisms of which only about 1.75 million have been formally documented. The interactions between the various components make up the total global biodiversity and have set the foundation on which human societies have evolved. Biodiversity and the interconnectedness of the various species within an ecosystem, provide services that sustain creatures living within, including humans. These are the essential goods that have value for current requirements and future needs and are of incalculable intrinsic worth.

Today, in the name of protecting biodiversity, only individual species that are depleting are highlighted and tracked. What is missed out in this debate is the interconnectedness and interaction of the various components of biodiversity which provide the ecosystem services. This in turn creates the ambience for survival of the species and of us humans. The richer the biodiversity, the greater the ecosystem services they provide, the greater the survival opportunities for humans.

A healthy biodiversity reflects an abundance of all the ecosystem services required for a good quality of life for the community. Its reverse should, therefore, immediately raise concerns about the

quality of biodiversity in the system. Depletion of native biodiversity is generally accompanied by a gradual loss of cultural diversity

10.2.1 Types of Ecosystem Services

Provisioning Services

- Food, Fiber and Fuel
- Genetic Resources
- Bio-chemicals
- Fresh Water

Regulating Services

- Protection against Invasive species
- Fodder Regulation
- Pollination
- Seed Dispersal
- Climate Regulation
- Pest Regulation
- Disease Regulation
- Natural Hazard Protection
- Erosion Regulation
- Water Purification

Supporting Services

- Primary Production
- Provision of Habitat
- Nutrient Cycling
- Soil Formation and Retention
- Production of Atmospheric Oxygen
- Water Cycling

Cultural Services

- Spiritual and Religious Values
- Knowledge System
- Education and Inspiration
- Recreation and Aesthetic values

10.3 THE BIODIVERSITY ACT 2002

Introduction:

India is a party to the United Nations Convention on Biological Diversity signed at Rio de Janeiro on the 5th day of June, 1992. This Convention reaffirms the sovereign rights of the States over

their biological resources. Therefore, legislation was enacted by the Indian Parliament in 2002 to give effect to the United Nations Convention.

This Act aims to provide for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto.

Important provisions of the Act:

- (a) Section 2(a) defines the term “Benefit Claimers” as; the conservers of biological resources, their by-products, creators and holders of knowledge and information relating to the use of such biological resources, innovations and practices associated with such use and application.
- (b) Section 2(b) defines the term “Biological diversity” as; the variability among living organisms from all sources and the ecological complexes of which they are part, and includes diversity within species or between species and of eco-systems.
- (c) Section 2(c) defines the term “Biological resources” as; Plants, animals and micro-organisms or parts thereof, their genetic material and by-products (excluding value added products) with actual or potential use or value, but does not include human genetic material.
- (d) Section 2(o) defines the term “Sustainable use “as the use of components of biological diversity in such manner and at such rate that does not lead to the long-term decline of the biological diversity thereby maintaining its potential to meet the needs and aspirations of present and future generations.
- (e) Section 3(1) regulates the access to Biological diversity for persons mentioned in section 3(2) who shall, without previous approval of the National Biodiversity Authority (NBA), obtain any biological resource occurring in India or knowledge associated thereto for research or for commercial utilization or for bio-survey and bio-utilization.
- (f) Section 3(2): The persons who shall be required to take the approval of the NBA under section 3(1) are the following, namely: (a) a person who is not a citizen of India; (b) a citizen of India, who is a non-resident as defined in clause (30) of section 2 of the Income-tax Act, 1961; (c) a corporate body, association or organization not registered in India or registered in India under any law for the time being in force which has any non-Indian participation in its share capital or management.
- (g) Section 4: No person shall, without the previous approval of the NBA, transfer the results of any research relating to any biological resources occurring in, or obtained from, India for monetary consideration or otherwise to any person who is not a citizen of India or citizen of India who is non-resident as defined in clause (30) of section 2 of the Income-tax Act, 1961 or a body corporate or organization which is not registered or incorporated in India or which has any non-Indian participation in its share capital or management.
- (h) Section 6(1): No person shall apply for any intellectual property right (IPR), by whatever name called, in or outside India for any invention based on any research or information on a

biological resource obtained from India without obtaining the previous approval of the NBA before making such application.

- (i) Section 7: No person, who is a citizen of India or a body corporate, association or organization which is registered in India, shall obtain any biological resource for commercial utilization, or bio-survey and bio-utilization for commercial utilization except after giving prior intimation to the State Biodiversity concerned.
- (j) Section 8(1): Central Government for the purposes of this Act, shall appoint a body called the National Biodiversity Authority (NBA).
- (k) Section 21(1): The National Biodiversity Authority shall while granting approvals shall ensure that the terms and conditions subject to which approval is granted secures equitable sharing of benefits arising out of the use of accessed biological resources, their by-products, innovations and practices associated with their use and applications and knowledge relating thereto in accordance with mutually agreed terms and conditions between the person applying for such approval, local bodies concerned and the benefit claimers.
- (l) Section 21(4): NBA shall in consultation with the Central Government frame guidelines for operationalizing section 21(1).
- (m) Section 22(1): For the purposes of this Act, State Government may, by notification in the Official Gazette, establish State Biodiversity Board.
- (n) Section 37(1): Without prejudice to any other law for the time being in force, the State Government may, from time to time in consultation with the local bodies, notify in the Official Gazette, areas of biodiversity importance as biodiversity heritage sites under the Act.
- (o) Section 37(2): The State Government, in consultation with the Central Government, may frame rules for the management and conservation of all the heritage sites.
- (p) Section 38: Without prejudice to the provisions of any other law for the time being in force, the Central Government, in consultation with the concerned State Government, may from time to time notify any species which is on the verge of extinction or likely to become extinct in the near future as a threatened species and prohibit or regulate collection thereof for any purpose and take appropriate steps to rehabilitate and preserve those species.
- (q) Section 41(1): Every local body shall constitute a Biodiversity Management Committee (BMC) within its area for the purpose of promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganisms and chronicling of knowledge relating to biological diversity.
- (r) Section 41(2): The NBA and SBA shall consult the Biodiversity Management Committees (BMCs) while taking any decision relating to the use of biological resources and knowledge associated with such resources occurring within the territorial jurisdiction of the BMCs.

- (s) The BMCs may levy charges by way of collection fees from any person for accessing or collecting any biological resource for commercial purposes from areas falling within its territorial jurisdiction.
- (t) Section 55(1): Whoever contravenes or abets the contravention of the provisions of sections 3, 4 or 6 shall be punishable with imprisonment for a term which may extend to five years, or with fine which may extend to ten lakh rupees and where the damage caused exceeds ten lakh rupees such fine may commensurate with the damage caused, or with both.
- (u) Section 58: The offences under this Act shall be cognizable and non-bailable.
- (v) Section 59: The provisions of this Act shall be in addition to, and not in derogation of, the provisions in any other law, for the time being in force, relating to forests or wildlife.

10.4 DEVELOPING A SENSE OF OWNERSHIP OF THE BIOLOGICAL DIVERSITY

Years of following top-down approaches to conservation have only led to a sense of disconnect for those living closest to natural ecosystems. Village communities have traditionally drawn on various elements of biodiversity as part of their life and culture. They understand its importance and the interconnectedness very well, which is the key to long-term conservation. What is needed is to provide more power to the local Panchayat, a legal body that is part of the local community. Although the Biological Diversity Act, 2002, provides power to Panchayats, their influence has not yet been fully realized.

Insider View of Biodiversity

A discussion on biodiversity makes us aware that most of our knowledge and information is academic. The most important view of biodiversity is from within – the lived experience that can only come from local communities and the individuals within them. In that sense, local communities are “the insiders” of the ecosystem and as such their role in the process of ecosystem conservation is of great importance. In any system, the role of an insider is critical for sustaining that system.

10.5 PEOPLE’S BIODIVERSITY REGISTER (PBR):

In order to survive the onslaught of climate change and continue to receive the services the ecosystems provide, it is but necessary that we go to the very people who have been living in the respective eco-spaces, to learn from their intimate coexistence as part of their biodiversity. The People’s Biodiversity Register is a small but concrete step in this direction. It is here that science and native knowledge get intertwined. Tracking the history of indicators and indications of the health of an ecosystem, through its biodiversity together with the local inhabitants, will enrich our understanding of the ecosystem services it provides. When the PBR processes are undertaken with a

new perspective, they can act as powerful mediators in the process of building resilience and adaptive capacities while reducing vulnerability of the community and the ecosystem to climate change.

10.5.1 The PBR has the following potential

- Make nature's value visible
- Pricing the priceless
- Valuing the future
- Risk reduction and accounting for uncertainty
- Measuring and maintaining records for better management
- Natural capital and poverty reduction
- Changing the incentives
- Ecological infrastructure and climate change

PBR is the first step towards bridging the gap between intellectual property rights of local people and benefits derived from genetic resources and associated traditional knowledge and enabling them to share those benefits. This helps to empower the local communities, making them aware of their rights, as well as conserving biodiversity. The significance of biodiversity has now been well underlined. While biodiversity is normally associated with large forests, rivers and oceans, it is essential to remember the importance of smaller insects, birds and butterflies that reside in our own backyards. Biodiversity is all around us, in a droplet of water and a tiny particle of soil.

The Biological Diversity Act, 2002, India, primarily addresses the issues concerning access to genetic resources and associated knowledge by foreign individuals, institutions or companies, and equitable sharing of benefits arising out of the use of these resources and associated knowledge by the country and its people. The Act governs Access and Benefit Sharing (ABS) through a three-tier system, National Biodiversity Authority (NBA), State Biodiversity Board (SBB) and Biodiversity Management Committees (BMCs).

Although the Biological Diversity Act, 2002, has provided some muscle to conservation efforts, the competition from the economic drivers for development makes protection very difficult. Hence, there is a need for a paradigm shift in our approach to conserving our biodiversity, which is critical for nature and human survival.

The concept of PBR arose from the need to capture and conserve traditional knowledge and to vest decision-making power in local communities. Already successfully pioneered by Foundation for Revitalization of Local Health Tradition (FRLHT) in several regions, there remained a question over its ownership. Were these registers containing community knowledge only to be filled and owned by conventional experts?

School children, youth groups, knowledgeable individuals and villagers have all to be involved in the observation, recording, reporting and documenting of the local biodiversity. There exist some wonderful examples of PBRs with amazing sample collections of plants, wild seeds, medicinal plants and wildlife observations. The motivation behind establishing the PBR in villages is

to make people aware of their rights over natural resources and the need to protect them under the Biological Diversity Act, 2002.

10.6 ACCESS AND BENEFIT SHARING: GLOBAL PERSPECTIVE

Access refers to granting permission to enter an area for the purpose of sampling, collecting and removing genetic or other resources. Benefit sharing refers to all forms of compensation for the use of genetic resources, whether monetary or nonmonetary. This includes participation in scientific research and development of genetic resources and sharing the findings of any potential benefits resulting from this work.

Articles 1 and 8(j) of the Convention of Biological Diversity (CBD) encourage the equitable sharing of benefits arising from Traditional Knowledge (TK) for conservation and sustainable use of biological diversity. In benefit-sharing arrangements, all parties share the benefits arising out of the use of genetic material and the TK of their uses. For the local community, this involves the sharing of TK and resources with contracting parties and others who wish to use these for research and/or for developing new products based on this knowledge. The contracting parties in turn would share any advancements, benefits (including financial), or products that make use of local biodiversity resources with the local community. Article 15 of the CBD states that access to genetic resources and any transfer of technology be provided and/or facilitated under fair and mutually agreed-upon terms. This would include types of financial arrangements described later in the CBD (Articles 20 and 21).

Benefits include a wide range of options, and often beneficiaries may receive more than one type of benefit. These include:

Start-up/upfront benefits or payments paid as a lump sum (if a financial arrangement) or delivered (if a cooperative or capacity-building project). Such benefits may be equipment such as computer hardware, software or extraction and screening facilities.

Process benefits are derived during the process of research and development. In addition to financial payments, process benefits may include capacity, expertise and/or know-how building and training through joint research.

Product benefits are paid after the commercialization of the final product. These may be royalty payments that are negotiated according to the contribution of the genetic resource or the amount or role of local knowledge that was used in creating the final product. Royalty rates may be based on a sliding scale, depending on the end-use of the research results and the magnitude of sales. Financial payments for benefit sharing would best be put into a trust fund for the community itself, rather than to specific individuals in the community. Such trust funds normally support community development projects and capacity building.

Moral and relation benefits – Unlike the financial benefits described above, moral and relation benefits are not transferred according to a formalized arrangement, but are based on the interaction between the local participants actually involved

10.7 ACCESS AND BENEFIT SHARING (ABS) – THE NBA (INDIA) GUIDELINES

Guidelines issued by the National Biodiversity Authority (NBA) of India on Access to Biological Resources and Associated Knowledge and Benefits Sharing Regulations (ABS Regulations), 21 November, 2014, are based on the Nagoya Protocol. Guidelines that are to be complied with are provided for ensuring the financial obligations of the users of genetic resources. It includes first determining the activity for which biological resources are to be obtained and then how the benefits accrued will be shared with the local community.

In a nutshell, the guidelines ensure the equitable sharing of benefits (both monetary and non-monetary) arising out of the use of accessed biological resources, their products, innovations and practices associated with their use and applications and knowledge relating thereto in accordance with mutually agreed terms and conditions between the persons applying for such approval, local bodies (BMC) concerned and the benefit claimers. The Biological Diversity Act, 2002, permits the benefits to be shared by:

- ✓ Grant of joint ownership of Intellectual Property Rights (IPR)
- ✓ Transfer of technology
- ✓ Location of production, research and development units in such areas that will facilitate better living standards to the local people and benefit claimers
- ✓ Association of Indian scientists, benefit claimers and the local people, research and development agencies working in biological resources, bio-survey and bioutilisation
- ✓ Setting up of venture capital fund for aiding the cause of benefit claimers
- ✓ Monetary and non-monetary benefits.

10.8 THE BIODIVERSITY MANAGEMENT COMMITTEE (BMC): FORMATION, FUNCTIONS AND PROVISIONING OF GUIDANCE AND SUPPORT

The Biological Diversity Act, 2002, aims to promote conservation, sustainable use and equitable sharing of benefits of India's biodiversity resources. With this view, the **National Biodiversity Authority (NBA)** and **State Biodiversity Boards (SBB)** have been established. It has also mandated the establishment of **Biodiversity Management Committees (BMCs)** at the level of Gram Panchayat, Taluka, District, Municipality and City Corporation. The NBA document provides the protocol for the formation of the BMC, which should be as representative as possible of the various communities within the village. There should be adequate inclusion of women and those from the scheduled caste and scheduled tribe sectors of society. A Biodiversity Management Committee for its area of jurisdiction shall consist of a chairperson and six persons nominated by local bodies. It

necessarily includes a minimum of one-third representation by women and 18% by SC/ST communities. In the case of Maharashtra, the SC/ST community representation is as per their proportion at district level.

Section 41 of the Act stipulates that “Every local body shall constitute a BMC within its area for the purpose of promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animals and micro-organisms and chronicling of knowledge relating to biological diversity.”

10.8.1 BMC Formation - Present status in PUNE Division:

As per information available from Maharashtra State Biodiversity Board office, total 496 BMCs have been formed in PUNE forest division.

Sr. No.	Taluka	No. of BMCs
1	Mulshi	95
2	Haveli	89
3	Maval	103
4	Daund	80
5	Baramati	99
6	Indapur	115
	Total	581

The BMCs are to be involved in four types of activities in the context of management of local biodiversity resources:

- Promoting conservation measures
- Organizing sustainable harvests
- Fixing traditional knowledge rights and collection charges
- Organizing value-added activities

Establishment and maintenance of the People’s Biodiversity Register is one of the BMC’s very important functions. The Register shall contain comprehensive information on availability and knowledge of local biological resources like folk varieties and cultivars, domesticated stocks, breeds of animals, land races, etc. and their medicinal or any other use, and/or any other traditional knowledge associated with them. The maintained PBR would require validation by the community, BMC and the SBB. Besides this, the committee shall also maintain a Register containing information about the details of the access to biological resources and traditional knowledge granted, collection of fees imposed, and benefits derived and the mode of their sharing.

The other functions of the BMC are to consult on any matter referred to it by the State Biodiversity Board or Authority for granting approval, and to maintain data about the local Vaidus (traditional healer) and practitioners using the biological resources.

The National Biodiversity Authority (NBA) specified format(s) of the People's Biodiversity Register are to be used. The particulars include the format for electronic database. The NBA and the SBBs shall provide guidance and technical support to the BMCs for preparing People's Biodiversity Registers.

Communities need to be capacitated and empowered to address the biodiversity concerns of their respective villages and to take responsibility as is recommended within the Biological Diversity Act, 2002. As BMC's main function is to prepare the PBR in consultation with the local people, the committee members will need support and training on the concepts of biodiversity, conservation concerns, tools and methods for documentation including mapping, and the safety, security and maintenance of the Register.

10.9: SPECIAL OBJECTIVES OF MANAGEMENT: -

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

10.10: PRESCRIPTION FOR THE MAINTENANCE & ENHANCEMENT OF BIODIVERSITY.

*** Other Activities**

- i. Sustainable harvesting of medicinal plants should be strictly adhered to. As the division already has the list of local medicinal practitioners (LMP) and the species used by them, it shall be the duty of the division to chalk out the ways and means of sustainable harvest, with or without the consultation with the LMPs, at its own discretion.

- ii. Sensitization of the staff of Pune Division to the issues of biodiversity is of utmost importance. The Division shall involve such experts and institutions in consultation with the Maharashtra Biodiversity Board, Nagpur for such trainings and workshops.
- iii. The field functionaries of Pune forest division shall identify areas of significant biodiversity value like **sacred groves** and take lead in In-situ conservation and Ex-situ conservation.
- iv. Identification of area of bird's presence in the division is a must. Bhigwan Dam is known to be rich in Avi-fauna and needs to be studied for further protection. It should be the endeavor of the division to explore potential sites/areas that would qualify as Identified Bird Areas (IBAs) and Ramsar site status.
- v. Identification and documentations of local practices, indigenous technical knowledge and other ethno-biological should be carried by the department.
- vi. Identification and Conservation of rare /endangered indigenous species of plants in the division.
- vii. All efforts should be made to control fire and grazing in the forests as these are among the biggest enemies of biodiversity.
- viii. As per biodiversity Act 2002, Biodiversity Management Committee through the Gram panchayat as per the norms decided by the Government needs to be established in all the JFM's villages.
- ix. As per Government circular WLP-0818/C.R.312/ F-1 dated 14 September, 2018. Deputy Conservator of Forests has been appointed as Coordinating Officer. He has been entrusted various works like- Coordinate between different departments at district level, take regular review of works undertaken, capacity building of staff of local bodies, stakeholders etc.
- x. The local guard should provide all help and co-operation to the gram sabha for the establishment of the works as and when required.
- xi. Capacity building for local communities, forest personnel at all levels, elected representatives, decision makers, and bureaucrats needs to include the provision of technical skills.
- xii. All JFM Committees should have Public Biodiversity Registers as part of the many records to be kept. Members from the State Biodiversity Board should be consulted for the same. Necessary Workshops, training etc. required for this should be carried out.
- xiii. The forest division in consultation with the local Colleges, anthropological/social science institutions and the Maharashtra State Biodiversity Board should carry out Biodiversity studies on the lesser-known lower life forms of the flora and fauna.

xiv. It may be seen that as the forest department has concentrated its working in the higher life form of trees and mammals/bird's other species have been relegated to oblivion.

- Documentation and studies of herbaceous plants
- Documentation and studies on the fungi, ferns, algae and Lichen and moss (If any).
- Carry out entomological studies (particularly butterflies).
- Carry out herpetological studies.
- Medicinal plants & practices documentation along with other indigenous technical knowledge.

In all the above studies, proper documentation with distribution of species, the abundance and threats to the species may be included.

10.11 MANAGEMENT GUIDELINES OF SACRED GROVES

PUNE division is blessed with number of sacred groves; however, none of these sacred groves is properly managed. Exhaustive survey of 21 sacred groves was done by two scientists (Savita Nagarkar and Vinaya Ghate). This survey shows that out of twenty-one sacred groves, only six were recorded still virgin with rich biological diversity as they are located in very remote areas. Remaining fifteen sacred groves were found in a dwindling state due to anthropogenic activities like increased transport facilities, dam construction and human interference.

Therefore, there is urgent need to have some guidelines for management of sacred groves, atleast those which are situated in forest areas. Suggested steps in management planning and implementation are as under-

a) Identification and delineation

The sacred groves are identified in a participatory manner (if possible, in a meeting of the gram sabha) so that its management planning becomes participatory from the very beginning. Such a participatory exercise would also help in:

- i) Arriving at the common traditionally held name of the site.
- ii) Determining if a local and traditional management body for the site already exists.
- iii) Determining the commonly agreed boundaries of the site.
- iv) Determining the nature and outstanding (if any) values associated with the site.

When the site lies outside of the government forests, and information as above has been agreed in association with the existing local body (if any) the site needs to be delimited on the ground and boundary pillars marked and raised to avoid any subsequent confusion or later raising of claims / counter claims in the matter. If agreed at the meet then a rubble wall or a trench around the site could help establish a much long-term boundary demarcation.

If the site lies within a government forest (RF, PF or Private Forest) then in all likelihood its location would have been shown in the 1:50,000 topo-sheet of the area in the question. Then the site again in consultation with the local body (if any) could be shown through circular marks on the extreme trees.

b) People's Biodiversity Register, PBR and traditional do's and don'ts

Once the site has thus been identified and delineated on the ground, then a PBR for the site need to be prepared in a participatory manner. This is to ensure that the biodiversity values as well as the traditionally held sacred beliefs as well as the do's and don'ts regarding the site in question are properly codified. The existing body (if any), or the BMC or the JFM committee given the responsibility for the sacred grove be asked to take the lead in the matter.

c) Local management body and its institutional capacity enhancement

BMC should make responsible for the upkeep, protection and appropriate interventions to be made in the sacred grove. It might be useful to have an institutional capacity building of the BMC so that the institution takes fully informed stewardship of the sacred grove with a sense of responsibility towards the present as well as the future generations. The components of such a capacity building exercise could include the following:

- i) Introduction to Sacred groves, their history and coverage in different part of the country
- ii) Importance and usefulness of sacred groves
- iii) Sacred groves as part of local heritage
- iv) Record keeping including formation and updation of People's Biodiversity Registers, PBR
- v) Active intervention to keep threats like fire, grazing, unauthorized removals and invasive species away without compromising on the site's naturalness and wilderness

d) Soil and Moisture (S&M) conservation works and rehabilitation of natural vegetation, if need be, through ANR

It is likely that over time, due to neglect, the physical state of the Sacred Grove has deteriorated in terms of its vegetation, soil cover etc. Thus, a scheme for carrying out Soil and Moisture conservation without disturbing original landscape, as well as re-vegetation at the site through ANR (assisted natural regeneration) be planned and implemented. Again, the BMC may be fully involved in planning as well as execution of these works. **Plantation if any may be only of local preferred species that** enriches the site's biodiversity.

e) Sacred groves as a Preservation Plot (PP)

Sacred groves on account of their protection emanating from their sacred status carry good potential to be looked upon as permanent Preservation Plots in terms of their floristic values. Thus, it would be useful to incorporate appropriately sized sacred groves (those that are too small in size may not fulfil the PP specification) as permanent Preservation Plots. Forest Research wing should ensure that the sacred groves do get included into the state's Preservation Plot inventory and network. This

would facilitate on one hand a regular research and documentation input from the state research wing into these sites and on the other provide manpower in form of BMC members to the research establishment. A good synergy between the BMC and the state Research wing could be a win-win for all concerned.

f) Declaring sacred grooves as Biodiversity Heritage site

At present only one Biodiversity Heritage site has been notified. Sacred groves are repository of good biodiversity, therefore sacred groves within forest areas should be proposed for Biodiversity Heritage Site.

10.12 MANAGEMENT ACTION PLAN FOR CONSERVATION OF BIODIVERSITY WITHIN SACRED GROVES

Introduction:

The sacred groves, despite their differences in nature and sizes carry important biodiversity values in form of its floral as well as faunal components. Currently these also face threats in form of a general state of poor maintenance and increasing degradation coupled with succeeding generations losing interest in them.

