सत्यमेव जयते

GOVT. OF MAHARASHTRA

MELGHAT TIGER RESERVE
AMRAVATI

TIGER CONSERVATION PLAN: CORE

(DRAFT)

Plan Period: 2024-25 To 2033-34

O/o Chief Conservator of Forest & Field Director
Melghat Tiger Reserve,
Camp, Amravati 444602

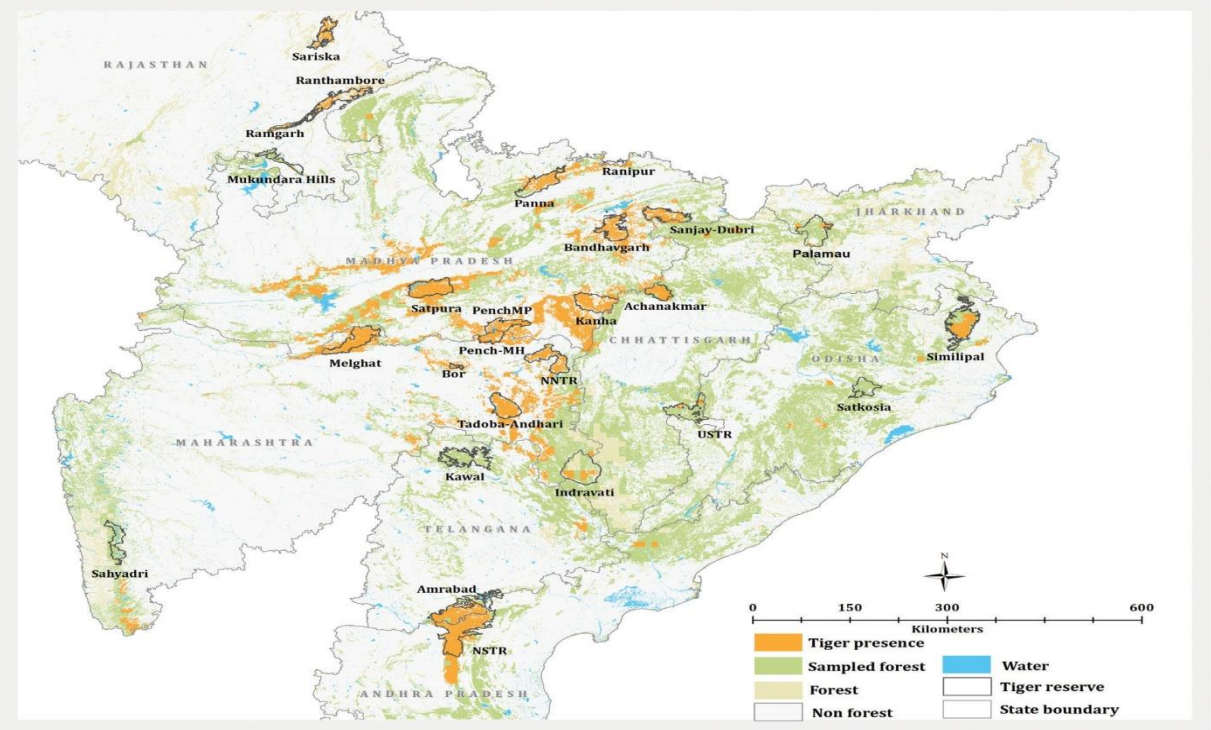
NAME OF THE TIGER RESERVE:

MELGHAT TIGER RESERVE, MAHARASTRA, INDIA

INTRODUCTION OF THE AREA:

(a) DESCRIPTION OF THE TIGER CONSERVATION UNIT/ LANDSCAPE AND SIGNIFICANCE OF THE AREA FOR TIGER CONSERVATION.

Tiger inhabited forests in India are classified into five major tiger landscapes which are also called as Tiger Conservation Units (TCU). Currently tigers occur largely in the forest areas of 18 States in India. Nagaland, Meghalaya, Tripura, and Haryana have reports of occasional tiger occurrence. The distribution of tigers and their density in these forests vary on account of several ecological and anthropogenic factors like forest cover, terrain, natural prey availability, presence of undisturbed/inviolate habitat and the quality of managerial efforts taken towards protection. Each of the TCU is considered to have tiger population sharing same genetic pool since the areas comprising these units are contiguous and historically have had good connectivity over long time. Tiger population in a TCU is also a source population for the adjoining protected areas and hence their conservation is essential for the maintenance of tiger population on a long term basis.



Map-1(a): Map showing Tiger Reserves in central India & Eastern ghat landscape

Melghat Tiger Reserve is the part of larger Central Indian landscape complex and specifically it is part of the Satpuda-Melghat landscape unit. Melghat is one among the first nine declared Tiger reserve of India declared in the year 1974. It is one of the prime tiger habitats in the state of Maharashtra. The continuous stretch of dry deciduous forest interspersed with valleys, mountain ranges and grasslands are considered as one of the best habitats of tiger. In account of the gene flow of tiger for long term population viability, Melghat plays a vital role in interstate dispersal of tiger between Satpuda- Melghat. Melghat has the 2nd largest population of tigers in Maharashtra.

Biogeographic classification of Melghat Tiger Reserve (Rodgers & Ponwar, 1988).

Biogeographic Zone	Deccan Peninsula
Biogeographic province	Central high land
Biogeographic Region	Satpuda-Maikal

Melghat Tiger Reserve covers an area of 2757.97 km² covering 1 National Park, 4Wildlife Sanctuaries and the surrounding contiguous Reserved Forests. The total breakup of land in the landscape and the boundary description is given below in **Table-1(a)**,

Sanctuary/NP/Buffer Area Statement Melghat Tiger Reserve, Amravati					
Sr. No.	**Name of Sanctuary/NP/Buffer area**	**Notification Date**	**Forest Area**	**Non-Forest Area**	**Total Area**
1	Gugamal National Park	27-11-1987 08-08-2000	36128.06	0.00	36128.06
2	Melghat Sanctuary	05-09-1985 15-02-1994 06-11-2000	76882.40	1992.82	78875.22
3	Wan Sanctuary	28-07-1997 29-07-1997	20586.19	514.51	21100.70
4	AmbabarwaSanctuary	09-04-1997	12472.66	238.76	12711.42
5	Narnala Sanctuary	02-05-1997	1235.09	0.00	1235.09
6	Buffer Area	29-09-2010	91008.95	34738.18	125747.13
Total (Melghat Tiger Reserve)			**238313.35**	**37484.27**	**275797.62**

Table-1(a): Area statement of Melghat Tiger Reserve showing Sanctuary/NP/Buffer area

Sl. No.	Name of the Division	Area in ha.		
		Core	Buffer	Total
1	Sipna Wildlife Division, Paratwada	48407.6	35502.1	83909.7
2	Gugamal Wildlife Division, Chikhaldara	46640.7	17354.1	63994.8
3	Akot Wildlife Division, Akot	55002.2	26190	81192.2
4	Melghat Wildlife Division, Paratwada	0	46700.9	46700.9
6	**Total(Melghat TR)**	**150050**	**125747**	**275798**

Table-1(b): Table showing Division wise breakup of area post reorganization

SIGNIFICANCE OF THE AREA FOR TIGER CONSERVATION

The Melghat nestling in the Satpuda hill ranges of Forsyth's and Dunbar's Central India's vast tracts of inviolate natural forests, consisting of unique and representative ecosystems with rich biodiversity and varied habitats offered by deep valleys (locally known as *khoras*) and high hills (locally known as *Ballas*), daunted with rivers and nallahs having water all the year round in the **'*doh*',** was the natural choice for the community of foresters in Maharashtra, when it came to choose an area for preserving it for posterity and for ensuring that the **'Tiger'** them ostmagnificent and flagship of the Indian wild species, could sustainaviable population and survive for the eternity. The fascinating landscape, its enchanting beauty and richness leave everlasting imprints on people visiting the area.

Melghat stands ahead of any other Tiger Reserve in the country for long term conservation of tiger and its habitat because of the following reasons:

1. The vastness of its area: The area of the Reserve extends over 2757.97 km^2 adorning it as the 4th largest in the Tiger Reserve network of India.

2. Melghat forms a unique habitat harboring rare and endangered flora & fauna assemblages. It's an important extension of Satpura hills into the west with its typical geological formation. It encompasses approximately 33 species of mammals, 264 species of Avifauna, several species of reptiles, butterflies and insects. More than 762 species of floral assemblages including 120 species of grasses are found in Melghat.

3. Ithar bors aviable population of Tiger (*Panthera tigris)* and of the endangered Gaur *(Bos gaurus).* It also harbors a number of other faunal species some of which figure in the IUCN Red Data List. These are Wild dogs (*Cuon alpinus),* Jackal *(Vulpes bengalensis),* Sloth bear *(Melurus ursinus),* Leopard *(Panthera pardus),* Caracal *(Felis caracal)* and Ratel (*Mellivora capensis).* Forest Owlet (*Athene belwitii*), Spiders, Flying Squirrels are also the major attractions of Melghats. It also includes the Himalyan elements like *Preistylus constrictus&* rare plants like *Convolvulus flavus, Utricularia striatula, Drosera indica* andmany species of orchids like *Vanda tesselata* and *Aerides maculosum.*

4. Melghat has the potential to restock tiger population in the Central India Landscape in general and the forests of Maharashtra in particular. It is part of Melghat- Satpuda landscape unit which is currently harboring around 99 (87-110) tigers &has a potential to sustain 400 tigers in future if the productivity of the grasslands is augmented.

5. Melghat harbor 2nd highest tiger population of Maharashtra. It plays a significant role in maintaining the long-term survival of tiger population due to genetic exchange between Satpura-Melghat. A functional corridor exists between Satpura TR of Madhya Pradesh & Melghat through Forested landscape of Hosangabad, Betul and East Nimar through low intensity agriculture field & human settlement. This population block is also tenuously connected to Pench Tiger Reserve. Effective protection of tiger corridors within the state & across the neighboring states will foster a viable tiger population with long term survival.

6. The presence of innumerable hills, valleys, grasslands, rivers and streams makes Melghat an ideal haunt for tigers, co-predators and prey animals.

7. Melghat TR account for more than 86% of forest area against its total geographical area sprawling across 3 districts Amaravati, Akolaand Buldhana districts of Vidharbha in Maharashtra state which plays a significant ecological role in biodiversity conservation & climate change mitigation.

8. No mining**,** no major industrial activity exists in close proximity to the TR. The district has mostly forest &agriculture-based economy with more emphasis on forest resources. Indigenous communities like Korku, Nihals, Gonds & Non tribal like Gawalis, Gawalan, Balai have enormous dependence on forest for sustaining their livelihood & indigenous ethno botanical practice.

9. Melghat mountain range reaches beyond 1100m elevation at many locations with highest point (1178m) at Vairat has profound influence on the climate regime in the adjoining region including the adjoining districts of Madhya Pradesh. Rivers like Tapi, Purna, Chandrabhaga have their important catchment area in this Tiger Reserve. Many rivers & streams originate from Melghat providing water to the plains surrounding it. It acts as lifeline for the people of Amaravati and Akola district by providing water, clean air and conserving soil.

10. Traditional mass hunting practices by the tribals has dwindled over the past decade due to effective protection measures and massive participatory awareness campaigns. Organized poaching has also reduced to considerable extent. However, sporadic poaching & hunting in small groups specially during certain times of the year is still prevalent. With continuous efforts on effective protection & awareness activities, poaching & hunting in Melghat landscape will be a thing of past.

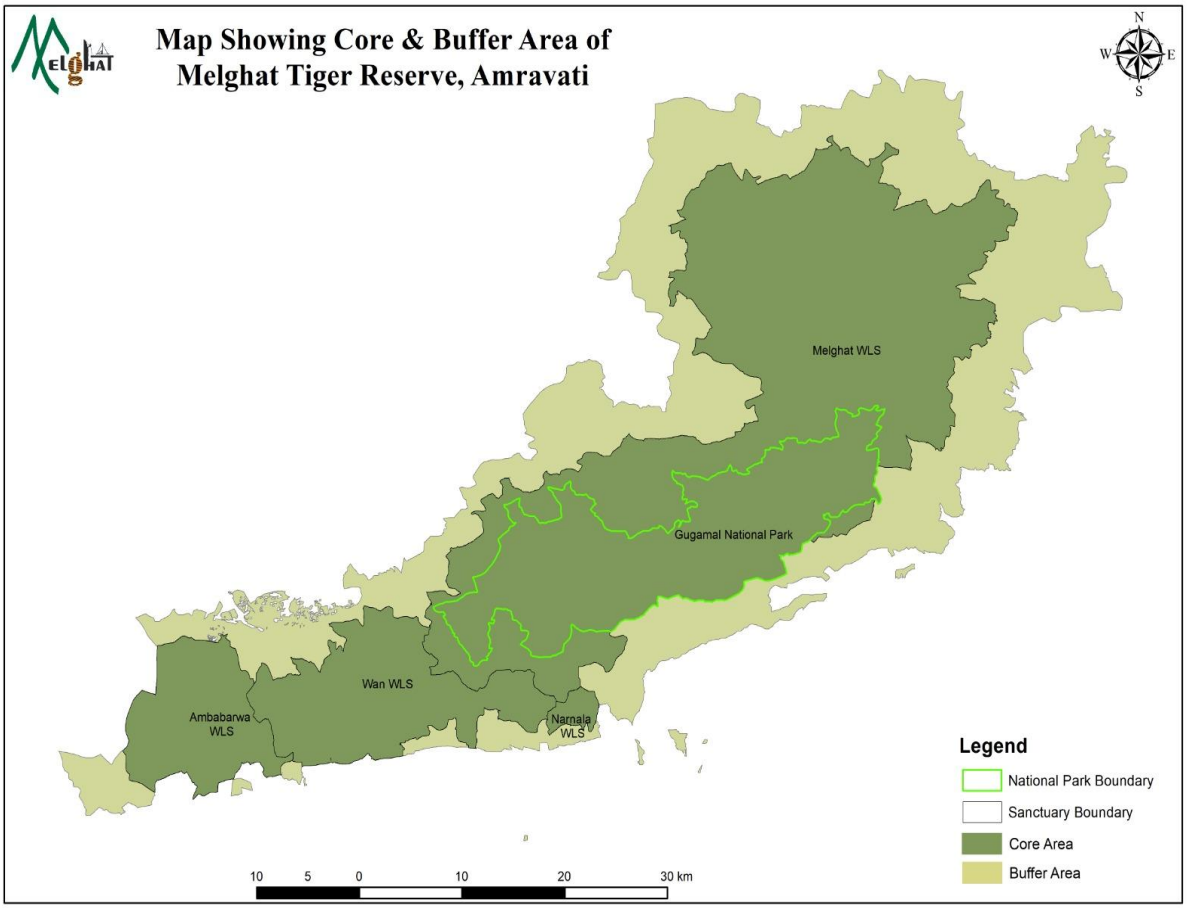
11. Consistent effort on relocation of villages from the core area and development of meadows at the relocated site has provided inviolate space for revival of tiger population, its co-predators & their prey base in Melghat.

12. Eco-Tourism has potential to provide alternate livelihood opportunity to the forest dependent communities in & around Melghat TR and elevate their socio-economic conditions. Places like Chikaldhara, Narnala, Semadohhas large potential of historical & nature-based tourism.

Melghat is the epitome of tropical dry deciduous forest in our country. The structural diversity and interspersion both in standing state and standing crop make it a unique ecosystem. Appreciating its value in long term biodiversity conservation, rich biodiversity and wide array

of habitat suitable for tiger conservation, it has therefore been declared as a Tiger Reserve under Project Tiger Reserve in 2nd February 1974 bythe Ministry of Environment & Forests, Govt. of India.

(b) MAP OF THE MELGHAT TIGER RESERVE/TIGER CONSERVATION UNIT



Map-1(b): Map showing Core & Buffer Area of MTR

(c) LEGAL PROVISIONS CONTAINED IN THE WILDLIFE (PROTECTION) ACT REGARDING TIGER CONSERVATION PLAN AND THEIR BRIEF DESCRIPTION OF THEIR RELEVANCE IN THE TIGER CONSERVATION UNIT/LANDSCAPE

Section 38V, subsection (3), chapter IV B, of the wildlife protection Act, 1972 amended in 2006, requires every state government to prepare a tiger conservation plan for each area declared as a tiger reserve under subsection (1) of section 38 V. It also makes it mandatory to include staff development and deployment plan as an integral part of such tiger conservation

plan. In the context of landscape approach to conservation, section (3) also requires the plan to ensure

a. Protection of tiger reserve while providing for site specific habitat inputs for a viable population
b. Ecologically compatible land uses in the tiger reserve and areas linking one reserve with another while addressing livelihood concerns
c. Compatibility of forestry operations in adjoining forest areas with the need of tiger conservation

Above legal provisions require the tiger reserve area to be managed as a part of larger landscape unit and all management decisions to be taken in a way that helps in improving the connectivity between different reserves that are part of the same landscape and larger landscape complex.

Section (4) requires a tiger conservation plan to ensure the agricultural, livelihood, developmental and other interests of people living inside tiger reserve and other tiger inhabited forests. This section has special relevance in the context of landscape approach as it defines tiger reserve to include core or critical tiger area habitat which are required to be kept inviolate and buffer or peripheral area where co-existence between wildlife and human activity is promoted with due recognition of rights of local people. The limits of such peripheral area are required to be determined on the basis of scientific and objective criteria in consultation with the concerned Gram Sabha and an expert committee. This legal provision firmly states that peripheral areas be given equal importance in management decisions as they are critical in providing connecting and dispersal habitat for wildlife. Besides, bringing peripheral areas under management influence of reserves will provide much needed protection to wildlife when it strays out of legal boundary of the reserve.

Section (5) provides for creation of inviolate areas for tiger conservation on the basis of voluntary relocation of people living inside the tiger inhabited areas on mutually agreed terms and conditions when other reasonable options of co-existence are not available.

DELINEATION OF AREA INTO CORE, BUFFER AND CORRIDORS

The Reserve has been delineated into core and buffer area as detailed below;

Sr. No	Area	Extent
1	Core Area: Wan Sanctuary, Ambabarwa Sanctuary, Narnala Sanctuary, Melghat Wildlife Sanctuary & Gugamal National Park:	1500.49 km²
2	Buffer Area: Reserve Forest &Non Forest Area of Sipna WL Division, Gugamal WL Division, Melghat Wildlife Division, Akot WL Division	1257.48 km²
	Total	**2757.97 km²**

The boundary description and other details have been given in Annexure-I.

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CORE AREA

PART-I: THE EXISTING SITUATION

CHAPTER-1

INTRODUCTION OF THE AREA

1.1 NAME, LOCATION, CONSTITUTION & EXTENT

1.1.1 NAME:

The area of the Critical Tiger Habitat is 1500.49Sq. Km. falling in the heart of the Melghat. It comprises of five protected areas namely Gugamal National Park, Melghat, Wan, Ambabarwa and Narnala Wildlife Sanctuaries.

1.1.2 LOCATION:

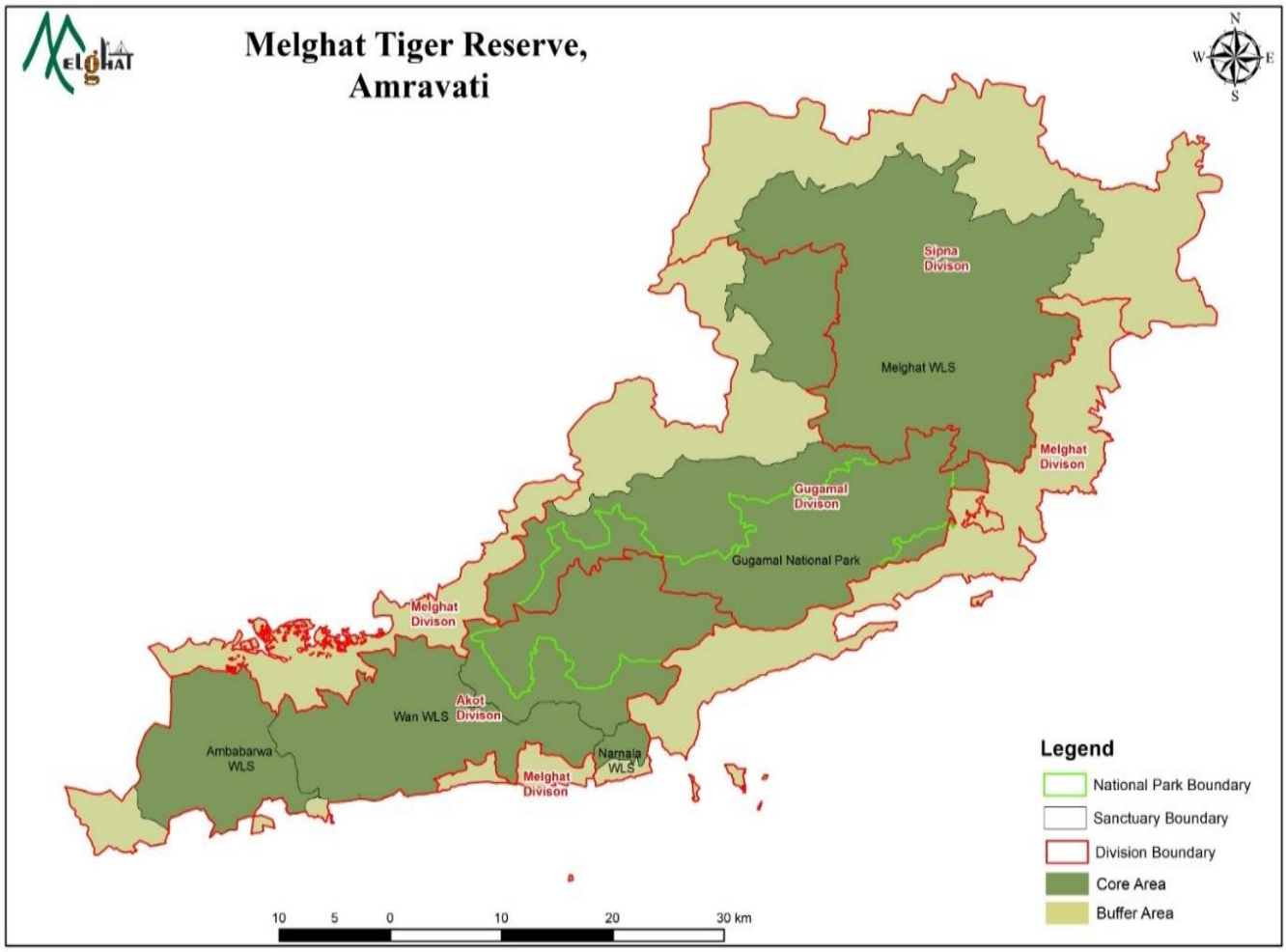
Melghat Tiger Reserve is located between $21^0 44'$ Nto$21^0 08'$N latitude and 76^0 $39'$Eand$77^0 31'$E Longitude. It is situated in Satpuda hill ranges of Central India, the area of Critical Tiger Habitat of the Melghat Tiger Reserve lies in Melghat forests of Amravati, Akola and Buldhana Districts of Vidarbha region of Maharashtra, bordering Madhya Pradesh in the North and East.

Administratively, the area of Gugamal National Park, Melghat Sanctuary and Wan Sanctuary falls in Dharni and Chikhaldara Tehsils of Amravati District, Ambabarwa Sanctuary falls in Sangrampur Tehsil of Buldhana District and Narnala Sanctuary is in Akot Tehsil of Akola District. For control and Management purpose, the area of the Critical Tiger Habitat is included in three Wildlife divisions, namely; Sipna Wildlife Division, Paratwada, Gugamal Wildlife Division, Paratwada and Akot Wildlife Division, Akot.

1.1.3 CONSTITUTION

The legally notified critical Tiger Habitat or core area has been notified vide Govt. of Maharashtra Notification No. WLP 10-07/CR-297/F-1, dated.27th December 2007,

The details of notification appended in **Annexure-I.**



Map-1(c): Map showing Division wise core & Buffer area of Melghat Tiger Reserve

1.1.4 EXTENT (AREA STATEMENT AND LEGAL STATUS)

After amendment to Wildlife (Protection) Act 1972 in 2006 (Section 38 V added), the National Tiger Conservation Authority, Ministry of Environment and Forests, Government of India vide their letter no. F-No PS-MS (NTCA)/2007 Misc., dated 5th October 2007 issued detailed format and guidelines for preparation of Tiger Conservation Plan.

The National Tiger Conservation Authority had requested the Government of Maharashtra to declare critical tiger habitats in the Tiger Reserves under section 38 (V) of the Wildlife (Protection) Act,1972 vide their letter dated 16th November 2007. Accordingly, Principal Chief Conservator of Forests, Maharashtra State, Nagpur submitted the proposal to the

Government of Maharashtra which issued a notification dated 27th December 2007 as appended in **Annexure-I**.

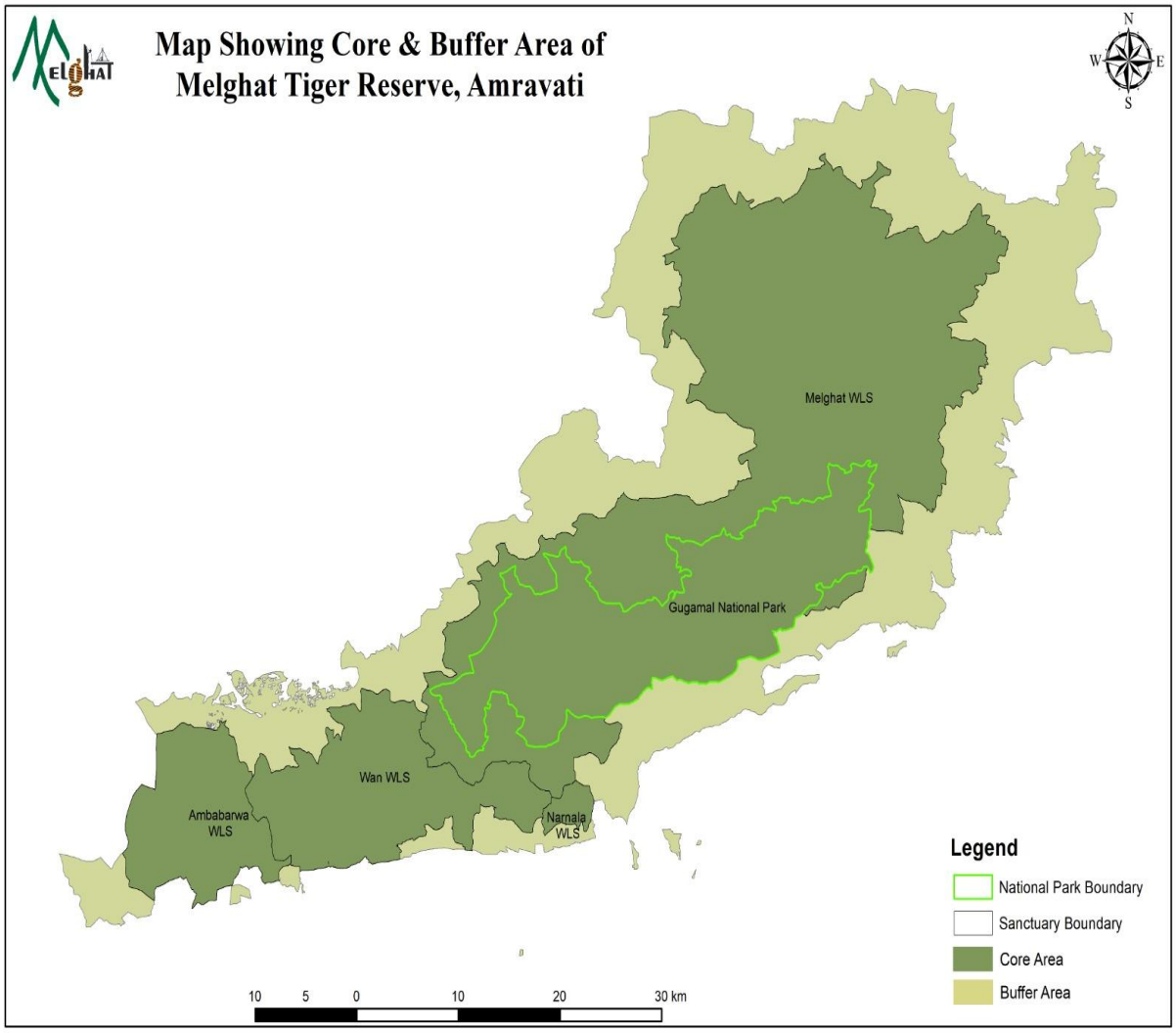
The detailed breakup of the critical Tiger habitat or Core area is given below as per **Table-1(c).**

Sl. No.	Tiger Reserve and Its Constituent National Park/Sanctuaries	Area (Sq. Km)	Notification No.
1	Gugamal NP	361.28	No.WLP.1098/CR-135/F-1, Dated08-08-2000.
2	Melghat WLS	788.75	No.WLP.10-2000/CR-41/F-1, Dated06-11-2000.
3	Narnala WLS	12.35	No.WLP.1096/CR-279/F-1, Dated02-05-1997.
4	Ambabarwa WLS	127.11	No.WLP.1094/CR-123/F-1, Dated09-04-1997.
5	Wan WLS	211.00	No.WLP.1097/CR-5/F-1, Dated27-07-1997.
6	**Total**	**1500.49**	

The division wise breakup of the critical Tiger habitat or Core area is given as per **Table-1(d).**

Sl. No.	Name of the Division	Area in Sq.Km. Core
1	Sipna Wildlife Division, Paratwada	484.07
2	Gugamal Wildlife Division, Chikhaldara	466.40
3	Akot Wildlife Division, Akot	550.02
4	Melghat Wildlife Division, Paratwada	0
6	**Total (Melghat TR)**	**1500.49**

Map-1(d): Map showing Core & Buffer area of Melghat Tiger Reserve



1.1.5 NOTIFICATION

The details of notification regarding declaration of legally notified critical tiger habitats or core area has been appended in **Annexure-I.**

1.2 APPROACH & ACCESS

1. Major Settlements surrounding the Tiger Reserve such as Chikaldhara, Parathwada, Dharni, Akot etc. have developed with the strengthening of road network connectivity in the last decade. All these areas have access to basic public health facilities, Mobile Network Coverage, well developed Markets, regular public transportation services, educational institutions, etc.