It shall thus be useful and helpful to devise a multi-year management action plan for the identified sacred groves that could guide the sustainable conservation of biodiversity in them.

YEAR 1

Key objectives:

- a) Revitalization of the Sacred Grove (SG) located within JFM area.
- b) Identification and marking on the ground of SG limits / boundaries (purely for management purposes, without getting into legal or historical hassles)
- c) Threat assessment
- d) Initiation of the preparation of a PBR (People's Biodiversity Register) for the site

Key actions:

1. JFM/ BMC formally resolves to revitalize / adopt the sacred grove
2. Location:
 - 2.1: GPS polygon of the site
 - 2.2: Compartment number, if the site lies within a RF or a Private Forest
 - 2.3: Marking of boundary trees at extreme locations when the SG lies outside of RF/PF
 - 2.4: Area of the SG in hectares and a rough map or a map from a topo sheet / village map.
 - 2.5: Special feature, if any of the SG, which might help identify / locate the site with ease. This could be an old tree, a temple, a pond, a hill, a cave, or some notable physical feature.

3. People's Biodiversity Register (PBR)

3.1: JFM/ BMC identify and form a group consisting of local knowledgeable persons to be involved in preparation of the PBR of the SG. The PBR group may include the local *Vaidu*, school teacher, present or past *Sarpanch*, knowledgeable and respected old woman who knows most traditional cure for common ailments etc.

3.2: Help from local NGO like Maharashtra Vriksh Sanvardhini may be taken to hand hold the JFM/ BMC in the task.

NB: A PBR shall be meaningful only for a sacred grove of substantial size and diversity. Anything less than 1 ha in size, or a site which is presently highly degraded with few standing trees (would have little meaning or use of a PBR).

Results / lessons:

- a) Sacred Grove is formally identified.
- b) Preparation of PBR (First version).
- c) A biodiversity 'baseline' as well as notable biodiversity values if any, of the SG is identified and protection measures (against destruction, removal) for the latter are initiated by the JFM/ BMC.

YEAR 2

Key objectives:

- a) Strengthening of the Sacred Grove by the JFM/ BMC in form of enrichment planting / ANR
- b) Finalization of the PBR
- c) Establishment of firm Do's and Don'ts vis a vis SG by the JFM/ BMC

Key actions:

- 1. Participatory need assessment by JFM/ BMC of enrichment planting / ANR if required at the SG (only local species to be considered) and its implementation
- 2. Participatory codification of do's and don'ts with respect to the SG by the JFM/ BMC and mechanism put in place for its implementation
- 3. Revisit the first-year draft of the PBR and finalize it in a participatory manner.

Results / lessons:

- a. PBR for the SG is finalized.
- b. Biodiversity restoration / regeneration at SG site starts to become perceptible.

YEAR 3

Key objectives:

- a) People's Biodiversity Register, PBR incorporates protection measures for the SG biodiversity
- b) JFM/ BMC monitoring of the changes (improvement / degradation) in SG biodiversity

Key actions:

1. PBR of the SG site becomes its ‘management’ document and is adopted by the JFM/ BMC as the base document for any measures to be taken (including harvest and removal of any material from the SG) with respect to the latter’s conservation
2. Permanent plots (30x30 m) are earmarked (with circular color lines on marginal trees) at suitable locations within the SG as biodiversity change monitoring plots.
3. A protocol (this shall be site specific) is devised to assess the impacts (positive and negative) of visitor presence in SG during the festivals etc. so that some indication of the SG’s carrying capacity in terms of visitor presence in the light of long term biodiversity conservation of the SC, could be arrived at.

Results / lessons:

- a. Sacred Grove, SG becomes a formal part of the division’s biodiversity conservation strategy.
- b. PBR becomes the SG committee’s reference document
- c. Systematic efforts begin to assess and document the changes taking place over time within the SG

YEAR 4:

Key objectives:

- a) Monitoring of changes if any in the SG biodiversity

Key actions:

1. Enter the biodiversity related information into the SG’s PBR

Results / lessons:

- a) PBR is updated

YEAR 5:

Key objectives:

- a) Revisit PBR to incorporate changes, new discoveries, lessons learned etc.

Key actions:

1. Thorough and professionally assisted (preferably by the initial NGO) effort to overhaul the PBR so that it remains a dynamic document

Results / lessons:

The sacred grove, SG emerges as well documented, managed and representative location/s for the long-term conservation of the local biodiversity

CHAPTER – 11

OLD PLANTATION MANAGEMENT

This chapter deals with the management of patches of old successful plantations of miscellaneous species, Glyricidia, Subabul, Prosopis, *Acacia auriculiformis*, Bamboo and Teak plantations taken since 1976 onwards. Stock maps are prepared for all compartments of division; old successful plantations are shown with separate colour code in these stock maps. However exact extent of these old plantations has not been assessed as they are interspersed with blank areas and other plantations. These patches of old plantations are found in all five Working Circles viz. Protection Working Circle, Afforestation Working Circle, Improvement Working Circle, Urban Forest Management Working Circle and Fodder Management Working Circle. While preparing treatment map of each working coupe, concerned Range Forest Officer should indicate the area under old plantation as area 'C' and prescriptions under this chapter should be followed.

11.1: SPECIAL OBJECTIVES OF MANAGEMENT

1. To improve the silvicultural conditions and productivity of old successful plantations.
2. To restore biodiversity, enrich the area by taking AR of suitable species.
3. To supply small timber and firewood to the local communities.
4. To create employment opportunities for the local people.
5. To involve JFMCs in protection and management of old plantations.

11.2: METHOD OF TREATMENT

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

'Tending' is defined as operations carried out for the benefit of a forest crop at any stage of its life between the seedling and mature stages; it essentially covers operations on the crop itself and on the competing vegetation and includes weeding, cleaning, thinning and pruning and does not include regeneration fellings and ground operations like soil working, drainage and controlled burning. The tending operations required for the management of the old plantations are explained below.

I. Cleaning: It is done in the sapling crop involving the removal or topping of inferior growth including individuals of favoured species, climbers etc., when they are interfering with the better grown individuals of the favoured species. It merges with thinning's as saplings grow into poles. It is

done to improve light conditions and to reduce root competition and transpiration water loss. The following operations will be carried out:

- i. Interfering climbers shall be cut in the plantation area.
- ii. Coppice shoots interfering or likely to interfere with the growth of planted saplings shall be cut back.
- iii. Malformed, diseased and damaged individuals of the planted saplings shall also be cut back.
- iv. Singling of coppice shoots keeping two most promising & healthy shoots arising from the stumps.

II. Thinning: It is defined as a felling made in an immature stand for the purpose of improving the growth and form of the trees that remain, without permanently breaking the canopy. Few years after the plantations are raised; there starts an intense competition amongst the saplings for limited light, minerals and water. Therefore, to avoid the adverse effects on the growth of the future crop, thinnings are required, to gradually reduce the number of saplings, poles and trees per unit area, as the crop advances in age. It consists of series of successive felling operations before the crop matures and is carried out in a crop after it reaches the sapling stage and continued up to the beginning of the regeneration period. The interval between two successive fellings may be fixed but it depends upon the time required for canopy closure.

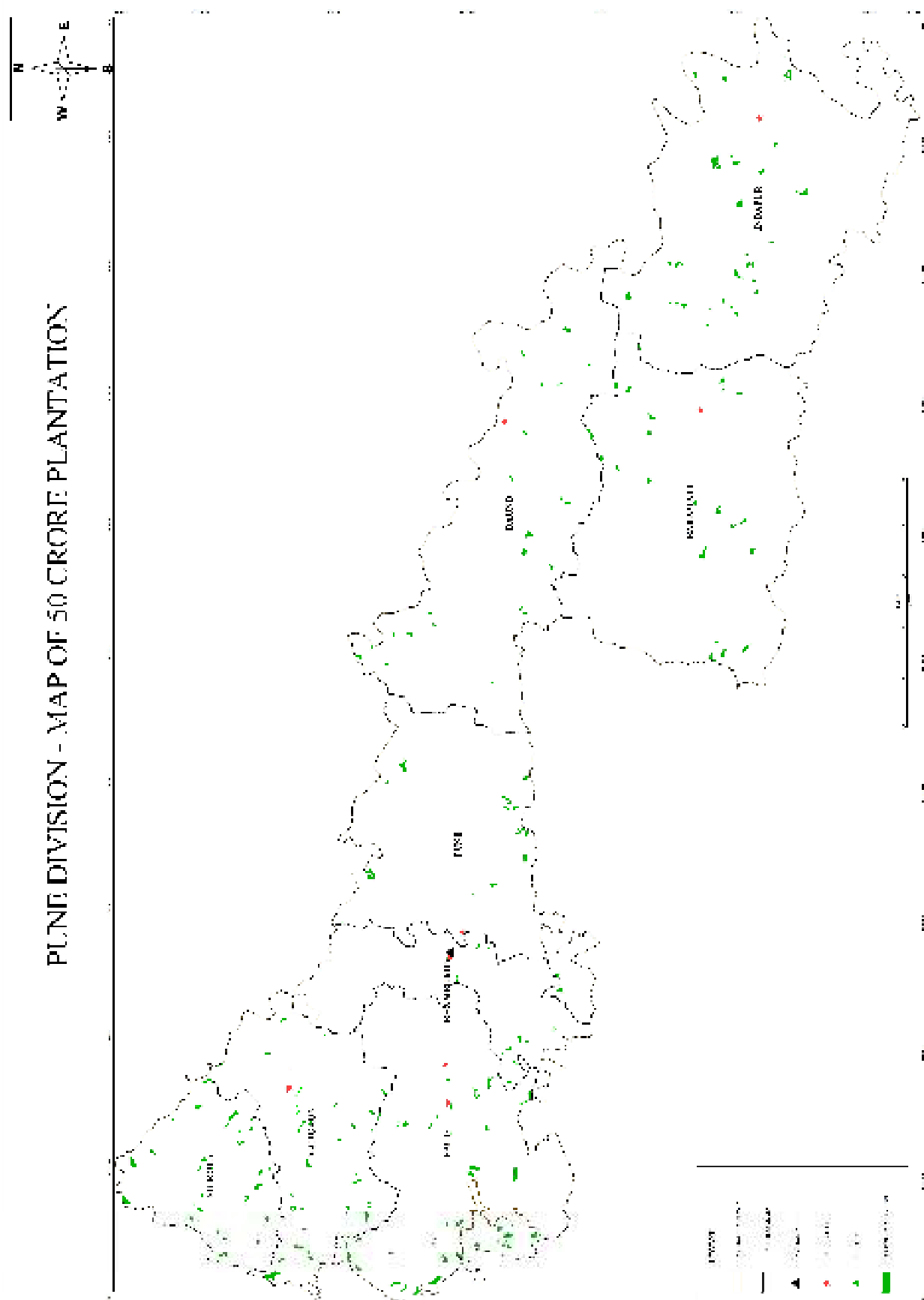
11.3 DIFFERENT TYPES OF OLD PLANTATIONS IN THE DIVISION

Evaluation of Plantations:

Evaluation Division has evaluated 113 plantations over 2752 ha. area, raised during this plan (from 2012-13 to 2018-19) period. This evaluation is mainly done in third/ tenth year of plantation. In 12 plantations - Pre plantation operations (PPO) were also evaluated for 265 ha area. On the basis of systematic enumeration and ocular estimations it was observed that out of total 113 plantations, 17 plantations covering an area of 367 ha. were successful plantations (survival more than 50%), 40 plantations covering an area of 898 ha. were successful plantations (survival more than 25%), rest 54 plantations covering an area of 1487 ha. were failure plantations (survival less than 25%). The successful plantation made 13%, partially successful made 32 % and the failure plantations made 54 % of the total plantation area.

The results of survival showed that in all 54 plantations that had failed, the survivals in these were mostly in the form of badly grazed and hacked seedlings, many times carrying multiple coppice shoots. It was also noted that pathway was going from the plantation, encroachment was present in a plantation site and also site selected for plantation was an old plantation site which had not succeeded. In the 17 plantations classified as partially successful also, the survivals were mostly in the form of badly grazed and hacked seedlings only. Whereas the successful plantation sites are resultant of good site selection, good planting material as well as proper protection.

PUNE DIVISION - MAP OF 50 CRORE PLANTATION



In the 12 PPO site for 265 ha area, only 4 plantations site selection is medium category other all sites are of poor quality as per evaluation code 1969. Moreover pits/ trenches were dug in Zone I & Zone II area.

The plantations were raised by carrying out by planting of polybag seedlings of Karanj, Jambhul, Shiwan, Ain, Bakan, Hivar, Shivan Aonla, Hirda, Wavla, Sissoo, Kanchan, Kashid, Tamrind, Sitaphal, Khair, Neem, Babhul and Shiras. It was supplemented by direct sowing of hardy species like Tamrind, Neem, Sissoo, Hivar, Babhul, Karanj, Shivan etc. Amongst the plants that had come up as a result of direct sowing Ain, Bakan, Hivar, Shivan, Babhul, Neem, Karanj had been found to survive. The maximum growth of the plants in terms of height and girth vary very widely from the minimum growth and this was on account of wide variations in local edaphic factors. All the afforestation areas had been found to be grazed. Protection of these plantations from grazing and fires appeared to be extremely difficult and they were the crucial factors along with hacking for firewood needs that determined the fate of plantation.

In Western part of Pune division, mainly in ghatmatha portion survival as well as growth is hampered due to heavy rains and fog in rainy season. All the plantation areas were subjected to heavy biotic interference showing thereby a great lack of public cooperation.

Abstract of Evaluation Reports-2007- 2014

Total units evaluated/ Area	Successful Pl. Survival > 50%	Partially successful Pl. Survival >25-50%	Failure Pl. Survival < 25%
113	17	40	54

11.3.1 Old Plantations – Areas containing successful plantations of the miscellaneous species, patches having congested Bamboo clumps, Teak and Prosopis areas along river banks are included in this part.

Extensive forest areas were brought under miscellaneous plantations since last 2-3 decades. These plantations have largely been taken on the refractory sites of the division.

The objective was to bind, conserve and improve the soil cover in such refractory areas. For management purpose these plantations are further divided into two categories viz.

Miscellaneous plantations and Glyricidia/ Subabhul Plantations/ Prosopis plantations.

11.3.1.1 Miscellaneous Plantations

Due to poorer site-quality, most of the plantations show stunted growth and are usually sparse. Therefore, only improvement works have been prescribed for such plantations as follows:

- All common climbers found interfering with the growth of the planted crop shall be cut in the plantation area.
- Rooted stock of the planted species shall be tended wherever required.

- iii. The undesirable under-growth which is preventing or likely to prevent the development of seed-based NR of the desired species, shall be removed.
- iv. The SMC works like bandharas, nalla-bunding, gully-plugging etc. will be carried out as per the requirement and suitability of the site.
- v. Under-stocked areas within the plantation area having good soil depth and more than 2 hectares in extent in a compact block shall be planted with suitable miscellaneous species.

11.3.1.2 Glyricidia Plantations

As per stock map area under exotic species plantation is 2684.79 ha (4.9%), out of this majority area is under Glyricidia and Subabul.

Environmental Impact

Due to its nitrogen-fixing ability, Glyricidia has the capacity to change soil nitrogen levels with negative impacts on nutrient balances and cycling in invaded areas. This species also grows forming mono-specific thickets that displace native vegetation (Anon., 1998) and alter successional processes. Replacement of native species in invaded areas is leading to lower quality habitat for native biodiversity.

Therefore, it is felt that monocultures of mature Glyricidia/ Subabul/ Prosopis at fertile sites with deep soil should be gradually replaced with diverse local miscellaneous species plantations. But it requires intensive working and supervision to make it a success and therefore site-specific estimates should be prepared with due care and application of mind.

Silvicultural system used will be 'Clear Felling in blocks' followed by AR. The prescriptions are as follows:

- i. Patches with deep soil preferably having more than 30 cm. depth shall be selected.
- ii. In the division, every year area shall be demarcated for treatment shall depend upon the financial provisions i.e. availability of funds for area of Glyricidia plantation, preparation of plantation site and planting activities along with provision for management of plantation for next five years.
- iii. The felling shall be restricted in due coupes only and from the mature Glyricidia plantations area shall be clear-felled and stumps of Glyricidia shall be uprooted, as it being a good coppicer.
- iv. Native RET and miscellaneous species preferably tall plants (minimum 1 meter tall) shall be planted in pits of minimum 45 x 45 cms.
- v. Felling is strictly prohibited on 20m both side of streams/ nallas/ water courses, soil depth less than 30 cms and slopes more than 25°.
- vi. Since Glyricidia being good coppicer and fast-growing species provision should be made in estimate to eradicate Glyricidia growth in areas which are replaced with native species during

next five years of management. If growth of *Glyricidia* persists then periodic uprooting is inevitable.

These types of works were prescribed in Working Plan (from 2012-13 to 2021-22) of Sh. Vikas Gupta for Pune Forest Division. However, these works were not carried out till year 2018-19. Since year 2018-19 around 15-20 hectare area under *Glyricidia* plantation in Bhamburda range, has been clear felled and plantation of tall plants of local miscellaneous species has been undertaken. The growth of these plantations is satisfactory but maintenance & protection has to be done beyond 5 years. These plantations have proved to be successful in Osmanabad and Junnar divisions too.

11.3.1.3: Teak Plantations

Teak plantations have been raised mainly in Paud, Shiota, Bhamburda, and some parts of Wadgaon ranges; however, these have not been tended and thinned as per the prescriptions of the earlier plans, thus affecting their growth. As per stock map area under

Teak plantations comes to 1165.27 ha. (1.76 %)

The method of treatment shall be as follows:

- i.** 'C' grade 'Ordinary thinning', a kind of silvicultural thinning shall be done which consists of removal of inferior individuals of the crop, starting from the suppressed class to the dominated class to some of the dominants but not creating any permanent gap in the canopy. The trees selected for retention are the trees with good boles and crown, evenly distributed over the area, with space on all sides for proper development. In this grade, few suppressed or dominated trees whose removal is of no economic or hygienic value may be left as soil cover.
- ii.** Thinning shall be done as per the Yield Tables which give the number of trees per unit area left after thinnings at different ages by site qualities. Site quality of the area where the plantation is raised and the age of the crop shall be ascertained. Site quality is measured in terms of average height of dominant trees in the plantation area. Yield tables prepared for teak plantations by the FDCM may be consulted if local yield tables are not available.
- iii.** Girth class wise distribution of poles or trees in the plantation area shall be obtained by random sampling. Sample plots of size 0.5 ha i.e., of 100 x 50 meters dimensions shall be laid with sampling intensity of 10% only. Corresponding to age and site quality the number of stems per ha and their distribution among different girth classes shall be obtained from the Yield Table, which shall then be compared with the number of stems actually available per ha in the stand to obtain the number of stems to be retained girth class-wise after the thinning. The deficiency in stems in any girth class shall be compensated with the surplus and healthy stems in nearest girth classes on the basis of basal area.

- iv.** After sample marking, basal area per ha of the stand excluding trees already marked for felling, shall be obtained by using wedge prism. This shall be compared with that of Yield Table value, to ascertain the correctness of thinning marking. Deficiencies if any shall be removed and thinning marking shall be completed by the RFO. The detailed marking list shall be prepared which shall be checked and verified by the concerned ACF and the DCF in the field. Thinning shall be completed after removal of deficiencies, if any. The following rules shall be observed while thinning.
- The dead, dying, diseased and malformed poles shall be marked first for thinning.
 - The multiple pole crops shall also be thinned to one pole per stool retaining the most promising one.
 - Care shall be taken to remove the poles of coppice origin first while retaining the poles of seedling origin.
 - All live high stumps shall be cut flush to the ground and shall be dressed thereafter with a sharp axe to get vigorous coppice shoots.
 - The established multiple coppice shoots shall be reduced to one per stool retaining the vigorous one while the newly risen coppice shoots shall be removed.
 - The undesirable under growth which is preventing or likely to prevent the development of seed-based NR of the desired species, shall be removed.

11.3.1.4: Prosopis Plantations

This part includes narrow strips of forests along the banks of Mula, Mutha, Indrayani, Pawna & Bhima River located in eastern part of Pune division i.e., Pune, Daund, Baramati & Indapur Range and some patches in Bhamburda Range. These are isolated forest patches located on the rich alluvial deposits along the river banks, occasionally extending inland.

The areas along the river banks which used to get inundated during floods in rainy season supported good Babhul (*Acacia arabica*) forests in the past. Here the soil is deep and fertile and Babhul used to consist nearly 90% of the crop composition previously.

But many such areas were clear felled in the past and were tried to be artificially regenerated by Babhul (*Acacia arabica*) along with dibbling of seeds of Vilayati babhul (*Prosopis juliflora*) and other species. The AR of *Acacia arabica* somehow could not establish and as a result *Prosopis juliflora*, a much lesser valuable species invaded into the valuable babhul forests, suppressing the growth and spread of babhul. Now, nearly all such areas are thickly infested with impenetrable growth of *Prosopis juliflora* which has now become the major constituent of the tree composition of these riverine forests. Vilayatibabhul did not remain confined to the areas where they were introduced but also got spread in the adjoining private lands and public waste lands. It is difficult to move through such forest due to thorny multiple coppice shoots arising from the stumps of Vilayati babhul (*Prosopis juliflora*) because of their repeated hacking for fuel wood by the head loaders.

Other species met with are Karanj (*Pongamia pinnata*), Chinch (*Tamarindus indica*) etc. NR of babhul is completely missing while that of *Prosopis* is found.

All these forest patches on the river banks are surrounded by private cultivations from the other sides and are not well demarcated in the field. Therefore, they are highly susceptible to encroachments due to their fertile soil and closeness to the water source and roads. The river banks bearing these forests are also subjected to heavy soil erosion due to scouring action of fast and turbulent flow of water along the banks. *Prosopis* crop cover has helped over the years in retarding the scouring action of water along the river banks as well as to save such forest patches from large scale encroachments.

Objects of Management

- i. To revive erstwhile Babul Forests
- ii. To meet the local demand for fuel wood, fodder, small timber to a certain extent.
- iii. To get gum from Babhul trees.
- iv. To protect the river banks from soil erosion.

These areas, in the earlier plan were prescribed to be managed under clear-felling system followed by AR of Babhul and Neem. In the present scenario, clear felling entire area bearing *prosopis* crop and possibility of regenerating such areas with babhul is difficult, since *prosopis* is a very good coppicer and babhul being slow growing takes much longer to establish. It may only invite encroachments from the nearby cultivators as well as may lead to soil erosion due to floods and heavy rains. Therefore, to revive these erstwhile Babhul areas, clear felling *prosopis* in small patches and replanting it with Babhul, planting Bamboo, Karanj (along river bank), and other soil binder species is prescribed.

Demarcation: Forest boundaries especially those touching cultivations and private areas be first surveyed and demarcated on priority since these areas are highly vulnerable to encroachment. The annual coupes shall be demarcated one year in advance.

Treatment:

- i. Soil binders like Sisal (*Agave* sp.), Nirgudi (*Vitex negundo*) and other suitable species like Bamboo (atleast 2 year old rhizomes), Karanj, Khas (*Vetiveria zizanioides*) shall be planted over a width of 10 meters from the river banks as per the site requirement.
- ii. Miscellaneous tree species except *Prosopis* shall not be felled.
- iii. Young NR of miscellaneous species if any shall be tended.
- iv. Strip of *Prosopis* over a width of 20 meters from river bank will be kept as buffer.
- v. The rest of the area will be divided into 100 x 50 mt grids. Every alternate grid will be treated in plan period. So that entire area will not be opened up in one stroke, this will reduce possibility of encroachment or erosion. The *Prosopis* crop in these patches shall be uprooted.

- vi. Healthy seedlings of Babhul {*Acacia nilotica* subsp. *Indica* (Godi Babhul), *cupressiformis* (Ram Kathi), *vediana* (Vedi Babhul)}, will be planted at spacing of 3 x 3 mts. The felled coupe shall be strictly protected against any kind of encroachment.
- vii. Seed dibbling of wild leguminous plants like *Vigna indica* (Ran moong), *Indigofera cordifolia* (Gokharu), *Crotolaria hebecarpa* (Godhadi), *Tephrosia strigosa* (Sharpunkha), *Alysicarpus tetragonolobus* (Lal Shevra), *Stylosanthes Species* (Hamata) may be done.
- viii. These plantations shall be strictly protected against grazing especially from goat & sheep grazing.