2. The villages in the Buffer Area are now well connected with the outside world with all -weather motorable roads & bus and other modes of transportation services. Public health facilities, educational institutions, solar powered electricity & water supplies, etc. have improved a lot in these villages.
3. Accommodation for visitors in the region have improved considerably in the last decades. Many private Hotels, restaurants, tourist operators have flourished in the region, especially at Chikaldhara & Parathwada.
4. Night stay facilities in the Nature Camps at Semadoh, Sahanor & Chikaldhara has been developed through community based Eco-tourism initiatives. Safari vehicles have also been procured & engaged for providing best experience of the nature to the visitors.

1.2.1 ROAD

Melghat is well connected through good roads. All road networks are crisscrossing in the heart of the Melghat Tiger Reserve. There are two major entry points one is from Amaravati- Parathwada-Semadoh side & another is Akot-Harisal side available to entry to Melghat. MSH-14 runs from Amaravati to Dharni & SH-281 runs from Akot to Harisal is the major communication link by road. Other roads passing through MTR are SH 307 (Dharni - Dhakna- Sheluphata), SH 292 (Dharni-Susarda-Dhulghat-Khatkali), SH 305 (Paratwada-Chikaldhara-Semadoh), MDR 08 (Chikaldhara-Ghatang).

Other major habitation/locations in the area are Jarida, Tarubanda, Chaurakund, Rangubeli, Hatru, Gadga, Bhandum and the villages from core Dhargad, Kelpani, Rora, Semadoh, Madizadap, Chopan, Pili, Somthana (K), Somthana (B), Talai, Ambabarwa, Rohankhidki, Pastalai, Mangia, Memna, Malur, Gullarghat, Dolar, Adhav, Raipur, Chunkhedi, Makhla, and Dhakna. These places are connected by state bus service with a frequency varying from 1 to 3 visits per day. Almost all villages in the Melghat area have been connected with road network. Some roads have been tarred. Therefore, in fair season communication is easy barring internal roads which are either *murum*or earthen roads. However in rainy season some of these roads get washed away at the cross drainages when the streams running across them are in spate. This renders some of the roads difficult to tread and consequently, some portion of the Reserve becomes inaccessible during rainy season.

The road distances of both the entrances from nearby cities are as follows:

Table-1(e): Distance of Major cities from Entry points to MTR

To	Major Cities/town				
Entrance Gate	**Nagpur**	**Amaravati**	**Paratwada**	**Akot**	**Akola**
Semadoh	245	93	46	99	144
Harisal	270	118	70	78	167
Sahanur	265	108	0	22	70

All Range Office headquarters, Anti-poaching Camps, Watchtowers, etc. are connected with all-weather motorable road network, VHF Communication Network. Several locations inside the TR have mobile network coverage which enables the staff to remain connected with the outside world. Check gates and barriers have been installed and made operational on all entry points to the Reserve with a view to regulate the entry of visitors and also keep a check on illegal and suspicious intruders in the area.

1.2.2 RAIL

The nearest railway station is Badnera and Amaravati located in the central railway zone on Mumbai-Kolkata route. The distance from Badnera to Semadoh is about 110 kms.

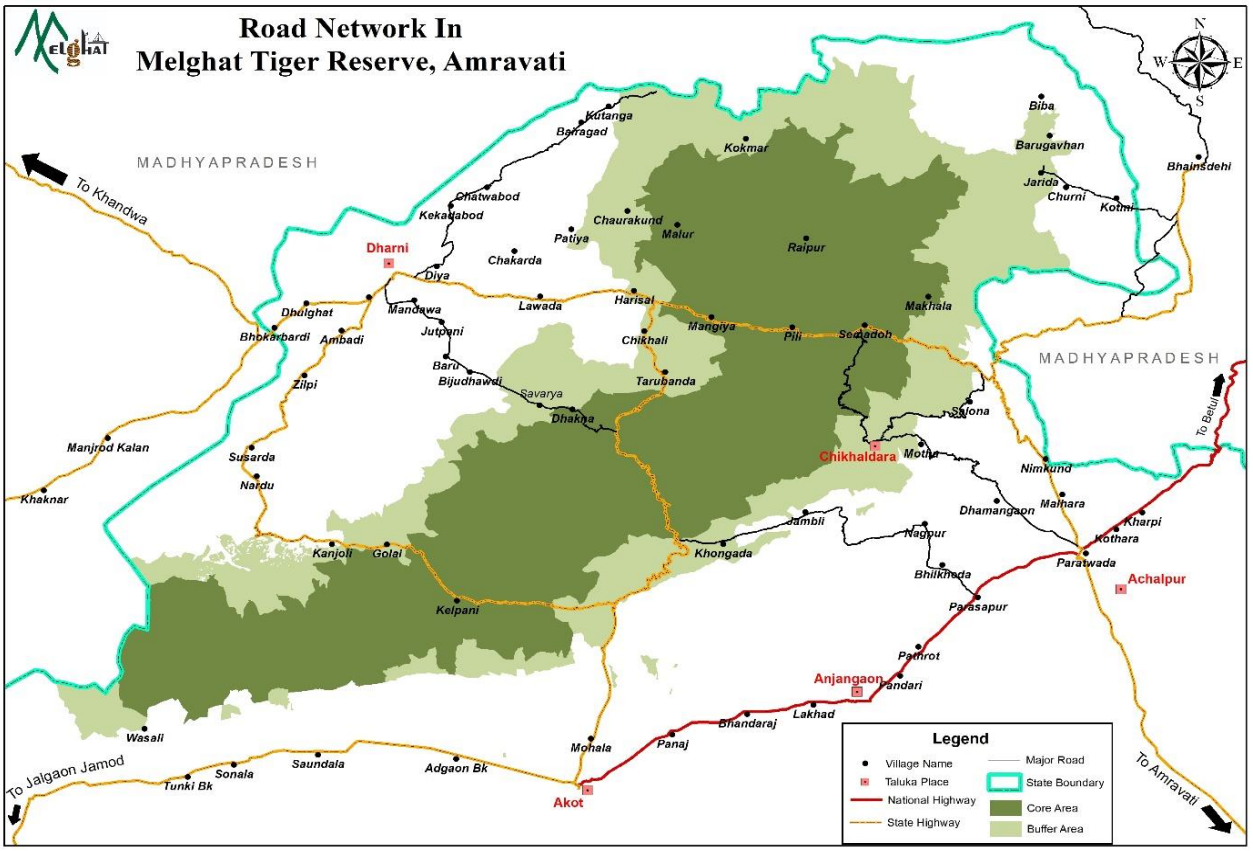
1.2.3 AIR TERMINALS

Nearest Airports are located at Nagpur, Maharashtra & Bhopal, Madhya Pradesh.

Table-1(f): Distance of various Air Terminals from MTR entry points

Nearest Air Terminal			
Entry Points	**Nagpur (International)**	**Bhopal (International)**	**Belora, Amaravati (domestic, Under construction)**
Semadoh	255 K.M	287 K.M	118 KM

Map-1(e): Map showing communication network to Melghat Tiger Reserve, Maharashtra



1.3 STATEMENT OF SIGNIFICANCE

Melghat Tiger Reserve is a typical representative of Central Indian Highland forming a part of the Biogeographic zone of Deccan Peninsula & Central Highlands province (RodgersandPanwar,1988). This area constitutes forests which are part of world's fifth biologically richest heritage country. The Reserve forms an important corridor between forest areas of Madhya Pradesh and Maharashtra ensuring contiguity of forests in Satpuras. It beholds one of the viable populations of tigers.

Melghat Tiger Reserve signifies innumerable tangible & intangible values which makes it special among all the protected area of the country in general and Maharashtra in particular. Based on the V.B Sawarkar guidelines, some the indicative values of Melghat are listed in tabular form in **Table-1(g)**.

Table-1(g): Values of Melghat Tiger Reserve

Sl. No.	Value Category	Illustrative Constituents

1	Real or Economic	Source of Timber, fuelwood, bamboo, medicinal plants, NTFPs. As per the report of **Economic Valuation of Tiger Reserves in India: a value+ approach by NTCA, MoEF & CC & IIFM, Bhopal**, under the Total Economic Value (TEV) framework, the annual direct, indirect benefits and option values of Melghat are estimated to the tune of Rs. **51.41 Crore, Rs. 10312.99 crore and Rs. 1984.95 crore** respectively.
2	Biological	• Melghat has a rich heritage of natural native biodiversity with important 'genepool' for many RET species. More than 769 species of plant, 265 species of birds, 37species of mammals, several of reptiles, insects, butterflies etc. • Flagship species, Tiger, Leopard, Sloth bear, Gaur and Flying Squirrel. • Home to Endangered **Forest Owlet (*Athene belwitii)*** endemic to India, which are of limited distribution in all over India. IUCN Red Data List species, • *Panthera tigris, Panthera pardus, Cuon alpinus. Vulpes bengalensis, Melurus ursinus, Felis caracal and Mellivcora capensis*. Refuge to 45-50 Tigers (30% of the total Tiger population of Maharashtra) • IUCN global IBA (Important Bird Area) category with important species such as Lesser Kestrel, Forest owlet, Malabar whistling thrush etc. **Flora** • Temperate species: *Geranium mascatense,*

		Senecio chrysanthemoides, Peristyluys constrictus, Apium graveolens. • Endemic species: *Achyranthes coynei, Ceropegiaoculata Aquatic species. Ceratophyllum demersum, Hydrilla verticillata, Aeschynomene indica, Sesbania bispinosa, Smithia conferta.* • Orchids: *Vanda tessellata, AeridesMaculosum, Habenaria grandifloriformis, H. roxburghii, H. plantaginea*. • **Rare Species:** *Convolvulus flavus, Utricularia striatula, Drosera indica.* • More than 120 species of grasses are found in Melghat which significantly high in comparison to other protected area of the country.
3	Ecological Processes & Functions	• Provide numerous Ecosystem services through different provisioning & regulating services. Act as a life supporting system by supplying clean water, air & soil amelioration. • As per the report of **Economic Valuation of Tiger Reserves in India: a value+ approach by NTCA, MoEF& CC & IIFM, Bhopal**, Important ecosystem services that arise from this reserve include provisioning of water (Rs. 3448.64 crore per year), carbon sequestration (Rs. 4120.48 crore per year) and genepool protection (Rs. 1984.95crore per year). has been estimated for Melghat TR. • Melghat serves as the watershed for Tapi and Purna river systems with major tributaries like Gadga, Sipna, Khandu, Dolar, Wan, Khapra etc. flowing through the area. Soil conservation values, acts as carbon sink, and

		also enhances lifeline for the people of Amravati and Akola as it provides water and fertile top soil.
4	Conceptual	Largest tiger reserve of the Maharashtra state with well designed, legally notified 1500 KM² core area including four Wildlife Sanctuary (Melghat, Wan, Ambabarwa, Narnala) & one National Park(Gugamal) act as a breeding ground for the flagship species like Tiger and rare endangered species like Forest owlet.
5	Physical attributes	Part of Satpuda mountain ranges with typical geographical formation. Large tracts of unending hills & ravines scarred by jagged cliffs & steep climbs.
6	Recreational	Currently, the annual visitation is more than 1 lakh visitors including Indian and foreign visitors. Huge potential to attract the nature lovers due to its beholding natural beauty. Nature trail, sightseeing bird watching, wildlife sighting, jungle safari, nature photography and trekking are the major recreational activities at Melghat.
7	Scientific	• Research ground for various scientific study related to endemism, biodiversity, ethnobotany, genetic resource, climate change, migration pattern, habitat restoration, Relocation impacts, anthropogenic impacts, corridor functionality, vegetation dynamicity etc. • Melghat has 61 vegetation survey plots which are monitored annually. Apart from this All India Tiger Estimation in every 4 years, the annual monitoring of vegetation, prey predators are also being conducted through Phase-IV exercise. Good number of scientific publication is brought out from Melghat including Technical reports, Flora of Melghat, Dawn to Dusk are prominent.
8	Educational	Hub of nature education for students, villagers, tourists. Nature interpretation with 4 interpretation centers at

		Semadoh, Amravati, Harisal and Gullarghat having different themes, conservation awareness and education, ethno botany with tremendous scope for compilation of Indigenous technical knowledge (ITK)
9	Assorted	
	i. Cultural	Traditional communities both Tribal & Non-Tribal living in Melghat have unique culture (Korku, Gawali and Nihal) lives in Melghat, providing a unique opportunity to learn typical, unique culture living with nature, the Korkus being one of the few tribes who worship Tiger as a God.
	ii. Religious	Temples like Dhargad temple, Dolarambaba temple, Narnala shrine, Kandri baba temple having religious importance & attracts huge devotees annually. .
	iii. Historical	• Melghat has a glorified history over 200 years old. History of scientific forest management since 1893 when the first Working plan was written here. • Narnala fort, Gavilgarh fort of archeological importance in the vicinity of MTR, Rest houses of British era like Rangubeli, Chunkhadi, Tarubanda, Dhargad, Dhakna, Hatru, Raipur etc. • Area visited by famous naturalists like Dunbar Brander and Captain J. Forsyth who made important observations about wild animal behavior like reporting herds of upto 40 wild dogs, explanation of biological control of langur population etc.
	iv. Other	Melghat is the oldest and the 4th largest Tiger Reserve of the country & largest in the Maharashtra state.

The above values are fitted into different scales & ranked into different category as per Dr. V.B Sawarkar guidelines and depicted in the **Table-1(g);**

Table-1(h): Ranking of Different Values of Melghat Tiger Reserve

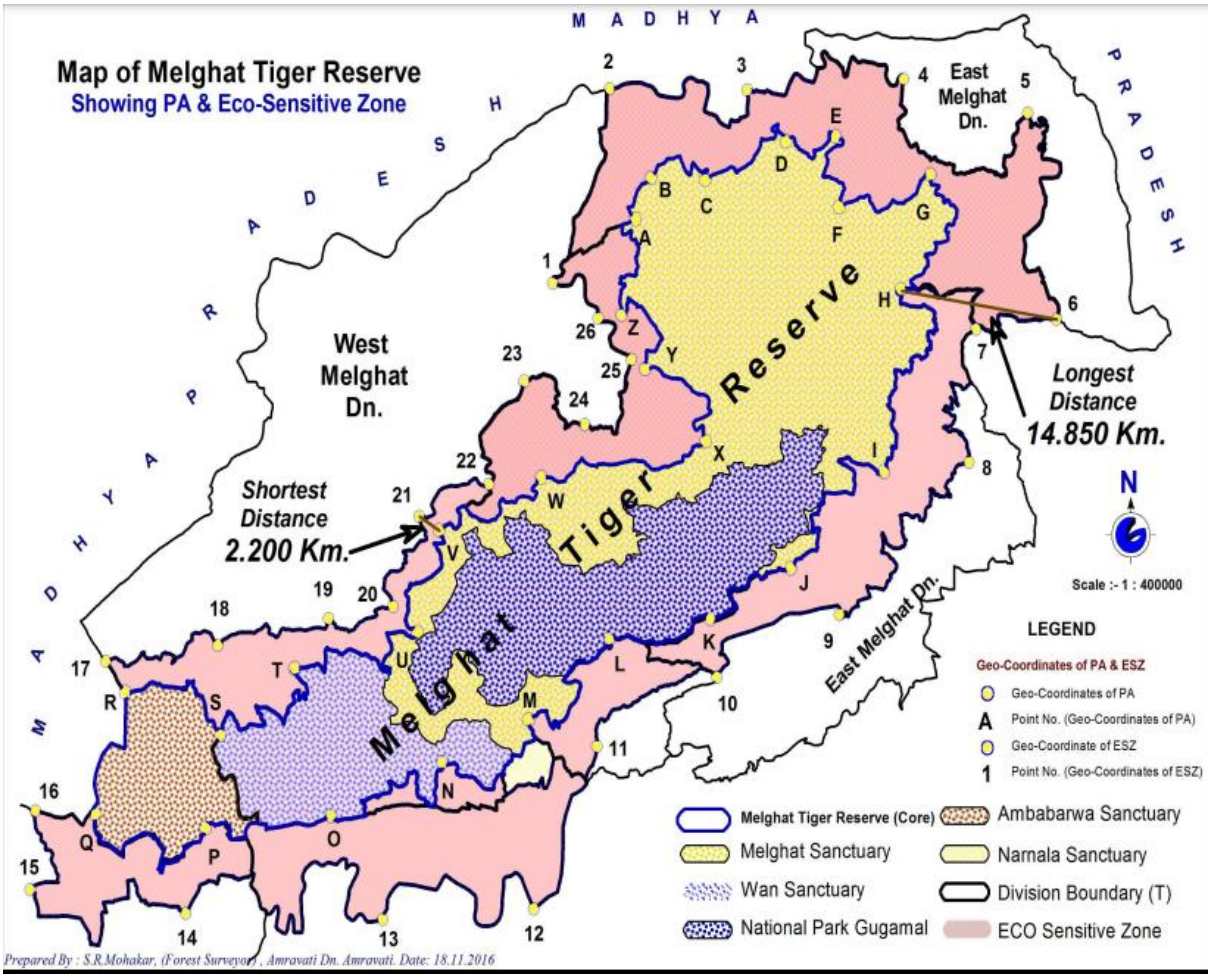
SL. No.	Value Category	Illustrative Constituents
1	Global	➢ Home to several IUCN Red Data List species like, Panthera tigris, *Panthera pardus, Cuon alpinus. Vulpes bengalensis, Melurus ursinus, Felis caracal and Mellivcora capensis*. ➢ IUCN global IBA (Important Bird Area) category.Lesser Kestrel, Forest owlet, Crimson Fronted Barbet, Malabar whistling thrush, White backed vulture and long billed vulture are among the rare avifauna found in Melghat. ➢ Vast tropical dry deciduous forest act as global carbon sink which sequestrate carbon to the tune of 500 million dollar or Rs. 4120.48 crore per year. (Economic Valuation of Tiger Reserves in India: a value+ approach by NTCA, MoEF & CC & IIFM, Bhopal**).** ➢ Important area for maintaining ecological process/ evolution process & also gene pool conservation with global importance.
2	National	➢ Among the 1st Nine Tiger reserve of the country declared during 1973. ➢ 4th Largest Tiger Reserve of the country in terms of geographical area. ➢ Home to many Scheduled Species as per WPA, 1972.
3	Regional	➢ Melghat forms an important corridor between forest areas of Madhya Pradesh and Maharashtra ensuringcontiguityofforests in Satpuras. ➢ Connecting link for genetic exchange of Tiger between Maharashtra & Madhya Pradesh due to interstate dispersal of Tiger for long term survival of viable tiger population in this region.

4	State	➢ Largest Tiger Reserve of Maharashtra state holding 30% of the Tiger population. Major contributors to the Tiger state, Maharashtra. ➢ Important catchment area of large river like Tapi & Purna which ensuring water supply for irrigation, industry & domestic use for Amaravati, Akola & Buldhana district. ➢ Melghat is among the most preferred tourist destination of the state due to its exceptional wilderness and fascinating mountains, waterfalls, rivers filled with extreme natural beauty.
5	Local	➢ Source of revenue & livelihood for the locals with continued supply of timber, fuelwood, NTFPs, other traditional medicines and livestock grazing. ➢ Ecotourism in Melghat is a boon for the local community in strengthening their financial backbone.

CHAPTER-2

BACKGROUND INFORMATION AND ATTRIBUTRES

2.1 BOUNDARIES



Map-2(a): Map showing Tiger Reserve & Eco Sensitive Zone boundaries of Melghat TR

Table-2(a): Geo Co-ordinates of Prominent Boundary of Melghat Tiger Reserve

Point No.	Longitude	Latitude	Point No.	Longitude	Latitude
A	77:07:31.707	21:37:23.772	N	76:56:58.308	21:13:49.157

B	77:08:22.116	21:39:10.966	O	76:50:55.074	21:11:30.396
C	77:11:19.851	21:39:06.239	P	76:44:05.164	21:10:58.420
D	77:15:44.764	21:40:45.720	Q	76:38:06.123	21:11:34.061
E	77:18:27.051	21:40:58.003	R	76:39:43.683	21:16:51.851
F	77:18:38.055	21:37:53.978	S	76:44:54.928	21:15:01.168
G	77:23:36.686	21:39:16.758	T	76:48:56.477	21:17:53.909
H	77:21:59.309	21:34:17.812	U	76:55:37.989	21:19:28.127
I	77:21:02.328	21:26:23.204	V	76:56:49.230	21:23:53.549
J	77:15:56.799	21:22:12.400	W	77:02:22.561	21:26:11.595
K	77:11:34.524	21:20:01.800	X	77:11:19.072	21:27:44.447
L	77:06:03.895	21:19:10.043	Y	77:08:02.383	21:30:53.292
M	77:01:39.670	21:15:40.409	Z	77:06:45.978	21:33:14.343

2.2 GEOLOGY, ROCKS AND SOILS

In general, the area consists of succession of hills and valleys, which are extension of main series of Satpuda range. In this tract main ridge of Gavilgad hills runs East to West. The area of Project Tiger lies in the North of this ridge. The highest point is Vairat, which is about 1178 meter above M.S.L. Numerous spurs, branch from this ridge towards the north where these have flat tops locally known as “ballas” (Plateau) of considerable size. The ridges usually have abrupt slopes and form narrow valleys below locally known as “Khoras.”

2.2.1 GEOLOGY AND ROCK

Geologically the Melghat Tiger Reserve area is the Deccan trap and underlying rock is basalt in one form or another. The most common form is a hard dark colored rock, compact or fine grained, but occasionally with numerous phenocrysts. This rock usually occurs in thick layers and outcrops of it give rise to the conspicuous scarps on the hill side. Prismatic jointing is well developed and at many places fine examples of columnar structure can be seen,

particularly in the beds of rivers and streams. When the hard scarp undergoes weathering, it is converted into soft earthy brown rocks with rows, representing the original columns of roughly spherical bodies exfoliating in successive concentric shells. A second form occurring in the lower hills is grey vesicular basalt, the cavities being lined with crystals of quartz and other minerals. Then there are the thick layers of basalt tuft, as off grey, dull fine-grained rock that occurs occasionally representing the intervals of time that elapsed between the successive lava flows. These rock units are formed by a variety of geo activities attributed to Archaean, Gondwana, Lameta, traps, laterites and alluvium.

2.2.2 SOIL

Soil types vary considerably; the reason attributed to this is different conditions of weathering and marked variation in rainfall within the area. Soil formation varies with rocky, clayey, lacustrine sediments with porous, pitted, clayey to alluvium calcareous, black cotton soil covering extensive areas. Soil so derived from the weathering and disintegration of underlying rock is fertile though generally stony and has considerable variation in depth and drainage. Soil is very shallow on the steep upper slopes. It is on terraces, lower slopes and valleys that the soil has some depth. The following three categories have been recognized.

(i) BOULDERY SOILS

This type of soil covers the greater part of the reserve. This is mostly confined to the slopes. It is dark brown in color, clay like in texture and blocky in structure. It being on slopes is very well drained, in fact drainage is very excessive which results in the soil becoming absolutely devoid of its moisture content in dry season. Analysis of this soil revealed that it is rich with nutrients. Texture on slopes is clay loam to clay. In the valleys it is clay on top but sandy loam-sandy clay-loam at lower depths. The soil tends to be neutral to slightly acidic which is suitable to most species. The best forests of the Tiger Reserve grow on this type of soil in valleys and on lower gentle slopes.

(ii) LATERITE LOAM

Lateritic loam generally occurs on hill tops and plateau and is noticed around the Chikhaldara, Vairat and other parts of the reserve. This soil is very shallow and dry and has a characteristic red brown colour. This soil is poor in nutrient, which gets leached out during the

rains, is very low in organic content and has very poor water retentive capabilities. Tree growth is very stunted and sparse on this soil.

(iii) CLAY SOILS

This type of soil occurs in depression and on level areas. These soils are very fertile but have poor drainage status. Open areas of such soils are liable to have frost in severe winter. Soil in general is rich in calcium and its PH is near neutral.

2.3 TERRAIN

The name Melghat itself signifies meeting of ghats and Reserve is located in a setting of rugged hills, steep cliffs and deep gorges. The highest ridge lies on the Southern flank of the reserve. Average height ranges between 381 meters and 912 meters above sea level, these hills and valleys have constant abrupt variations in aspect and gradient.

2.4 CLIMATE

Climate is tropical. December is the coldest month, when night temperature may drop to 5^0C and May is hottest month (47^0C). Due to the variation in altitude and aspect, the climate in Melghat is varying and distinct seasons are experienced during the year. Except for monsoon season, the air is generally dry.

(i) The monsoon or rainy season- from the middle of June to the end of September.

(ii) The autumn season- October to November.

(iii)The winter season - from December to February.

(iv)The summer season from March to Middle of June.

2.4.1 RAINFALL PATTERN AND DISTRIBUTION

The annual rainfall in Melghat Tiger Reserve varies from place to place. The rainfall differs with altitude and topography. Good rainfall is received during monsoon. The rainfall in the area varies from 2250 mm to 1000 mm. Average no. of rainy days experienced is 65 to 90 days. The northern slopes receive heavier rainfall during winter, whereas the southern slopes are virtually devoid of it. Thus in general, north phasing slope with better space rain accordance for more luxuriant vegetation than in south over 80% of the area of Melghat is under forest.

2.4.2 TEMPERATURE; A SUMMARYOF YEAR-ROUND PATTERN

Temperature varies considerably with the altitude. The higher hill plateaus and valleys to the North of the main Gavilgarh ridge are very much cooler in summer than the southern foot hills. The plateau and the higher hills enjoy almost equitable and pleasant climate throughout the year. While valleys become cold during winter. These valleys experience sometimes heavy dew and occasional frost. The average mean maximum annual temperature is 46^0C and the average mean minimum annual temperature is 4^0C.

Frost generally occurs in the valleys of Semadoh, Raipur, Harisal and parts of Akot range. Within the tiger reserve frost damage is caused in the low-lying and open areas under cultivation or adjoining cultivation. Originally, damage is confined to young growth when leaves and tender shoots are killed. Area prone to frost is indicated by its low lying black, cotton soils, the presence of dominant "Saj" (*Terminalia tomentosa*) and bushes like "Dhi" (*Woodfordia floribunda*) and "Samalu" (*Vitex negundo*).

Dew formation is very common during winter. It is important to know the period of cessation of dew formation as it is interrelated with the commencement of pinch period. But in this respect no record is available. Fogs are also known in the area. Chikhaldara, Makhala plateau, Ghatang to Koktu experience prolonged fogs in rainy and winter seasons.

2.4.3 HUMIDITY; A SUMMARYOF YEAR-ROUND PATTERN

The relative humidity in Melghat Forest area varies from 63.25-64.0. Relative humidity is high during rainy season. (Dr Ujwala Kokate, 2022, Study on Morpho-taxonomical study of *Selaginella blatteri* from Melghat Forest,Amravati District)

2.4.4 WIND SPEEDS: A SUMMARYOF YEAR-ROUND PATTERN

Winds are generally light to moderate. There is no record of severe storm or cyclone of any consequence in the area. There are records of areas which has seen wind fallen trees because of strong squalls. The stunted nature of the forest in exposed situation at high elevation is partly due to strong winds, which sometimes occur during the hot and rainy season.

2.5 HYDROLOGY AND WATER SOURCES

The Melghat Tiger Reserve located in the southern ridge of Satpura Hill Ranges has rugged and scrap topography. The highest point variant touches the altitude of 1178 meters above MSL and the lowest along the banks of rivers Tapi a meager 312 meters above MSL. The differential altitude ensures speedy runoff. The high ridge running east-west from Chikaldara plateau forms the watershed line dividing the watershed of river Tapi and Purna. The tract north of the ridge drains into river Tapi through tributaries as Khandu, Khapra, Sipna, Gadga and Dolar. The tract has five major drainage systems viz. Khandu, Khapra, Sipna, Gadga and Dolar and these rivers contribute as the important tributaries of Tapi river which is a perennial river and flows along the northern boundary of the reserve between Kund and Rangubeli for about 6 kms.

The tract south of the ridge drains into river Purna through Chandrabhaga, Sapan, Vanadi and Wan. River Purna further joins river Tapi which flows westwards to join the Arabian Sea.

The rivers are fed by numerous hard bedded fast flowing hill streams. The rain water quickly drains off the hill slopes and then through these streams soon become dry, retaining water in depression. Although these rivers are dry from March to mid-June they retain water in small pools locally known as "Dohs".

The "Khapra" is the longest river running through the reserve. It runs 46 km through the reserve. The "Sipna" is also originated from MTR. It flows 41 km through the reserve. It is fed by 6 major nallahs or the right bank and 3 on the left bank including two small rivers - Kali and Batori. The river "Gadga" originates on the southern slopes of Gawilgarh ridge which is fed by five feeder nallahs on right bank and five feeder nallahs on the left bank. The river "Dolar" originates as the Koktu river near Koktu within the core of MTR. It is fed by many nallahs and gain volume and is then named as Dolar River. It flows a distance of 21 kms.

The Gugamal National Park and Melghat Sanctuary area is well drained by many rivers. Most of the rivers are seasonal and flowing water remains there till February only. Few artificial water bodies like tanks near Tarubanda, Kesarpur, Gullarghat, Malur, Chaurakund, Mehriaam, Chunkhadi, Ruipathar are significant additions to surface water source because of their close

vicinity to habitation. Absence of large surface water bodies has avoided faunal congregations and consequent damage to habitat.

In the Wan Sanctuary there is only one major river draining the area namely, Wan River that flows from East to West. Other important surface water body in the protected area is the Wan reservoir at Wari. The presence of Wan dam, with its watershed acts as a good source of groundwater. With the relocation of all villages from here, it has become a major habitat of all prominent wildlife.

In the Ambabarwa Sanctuary there is no major river draining the area. The presence of base flow in various nullah confirms the fact that it is a gaining area i.e. groundwater is being discharged. Important surface water body adjoining the protected area is the Wan reservoir at Wari. The presence of Wan dam, with its watershed acts as a good source of groundwater recharge to the formations in the area.

From the hydrological points of view the tract of Narnala sanctuary is a part of Gavilgarh range covered by the boulders and debris. Abundant supplies of fresh water are available at a depth of 3 to 5 meters from the surface. The old tanks on the plateau are important source of water.

2.5.1 WATER MANAGEMENT

Water scarcity in summer is a major impediment that affects distribution of wildlife and thereby habitat utilization. The rivers and numerous nullah flowing through Melghat Tiger Project are seasonal and have beds strewn with boulders. The rain water is quickly drained out through these rivers & nullah. There are number of small pools in these rivers where water is available almost throughout the year, and these are utilized by human beings as well as animals. There are a few springs where water continues to trickle in small quantities even in severe summer. In summer, water is available in *Dohs* in the rivers, nullah and from a few springs. The wild animals, therefore, descend in the valleys in the plain and the lower slopes in search of water, leaving their habitat at higher reaches unutilized. There are natural perennial water holes which have the ability to recoup their potential and storage capacity but these are very few. In order to augment water resources artificial waterholes have been created by

constructing bunds, anicuts & underground bunds etc. Desilting of water holes, protection from poisoning, restricting use by domestic cattle and cleaning of water holes may also improve the situation.

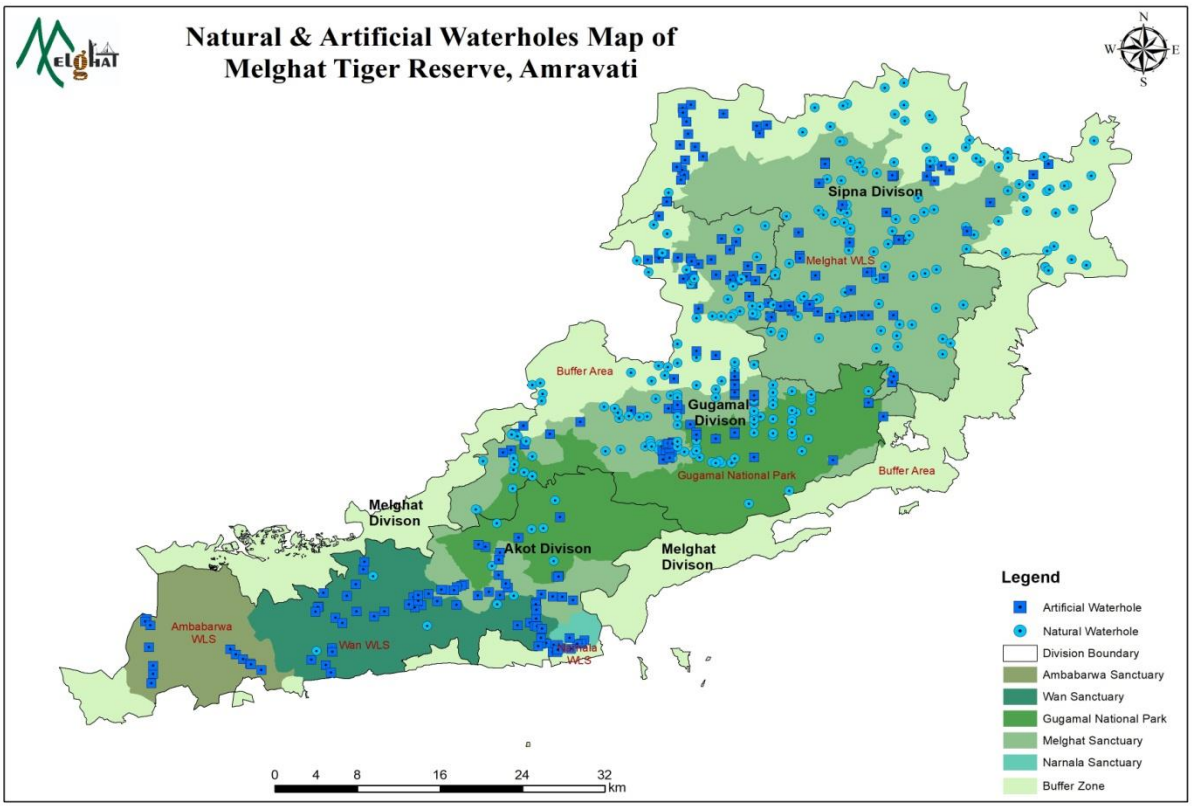
Natural Water Holes

Other than Nallahs, there are many natural water holes in MTR and these water holes largely retain water throughout the year.

Artificial Water Holes

Scarcity of water in summer is the dominant limiting factor. Notwithstanding the food potential of the area in context of herbivores, it is actually the availability of water in summer that will influence the numerical strength of wildlife in this area so also species composition.

The availability of water at MTR is not only dependent on rainfall but its distribution. Therefore, many artificial water holes have also been developed by MTR administration to cater the lean dry season.



Map-2(b): Map showing Natural & Artificial waterhole map of MTR

2.6 RANGE OF WILDLIFE STATUS, DISTRIBUTION AND HABITAT (WILD FAUNA, HABITATS AND TROPHIC NICHES

2.6.1 VEGETATION

The forests of Melghat Tiger Project are classified as "Tropical Dry Deciduous Forests" in the Champion and Seths'' Revised Survey of Forest types of India" and fall under the sub-group 5-A "southern tropical dry deciduous forests." Most dominant tree species is Teak. Other timber species are Tiwas, Bija, Haldu, Saja, Dhawda, Ain, Lendia etc. Other important trees producing NTFP are Moha, Tendu, Achar, Amla, Behada, Bhilawa, Bor, Mango, Khair, Jamun, Apta, Bel, Kulu etc. Weeds like Tarota, Achyranthus, Rantulsi, Lantana etc form a thick undergrowth and are partly detrimental to tree regeneration.

The tract being sparsely populated, the biotic factors are less influential except fires which along with general distribution of rainfall, aspect and change in depth and nature of soil are responsible in determining the local variations within the above broad type. The area north of main Gawilgarh ridge which receives rainfall higher than the part south of it, bears a good growth. Within this area, the better growth is confined to the northern aspects of the lower gentle slopes and in valleys having flood drainage pattern. Besides receiving less rain fall, the southern part of the region is also subjected to frequent fires, often twice in a year and bear more open forests with species rather resistant to fire. The species like Semal (*Bombax ceiba*), Salai (*Boswellia serrata),* Tendu *(Diospyrous melanoxylon), (Lagerstroemia parviflora)* survives the fire. Similarly, the teak forests here owe their existence to the remarkable power of the species to withstand repeated burning and to establish itself on burnt grass land. The purity of the present teak forests is largely attributable to the fact that its natural associates are less resistant, and none of them appears to be able to establish in high forest in repeatedly burnt area. As the fire sweeps in, the bark of teak, having low conductivity prevents the damage of the cambium and phloem and helps in survival of the tree.

The geological formation and the soil largely determine the type of vegetation it is going to support. The most of the area has the soil of trap origin. These soils are rich in mineral and have a high-water holding capacity. They have a high rate of exchangeable calcium and PH varying from 6.5 to 7.5 thus supporting the best form of teak. Alluvial deposits along Tapti in

Rangubeli support good teak forests along with bamboos. Teak needs a good quantum of moisture to support its long growing season. The places at ballas or on slopes, where the moisture condition deteriorates, the teak is soon replaced by Salai (*Boswellia serrata*) and Tiwas (*Desmodium oogeinensis*).

2.6.1.1 THE BIOGEOGRAPHIC CLASSIFICATION

Melghat lies in Central Highland Biotic Province (Province 6E) of the Deccan Biogeographically Zone (ZONE 6).

2.6.1.2 THE FOREST TYPES, COVER AND FOOD FOR WILD ANIMALS

According to the classification of Champion and Seth (1968), the forests can be broadly classified into the following sub types:

Table-2(b): Table showing forest type/classification in Melghat TR General Description of Forests

Forest Types	Champion and Seth's classification
Sub group 5 A	Southern Tropical Dry deciduous forests
a) Climax types	
i) 5A/C1 ii)iii) 5A/C1 a 5A/C1b 5A/C-3	Dry teak bearing forests. Very dry teak forests. Dry teak forests. Southern dry mixed deciduous forests.
b) Edaphic type	
i) 5/E-2	Boswellia Forest.
ii) 5/E-5	Butea Forests.
c) degradation State 5/d S 1	Dry deciduous scrub.
d) Primary seral type 5/1 s1	Dry tropical riverine forests.
e) Working plan type i) Tiwas forests ii) Mixed forests.	Edaphic-biotic type.

The Dry Deciduous Forests of MTR represents the climatic climax stage of succession. Here, the upper canopy is usually closed. It consists of a mixture of trees predominantly deciduous in nature shedding leaves by the end of winter and remaining leafless for several months. Teak is the predominant species in this forest and other species commonly found

growing with it in association are, *Terminalia, Ougenia, Bombax, Boswellia, Lannea, Sterculia, Anogeissus*, etc.

The lower canopy is also of Dry Deciduous type with few semi-evergreen species like Ficus. Bamboo is often present along the moist slopes but is not very luxuriant in growth. Ground layer is covered by grass growth, however in areas near the villages there is a predominance of weeds like *Lantana, Hyptis, Pogostemon, Colebrokia*, etc. Climbers are more prevalent in undisturbed and moist areas. Epiphytes and parasites along with lower flora like Bryophytes and pteridophytes are relatively very few in numbers. The site quality of the area in general is between III and IV. The valleys and lower slopes show high density of forests which are more open on the upper steep slopes and plateaus. The natural regeneration is found to be deficient in areas where biotic interference is more. The riverine areas show a distinct type of vegetation.

A. Climax Types:

5A/C1 - Dry Teak bearing forests

Exist in two subtypes

(a) 5A/C1 a -Very Dry Teak forests

It occurs near hill tops and ballas where depth's very shallow (10-15 cm) and soil is dry and infertile. Teak occurs here almost as pure crop with scanty ground cover and poor regeneration. It is generally of poor quality with the height of 6-8 m. common associates found along with it are Dhaora (*Anogeissus latifolia*), Salai (*Boswellia serrata*), Kulu (*Sterculia urens*) and Ains (*Terminalia tomentosa*). The underwood consists of Palas (*Butea monosperma*) and Khair (*Acacia catechu*).

(b) 5A/C1 b - Dry Teak Forests

This is the most common type of forest found in MTR. On the basis of the quality of timber produced it can be further divided into three sub categories:

(i) **Good quality Teak forests on alluvial deposits**:

Location: River Tapi and its minor tributaries mostly in Chaurakund range. The soil is sandy loam deep and well drained with good moisture content. Teak forms 20-60% of the crop with a density of 0.6 to 0.8. The commonly found associates are Dhaora (*Anogeissus latifolia*),

Lendia *(Lagerstroemia parvijora*), Saj (*Terminalia lomentosa*), Haldu (*Adina cardifolia*), Tiwas (*Ouginia oogenensis*), Awla (*Emblica officinalis*), Dhaman (*Grewia tilifolia*), Salai (*Boswellia serata*), Kekda (*Garuga pinnata*), Kadam (*Mitragyna parviflora*), Mahua (*Madhuca longifolia*), etc. Saj is common in best stocked areas and Haldu is abundant in valley region, while bamboo forms the middlestory. Grasses form a thick mat on the ground layer. Main species found here are, Kusal (*Heteropogon contortus*), Sainar (*Ischaemum sulcatum*), Pochati (*H. ritchiei*). The area also supports some excellent teak plantations belonging to site quality III. Weed infestation are generally less and undisturbed areas are marked by profuse regeneration especially of miscellaneous species.

(ii) Good quality teak forests on trap zones

Bulk of the Melghat forest falls under this category. It covers Chaurakund, Harisal, Dhakana and Tarubunda areas on slopes, valleys as well as flat surfaces. Soil is very rich with high water holding capacity. Teak composition is 40-80% with an average site quality of Ill and IV a. In some areas because of water logged conditions saucer formation beneath the soil occurs leading to, open patches among thick forests where only grasses are seen. These areas are less prone to fires and here also profuse regeneration of miscellaneous species is seen. Bamboo is present only on well drained soils. Common associates of teak found here are Dhaora (*Anogeissus talifolia*) Tiwas, haldu, Saj, Landia, Kekad, Kosari (*Bridelia retusa*), Kalam, Kahu, Kusum (*Schleichera oleosa*) Bilwa (*Semecarpus anacardium*). Shrubby undergrowth is sparse except for Lantana. Commonly found shrubs in the area are Marudhsing (*Helicerus isora*) Bhandar (*Coolebrokia oppositifolia*), Nirgudi (*Vitex neguda*)
Ranhend (*Thespesia lampas*) Waiwarang (*Emblea robusta*). Common grasses found here are, Pochati (*H. ritchiei*), Kusal (*H. contortus*) Gandhali (*Anthistiria ciliata*) Sainar (*Ischaemum sulcatum*) Phuli (*Apluda varia*). Climbers are few and generally confied to moist localities. These are, Kawarel (*Cryptolepis buchnant*), Palasbel (*Butea suporba*), Mahul (*Bauhinia vahili*), Chilabi (*Mimosa rubiculis*)

(iii) Poor quality Teak forests on the trap zone

Location: It is found near Dharni and Dhakana areas and in localities which are dry and exposed with shallow soil depth and heavy grazing and fire pressures. Teak here forms 50-90% of the crop but is of a very poor quality with epicormic branches (site quality IVa or IVb) Bamboo is generally absent. Common teak associates found here are Dhaora (*Anogeissus latifolia*), Landia (*Lagerstromia parviflora*), Salai (*Boswellia serata*) Moyam (*Lannaea grandis*), Ain (*I. tomentosa*), Tendu (*Diospyros melanoxylon*) Bel (*Aegle marmelos*), Char (*Buchnania lanzan*),

Bhirra (*Chloroxylon sweitenia*). Shrubs here include Ber, Bharati, Kharsi. Climbers generally found here are Chilati (*Mimosa rubicolis*)

(c) 5A/Cs - Southern Dry Mixed Deciduous Forests

Location: They are found in the under hills of Chandrabhaga river on the Northern slope of Chikaldara range and Dhakana range. There are distinguished by the presence of thorny trees which remain dry. On good quality soils and valley areas, the site quality is I. Teakis also present.

Regeneration is generally plentiful but there, forests are degraded wherever biotic pressures are more. Important species found here are Saj (*T. tomentosa*) Dhaora (*A. latifolia*) Kadam (*M. parviflora*), Mahua (*M. longifolia*) and tendu (*D. melanoxylon*) forming the top canopy. The understory consists of Ber (*Z. jujuba*) Marodphal (*H. isora*) Dhen (*W. floribunda*) Raimunia (*Lantana camera*)

B. Edaphic Climax

(a) 5/E 2 - Boswellia/Salai forests

This type is commonly found in Chikaldara range where soil is bouldary, pebbly, shallow and dry. It is generally seen on hill tops, ridges, spurs and well drained plateau areas.

Boswellia is the dominant over wood with associates like Dhaora (*A. latifolia*) Landia (*L. parviflora*) Aonla (*E. officinalis*) teak (*T. grandis*).

(b) 5/E5 - Palas forests

These occur in degraded forests of Dharni and Chikhaldara tehsil. They are generally found in stiff and badly drained soils or on very dry clayey soils and black cotton soils in all drained flats and depressions. This type gives a savannah kind of appearance with scattered stunted and malformed trees standing over short grasses or bare ground.

C. Degradation Type

There are two kinds of Degradation seen here

(a) 5/D - S, - Dry Deciduous Scrub forests

Location: Few such patches exist near Chikhaldara station and is generally found in highly degraded and disturbed areas in and around villages. It consists of a low broke soil with shrubby

growth of around 3-6 m height including some stunted tree crops reduced to similar conditions. Species here are usually fire resistant.

(b) 5/D - S4 - Dry Grasslands

Such grasslands occur amidst tree forests as natural blanks where the soil has been eroded. Soils are generally superficial but deep in areas of saucer formation. The prominent grasses here are Gondhal (*Themeda quadrivalvis*), Kusal (*H. contortus*), Rusai (Simbopogen sp.) (*Scheima nervosum*). On deep soil *Dichantium undulatum, H.contortus, H. ritchiei, Cynodondactylon.*

D. Primary Soil Type

5/1 S1 - Dry Tropical Riverine Forests

These are found in narrow strips along the hilly sections of the larger stream and widens as the valleys get wider. These areas are often referred to as the riparian zone. In these forests the trees are of larger size than the climatic climax. Soils are sandy, overlaying impervious rocks. Arjun (*T. arjuna*) is found in the over wood associated with Kadam (*M. parviflora*), Palas (*Butea monosperma*) Imli (*Tamarindus indicus*) and Jamun (*Syzigum cumini*). These areas are usually rich in avifauna and wildlife.

E. Working Plan Types

These have two categories

(a) Tiwas forests

These are seen generally in Chikhaldara and Tarubandha and others on top of high plateaus and terraces over 1000 msl. Here, Tiwas (*Desmodium oogenensis*) is the most common species forming 10-15% of the growing stock. These forests are generally poorly stocked with stunted growth. There are numerous blanks containing only grasses, lantana and colebrokia. Lantana, colebrokia invasion is very high. Common associates of Tiwas are Dhaman (*Grewia telifolia*) Anola (E. officinalis) Kumbi (Carva arborea) Jamun (S. cumini) Gular (*Ficus glomarata*) Semal (*Bombax ceiba*).Grasses commonly found are Kusal (*H. contorts*) Sainer (*Scheasulcatum*).Regeneration of Tiwas is good but of other species is scanty.

(b) Mixed forests

This type is found around Chikhaldara and areas having moist condition. It is conspicuous by absence of thorny species which is otherwise the characteristics of mixed

southern dry deciduous forests. Teak is also found here but its percentage is very less and is confined to the moist aspects of the valley and on the northern slopes. Other commonly found species are Koral (*F. hispida*), korelawa (*F. cunia*)

Aquatic and semi-aquatic components

MTR being a catchment of Tapti and Purna river is interspersed by a number of major and small streams and water bodies hosting a variety of aquatic flora. These species found vary with permanent and seasonal water bodies e.g. *Ceratophyllum demersum, Hydrilla verticellata, Calisneria spiralis, Crinum deflixum* are found in permanent water bodies. On temporary water bodies on low lying situation species like *Aeschynomene indica, Sesbania bispinesa, Smythiaconfetta, Lignophylla indica, Polygonum glabrum, Typha angustata,Cyprus sp. Echinochloa colonum, Coix aquatica*, etc.

Orchids

The flora in MTR represented by species like *Vanda tessellate Aridesma sculosum*. These are commonly found growing on *Mangifera indica* especially in the Semadoh valley. Terrestrial orchid species are *Habenaria grandiforifoimis,*
H. roux borgi and *H. planteginea*. These are found in hill slopes.Bryophytes and pteridophytes are rarely found in MTR.

Plant Parasites

*Dendrphthoefaliata*has the broadest host range. *Visumarticulatum*is rare and occur only in Dhangadi, Bori and Kelpani areas. Two species of Cuscuta also found. There are *Cuscuta reflexa* also found. There are *Cuscuta reflexa* which is quite rare and C. chinensis which is present widely on the Chikaldara plateau. *Striga angustifolia* and *S. jesnaroides* are found as parasites on different grass species.

Weeds

Weeds are of common occurrence in disturbed areas and depending on locality the following weeds are seen Lantana camera is seen inside the forests where grazing is more. *Hyptissuvabivolans* occurs gregariously near village sites, especially in Dhakana, Rangubeli, Raipur and some other areas. Buffer areas are seen to have four times more concentration of the species than the core.

Apart from this, species like *Argemone mexicama, Hibiscus lobatun, Sida acuta, Cassia tora, Tridaxprocumbem, Cathoranthespulchellus, Achyranthes aspera, Euphorbia geniculata*, etc. are found in around agricultural fields and forest areas near the villages.

Lantana has invaded large areas of the reserve and is gregarious in Semadoh, Chikhaldara, Raipur and Tarubandha areas but sparse in Akot, Harisal and Jarida. It has been seen that Lantana avoids places where bamboo is present and Bhandar (*Strobilanthus callous*) areas.

The presence of grasses like Kusal (*H. contortus*) and Pochati (*H. richiei*) also show a negative correlation with lantana occurrence, thus, acting as natural control over lantana.

Heavy grazing pressures have also resulted in establishment of non-palatable species of annual herbs such as *Acanthospermumhispidum, Achyranthus aspera, Alternanthera pungem, Gomphrena celosoides*, etc. It has also resulted in introduction of the notorious exotic weed like *Partheneumhisterophorus* which has been found near many villages of Melghat e.g. Semadoh, Harisal, Chaurakund, Dhangari, Gularghat, Koha, Chikhaldara, etc.

Phenology

The most favorable period of vegetation growth in the Reserve is July to October. Entire area gets a lush green look from August to November which dries up completely by December. Dry Deciduous teak forests here exhibit the maximum seasonal changes. Teak being a deciduous species sheds leaves from November to January and remains leafless from November to January and remains leafless throughout the summer season. Leaves appear after June but in moist area it may begin leafing as early as April to May. Other teak associates like *Terminalia tomentosa, Anogeissus latifolia, Madhuca longifolia, Buchnanialamzan, Mitragyna parviflora and Lannea coromendelica* also show a similar phenophare.They shed their leaves from March onwards and remain leafless till June. Fruits appear inApril and ripen till May to June. In the Dry Deciduous Forests, the following peak is between February to May where species like *Butea monosperma, M. longifolia, C. fistula, L. parviflora, B. vahili, B. superba*, etc. being to flower.

The prominent weeds in the area which show flowering and fruiting throughout the year are *Lantana camera, Parthenium hysterophorus, Argemone mexicana and Achyranthus aspera.Hyptisswabiolens starts* flowering and fruiting from September to February. *Cassia tora* - August to October, *Ageratum conizoides* - August to March, *Pogostemonplectranphoides* - January to March, *Coolebrokeiaoppositifolia* - December to March.

VEGETATION MONITORING PLOTS

The data collected from 61 vegetation monitoring plots spread in remote and undisturbed area as well as areas situated near habitations and areas open to grazing and other use by human population in Sanctuary area, was analyzed for the trend of the growth in number of species as well as their occurrence per unit area. It has been observed that the area in the National Park as well as area undisturbed and free from human used have recorded a density of 25 to 28 floral species per hectare. Whereas the areas which were disturbed near habitation or the areas on degraded ridges or plateaus have shown density of 12-15species per hectare. This shows that diversity is maximum where the areas are fully protected. Number of species has also increased 2-4 per hectare in the P.A.s which shows that rigid protection results in increase of biodiversity. Detailed analysis on the subject further may reveal more interesting and valuable findings.

FLORAL BIODIVERISTY

More than 769 naturalized plant species are listed in the Flora of Melghat belonging to about 400 genera representing 97 families. It includes 90 tree species, 66 shrub species, 316 herb species, 56 climbers, 23 sedges and 99 grass species. The flora shows a combination of floristic elements from Western Ghats and Satpuda, with many endemic species. Some of the Himalayan plant species like Preistylusconstrictus are also reported here. The rare plants include *Convolvulus flavus, Utricularia striatula, Drosera indica* and many species of orchids like *Vanda tessellata and Aeridesmaculosum*. Ethnobotanical account from MTR is provided by Khaire and Giri (1992) which contains information on 215 plants being used as medicine by local people. These contain 64 trees, 27 shrubs, 29 climbers, 2 grasses and one bamboo. Quite surprisingly, there are enough evidences of presence of even temperate flora in the Reserve which are found in East and North East India, Himalayas, Jammu, Kashmir and Hills of Uttar Pradesh. *Peristylusconstrictus, Apium graveolens, Morchellaconica, Geranium mascatense, Senecio chryanthemoides* are such examples. Species with extremely restricted distribution, *Achyranthes coynei* or the species *Ceropegiaoculata* which is endemic to Maharashtra and is also endangered are speaking examples of the rich and varied habitat this Reserve provides to a variety of plant species.

The forests also provide niche to insectivorous plant species like *Drosera indica*, rare species like *Sruithiabigemia*, medicinally important plants like Habenaria and Senecio spp. A varied and interesting orchid flora also inhabits forests of this Reserve.

The illustrative examples of Melghat Flora are as under.

* Temperate species: *Geranium mascatense, Senecio chrysanthemoides, Peristyluscon strictus, Opium graveolens*.
* Endemic species: *Achyranthes coynei, Ceropegiaoculata. Aquatic species; Ceratophyllumdemersum, Hydrilla vorticillata, Aeschynomene indica, Sesbaniabispinosa, Smithiacanferta*.
* Orchids: *Vanda tessellata, AeridesMacculosum, Habenariagrandifloriformis, H. roxburghii,H.plantaginea*.
* Rare species: *Convolvulus flavus, Utricullariastriatula, Drosera indica*.

2.6.1.3 SPECIES AND COMMUNITIES OF CONSERVATION IMPORTANCE; KEY AREAS

The insectivorous plants like *Drosera, Uriticularia* which are generally confined to flatter tops area have become very rare because of over exploitation. Similarly plants like *Convolvulus flavas* and orchids like *Elophia partensis* and *E.nuda* are being exploited because of their high market value. Another species Embelia found in MTR has already become a Red Data Plant.

NTFP species are culturally and economically significant for the local and forest dwelling people. Common NTFP species found in MTR are *Madhuca longifolia, Buchnanialanzan, T. chebula, T. bellarica, E. officinalis, D. melanoxylon*, medicinal plants, edible mushrooms, honey etc.These species are more or less evenly distributed throughout MTR. NTFP collection leads to income generation during the lean season. However, over exploitations of certain species has led to their reduction by either effecting their regeneration or disposal. Collection of mahua and tendu is one of the major causes of fire in the region.

Main species needing conservation efforts are fodder species for wild ungulates, some of which are:

1. *Sucurnegavirosa* (Pithondi): It is a large shrub which gets new foliage in May, in the pinch period when food is not easily available, gaur are usually found in abundant with this shrub, mainly in Harisal, Chaurakund, Kolkas and Malur.

2. *Heteropogonrichtieii*: It is a tall grass and is highly palatable and nutritious. A positive relationship of it has been established with gaur distribution.
3. *Helicteresisora*: It is a shrub and serves as a good nutrition fodder and has positive association with distribution of sambar.
4. *Clitoriabiflora*: A leguminous herb abundantly occurring in ungrazed and low grazed areas away from the villages.
5. *Careya arborea*: A medium sized tree, its fruits form a staple diet of sambar and chital during summer.
6. *Bridelia retusa*: The fruits are fed upon easily by birds.
7. *Syzyziumcumini*: The fruits are eaten by animals.
8. *Randiabrandisi*: It is the most favorable species browsed by wild and domestic animals.
9. Ficus spp: The fruits are eaten by a large number of birds and wild animals.

Alpina allugas, Musa arnata, Sauharumprocerum, Alibiziaprocera, etc are other species preferred by wild animals.