The results of growth and survival of these plantations may be analysed by Evaluation wing. Depending on these results remaining portion of coupe may be treated consequently in next plan period, once earlier plantation of Babhul is well established.

11.3.1.5 Bamboo Areas

This part deals with bamboo planted in the old afforestation programme as well as to some extent found naturally in some patches of protection Working Circle area. As per stock map 100.00 ha area (0.15%) is under Bamboo plantation. Such bamboo seedlings will be tended by soil working and application of manure wherever necessary.

Dendrocalamus strictus has been planted largely while *Bambusa* bamboo (Kalak bamboo) has also been planted to limited extent. *Bambusa* bamboo is generally found growing naturally in the wild in the forest areas. *Oxytenanthera stocksii* (Managa/ Chivari/ Mes) on the other hand is found growing on the bunds of private cultivations at places mainly in the western region of the district but is rarely seen in the forest. *Oxytenanthera monostigma* (Chiva-kathi) is found growing in small quantities mainly on top of the ridges and hills. Majority of the old bamboo clumps found growing naturally or in plantations in the forest areas have never been worked before and show lot of congestion bearing dead, deformed and over mature bamboos. These bamboo areas mainly fall in 'Protection Working Circle'. The culms of *Bambusa bambos* are found to be badly entangled within the clumps due to over congestion. The growing stock is also damaged due to forest fires and illicit cutting. Rather dried/ damaged bamboos culms become easily available raw material for spread of forest fires. These clumps therefore require immediate management interventions.

Objects of Management

- i. To improve bamboo productivity by using various management interventions.
- ii. To harvest bamboos scientifically as per the local demand.
- iii. To generate employment to the local people.

Agency for harvesting

Bamboo areas will be worked departmentally or as per the prevailing government policy. The DCF in consultation with the CCF (T) will decide the extent and location of bamboo area and its

quantity to be harvested annually as per the local demand while considering silvicultural, financial and administrative requirements.

Method of Treatment

Majority of the bamboo crop falls in Protection Working Circle with highly congested clumps. Considering heavy congestion of clumps and badly entangled culms especially in case of *Bambusa bambos*, practicing following prescriptions for the clumps being worked for the first time may not be easy. Harvesting of highly entangled bamboos may not be possible without breaking them. Such clumps of *Bambusa bambos* or other species which are difficult to work as per standard bamboo working due to heavy congestion should be worked so as to retain culms in 'U' shape or to retain bamboo culms on the periphery of the clumps. This should be done only once after which following standard bamboo working prescriptions should be strictly followed. Considering the difficulties in working of the congested bamboo clumps for the first time, special wage rates may be sanctioned by the CCF Pune based on the work study report submitted by the DCF Pune, in consultation with CF Research.

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

- i. Bamboo cutting will be done with a sharp axe. A bamboo culm must be cut in a single stroke with a slant cut so that cutting is above the first inter-node and the height of the cut is between 15 cm to 45 cm above the ground, to avoid drying of the rhizome due to capillary action.
- ii. All clumps will be cleaned during working. Cleaning operations in bamboo clumps will include the following:
 - a. Climbers infesting bamboo clumps will be removed.
 - b. All dead, decayed and dry culms will be removed.
 - c. All culms will be cut above the first internode.
 - d. Twisted culms will be removed.
 - e. Top broken culms with more than half of the top damaged and malformed culms will be removed.
- iii. No clump shall be considered fit for harvesting unless it contains more than 12 culms of one year or older in age.
- iv. While extracting bamboo, it should be ensured that the reserved culms are evenly spaced and some mature culms are present on the periphery of the clumps.
- v. All current year and previous year culms will be retained. Current year culms have the culm sheath on the lower half and abundant bloom i.e., white powdery dust which comes off easily when touched. Previous years culms do not have the culm sheath and the patchy bloom does not come off easily. Older or mature culms have blackish grey bloom.

- vi. The mature culms equal in numbers to the current year culms subject to minimum of 8 culms must be retained to provide support to the younger culms.
- vii. The remaining mature culms after reserving as described in the preceding paragraph may be harvested. No culm shall be extracted without cleaning the clump which should be an integral part of the bamboo harvesting.
- viii. Debris after cutting the bamboos should be stacked at least 3 metres away from clumps.
- ix. Digging of rhizomes, removing tender parts of older culms or cutting of current or previous year culms will be strictly prohibited.
- x. The culms at the periphery of the clump will not be removed except where it is absolutely necessary for facilitating working in the interior portion of the clump.
- xi. The leading exterior culms may not be cut under any circumstances even if they are malformed. Their retention is in the interest of the outward growth of rhizome and clump as they support new culms.
- xii. In order to make whole of the clump accessible, removal of all the culms in the form of a wedge may be permitted but the width of the wedge shall not be more than one meter.
- xiii. The working of the clump will be such that the culms after working are well spaced.
- xiv. The bamboo extraction should end by March when the culms are almost devoid of starch and attract less insect borers.
- xv. Areas suitable for bamboo plantations should be identified and planted preferably with Managa bamboo (*Oxytenanthera stocksii*) or Kanak bamboo (*Bambusa bambos*).

General Prescriptions

- i. Felling on slope more than 25° should be strictly avoided.
- ii. Permission/ felling proposal approval should be sought well in advance.
- iii. Before felling the trees should be enumerated and felling must strictly as per prescriptions.
- iv. Felling should not be initiated without making financial provision for regeneration is done.
- v. Felling estimate should be approved as per government orders.
- vi. Felling in Protected Areas & Eco-Sensitive Zones, etc. should be as per orders of Government from time to time.

OTHER REGULATIONS

- i. **Fire Protection:** Old plantations shall be fire-traced and rigidly fire-protected. The area shall be cleared-off of all the dry and cut remains of bushes, leaves etc. by end of February to avoid fire hazards to standing crop as well as to NR. Effective protection against fire for a period between Feb.15 to June 15 is a must to ensure survival and establishment of NR of all species for developing it into the future growing stock. 'Joint Forest Management

committees' shall be formed and a comprehensive fire fighting scheme shall be chalked out, the details of which are given in the 'Miscellaneous Regulations'.

- ii. **Closure to grazing:** Plantations taken after removal of Glyricidia/ Subabul shall remain closed to grazing for a period of 10 years from 1st year of its working.
- iii. **Protection Measures:** The plantations will be strictly protected from illicit felling and encroachments including seasonal encroachment for the purpose of agriculture with the help of JFMCs.
- iv. **Resolving conflict with Micro Plans made under JFM/ FDA:** If any conflict is noticed between the prescriptions given in this chapter and the micro plan written under JFM, FDA etc. for the same area, then the said area shall be treated in accordance with the special objects of management pertaining to this chapter and suitable amendments shall be made in the Micro Plan, if necessary.
- v. **Training Workshops:** The DCF Pune with the help from the CCF, Education, Pune should organize Workshops in the division to sensitize and train the field staff in implementing the prescriptions of this WP. The induction training of the field staff should be on priority by the CCF, Education Circle which will help in effective implementation of various WP prescriptions.

CHAPTER - 12

ECO-TOURISM.

12.1 INTRODUCTION

Ecotourism is defined as “Responsible travel to natural areas that conserves the environment and improves the well-being of local people. Ecotourism must make a positive impact on both the Ecology and Economy of a given destination.

In simple words, ecotourism means a sustainable form of tourism that allows the tourist to see the most pristine form of Mother Nature. Ecotourism encourages travelers to spend time in the lap of nature. In ecotourism, tourists are indulged more in activities that are less intrusive or destructive toward ecosystem and more sustainable and supportive towards promoting the native culture of the locals.

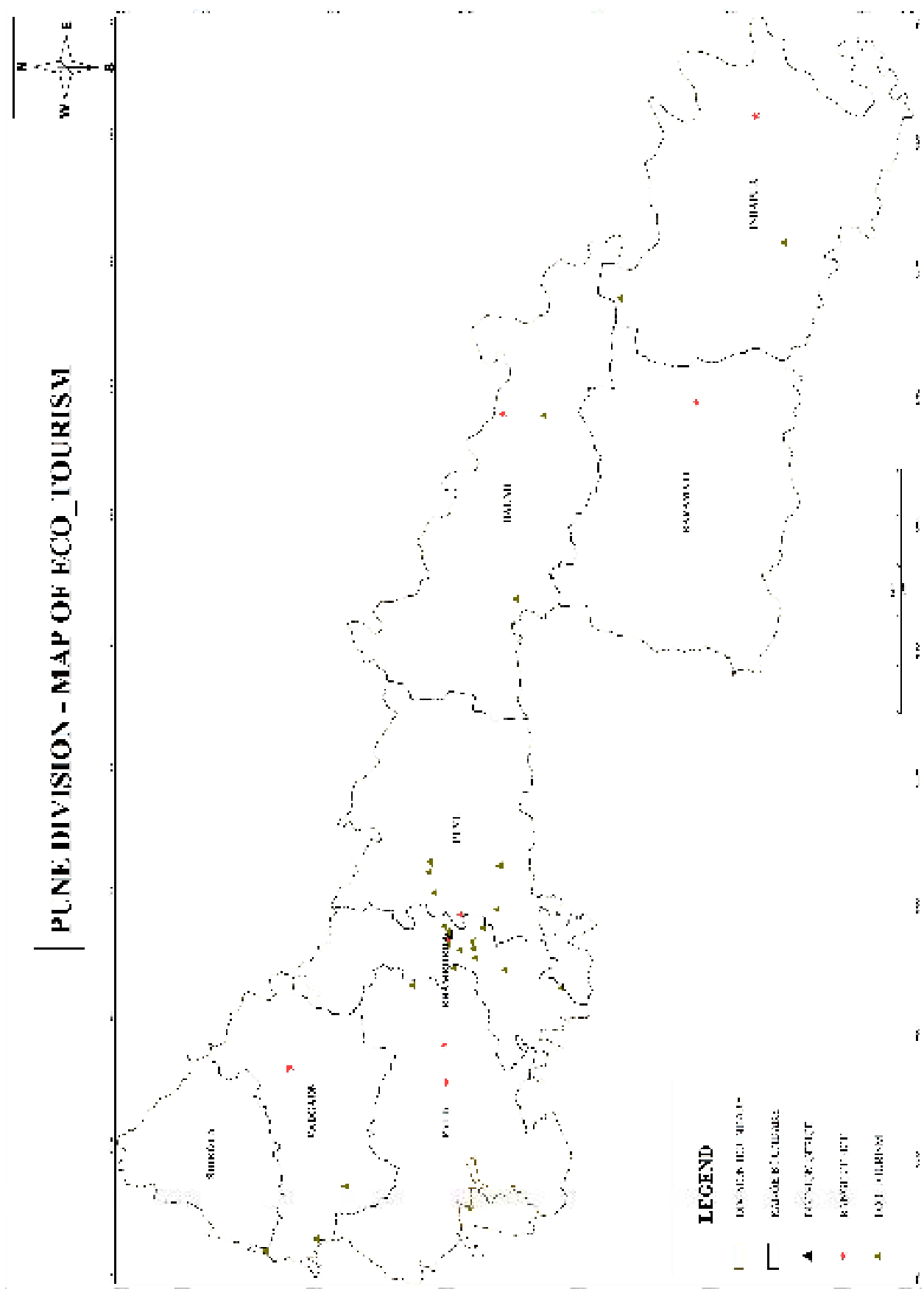
Ecotourism has received much attention in recent years especially within the developing world. Ecotourism in simple terms means management of tourism and conservation of nature in a way so as to maintain a fine balance between the requirements of tourism and ecology on the one hand and needs of the local communities for jobs, new skills, income generating employment and a better status for women on the other. Ecotourism developed in India in 1980s. Ecotourism was globally identified as a means of achieving twin goals of biodiversity conservation and sustainable development. Sustainable tourism and nature tourism are umbrella concepts that include ecotourism. India, the land of varied geography offers several tourist destinations that not just destress but also rejuvenate people.

The traditional treatment of a visitor in India is based on the historical concept of Atithi Devo Bhavah (Guest is God). This was the mantra of the Indian tourism sector.

The Tourism Ministry has launched the “Atithi Devo Bhavah” campaign under an ambitious programme to attract more tourists. The concept is aimed at capacity building for service providers and stakeholders in the tourism sector to make the tourists aware of the benefits in India and the need to treat them with traditional care and utmost courtesy. This has been further boosted by the New National Tourism Policy, which revolves round a framework ‘*Government led, private sector driven and community welfare oriented*’. A countrywide awareness campaign for sensitizing the public against Garbage and Graffiti at monuments has been launched under the title “Atithi Devo Bhavah” for preservation and protection of heritage monuments and tourist sites in the country.

12.2 IMPORTANCE OF ECOTOURISM

India is one of the 12-mega bio-diverse countries of the world and has a rich cultural heritage too. It has a vast potential for ecotourism that needs to be tapped for healthy conservation and preservation of nature and bringing about economic benefits to the local communities. Ecotourism in India has developed recently, for the concept itself is a relatively new one. India has spectacularly



attractive natural and cultural tourist attractions. India offers enormous diversity in topography, natural resources and climate. The most significant feature of the ecotourism industry in India is its capacity to generate large-scale employment opportunities, particularly in remote and underdeveloped area. Ecotourism industry is one of the leading employment generating sectors of India and it generates directly or indirectly approximately 3.8% employment out of the total employment generation every year in India.

The State of Maharashtra is rich in biodiversity. It has main four bio-geographic regions which have specific geographical, climatic and landscape settings. They include the Northern belt of teak forests and the Satpudas; the semiarid Deccan Plateau grasslands and Thorn Forests; the biologically rich and fragile evergreen and semi-evergreen forests of the Western Ghats; and the distinctive ecology of the coastal belt with its terrestrial and marine eco systems. Its fresh water aquatic ecosystems are equally diverse. Great rivers and their impoundments are distributed across the length and breadth of this diverse land. Though green travel in Maharashtra is at its nascent stages, Maharashtra Ecotourism Development Board has slowly started developing ecotourism site in the state by involving all stakeholders.

12.3 ECOTOURISM POLICY

- ❖ Ministry of Tourism, in Government of India has declared “Eco-tourism in India Policy and guidelines, 1998”. This policy has underlined the activities of tourism ought to be environment-friendly having no adverse impact on ecosystem.
- ❖ The United Nations World Tourism Organisation (UNWTO) came into force in 1970 on 27th September. To bring awareness among the people about the role and impact of tourism on society, the UNWTO started celebrating World Tourism Day on 27th September every year since 1980. Every year a theme is launched on the eve of World tourism Day by UNWTO. Ecotourism, Environment Protection, Climate change, Biodiversity, Community development became theme of World Tourism Day in the year 2002, 1997, 2008, 2010, and 2014 respectively.
- ❖ Government of Maharashtra, in Tourism and cultural affairs vide Resolution No. MTC-2005/2/CR-172/ Tourism, Mumbai dated -2006, declared Tourism Policy-2006 having tourism vision 2025. This policy has identified “Ecotourism” sector. Infrastructure development, public-private partnership, capacity building, creating awareness etc. are high lights of this policy.
- ❖ Govt. of Maharashtra in Revenue and forest Department vide Resolution No. WLP 1002/C.R.53/F-1, Mumbai dated 20.2.2008 has declared “Eco-tourism Policy 2008”. This policy illustrates the role of stake holders, capacity building of stake holders, Information,

Education and communication, selection of eco-tourism centres and operationalization of it, formation of “Maharashtra Eco Tourism Development Board” to promote ecotourism.

This policy laid down principles of Eco tourism as below:

- The Ecotourism activity should be concise and small for operationalization.
- It should be proper in view of environmental, social and cultural aspects.
- It should be proven and worthy of adoption.
- Participation of local community.
- It should neither be degrading nor destructive.
- As per tourist demand but definitely with some restrictions. This policy entrusts Forest Department to prepare management plan of ecotourism centres’ in pursuance of Forest Conservation Act.1980, Wildlife Protection Act 1972, and guidelines by National Tiger Conservation Authority. The Maharashtra Ecotourism Board has key role in co-ordination of line departments, granting of permission for infrastructure development, signing of MOU with Forest Department regarding development of infrastructure and revenue sharing.
- The Govt. of Maharashtra, in Revenue and Forest Department vide Resolution No.-M-2011/ C.R. 174/F-5, Mumbai, dated 24.11.2011 has issued guidelines for implementing eco-tourism activities in forest areas. Identification of ecotourism places, preparation of management plan, involvement of stake holders, stay and food facilities, home-stay facilities, capacity building of local people and staff, identification of various types of tourism etc. are important provisions in eco-tourism policy 2008.

12.4 POTENTIAL OF ECOTOURISM IN PUNE DIVISION

Area of Pune Division is one of the leading regions in case of agriculture and industrial development. This development is not uniform in all the parts. Its westernmost part, mainly Paud and Parts of Shirota is yet in developing phase of agriculture and industrial progress but, the area is bestowed with scenic landscape. These all ranges have factors like natural beauty (Ghats, waterfalls, variety of flora), temples, forts, caves, festivals which provide vast opportunity for taking up ecotourism development in near future. Efforts should be made for sensitizing host community as well as administrators and planners. Pune has a long history of religious tourism, Pune division is having three out of eight Ashtavinayak temples - Theur, Ranjangaon & Siddhtek (adjoining to Pune division), one Jyotirlinga in adjoining Bhimashankar Wildlife Sanctuary & Ekvira devi temple.

Forts

Along with the religious places it has many forts of great historical importance like Sinhagad, Tunga, Tikona, Visapur, Lohagad, Rajmachi, Morgiri, Koraigad, Tailbaila, etc. Most of the forts are located within the heart of forest area as these forts were built on high plateaus in deep forest by the

then rulers. These forts are frequently visited mostly in monsoon and winter season as trekking spots and face huge biotic pressure due excess influx of tourists in these forts.

Dams

Dams and water reservoirs are also have a great potential for tourism development. Pune division is having many large and medium size dams, having the potential of becoming a tourist spot and some have already evolved as tourist spots providing employment to locals. These dams are located in lower ridges of forest areas where most of forests are catchment areas of these dams. The list of dams is Pawna, Bhushi, Andhra, Walwan, Shiota, Uksan, Mulshi, Khadakwasla, Malwandi, Panshet, Varasgaon, Temghar, Ujani, etc. Tourism like aqua sports, camping along the dam-site, trekking in forests are few tourism activities present in the region. But these tourism activities are not regulated so there is heavy tourist pressure on these spots on weekends causing traffic on narrow roads to these areas and also polluting the area by litter, etc.

Ghats and tourist spots

Some beautiful ghats are located in Western Ghat region of the division which are famous tourists' spots located within forests or adjacent to the forests. The popular ghats are Khandala, Javan-Tungi, Bhaje, Bhopdev, Dive, Katraj, etc. Mainly in Monsoon season they look beautiful with greenish surrounding, streams and springs, waterfalls, fogs and a typical ghat atmosphere. Many local and outside visitors travelled on weekends and enjoy the rainy climate. Some tourists spots along ghats and other forest areas are Lion point, Tiger point, Monkey point, Shivling point, Dukes Nose, Dudhivre khind, Saltar khind, etc.

Caves

Apart from above locations famous ancient caves on the slopes of hills are located in forests or adjoining to forest areas which are also famous for eco-tourism. Few prominent caves are Bhaje, Karla, Dhak Bahiri, Bedse, Yelghol, Kondhane, etc.

Urban Eco-tourism

Within the city limits and places bordering city limits are few ecotourism spots developed by forest department. They are Pachgaon Parvati, Taljai, Vetaltedi, MAFCO garden, Warje Shanti van, Vandevi (Warje), Dhayari, etc. In these places eco-parks with plantations of medicinal and aromatic plants, open gym, children park, eco-trail, interpretation centre, etc. type of development are present which are relished by urban citizens.

12.5 MEASURES TO BE TAKEN FOR DEVELOPMENT OF ECOTOURISM IN PUNE DIVISION

There is ample opportunity to develop Ecotourism activities in and around above places depending on availability of area. The principles of Eco-tourism stated above should be the guide for all such developments. Some of the following activities can be taken up depending upon site requirements;

- Biodiversity garden, Medicinal Plants gardens, Nakshatra van etc.
- Nature interpretation centres, Nature Trail, Observation towers, Bird watching, etc.
- Protection hut, Camping site, Adventure Sports, Home stay development, Boating, etc.

Apart from keeping in mind the principles of ecotourism, the Division should take all care that the following area adhered to:

- a) While developing above eco-tourism sites, it should be verified that the proposed activities must not attract nor violate provisions under Forest Conservation Act 1980.
- b) The Deputy Conservator of Forests shall prepare an Eco-tourism Development Plan for the Division incorporating the above sites and any other potential sites.
- c) Local people especially the JFM Committees and EDCs wherever are in existence should be fully involved right from the planning stage.
- d) Adequate training and capacity-building of the staff and locals should form part of the development plan.
- e) The specialty and uniqueness of each site should be properly documented and should be brought up in attractive brochures keeping in mind the information that tourists would require and the Dos and Don'ts for such tourists.
- f) Any local traditional product, crafts, food items/local cuisine, cultural display etc. should be encouraged as part of the eco-tourism package
- g) The development of the ecotourism sites should go hand in hand with the conservation of the biodiversity, the nurture of environment and the appreciation of nature by the tourists.

While designing the plan the interests of the forests and wildlife should be of prime importance. The different actors/stakeholders like the community, visitors, businesses, NGOs should no doubt be taken into consideration. A common phenomenon is that ecotourism can generate both symbiosis and conflict between the actors. The potential for ecotourism to result in symbiosis between conservation (e.g., natural areas) and development (e.g., businesses) has been widely touted, but the potential for conflict should not be ignored.

In the recent years due to good transportation facilities, the number of tourists has increased considerably. This has raised an alarm for conservation measures to be taken.

- Large scale construction works should be avoided in Eco tourism areas. Emphasis should be made on development of existing infrastructure with maximum use of local and eco-friendly material.
- Design the structures in such a way that they should merge with surrounding nature.
- Main objective should be creating ecological awareness among the visitors.
- Possibility of exploring the fact as if whether some work related to Eco- tourism can be taken up in private forest.
- Scientific studies of the plateaus and sacred groves vegetation through local people and JFM.
- Awareness creation among the concerned parties and new generation about total diversity and its significance to the area in particular and nation in broad sense. With respect to instant and long term benefits, such as water resources is definitely maintained due to the forest on and around the plateau.
- Training to selected locals to be guide to tourist and pilgrims, for this some charges could be taken from the visitors and benefit could be shared with JFM.
- Training to selected locals for providing hospitality to the visitors in the form of refreshment, food and shelter in turn of the charge.
- Complete ban on plastic wares.
- Implementation of normal entry fee for vehicle, tourists and pilgrims, the revenue generated could be used for creation and maintenance of the facilities at tourist place.
- Set up instruction boards, signage, information banners and awareness posters at different places.

Restriction on number of visitors and their vehicles as per carrying capacity. A detail study of all the eco-tourism sites should be done where number of tourists with respect to the carrying capacity of the area season-wise should be calculated and online booking must be made available for visitors to plan accordingly. Example – on Sinhagad fort during weekends in monsoon around 15000 – 18000 visitors visit the fort and entire ghat, parking is over flooded with vehicles causing long queue. Moreover, the fort has limited capacity for tourists to visit when number of tourists increase numerous mishaps have happened in the past. So, to overcome this issue the division has initiated Electric bus service which was temporarily withheld due to technical issues and would be revived soon. This will control the flow of tourists and also reduce the vehicular movement thus providing some respite to ecology. Such planning may be done in other places like Ekvira devei temple, Bhaje & Karla caves, small ghat roads in Paud, Maval & Shirola ranges, etc. Detail list of potential eco-tourism sites is mentioned in Appendix No XL of Volume II

12.6 SOME MAJOR ISSUES OF ECO TOURISM

“Tourism has a tendency to become something like a steamroller wherever it goes. It can completely destroy natural places. Ecotourism is about trying to stop that”. The quotation tries to

define loudly the scope of ecotourism in comparison to mass tourism. Making a concept is much easier than its implementation and it is quite practical if we say that achieving hundred percent successes in any implementation program is inevitable. It is true with the concept of ecotourism all over the world. Indian ecotourism industry is successful but facing with number of problems, which are adversely affecting. There are number of issues relating to ecotourism in India, which contradict the very principle of the concept.

Environmental Issues: One of the most disturbing facts about ecotourism is that it is mainly promoting the expropriation of wilderness area, national parks, isolated tribal areas and even the areas having no trace of any permanent settlement. Tourists opting for such tourism often belong to the prosperous strata of society and are capable and ready to pay for everything they wish, so consumerism becomes focal theme here. Tour operators succumb to ever increasing demands made by visitors and to facilitate and entertain them, they build completely artificial landscape in the area, which have mega-resorts, luxury hotels, and shopping centres. Such changes cost almost the entire eco system dearly, many of flora and fauna species lose their natural habitat and in the long run this may even lead to species extinction. Tourism competes with other forms of development and human activity for natural resources, especially land and water. The use of natural resources subsequently leads to the transformation of ecological habitats and loss of flora and fauna. Land transformation for tourism development can directly destroy ecological habitats. The use of resources for tourism involves an 'opportunity cost' as they are denied to other sectors of economic development.

Socio-Economic Issues: Just because something is marketed as ecotourism, it does not necessarily mean that the long-term motto of providing socio-economic benefit with protection of environment to the host areas will be achieved. The fact that ecotourism business is often owned and controlled by outside interests in just the same way as mass tourism means the economic benefits often are not used for the protection of the areas or to support the local community. Besides, the carrying capacity of host areas is not calculated. As a result, there is a breakdown of civil amenities during peak season when the influx of tourists is tremendous.

Impact over Locals: One of the basic objectives of ecotourism is to engage local communities so that they benefit from conservation, economic development and environmental education. While nearby inhabitants are most directly affected by the establishment of parks and protected areas, they also stand to profit by their conservation. Ecotourism deceives the locals in two ways. First, their traditional economic and social structure undergoes a transformation towards tourism monoculture. Secondly, the promise made to them to provide perennial source of income and rational distribution of profit made is highly insincere. Those locals get jobs but only of low quality, low valued and seasonal in nature. They serve mostly as tourist guide, food providers, or souvenir vendors in the locality. The lion's share of revenue generated goes only in hands of organizers. So, it can be said that the cost of ecotourism is borne by locals and big players like organizers make profit.

CHAPTER – 13

MISCELLANEOUS REGULATION

13.1: MAINTENANCE OF FOREST BOUNDARIES

The forest boundaries that have been properly maintained and boundary marks are seen at many places. However, in Range of Daund, Baramati & Indapur it requires proper demarcation and maintenance whereas in other ranges the work is just satisfactory. The survey and demarcation of acquired forests has not yet been done. Large area of RF has been taken back from the Revenue department during last plan period. This area needs to be demarcated with boundary marks without waste of time. It has also been observed that few forest areas bear the names of private individuals in the 7/12 extracts which are needed to be rectified. Old village maps bearing survey nos. and toposheets/ Bombay Forest sheets along with gazette notifications should be used for the survey and demarcation purpose in the field till the time all such issues get resolved.

13.1.1 The following works are required to be carried out for these areas:

- I. Detailed verification of village survey maps/ MRSAC map, Form No. 1 records and gazette notifications has been done by office of Dy. Conservator of Forest, Working Plan Division, Pune. Specific discrepancies observed are annexed as Appendix No. XLI. Area which is set aside as miscellaneous is needed to be verified and proper demarcation in the field has to be done as per sequence mentioned in Appendix No. XLII within a period of five years from the commencement of this plan. During the time of Mid-term review appropriate Working Circle should be allotted by the Working Plan Officer in consultation with territorial field staff. If areas could not be demarcated then separate report in details should be provided by DCF (T) Pune at that time of Mid-term review to Working Plan Officer through CCF (T) Pune

RANGE WISE DISTRIBUTION OF MISCELLANEOUS AREA

Sr. No.	Range	Area of Range in Ha.	No. Of Compartments		Area Allotted to the MISC.	% To the Area of the Range	% To the Area of the MISC. AREA
			Full	Part			
1	Vadgaon Maval	10124.18		2	102.88	1.01	1.79
2	Shirota	12766.60		1	2060.76	16.17	35.86
3	Paud	11770.701		2	311.61	0.19	0.40
4	Bhamburda	6514.60			74.86	1.14	1.30
5	Pune	7062.128		1	336.48	4.76	5.85
6	Daund	6107.97	1	4	731.08	11.96	12.72
7	Indapur	6753.67		2	2016.72	29.86	35.09
8	Baramati	5031.11			400.28	7.95	6.96
	Total	66130.9615	1	10	6034.67	8.68	100

II. The discrepancies found should be removed with the help of DILR by carrying out survey and final maps of the areas should be prepared and demarcated on the ground.

III. It is found that there is common tendency of neglecting maintenance of stone pillars erected earlier and go for raising new cement pillars. Therefore, precaution should be taken to maintain these stone pillars as well.

IV. The specifications of cement concrete pillars for boundary demarcation work, viz. size, design and cost are already approved by the PCCF, Maharashtra state, Nagpur; same has been given as Appendix No. XLIII. It is found that these cement concrete pillars are not that effective due to theft for iron rods embedded in it. It is learnt that boundary pillars on the lines of M.P. are being evaluated at PCCF (HoFF) office level, so as per their directives suitable pillar should be erected.

V. All Gazette notifications under various Indian Forest Acts, (1878, and its amendments from time to time, 1927 IFA) declaring lands as reserved and deforested should be collected and updating the area statement in Form No.1 by making mutation entries on time.

13.1.2. Procedure for Maintenance of Forest Boundaries

- I. **Clearance of the Boundary line:** Boundary line clearance on the artificial boundaries will follow the standard width as described in the directives on the subject. Trees should not be felled for the boundary line, but shrubby undergrowth should be cleared. Norm for the external boundary line is 12 meters. The inter compartment i.e., village boundary/ compartment boundary lines should be 3 meter wide.
- II. **Colour wash on the Boundary marks:** The forest beat guard shall be responsible for the maintenance and protection of all the boundary marks in his beat. He should get these marks colour washed annually after rains.
- III. **Recording GPS readings of Boundary Marks:** The forest beat guard should visit and record GPS readings of all boundary marks in his possession. He has to maintain Boundary Register with following specifications.

Boundary Mark Register

Range:

Beat Name-

Village Name & compartment no:

Boundary mark no.	Type of Boundary mark	GPS Reading		Remark
		Latitude	Longitude	

- IV. **Showing Boundary Marks on maps:** The location of the boundary pillars and cairns along with their numbers should be shown on the maps/ toposheets. The numbers shown on the toposheets will be maintained unless warranted by the compelling reasons. Such reasons must be reduced in writing and entered as a note on the master set of the maps. This master set will be made available to the Working Plan Division for updating the working maps and the digital database with GPS reading. Also register for maintenance of boundary marks should be updated at range and division level.
- V. **Inspection of Boundary Marks:** The Round Officer shall be responsible for the maintenance and protection of all the boundary marks in his round and shall see that they are maintained and properly repaired and colour washed by the beat guard. He shall check all the boundary marks and Boundary Register in a year. He shall also annually submit the R.F.O. a certificate in the following form –

“I, Shri./ Smt. _____
R.O. _____ certify that the annual length of the boundary lines as prescribed under the scheme given in the appendix of the Working Plan for Pune forest division has been verified by me personally and that boundary line and marks are found to be correct as per the maps. There are no encroachments or encroachments are as detailed below:

Signature of the R.O. with date.

13.2 PROGRAMME FOR 1/5TH BOUNDARY DEMARCATION

It is prescribed to work the entire boundary of Reserve Forest and Protected Forest in 5 years period. A statement showing details of 5-year boundary demarcation programme is given in Appendix No. XLIV.

- The Range Forest Officer, Mobile Squad at Circle level, will co-ordinate be crosschecking of ‘Compartment Inspection Certificates’.
- These guidelines shall be applied along with other directives issued for the forest protection from time to time. Other field officers will carry out their field inspections according to these guidelines as modified from time to time.

13.3. DEMARCATION OF COUPE:

- I. As far as possible, while allotting coupes care has been taken to follow natural boundaries as coupe boundary. The annual coupes for treatment will be demarcated one year in advance (except for coupe number ‘I’ where marking and working would be same year). The Range Forest Officer will thoroughly inspect the coupe after demarcation and issue ‘Coupe

Demarcation Certificate' in the prescribed format, given in the following paragraph, which is to be verified by the concerned Assistant Conservator of Forests.

Format for the Coupe Demarcation Certificate is prescribed, as follows

"I ----- R.F.O. -----certify that I have personally inspected the demarcation of the coupe No. ----- in Compartment No. ----- of W.S. -----of W.C. -----on dated----- and found that the coupe has been demarcated as prescribed in the working plan. The area of the coupe is - ----- hectares.

Date:

Signature of the RFO

- II. **Procedure for demarcation of Coupes:** Annual coupes have been prescribed to be demarcated by cutting and clearing bushy undergrowth on 3 (three) meter wide line and by erecting pillars or posts up to 2-meter height in middle of the cut line at suitable intervals, so as one pillar shall be visible from the other one, except where the coupe boundary runs along streams, fire line or road. The pillars shall bear the coupe number, name of the felling series and the Working Circle on the side away from the coupe.
- III. Selected trees, above 45 cm gbh, at suitable intervals standing on the periphery of the coupe will be given two coal tar bands and a geru band in between after scrapping the loose dead bark. The lower coal tar band will be at B.H. and the other coal tar band will be 15 cm above it. Just below the lower coal tar band *Tree serial number* in English will be given on the side away from the area of the coupe. The bands and serial numbers of such trees will be maintained in the marking register as following,

Sr. No.	Name of species	GBH (OB)	Remarks
1			
2			
3			

- IV. No tree, bearing the coupe demarcation bands, is proposed to be marked for felling.
- V. **Assessment of Natural Regeneration:** At the time of survey and demarcation, the staff should also assess the number of seedlings present due to Natural Regeneration in the coupe. The actual number obtained by total count or sampling, will decide the number of ANR seedlings that would be required at the time of NR operation as part of the post-harvest works in the coming year.

13.4 PREPARATION OF TREATMENT MAP:

- I. Immediately, after completion of demarcation of the coupe, Range Forest officer will prepare the treatment map with the help of stock map supplied by working plan division and Mahaforest Geoportal. Conventional stock mapping has been done by the staff of the working plan division with the help of territorial division. Working plan division has used satellite imageries and done ground truthing for verification. By taking support of these stock maps, the various treatment type areas as prescribed should be shown clearly. The concerned ACF will verify the treatment map and make corrections, if necessary, before submission to the DCF Pune for approval.
- II. The treatment map will bear the date of preparation by the Range Forest Officer and verification by the Assistant Conservator of Forests.
- III. Preparation of treatment map shall be done one year in advance of the coupe working. Timely preparation would facilitate necessary checking and corrections, if any in time.
- IV. In Pune working plan, forest area is treated under five different Working Circles. Treatment-types prescribed under these Working Circles have to be shown in treatment map of coupe. They are-

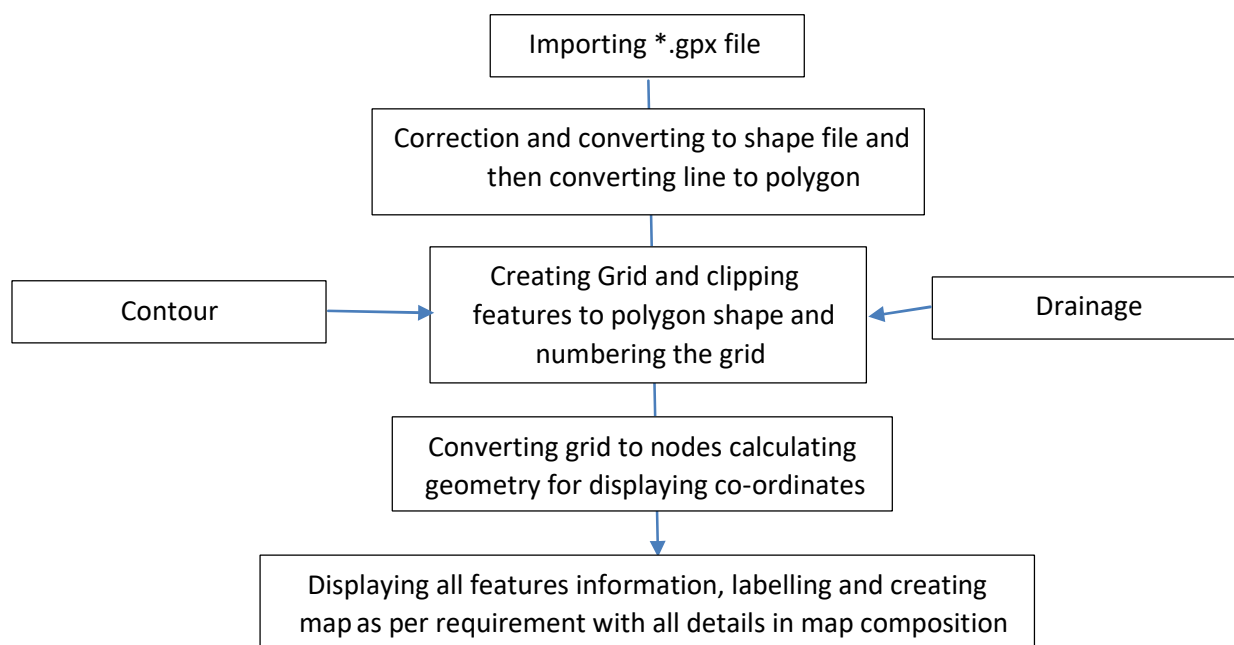
Working Circle	Treatment Types (To be shown in treatment map of coupe)
Protection WC.	Area 'A'- Protection areas Area 'B' – Under stocked areas Area 'C' – Old plantation areas Area 'D' – Well stocked areas
Afforestation WC	Area 'A'- Protection areas Area 'B' – Under stocked areas Area 'C' – Old plantation areas Area 'D' – Well stocked areas
Fodder Management WC	Area 'A'- Blank areas with shallow soil Area 'B' – Old plantation/ Better soil depth areas.
Improvement WC	Area 'A'- Protection areas Area 'B' – Under stocked areas Area 'C' – Old plantation areas (Area demarcation with no. of trees selected for improvement felling) Area 'D' – Well stocked areas

Urban Forest Management WC	Area 'A'- Protection areas Area 'B' – Under stocked areas Area 'C' – Old plantation areas Area 'D' – Well stocked areas

V. Immediately after seeking approval of the treatment map, site-specific work plan for the entire coupe shall be prepared by RFO, incorporating all the prescribed activities under various treatment-type areas marked on the map, entailing quantum of work involved, estimated amount required and period of operation for each activity. The work plan is proposed to be verified by the ACF concerned and submitted for approval to the competent authority.

VI. Treatment map of plantation:

Digital treatment maps should be prepared by adopting following procedure-



13.5 MARKING RULES:

- I. Trees marked for felling / petty felling will be given *geru bands* at breast height and will bear marking hammer impression at the B H (breast height) as well as at the base on the blazes of sizes 10 cm x 10 cm. The blaze size should be strictly adhered to so as to aid in identification of marked trees at the time of felling.

- II. All trees marked for felling shall bear serial nos. in coaltar only. The number of the trees marked shall be written vertically on the blaze as shown below:

XX (Hammer mark)

1

9

5

For Tree no. 195

Where xx gives marking hammer inscription and 195 is the serial no. of the marked tree.

- III. All trees bearing serial numbers will be individually recorded in marking (recording) book.

Serial number given in coal tar must be recorded in the marking book. Remarks column shall invariably mention about the deformities if any, such as Dead, Top broken, Hollow, severe insect damage etc.

Format for Marking of Trees for Harvesting

Tree Digit No.	Serial No. Coal tar	Name of species	GBH (OB)	Remarks

- IV. Abstract of trees marked for felling will be made in 15 cm girth classes.

Timber, poles and firewood trees will be shown, separately.

- V. Malformed trees alone will be recorded as fuel trees, except that of teak. A tree will be classified as fuel tree only when it is incapable of yielding any useful sawn timber or pole.

13.6.1. Regulations for fire protection

It is now well known that wild fire is one of the most important reasons of destruction of the forest and wildlife. One single uncontrolled fire in the summer season is capable of wiping off the fruitful results of several decades of hard labour and scientific forest and wildlife management. Hilly areas are prone to surface fires. Heavy frequency of forest fires is a great threat to forest flora and fauna. Fire incidences recorded in Pune forest division during last plan period is given below-

Sr. No	Year	No. of Fire Incidences	Area burnt (Ha.)
1	2	3	4
1.	2012-13	20	86.06
2.	2013-14	24	114
3.	2014-15	20	129
4.	2015-16	31	191.3
5.	2016-17	33	149.4
6.	2017-18	38	139
7.	2018-19	102	277.26

8.	2019-20	100	324.94
9.	2020-21	141	436.29
10.	2021-22	65	212.51
	Total	574	2059.76

13.6.2. Plan for Fire Management

Fire is a good servant but a bad master. If used judiciously fire can work wonders by way of controlled burning as a good management tool. This theme plan prescribes for managing fire for betterment of forest and wildlife. The important objectives of fire management are viz.

- i. To use fire as a management tool for controlled burning.
- ii. To maintain fire lines.
- iii. To detect and fight fires promptly.
- iv. To involve local people in fire protection.

The proposed measures for reducing forest fires are:

➤ Indirect Preventive Measures

- v. Involvement of the local people needs to be taken. MOU with the villagers should be done before the fire season.
- vi. Awareness programs through workshop, meetings, posters, handouts, boards and other media like short films shall be taken up.
- vii. Forbidding collection of minor forest produce especially honey during the fire season.
- viii. Action against dereliction of duty and reward for conscientious work in preventing forest fire.
- ix. Putting up notices prohibiting kindling, keeping and carrying of fire.

➤ Direct Preventive Measures:

- Forecasting of fire prone areas based on fire history of last five years, availability of combustible material.
- Organisation of training and briefing of staff for fire control activity.
- Fire fighting equipment's like rakers, blowers, cutters will be provided.
- Registration of all staff for fire alerts from FSI.
- Establishing good network of Fire lines & Watch towers to locate forest fires.
- Deployment of staff and fire watcher at vantage points / Watch towers to locate and extinguish fire.
- Strengthening the communication system.
- Efficient patrolling. Hazard reduction by clearing camping sites and areas along paths and roads.

➤ Post fire management.

- All the fire incidences will be recorded meticulously.
- The burnt areas will be mapped by taking GPS track.
- The cause of fire and extent of area will be enquired and recorded.
- The damage due to fire will be assessed and responsibility will be fixed.

13.6 ILLICIT GRAZING

The following steps should be taken to control the Illicit Grazing and bring it down to carrying capacity of the area.

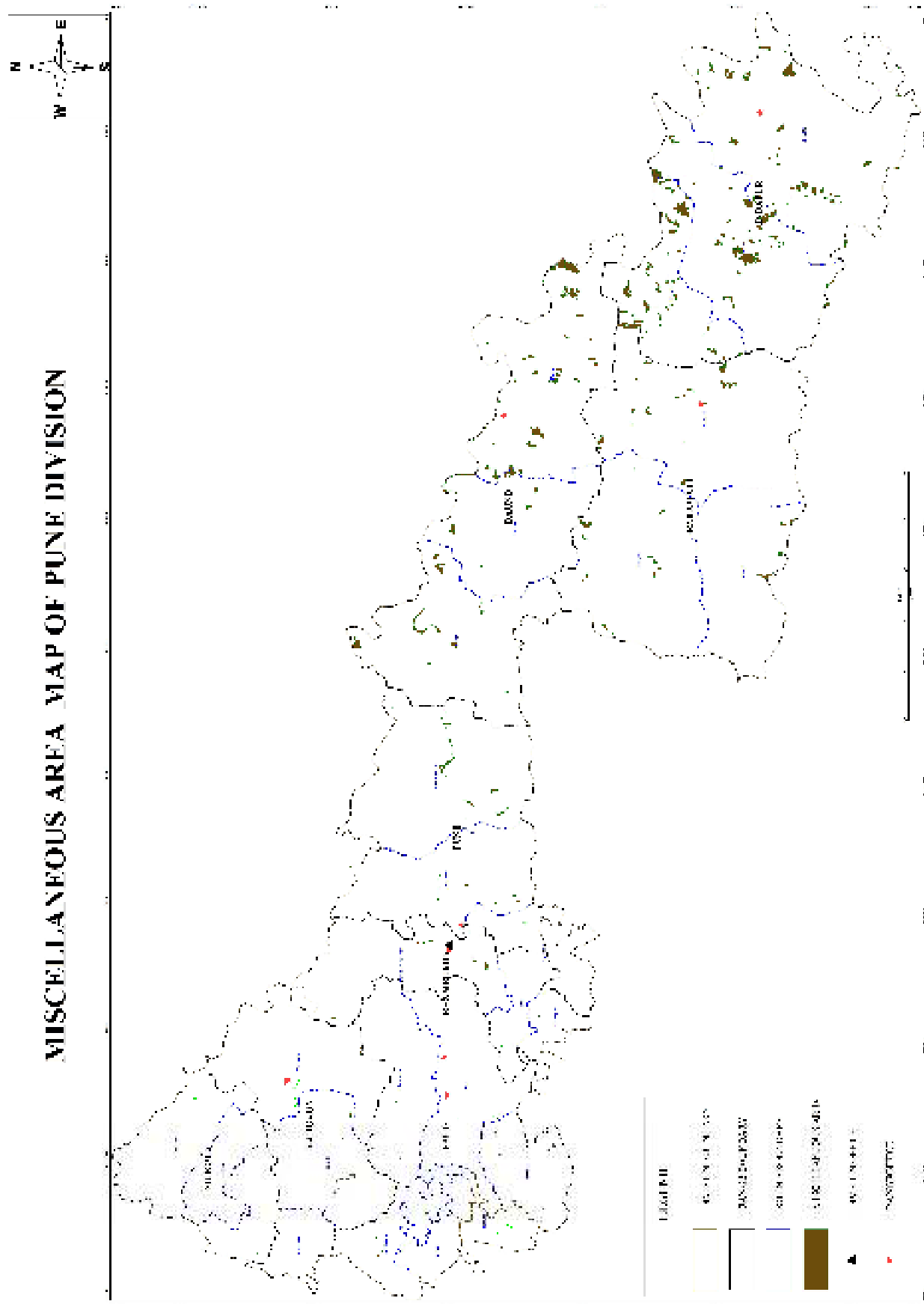
- (i) Local villagers should be educated and motivated for stalled feeding. This can be achieved by involving local villagers in forest management through JFM.
- (ii) Villagers should be motivated to reduce the cattle population by replacing unproductive animals to healthy and productive animals. The help of NGOs should be taken to achieve this objective.
- (iii) Rotational Grazing should be implemented in the areas reserved and identified for grazing on very restricted manner.
- (iv) The pasture areas with good quality grasses should be developed on community land by JFM Committees to meet the requirement of local villagers.

13.7 PETTY FELLING

Petty Felling and extraction for research and training needs should be allowed after approval from Chief Conservator of Forest (Territorial) and Conservator of Forest (Silviculture).

It is also necessary to emphasize the fact that experimental, preservation and sample plot, seed stand and their demarcated surrounds, etc. are excluded from all operations prescribed in the working plan. These areas are specially designated for conservation only and felling may be allowed only for research purpose.

MISCELLANEOUS AREA MAP OF PUNE DIVISION



13.8 ILLICIT CUTTING

Although dependency of local population on firewood is less, fast communication including vehicle facilities, adequate defense capabilities, frequent training and establishment of forest stations at strategic places are recommended to control illicit felling and wildlife offences. Establishing intelligence network for the purpose is strongly recommended. The Secret Service Fund scheme instituted by the Govt. of Maharashtra should be used to control illicit tree fellings.

In addition to addressing supply-side management by augmenting wood production on forest and other community land, the demand-side management should take up efficient wood utilization and energy efficient alternatives like smokeless chulhas, biogas, LPG connections, solar cookers, etc.

13.9 RIGHTS AND CONCESSIONS

Following are few rights and concessions which are mentioned in Form No. 1 viz.

- Right to access by footpath for fields, for water streams, temples, etc.
- Right for cart track road access to fields, streams, temples, etc.
- Right to access for village
- Right for conducting fairs during festivals for few villages e.g. Daranbre village Wadhadevi fair, Ganhuje village Mahadev temple, Malewadi village vanolia Hansdeo temple, Mangrul village Pir baba fair, Nanoli tarfe Nane village Khandoba temple fair, Nigade village Padmavati temple fair, etc.
- Right to cut and take grass for fodder at half of the fixed price.