Key Areas

Riparian areas: These are present along the streams and water ways forming a narrow belt. They are characterized by species like *Terminalia arjuna, S. cumini, Aldina cardifolia, mangifera indica, Ficus spp*. Etc. Species present here are much larger in size than the rest of the areas. These areas form important habitat for giant squirrels.

Mesic sites

These are characterized by groves of massive old trees of *Mangifera indica and S. cumini* with heavy, continuous canopy and preponderance of dent trees, occasional large snags and associated witha spring or small water body. All large owls in MTR are associated with mesic sites.

2.6.2 ANIMALS

Melghat Tiger Reserve is richly stocked with varied animal forms. There are 37 species of Mammals with Tiger as a top most predator, 308 species of birds including the rediscovered forest spotted owlet, 25 species of reptiles, 8 species of amphibians, 28 species of spiders, 141 species of butterflies and 67 species of fishes in Melghat Tiger Reserve.

2.6.2.1VERTEBRATES, THEIR STATUS, DISTRIBUTION AND HABITATS. HABITAT QUALITY, QUANTITYAND KEY AREAS.

VERTEBRATES OF MELGHAT:

1. **Pisces**: Only 55 species of fishes were recorded earlier from Melghat Tiger Reserve. Now, a total of 96 species under 50 genera belonging to 17 families and 6 orders are known after these faunistic surveys by WRS, ZSI, Pune. The total collection of 41 species was actually made while 55 are updated from literature and distributional records.
2. **Amphibia**: 8 species of amphibian are available, included under 7 genera and 4 families.
3. **Aves**: Birds. Considerable work on birds of Melghat Tiger Reserve was published earlier. The checklist included 308 species of birds which was published by Project Tiger Reserve. The present study raised this total to 308 species. As many as 16 orders, 9 subfamilies and 167 genera are represented here.
4. **Estrildidae**: is an endemic to Central India and is also recorded from Melghat.
5. **Reptiles:** Systematic list of Reptiles prepared after sightings and few collection of specimens yielded a total of 54 species. This includes Loricata (Crocodylia), 1 sp., Testudines (Chelonia) 4 sp., Squamata (Lacertilia) (Lizards), 22 species; Serpents (Ophidia) snakes, 27.
6. **Mammalia**: Mammals are represented by 9 Orders, 28 Families and 53 Genera. A total of 80 species/sub species are recorded from Melghat Tiger Reserve. Out of these 80 species, 52 find mention in various schedules of Wildlife (Protection) Act (Pradhan and Ramakrishna, 2004).

2.6.2.3 IMPORTANT INVERTERBRATES, THEIR STATUS, DISTRIBUTION AND HABITAT.

With greater emphasis on the mammals, animal forms of lower animal kingdom have been almost ignored. The present knowledge of the occurrence and status of some of the invertebrates is most important from the point of management.

Insects being primary feeders are important part of the ecosystem. Larvae and grubs feed extensively on autotrophs as also their decaying remnants. Some of the important invertebrates are given below

1. **Cladocera (Crustacea)**: As many as 29 species of Cladocera: Crustaceans are recorded, those belong to Suborder Eucladocera, 2 superfamilies; 5 families and 19 genera. One new subspecies is described.
2. **Freshwater Mollusca**: 23 species representing 9 families from both subordinates viz. Gastropoda and Bivalves spread over 11 genera are recorded.
3. **Scolopendra (Centipedes)**: Previous record from Melghat Tiger Reserve and adjoining are 5 species. However a total of 15 species (including 5 mentioned earlier) are reported in present studies.
4. **Arachnida**: Araneae (Spiders): 14 species of spiders belonging to family Aranea were identified. 11 species could be identified up to generic level. So a total of 25 genera were recorded from Melghat Tiger Project.
5. **Scorpions**: Scorpions belonging to 3 families, 6 genera and eight species were collected and identified.
6. **Solifugida**: Only one species of sun spiders order Solifugida was collected. Galeodus indicus Pocock, is the only representative of this order from Melghat Tiger Reserve.
7. **Insecta**: Diptera (Cecidomyiidae): 15 species of Gall midges (Cecidomyiidae) are recorded. All these species are identified from the adult gall midges or the galls formed by them on variety of plants.
8. **Aquatic & Semi Aquatic Hemiptera**: An account of 20 species under 14 genera and 6 families was made available through the recent surveys.
9. **Aphids**: 8 species of Aphids were recorded from Melghat Tiger Project area.
10. **Odonata**: 24 species belonging to 17 genera in 11 subfamilies and 6 families representing both the suborders viz. Anisoplera and Zygoptera have been reported from Melghat Tiger Reserve, which contains one new record for Maharashtra State (Kulkarni et al. 2002).
11. **Orthoptera**: A total of 38 species from Orthoptera were collected and identified. These represent both the suborders 1) Caclifera and 2) Ensifora. These Orthopteran species are distributed amongst 34 genera & 7 families.

Composition of fauna of Melghat Tiger Reserve (Surveys by Z.S.I.,W.R.S.,Pune) is given in the below table;

Table-2(c): Table showing invertebrate composition in Melghat TR

Sl. No	Name of the group	Order	Families	Genera	Species/Sub species	Recorded in MTR	Species/Sub species
1	Cladocera	1	5	19	29	29	1
2	Mollusca Fresh-water	1	9	11	23	23	-
3	Scolopendraarachnida	1	1	5	15	10	-
4	Araneae	1	16	26	14	14	-
5	Scorpions	1	3	6	8	8	-
6	Soilfugidainsecta	1	1	1	1	1	-
7	Diptera (Cecidomyiidae)	1	1	8	15	15	-
8	Hemiptera (Aquatic/Semi Aq.)	1	6	14	20	20	-
9	Aphids	1	1	6	8	8	-
10	Odonata	1	6	17	24	24	-
11	Orthoptera	1	7	34	38	38	-
12	Lepidoptera	1	8	36	45	-	-
13	Pisces	6	17	50	96	41	-
14	Amphibia	1	4	7	8	8	-
15	Reptiles	4	16	36	54	-	-
16	Aves	16	57	167	263	11	-
17	Mammals	9	28	53	80	-	-

HABITAT, HABITAT QUALITY, QUANTITY AND KEY AREAS

It can be stated that the reserve predominantly consists of deciduous forests; mostly teak forests. However the reserve supports miscellaneous forests with *Boswellia serrata and Lannea sp.*, etc. Because of factors like elevation, aspects, slopes ad soils, different plant species occupy different areas.

Rugged terrain coupled with boulders provides shelter to a number of animals along the lower slope as also the valleys. The periphery towards the north of the reserve has gentle slope and better soil and moisture regime. Thus, there are number of habitations and the edges of this habitation also contribute very important wilderness zone as it supports a variety of avifauna and preponderance of chital, nilgai and wildboar. The flat plateau on the hill range constitute a peculiar niches because of factors like widely spread apart, stunted trees, extensive and rich grassland and paucity of water during summer.

It is observed that some wild animals have different distinct habitat affinities. Based on the specific attributes of Melghat Tiger reserve, area can be divided into the following habitat mosaics.

a) Wood lands on flood plains and valleys, as also lower plateaus.
b) Grassland interspread with scrubby growth.
c) Riverine areas, nullah, banks
d) Caves and burrows
e) Snags, deadlogs, waterhole

HABITAT STUDY REPORT

Habitat Studies were conducted in Melghat Tiger Reserve by researchers from various universities, NGOs as well as officers and staff of the Melghat Tiger Reserve. The details of the study conducted is enumerated below:

(i) Vegetation Monitoring Plots:-

To monitor floristic charges in response to rigid protection as also habitat manipulation practices, 61 permanent Vegetation Monitoring Plots (VMP), as per the guidelines of M/s Sykes and Horril, were set up at random in Melghat Tiger Reserve. Each one of them is a square plot of 1 ha. of 100m*100m in size. The observation on these plots are recorded as per scheme given in the programme set for observations when the plots were laid down. Based upon the

phyto-sociological study undertaken in the plots, a total of 27 species have been categorized based upon their percentage frequencies occurrence as (a) more than 75% frequency and (b) frequency from 51% to 75%. Similarly, estimation of biomass productivity of the herbaceous cover from these plots is worked out. The values ranging between 700 kg/ha. From poor habitats like steep, bouldery slopes to 6000 kg/ha. for grass association like *Heteropogon contortus*/ *Sorghum controversum* are obtained. The biomass is mainly contributed by the grass species. Shri Ramanuj Chowdhary (Ex-Field Director, MTR) suggested in his doctorate thesis "STATUS AND ECOLOGY OF TIGER IN MELGHATS" submitted to Sant Gadge Baba University, Amravati that regular observation on Vegetation Monitoring Plots laid down in the area should be carried out and analyzed at an interval of 10 years to judge the impact of protection and anthropogenic factors on evolution, growth or decline of biodiversity and lower flora.

(ii) Teak plus trees: -

The Assistant Silviculturist, Nagpur has laid out number of seed production plots and has marked "Teak Plus-Trees". To correctly assess the wide gene pool of teak and other economically important tree species, seed production areas as also plus trees are of interest.

(iii) Medicinal Plants:-

Melghat Tiger Reserve is very rich in Medicinal Plants and their traditional use by tribal and local vaidyas. An ethno botanical account was conducted by Shri R. B. Giri, Retd. Range Forest Officer. Melghat Tiger Reserve has published a technical bulletin on this matter, which gives details of Medicinal Plants, parts and their traditional use by the local tribal on various ailments. Publication of technical bulletin on identifying and describing varied floristic details was also carried out in Melghat Tiger Reserve. The first exhaustive work was published vide technical bulletin no.1, a document named "Flora of Melghat Tiger Reserve" authored by Dr. M. A. Dhore and Shri P. A. Joshi (1988) which described 648 naturalized species belonging to 398 genera of 97 families. The flora described 88 trees species, 316 herbs, 56 climbers, 66 shrubs, 23 sedges and 99 grass species**.**

Further additions in this bio diverse list was done vide Technical Bulletin No. VII named as "Additionsto the Flora of Melghat" which was authored by Dr. Prabha Y. Bhogaonkar and Shri V. D. Devarkar(1999). This re-exploration of about one and half year has resulted in addition of 67 species. Lateron Ms. Aparna Watwe, Research Assistant, Botanical

Survey of India identified 58 species in Melghat Tiger Reserve.

2.6.2.2 THE LIMITING FACTORS

Limiting factors act through habitat and result in keeping check on animal population, their distribution and their habits. These are explained as follows:

1. **Food**

   Food is not limiting factor in general for this protected area. Though it is found that during summer, tender grass is not available for herbivores, fodder availability goes down and animals have to take less preferred food items. In this season, flowers of Mahua, Palas and fruits of Tendu, Apta, Teak barks and Mahua become source of food for many species. Open meadows are not much. Wherever they are present, herbivores are noticed. The relocated village sites are good potential meadows. Similarly, small open patches need to be developed as meadows, wherever possible, particularly in middle hills.

2. **Water sources**

   Though the terrain of this region is hilly and rugged, 5-6 major rivers namely Sipna, Khapra, Khandu, Khursi, Gadga, Dolar with their major and minor tributaries flow in this area. These rivers are all fast flowing and flow seasonally only from July to November. But due to high gradient these rivers flow fast in rains and winter but become dry at the end of November. Due to their fast flowing nature, water accumulates in the depression and water holes are formed which are called as dohs inthe river bed and these water bodies last till the next rainy season. Similarly, during the wildlife management period of Melghat forests of last 30-40 years, many major anicuts have been constructed and few repaired and desilted, which are perennial water source for the wildlife. Some underground water channels also open in the river or nullah bed. These channels also act as drinking water source for the wildlife. So water is not a limiting factor in MTR. The maintenance of the natural water sources by activities such as desilting of water holes and retention of water channel by arresting the flow is being done and it should be a continuous activity.

3. **Cover**

Cover is not a limiting factor in this protected area. From the information of animal species found here, it can be said that their requirement of cover is met in the nullah banks, caves, rocky crevices and similar natural structures.

4. Biotic pressure

The presence of 33 (19 fully relocated, 6 in process of rehabilitation and 8 remaining to be rehabilitated) villages puts lot of biotic pressure. The trend indicates deterioration of habitat near villages and calls for immediate restorative steps in the areas in the vicinity of villages in the form of eco-development programs for eco-restoration. The biotic pressure gives rises to more fires, more compactness of soil, lesser proportion of palatable species and more weeds occurrence.

Table-2(d): Table showing the list of totally relocated villages in Melghat TR

Sl. No	Village Name	Area vacated (Ha)	No of Families
1	Koha	59.09	41
2	Kund	31.57	33
3	Bori	36.91	20
4	Dhargad	130.06	163
5	Churni	63.96	55
6	Amona	82.35	90
7	Nagartas	74.62	70
8	Barukheda	61.55	265
9	Dolar	93.76	130
10	Memna	141.86	90
11	Vairat	70.3	68
12	Gullarghat	196	185
13	SomthanaBujruk	61.3	198
14	Somthana Khurd	151.77	277
15	Kelpani	196.76	425

16	Chunkhedi	50.53	236
17	Talai	106.25	273
18	Rohinkhidki	146	549
19	Ambabarawa	74.75	305
	Total	1829.39	3473

In addition, animals of buffer area also exert their pressure in many pockets.This human and cattle population creates tremendous biotic pressure on land for NTFP, small timber, fodder & fuel wood around the village area. The wild animals, therefore, avoid area near roadside and village vicinity.

5. **Fire**

The dry climate aggravate fire in the park. The terrain makes the control of these fires difficult. Fires occur in summer when fodder availability is low. Reduced fodder availability increase competition between wildlife and livestock.

2.7MAJOR CONSPICUOUS CHANGES IN THE HABITAT SINCE INCEPTION

The decadal assessment of change in forest cover with Melghat Tiger Reserve helps in assessing the impact of conservation measures and management interventions that have been implemented over the years. For decadal assessment, change in forest cover, during the period 2011 (data period 2008-2009) and ISFR 2021 (data period 2019-2020) has been analyzed.

FOREST COVER IN MELGHAT TIGER RESERVE (2011 - 2021)

(AREA IN SQ.KM.)

	Area as per digitized	**Assessment year**	**Changes in forest cover**

	Tiger reserve Boundary			w.r.t ISFR 2011
		2011	**2021**	
(A) Very Dense Forest		481.39	456.31	
(B) Moderately Dense Forest		954.27	965.62	
(C) Open Forest	**2028.47**	430.68	425.05	**-19.36**
Scrub		0.02	0.00	
% of total forest cover w.r.t area of digitized Tiger Reserve Boundary		92.01%	91.05%	

Table-2(e): Table showing decadal change in Forest Cover in MTR from 2011-2021

From the above table, it is inferred that, there is a change in forest cover for the past 10 years (2011-2021). An area of 19.36 forest cover was lost during this period. The main reason for the cause of this decline could be:

1. **Forest Rights Act**

   Forest department not being an implementing agency of FRA and Casual implementation of FRA have led to serious honeycombing fragmentation of the forest which is visible in the ISFR report.

2. **Forest fire**

   Because of rough terrain and steep slopes in Melghat, controlling fire is a difficult task.

Table-2(f): Table showing division wise FRA claimed in MTR

FRA Claims Obtained	

Sr. No	Name of Division	Total Claims Obtaind		Claims Sanction		Total land given to FRA
		CFR	IFR	CFR	IFR	
1	Gugamal Wildlife Division, Chikhaldara	17	181	13	38	5491.05
2	Sipna Wildlife Division, Paratwada	13	….	13	317	
3	Akot Wildlife Division, Akot	0		0		
4	Melghat Wildlife Division, Paratwada	22	244	22	127	7218.04

3. **Illicit felling**

   Villages in buffer areas continue to depend on forests for firewood and small timber which leads to illicit felling which might have been a cause

4. **Population**

   The rise in population of these villages inside the forest has also put pressure on the forest resulting in encroachments.

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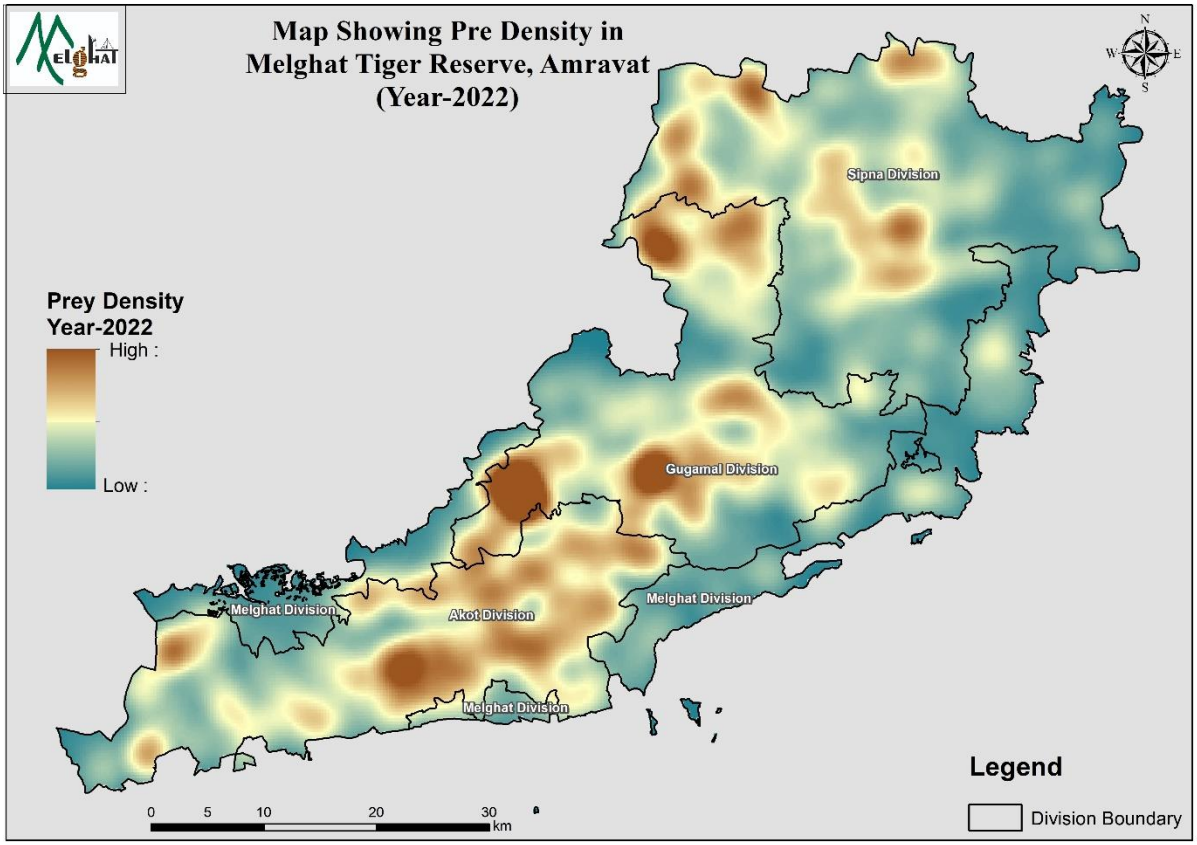
CHAPTER-III

STATUSOFTIGERANDCO-PREDATORS

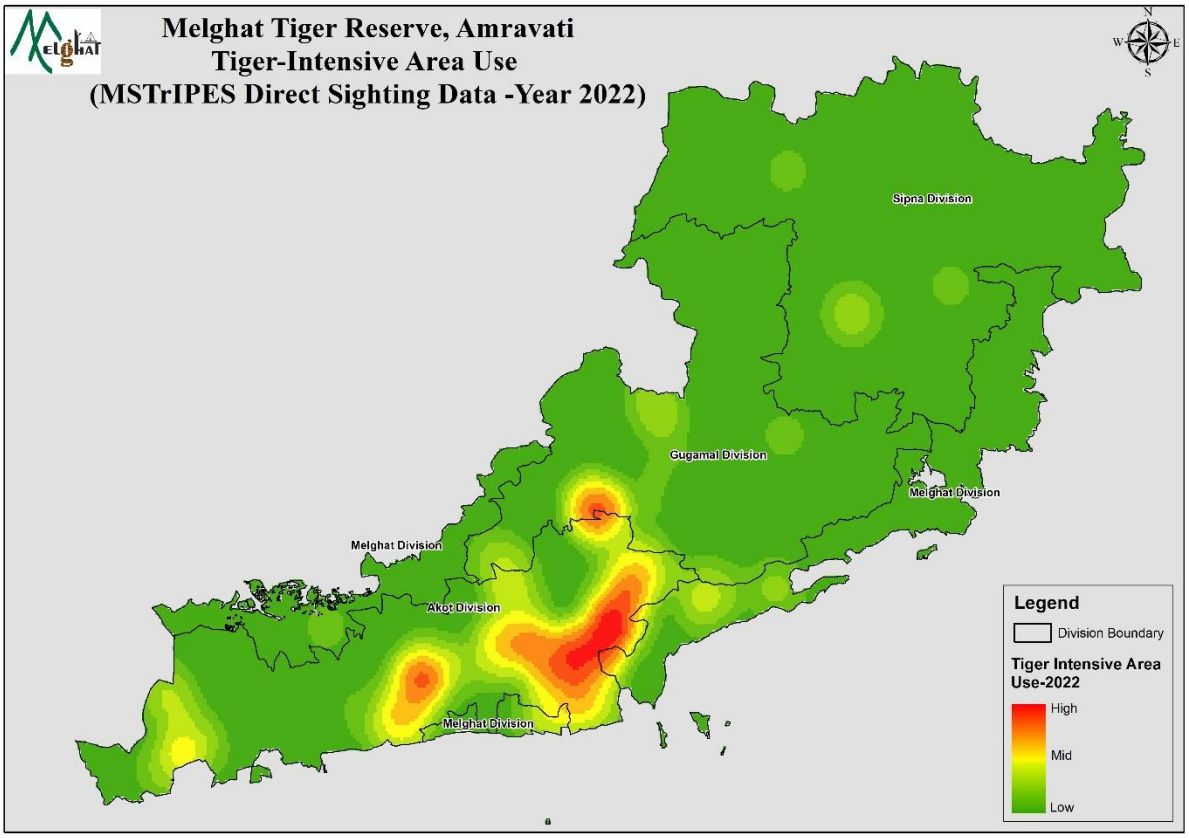
3.1 Distribution

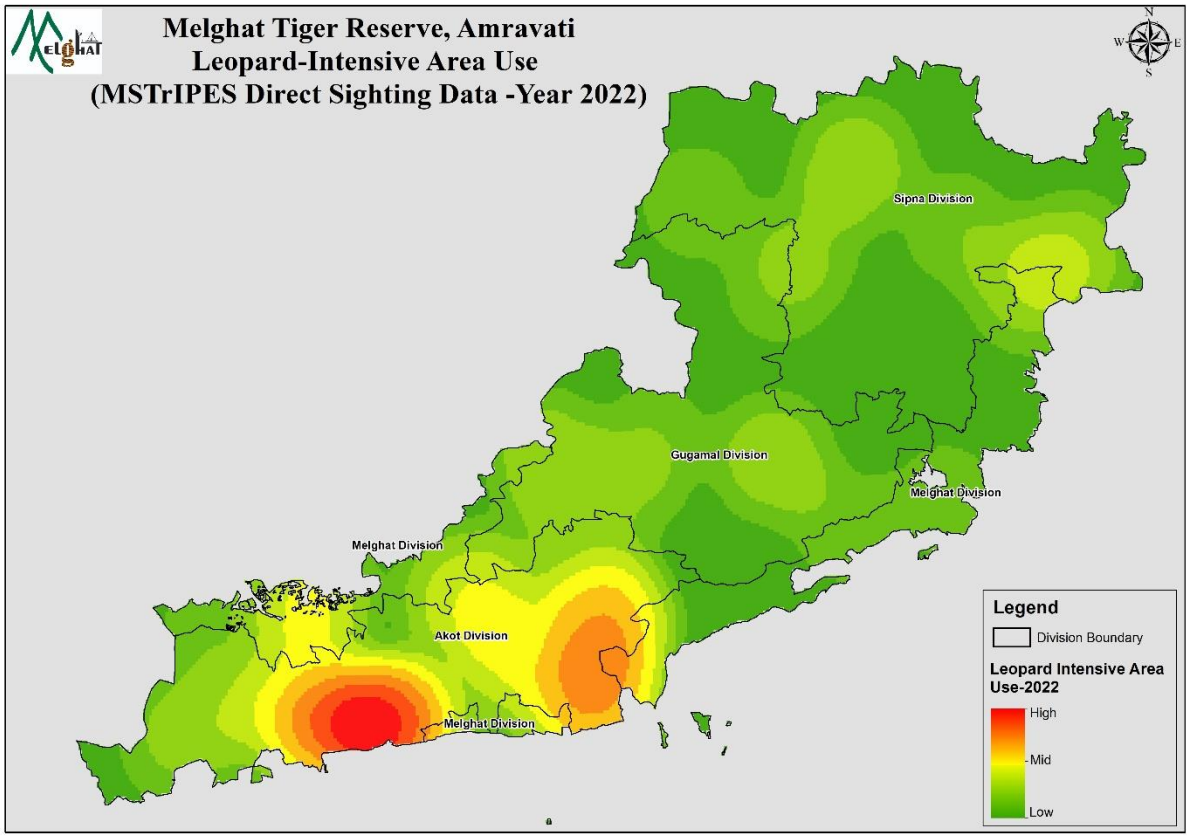
Occupancy of a forest patch by tigers is negatively proportional to human disturbance indices and positively correlated with prey availability and expanse of undisturbed core. In Melghat, the distribution of tiger density is uneven and heavily influenced by biotic pressure imposed by the villages located with in the critical tiger habitat.



Map-3(a): Map Showing Prey density of Melghat Tiger Reserve during 2022

In MTR, there is a pocket (500-600 sq.km.) which supports high density of prey as well as predators like Gugamal National Park, Narnala, Wan and Ambabarwa sanctuary area which are reaping the benefits of early village relocation and habitat improvement. This pocket alone supports more than 75% to 80% of tiger population of MTR.