Few rights were given during settlement process which were present for specific period or have been quashed over period of time by different acts and policies e.g. right of grazing to only few people have been controlled by restricted grazing by issuing passes.

CHAPTER - 14

CONTROL AND CONTROL & RECORDS

14.1: CONTROL AND RECORDS:

The following records will be maintained in Pune Forest Division Office:

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

14.1.1 Control Forms:

The records of subsidiary cultural operations, regeneration works, fire protection, NTFP harvesting practices, boundary pillars, and soil and moisture conservation works carried out as per this working plan prescriptions, will be mentioned in the control forms. Following control forms are prescribed for Pune division -

1. Control form for Protection Working Circle.
2. Control form for Afforestation Working Circle.
3. Control form for Improvement Working Circle.
4. Control form for Urban Forest Management Working Circle.
5. Control form for Private Forest - Survey & Demarcation.
6. Control form for Fodder Management Working Circle.
7. Control form for 1/5th boundary demarcation.
8. Control form for fire management.
9. Control form for NTFP management.

The proforma of the various control forms have been given in the Appendix No. XLVI of Volume II. Control forms are given both in Marathi and English language for better understanding of field staff.

Two sets of control forms will be prepared. One set will be kept in the division office and the other set will be submitted to the Dy. Conservator of Forests Working Plan Pune, through CCF (T) Pune along with abstract of division and comments if any. The Forms will be sent annually by the Deputy Conservator of Forests Pune (T) Division to the Dy. Conservator of Forests Working Plan Pune through CCF (T) Pune not later than October, 1st every year taking the necessary entries (as per prescriptions mentioned in National Working Plan Code 2014 Chapter X). The Dy. Conservator of Forests, Working Plan, Pune will scrutinize it and process further.

DCF Pune should arrange meeting of field staff with working plan officer every year to seek guidance regarding compliance of control forms and record related to implementation of working plan. Control forms and other records can be more effectively gathered by using simple techniques such as Google Forms or by developing mobile app.

14.1.2. Deviation Proposals:

When forestry activities are done in accordance with working plan prescriptions reporting is done through control forms but when variation is done / proposed from working plan prescriptions reporting is done through deviation proposal.

Petty fellings carried out as mentioned in Para under Petty fellings as well as removal of dead fallen firewood will not be constituted as deviation from the Working Plan. Deviations can be classified into two categories as per National Working Plan Code, 2014. Deviation beyond 20% of target is considered to constitute a major deviation and if it is below 20% of target is said to be minor deviation. Following is the format of Deviation Statement.

Statement showing deviations from working plan prescriptions

Year.....

Division.....

Sr. No	Control Book Name Form No. page	Reference to working plan		Nature of deviation requiring sanction
		Paragraph	Nature of prescription	

DCF Pune will forward through CCF(T) Pune the copies of this form in triplicate yearly, with his copy of control forms. No explanatory remarks are required on this form, but these should be given in the forwarding letter. All minor deviations, which do not permanently alter the basis of management, may be approved and sanctioned by the PCCF (Production and Management) on behalf of the PCCF (HoFF), provided he agrees with the necessity of these deviations. One copy of the statement will be returned to the DCF Pune through CCF(T) Pune after the deviations have been sanctioned and the other copy will be sent to Dy. CF (WP) Pune, for record. All major deviations without altering the basis of management, the prior sanction of the PCCF (HoFF) should have been obtained in advance; the sanction number and date should be quoted in the last column.

For all major deviations with respect to prescriptions where sanction of the MoEF & CC is mandatory, an explanatory note along with request for regularization has to be sent by PCCF (HoFF) to RAPCCF (MoEF & CC). In case where there is difference of opinion between the PCCF (HoFF) and RAPCCF (MoEF & CC), the former will refer the matter to DGF&SS (MoEF & CC), whose

decision shall be final. The PCCF (HoFF) will countersign the deviation statement for reporting to the MoEF.

14.2: COMPARTMENT HISTORY:

Compartment is a basic unit to analyze forest resource in working plan. The area of a compartment depends mainly on the intensity of management. In forest areas worked intensively, the area of a compartment is usually small and sometimes it may be around 10-20 hectares. However, in forests managed extensively, the area of a compartment may go up to 1000 hectares or even more. The other factors such as topographic and site variations may also affect the area of the compartment. Compartment is a basic management unit and most of time managed by more than one beat guard as boundaries of compartment are not in consonance with Beat or village.

National Working Plan Code 2014 says that *“There has been a paradigm shift in the objectives of management of forests and forest management has become more people centric and oriented to provide the goods and services from forests on sustained basis, with an emphasis on ecological services and harvest of usufructs as well. The working plan should be in consonance with general planning, which is village based. Therefore, the working plan should encompass the village as a unit and realign the compartments accordingly”*. Accordingly, area of Pune division is divided into 538 no. of village and 446 compartments. Separate compartment history files are prepared for each village / compartment. Stock of each village/ compartment is analyzed separately and maps are attached in compartment history file.

Compartment histories should contain a record of a various forestry activities and observations made in the past years and will be mentioned in the prescribed proforma of compartment history (CH) form number 1 to 9 should be invariable contains details information on aspect given below.

CH-Form No-1	Compartment description	To be filled by the WPO
CH-Form No-2	Compartment enumeration	To be filled by the WPO
CH-Form No-3	Bio-diversity assessment	To be filled by the WPO
CH-Form No-4	Management details	To be filled by the WPO
CH-Form No-5	Details of NTPF including MAPs	To be filled by respective beat guard every year and submit to DFO Pune. DFO Pune to submit to CF Working plan Pune through CCF (T) Pune.
CH-Form No-6	Trees Marked for felling since last plan	
CH-Form No-7	Compartment out-turn	
CH-Form No-8	Harvesting of NTFP	
CH-Form No-9	Past events during the last plans in the compartment	

Each Compartment must have a separate file for its records. Compartment history must be maintained in the office of Pune Forest Division, since they keep the record of past management practices and their effects on the growing stocks.

Every year, in July, the Range Forest Officer should get CH forms 5 to 9 filled and will send it to DCF Pune Forest Division for scrutinizing, editing through ACF in charge, who after doing so will get them typed and sign them. One copy of the forms will be sent to DCF, Working Plan Pune for scrutiny. Proforma of all control forms is given as Appendix No. XLVII in Vol. II

14.3: PLANTATION AND NURSERY REGISTERS:

Plantation registers will be maintained for all the areas regenerated artificially as per established departmental procedures. In Pune Forest Division plantation treatment maps are already being prepared by using GIS technique so further efforts should be made to prepare e-plantation registers.

14.4: Divisional Note Book: At divisional level all important matters will be recorded by the DCF every year with his explicit opinions about the working plan operations. A brief note about the plantation will also be recorded by the DCF under appropriate heads.

14.5 Fire Records: They should be maintained as per the latest orders from State Government from time to time.

14.6 Other Records: List of amendments to the working plan and list of area changes will be maintained in prescribed forms. **Up keeping of Form No.1 by updating the mutation entries regularly is very important.**

CHAPTER-15

NON-TIMBER FOREST PRODUCE

15.1: NON-TIMBER FOREST PRODUCE

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

15.2: GENERAL CONSTITUTION

The important NTFPs found in Pune division are Hirda fruits, Shikekai pods, Apta leaves, Nirgudi, Kadhipatta, Grass, Toran, Honey, Jamun, Behada fruits etc., and different medicinal and wild edible plants. The collection and sale of these NTFP generate employment to the local communities.

Non-Timber Forest Produce (NTFP) plays a key role in the life and economy of communities living in and around forest. The tribal people have been conserving plant and crop genetic resources as well as the knowledge of their utility. The people living in forest mostly supplement their food with leaves, tubers, flowers and fruits all year around. The medicinal plants play a key role in the health support systems in remote villages and also as a source of income.

Non- Timber Forest products (NTFPs) are increasingly argued as having high value in the tropical region (Mahapatra and Tewari 2005; Godoy et al 1993). Earlier in Year 1958-59 huge amount of Hirda was collected from Paud range has been reported in annual administrative report 1952. It is only in recent decades that the status of NTFPs has improved due to the realization that they contribute substantially to the rural economy. Historically, NTFPs have contributed towards rural livelihoods in both subsistence and commercial uses such as food, medicine, energy and so on.

15.3 GENERAL CHARACTERISTICS OF VEGETATION

The Pune Forest Division has following types of forests –

a) **Western sub-tropical hill forests**

These type forests are noted between the elevation of 700m and 900m on both the east and west slopes of the main crest line and around rocky open in Western Ghats. This type of forests is mainly composed of *Caryota urens*, *Ficus racemosa*, *Firmiana colorata*, *Garcinia indica*, *Mangifera indica*, etc.

b) **Southern moist mixed deciduous forests**

The moist deciduous forests in Pune division are at middle and lower elevations, especially along the slopes surrounding rocky areas and on the west side of the division. The top canopy of these forests is constituted by small trees of *Anogeissus latifolia*, *Terminalia chebula*, *T. bellirica*, *T. cuneata*, *Mallotus philippensis*, *Bridelia retusa*, *Tectona grandis*, *Ficus racemosa*, *Erythrina stricta*, *Heterophragma quadriloculare*, *Gnidiaglauca*, *Xantolis tomentosa*, etc.

c) Plateau vegetation

The plateaus and rocky slopes are interspersed with some stunted vegetation of *Terminalia chebula*, *Memecylonum bellatum*, *Syzygium cumini*, *Gnidia glauca*, *Atalantia racemosa*, *Pavetta crassicaulis*. Etc. Plateau vegetation shows great variation in floristic composition according to the microhabitats on it. The microhabitats identified on rocky plateaus are exposed rock surfaces, rock crevices, seasonal ponds, and soil covered areas. Exposed rock surfaces are generally occupied by lichens, mosses and small ephemeral angiosperms like, *Eriocaulon cookei*, *E. minutum*, *E. ritcheanum*, *E. stellulatum* and *Utricularia* species. Rock crevices support the populations of *Murdanniasp.*, *Eriocaulon* spp. and some grasses like, *Aristida stocksii*, *Arthraxon Puneensis*, *A. lancifolius*, *Arundinellaspicata*, and *A. tuberculata*. Larger crevices support populations of *Curcuma pseudomontana*, *Ceropegiasahyadrica*, *C. media*, *Pimpenellaadscendens*, *P. tomentosa*, *Senecio bombayensis*, *S. dalzellii*, ferns and grasses.

Seasonal ponds are generally inhabited by *Persicaria glabra*, *Rotala densiflora*, *Coixlacrym-jobi*, *Echino cloacolona*, *Sporobolus indicus* and *Pogostemon stellatus*. The soil covered areas are densely inhabited by *Habenaria grandifloriformis*, *H. heyneana*, *Hypoxis aurea*, *Drosera indica*, *Curculigo orchioides*, *Rhamphicarpa fistulosa*, *Sopubiadel phinifolia*, *Burmanna coelestis*, *Smithia bigemina*, *S.purpurea*, *S. pycnantha*, *S. blanda*, *S.sensitiva*, *S.setulosa*, *Utriculariaal bocaerulea*, *U.uliginosa* and *U. striatula*.

This vegetation of monsoon flora along with the grasses confers a mass effect of blooming during and post monsoon periods to the plateau vegetation. This mass blooming also indicates successive changes occurring in the composition of dominant species on these plateaus. These areas show more herbaceous diversity because of the microhabitats supporting short-lived herbaceous taxa.

15.4: FELLING SERIES, CUTTING SECTIONS AND JFM AREAS:

Not Applicable

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

Entire Forest Area of the Division.

15.6: SPECIAL OBJECTIVES OF MANAGEMENT:

As per the National Forest Policy, 1988 and ‘**The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act,2006**’, the development of Non-Timber Forest Produce (NTFP) has been one of the most important objectives in forest management. Draft National Forest Policy 2018 has pursued sustainable management of NTFPs such as medicinal and aromatic plants, oil seeds, resins, wild edibles, fibre, bamboo and grass etc. Therefore, consistent with these policies and law, the special object of management is enunciated as below:

- i. To manage the marketable NTFPs on sustained basis in the division and to help ensure reasonable returns to the local villagers especially the tribal communities
- ii. To improve stocking of various NTFP species in the forest areas and enhance collection of various NTFPs by improved collection techniques.
- iii. To get enhanced economic returns by training the local communities on value addition techniques and marketability of various NTFPs found in the division.
- iv. To generate employment and improve the economy of the local people and thereby improving their socio-economic conditions.
- v. Conservation of natural habitats with active involvement of local community.

15.6.1: ANALYSIS OF THE CROP:

- i) A sizeable portion of the forests of this division is of sub-tropical hill forest type, which supports few species of NTFP value, namely, Hirda, Amba, Behada, Shikekai, Jamun, Karonda *etc.* These trees are found scattered in western part of the division and well mixed with other species. NTFP collection also generates employment opportunities. The important NTFPs found and collected in this tract are Hirda fruits, Shikeki pods, Behada fruits, Jamun Fruits, Karonda fruits, Honey *etc.*
- ii) The tract is rich in variety of medicinal plants like Vavding fruits, Nirgudi, Bedki leaves, which are used for curing various ailments by the local people. Agharkar Research Institute, Pune has done exhaustive study on 'Important Medicinal Plant Resources of Maharashtra. Quantitative assessment made in this study shows that Pune district has more than 300 medicinal plant species which are collected and traded, which is highest amongst all districts in the state. Salient features of this study in case of Pune division are as follows-

Taluka	Soil type	Occurrence			Grand Total
		Common	Occasional	Rare	
Baramati	Laterite	2	14	12	28
Daund	Black	3	5	2	10
	Laterite	3	11	3	17
Haveli	Laterite	2	14	7	23
	Red	1	19	15	35
Indapur	Laterite	3	14	1	19
Maval	Laterite	1	13	1	15
	Red	2	21	13	36
Mulshi	Laterite		20	5	25
	Red	5	29	24	58
Grand Total		22	160	83	266

iii) Details of number of medicinal plants available, their occurrence etc. is given in Appendix No. XLVIII.

The tribes such as Katkari, Varli, Konkana, have been using these plants from time immemorial. The knowledge about these plants has been handed over from generation to generation. The present-day traditional medicine man or vaidu are rare and handful. Among the younger generations due to lack of interest as well as people's tendency to transmigrate at cities for profitable job, there is option of losing the prosperity of knowledge in near opening. This is appropriate time to obtain and to preserve the traditional system of medicines with by proper identification and documentation of the specimen. This will help to their conservation through cultivation and will reduce the pressure to over exploitation from natural habitats.

In one study on ethnobotany of all talukas in Pune division, 53 species were found, their use and occurrence are as follows –

List of Ethno Medicinal Important Plant Species and their occurrence in all Talukas of Pune Forest Division

Species	Taluka					
	Baramati	Daund	Haveli	Indapur	Maval	Mulshi
<i>Abrus precatorious</i>			✓			
<i>Abutilon indicum</i>			✓			
<i>Acacia chundra</i>			✓		✓	✓
<i>Acacia concinne</i>						✓
<i>Acorus calamus L.</i>			✓			
<i>Aegle marmelos</i>			✓			
<i>Ailanthus excelsa</i>	✓	✓				
<i>Alangiumsalviifolium</i>	✓					
<i>Albizia lebbeck</i>	✓	✓	✓	✓		
<i>Aloe vera</i>	✓					
<i>Alstoniascholaris</i>			✓			✓
<i>Anogeissus latifolia</i>			✓			✓
<i>Argyrea nervosa</i>					✓	
<i>Aristolochiabracteolata</i>		✓				
<i>Asperagusracemosus</i>			✓	✓	✓	✓
<i>Azadirachta indica</i>	✓	✓	✓	✓		✓

<i>Bacopa monnieri</i>	✓	✓	✓	✓		
<i>Balanitis aegyptiaca</i>	✓			✓		
<i>Barleriaprionitis</i>				✓		✓
<i>Bauhinia variegata</i>					✓	
<i>Boerhaviadiffusa</i>	✓	✓	✓	✓		
<i>Bombax ceiba</i>			✓		✓	✓
<i>Boswellia serrata</i>			✓			
<i>Bridelia retusa</i>			✓		✓	✓
<i>Buchananiacochinchinensis</i>	✓		✓			
<i>Butea monosperma</i>			✓		✓	✓
<i>Caesalpinia bonduc</i>				✓		
<i>Careya arborea</i>					✓	✓
<i>Cassia fistula</i>			✓		✓	✓
<i>Catunaregam spinosa</i>						✓
<i>Celosia argentea L</i>		✓				
<i>Centella asiatica</i>		✓			✓	
<i>Chlorophytum borivillianum</i>						✓
<i>Cissampelos pareira</i>						✓
<i>Crateva magna</i>						✓
<i>Cullen corylifolium</i>			✓			
<i>Curculigoorchioides</i>					✓	✓
<i>Desmodiumgangeticum</i>						✓
<i>Drimia indica</i>	✓	✓	✓			✓
<i>Ecliptaprostrata</i>	✓	✓				
<i>Embeliabasaal</i>					✓	✓
<i>Entada rheedii</i>					✓	✓
<i>Eulophida nuda</i>					✓	✓
<i>Fagoniaschweinfurthii</i>	✓	✓				
<i>Garcinia indica</i>						✓

<i>Glossocardiosvalla</i>	✓	✓		✓		
<i>Gmelina arborea</i>				✓		✓
<i>Gymnemasylvestre</i>					✓	✓
<i>Helicteresisora</i>					✓	✓
<i>Hemidesmus indicus</i>	✓		✓			✓
<i>Hiptagebenghalensis</i>						✓
<i>Holarrhenapubescens</i>			✓		✓	✓
<i>Hygrophila auriculata</i>		✓	✓			
<i>Justicia adhatoda</i>			✓			
<i>Limoniaacidissima</i>			✓			
<i>Madhuca longifolia</i>			✓		✓	
<i>Mallotusphilippensis</i>					✓	✓
<i>Mimusopselengi</i>					✓	
<i>Moullava spicata</i>						✓
<i>Mucuna pruriens</i>					✓	✓
<i>Nothapodytesnimmoniana</i>					✓	✓
<i>Phyllanthus emblica</i>					✓	✓
<i>Piper nigrum</i>					✓	✓
<i>Plumbago zeylanica</i>	✓	✓	✓			
<i>Polycarpaeacorymbosa</i>				✓		
<i>Premnaserratifolia</i>						✓
<i>Pterocarpus marsupium</i>			✓			✓
<i>Rothea serrata</i>						✓
<i>Rubia cordifolia</i>					✓	✓
<i>Santalum album</i>			✓	✓		
<i>Sapindusemarginatus</i>			✓			
<i>Saracaasoca</i>			✓			✓
<i>Semecarpus anacardium</i>			✓			
<i>Solanum americanum</i>	✓					

<i>Solanum anguivi</i>					✓	✓
<i>Spermadietys suaveolens</i>			✓		✓	
<i>Syzygium cumini</i>	✓	✓	✓		✓	✓
<i>Tactona grandis</i>		✓	✓	✓	✓	✓
<i>Tamarindus indica</i>	✓	✓	✓	✓	✓	
<i>Tephrosia purpurea</i>	✓	✓		✓		
<i>Terminalia bellirica</i>			✓		✓	✓
<i>Terminalia chebula</i>					✓	✓
<i>Tinospora cordifolia</i>	✓		✓	✓		
<i>Tribulus terrestris</i>	✓	✓		✓		
<i>Tylophora indica</i>					✓	✓
<i>Withania somnifera</i>	✓		✓			
<i>Woodfordia fruticosa</i>			✓		✓	✓
<i>Zanthoxylum rhetsa</i>					✓	✓
Grand Total	22	19	40	17	34	52

iii) Utilization of wild plants as food is the oldest tradition. Vartak (1980); Vartak and Gadgil (1980) reported 120 wild food plants from three districts of Western Ghats, Konkan region of Maharashtra and Goa. They also had given emphasis on more explorations and documentation of the wild resources from rest of the Maharashtra state. The people residing in the remote and hilly area fulfil their need for food by using the available resources from the forests, because the farm produce is not sufficient to make ends meet for a year. Tribals are well acquainted with the useful plants from surrounding forests and know what is edible and process of separating harmful substances from edible parts through mechanical methods or through processing. But due to overpopulation and shrinking forest areas, many plant species are at the verge of extinction and need due care for their conservation. These plants may become the supplementary source of food for common peoples if brought under cultivation. Such edible plants and wild relatives of the established crop plants are reservoirs of important desirable genes for resistance against fungal, bacterial and especially viral pathogens. They also harbour resistant genes for adverse climatic conditions such as drought, frost, water lodging, etc.

The wild edible plants have rich nutritional values and are rich in providing vitamins and bio-active compounds.

In Pune division traditionally wild edible plants are being collected, consumed for many decades. Recently efforts are being made to popularize it among city dwellers by organizing Wild Vegetable

Festivals. The purpose of initiating such festivals is to create awareness about the wild edible plants and also to regain respect for traditional food which has been existed for decades in the country. Exhaustive list of wild edible plants is given as Appendix No. XLIX.

15.6.2 SILVICULTURAL SYSTEM

NTFP collection is very meagre and restricted to only few species and that too in few pockets of Pune, Shirola, Wadgaon Maval, Paud, Bhamburda, ranges. Therefore, specific holistic efforts are required to encourage JFMCs to harvest NTFPs to create livelihoods.

Proper grading, value addition and exploring new markets for the traditional NTFPs, shall be included under the JFM programme of the Division. The possibility of involvement of good NGOs like Medicinal Plants Conservation Centre & Trust, BAIF, in such an endeavour should be explored.

15.6.3 ROTATION PERIOD: No felling is prescribed in this Chapter and so rotation period is not applicable.

15.6.4 HARVESTABLE DIAMETRES: The collection of NTFPs on sustainable basis without ruining the crop remains the fundamental principle of prescriptions provided in this chapter. As no felling is prescribed, no harvestable diameter is prescribed.

15.6.5 REDUCING FACTORS AND REDUCED AREAS: Not applicable

15.6.6 FELLING CYCLE: The sustainable collection of NTFPs will be done annually as per the monitoring plan prepared at division level.

15.6.7 DIVISION INTO PERIODS AND ALLOTMENT TO PERIODIC BLOCKS:

Not applicable

15.6.8 CALCULATION OF YIELDS: Because of lack of proper recording NTFP collection data, the past yield and future yield forecast cannot be done.

15.6.9 TABLE OF FELLING: Not applicable.

15.6.10 METHOD OF EXECUTING THE FELLING

Traditional felling is not expected but process of implementation of sustainable harvesting through participatory approach shall be followed for sustainable harvesting. At present hirda fruits are collected by beating the trees, similarly wild edibles, medicinal plants are also extracted by using destructive methods, which leads to unsustainable yield and threat to its conservation. For sustainable extraction and better value for NTFP following methodology devised by KFRI is suggested as follows-

a) Criteria for species selection

1. Species providing higher livelihood opportunity to communities with more commercial value.
2. Species harvested for different parts, which have medicinal value.
3. Species heavily harvested due to high demand from market trade, which is likely to increase in future.

4. Species collected only from the wild that warrants maintenance of their stock and productivity for posterity.
5. Plant parts that are collected following destructive collection methods.
6. Species representing various habits.
7. Species of conservation concerns especially plants belonging to threatened categories and/or species endemic to region.

b) Process of implementation of sustainable harvesting through participatory approach

In the participatory approach, task team members under the supervision of JFMC should be involved in the implementation process such as collection, value addition and the marketing of medicinal plants at JFMC level. Following are the steps to implement sustainable harvesting practices.

1. Those engaged in collecting the plants within the jurisdiction of a JFMC should be identified and trained in sustainable harvesting regimes and marketing arrangements. All should be issued identity cards signed by the Range Forest Officer and the president of the JFMC, and are allowed to collect identified medicinal plants as per the harvesting regime. This will help to create resource ownership among the collectors and also check illegal collection by outsiders.
2. Task team members are expected to conduct population status and resources assessment of the identified species with technical support from the field staff and some NGOs working in this field.
3. Collectors should be provided with necessary equipment and tools by Pune division either through JFMCs or through other fund resources like District Innovative Works scheme or CAMPA.
4. Task team members should be provided field training on the collection of improved harvesting methods. They in turn should train and build the capacity of other collectors in the JFMC to follow the sustainable practices.
5. In each site, collectors should be enforced to make collection of identified medicinal plants species following the improved harvesting practices developed through participatory approach.
6. There has to be collection and storage center's ideally run by the JFMC from where the material collected by the authorized collectors can be received. The base price fixed by the JFMC can be paid to the collectors on the spot through revolving funds given to JFMCs by the forest department through FDA. Issuance of passbook to all the collectors may be arranged to record the details about the stock of medicinal plants received with information on the quantity, date, price and the amount paid.
7. Post-harvest interventions in value addition such as cleaning, drying and packing, can be taken up by the members of SHGs and the JFMC.

8. The opportunity for direct market linkages for sustainably collected wild plant materials needs to be explored. In the case of providing market linkages from herbal industries, the JFMCs will enter the MoU agreement under the supervision of forest department. It is expected that providing market linkage to sustainably harvested materials from herbal industries should increase the margin of profit. Besides, the usual marketing methods like open tendering, auctioning can also be attempted under the supervision of forest department.
9. The price appreciation from the market price has to be worked as they are sustainably collected with the herbal industries. The distribution of net profit obtained from the sale (after deducting the expenditure) may go to the collectors as a bonus from the JFMC. Besides, some portions of profit can be retained by the JFMC for maintenance purposes.

c) Steps followed in developing Good Collection Practices (GCPs)

1. Species prioritization using criteria that include large collection, part(s) collected, value addition possibility, increasing market demand and conservation importance.
2. Development of Good Collection Practices (GCPs) protocols.
 - Resource assessment of harvestable plant materials available for the season.
 - Good collection practices on
 - i) what to collect;
 - ii) what stage to collect;
 - iii) when to collect;
 - iv) how to collect;
 - v) how much to collect;
 - vi) how to transfer
 - vii) Value addition practices including drying, powdering, packing, etc.
3. Field implementation of sustainable wild collection and value addition
 - Formation of 10 - 15 stakeholder members as a 'Task Team'
 - Documentation of traditional knowledge to be used in the preparation of good collection practices protocols
 - Capacity building of plant collectors through interactive meetings, field training programmes, exposure visits, etc.
 - Facilities such as storage godown, drying yard, processing equipment, collection tools are provided
4. Market linkage is provided through organizing regular meetings between pharmaceutical industries and plant collectors.

15.6.11: ASSOCIATED REGULATION & MEASURES:

15.6.11.1: OWNERSHIP OF NTFP:

The statutory provisions have vested ownership rights over the listed NTFPS species in the village communities in the Scheduled Areas without granting such rights over the trees and the land. Till recently, this list did not include Tendu, Apta and Bamboo, the prominent NTFP species in this tract. But after the enactment of ‘The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006’, even these forest produces have been included in the category of NTFP. The Seventy-third Amendment of the Constitution of India has brought the NTFPs under the management of the Village Panchayat. NTFPs (MFPs) in the state and its sale procedure can be categorized into two parts:

A) 33 NTFPs (MFPs) in scheduled areas

B) Other NTFPs (MFPs) excluding 33 NTFPs in scheduled area and NTFPs in Non-Scheduled Areas.

A) 33 Minor Forest Produce in Scheduled Areas:

- 1) “Govt of India passed the Provisions of the Panchayat Extension to the Scheduled Areas in 1996”. In pursuance to this, Govt of Maharashtra passed Maharashtra Act No XLV of 1997, “Maharashtra Transfer of Ownership of Minor Forest Produce in the Scheduled Areas and the Maharashtra Minor Forest Produce (Regulation of Trade) (Amendment) Act 1997.”
- 2) As per 1997 amendment, 33 Minor Forest Produce found on Govt land in Scheduled Areas; ownership lies with Gram Sabha.

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

1. R & RD, GoM, Govt. Resolution dated 5th October 2011, confers the rights of NTFP collection, processing and sale to the JFMCs. Therefore, capacity building of JFMCs is crucial for realizing the potential of harnessing employment generation to JFMC members and additional income to the committee to further invest in the development of NTFPs.
 2. Forest Rights Act, 2006 confers the rights over NTFPs to the community right holders. Therefore, in areas where the CFRs (involving NTFPs) have been vested with village community, in such areas, the process of NTFP collection, processing and sale has to be initiated by that community.
 3. Excluding the above-mentioned areas, DCF can form NTFP units and put for auction. However, mechanism has to be evolved to regulate excess harvesting.
- Based on estimation figures of NTFPs, it is evident that the distribution of NTFP tree species is not up to the mark. Efforts need to be taken to increase the area under NTFPs wherever the concentration of those species is present.

The above estimation includes only tree species. Systematic efforts need to be taken at Divisional level to collect the data of valuable shrubs and herbs of important NTFPs.

15.6.11 SUBSIDIARY SILVICULTURAL OPERATIONS, CLEANING AND THINNING

Fire Protection Measures: Collection of NTFPs is frequently associated with forest fires, because the villagers set fire around the NTFP yielding trees for clearance of leaf litter and undergrowth. If it is left unattended, such fires spread into forests resulting in damage to huge track of forests.

- The Village Panchayats and JFMCs shall be involved in awareness creation programme to help control forest fires.
- In case of forest fire, legal action should be taken against the defaulters. Strict vigilance is necessary during the months of February to April to limit the spread of fires especially during Mahua flower season.

15.6.12 REGENERATION

The treatment to be given will be different for different types of NTFPs.

Therefore, the treatment prescribed for important NTFP is as follows:

15.6.13. MANAGEMENT OF MEDICINAL AND EDIBLE PLANTS:

In Pune division many useful plants are harvested and sold in local markets to make ends meet by local peoples. Especially in the western parts among hills of Sahyadri, the tribals are dependent on many plant taxa for their needs. The plants are directly harvested from forests natural populations without any conservation steps taken. Following are the plant taxa generally used as medicinal plants and harvest in unscientific way which leads to destruction of natural populations of the species. The plants mentioned in the table given in Appendix No. XLVIII, are being harvested for different purposes in Pune division by the local peoples. Plant part(s) harvested presently Present status & threat, how to multiply / Multiplication mode, habitats for plantation in new areas, sustainable Management of harvest is given in this table.

Beside these plants some more plants are also harvested, but considering the need of conservation and available population of the useful plants only few are mentioned. The proposed strategies are aimed towards development of cultivation practices for the important plant resources which are fulfilling the ends meet of many local peoples.

There is need for sustainable conservation which include following steps to be taken on priority basis.

1. Identification of use value plants and their present natural population(s).
2. Mapping distribution of the plants across the division.
3. Finding out suitable in situ method for multiplication with efficiency of multiplication.
4. Identification of potential suitable sites for reintroduction of plantlets.
5. Development of cultivation practice for efficient survival of the plantlets.

6. Introduction of the plantlets in pre-identified localities in nature.
7. Regulation of harvesting by locals.
8. Training of the locals for sustainable harvest, multiplication and usage of valuable plant resources.

These objectives should be attained through involvement of Forest personals, Subject experts, and local peoples. In this regards, guidance of local researchers Dr. S. R. Rahangdale and Dr. S. S. Rahangdale would be taken.

CHAPTER - 16

SCIENCE AND RESEARCH

During the process of writing of this, Plan the following papers, articles, reports and documents were referred and used for the writing of the Plan.

Table - List of papers, articles, reports, books and documents

Sr. No.	Institute / Department	Subject
1	SOFR 2017	The condition of the forests & forest cover over the last decade during the implementation of the plan based on the FSI satellite data.
2	National Forest Inventory Manual	Forest inventory
3	Carbon Statistics of India	Carbon & Forest Eco-system Methodology for the assessment of Forest Carbon, accounting of Forest Carbon Stock.
4	Agharkar Research Institute	Mapping and documenting floral and faunal diversity of Selected Sacred Groves of Pune District (excluding Junnar & Bhore Division)
5	Agharkar Research Institute	Important Medicinal Plant Resources of Maharashtra
6	Wildlife Institute of India	Project Proposal titled “Understanding Population Dynamics, Space Use, Movement and Diet of Leopards in Junnar Taluka, Maharashtra for Human Leopard Conflict Mitigation”
7	Modern Arts, Science, Commerce College, Ganeshkhind, Pune	ओळख रानभाज्यांची ख-या नैसर्गिक सेंद्रीय भाज्या
8	Govt. of India, Ministry of Water Resources, Central Ground Water Board	Ground Water Information Pune District Maharashtra.
9	Maharashtra State Biodiversity Board, Pune (M.S.)	Making Biodiversity a Community Resource, People's Biodiversity Register, A “How-To” Manual
10	Research Paper by Savita Nagarkar & Vinaya Ghate	Status of Sacred Groves in Junnar Taluka, Pune District.
11	International Journal of Research in Biosciences, Agriculture and Technology.	Some less known wild plant resources used as food in Pune region of Maharashtra, India.
12	International Journal of Research in Biosciences, Agriculture and Technology.	Biodiversity in Wild Vegetable of Konkan region- Maharashtra.
13	Research Paper by Sanjaykumar Rahangdale & Savita Rahangdale	Potential wild edible plant resources from Maharashtra: Future prospects for their conservation and improvement.
14	निसर्गसेवक : ऑक्टोबर 2016 *12*	कुडेश्वर रानभाजी महोत्सव
15	Research Paper by Dr. Vinaya Ghate	रानभाज्यांचे भांडार
16	MACS – Agharkar Research Institute, Pune	Forest food of Northern region of Western Ghats.

17	Arid Forest Research Institute, Jodhpur (Rajasthan) and State Forest Department, Jaipur, Rajasthan	A Manual for Dry Land Afforestation and Management.
18	Publication of Forest Department	Biodiversity of Durgawadi Plateaus- by Sanjaykumar Rahangdale & Savita Rahangdale
19	Pune District Environment Atlas DEA Report 2008 – MPCB	Wetlands in Pune
20	National Wetland Atlas	
21	GSDA - Central Ground Water Board, Central Region, Nagpur	Report on the Dynamic Ground Water Research of Maharashtra: 2011-12
22	Research Paper by Sanjaykumar Rahangdale & Savita Rahangdale	Floristic diversity of Bhimashankar Wildlife Sanctuary, northern Western Ghat, Maharashtra, India
23	Research Paper by Rajib Biswal	Exploring the contribution of NTFPs to Rural Livelihood
24	Report of the Sub- group II on NTFP & their sustainable Management in the 12 th 5- year plan	NTFP management
25	KFRI, Peechi, Keral	Medicinal plants- Benefit Sharing, Development, Conservation
26	Research paper by Surabhee Konkanel, Sangeeta Thumati, Manik Phatak, Sunil Bhide, Ajit Vartk and Dilipkumar Kulkarni	Carbon Sequestration of Sacred Groves in Ambegaon taluka of Pune districts through student activity
27	Research paper by M. R. Bhise, S. S. Rahangdale, S. R. Rahangdale, S. V. Kambhar	Floristic Study of Kalbhairavanatha Sacred Grove, Terungan, Ambegaon Taluka, Pune
28	Evaluation Report 487, Forest Department, Maharashtra	Evaluation of MPCAs
29	Evaluation Wing, Forest Department, Maharashtra	Evaluation Reports during 2009 to 2016
30	Forest Department, Maharashtra & Agharkar Research Institute	Forest Foods of Northern Region of Western Ghat
31	Forest Resources Assessment Working Paper 183 Rome- FAO	Towards The Assessment of Trees Outside Forests
32	Expert Committee Report 2018 – MoEF & CC	Strategy for Increasing Green Cover Outside Recorded Forest Areas
33	District Environmental Atlas - MPCB	Wastelands, Dams, Drainages in Pune
34	Study project done by Wildlife Division Pune, BNHS, Anthra and Wildlife Conservation Society	Ovitala Landga

16.1 RESEARCH GAPS:

Some research work has been done especially on Sacred Groves, Wild edible plant resources, inventory of medicinal plants but there is no linkage between this research and department. Hence department is not aware of these facts and figures.

The research gap is in almost every aspect of the Working Plan as the scope of earlier Plans was restricted in many issues like Biodiversity and all its components, Climate change and Carbon sequestration, NTFP research, Trees outside forests, Social and cultural aspects of forests, Ecosystem Services etc. However, an area in which the research gap is felt is as below;

- **Biodiversity:** Apart from a few mammals, trees and a few major herbs and shrubs, the Department does not have record of the whole gamut of biodiversity of the Divisions. In this Plan, information was taken from different sources for Birds, reptiles from BSI/ ZSI. It is clear that a Biodiversity Assessment study is very much required for the documentation of the richness of our forests.
- **Carbon sequestration:** Carbon sequestration is an important aspect of the contribution of forests towards Climate Change. However, since we do not have base data, it would be difficult to monitor the increase/decrease in sequestration levels. Also, the methodology for the assessment of the different pools of Carbon should be very clear to the SOFR units so that information will be more accurate. Research is needed for Tier-III level measurements of the key C-stock components over time.
- **NTFP Research:** NTFP is integral to the health and productivity of the forests. Though we have data on the major NTFP tree species and few prominent medicinal plants, it is known that the people around forests use many more variety of species than we ever know. There is a need for research to be done for the documentation of all the species that are being used by the people and also to devise the best methods for the harvest of the species through experimentation.

16.2 PRESERVATION PLOTS:

National Working Plan Code 2014 emphasize that sufficient number of preservation plots should be created and maintained for preserving representative patches of existing forests as far as possible in their present form and preserving such selected plots from all forms of disturbances so as to allow progression towards climax form and to study and correlate vegetation change matrix with the impact of climate variation., DCF Pune in consultation with CF, Research, Pune, should identify one or two sacred groves for establishing it as Preservation Plot.

- These plots should be well-demarcated on the ground, geo-referenced and plotted on a GIS-based map. The trees on the border should be demarcated with such demarcation as were marked in the other Preservation Plots in the country/state.
- The preservation plot will be completely fenced with Chain link fencing.
- These plots shall be spared from all human interference including harvesting operations, if prescribed in the Plan. Activities shall be limited to those that would ensure protection and maintenance.

- The recordings for the Preservation Plots should be updated timely and a copy of the same be submitted to Working Plan office annually.

16.3 SAMPLE PLOTS:

National Working Plan Code 2014 also emphasize that similar to preservation plots, establishment of representative sample plots of all ages, all species in different site qualities along with revival of previous sample plots for growth studies and a set of separate sample plots for NTFP should be planned for more focused research aspects in this chapter. As per National Working Plan Code 2014, exercise of Tree Enumeration has been done in all ranges, out of these tree enumeration plots, per range two representative plots should be identified and establish it as Sample Plot. In consultation with Research Wing and Working Plan division, a time schedule for data collection should be provided so that sustainable management of forests can be prescribed on the basis of scientific analysis.

16.4 REGENERATION PLOTS:

National Working Plan Code 2014 says that Regeneration Plots may be established to study the regeneration status of important species. In year 2013-14 exercise of Natural Regeneration on 5 ha. through Shramdan was done. Out of this plots some small plot of say 0.1 ha. Area should be set aside as Regeneration Plot. Data should be collected on population dynamics of seedlings, saplings and young trees. By marking them and monitoring their status periodically, finding out the conditions in which a species regenerates best and creating those conditions can make the working plan effective with regards to forest sustainability. While monitoring the marked seedlings, causes of damage, effect of canopy gap, growth parameters, role of mycorrhizae and litter cover management should be considered. Similar exercise is being done by Research Wing, so required guidance may be taken from them regarding various aspects.

16.5 NTFP PLOTS:

As per National Working Plan Code 2014, permanent plots of suitable sizes may be laid for development of safe harvesting protocol and the optimum limit of the harvest should be standardized for assured regeneration of the species. Extraction of NTFPs like Nirgudi oil, Bedki leaves, Shikekai powder is being done with value addition by involving local villagers. NTFP plots should be selected from this MPCA area.

As prescribed in code, following harvesting regimes may be experimented to work out safe harvesting limit:

- 100 % harvest of the marketable parts (by removing the whole number)
- 75 % harvest of the marketable parts (by leaving 25 % of the whole number)

- 50 % harvest of the marketable parts (by leaving 50 % of the whole number)
- 25 % harvest of the marketable parts (by leaving 75 % of the whole number)

The plots should be laid in triplicate. The plots so treated shall be visited after a gap of one year to enumerate the number of new recruits and the effect of above removal shall be calculated using standard mathematical formulae.

16.6 OTHER RESEARCH AND EXPERIMENTAL PLOT

At present there are no seed orchards, clonal seed orchards in Pune division. In Pune division, some nurseries like Bhambhurda Range, Wadgaon nursery & Shiota Range Nursery has expertise in raising good nursery stock, these nurseries should be upgraded for raising quality seeds/ seedlings and planting stock. With the help from Research Wing experiments on different aspects of nursery may be undertaken.

CHAPTER - 17

TREES OUTSIDE FOREST

17.1 INTRODUCTION –

The concept of “Trees outside Forests” -TOF- emerged in 1995 to designate trees growing outside the forest and not belonging to Forest or Other Wooded Land. The term represents an effort to concentrate attention that had been spread out on components of this rather diffuse resource: agroforestry, silvopastoralism, urban and rural forestry, and other related disciplines. In policy and public discourse, these important resources were overlooked. Trees outside the forest (TOF) include trees in cities, on farms, along roads and in many other locations which are by definition not a forest. All trees make a contribution to the environment and to the social and economic well-being of humankind. This chapter briefly describes the importance of trees outside the forest and some of the issues related to their assessment. The importance of Trees outside Forests for sustainable and integrated land management prompted the Expert Meeting on Global Forest Resources Assessments (FRA), held in 1996 in Kotka, Finland (Kotka III), to recommend that FAO and the FRA programme take steps to improve the data on this sector.

In response, the TOF issue was included into the Global FRA 2000 process. An expert consultation on “enhancing the contribution of TOF to sustainable livelihoods”, held in FAO-Rome (November 2001), produced various reports and publications, and the synthesis “Trees outside Forests: Towards better Awareness” (FAO conservation Guide 35, 2002). The FAO Forestry Department held regional training workshops such as the workshop on “Assessment of TOF” held in April 2002 in Dehradun, India, and the project on “the role of planted forests and trees outside forests in landscape restoration in low forest cover countries” (FAO 2004). In parallel with these efforts to raise awareness about TOF, the FAO Forestry Department took two important initiatives to support integration of TOF into national assessment.

- Including TOF into the National Forest Monitoring and Assessment Programme (NFMA). As of 2010, the programme has provided direct support to more than 15 countries that have implemented national inventories in and outside forests.
- Including information on the extent of a TOF subset –Other Land with Tree Cover (OLwTC)- in the country reporting tables to global FRA. The number of countries and territories that filled the OLwTC line increased from 61 in FRA 2005 to 77 in FRA 2010.

India is signatory to this assessment programme and Forest Survey of India; Dehradun regularly submits an account in this regard to UN through State of Forests Report which is generated regularly for entire nation after every two years. The Forest Survey of India started estimating tree cover in the country since the year 2001 to have a complete picture of forest and tree cover to compare with the national goal of 33% forest and tree cover.

Few benefits of Trees outside forest are as follows

- Constitutes to form be a major source for production of industrial wood in India
- Trees in Riparian Zones: regulate sediment/chemicals/pollutants transport, nutrient sinks
- TOF valuable majorly for timber & fuel wood.
- TOF (Rural): A source of food and fodder, nutrients sinks, soil and water conservation, wind breaks, ethno forestry, biodiversity.
- TOF (Urban): microclimate regulation, mitigation of urban heat island effects, mitigating effects of air & noise pollution, ground water recharge, prevention of soil erosion, carbon sequestration, urban green habitat and food, de facto sanctuaries for some species, community bonds, etc.
- Other benefits: Social, psychological, health, aesthetic, carbon sequesters ecological and economic functions.

17.2 NEED FOR ASSESSING TOF –

In a district, a state or a country, policy and decision-makers at each level need to know the state of the resources present in their jurisdiction in order to plan their management on a sound basis. They need to know the location, amount and production of each resource, and their contribution to the economy and livelihoods of local communities, and their economic, social, cultural and environmental values. They also need to know the past changes in these different parameters, in order to make informed hypotheses regarding expected Background and Rationale trends. With growing appreciation of information and openness in society, policy makers also increasingly need to showcase that, detailed assessments are made, and that results of these assessments are effectively communicated to the public, for their active involvement, as they are major stakeholders in this area. The area under forest and forest land is difficult to increase, in fact, lot of diversion of forest land take place from year to year. As such there is hardly any scope to increase the recorded forest area in Pune division or in the country in general. The only way left for the increase of forest cover and tree cover has to be through afforestation activities in non-forest areas. To identify potential area for increasing trees outside forest, it is prerequisite to know the prevailing extent of tree cover outside forest. Hence, regular assessment of TOF is inevitable.

17.3 ASSESSMENT OF TREES OUTSIDE FOREST -

Forest Survey of India has already assessed TOF for 25 districts in Maharashtra, however in Pune Forest Circle assessment has not been done. Trees outside forest were supposed to be calculated for rural and urban areas separately. But to calculate the ToF in Rural areas there must be a proper segregation between forest area and non-forest area. In Pune division Forest area Private Forest area is around 11500 ha. and miscellaneous area comprises to be 6000 ha which are all not demarcated.

Similarly, around 200 ha of identified forest is also not demarcated in the field. Also, in numerous areas litigations are pending to be settled between forest and non-forest areas. So, distinguishing between forest and non-forest area is a difficult task. Hence calculation of ToF in rural area was not done.

Trees outside forest (Urban) - In year 2019 all the trees within the limits of Pune Municipal Corporation (PMC) were done. Here the PMC had enumerated in detail each and every tree within the city limits. The data of these trees was shared by PMC to Working plan division and analysis was done on this data. Total area of PMC is 34,04,500 ha. comprising of 38 revenue villages. PMC has 111 parks which are prominent places where trees outside forest are present. The details of analysis are as follows

Sr. No.	Particulars	No. of Trees
1.	No. of Total trees enumerated	40,00,174
2.	No. of Healthy trees	38,23,202
3.	No. of Average Health trees	1,24,521
4.	No. of poor health trees	8,698
5.	No. of dead trees	40,891
6.	Most dominant trees species (6 species in descending order as per their occurrence)	<i>Glyricidia sepium</i> , <i>Lecueana leucocephale</i> <i>Dalbargia melanoxyton</i> <i>Prosopis juliflora</i> <i>Acacia nilotica</i> <i>Azadirachta indica</i>
7.	Average no. of trees/ ha.	1.12
8.	Average volume / ha. (Cu.m)	0.16

17.4 AGENCIES RESPONSIBLE FOR MANAGEMENT OF TOF IN MAHARASHTRA

In Maharashtra state the following departments are given the responsibilities of management of TOF in different sectors;

- **Forest department:** Forest department is looking after both i.e., plantation and regulation of tree felling inside forest and outside forests. The Social forestry wing is the Nodal department for promoting and taking up plantations on lands outside the recorded forest areas.
- **Revenue department:** The District Collector is the Chairman of District Wasteland Development Board. Basically, there are two types of waste lands, namely- Culturable waste lands and Non-Culturable waste lands. Being the chairman of the Wasteland Development

Board, it is the responsibility of the District Collector and Revenue department to ensure that all culturable waste lands are brought under green cover.

- **Agriculture/Horticulture department:** This department deals mainly with raising of fruit plants on Agriculture lands under different schemes.
- **Municipal Corporation:** Both regulation of tree felling and greening of Urban areas and according to THE MAHARASHTRA (URBAN AREAS) PROTECTION AND PRESERVATION OF TREES ACT, 1975 under section 7
(b) census of trees in urban areas shall be done by tree officer once in every 5 years.
- **Nagarparishad/ Nagar Panchayat:** Both regulation of tree felling and greening of their respective areas.
- **Gram Panchayat:** The responsibility of greening of areas under the control of Gram Panchayat including the community land is with respective Gram Panchayat.
- **Industry department:** They look after the greening in MIDC and other industrial areas.
- **Irrigation department:** Greening along the canals and Dam site
- **Education department:** Both Higher and lower Education departments look after the greening in school premises, University lands, etc.