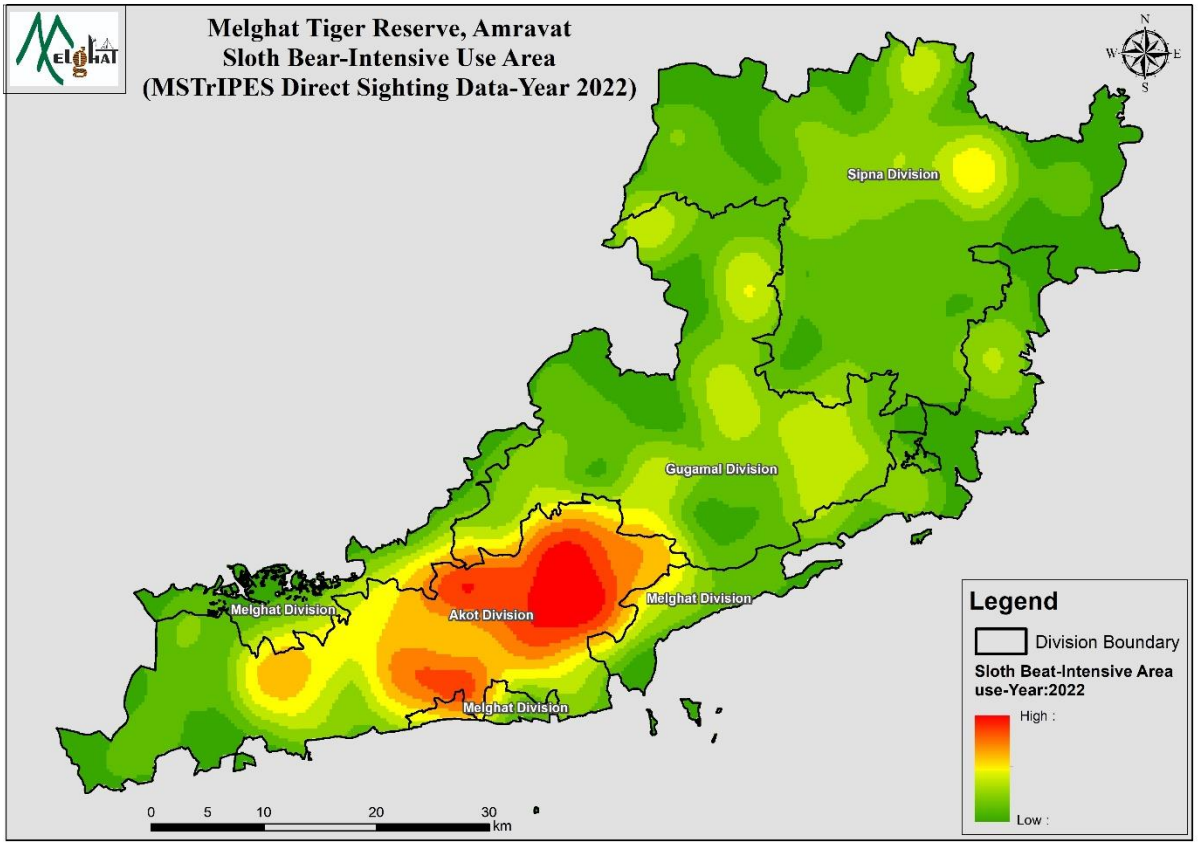




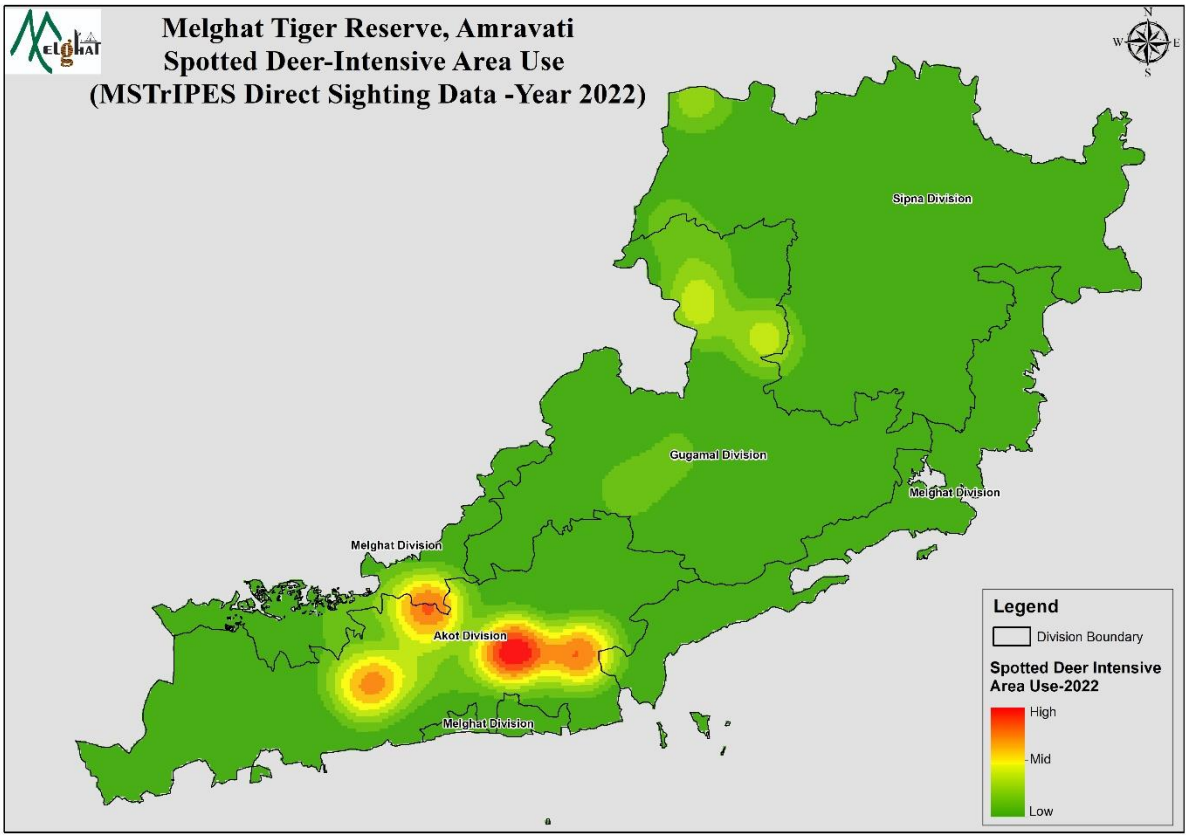
`Map-3(b): Tiger density in Melghat 2022

Map-3(c) : Leopard Distribution of MTR

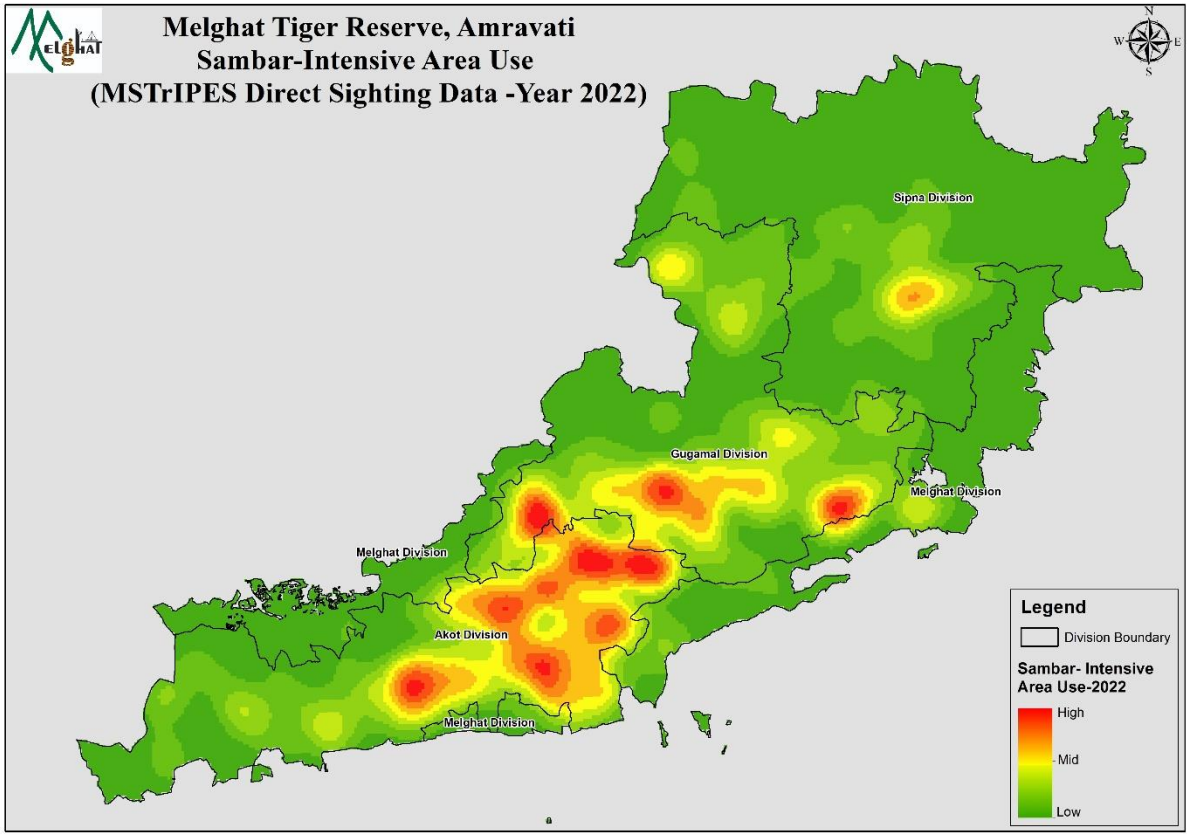
But at the same time there are many pockets (more than 1000 sq.km. especially in the Melghat sanctuary area) where the tiger density is very low i.e. 1-2 tigers per 100 sq.km. These pockets share the same landscape characteristics as that of High Density Pocket of Gugamal National Park except the high biotic pressure. There is ample chance for augmenting prey and predator populations in these areas by relocating remaining villages, reducing biotic pressure and carrying out habitat amelioration.



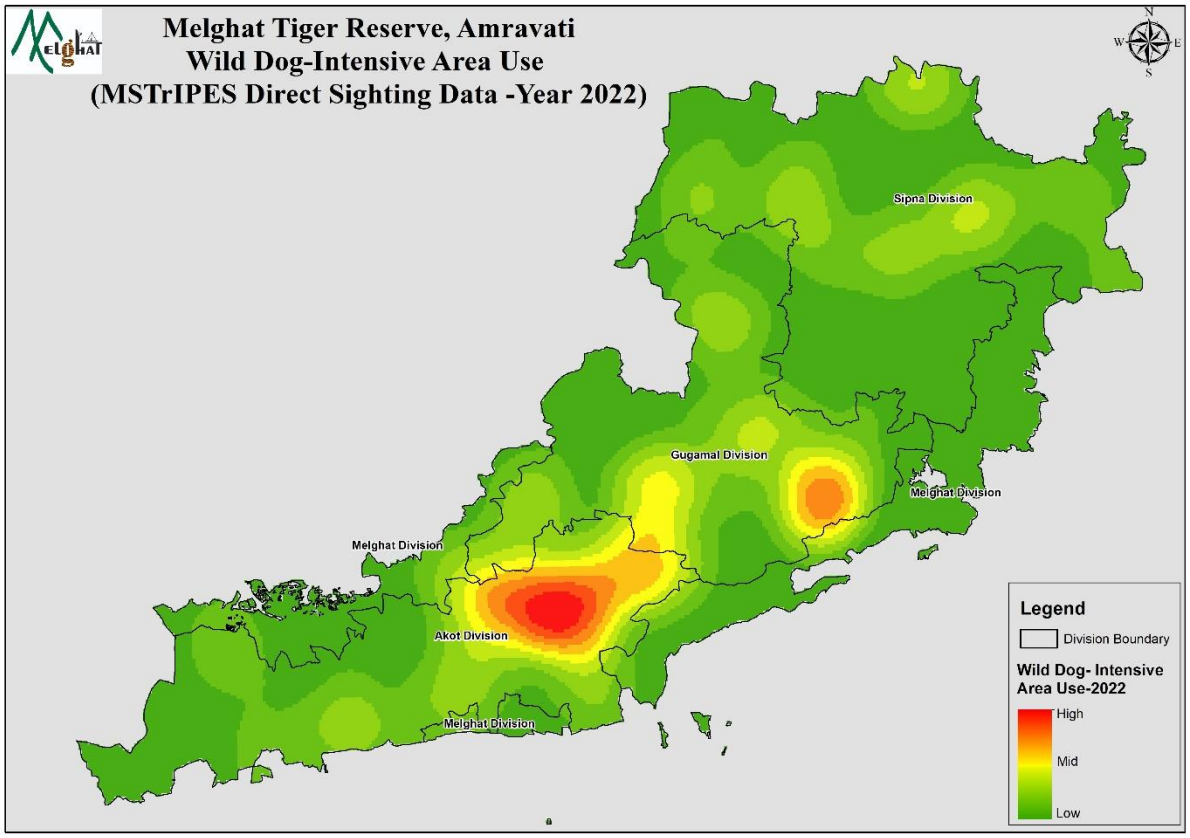
Map-3(d) : Sloth Bear Distribution of MTR



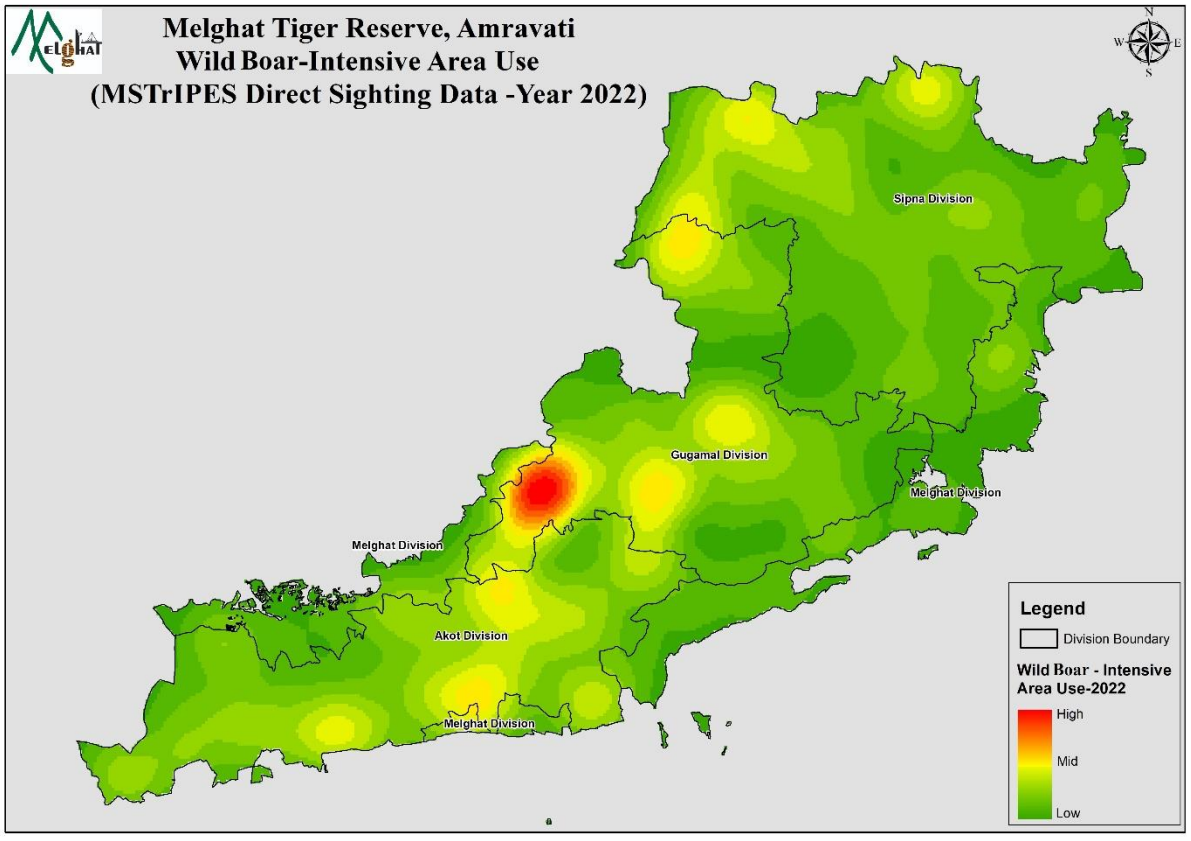
Map-3(e): Chital Distribution of MTR



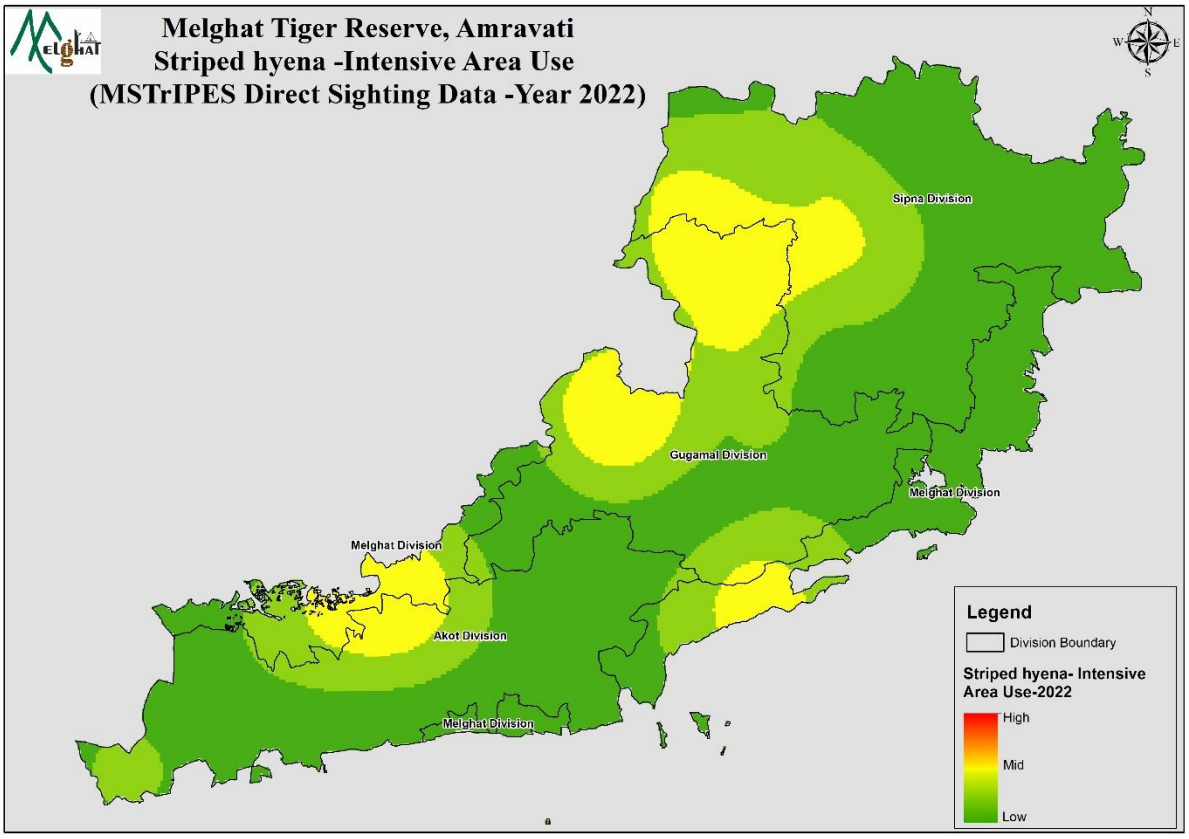
Map-3(f): Sambar Distribution of MTR



Map-3(g): Wild Dog distribution of MTR



Map-3(h): Wild Boar Distribution of MTR



Map-3(i): Hyena Distribution of MTR

3.2 ABUNDANCESTATUS

3.2.1 TIGER POPULATION IN MTR

Melghat comprising a part of the Satpuda Landscape, having a recorded tiger presence in 2757.97 km^2.The tiger distribution in Melghat is contiguous with the population in Madhya Pradesh forming a Meta population with the Satpuda Tiger Reserve as the other source population. The phase IV of AITE shows tiger estimation for Melghat as 56(±1.05) with density of 2.46 (±0.3).

Table-3(a): Population estimates of tigers in Melghat Tiger Reserve, Maharashtra, India for the years 2020, 2021 and2022

Year	Effective trapping area (km^2)	No. of Individuals Captured	Estimate	Density per 100sq.km.

2020	1437.7	25	47(±2.5)	1.53(±0.3)
2021	2265.5	47	47(±0.79)	2.07(±0.3)
2022	2265.5	55	56(±1.05)	2.46(±0.3)

AITE reports of 2010, 2014, 2018 and 2022 shows that the tiger population is steadily increasing over the period due effective management practices

Year	**Tiger Estimate**
2008	11
2010	13
2014	25
2018	47
2022	55

Table-3(b): Details of species recorded and mean group size in the Melghat TR, 2022

Species Recorded	**Number ofSightings**	**Individuals recorded**	**Average group size**
Sambar	211	560	2.65
Barking Deer	156	208	1.33
Spotted Deer	51	211	4.13
Gaur	69	204	2.95
Nilgai	116	299	2.58
Wild Boar	123	814	6.61
Langur	83	698	8.41
Rhesus Macaque	168	1246	7.41
Indian Hare	30	32	1.06
Peafowl	110	359	3.26

Grey Jungle fowl	62	265	4.11

Table-3(c): Comparison of prey density in Melghat Tiger Reserve, Maharashtra, India during the years 2020,2021 and2022.

Species Recorded	2020	2021	2022
Sambar	2.07 (±0.23)	1.60 (±0.17)	2.69 (±0.33)
Barking Deer	1.14 (±0.13)	0.86 (±0.08)	1.04 (±0.14)
Spotted Deer	0.41 (±0.14)	0.25 (±0.08)	1.56 (±0.48)
Gaur	1.32 (±0.25)	1.96 (±0.29)	0.78 (±0.19)
Nilgai	1.34 (±0.21)	0.89 (±0.13)	1.09 (±0.17)
Wild Boar	2.65 (±0.58)	2.86 (±0.37)	3.79 (±0.71)
Langur	7.28 (±1.00)	4.66 (±0.82)	5.73 (±1.38)
Rhesus Macaque	1.22 (±0.40)	5.54 (±0.68)	6.88 (±1.02)
Indian Hare	-	-	0.23 (±0.07)
Peafowl	1.52 (±0.26)	2.69 (±0.32)	2.15 (±0.35)
Grey Jungle fowl	-	-	1.44 (±0.36)

Table-3(d):Comparison of prey density of major prey species-2018, 2020, 2021 and 2022

Prey	2018	2020	2021	2022
Sambar	2.55(0.57)	2.07(±0.23)	1.60(±0.17)	2.69(±0.33)
Gaur	2.03(0.48)	1.32(±0.25)	1.96(±0.29)	0.78(±0.19)
Nilgai	1.73(0.40)	1.34(±0.21)	0.89(±0.13)	1.09(±0.17)
Barking deer	1.76(0.21)	1.14(±0.13)	0.86(±0.08)	1.04(±0.14)
Chital	-	0.41(±0.14)	0.25(±0.08)	1.56(±0.48)

Due to relocation of villages and habitat development works carried out in the evacuated areas the prey population has started to rebound and shows increase in trend. Especially chital, which is a gregarious prey species, has started to repopulate the meadows developed on the relocated sites.

Table-3(e): Population estimates of leopards in Melghat Tiger Reserve, Maharashtra, India for the years 2020,2021and2022

Year	Effective trapping area (km^2)	No. of Individuals Captured	Estimate	Density per 100sq.km.
2020	1437.7	72	131(± 5)	4.74(±0.56)
2021	2265.5	145	147(±1.48)	6.43(±0.54)
2022	2265.5	168	181(±4.00)	7.32(±0.57)

3.3 PREYPREDATORRELATIONSHIP

The carrying capacity of tigers in a given area is primarily determined by the availability of prey base. A tiger requires a deer size mammal approximately once a week, which means that it consumes almost 50 such animals in a year. To maintain a stable prey population in a long run the consumption should broadly corresponds to the rate at which the prey population grows. There as on forth is closely linked to the need for biological sustainability of both tigers and their prey.

For the prey population to sustain itself, the off take of prey (predation rate) can not exceed the prey's reproduction rate. The prey population typically grows at about 10 percent, and in equilibrium this "excess" is consumed by predators. The main prey species of tiger and co-predators are Sambhar, Spotted Deer, Gaur, Wild Boar and Barking Deer etc. The meadow development works done post relocation of villages has resulted in increasing prey base in Melghat. The increase in prey density and the tiger numbers is more visible in Gugamal and Akot divisions where relocation was complete. Some areas within Melghat TR especially in the Melghat

sanctuary have good potential for carrying more prey and predators given that the villages are relocated and habitat amelioration is carried out.

3.3.1 Carrying capacity

Prey	**3/4th bodyweight Of female**	**Density(perKm^2)**	**Prey Biomass(kg/Km^2)**
Chital	30	1.56-	46.8
Sambar	136	2.69	365.84
Gaur	442.5	0.78	345.15
Wild Boar	42.75	3.79	162.02
Nilgai	150	1.09	163.5
Total			**1083.31**

EquationfromHayward'set.al.2007:

y=-2.158+0.377x. Where,
y = log 10 of maximum carrying capacity of predator density for the available prey.
X=log10 of prey biomass per unit area persq.km.
Putting the values in above equation we get,
y= -2.158 + 0.377 (log 1083.31)

Solving the equation, we get;

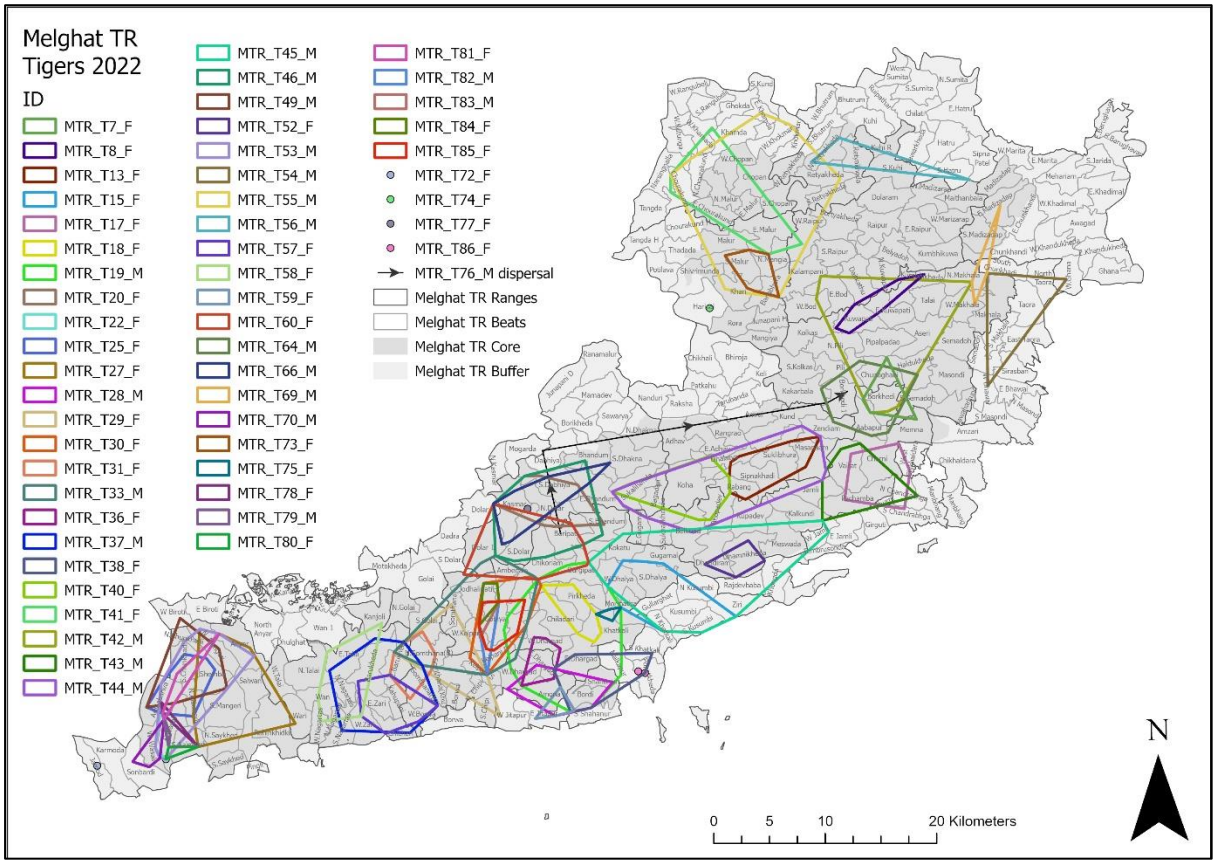
Predicted predator (Tiger) density= 0.096 per square km
Predicted Tiger density = 9.68 per 100 sq km
So for an area of 2758 Sq km (The area of MTR),
the Predicted tiger population is 2758 x 0.96 = 266 (approx.)

However as per the phase IV exercise 2022 conducted in MTR, the Observed Tiger density is 2.46 per 100 sq km and the Population estimate of Tiger is 56.

The question that arises then is, is the tiger reserve under populated with tigers and should
we aim to achieve the predicted tiger density of 9.68 per 100 sq km or 266 tigers for an area of 2758 sq km? The answer is no because the explanation is more nuanced.

• First, we must acknowledge the fact that Hayward's formula estimates predator density based on the Prey Biomass which supports not just one predator i.e Tiger, but other predators like Leopards, Wild Dogs, Hyenas too. So, the predicted predator density is not just for the Tiger alone.
• Second, Hayward's formula doesn't factor in the home range requirements of Tiger, which is a territorial animal. The home range is defined as an area in which an animal lives and moves on a periodic basis. Home range size varies across landscapes due to variations in resource availability (smaller home ranges in resource rich areas and larger home ranges in resource poor areas), varies during seasons and varies even with gender of the animal (Male tigers generally have a larger home range compared to female tigers).

A radio collar-based study in Pench Tiger reserve, Madhya Pradesh (Majumder et al,2012) had the home range (based on 95% Fixed Kernel analysis) to be 65 sq km for male tigers and 32 sq km for female tigers. Whereas in Panna Tiger reserve, annual home range (based on 95% Fixed Kernel analysis) for male tigers was about 120-130 sq km while that of female tigers was about 60-70 sq km (Ramesh et al,2016). So, on conservative side, let us take the home range requirement of Male tiger in Central Indian landscape to be 80 sq km and Female tiger to be 40 sq km. These home ranges are not mutually exclusive. 2:1 (Female: Male) is observed to be the normal sex ratio in tiger population and accordingly a home range of male tiger generally has home ranges of 2 female tigers inside it. Within the same gender though, the overlap is less. Female home ranges have little to no overlap, while male tiger home ranges have some overlap. This is the same that has been observed in Melghat too :



MAP 3(j): Male & Female Tiger Overlapping

So from the above discussion, the point to be noted is that even though hayward's formula predicts the predator density for a given prey density, the home range requirements of tigers fixes a limitation on how much tigers a landscape of given size can hold. So what is that land size? It is normally the core of a tiger reserve which is 1500 sq km in case of MTR. Based on our conservative assumption of 2 female tigers and 1 tiger in a 80 sq km area, 1500 sq km of core can easily accommodate approximately 38 adult female tigers and 19 adult male tigers (a total of 57 adult tigers).

But is 1500 sq km area of core, the effective core? The concept of carrying capacity is a mathematical number that focusses only on prey availability and area, but not on the shape of the area or relative proportion of an inviolate core and a buffer. When the concept of core and buffer was postulated, a concentric area scheme with core in the centre and a buffer all along the sides of core was visualized. This

meant that the prime breeding tigers will occupy the core while the old and dispersing tigers will move from core into buffer. But many a times the area of buffer does not completely encircle the core, leaving core exposed directly to areas without any land use restrictions (mostly human settlements), leading to conflicts. Also, as per NTCA's TCP guidelines 2007, for the population of tigers to sustain themselves for the next 100 years, an inviolate core area of 800-1000 sq km is required along with a buffer area of 1000-3000 sq km all around the core. But many a times, the size of buffer are found to be smaller than core area itself. Hence there is a need to calculate an effective core and the corresponding **Managerial Carrying Capacity (MCC)** which is based on field realities.

To calculate this first we need to calculate the effective core area:

Effective core area= Reductive factor x Core area

Reductive factor = Buffer area/ Core area

For MTR, Reductive factor = 1258/1500 = 0.8 (approx.)

So Effective core area = 0.8 x 1500 = 1200 sq km

So an effective core area of 1200 sq km in MTR, can theoretically accommodate 30 adult female tigers and 15 adult male tigers (totaling about 45 adult tigers in core). The buffer of Melghat also by and large encircles the core area of Melghat, thus ensuring the real shape of the reserve matches the theoretically desired shape of encircled core-buffer.

Presently there are 33 adult female, 22 adult male and 22 sub adult tigers in an area of 2758 sq km area of MTR as per phase 4 (2022). Of the adult tigers, 30 tigers use core exclusively, 3 use buffer exclusively and 22 use both core and buffer. Clearly there are enough tigers using core as required in the above calculations of effective core area and tigers it can accommodate. Also, one can observe that the number of tigers using core exclusively is way larger than the ones using buffer only which is the desired scenario and must be maintained in the same way (There should not be any effort to enrich habitat in buffer areas. Otherwise buffer might begin to act like core and increase human tiger negative interactions)

NTCA TCP guidelines 2007, also mentions that if there are 20 breeding tigresses in an inviolate space of 800-1200 sq km, then they will be able to sustain 80-100 tigers which will sustain the tiger population for the next 100 years. The present core size (effective core size 1200 sq km) and tiger numbers (33 adult male, 22 adult females, 22 sub adults totaling 77) in core indicate that MTR is in a good trajectory to sustain the tiger population of 75-100 tigers, provided the relocation efforts are done and the habitat management is sustained at present levels. (Divisions of Sipna and Gugamal, still there are villages which are yet to be relocated, which when accomplished will create the true inviolate space of 1500 sq km). So, what is that magic number of carrying capacity for MTR? Generally, population of a predator increases with increase in prey population and after certain point stabilizes near a number around which it begins to fluctuate (logistic growth of population). This number indicates the carrying capacity for that predator in that landscape. Continuous phase IV monitoring of tigers will help the management identify the band of number around which the population stabilizes and this needs to be monitored long term to make any reasonable statement of substance. All the above calculations are of course theoretical. But they must be kept in mind while making decisions like:

- Is there need for tiger translocation from outside areas into MTR?
- Is there a need for herbivore augmentation in MTR?
- Is there a need to alter buffer management strategies? (the present scenario of more tigers using core than buffer needs to be maintained)

3.4 ASSESSMENT OF THREATS

The detailed threat perception, assessment and protocol for protection has been covered in a separate, protection plan of the MTR. However, major threats to the area and its resources in the Reserve are as follows;

3.4.1 Atpresentmostofvillagesarewillingtorelocate.Howeverunwillingnessoffewhouseholds to relocate from those villages acts as stumbling block for village relocation. Judicial litigations and Instigation of villagers by some NGOs with vested interest also drags the relocation process.

3.4.2 Encroachments for agricultural purposes on wildlife habitats and forest lands by local people. Many times it is instigated by local leaders.

3.4.3 Illicit cutting of trees for local needs and commercial purposes.

3.4.4 Illegal grazing by local/migratory cattle and other biotic pressures.

3.4.5 Poaching and hunting of wild animals by locals as a part of local customs, are detrimental to conservation values.

3.4.6 Fires, mostly man made for Mahua/Tendu/local poaching and to scare away the wildlife.

3.4.7 Illegalremovalofnon-timberforestproduceandvaluablemedicinalplants.

3.4.8 Illegal traffic of timber, forest produce, wildlife and its products, due to long porous border with Madhya Pradesh.

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CHAPTER-4

HISTORY OF PAST MANAGEMENT AND PRESENT PRACTICES

4.1 GENERAL

From time immemorial the wild animals have occupied a place of pride in the Folklore of Indian culture. Forests across the Melghats, to which a fiscal value was given were considered to be the property of the ruling powers and as such formed a source of revenue to the state. However, hunting became an important pastime during the colonial rule for meat as well as for preparing trophies.

There was no forest administration and management existing before Melghat Tehsil came under British Administration in 1853. It was harvested by Korkus for trading in forest produce in plains as livelihood. Britishers started reservation of forests and completed it by 1913.This reservation of forests gradually brought the indiscriminate felling under control. The Reserved Forest were worked under Improvement Felling up to 1935.Consequently, from 1936 to 1955 the forests were worked as per **Stein's working plan** which prescribed Uniform System in the better-quality teak forests and Coppice with Reserve in comparatively poor-quality forests. Remote and understocked areas were not subjected to any type of regular working.

According to Sharma's working plan (1956-1970), which came into force in 1956, prescription was selection cum improvement felling in better quality teak forests whereas the others remaining the same as earlier.

In past, the Melghat forests were worked through following Working Plans and schemes:

a) Bugshaw's working Plan (1893-1915) for Bairagarh and Gugamal Reserves.

b) Gugamal Reserve working scheme (1910–1915)

c) Tapti Reserve working scheme (1912-1915)

d) Dunbar Brander's working plan (1915-1916to1935-1936)

e) Stein's working plan (1935-1955)

f) Sharma's working plan (1956-1970)

g) Bhatena's working scheme (1961-1971)for Dabiya, Dhulghat, Wan and part of Rupagarh Reserve.

h) Joshi's Working plan(1975–1985)

4.1.1. Short descriptions of the plan:

During the above plan periods, the forests in the area were basically worked under Selection Cum Improvement Working Circle. The objective of these plans and schemes was to harvest timber for commercial purposes. The SCI was considered most natural system as this ensured the sustainability of forests. The improvement operations resulted in to preponderance of teak of good quality. The CWR system was with the objective of producing small timber to meet the requirement of local villages.

Among all, Joshi is accredited with the construction of separate **working circle for wildlife** in the history of management of Melghat who highlighted the following management inputs to make a beginning,

I. Prohibition of felling in radius of about100meterinperennialwater source,

II. Prohibition of felling of fruit trees,

III. Development of salt licks, erection of wildlife watch towers and creation of shelter and hiding places after main felling or in subsidiary cultural operations during coupe working,

IV. Strict surveillance and vigilance of water source during the summer.

Picking up from the foundation laid by Joshi's working plan and Sawarkar's the broad wildlife management plan, **Gogate** prescribed refinements for MTR in his management plan,

- Habitat restoration and development works,
- Development of approaches for habitat improvement and resource mobilization, Optimum resource utilization,
- Augmentation of surface water,
- Veterinary care and orphanage,

- Rehabilitation of Chital, Sambar and Nilgai
- Captive breeding of endangered sp.,
- Monitoring,
- Rational use of wildlife resource and better appreciation,
- Development of interpretative and educational facilities,
- Review of organizational setup.

The management practices prescribed in Gogate's management plan also included localization and compartmentalization of identified preservation, buffer and tourism zones. It is worth mentioning that the concept of core area was rigidified by allocating the same as Zone of preservation which included two satellite cores.

The earliest available in formation about natural regeneration is in the administrative report for 1875-76 which shows that at that time the natural regeneration of teak was so good that the authorities intended to rely, for the production of forests upon natural regeneration only. The report says "where fire is excluded, natural reproduction may now be seen as certainty". Again, the administrative report 1878-79 mentions that the expenditure on plantations that year was considerably less than the previous year because it was not necessary to rely on plantations for the reclothing of the Melghat Forests.

According to the report "The natural reproduction of teak of Bairagarh reserve is increasing so rapidly that there is no longer any real necessity for forming artificial plantations".

In 1893, as is evidenced by Durbar Brander's working plan,754 acres of plantations in Sipna valley of Melghat area were found to be fully stocked, but natural reproduction in adjacent forests made such strides that it became difficult to trace the plantations. In 1917, the percentage of teak in Bairagarh reserve was high as desirable and it consisted of sufficient undergrowth that consisted of coppice and seedlings of all ages, the latter dominating over the former. In Gugamal reserve also, the percentage of teak was on the increase. **Stein's plan** refers to teak as being "everywhere on the increase and names it

as **"invading species"** in Melghat forest. Stein observed that mid-thirties, scattered throughout the forests was a fair quantity of teak seedlings and saplings but in certain locations they occurred in dense patches.

Viewing the phenomenon of natural regenerations on the temporal scale extending from the late 19th century to the present time, it becomes clear that the deterioration had started during Stein's working plan period. This gradual decrease in natural regeneration should have a causal link with the extremely complex interaction of all the factors mentioned in the working plans under the heading "injuries to which the crop is liable and the consequent influence of the resultant overall impact on the whole of Melghat distributed overtime.

4.1.2 Findings

The various observations made in Melghat show that the species diversity level is going down. This must be either because of destruction of niches or because of competition started in this area for available niches consequent to the unprecedented changes going on a tan extremely fast rate. The floral diversity aspect of this area has been consistently affected since 1869 when monoculture was introduced for the first time. The large-scale clear felling done in Stein's working plan period also must have affected this aspect. Lantana have proved to be a competitor for younger as well as middle aged teak so far as nutrient is concerned. This idea is based on the fact that the teak trees in this region have generally a very shallow and fairly spread out (often just below the soil) root system as a result of shallow soil regime. In the year 2021, due to torrential rain followed by speedy wind has led to uprooting of large number of teak trees. The root system is very shallow horizontal spreading. Consistent defoliation decreased photosynthesis, led to reduction in the formation of carbohydrates and consequently effected flowering adversely. The availability of Nitrogen which prolongs photosynthesis and promotes greater carbohydrates reserves also decreased over time due to factors already mentioned and hence flowering was gradually reduced. Because of these reasons, perhaps in most of the areas teak gradually stopped bearing seeds and even in areas where some seeds were produced, they were of very low quality and small of in size.

Thus, the phenomena of non-production of seeds in most of the areas, lowering of quality as well as quantity of the seeds (wherever found), conditions of the germination incidence of lantana thicket, have affected regeneration in Melghat.

4.1.3 Impact on wildlife

In respect of wildlife also the diversity has gradually gone down even though hunting is banned in this area since 1968-69. The extinction of Spotted Owlet from Melghat areas is certainly a proof of decreasing diversity. Again Vultures, which are excellent scavengers, have gradually disappeared from Melghat area. This indirectly shows that the overall wildlife population in this area has gone down considerable although the disappearance of Vultures may also have occurred because of poisoning by Aldine. Whatever be the case, the fact remains that an important function in Melghat, so far as scavenging aspect is concerned, is left unattended to. In other words, one niche has lost its occupant and this is not a healthy sign in any ecosystem unless natural functional alternatives came up in due course.

4.1.4 History of wildlife management in Melghat Tiger Reserve (MTR).

Since the constitution of MTR in 1974, the important management interventions/ landmarks areas follow-

i. Sawarkar and Sheikh's Working Plan,1975-1985,

ii. Gogate's Management Plan,1988-1998,

iii. Chaudhariet al. Management Plan,2003-2012

iv. Melghat Tiger Conservation Plan, 2014-15to2023-24.

1974 First Management Plan for the Tiger Reserve area (1571.74Km.) was prepared by Sheikh and Sawarkar for the period 1973-1978 for orienting the activities in the area to realize the needs and objectives of wildlife conservation.

Table No-4(a): Table showing Chronology of Management in MTR

CHRONOLOGYOFMTR	
1876	Declaration of Gugamal Reserve
1913	Melghat Reserve declaration
1969	Declaration of Dhakna-Kolkas Sanctuary
1974	Declaration of Melghat Tiger Reserve
1985	Declaration of Melghat Tiger Sanctuary
1987	The commercial harvesting of timber was stopped.
1987	Visit of Shri Kailash Sankhala, First Director of Project Tiger to Melghat.
1987	Declaration of Gugamal National Park.
1988	The second Management Plan was prepared by Shri M.G.Gogatefortheperiod1988-1998 to ensure maintenance of viable population of tiger for scientific, economic, aesthetic, cultural and ecological values. Nature Interpretation Centre at Semadoh established.
1991	Zoological Survey of India surveyed Melghat.
1992	The collection of Tendu Leaves was stopped
1994	Declaration of Multiple Use Area.
1995	The lease of bamboo harvesting by Ballarpur paper mills terminated since 1995.
1995	Shri P. J. Thosare prepared a plan of Multiple Use Area for the period1995-2004.
1997	Declaration of Wan, Ambabarwa, Narnala Sanctuaries.
1999	Entire area of the Reserve including the area of Ambabarwa and Narnala Sanctuaries with three divisions namely Sipna Wildlife Division, Gugamal Wildlife Division and Akot Wildlife Division, Akot put under the Project
	Tiger Directorate, through the Government of Maharashtra order
	No.WLP/1094/Pra-211/F-1/Dated 26th April 1999 for unified control.
2000	Subsequent changes in the area of Melghat Sanctuary, Gugamal National Park and Multiple Use Area, Government issued a final notification declaring the area of National Park and Melghat Sanctuary.
2001-03	Bori, Koha and Kund villages from Melghat Sanctuary rehabilitated at Rajurgirwapur in Akot Tehsil of Akola District.

2002	Management plan for the period 2004-05 to 2013-14 Sanctioned by Principal Chief Conservator of Forests (Wildlife) Maharashtra State, vide letter No. Desk22(8)/F.N.521(1)/2182/03-04Nagpur dated 6th November 2003.
2007	Nature Interpretation Centre, Semadoh renovated.
2007	Declaration of Critical Tiger Habitat in Melghat Tiger Reserve (1500.49sq.km.)
2009	Registration of "Melghat Tiger Reserve Conservation Foundation."
2010	Notification of buffer zone (area1268.03sq.km.)
2018	Buffer area brought under unified Control of Melghat Tiger Reserve as an exclusive buffer division

In addition to the above landmarks, the Wildlife Management in these forest before the declaration of tiger reserve deserve a mention. Before re-organization of states, the wild life conservation was through the implementation of the provisions of the Indian Forests Act 1927 and the shooting rules framed by the Madhya Pradesh Govt. as given in Appendix of M.P. Forest Manual, Sect. II, combined with the Wild Bird and Bird and Animal Protection Act 1912 as amended by the Central Province Amendment Act of 1935.

In 1927, shooting blocks system was started. The Conservator of Forests in consultation with the Divisional Forest Officer and District Magistrate, declared certain blocks of reserve forest with abundant game as open for shooting. Subsequently a sliding scale of animals to be shot annually in each block was introduced. The Bombay Wild Animals and Wild Birds Protection Act,1951 was made applicable to the Vidarbha Region in 1961. The shooting blocks as contained in the Bombay Wild Animals and Wild Birds Protection Rules were made applicable through out the State.

Management Plan by Shaikh and Sawarkar reveals the instructions and number of permits issued and game shot in the shooting blocks in Melghat prior to 1968 vide appendix XVII, of the Management Plan written by them. It is seen that Melghat was a much sought after game reserve. As many as 53 permits were issued in the year 1955-56. Shooting spree continued in later years also till Govt. of Maharashtra, Revenue and Forest Dept. vide their Gazette notification dt. 20th June 1969 declared an area of 381.58 sq.km.as Dhakna, Kolkas game Sanctuary. The Wildlife (Protection) Act, 1972 has come into force in the State of Maharashtra with effect from1st June, 1973.

Under this Act, Wildlife Protection (Maharashtra) Rules 1975, Wildlife (stock declaration) Rules 1973 and Wildlife (Transaction and Taxidermy) 1973 rules were adopted by the Govt. of Maharashtra. All shooting blocks in Melghat were declared closed to shooting by the orders of the ChiefWildlifePreservationOfficerduring1968-69. Tiger hunting was banned to begin with, for two years period from 1st August 1970 under Revenue and Forrest Dept. Resolution No. WLP 1570/45414-Y Dated 25/7/1970 and was subsequently extended for further period of three years vide Govt. notification No.WLP1572/75100-X,dated2/8/1972. Since then there has been absolute ban on not only shooting of Tigers but also, all animals of schedule I and IV of the Wildlife Protection Act, 1972.

4.2 TIMBER OPERATIONS INCLUDING BAMBOO AND FIREWOOD HARVEST

4.2.1 SILVICULTURAL SYSTEMS AND TENDING OPERATION

All the 39 villages situated in MUA Were Forest villages till 1975 when they enjoyed concession of grazing their cattle, NTFP collection etc. They were usually employed on forestry works mainly for the work of harvesting of the Forest produces. Agricultural practice was also seen. The Reserve Forest area was planted with teak from time-to-time Area was worked till 1987 under Systematic Forest management right from1935 and was given silvicultural treatment. The major part of the area worked under **selection-cum-improvement** working circle with an object of extracting large sized timber for commercial sale. The commercial activity ceased from time to time with the area status of wildlife sanctuary in1985. The commercial activities including harvesting of timber stopped in the area in 1987. Tendu leaves collection was stopped since 1992and bamboo felling by Ballarshah papermillsstoppedsince1995.

Reserve forests were worked under improvement felling till 1935. From 1936 - 1955, the forest was worked under Stein's plan, which prescribed uniform system for better quality teak forest and coppice with reserve for poor quality forest. Remote and under-stocked areas were not worked. Sharma's plan (1956-1970) prescribed selection cum improvement feeling good quality teak forest with other prescriptions remaining the same as in Stein's plan. The following areas of MTR were worked as per the silvicultural systems.

SANCTUMSANCTORUM

The management practice in the sanctum sanctorum is tabulated below.

Table-4(b): Table shoeing silvicultural operations in sanctum sanctorum

SILVICULTURAL OPERATIONS IN SANCTUM SANCTORUM					
Felling Series No.	**No. of compartments**	**Silvicultural Systems followed**	**Area(km2)**		
			Worked	**Unworked**	**Total**
6	96	Selection cum Improvement	186.16	119.05	305.21
1	2	Coppice with Reserves			

It is also worth mentioning that there was a protection working circle which comprises of 20 compartments over an area of 36.52sq.km in the sanctum sanctorum. The sanctum sanctorum or the wilderness zone was basically divided in to two broad categories.

1. Research and development area (this includes area with SCI and CWR system) consists of 272.34sq.km.
2. Primitive zone (area under protection working circle) consists of 36.52 sq. km.

By including this area as per order of the Government of Maharashtra dated 5.9.1985 another 53.60 sq. km, area, from so called buffer was added to the sanctum sanctorum and thus the total area became 361.28sq.km. The earlier buffer of sanctum sanctorum, before declaration of the Melghat Sanctuary, and comprised of East and West Melghat territorial Divisions, those working blue print is as follows.

Table-4(c): Table showing Silvicultural Operations in East Melghat Division

TABLENO:4.4 SILVICULTURAL OPERATIONS IN EAST MELGHAT DIVISION					
Felling Series No.	**No. of Compartments**	**Silvicultural Systems followed**	**Area (km2)**		
			Worked	**Unworked**	**Total**
11	469	Selection cum improvement	459.05	302.5	961.59

There were 8 compartments under protection working circles spread over10.75sq.km. in East Melghat Territorial Division.

Table- 4 (d) : S ilvicultural operations West Melghat Division.

SILVICULTURAL OPERATIONS WEST MELGHAT DIVISION					
Felling Series No.	No. of compartments	Silvicultural Systems followed	Area(km2)		
			Worked	Unworked	Total
6	206	Selection cum Improvement	302.52	170.6	475.12
3	36	Coppice With reserves	49.93	48.58	98.51

It is obvious that the silvicultural systems were formulated to magnify the large timber extraction but it can be apprehended that the coupe demarcation did not Considerthespecialhabitatandnodueimportancewaspaidtowildlifepointofview.

4.2.2 EVEN-AGEDANDUNEVEN-AGEDFORESTS

It would not be wrong to mention that the plantations were even-aged patches/forests and all other areas cither previously working under SCI and CWR or unworked areas are uneven aged forests in Melghat. By 1913, British brought about reservation against indiscriminate felling in this area. Up until 1935, these forests were worked under improvement felling which led to uneven-aged forest. From 1935to1970, SCI felling was carried out in better quality forests and CWR felling in poor quality forest. These all practices resulted the large chunk of Melghat forests to be uneven-aged. It is observed that the Teak plantation in this area was started in 1954 in compartment No. 855 in Wildlife Division. Plantations in subsequent years were taken place. The focus was on Harisal and Raipur areas. Before 1966, Teak was the only one species planted over Melghat area. Need to Bamboo plantation was felt in the year 1966 and 20 ha area in Dhakna area was planted with bamboo for the first time in plantation history of this area. Up to 1983/84 Harisal, Dhakna and Raipur ranges were selected for plantation of teak and bamboo. From 1984-

1987 the bamboo was the focused species for plantation. From 1990 onwards the mixed plantation of Mahua, Behara, Bamboo, Teak etc. were taken up in larger scale but the emphasis was on bamboo plantation.

Table-4(e): Table showing plantation works

PLANTATION WORKS

Year	Area(ha)	Major species	Major Areas
1973	69.4	Teak, Bamboo	Harisal, Chikaldara
1974	43	Teak, Bamboo	Harisal, Chikaldara
1975	52	Teak	Raipur, Chikaldara
1976	87	Teak, bamboo	Dhakna, Raipur
1977	208	Teak	Harisal, Dhakna, Raipur
1978	51	Teak	Raipur, Harisal
1979	60	Teak	Raipur, Harisal
1980	108	Teak	Raipur, Harisal, Dhakna
1981	74	Teak	Raipur, Harisal, Dhakna
1982	358	Teak	Raipur, Harisal, Dhakna, Hatru
1983	85	Teak, bamboo	Raipur,Harisal,Dhakna
1984	735	Bamboo	Raipur,Harisal,Dhakna
1985	336.6	Bamboo	Raipur,Harisal,Dhakna,Semadoh
1986	418	Bamboo	Raipur,Harisal,Hatru,Semadoh
1987	480	Bamboo	Raipur,Harisal,Hatru,Semadoh
1988	217	Bhariv, Teak, Bamboo	Raipur, Harisal,Hatru, Semadoh, Dhakna
1989	314	Bhariv, Teak, Bamboo	Raipur, Harisal,Hatru, Semadoh, Jarida
1990	514	Bhariv, Teak, Bamboo	Raipur, Harisal,Hatru, Semadoh, Dhakna
1991	745	Bhariv, Teak, Bamboo	Harisal,Hatru,Semadoh,Dhakna
|1992	1721	Bamboo,mixed	Raipur,Harisal,Hatru,Semadoh
1993	768.5	Bamboo,mixed	Raipur,Harisal,Hatru,Semadoh
1994	1336	Bamboo,mixed	Raipur,Harisal,Semadoh,Jarida
1995	975	Bamboo,mixed	Raipur,Harisal,Hatru
1996	975	Bamboo,mixed	Raipur,Harisal,Dhakna,Semadoh

Table-4(f): Table showing plantation works in last 5 years

PLANTATION WORKSINLAST5 YEARS								
Sr. No.	**Plantation Year**	**Nature of Work**	**Amount Received (In Lakhs)**	**Area (inHa.)**	**LocationofWork**			
					Range	**Round**	**Beat**	**Comp. No.**
1	**2018-19**	**PPO**	130.075	10	Tarubanda	Adhao	Nanduri	844
				5	Tarubanda	Adhao	Nanduri	845
				10	Tarubanda	Adhao	Raksha	834
				10	Dhakna	Dhakna	North Dhakna	842, 843
				5	Dhakna	Bhandum	Dabhiya	895
				5	Dhakna	Bhandum	Dabhiya	894
				5	Dhakna	Bhandum	Dabhiya	895
				50	Dhakna	Bhandum	Dabhiya	895
				10	Harisal	Harisal	Shevari Munda	642
				10	Harisal	Harisal	Harisal	635
				5	Harisal	Harisal	Harisal	632
				25	Harisal	Harisal	Rora	633
	Total		**130.075**	**150**				

4.2.3 BAMBOO WORKING

In Sawarkar's plan, the bamboo was exploited on a basis of cutting cycle of 4 years and annually it was 25% of the total area of 255.52 sq. km. of the tiger reserve, mostly bamboo was extracted by purchasers of rated passes. In order to extract the bamboo, the KHANGIS ystem was adopted by the Forest Department. Within the tiger reserve, certain area under bamboos in Jarida felling series was given on leases for bamboo exploitation to paper and straw board mills, Ballarpur for manufacture of paper. It was not proposed to stop the exploitation since legal complications came into being. Nistar rights were practiced for distribution in local forest villages. In 1995, the bamboo working circle ceased to be operated.

4.2.4 FUELWOODHARVESTANDCOLLECTION

Fuel wood is one of the major forest resources which is tapped. Generally, the fuelwood required for domestic use is obtained from nearby forest areas. The people residing in the enclave villages in Melghat Tiger Reserve collect fallen dry wood which is available in enough quantity for most of the villages.

4.3 NON-WOODFORESTPRODUCECOLLECTION

Amongthenon-wood forest produce (NWFPs), Russa grass (*Cymbopogon martini*) was commercially important commodity which occurred in part of Tarubandha range with in the reserve. Tendu leaf for wrapping Bidi was of great demand which collected departmentally since nationalization of trade in Tendu leaves in1969-70. It was definitely a big operation which affirmatively impacted the socioeconomic status of forest villagers as laborers but is seems that the wildlife angle was never critically adjudged. At this instanceTendu leaf collection is totally banned in National Parks and Sanctuary.

Mostly for the MFP distribution, Nistar was practiced and exercise of the same

generally restricted to the forest village areas. Karaya Gum (*Sterculia urens*) was anotherimportantNTFPwhichwasauctionedandexploitedthroughtheagencyofcontractors. Thelocalvillagepeopleactedaslabourersmostly. The movement of people for collection of NWFP throughout the year made the area vulnerable to hunting, trapping and fire and damaging the tree.

The some important NTFPs are as follows,

- Tendu leaves (*Diospyros melanoxylon*),
- Gum (*Anogeissus latifolia* and *Sterculia urens*),
- Mahua (*Madhuca indica*) flowers and fruits,
- *Cymbopogon martini* collection,
- *Chlorophytum tuberosum*, used as medicinal plant,
- Lac,
- Honey,
- Antlers,
- Frequent use of *Terminalia belerica, T.chebula, Emblica officinalis*
- *Buchanania lanzan.*

4.4 LEASES

No systems of leases are currently in practice in Melghat Tiger Reserve (MTR). Earlier Ballarshah Paper Mill was given lease for harvesting the Bamboo which was ceased after legal notification of the MTR.

4.5 OTHERPROGRAMMESANDACTIVITIES

Many programs and activities were undertaken by the forest department to improve the Tiger Reserve in different angle of management like **habitat improvement, protection of flora and fauna, staff and local people's welfare etc**.

Besides Forest Department, NGOs and other line agencies are working in this area. Programs and activities in MTR lie in the heart of management of wildlife, forestry and eco-development broadly which includes:

- Protection and habitat management measures,
- Patrolling,
- Establishment of village forest protection committee,
- Ecodevelopment activities,
- Education and awareness programs,
- Medicinal plant conservation issues,
- Rehabilitation of the identified villages from the reserve,
- Soil and moisture conservation measures,
- Research and monitoring works,
- Fire protection works including maintenance of fire lines and watch tower construction,
- Periodic census of wild animals,
- Water management works,

4.6 FORESTPROTECTION

4.6.1 LEGALSTATUS

Melghat forests are spread over seven reserves namely Bairagarh, Motha, Chikaldhara, Bod, Chithri, and Chikhali. Bairagud was the first reserve to bedeclared in the Melghat in 1866, followed by Gugamal reserve which was declared in 1876.Chikhali reserve was notifiedin 1911 and classified as a class "A", division II under Berar Forest law,1886. "A" class Forest as managed principally as Timber and Fuel wood reserve and Ç class forest primarily for grazing. The tiger reserve area was comprised only A class forest consisting of 15 blocks namely Bairagarh, Gugamal, Chikhaldara, Koha, Tapti, Chitri, Bod, Zapnadeo, Dabida, Dhulaghat, Wan, Rupagarh, Khirpanı, Motha and Chikhali.

However, under provision of Indian Forest Act 1927, status of this forest was that of Reserve Forest. Lately, most significant change, which has taken place, is deforestation of land in old forest villages in their **conversion into revenue villages**. This process was completed in 1969 to 1987. In June, 1969, area of 381.59 sq. km. included in the part of East Melghat Division and West Melghat Division was constituted as Dhakna – Kolkas game sanctuary.

In 1974, Tiger Reserve was created over an arca of 1571.74sq.km. which included the area under Dhakna-Kolkas Sanctuary and the Reserve Forest areas were carved out of

Erstwhile East and West Melghat Forest Division.