17.5 LIMITATIONS FOR ASSESSMENT –

There is rigidity in methodology since all the classes have to be pre-defined in advance, which imposes assessor to have good preliminary knowledge of the landscapes to be mapped. Areas < 0.5 ha could not be assessed. Technological limitation too prevails as available satellite images have limitations to map smaller areas. Assessment for TOF area in rural areas is much easier as compared to process methodology for calculating TOF in urban areas.

17.6 FUTURE MANAGEMENT AND PRESCRIPTIONS FOR MANAGEMENT OF TREES OUTSIDE FOREST –

Departmental potential – TOF being cross sector issue so, it shall be taken care by joint involvement of both social forestry wing and territorial forest department. Plantation activities may be taken up in degraded pasture lands which constitute to form 3% of total geographical area of division.

- Social Forestry wing of Maharashtra Forest Department shall work in tandem with other stakeholders like Maharashtra Bamboo Development Board (MBDB), Maharashtra State Biodiversity Board (MSBB), Agriculture Universities, Research Institutes; Wood based Industries, Sawmill Associations, Farmers and other stakeholders.
- Territorial and Social Forestry wings need to prepare a programme of ‘Van-

Mahotsav' like that of Wildlife week by involving all stakeholders like Eco clubs under National Green Corps (NGC), Green Army, NGOs, School children, Industries, Other Government departments, etc. to actively involve them all in order to increase TOF area.

- The linear plantations under 'Bihar pattern', high density plantations (Miyawaki concept) need to be expanded to cover all potential areas available.
- Plantation along village roads, tank foreshores, village common lands may be undertaken under MGNREGA involving the local community.

Legal Potential -

- Systematic recording of trees planted on private lands by Talathi in 7/12 records as per Maharashtra Land Revenue Code 1966 and by the Town Surveyor on property card in Urban areas shall be made compulsory. It shall be the responsibility of the concerned person to get the 7/12 or property card updated every year. The details like when to fell, how to fell and disposal of the trees on private land to be recorded by the concerned Talathi in consultation with Forest department.

Institutional Potential -

- Methodology shall be developed to help in ease of doing business and help the farmers/industries to reap benefits from commercial plantations.
- Promotion of investments in the sub-sector by making institutional funds available to the growers on concessional terms on long term basis including insurance cover.
- Grant of incentives for growth and development of farm forestry and simplification of rules for timber transit and felling of trees for farm grown timbers. Agro-based status to cottage industries on value addition may boost the enterprise with added rural employment generation.
- Incentives, subsidies, credit, insurance and similar financial tools must be promoted for TOF systems
- Creating Market and price support system to ensure right prices and smoothen market fluctuations for both buyers as well as suppliers.
- Larger chunks of wasteland may be leased to Corporate Industries for development of TOF under their CSR funds keeping safeguards for the interests of local community and wildlife.

Agroforestry Potential -

- Agroforestry should be prioritized by granting subsidy for plantation of trees in farm land. Strengthening Farm and Agroforestry research and extension services to develop profitable and replicable agroforestry models.

- Agriculture department and Horticulture board would promote schemes to support agroforestry through plantations not only restricted to fruit orchards but also include medicinal and aromatic trees, etc.
- RET species within country to be encouraged for cultivation on non-forest lands with strict supervision and regulations, along with spin-off benefits of ensuring conservation of RETs in natural habitats.
- Agro-forestry on the private agriculture land of willing farmers under IWMP and NRLM/SMAF/National Bamboo Mission/MGNREGA, etc.

Value Addition and its Potential -

- Certification of products from TOF shall be value addition and can promote export which in turn would reduce burden of government exchequer.
- Registration of private nurseries with government agencies, to facilitate availability of certified quality planting material from known source.

Facilitating creation of a Carbon Registry to provide a listing, trading and tracking platform for carbon credits to stakeholders including industry with overarching objective of meeting the NDC commitment of the country under Paris Agreement of UNFCCC.

CHAPTER – 18

FINANCIAL FORECAST

There has been a steady increase in the funding to the different activities of the Forest Division in the past three – four years. This increase is a good sign and needs to be maintained. Looking into the prescriptions given for main working circles of the plan, it is seen that the implementation of this plan will incur an average amount of Rs. 2801 lakh annually in the first three years and Rs. 5815 lakh annually for the next seven years that is from the fourth year onwards. The total expenditure will come to Rs. 49103 lakh. Besides some thinning operations in old teak plantations, timber/ firewood exploitation is not prescribed in this plan. Hence, substantial revenue is not expected from the implementation of the Plan. The expenditure and revenue of the Division during the last ten years is given below:

Annual Revenue & Expenditure

Division - Pune (Territorial)

Sr. No.	Year	Revenue	Expenditure
1	2007-2008	1938300	70254668
2	2008-2009	624498	19903022
3	2009-2010	1439649	10469517
4	2010-2011	433753	10578760
5	2011-2012	2086713	21485052
6	2012-2013	1506872	15878429
7	2013-2014	789156	18342425
8	2014-2015	1648415	51185837
9	2015-2016	649499	37825809
10	2016-2017	1517371	54689302
11	2017-2018	1979883	51020317
12	2018-2019	1469271	44363682
13	2019-2020	3161599	45668253
14	2020-2021	10911692	16228000
Total		30156671	467893073

Compensation paid for crop damage, cattle and human death/injury since 2011-12 to 2020-21 is Rs. 32.55 Lakhs.

18.1 SOURCE OF FUNDS FOR THE IMPLEMENTATION OF THE PLAN:

The sources of funds during the last Plan were Plan Schemes, Non-Plan schemes, CAMPA, District Plan (DPDC), MNREGA, Jalyukt Shivar, Green India Mission, (GIM) etc.

PLAN Funds: From the Plan expenditure statement, as provided by the DCF, for the last 14 year's average, the annual Plan funding is Rs. 1748.90 lakh. Going by this average, the expenditure that would be required for the implementation of the Plan/Scheme needs to be enhanced.

CAMPA: The CAMPA is an important source of funding. In the Pune Division, the CAMPA fund made available between 2006-07 to 2020-21 was Rs. 3653.88 lakhs. This can be increased in the core forestry operations for the implementation of the Plan.

District Plan: The District Plan funding for the upgradation of Nurseries, the development of Eco-Tourism sites, etc. should be explored.

MNREGA: Labour intensive works that can be implemented through MNREGA should be thought of as this is a good source of funding. EGS, which is the original scheme started for employment guarantee as the first such scheme in the country by the Government of Maharashtra, should also be tapped into as done in the past.

NAP (FDA): The National Afforestation Program implemented all over the country with emphasis on people's participation should be made use of for the implementation of the Working Plan prescriptions. During the last plan period total expenditure was 1295.69 lakhs.

Special Projects: State specific and District-specific projects like Shyama Prasad Mukharjee, Green India Mission (GIM) and others should be taken up for the implementation of the Plan. During the last plan period total expenditure done under GIM was 335 lakhs.

However, it should be noted that the implementation of such projects should be as per the Working Plan and not in conflict with it. A point to be noted is that sometimes the DCF taking the opportunity of the funds available, takes up work on coupes not due even though such work could be carried out on the due coupes. This should be strictly avoided.

BENEFIT COST RATIO: As such exploitation of timber/ firewood was prescribed but felling was not done; revenue obtained from sale of seedlings, fees charged for different purposes is negligible. Only timber wood caught in offence cases was sold had significant value but, it is not a continuous source of revenue. Hence there is no point in calculating the benefit cost ratio for the implementation of this plan.

If the value of the benefits of the Forest including tangible and intangible is taken into account, the amount that is being derived as benefit far outweighs and exceeds the little investment that will be put in. The value of the benefits derived from the Forests is around Rs.33,53,63 lakhs as per the current rate of NPV value for the Pune Forest.

18.2 VALUING FOREST ECOSYSTEM SERVICES

The importance of forest ecosystems to human well-being cannot be understated. These multifunctional ecosystems provide various services on all spatial and temporal levels. The ecosystem services are benefits which people derive from forests and include provisioning services such as food, water, timber; regulating services such as climate and water quality regulation; cultural services such as recreation and spiritual benefits; and supporting services such as nutrient cycling (MA 2005). Ensuring flow of these services from forests has significant implications on human well-being. Based on this concept IIFM, Bhopal had devised a method for calculating Ecosystem Services and the value based on this calculation is as follows

Ecosystem Services	VDF	MDF	OF	Scrub	Value in Rs.	Value in crores
	Valuation in (Rs. / ha)					
Timber production	60058	41198	15346	1707	842296316	84.23
Bamboo production	23376	4274	909	275	79629135.8	7.96
Fodder production	12535	12535	12535	12535	394743477	39.47
NTFP	17074	17026	7754	930	365846475	36.58
Fuel wood production	5320	5320	5320	5320	167533729	16.75
Carbon Sequestration	3361	2442	1150	488	54229874.8	5.42
Gene pool conservation	67852	67852	67852	67852	2136747857	213.67
Pollination and seed dispersal	10167	10167	10167	10167	320172073	32.02
Soil conservation	13947	9024	4101	823	195034172	19.50
Water recharge	1951	1269	527	103	26782581.6	2.68
Carbon storage	300064	270040	95721	95721	5771104626	
Water purification	2950	2950	2950	2950	92899342.4	9.29
Total						467.59

18.3 FINANCIAL FORECAST FOR WORKING CIRCLE'S

Details of financial forecast for different Working Circle is as follows

Protection Working Circle															Area of WC in ha.		35053.00
Sr. No.	Particulars of work	Avg. Quantum of Work	unit	man-days/unit	rate/unit	Labour Component %	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Demarcation and marking	3505	Ha.	2	449	95	29.90	34.39	39.55	45.48	52.30	60.15	69.17	79.54	91.48	105.20	607.16
2	Coupe Working (thinning)																
2a	Pole/ Firewood extraction from Teak thinning	30	stack	3.5	1571.5	85	0.40	0.46	0.53	0.61	0.70	0.81	0.93	1.07	1.23	1.41	8.14
3	ANR+Nursing of naturally occurring seedlings and coppice management etc. in understocked patches																
3a	PPO/FYO	50	Ha.	172	77228	85	32.82	37.75	43.41	49.92	57.41	66.02	75.92	87.31	100.40	115.46	666.41
3b	FYO (First year operations)	50	Ha.	74	33226	80	13.29	15.28	17.58	20.21	23.24	26.73	30.74	35.35	40.66	46.75	269.84
3c	SYO (Second year operations)	50	Ha.	56	25144	95	11.94	13.73	15.80	18.16	20.89	24.02	27.63	31.77	36.54	42.02	242.50
3d	TYO (Third year operations)	50	Ha.	59	26491	95	12.58	14.47	16.64	19.14	22.01	25.31	29.11	33.47	38.49	44.27	255.49
	Total						70.64	81.23	93.42	107.43	123.55	142.08	163.39	187.90	216.09	248.50	1434.23
3e	Soil and moisture conservation works	1100	Ha.	31	13919	95	145.45	167.27	192.36	221.22	254.40	292.56	336.44	386.91	444.95	511.69	1329.61
4	Teak Plantation (Polypot)																
4a	PPO/PYO	30	Ha.	432	193968	85	49.46	56.88	65.41	75.23	86.51	99.49	114.41	131.57	151.30	174.00	1004.26
4b	FYO (First year operations)	30	Ha.	302	135598	80	32.54	37.43	43.04	49.49	56.92	65.46	75.28	86.57	99.55	114.48	660.75
4c	SYO (Second year operations)	30	Ha.	116	52084	95	14.84	17.07	19.63	22.58	25.96	29.86	34.33	39.49	45.41	52.22	301.39
4d	TYO (Third year operations)	30	Ha.	78	35022	95	9.98	11.48	13.20	15.18	17.46	20.08	23.09	26.55	30.53	35.11	202.66
4e	4 th YO (Fourth year operations)	30	Ha.	39	17511	95	4.99	5.74	6.60	7.59	8.73	10.04	11.54	13.28	15.27	17.56	101.33
4f	5 th YO (Fifth year operations)	30	Ha.	39	17511	95	4.99	5.74	6.60	7.59	8.73	10.04	11.54	13.28	15.27	17.56	101.33
	Total			1006			116.81	134.33	154.48	177.66	204.30	234.95	270.19	310.72	357.33	410.93	2371.71
5	Mix Plantation (3x3 mt)																
5a	PPO/PYO	30	Ha.	411	184539	85	47.06	54.12	62.23	71.57	82.30	94.65	108.85	125.17	143.95	165.54	955.44

5b	FYO (First year operations)	30	Ha.	94	42206	80	10.13	11.65	13.40	15.41	17.72	20.37	23.43	26.94	30.99	35.63	205.67
5c	SYO (Second year operations)	30	Ha.	58	26042	95	7.42	8.54	9.82	11.29	12.98	14.93	17.17	19.74	22.70	26.11	150.69
5d	TYO (Third year operations)	30	Ha.	49	22001	95	6.27	7.21	8.29	9.54	10.97	12.61	14.50	16.68	19.18	22.06	127.31
5e	4 th YO (Fourth year operations)	30	Ha.	39	17511	95	4.99	5.74	6.60	7.59	8.73	10.04	11.54	13.28	15.27	17.56	101.33
5f	5 th YO (Fifth year operations)	30	Ha.	39	17511	95	4.99	5.74	6.60	7.59	8.73	10.04	11.54	13.28	15.27	17.56	101.33
	Total						80.86	92.99	106.94	122.98	141.43	162.64	187.04	215.09	247.35	284.46	1641.77
	Grand Total						444.07	510.68	587.28	675.37	776.68	893.18	1027.16	1181.23	1358.42	1562.18	7392.62

Models used for preparation of estimate are approved by PCCF (HOFF), vide Desk -1/MREGS/ F. No.-10/2282/2017-18 dt. 07/03/2018. Model 4A for Teak & Model 7A for mix plantation.
Govt. of Maharashtra MREGS-2011/F.No.-130/EGS-10A Dt. 28-12-2011 Model No 10 for ANR

Improvement Working Circle															Area of WC in ha.		5034.00
Sr. No.	Particulars of work	Average Quantum of Work	unit	man-days / unit	rate /unit	Labour Component %	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Demarcation and marking	503	Ha.	2	449	95	4.29	4.93	5.67	6.52	7.50	8.63	9.92	11.41	13.12	15.09	87.11
2	Coupe Working (thinning)																
2a	Timber	20	cu.m.	9.5	4266	85	0.73	0.83	0.96	1.10	1.27	1.46	1.68	1.93	2.22	2.55	14.72
2b	Pole/ Firewood extraction from thinning	25	stack	3.5	1572	80	0.31	0.36	0.42	0.48	0.55	0.63	0.73	0.84	0.96	1.11	6.38
2c	Nursing of naturally occurring seedlings, root stock and coppice management etc.	150	Ha.	10	4490	85	5.72	6.58	7.57	8.71	10.01	11.51	13.24	15.23	17.51	20.14	116.23
2d	Soil and moisture conservation works	250	Ha.	31	13919	95	33.06	38.02	43.72	50.28	57.82	66.49	76.46	87.93	101.12	116.29	671.19

3	Removal of windfallen																
3a	Timber	2	cu.m.	9.5	4266	85	0.07	0.08	0.10	0.11	0.13	0.15	0.17	0.19	0.22	0.26	1.47
3b	Pole/ Firewood extraction from thinning	2	stack	3.5	1572	80	0.03	0.03	0.03	0.04	0.04	0.05	0.06	0.07	0.08	0.09	0.51
4	Teak Plantation (Polypot) (2 x 2 x 2 m) (2500 plants/ha)																
4a	PPO/PYO	60	Ha.	432	193968	85	98.92	113.76	130.83	150.45	173.02	198.97	228.82	263.14	302.61	348.00	2008.52
4b	FYO (First year operations)	60	Ha.	302	135598	80	65.09	74.85	86.08	98.99	113.84	130.91	150.55	173.13	199.10	228.97	1321.51
4c	SYO (Second year operations)	60	Ha.	116	52084	95	29.69	34.14	39.26	45.15	51.92	59.71	68.67	78.97	90.82	104.44	602.77
4d	TYO (Third year operations)	60	Ha.	78	35022	95	19.96	22.96	26.40	30.36	34.91	40.15	46.17	53.10	61.07	70.23	405.31
4e	4 th YO (Fourth year operations)	60	Ha.	39	17511	95	9.98	11.48	13.20	15.18	17.46	20.08	23.09	26.55	30.53	35.11	202.66
4f	5 th YO (Fifth year operations)	60	Ha.	39	17511	95	9.98	11.48	13.20	15.18	17.46	20.08	23.09	26.55	30.53	35.11	202.66
	Total			1006			233.62	268.67	308.97	355.31	408.61	469.90	540.39	621.44	714.66	821.86	4743.43
5	Mix Plantation (4 x 4 mt) (625 plants/ha)																
5a	PPO/PYO	150	Ha.	411	184539	85	235.29	270.58	311.17	357.84	411.52	473.25	544.23	625.87	719.75	827.71	4777.21
5b	FYO (First year operations)	150	Ha.	94	42206	80	50.65	58.24	66.98	77.03	88.58	101.87	117.15	134.72	154.93	178.17	1028.33
5c	SYO (Second year operations)	150	Ha.	58	26042	95	37.11	42.68	49.08	56.44	64.91	74.64	85.84	98.71	113.52	130.55	753.47
5d	TYO (Third year operations)	150	Ha.	49	22001	95	31.35	36.05	41.46	47.68	54.83	63.06	72.52	83.40	95.90	110.29	636.55
5e	4 th YO (Fourth year operations)	150	Ha.	39	17511	95	24.95	28.70	33.00	37.95	43.64	50.19	57.72	66.38	76.33	87.78	506.64
5f	5 th YO (Fifth year operations)	150	Ha.	39	17511	95	24.95	28.70	33.00	37.95	43.64	50.19	57.72	66.38	76.33	87.78	506.64
	Total			690			404.30	464.95	534.69	614.89	707.13	813.20	935.18	1075.45	1236.77	1422.28	8208.83
	Grand Total						682.14	784.46	902.12	1037.44	1193.06	1372.02	1577.82	1814.49	2086.67	2399.67	13849.89
Models used for preparation of estimate are approved by PCCF (HOFF), vide Desk -I/MREGS/ F. No.-10/2282/2017-18 dt. 07/03/2018. Model 4A for Teak & Model 7A for mix plantation																	

Afforestation Working Circle															Area of WC in ha.		6943.00
Sr. No.	Particulars of work	Average Quantum of Work	unit	man-days / unit	rate /unit	Labour Component %	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Demarcation and marking	695	Ha.	2	449	95	5.93	6.82	7.84	9.02	10.37	11.93	13.71	15.77	18.14	20.86	120.38
2	Coupe Working (thinning)																
2d	Soil and moisture conservation works	345	Ha.	31	13919	95	45.62	52.46	60.33	69.38	79.79	91.76	105.52	121.35	139.55	160.48	926.25
4	Teak Plantation (Polypot) (2 x 2 x 2 m) (2500 plants/ha)																
4a	PPO/PYO	50	Ha.	432	193968	85	82.44	94.80	109.02	125.38	144.18	165.81	190.68	219.28	252.17	290.00	1673.77
4b	FYO (First year operations)	50	Ha.	302	135598	80	54.24	62.38	71.73	82.49	94.86	109.09	125.46	144.28	165.92	190.81	1101.26
4c	SYO (Second year operations)	50	Ha.	116	52084	95	24.74	28.45	32.72	37.63	43.27	49.76	57.22	65.81	75.68	87.03	502.31
4d	TYO (Third year operations)	50	Ha.	78	35022	95	16.64	19.13	22.00	25.30	29.10	33.46	38.48	44.25	50.89	58.52	337.76
4e	4 th YO (Fourth year operations)	50	Ha.	39	17511	95	8.32	9.57	11.00	12.65	14.55	16.73	19.24	22.13	25.44	29.26	168.88
4f	5 th YO (Fifth year operations)	50	Ha.	39	17511	95	8.32	9.57	11.00	12.65	14.55	16.73	19.24	22.13	25.44	29.26	168.88
	Total			1006			194.69	223.89	257.47	296.09	340.51	391.58	450.32	517.87	595.55	684.88	3952.86
5	Mix Plantation (4 x 4 mt) (625 plants/ha)																
5a	PPO/PYO	70	Ha.	411	184539	85	109.80	126.27	145.21	166.99	192.04	220.85	253.98	292.07	335.88	386.27	2229.36
5b	FYO (First year operations)	70	Ha.	94	42206	80	23.64	27.18	31.26	35.95	41.34	47.54	54.67	62.87	72.30	83.15	479.89
5c	SYO (Second year operations)	70	Ha.	58	26042	95	17.32	19.92	22.90	26.34	30.29	34.83	40.06	46.07	52.98	60.92	351.62
5d	TYO (Third year operations)	70	Ha.	49	22001	95	14.63	16.83	19.35	22.25	25.59	29.43	33.84	38.92	44.76	51.47	297.06
5e	4 th YO (Fourth year operations)	70	Ha.	39	17511	95	11.64	13.39	15.40	17.71	20.37	23.42	26.94	30.98	35.62	40.97	236.43
5f	5 th YO (Fifth year operations)	70	Ha.	39	17511	95	11.64	13.39	15.40	17.71	20.37	23.42	26.94	30.98	35.62	40.97	236.43

	Total			690			188.67	216.98	249.52	286.95	329.99	379.49	436.42	501.88	577.16	663.73	3830.79
	Grand Total						441.25	507.44	583.56	671.09	771.75	887.52	1020.64	1173.74	1349.80	1552.27	8959.06

Models used for preparation of estimate are approved by PCCF (HOFF), vide Desk -1/MREGS/ F. No.-10/2282/2017-18 dt. 07/03/2018. Model 4A for Teak & Model 7A for mix plantation

Grassland Management Working Circle															Area of WC in ha.		9180.00
Sr. No.	Particulars of work	Avg. quantum of Work	unit	man-days/unit	rate/unit	Labour Component %	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Demarcation of coupe	918.00	Ha.	1	449	95	3.92	1.6	1.68	1.76	1.85	1.95	2.04	2.14	2.25	2.36	19.17
2	Artificial grass plantation of 5 year model (Polypot)*																
2a	PPO/PYO	320	Ha.	141	63309	85	172.20	198.03	227.74	261.90	301.18	346.36	398.31	458.06	526.77	605.78	3496.31
2b	FYO (First year operations)	320	Ha.	54	24246	80	62.07	71.38	82.09	94.40	108.56	124.84	143.57	165.11	189.87	218.35	1260.25
2c	SYO (Second year operations)	320	Ha.	47	21103	95	64.15	73.78	84.84	97.57	112.20	129.03	148.39	170.65	196.25	225.68	1302.55
2d	TYO (Third year operations)	320	Ha.	41	18409	95	55.96	64.36	74.01	85.11	97.88	112.56	129.45	148.86	171.19	196.87	1136.26
2e	4 th YO (Fourth year operations)	320	Ha.	39	17511	95	53.23	61.22	70.40	80.96	93.11	107.07	123.13	141.60	162.84	187.27	1080.84
2f	5 th YO (Fifth year operations)	320	Ha.	39	17511	95	53.23	61.22	70.40	80.96	93.11	107.07	123.13	141.60	162.84	187.27	1080.84
	Total						460.85	529.98	609.48	700.90	806.04	926.94	1065.98	1225.88	1409.76	1621.23	9357.04
3	Fodder Tree Plantation (6x6 mts)																
3a	PPO/FYO	80	Ha.	124	55676	85	37.86	43.54	50.07	57.58	66.22	76.15	87.57	100.71	115.81	133.19	768.69
3b	FYO (First year operations)	80	Ha.	59	26491	80	16.95	19.50	22.42	25.79	29.65	34.10	39.22	45.10	51.86	59.64	344.23
3c	SYO (Second year operations)	80	Ha.	47	21103	95	16.04	18.44	21.21	24.39	28.05	32.26	37.10	42.66	49.06	56.42	325.64
3d	TYO (Third year operations)	80	Ha.	45	20205	95	15.36	17.66	20.31	23.35	26.86	30.89	35.52	40.85	46.97	54.02	311.78
3e	4 th YO (Fourth year operations)	80	Ha.	39	17511	95	13.31	15.30	17.60	20.24	23.28	26.77	30.78	35.40	40.71	46.82	270.21