During 1985, Govt. of Maharashtra vide its gazette notification *WLP1978/10553*

(9) F-5 dated. 5/12/1985 issued under sec. 18 of WLPA 1972 declared its intention to constitute Melghat Tiger Sanctuary extending over an area of 1597.23sq.km. this include entire part of earlier tiger reserve and also added some more area in the proposed sanctuary thus giving the Tiger Reserve area legal status of sanctuary. Entire area proposed for declaration as sanctuary came to be managed as tiger reserve area. Subsequently during1987 Gugamal National Park with an area of 361.81 sq. km was created vide Govt. of Maharashtra notification no. *WLP-1086/1 8061/F-5 dated 27/11/1987 under sec.35(1)* of WIP Act 1972 by adding 27.07 sq. km area to the existing core of about 308 sq. km and making certain adjustment for errors in the areas reported earlier. Accordingly, the area of Tiger Reserve also changed to 1624.30 sq. km.

During1994 the area of Melghat Tiger Sanctuary declared under section 18 of WPA 1972 was renamed as Melghat Sanctuary and reconstituted as to extend over an area of 1150.03 sq.km by Govt. of Maharashtra notification of *WP Act 1972 -1092/PRS 526/F-5 dated15/02/1994*.This included 1045.54sq.km of deemed sanctuary, 83.10sq. km of additional area proposed to be added in the sanctuary and 21.39sq. km non-forest area proposed to be included in the intended Melghat Sanctuary. The total area of

Melghat sanctuary considered to be deemed sanctuary is 1128.64 sq. km. (1045.54 plus 83.10) as per notification. This area was constituted by reducing 526.90 sq. km (reserve forest and non-forest) The Excluded area of 526.90 sq.km which has reserve forest area of 469.75 sq. km and non-forest area 57.15sq. km, since the nitis known as multiple use area (MUA) and is the part of MTR. This resulted in total area of MTR as 1676.93 sq. km which included 1150.03 sq. Km of Melghat sanctuary and 526.90 sq. km of MUA. This was the situation till 1994.

Further during August 2000 Govt. of Maharashtra vide their notification no *WLP-1098/CR-135/F-1/dated8th,August2000*issuedundersub-section4ofsec.35oftheWPA1972 declared an area of 361.28 sq. km. as Gugamal National Park rectifying thus the intended declaration of national park as notification under subsection 1 and 2 of section 35 of WPA 1972 vide notification no. *WLP 1086/ 18061/F-5/ dated 27 November, 1987*.Further Govt. of Maharashtra vide the notification no. *WLP-10-2000, C.R.-41 /F-1/dt 6hNovember 2000* declared an area of 767.36 sq. km. as Melghat Sanctuary under section26/1(D) of WLPA 1972. This was done by revising the limits of Melghat sanctuary by excluding partly overlapping area, declared under section 18 vide notification no. WLP1092/PRA-526/F-5dated15" "February 1994, the overlapping area having been declared as Gugamal National Park vide notification dated 8th August 2000.

Multiple Use Area and its Legal Status the Multiple Use Area (MUA), which admeasures 526.90 sq. km. and has 39 villages scattered within is the unique procession with the MTR. Forest of MUA has got legal status of Reserve Forest. The area was the part of Melghat Tiger Sanctuary from 1985 till 1994 when Melghat Tiger Sanctuary was reconstituted as named Melghat Sanctuary. It acted as additional buffer area to the core. The area was under the administrative control of the territorial forest division till May 1999, though right since 1973 to 1974 the arca has been a part of Melghat Tiger Reserve. After reorganization of the area under unified control, entire area of Sanctuary and MUA is brought under the administrative control of MTR.

4.6.2 HUNTING

Prior to the reorganization of State, the wildlife conservation was through the implementation of the provision of the Indian Forest Act and the shooting rules framed by the Madhya Pradesh govt. is given in MP Forest Manual. By1927, shooting block system was started. The Conservator of Forests in consultation with the Divisional Forest Officer and the District Magistrate declared certain blocks of reserve with abounded game, open for shooting, subsequently a sliding scale of animals to be shot annually in each block was introduced.

Under the provision of the Bombay Wild animals and wild birds' protection Act (BWAWB) 1951, arms license holders for Sports had to be registered with the Wildlife Preservation Officer. Hunting licenses were categorized in to:

1. Small game
2. Big game
3. Special big game
4. Pet animal

No person was allowed to carry on trade in trophies without a separate trophy dealer's license. The shooting rule as contained in BWAWB was made applicable throughout the State.

4.6.3 ILLEGAL ACTIVITIES

4.6.3.1 POACHINGANDFISHING

The villagers including seasonal migrants from M.P. occasionally indulge in hunting of herbivores like Sambar, Chital, Barking deer, Wild boar and Chausinga etc. for meat. The modus operandi varies according to the season and animal to be hunted. The poaching of Tiger and Leopard is not common. However, poaching of Sambar, Chital, Barking deer, Wild boar etc. is more to do with the local customs and their

tribal culture.

TABLE-4(g): Table showing offence cases pending (last 10 years) till 2022-23

TABLE-OFFENCE CASES PENDING (LAST 10 YEARS) TILL 2022-23				
Sr. No.	**Type of offence**	**Pending at division level**	**Pending at RFO Level**	**Pending in Court**
1	Wildlife hunting	0	19	79
2	Illicit felling	16	417	97
3	Grazing	0	133	30
4	Encroachment	0	14	131
5	Trespass	0	21	31
6	Illicit fishing	0	0	0
7	Mining	0	0	0
8	Fire	0	64	16
9	Illicit transit	0	0	0
10	Other	0	28	31
TOTAL		**16**	**696**	**415**

Table-4(h): Table showing poaching cases in Melghat Tiger Reserve 2006-07 to 2022-23

POACHING CASES IN MELGHAT TIGER RESERVE 2006-07 TO 2022-23						
Year	**No. of poaching cases**			**No. of animals**		
	Tigers	**Leopards**	**Other**	**Tigers**	**Leopard**	**Others**
2006-07	2	3	4	2	3	3+fishing
2007-08	0	0	0	0	0	0
2008-09	1	0	0	1	0	0

2009-10	0	0	3	0	0	3
2010-11	0	0	4	0	0	18
2012-13	2	1	0	2	1	0
2013-14	0	1	3	0	1	3
2014-15	0	0	4	0	0	4
2015-16	0	0	4	0	0	4
2016-17	0	2	4	0	2	4
2017-18	0	1	9	0	1	9
2018-19	2	2	5	2	2	5
2019-20	1	1	12	1	1	12
2020-21	2	1	9	2	1	9
2021-22	0	1	5	0	1	5
2022-23	0	2	8	0	2	8
Total	**10**	**15**	**74**	**10**	**15**	**84**

Initially customary fishing was practiced in Melghat Tiger reserve but over the years it has also taken a commercial turn. Illegal fishing using dynamites, pesticides like urea, endosulfan have also been reported in large water reservoirs like Wan. Sometimes, the poisoning of natural waterholes is also done to facilitate fishing. In the summer season, if not prevented on waterholes, it becomes a serious problem for the other wildlife which come in search of water. Therefore, a regular vigil on the waterholes needs to be maintained using pH(litmus) papers or pH meter.

4.6.3.2 ILLICITFELLING

Except for the fringes and area adjoining original Paratwada areas, the scale of illicit felling is very low compared to the past, though the trend of increase in certain

pockets is cause for concern especially in areas where villagers are yet to be relocated. The prominent areas of illicit felling are M.P. border in Jarida range, Hatru range, southern boundary of Wan Sanctuary, western boundary of Harisal and Dhakna range. The following table shows the figures of illicit felling for last 8 years.

Table-4(i): Table showing illicit felling cases in Melghat Tiger Reserve 2015 to 2022

ILLICIT FELLING DETAILS (LAST 08 YEARS) TILL 2022-23				
Sr. No.	**Year**	**Total no. of cases**	**Material recovered at spot**	**Total loss due to felling**
1	**2**	**4**	**5**	**6**
1	**2015**	**2061**	**413989.301**	**1114772**
2	**2016**	**1393**	**451918.524**	**1275786**
3	**2017**	**1533**	**714237.451**	**2042385**
4	**2018**	**742**	**1361941**	**1002694**
5	**2019**	**1420**	**856993.884**	**1862657**
6	**2020**	**2489**	**2057687.098**	**3609755**
7	**2021**	**1938**	**998656.754**	**2549612**
8	**2022**	**1425**	**1250112.724**	**780348**

4.6.4 LIVESTOCK GRAZING

Grazing is prohibited in Gugamal National Park. Though, in sanctuary areas rotational grazingis permitted by issuing grazing passes as per the section 33 (d) Wildlife Protection (Amendment) Act 2006. No grazing passes are to be issued without vaccination of cattle. However, Hon'ble Supreme court direction dated 14/02/2000 in IA no. 548 in W.P. (C)no. 202/95 received vide Central Empowered Committee letter no. 1-26/CEC/2003 dated 2nd July, 2004, the grazing is prohibited in Sanctuary area also. This is being implemented strictly by the management but this leads to regular conflict with the Gawali community (traditional graziers) and many a times the management faces

challenges in dealing with this issue due to vast area and resource crunch. Controlling illegal grazing, trespass and illegal cattle camps inside dense forest of the Reserve is the biggest challenge for the staff, especially during rainy season when large group enters the area with their large herds of cattle.

4.6.5 WILD FIRES

The fire incidences in Melghat Tiger Reserve are common due to following Reasons:

(i) The area comes under the dry tropical zone so the summers are dry, hot and long.

(ii) The major species are deciduous, which produce an inflammable leaflitter.

(iii) Intense biotic pressure.

(iv) Cultural practices of tribal, particularly in month of May. Forgetting a good grass growth, the local villagers start the fires, for collection of NTFP

(v) To scare a way the wild animals in night, the villagers carry torches of bamboo.

(vi) Revenge fires against any legal action taken by forest department

(vii) Porous border with Madhya Pradesh

This makes the whole tract very fire prone. The undulating terrain, steep slopes make firefighting measures and efforts very difficult. Many times, inaccessibility of the area proves to be a challenge.

The following table shows the fire incidence in Critical Tiger Habitat cases for last 5 years.

Table-4(j):Table showing fire incidences in Melghat Tiger Reserve 2017-2021

YEAR	NO.OF FIRE INCIDENCE	BURNT AREA IN KM^2
2017	396	87.69
2018	390	91.37
2019	357	53.25
2020	97	8.19

2021	221	28.92
2022	407	43.46
2023	132	12.89

Table-4(K): Table showing division wise fire-fighting equipment available in MTR

FIREFIGHTINGEQUIPMENT							
Sr. No.	**Name of range**	**No. of blowers**	**No. of mist blowers**	**Rack**	**Helmets**	**GPS**	**Grasscutter**
Sipna Wildlife Division	Chaurakund	14	0	0	0	25	0
	Raipur	10	0	0	0	24	1
	Hatru	15	0	5	21	25	1
	Semdoh	12	0	0	8	28	1
	Jarida	18	0	0	20	6	1
Total		**69**	**0**	**5**	**49**	**108**	**4**
Akot Wildlife Division	Wan	16	0	0	0	17	8
	Narnala	4	0	0	0	4	1
	Sonala	17	13	0	0	23	8
	Somthana	20	0	0	0	15	7
	Dhargad	11	6	0	15	24	12
Total		**68**	**19**	**0**	**15**	**83**	**36**
Gugamal Wildlife Division	Chikhaldara	14	0	0	0	17	3
	Dhakna	14	0	0	0	23	6
	Tarubanda	14	0	0	0	22	2
	Harisal	15	2	12	20	20	5
Total		**57**	**2**	**12**	**20**	**82**	**16**
Melghat Wildlife Divison		**66**	**0**	**0**	**0**	**75**	**0**
Total		**66**	**0**	**0**	**0**	**75**	**0**
Grand Total		**260**	**21**	**17**	**84**	**348**	**56**

To deal with Forest Fire effectively series of preventive as well mitigative measures were taken by the authorities. Fire lines are created in the strategic locations to prevent the spread of forest fires into the crucial area. The details of Fire lines are in Melghat TR are appended in the **Annexure- 3** for ready reference. Similarly, Fire watch tower are created to have vigilance over the fire from distance. The locations of Fire watch tower in Melghat TR is given in **Annexure -4.**

4.7 TOURISM

ECO-TOURISM POTENTIAL OF THE P. A. AND ITS SURROUNDING AREAS

Semadoh, the first Nature Interpretation Center of the Project Tiger, was established about 25 kms from Chikhaldara and about 50 kms from Paratwada. Wildlife viewing in tourist zone in vehicle safari and the Project Tiger Museum are some of the attractions at Semadoh from nature interpretation and ecotourism point of view. This museum has vast potential for up gradation as a national level museum and Nature Interpretation Centre. Experts shall be involved in this process for upgradation, inter active is plays would be installed.

Interpretation center at Harisal has been established to attract tourists from M.P. and Dharni area of Maharashtra. This has Sipna River crossing in its backyard. Ithas very good potential for large scale investment as it is on fringe of core-buffer area and upgradation as an eco-tourism Centre.

Interpretation center at Gullarghat has been established to create and disseminate awareness of local medicinal plants. This will be upgraded by using latest displays. It has lot of potential in view of large tourist in flow particularly during monsoon in Dhargad temple nearby.

Interpretation Center at Amravati has been established for meeting the needs of nature education to urban population and as a gateway to Melghat. Chikhaldara plateau which is a fine hill station in Amravati district, is part of Project Area and is amajor tourist attraction, especially during summer holidays. About 2.5 km. to the South-West to Chikhaldara lies the Gavilgad fort which is a tourist attraction.

A part from the fort, which commands several splendid views, Chikhaldara offers other points of tourist interest. Beside Chikhaldara and wildlife tourism around the Semadoh Project Tiger Complex, some other points of tourist interest in and around Melghat area sunder:

(i) **Vairat Point:-**also called sunset point, is at a distance of about thirteen kilometers and is the highest of all the hills of Chikhaldara. The place is associated with ancient Indian mythology for it is considered to be the ruling seat of king Virat with whom the Pandav as are supposed to have resided during the period of their exile. Chandrabhag a River rises just below the Vairat plateau.

(ii) **The Makhala road** offer several scenic view points, particularly in monsoons when a thick fog wraps a mystic ambience to the whole region.

(iii) **The Sankhala point,** Named after **Shri, Kailash Sankhala**, father of Project Tiger in India. This point is of interest to wildlife tourist as Sankhala during his visit to Melghat camped at this scenically beautiful site, near Makhala.

(iv) Kolkas and surrounding forest. Rakhidoh or Rakshadoh and Dia doh near Kolkas.

(v) Narnala fort also known as “Shahnur Fort”, is a hill fortress in Maharashtra, India, named after the Rajput Ruler Narnala Singh. The name Narnala was given after the Rajput Ruler Narnal Singh or Narnal Swami. The fort was built in 10 A.D. by Gond Kings. In 15th Century Deccan sultanate have occupied and rebuild the fort and hence it has been called Shahnoor Fort. Narnala was one of the thirteen sarkar of Berar Subah. Narnala consists of three small forts named Zafarabad fort (or Jafarabad) on the east, Narnala in the centre and Teliagarh on the west.

(vi) **Wan Sanctuary:** Dhulghat railway makes a structure '8' while traversing the bend. Waridam, Hanuman temple, and there location of 3 villages has been developed as meadows with increased wildlife sighting, would become important Tourist Circuit.

(vii) **Ambabarwa Sanctuary:** Ambabarwa Sanctuary is in Buldhana district and it can be another tourist destination.

A part from above prominent points, numerous trekking routes and cycling routes can be developed to attract adventurous eco-tourists, for which there is lot of potential.

Table-4(l): Table showing important tourism attractions in Melghat TR

UNIQUE PLACESIN MTR					
Sr. No	Type of place	Range	Comp. no	GPS	Location
1. Waterfalls	Dhavanagiri	Chaurakund		N-21'40'34.70' E-077'06'05.98''	
	Chunapohi	Chaurakund		N-21'40'41.75'' E-077'05'53.56''	
	Jawaharkund	Semadoh	180	N-21'29'194'' E-077'21'361''	Jawaharkund
	Waterfalls	Sonala	363	N21'10"16 E076'37"44	Jatashankar
	Waterfalls	Dhargad	931	N21'31"88.84 E076'98"47.56	Zopadigadda
	Vairat Water fall	Chikhaldara	784	N21^0 22' 48' E077^{0}15' 44'	Tourismarea vairat
	Mhadev Kundi Waterfall	Chikhaldara		N21^{0}34"77.25' E077^{0}13" 05.35'	Dhondriaam Beat
	Kutkhai Waterfall	Chikhaldara	34	N21^{0}23"22' E077^{0}15' 45'	Tourismarea vairat
	Nilikahu Waterfall	Tarubanda	774	N21^0 25" 22.63' E077^{0}11' 20.42'	Sukalibhura Beat
	Bumbuch Ufri Waterfall	Dhakna	886	N21^{0}22"13' E077^{0}3" 39'	North Bhandum Beat
	Banabhura	Harisal	620	N21^0 33" 18'	Banabhura
	Waterfall			E077^{0}12"9'	Beat
	Chingghogara Waterfall	Harisal	617	N21^0 23"13.01' E077^0 06" 36.25'	N. Mangiya Beat
2. Temples	Bhumkababa	Semadoh	118	N-21^0 29"84.09'	Old pili

				E-077^0 16”10.70’	Village
	Temples	Somthana	1072	N21'24"72.11 E076'99"34.92	E.Dhargad
	Temples	Narnala	165	N21'14"26 E076'1"24	Shahanur
	Temples	Sonala	363	N21'10"16 E076'37"44	Jatashankar
	Temples	Sonala	553	N21'13"15 E076'42"47.09	Mangeri Mahadeo
	Kandribaba	Tarubanda	766	N-212538.69 E-77 10 13.57	Tarubanda Village
	VairatDevi	Chikhaldara	34	N-213862.21 E-77 25 17.02	Pachamba Beat
3.Local	Makhala	Semadoh	190	N-21’31’40.06’’ E-077’22’26.69’’	Makhala Village all Area

Table-4(m): Table showing tourist flow & revenue generated in MTR from 2010-11 to 2022-23

TABLE NO: 4.21 TOURISTIN FLOW		
Year	**No. of visitors**	**Revenue received Rs.**
2010-11	49,950	19,23,767
2011-12	22,410	9,60,955
2012-13	26,277	15,86,974
2013-14	33,882	13,81,453
2019-20	79870	1,74,24,679
2020-21	97476	2,50,37,261
2021-22	114664	2,12,88,950
2022-23	166866	3,20,17,400

Considering the vastness, varied and scenic and scape, number of tourists is very low mainly concentrated to weekends and holidays.

4.8 RESEARCH, MONITORING AND TRAINING

For the effective and meaningful management of the Tiger Reserve, it is necessary to have basic knowledge about important factors which have bearing on the occurrence of various floral and faunal species, their distribution in there serve and their population dynamics. Therefore, such impacts as well as different biotic and abiotic factors need to be understood, so that their combined effect on habitats and wildlife can be studied and anticipated in a manner to know the desired mix of managerial practices and regulations which are most suited for the area. This is essential with reference to their long-term impact on floral and faunal species. Requisite data is, therefore, required to be collected, compiled and analyzed periodically.

The wildlife research as well as management requires specialized knowledge and attitude. Developing such attitude in field staff is major challenge for the management. Training and human resources development needs can never be wished away. At present are gular system of monitoring of wildlife through patrolling, protection camps, water hole supervision and regular annual monitoring exercise is being done. Of late GPS and camera traps are being used regularly and a database is being developed. The capacity building session for the staff on various aspects are regularly taken up. This needs to be continued with further improvement.

4.8.1 RESEARCH ACTIVITIES

Research and monitoring activities on various aspects of wildlife management and wildlife health in the reserve may be taken up. Management receives applications from students, NGOs, scientists etc. to pursue these studies. These activities are regulated as per the guidelines issued by Govt. of Maharashtra vide letter no. *WLP-1006/C.R.255/F-1 datedAugust8, 2007.*After due approval of Chief Wildlife Warden, the applicants are permitted to undertake their studies. Some studies which have been permitted in recent past areas given in **Annexure-5.**

4.8.1 MONITORINGOFWILDANIMALPOPULATION:

Upto2005, Annual Tiger /Leopard Population Estimation used to be done by using the pugmark Technique Method and that for the herbivores by Waterhole count

every year. Since 2005, the technique has been replaced as per the directives received from the National Tiger Conservation Authority, New Delhi. The camera traps at the strategic locations are being established in parts of reserve on periodic basis.

A system of daily monitoring of Tiger/Leopard had been initiated in Melghat Tiger Reserve and direct sighting of Tiger and Mortality Report relating to Tiger and Leopard has been initiated in Melghat Tiger Reserve since 2005. For the daily monitoring of the existence of Tiger/ Leopard, National Tiger Conservation Authority has issued certain instructions. These are as follows.

(i) A minimum of 5 PIPs will be permanently maintained in each beat. The dimension of the PIP shall not be less than 6m in length and the width of the PIP should equal the foot path, jungle trail dry nullah width on which the PIP is made. GPS coordinates of all PIP's need to be recorded.

(ii) The tiger data sheets

(iii) Direct tiger sighting report, through wireless.

Scope for Research and Monitoring

Relocation of villages will provide an opportunity for nature to unravel the process of ecological succession. These evacuated sites are, therefore expected to provide much needed database, which would be of real relevance to understand the ecology of dry deciduous forests and flora and faunal attributes at different stages of succession, /with and without human presence.

4.9 WILDLIFECONSERVATIONSTRATEGIESAND THEIR EVALUATION

The thrust of all managerial practices under Project Tiger has been to protect the eco-system by mitigating the anthropogenic adverse limiting factors. Of the total Project Tiger area, core area of Gugamal Nation Park got the rigid protection since Project Tiger was launched way back in 1973. The forests in this area had plenty of valuable teak and

bamboo with high commercial potential yet it was completely free from forestry operations. Following this, other areas which were enjoying the status of Wildlife Sanctuary since1985 have also been extended rigid protection from hunting and other illegal activities. The control over grazing, restriction on use of agricultural crop protection guns and protection from fire along with other habitat improvement measures like creation of waterholes at suitable places and weed eradication works were also taken up which led to increase of wildlife in entire Project Area.

Demarcation of boundary of National Park and Sanctuary areas, creation of perennial water points, has been taken up along with establishment of veterinary care centers and nature interpretation centers. The relocation of villages from Sanctuary area has had positive impact. Poaching of major carnivores like Tiger and Panther has been almost reduced to nil except a few stray incidents of road accidents. The incidences of cattle kill cases have been reduced which speaks of better control on grazing and cattle camps. The following table indicates the data of cattle kill for last 5 years.

Table-4(o): Details of cattle kill cases & Compensation Paid in Melghat Tiger Reserve 2006–07 to 2022-23

CATTLE KILL & COMPENSATION PAID			
SL. No.	**Year**	**No. of cases**	**Compensation**
1	2006-07	145	6,20,125/-
2	2007-08	198	6,57,040/-
3	2008-09	235	7,43,333/-
4	2009-10	140	4,24000/-
5	2010-11	150	5,63,153/-
6	2011-12	123	474632
7	2012-13	82	466700
8	2013-14	155	791800
9	2014-15	193	1207952
10	2015-16	208	1433065
11	2016-17	188	1343984

12	2017-18	116	931682
13	2018-19	61	455902
14	2019-20	164	1602330
15	2020-21	215	1869877
16	2021-22	183	171209
17	2022-23	188	1397433

The poaching offences related with herbivores and smaller fauna have shown a bit of recurrence and are major cause for concern particularly in areas in open and plain area neighboring highly populated villages situated in erstwhile Multiple Use Area.

Due to hilly and rugged terrain, a number of rivers and their tributaries, and the nature of river itself, many spots act as perennial and seasonal waterholes. The number is more than 500. Lots of them have also been artificially prepared. In addition, every year the **soil and moisture conservation** works have been carried out. A network of wireless and a few cellphones is in operation for **effective communication** which helps in controlling the wildlife crimes.

Table-4(p): Table showing offence cases pending (last10years) till2022-23

TABLE-OFFENCE CASES PENDING (LAST10YEARS) TILL2022-23				
Sr. No.	**Type of offence**	**Pending at division level**	**Pending at RFO Level**	**Pending in Court**
1	Wildlife hunting	0	19	79
2	Illicit felling	16	417	97
3	Grazing	0	133	30
4	Encroachment	0	14	131
5	Trespass	0	21	31
6	Illicit fishing	0	0	0

7	Mining	0	0	0
8	Fire	0	64	16
9	Illicit transit	0	0	0
10	Other	0	28	31
TOTAL		**16**	**696**	**415**

Protection and intelligence gathering

The Melghat Tiger Reserve in the past enjoyed, to some extent, an natural protection due to the surroundings mountain ranges. Its undulating terrain, crossing hill ranges, plateaus, valleys, rivers, *and nullah* all contributed in restricting the number of motorable entry and exit points in and out of the Melghat Tiger Reserve. The British recognized the value of this extensive tract of Teak forests and made in-roads into this region so as to harvest the valuable timber and also to scientifically manage this valuable resource. For the removal of forest produce towards the plains of Berar, two major roads were established making use of the "Saddle" at Seremban on Paratwada-Dharni road and other at Rajdeo baba on Harisal-Akot road. These two roads today have been converted into state highways connecting commercial places like Burhanpur in M.P. and Akola/Akot, Nagpur in Maharashtra, and are most busy roads for entering and leaving Melghat. In addition to important timber markets established at Paratwada and Akot which were fed with forest produce by these two roads, they now are extensively used for transport of goods and heavy traffic between booming markets of Dharni, Burhanpur, Paratwada, Nagpur, Akot and Akola.

With passage of time more roads were made into Melghat. In 1969 with the process of conversion of forest villages into revenue villages starting, road network was extended even to the remotest village to facilitate communications and for providing facilities. With the spectra of malnutrition, large network of roads connecting even the remotest village in Melghat with the involvement of Building & Constructions department by building bridges, culverts etc. and even metal roads were enhanced. As a result, the two State highways along with the metal roads developed to connect various villages and towns like Dharni, Paratwada, Akot, and Chikhaldara, Semadoh has become

a growing market places. Owing to it shilly terrain and bound by high rising hills and plateaus from North East, East and South West, the area is considered to be safe and inaccessible for large scale illicit cutting or commercial poaching. However, up gradation of two major highways i.e. Paratwada, Semadoh, Dharni and Akot, Dharni roads and very constant efforts to link these with all the villages inside the MTR area through metal roads or all weather roads providing relief to tribals is likely to prove a very serious threat to wildlife and its habitat in the existing Project area. The speedy vehicles on the highways area already taking big toll by killing several wild animals crossing these roads. Neighboring Madhya Pradesh village shave been noticed trying to have access through inner roads to remote and interior places like Raipur, Bhutrum, Belkund, Dhargad, Bori, Ambabarwa etc.

For controlling heavy traffic on the highways, passing through the Critical Tiger Habitat the old **check gates** are still operational at,

(i) At Bihali on Paratwada-Dharni road.

(ii) At Popatkheda on Harisal-Akot road

(iii) At Dharni on Paratwada-Dharni-Burhanpur road.

(iv) At Harisal, Semadohon Paratwada-Dharni road.

(v) At Koha and Khatkali on Akot-Dharni road.

(vi) Zarinaka and Talainaka on Hiwarkhed-Dhulgat road.

(vii) Wasali on way to Ambabarwa.

(viii) At Memna on way to Chikhaldara-Semadoh.