3f	5 th YO (Fifth year operations)	80	Ha.	39	17511	95	13.31	15.30	17.60	20.24	23.28	26.77	30.78	35.40	40.71	46.82	270.21
	Total						112.82	129.75	149.21	171.59	197.33	226.93	260.97	300.12	345.13	396.90	2290.76
	Grand Total						577.59	661.33	760.37	874.25	1005.22	1155.82	1328.99	1528.14	1757.15	2020.49	11666.97
Models used for preparation of estimate are approved by PCCF (HOFF), vide Desk -1/MREGS/ F. No.-10/2282/2017-18 dt. 07/03/2018. Model 5A for Fodder Tree Plantations. Govt. of Maharashtra MREGS-2016/F.No.-103/EGS-1 Dt. 29-09-2016 Model No 9 for ANR																	

Urban Forest Management Working Circle																Area of WC in ha.	3888.00
Sr. No.	Particulars of work	Average Quantum of Work	unit	man-days / unit	rate /unit	Labour Component %	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Demarcation and marking	388	Ha.	2	449	95	3.31	3.81	4.38	5.04	5.80	6.66	7.66	8.81	10.14	11.66	67.28
2	Coupe Working (thinning)																
2a	Timber	5	cu.m.	9.5	4266	85	0.18	0.21	0.24	0.28	0.32	0.36	0.42	0.48	0.55	0.64	3.68
2b	Pole/ Firewood extraction from thinning	10	stack	3.5	1572	80	0.13	0.14	0.17	0.19	0.22	0.25	0.29	0.33	0.38	0.44	2.55
2c	Nursing of naturally occurring seedlings, root stock and coppice management etc.	30	Ha.	10	4490	85	1.14	1.32	1.51	1.74	2.00	2.30	2.65	3.05	3.50	4.03	23.25
2d	Soil and moisture conservation works	150	Ha.	31	13919	95	19.83	22.81	26.23	30.17	34.69	39.89	45.88	52.76	60.67	69.78	402.72
3	Removal of windfallen																
3a	Timber	2	cu.m.	9.5	4266	85	0.07	0.08	0.10	0.11	0.13	0.15	0.17	0.19	0.22	0.26	1.47
3b	Pole/ Firewood extraction from thinning	2	stack	3.5	1572	80	0.03	0.03	0.03	0.04	0.04	0.05	0.06	0.07	0.08	0.09	0.51
4	Teak Plantation (Polypot) (2 x 2 x 2 m) (2500 plants/ha)																
4a	PPO/PYO	30	Ha.	432	193968	85	49.46	56.88	65.41	75.23	86.51	99.49	114.41	131.57	151.30	174.00	1004.26
4b	FYO (First year operations)	30	Ha.	302	135598	80	32.54	37.43	43.04	49.49	56.92	65.46	75.28	86.57	99.55	114.48	660.75

4c	SYO (Second year operations)	30	Ha.	116	52084	95	14.84	17.07	19.63	22.58	25.96	29.86	34.33	39.49	45.41	52.22	301.39
4d	TYO (Third year operations)	30	Ha.	78	35022	95	9.98	11.48	13.20	15.18	17.46	20.08	23.09	26.55	30.53	35.11	202.66
4e	4 th YO (Fourth year operations)	30	Ha.	39	17511	95	4.99	5.74	6.60	7.59	8.73	10.04	11.54	13.28	15.27	17.56	101.33
4f	5 th YO (Fifth year operations)	30	Ha.	39	17511	95	4.99	5.74	6.60	7.59	8.73	10.04	11.54	13.28	15.27	17.56	101.33
	Total			1006			116.81	134.33	154.48	177.66	204.30	234.95	270.19	310.72	357.33	410.93	2371.71
5	Mix Plantation (4 x 4 mt) (625 plants/ha)																
5a	PPO/PYO	50	Ha.	411	184539	85	78.43	90.19	103.72	119.28	137.17	157.75	181.41	208.62	239.92	275.90	1592.40
5b	FYO (First year operations)	50	Ha.	94	42206	80	16.88	19.41	22.33	25.68	29.53	33.96	39.05	44.91	51.64	59.39	342.78
5c	SYO (Second year operations)	50	Ha.	58	26042	95	12.37	14.23	16.36	18.81	21.64	24.88	28.61	32.90	37.84	43.52	251.16
5d	TYO (Third year operations)	50	Ha.	49	22001	95	10.45	12.02	13.82	15.89	18.28	21.02	24.17	27.80	31.97	36.76	212.18
5e	4 th YO (Fourth year operations)	50	Ha.	39	17511	95	8.32	9.57	11.00	12.65	14.55	16.73	19.24	22.13	25.44	29.26	168.88
5f	5 th YO (Fifth year operations)	50	Ha.	39	17511	95	8.32	9.57	11.00	12.65	14.55	16.73	19.24	22.13	25.44	29.26	168.88
	Total			690			134.77	154.98	178.23	204.96	235.71	271.07	311.73	358.48	412.26	474.09	2736.28
	Grand Total						276.28	317.72	365.38	420.18	483.21	555.69	639.05	734.90	845.14	971.91	5609.45
Models used for preparation of estimate are approved by PCCF (HOFF), vide Desk -1/MREGS/ F. No.-10/2282/2017-18 dt. 07/03/2018. Model 4A for Teak & Model 7A for mix plantation																	

DISCLAIMER

The draft working plan report is a document of Maharashtra Forest department, which is solely developed to aid scientific management of forest. The contents of this document are intended only for the management and informational use of the addressee. All the information, statement of area and maps included are only for management purpose and must not be used for any legal purpose or otherwise.



भारत सरकार
GOVERNMENT OF INDIA

पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
MINISTRY OF ENVIRONMENT, FOREST
& CLIMATE CHANGE

Regional Office
Ground Floor, East Wing
New Secretariat Building
Civil Lines, Nagpur - 440001
apccfcetral-ngp-mef@gov.in

Date: 07.11.2023

F.No. 12-7/2004 (FOR) /12437

To,

The Principal Secretary (Forests)
Revenue and Forest Department
Hutatma Raiguru Chowk
Madame Cama Marg
Mantralaya, Mumbai- 400032.



Sub: Approval of Working Plan of Pune Forest Division for the period 2023-24 to 2032-33- regarding.
Sir,

The undersigned is directed to refer to PCCF (P&M), Maharashtra office letter no. Desk-14/WP/ACF/19/23-24 dated 02.06.2023 on the above subject seeking prior approval of the Central Government under Forest (Conservation) Act, 1980 and to say that DWPR of Pune Forest Division has been examined in the Regional Office in light of relevant provisions of the Forest (Conservation) Act, 1980, Rules and Guidelines framed there under.

After careful examination of the DWPR of Pune Forest Division written by Shri Rahul Patil, IFS and Shri V.D. Suryawanshi, IFS, the Central Government hereby accords approval to the said Working Plan for the period of 2023-24 to 2032-33 in accordance with the powers vested under Forest (Conservation) Act, 1980 and subject to the following conditions:

1. The currency of Working Plan shall be for a period of 10 years i.e. from the year 2023-24 to 2032-33. Period of last Working Plan was up to the year 2021-22, the present Working Plan is approved from the year 2023-24. Intervening period i.e. 2022-23 will be considered as per the prescription of last working plan and whatever work has been carried out may be got regularized/will be considered as part of last working plan, after taking approval of the competent authority wherever needed. In case there has been any work carried out in 2022-23; State Government has to submit proposal for regularization of the same.
2. The orders of Hon'ble Supreme Court in the matter of T.N. Godavarman Thirumulpad Vs Union of India in W.P. (Civil) No. 202/95 and related interlocutory applications shall be strictly adhered to. Any prescription or operation at variance with the Hon'ble Supreme Court's order shall be kept in abeyance till the order is in force or otherwise modified.
3. Further, in compliance with order to Hon'ble Supreme Court's Order dated 22.09.2000, the Government of Maharashtra shall ensure that regeneration of forests is commensurate with felling carried out under this Working Plan.
4. No felling shall be carried out without allocating necessary fund for implementation of regeneration operation so as to make regeneration commensurate with felling. In the events of failure in regeneration or any shortfall in carrying out regeneration operation, no further felling shall be undertaken until the failure/ shortfall is made up.
5. Following the directions issued by MoEF&CC vide letter dated 23.02.2018, Regional Offices of MoEF&CC under the chairmanship of Deputy Director General of Forests (Central) of the Regional Office of this Ministry will be competent authority for deciding the extent of harvesting that could be permitted under approved Working Plans for ensuring regeneration to be commensurate with felling. Instruction/ directions of the Central Government that may be issued in future in this regard shall be strictly complied with. Felling is to be done by State Government only after seeking permission from REC, RO, Nagpur.

PSM

R/17/11/2023
personally taken
Kunika
Dhoke

Desk-14
PCCF(P&M)
A. T. J.

Ans

6. Fruits bearing naturally grown trees shall not be clear felled for any purpose whatsoever.
7. Standard thinning and silvicultural operations under the strict supervision of Assistant Conservator of Forests and above will be allowed as per norms to improve the health of growing stock while executing the prescriptions of the Working Plan.
8. Prescriptions of micro plans for JFM (if made) should not deviate from the broad framework/guidelines of the Working Plan and shall be in accordance with various orders of Hon'ble Supreme Court.
9. Felling carried out on forest land after seeking approval of the Central Government under Forest (Conservation) Act, 1980 will not be treated as deviation. However, proposed felling in the forest division shall be restricted proportionately in the current/ future years to compensate this removal.
10. No deviations shall be made from the prescriptions of Working Plan without prior approval of the Central Government under Forest (Conservation) Act, 1980. However, deviations of positive nature i.e. voluntary plantations carried out outside the working area under any project, schemes and compensatory afforestation may be approved by the competent authority of the State Government from time to time.
11. The exploitable girth of tree species and period of felling cycle shall not be lower than what was approved in previous working plan.
12. In the vicinity of Nalas and water bodies felling shall not be undertaken. Further felling shall not be undertaken near the known resting/nesting places of wild animals and birds.
13. No commercial felling shall be carried out along the 2 km strip of all perennial Rivers of Maharashtra State as recommended by REC in its meeting dated 24.02.2020 viz; Bhima, Godavari, Kanhan, Koyna, Krishna, Manjara, Mula, Nira, Panchganga, Pench, Penganga, Pranhita, Purna, Tapi, Vaitarna and Wainganga; further, no commercial felling shall be carried out along the strip of 500 meters of all seasonal Rivers; only eco-restoration work shall be carried out.
14. Removal of dead and diseased trees will be undertaken under the supervision of an officer not below the rank of Assistant Conservator of forests.
15. Volume details of all kinds of fellings viz; dead and diseased trees, grants of right and concession and all illicit felling should be compiled along with the estimation of their standing volumes as per the same volume table used for the assessment of growing stock. This report shall be prepared annually working circle and compartment wise by the territorial Sub- DFO and shall be submitted to the CF, Working Plan for this purpose within 02 months of the end of control year. Such removal shall be accounted vis-a-vis prescribed felling yield of the relevant year.
16. To ensure sustainable management of Non Timber Forest Produce (NTFP), scientific assessment of estimated quantity has to be done before their removal as per the prescription of Working Plan. Proper mechanism has to be in place for the collection of NTFPs in sustainable manner.
17. Status of rare, endangered and near extinct species shall be monitored closely and adequate measures will be taken for their protection and conservation.
18. Execution of Working Plan shall be in conformity with the National Forest Policies, 1988.
19. No regularization of existing encroachment should be done without following due procedure. And an appendix may be added giving details of the encroachment of the forest area in the division. A definite plan has to be made to remove encroachment and vacated area shall be planted with suitable local species as per Government of India and Hon'ble Supreme Court Orders/Guidelines in the matter.

20. Eco-tourism shall/may be undertaken on sustainable basis. No permanent structures shall be allowed at such sites. Temporary structures made up of local forest produce may be allowed for public. Such sites will be declared as Plastic Free Zones. These eco-tourisms sites will be managed by the forest department as per the prescriptions of the working plan and after taking prior approval of Central Government under Section-2 of Forest (Conservation) Act, 1980.
21. Demarcation and consolidation of Forest Boundaries will be done adequately. Identification of Land Bank in the form of degraded forest areas in the Division to be explored for CA plantations.
22. Gregarious flowering of bamboo, if any, must be reported to ICFRE and other institutes as mandated and the situation be dealt with standard protocol.
23. Proper mechanism has to be put in place to control illegal felling, grazing and fire. Proper fire management plan shall be prepared and executed meticulously.
24. Only 50% of normal yield, if silviculturally available, will be allowed for removal in case of Teak, Dhawada, Bhirra, Lendia, Chichawa, Mowai, Rohan, Shiwan, Shisham, Surya, Karai, Mokha, Palas, Dhaman, Bhilawa, etc. In case of Haldu, Ain, Bija, Tiwas, Kalam, Salai, Garadi, Khair it shall be 20% if silviculturally available.
25. Efforts should be made to undertake artificial regeneration of local species along with 10-15% RET species in such a way that it serves the purpose of biodiversity conservation as well as meeting the demand of fuel wood, fodder and the timber. Planting of exotic species should be avoided.
26. Lac cultivation, if any, will be practiced as per the provisions of Forest (Conservation) Act, 1980.
27. Documents and appendices mandated in National Working Plan, 2014 Code will be incorporated in the Working Plan.
28. Attempts shall be made to grow trees outside forest areas to meet the local demand of small timber, fuel wood and fodder as well as to achieve the 33% forest cover as envisaged in National Forest Policy, 1988.
29. Socio-economic survey is to be conducted within first year of implementation of plan and the same be appended with the Working Plan.
30. Cutback operation shall be undertaken as per standard norms and grassland will not be expanded at the expense of natural tree cover.
31. While managing forests, provisions of the Biological Diversity Act, 2002 and Wildlife Protection Act, 1972 shall be fully complied.
32. Prescriptions on Wildlife Management should be vetted by the CWLW and a certificate of the same be attached to the plan at the time of final printing.
33. Grazing to be properly regulated and grazing fee should be levied.
34. Annual Plan of Operations under Compensatory Afforestation Fund Act, 2016 and Compensatory Afforestation Fund Rules, 2018 shall be in conformity with Working Plan prescriptions.
35. All the Unclassed Forest, acquired CA areas and acquired Private Forests should be notified as RF/ PF in time-bound manner at the earliest.
36. Midterm review of Working Plan shall be undertaken after five years so as to review the compliance of conditions as laid down in this approval. Modification/addition in some conditions may be made to meet the objectives, with the approval of Regional Office, Nagpur.
37. The Central Government reserves the right to review, modify, withdraw, this approval at any time if any of the conditions of approval are not implemented. Relevant modifications in the

working plan are required to be carried out so as to keep it in conformity with the orders, circulars and guidelines issued by the Central Government or the Apex Court under Forest (Conservation) Act, 1980 or any other statute and National Forest Policy from time to time.

NOTE: The above mentioned approval is subject to attending shortcomings as below and submitting complete Working Plan within 6 months:

1. Information on Chapter- I(f) i.e. Works prescribed during the Plan period in a tabular form along with annual target is not incorporated in Working Plan. The same has to be incorporated.
2. Latest data i.e 2021-22 regarding density classification for forests as per ISFR (Indian State Forest Report) 2021-22 report of FSI has not mentioned in Section- 2.4.3 (Change in Land Use, Land Use Change on basis if density classification). The same has to be incorporated.
3. Information on Section- 11.3 (Special works of improvement undertaken), and Section- 11.4 (Past yield, revenue and expenditure) is not included in the Working Plan. The same has to be incorporated.
4. Section 4.6.12 should have been Regeneration and Section 4.6.13 should have been Associated regulations and measures in Chapter- 4 i.e. Grassland Management Working Circle. The same has to be incorporated.
5. General information w.r.t General financial forecast and financial plan of operation chapter, Miscellaneous regulations chapter containing below mentioned section is not incorporated in the Working Plan:
 - a. Petty felling and extraction.
 - b. Rights and Concessions.
6. KML file of compartment and boundary of the division is not submitted. The soft copy of KML file needs to be submitted.
7. Maps viz. Management map, Working Plan map and Reference map and other necessary maps shall be submitted.

This issues with the approval of DDGF (Central), Regional Office, MoEF&CC, Nagpur.

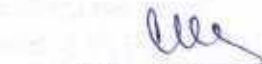
Yours faithfully,



(C.K. Sonwane)
DIGF (Central)

Copy to:

1. The IGF (RoHQ), Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jorbagh Road, Aliganj, New Delhi- 110003.
2. The Principal Chief Conservator of Forests (HoFF) Govt. of Maharashtra, Van Bhawan, Ramgiri Road, Civil Lines, Nagpur- 440001.
- ✓ 3. The Principal Chief Conservator of Forests (P&M), Govt. of Maharashtra, Van Bhawan, Ramgiri Road, Civil Lines, Nagpur-440001.
4. Guard File.



(C.K. Sonwane)
DIGF (Central)



दूरध्वनी क्रमांक ०२०-२५६१११०४/२५६१११०८
e-mail : consf.wpunest@mah.nic.in

पत्र



वनसंरक्षक, कार्य आयोजना-पश्चिम, पुणे यांचे कार्यालय

वन भवन, ३ वा मजला, को. विम, को. यांचे भवन, नागपूर, पुणे - ४११०१६

विषय: पुणे वनविभागाची कार्य आयोजना सन २०२३-२४ ते २०३२-३३ च्या कालावधीचा प्रारूप कार्य आयोजनेस मंजूरी बाबत.

जा.क्र.कक्ष-६ / काआप / २४५ / २०२३-२०२४
पुणे - ४११०१६, दिनांक :- २९ / १ / २०२४

संदर्भ:-गा. प्रधान मुख्य वनसंरक्षक (वन्यजीव) म.रा. नागपूर यांचेकडील पत्र जा.क्र. कक्ष-२२/(८)/वन्य/प्रक्र. ३९(२३-२४)/४२१३, दिनांक २१/१२/२०२३

पुणे वनविभागाच्या कार्य आयोजनेस सन २०२३-२४ ते २०३२-३३ च्या कालावधीच्या प्रारूप कार्य आयोजनेस मंजूरी प्रदान करण्यात आलेली आहे. त्या अनुषंगाने वन्यजीव प्रमाणपत्राची (Wildlife Certificate) मागणी करण्यात आलेली होती.

सदर मंजूरी प्रदान केलेल्या कार्य आयोजनामध्ये मुददा क्र.३२ नुसार आवश्यक असलेले वन्यजीव प्रमाणपत्र (Wildlife Certificate) वरील संदर्भान्वये प्राप्त झालेले आहे. सदर पत्रात नमूद केलेल्या प्रत्येक प्रादेशिक विभाग/ उपविभाग यांना वन्यजीव व्यवस्थापनासाठी त्या विभागांचा एक परीपूर्ण सूक्ष्म अभ्युदय तयार करून मुख्य वन्यजीव रक्षक यांचे कडून मंजूर करून घेण्यात यावा. अशा सुचना देण्यात आलेल्या आहेत. सदर सुचनांचे बारकाईने अवलोकन करून त्याची अंमलबजावणी करण्यात यावी. सदर पत्राची प्रत या सोबत जोडून पुरविल्यात येत आहे.

वनसंरक्षक,
कार्य आयोजना (पश्चिम), पुणे

प्रति,

उपवनसंरक्षक कार्य आयोजना विभाग,
पुणे

पुणे यांना कार्यवाही करायची

Office of the Dy. Conservator of Forests
Working Plans Puno.

Inward No.: 147

Date: 4/1/2024

d:\अपर प्रधान मुख्य वनसंरक्षक कार्यआयोजना letters.docx



महाराष्ट्र शासन
वन विभाग



प्रधान मुख्य वनसंरक्षक, महाराष्ट्र राज्य, नागपूर यांचे कार्यालय.

O/o Principal Chief Conservator of Forests (HoFF), Maharashtra State

Phone - 0712-2549563

E-mail - pccfwlmgp@mahaforest.gov.in

Website - www.mahaforest.gov.in

प्रधान मुख्य वनसंरक्षक (वन्यजीव) महाराष्ट्र राज्य

Principal Chief Conservator of Forests (Wildlife), Maharashtra State

"Van Bhavan" 3rd Floor, Ramgiri Road, Civil Lines, Nagpur 440 001

क्रमांक :- कक्ष-२२(८)/वजी/प्रक्र. १०४(२३-२४)/^{५५१३} /२३-२४ नागपूर, दिनांक:-^{२९} /१२/२०२३

प्रति,

उपवनसंरक्षक,

कार्य आयोजना विभाग, पुणे

विषय :- पुणे वनविभागाची कार्य आयोजना सन २०२३-२४ ते २०३२-३३ च्या कालावधीचा प्रारूप कार्य आयोजनेस मंजूरी बाबत.

संदर्भ : आपलेकडील पत्र क्रमांक जा. क्र. ब./वक्षेस/का.आ./पुणे/ २४७, दिनांक ११.१२.२०२३

वरील संदर्भीय पत्रान्वये पुणे वनविभागाची कार्यआयोजना सन २०३२-२४ ते २०२३-३३ ला केंद्र शासनाची परवानगी मिळालेली असून मंजूरी आदेशातील अट क्रमांक ३२ अन्वये वन्यजीव व्यवस्थापनासाठी संबंधित बाबी मुख्य वन्यजीव रक्षक यांचेकडून तपासून घेवून तसे प्रमाणपत्र कार्य आयोजनेत जोडावे असे निर्देशित आहे. त्यानुसार प्रमाणपत्र व सूचना सोबत पाठविण्यात येत आहे.

या कार्यालयाचे आदेश क्रमांक कक्ष -२२(८)/प्र.क्र.१७६/४०७२, दिनांक ०५.०२.२०१५ अन्वये प्रत्येक प्रादेशिक विभाग/उपविभाग यांना वन्यजीव व्यवस्थापनासाठी त्या विभागांचा एक परिपूर्ण सूक्ष्म आराखडा तयार करून मुख्य वन्यजीव रक्षक कडून मंजूर करून घ्यावा अशी सूचना जारी केलेल्या आहेत. सूक्ष्म आराखड्याचे प्रारूप प्रपत्र सोबत दिले आहे. तरी या बाबत सदर कार्य आयोजनेत उल्लेख करण्यात यावे.

सहपत्र - १. प्रमाणपत्र

वनसंरक्षक, कार्य आयोजना विभाग, पुणे. २. या कार्यालयाचे पत्र क्र. ४०७२ दि. ०५.०२.२०१५

आवक क्र. २९०

तारीख 29 DEC 2023

कक्ष: २४

उपाक्षी:

प्रतिलिपि - १. प्रधान मुख्य वनसंरक्षक (उत्पादन व व्यवस्थापन) यांना माहिती व आवश्यक कार्यवाहीस सन्नेह अर्पित.

(महिष गुप्ता)

प्रधान मुख्य वनसंरक्षक (वन्यजीव)

महाराष्ट्र राज्य.

२. अपर प्रधान मुख्य वनसंरक्षक (वन्यजीव) पश्चिम, मुंबई यांना माहितीस अग्रेषित.
३. मुख्य वनसंरक्षक (प्रा.) पुणे यांना माहिती व योग्य कार्यवाहीस अग्रेषित.
४. वनसंरक्षक कार्य आयोजना (पश्चिम) पुणे यांना माहिती व आवश्यक कार्यवाहीस अग्रेषित.

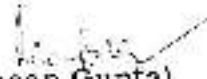
No. Desk-22(8)/WL/WP/CR-104/4813/23-34
Nagpur-440 001 Dated: 21/12/2023

Certificate

This is to certify that the Wildlife Management Prescriptions provided in chapter- 89 (vii) of Working Plan of Pune Forest Division period from 2023-24 to 2032-33 is vetted by this office. The general prescriptions mentioned are in tune with principles of Wildlife Management.

For covering micro level details of management prescriptions this office has issued directions vide T/O no.Desk-22(8)/CR.176/4073, dt: 5/2/2015 to all territorial forest units to prepare special wildlife micro plan in given Proforma for wildlife management for five years or remaining period of Working Plan. Whichever is later. This plan will be prepared by concerned Deputy Conservator of Forests/Divisional Forest Officer / Sub-Divisional Forest Officer of that division/ sub-division and obtain sanction from the Chief Wildlife Warden.

The above directions should be reproduced in the concerned chapter of the Working Plan.


(Maheep Gupta)
Chief Wildlife Warden
&
Principal Chief Conservator of
Forests (Wildlife)
Maharashtra State