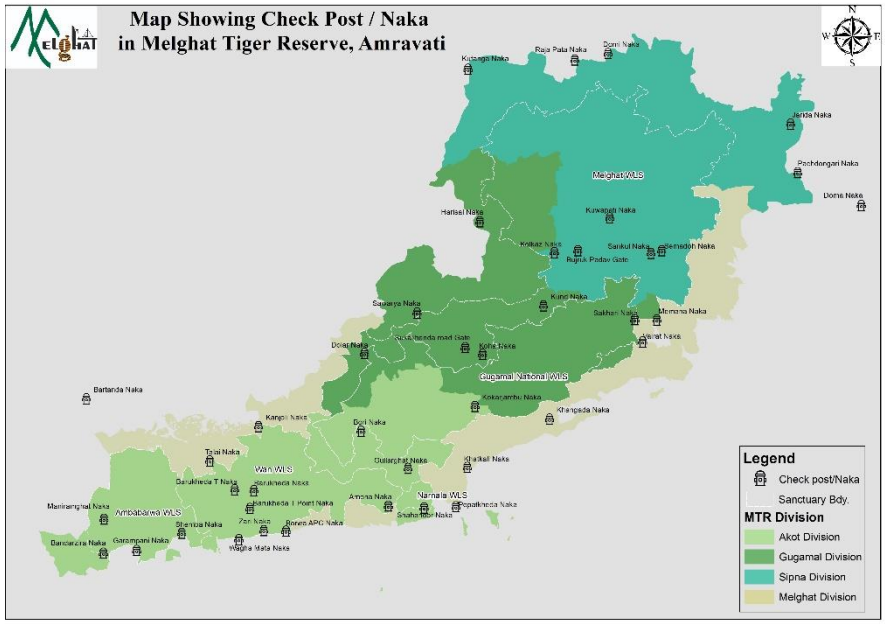
(ix) Hirapaninaka on Dharni to Bijudawri to Dhakna road

(x) Baratandanaka on Dharni-Dhulgat road

(xi) Ranigaonnaka on Susarda-Dulghat road

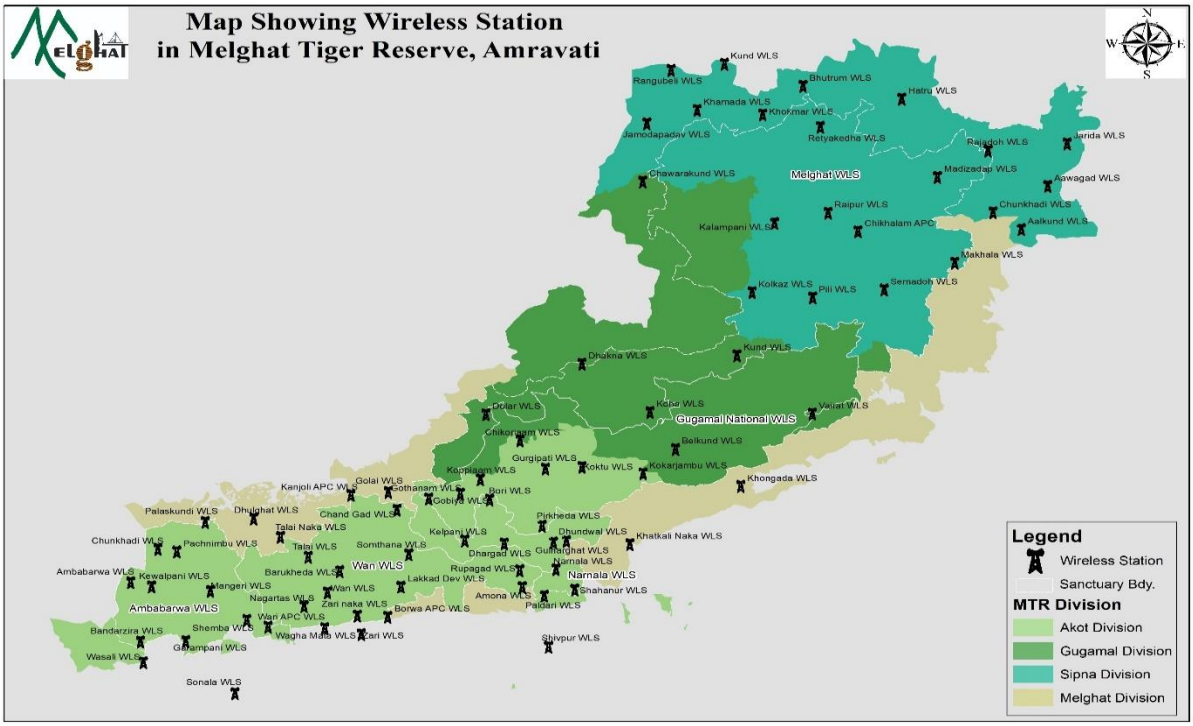
(xii) Gotadiphata naka on Tembrusonda-Kongda road

(xiii) Dhamangao gadi naka on Paratwada-Chikaldara road



Map Map-4(a): Map showing Location of Check Nakas in MTR

Since Sanctuary area is the area which is to be given rigid protection, the important entry points having regular traffic movements have to be manned for 24 hrs to ensure proper checking. On the other entry points in the Reserve which are not much in use by traffic, staff posted as per necessity.



Map-4(b): Map showing Location of Wireless station in MTR

Encroachments

The threat of encroachment on forest land persists in two forms as enumerated below.

i. Gradually extending the boundaries of the cultivation area which is to some extent prevalent even today due to FRA.

ii. Carrying out new encroachment.

According to the policy of the state Govt. vide their G.R. dated 31 March 1978 all encroachment on forest land from 1/4/1972 to 31st March 1978 were to be regularized by adopting the following procedure.

(i) Preparing list of encroachments by Field Director.

(ii) Deciding the eligibility of the encroacher by the Revenue and Forest Department Jointly.

(iii) Removal of tree growth, if any, on such land.

(iv) Granting of pattas by the Revenue Dept. before 5thOct. 1980

Table-4(q): Table Showing encroachment removal till 2022-23

ENCROACHMENT REMOVAL TILL 2022-23			
Sr. No	Name of Division	Total No of Site	Total area Obtained (Ha)
1	Gugamal Wildlife Division, Chikhaldara	60	52.34
2	Sipna Wildlife Division, Paratwda	374	487.42
3	Akot Wildlife Division, Akot	48	59.10
4	Melghat Wildlife Division, Paratwada	111	101.17
Total		**593**	**700.03**

As the Forest conservation Act, 1980 came in to operation in the state since1980, it would be necessary to submit all proposals to Govt. of India for permission to regularize

encroachment. The protection has been accorded to desist people from making new encroachment.

The Scheduled Tribes And Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006

"The scheduled tribes and other traditional forest dwellers (recognition of forest rights) act, 2006" which came in to force on January 1,2008,to recognize traditional forest rights enjoyed by Schedule Tribes and Other Traditional Forest dwellers as on December,2005,puts duties on the forest dwellers and the holders of any forest rights, Gram Sabha and village level institutions in areas where there are holders of any forest to:-

a) Protect the wildlife, forests and biodiversity:
b) Ensure that adjoining catchments area, water sources and other ecological sensitive are as are adequately protected:
c) Ensure that habitat of forest dwelling Scheduled Tribes and other traditional forest dwellers is preserved from any form of destructive practices affecting their cultural and natural heritage:
d) Ensure that decisions taken in the Gram Sabha to regulate access to community forest resources and stop any activity which adversely affects the wild animal, forest and the biodiversity are complied with.

Table-4(r): FRA claim obtained till 2022-23 in Melghat TR

FRACLAIMS OBTAINED(TILL2022-23)						
Sr. No	**Name of Division**	**Total Claims Obtained**		**Claims Sanction**		**Total land given to FRA**
		CFR	**IFR**	**CFR**	**IFR**	
1	Gugamal Wildlife Division, Chikhaldara	17	181	13	38	5491.05
2	Sipna Wildlife	-	-	-	-	-

	Division, Paratwada					
3	Akot Wildlife Division, Akot	-	-	-	-	-
4	Melghat Wildlife Division, Paratwada	22	244	22	127	7218.04

"The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition Of Forest Rights) Act, 2006" is being implemented in accordance with Wildlife (Protection) Act, 1972. The co-operation from local people in prevention of encroachment is being taken through VEDC. The survey and demarcation works are being carried out regularly to prevent any fresh encroachment."

As regards encroachment in the form of gradually extending the boundaries of the cultivation it has been restricted to a large extent by digging TCM on forest boundaries and by making clear demarcation. This needs continuous maintenance.

4.10 ADMINISTRATIONANDORGANIZATION

At present, the Melghat Tiger Reserve is headed by a Field Director at the rank of Chief Conservator of Forests. He/she is the over-all in-charge of the Melghat Tiger Reserve, based at Amravati. The Melghat Tiger Reserve is under the administrative control of APCCF(WL-east) who in turn reports to Principal Chief Conservator of Forests (Wildlife) Nagpur. Melghat Tiger Reserve has four divisions namely Sipna Wildlife Division, Melghat Wildlife Division both with head quarter at Paratwada, Gugamal Wildlife Division with HQ at Chikhaldara and Akot Wildlife Division with head quarter at Akot. There are two RFOs at the Directorate level to assist the Field Director-the Research Officer and the Nature Interpretation Officer. There are 5 Ranges in Sipna Wildlife Division, 4 in Gugamal Wildlife Division, 5 in Akot Wildlife Division and 5 in Melghat Wildlife Division. This setup has evolved over last many years, since the formation of Melghat Tiger Reserve. This is given in the following table.

Table- 4 (s) : The organization set up before 1999 (Before proposed areas of all Wildlife Sanctuary in MTR was brought under the control of Field Directorate)

THE ORGANIZATION SETUPBEFORE1999			
Division	Average Area of Ranges (sq.km)	Average Area of Rounds (sq.km)	Average Area of Beats (sq.km)
Conservator of Forest & field Director, MTR Amravati	4	15	66
	404.75	107.94	24.53

Table- 4 (t) : The organization set up after 1999 of MTR (When proposed areas of all Wildlife Sanctuary in MTR was brought under the control of Field Directorate)

Division	Average Area of Ranges (sq.km)	Average Area of Rounds(sq.km)	Average Area of Beats(sq.km)
Sipna Wildlife Division, Paratwada	167.81	41.95	12.71
Gugamal Wildlife Division, Paratwada	4	16	62
	209.46	52.36	13.51
Akot Wildlife Division, Akot	5	10	31
	87.61	35.04	11.3
Directorate Average	13	46	159
	155.95	44.07	12.75

Table- 4 (u) : The organization set up w.e.f. 01.10.2005 of MTR

THEORGANIZATION SETUP FROM 1O CTOBER 2005			
Division	Average Area of Ranges (sq.km)	Average Area of Rounds(sq. km)	Average Area of Beats (sq.km)
Sipna Wildlife Division, Paratwada	167.81	27.06	8.74

Gugamal Wildlife Division, Paratwada	5	24	87
Melghat Territorial division	167.89	34.97	9.64
Akot Wildlife Division, Akot	4	13	46
	87.61	26.95	7.61
Directorate Average	14	68	229
	144.81	29.81	8.85

The necessity for another reorganization was felt in 2009 for following reasons-

1) For the effective control over Dhargad range from the management point of view attachment of Dhargad range to Akot wildlife division from Gugamal wildlife division, Paratwada.
2) Reorganization of some beats and rounds in Akot and Sipna wildlife division from the protection point of view.
3) Utilization of special duty staff in protection works.
4) Retirement of many regular Van Majdoors over along period, creating many Vacancies in the field.

After 2009, out of this proposed reorganization, the Dhargad range has been shifted from Gugamal division and has been attached to Akot wildlife division since, 31stMay2011vide PCCF(WL), M.S., Nagpur Sec.22(4) /estt./611/ 2011-12, dated 31/05/2011.

Formation of Buffer in 2010

On 29 September 2010, an area of 1268.03 sq.km was declared as buffer of MTR constituting areas of the territorial divisions of Akola(179 sq km) , Buldhana(93.46 sq km) , East Melghat(223.17 sq km) , West Melghat(243.84 sq km) and areas of wildlife divisions of Gugamal (173.54 sq km) and Sipna(355.02 sq km) division.

Table- 4 (u) : The organization set up w.e.f. 29 September 2010 (after Buffer notification)

THE ORGANIZATION SET UP after 29 September 2010

Division	Average Area of Ranges (sq.km)	Average Area of Rounds(sq. km)	Average Area of Beats(sq. km)
Sipna Wildlife Division, Paratwada			
Gugamal Wildlife Division, Paratwada			
Melghat Wildlife Division			
Akot Wildlife Division, Akot			
Directorate Average			

Unified control in 2018

Despite notification of buffer, the areas belonging to territorial divisions continued to be administered by the respective divisions. However on 4th December 2018,Govt. of Maharashtra issued a GR for the reorganization and unified control of MTR. With this the buffer areas belonging to territorial divisions were brought under the administrative control of Melghat Field Directorate. The buffer areas of East and West Melghat territorial divisions were constituted into a new Melghat Wildlife Division.

Currently, MTR is having 4 Division namely Sipna WL Division, Akot Wildlife Division, Gugamal WL Division & Melghat WL Division as per the latest reorganization.

The details of the area statement are given below in Table;

Table-4(v): Current Administration of MTR

Division	**Range No. with Average Area of Ranges (sq.km)**	**Round No. with Average Area of Rounds (sq. km)**	**Beat No. with Average Area of Beats (sq. km)**
Sipna Wildlife Division, Paratwada	5	31	96
	167.81	27.06	8.74
Gugamal Wildlife	4	18	67

Division, hikhaldara	159.98	35.55	9.55
Akot Wildlife Division, Akot	5	19	71
	162.38	42.73	11.43
Melghat Wildlife Division, Paratwada	5	16	53
	93.40	29.18	8.81
FD, MTR	19	84	287
	145.15	32.83	9.60

The total strength of MTR is as given below.

Table-4(w): Information on staff strength and vacancies(up to 12/06/2023)

Sr. No.	Cadre	Sanction Post
1	CCF	1
2	DyCF	3
3	DFO	2
4	ACF	7
5	Assistant Commissioner Animal Husbandry Wildlife	6
6	Veterinary Officer	1
7	Range Forest Officer	23
8	Forester	140
9	Chief Accountant	4
10	Forest Guard	333
11	Accountant	16
12	Clerk	46
13	Surveyor	4
14	Wireless Technician/Operator	2
15	Driver	16
16	Mahavat	4
17	Charakapi	4

18	Peon	7
19	Chaukidar	10
20	Safai Kamgar	4
21	Mali	5
22	Cleaner	8
23	Vanmajur	115
24	Police Constable	1
25	Waterman/Water women	2
26	Cook (Khansama)	3
27	MOTERCLEANER	1
28	WARDBOY	1
29	Office superintendent	1
30	Steno	1
31	Nick	1
32	Dakrunner	1
33	Messenger	1
Total sanctioned Post		**772**

4.11 COMMUNICATION

Melghat is well connected through roads. All road networks are crisscrossing in the heart of the Melghat Tiger Reserve. There are two major entry points one is from Amaravati- Parathwada-Semadoh side & another is Akot-Harisal side available to entry to Melghat. SH-6 runs from Amaravati to Dharni & SH-204 runs from Akot to Harisal is the major communication link by road. Another black topped road which join Chikhaldara to Semadoh is frequently being used by the tourists.

Other major habitation/locations in the area are Jarida, Tarubanda, Chaurakund, Rangubeli, Hatru, Gadga, Bhandumand thevillages fromcore Rora, Semadoh, Chopan, Pili, Mangia, Adhav, and Dhakna. These places are connected by state bus service with a frequency varying from1to3visits per day. Almost all villages in the Melghat area have been connected with road network. Some roads are tarred. There fore, in fair

season communication is easy barring internal roads which are either *murum*or WBM(Water Bound Macadam) roads. However in rainy season some of these roads get washed away at the cross drainages when the streams running across the mare in spate. This renders some of the roads difficult to tread and consequently, some portion of the Reserve becomes inaccessible during rainy season.

All Range Office headquarters, Anti-poaching Camps etc. are connected motorable road network, VHF Communication Network. Several locations inside the TR have mobile network coverage which enables the staff to remain connected with the outside world. Checkgate sand barriers have been installed and made operational on all entry points to the Reserve with a view to regulate the entry of visitors and also keep a check on illegal and suspicious intruders in the area. The details of Wireless communication station of MTR is given in **Annexure-6**

4.12 SUMMARYANDTHREATSTOWILDLIFE

The detailed threat perception, assessment and protocol for protection has been covered in a separate, protection plan of the MTR. However, major threats to the area and its resources in the Reserve areas follows;

i. At present most of villages are willing to relocate. However unwillingness of few households to relocate from those villages acts as stumbling block for village relocation. Frequent Judicial litigations also drags there location process.
ii. Encroachments for agricultural purposes on wildlife habitats and forest lands by local people.
iii. Illicit cutting of trees for local needs and commercial purposes.
iv. Illegal grazing by local/migratory cattle and other biotic pressures.
v. Poaching and hunting of wild animals for local as well as commercial purposes.
vi. Fires, mostly man made for Mahua/Tendu/local poaching and to scare away the wildlife.
vii. Illegal removal of non-timber forest product and valuable medicinal plants.
viii. Illegal traffic of timber, forest product, wildlife and its products, due to long porous border with M.P.
ix. Local customs, such as small hunting, which are detrimental to conservation values.

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CHAPTER -5

THE PROTECTED AREA AND THE INTERFACE LAND USE SITUATION

5.1THE EXISTING SITUATION IN THE ZONE OF INFLUENCE

The zone of influence are those ecologically sensitive areas, used by wildlife and not merely the notified administrative boundaries. These comprises natural forest area, plantation, and non-forest areas (including villages). Also due to presence of 153 villages inside this zone, areas are being used for agriculture, farming, habitation and other purposes. Within this area numbers of patta under FRA were also allotted.

5.1.1 THE LOCATION, EXTENT, BOUNDARIES AND NATURAL ATTRIBUTES OF THE ZONE OF INFLUENCE

The areas notified under Eco-sensitive zone is included as Zone of influence since there is no separate area demarcated for this. The zone extends from the notified boundary of Melghat Tiger Reserve, ranging from 2.2 km to 14.85 km and covering an area of 126803.67 hectares. Extent of zero kilometer is kept along the border with Madhyapradesh. The zone of influence covers villages in Talukas namely, Dharni, Chikhaldhara, Chikali, Motala, Khamgaon, Akot, and Sangrampur at the districts of Amravati, Akola and buldhana.

Table-5(a): Table showing area under Zone of Influence of MTR

Sr. No.	District	Forest Area in ha	Non forest area in ha
1	Amravati	86696.56	12860.54
2	Akola	1932.43	156967.48
3	Buldhana	3436.50	5910.16
Total		**92065.49**	**34738.18**

5.1.2 VILLAGES INSIDE AND OUTSIDE THE PA. ETHNIC IDENTITIES, TRADITIONS, CUSTOMS, RELATIONSHIPS BETWEEN DISTINCT GROUPS OF PEOPLE, RELATIONSHIP WITH FORESTS:

Total 33 villages are in the core zone of Melghat Tiger Reserve. Out of these 33 19 villages were voluntarily rehabilitated and 6 are under process of Voluntary rehabilitation, whereas, 8 villages are still remaining inside the Core Zone. These villages of core zone are also acting as zone of influence. Whereas, in Zone of influence outside PA there are 153 villages, forest land, other institutions and establishment.

The inhabitants of Melghat TR is dominated by Korku tribe followed by Gond, Nihal and Scheduled Caste community Balai. The villagers are marginal farmers and depend upon the forests for their requirement of small timber, grazing and firewood. Since these villages were either ex-forest villages or Rayatwari villages, they enjoyed concessions available to the village dwellers before constitution of area, National Pak or Sanctuaries. These were governed by the Central Provinces Forest Manual 1915, and Government of Maharashtra G.R.s of 1968 and 1973. Moreover, the work of exploitation and felling under various systems of forest working as well as plantations were also undertaken. After the formation of Tiger Project, change in approach of Forest Management has moved towards conservation and wildlife management. Collection of NTFP and exploitation of any type is stopped. Grazing and felling are prohibited. Therefore, the villagers are now predominantly engaged in agriculture or as laborers.

The people have very good knowledge about forest, its resources and use of different medicinal plants and forest produces. They worship local Deities and Totems like Kandri Baba, Bidi wale Baba, Bhumka baba, Devi point. They treat the Tiger as Kula mama, andtheir surnames are after the names of trees.

As part of traditional festivals, Rando Bhawai (pooja before commencing rain), ChikhalBhawai (pray to God to save from natural disaster), Dedra Mata Poojan (pooja to end drought). However, Dushera and Holi are the major festival but Holi is the flagship of all festivals.

5.1.3 RELOCATION OF VILLAGES – PAST EFFORTS, STRATEGY ADOPTED, LEARNINGS, LINKAGES MAINTAINED

Past Efforts:

Due to increase in population, more space was required and this came in conflict with conservation goals and thus relocation of villages was necessary. Under different government run program and packages, effort for relocation of villages were started.

Rehabilitation efforts were carried out in two phases. In first phase, Bori Village was rehabilitated in 2001-02, followed by Koha and Kund in 2002-03 and were settled in Akot Tehsil of Akola District. All the basic facilities and amenities were ensured in the resettled location.

In second phase, effort for rehabilitation of 3 villages, Vairat, Churni and Pastalai in Chandur Bazar and Achalpur Teshil of Amravati District were initiated in 2003-04. But due to technical and coordination issue, effort was not cent percent successful and effort continued till 2010-11, by release of more fund by the state.

In February 2008, the central Govt had announced a rehabilitation package of Rs 10 lakh per family of villages who are willing to resettle from PAs. It was observed that, the villagers started opting this as Option – I and in 2011 three more villages, Amona, Barukheda and Nagartas from adjoining areas of Wan Sanctuary were relocated. Following 3 village, in 2012 one more village named Dhargad rehabilitated.

In next 2 years, 2012- 2014, Gullarghat, Somthana Bujruk, Somthana Khurd, and Kelpani were shifted. Same happened in 2014-15 when more 3 villages, Rohinkhidki, Chunkhadi and Ambabarwa were rehabilitated making Ambabarwa sanctuary inviolate. Talai village was relocated in 2016-17.

During 2016-2020 relocation of villages from Gugamal Division were carried out and people from Dolar, Memna were completely relocated while majority were relocated from, Mangia, Pastalai,Rora, Malur and one Pili village from Sipna Division.

At present relocation effort for 6 villages, Mangia, Pasthalai, Pili, Chopan, Malur and Rora are ongoing but unfortunately relocation process for 8 nos villages, Semadoh, Raipur, Madizadap, Ratikhada, Boratakhera, Dhakna, Adhav and Makhna still pending.

Strategy adopted: Initially relocation of villages in the State of Maharashtra were done utilizing state fund and were covered under "**Maharashtra Project Affected Person Rehabilitation Act 1999**" where many provisions were mentioned like

a) As per section 4 (b) of the act, the provisions of the act are also applicable to National Park, sanctuary and also the entire responsibility to execute them and to rehabilitate the project affected persons shall rest with the concern department of Govt of Maharashtra by entering and agreement with the project authority or body.

b) In the definition as per section 10 (d), "Project" means National Park and sanctuary declared under the provision of the Wildlife Protection Act, 1972.

c) Chapter – II of the act deals with Project Authority, their powers and duties.

d) Chapter – II deals with the rehabilitation of affected persons.

e) Section – 11, deals with areas of affected and benefited zone to be notified.

f) Section – 14 provide powers to purchase or acquire land for the purpose of this act.

g) Section – 22 deals with officers of Govt and local authorities to assist Commissioner or Collector for the purpose of carrying out provisions of act.

However by the 2006 amendment of WPA 1972, the concept of CTH- Critical Tiger Habitat(core) was introduced and as per Section 38V (5), the process of recognition of rights of Schedule Tribes and Forest dwellers was required as a prerequisite for relocation of village. On 27 December 2007, CTH for Melghat Tiger reserve was notified. On February 2008, NTCA brought in the guidelines for voluntary relocation of villages, providing the compensation package. Till this guidelines came in, the relocation and rehabilitation of villages in Melghat were done as per Maharashtra Projected Affected persons act 1999 (MPAP). However as per section 14 of this act, the entire process is compulsory acquisition. However, the 2006 amendment to Wildlife protection act made the relocation voluntary and hence the procedure of MPAP act 1999 became unoperable. So NTCA 2008 guidelines were used for relocation of villages between the period of 2008-2012 and this included Amona, Nagartas, Barukheda and Dhargad. However since 3 November 2012, State of Maharashtra brought in a GR for relocation which was used for the subsequent relocations.

The concept of the Central Govt also announced package for Rs. 10 lakh in 2008 and in Maharashtra, the State Govt also have announced Rs.15 lak1hs plus four time valuation of land & double the amount of immovable properties like house and trees.

Learnings:

The village rehabilitation is a complex work, and need repeated persuasion with the villagers, a good coordination with the concerned department and timely funding.

But the outcome of the village rehabilitation is surprisingly effective in terms of forest and wildlife conservation as well as for the benefit of the villagers, who are getting more facilities then residing inside forest without basic amenities. At present areas of Wan, Ambabarwa, and Gugamal become very good habitat for wildlife due to inviolate area. So by rehabilitation the rest of villages, quality of Melghat Tiger Reserve can be improved in coming days.

Linkages maintained:

It is found that, effort for relocation process is still going on in 6 villages and more planning at every level will be required for relocating rest of 8 villages. Among 8 villages some are very big in size and will be a difficult job. Not much data is available with regard to communications maintained with the already relocated villages.

However, skill development training programme are being imparted by the department, especially JCB training, MSCIT, electricals free of cost.

5.1.4 THE STATE OF THE PEOPLE'S ECONOMY. VOCATIONS, LAND USE, USE OF FOREST AND NON- FOREST BASED NATURAL RESOURCES BY PEOPLE AND SEASONAL PATTERNS

Majority of villagers belonged to ST and some are SC and present source of income is from Agriculture. The land where they are raising crops are not so fertile (black cotton soil) specially on the slopes, due to soil erosion fertility is less and crops like lesser millets like kodo, Kutki, Gadmal and ragi, oil seed and soya bean are preferred. Apart from agriculture, under MGNREGA scheme also they are getting some earning. Some went outside to find daily labour jobs. They also sale their grown vegetables and crops in the local market and earn money.

Seasonal land use pattern:

Due to comparatively less rainfall and non-fertile soil, the villagers do not grow crops round the year. During June and July, they prepare land and sowing of crops are done. Then during August and September they do the harvesting of crops. So roughly 4-5 months in year, agriculture activities are carried out. During rest of season, the land remains unused.

It is observed that, the villagers also remain busy during agriculture season and afterward they go outside of the villages in search of alternative livelihood. So by observing their seasonal activity, planning for protection and other activities may be planned to make them busy in Departmental works and to protect forest during their leisure or free season.

5.1.5: IMPLICATIONS OF THE LAND USE AND RESOURCE DEPENDENCY FOR THE CONSERVATION OF PA

Present land use pattern, i.e. agriculture based and their dependency on forest produce have adverse effect on the wildlife. Exposure to modern agriculture has increased in usage of pesticides and fertilizers in crop field. The smaller prey species like rats feeding on such crops in turn affect birds like Owls which feed on them.

It is a general practice adopted by villagers every year, for the ease of collection of tendu leaf and mahua flower, they set fire in the forest for clearing forest surface. Regular collection of poles, firewood and other MFP, definitely puts so much pressure on the forest and wildlife.

5.1.6 FOREST/PA MANAGEMENT PRACTICES AND THEIR IMPLICATIONS FOR PEOPLE

Habitat improvement: Under habitat improvement activities many water holes were created, and it is also noticed that cattle of villagers are also using the same water holes. Due to sharing of these water hole, cattle kill by predators will also increase conflict. The local people are engaged in implementation of activities like, water hole creation, check dam , gabion structure construction, grassland management etc.

Prohibition on activities: In the core zone no destructive activity is permitted, so people from yet to be relocated villages come in conflict with law for collecting MFPs, and other forest and non-forest produces.

Protection: Local youths were engaged in protection activities, like firewatchers, camp labourers and under special state provision, locals are also given priority in govt jobs.

Tourism: Since introduction of tourism in MTR, local people are being engaged in different activities like guides, gypsy drivers and there is also more scope to enhance the livelihood of local people through tourism.

EDC activities: Different activities are implemented through Eco-Development Committees and all the members of EDC are local villagers only. So, more activities can be planned to conserve the MTR in this joint venture.

5.2 THE DEVELOPMENT PROGRAMMES AND CONSERVATION ISSUES

The development program can have both positive and negative effect on Protected areas around the world. But it depends how the development program is implemented. Programs which aim for conservation and protection can significantly benefit the habitat. Works like, protection camps, Anti-poaching camp, accommodation for staffs, Habitat improvement works, Soil and moisture conservation activities contribute positive effect. Details of activities provided to local villagers and source of fund is shown in**Annexure-7.**

But on the other hand, works like, linear infrastructures, unusual tourism activities, infrastructure development and expansion can have negative consequences. But these development activities also if implemented in scientific and environment friendly way, will contribute to positive effect.

5.2.1 AN EVALUATION OF GOVERNMENT AND NON-GOVERNMENT AGENCY PROGRAMMES FOR DEVELOPMENT- IMPLICATIONS FOR THE PA, PEOPLE AND THE ZoI

Most prominent government and non – government activities are Existing roadways, water pipelines, transmission lines, institutional buildings, hotels and resorts of Tourism. It can be mentioned here that, 3 major roads connecting Paratwada to Dharni, Paratwada to semadoh via chikhaldhara, Shahnor to Harisal have some problems. It is found that wildlife are regularly crossing over these roads in search of food and water, but not a single animal passage has been developed. However, some bridges and culverts are seen, which are not friendly to all type of species..

For example, during 17/01/2013 to 03/11/2022, 44 nos. of wildlife were killed due to accident both in buffer and inside Sanctuary, with the road deaths in Paratwada to Dharni road

accounting for 41nos. The details of accident due to road traffic are given in **Annexure-8**. Now there are also occasional demands to convert the road into 4 lane which might aggravate the issue more.

In terms of tourism, it is still in development phase. Presence of regulations under ESZ and Buffer are ensuring no unsustainable tourism is happening around MTR

5.2.2 THE INTERPLAY OF MARKET FORCES AND THEIR IMPACT ON THE SUBSISTENCE ECONOMY OF THE LOCAL PEOPLE

Due to fast growing market forces, mainly due to tourism in case of MTR, there is an impact on the traditional economies of people. However, the MTR administration is taking efforts to ensure smoother transition into this new economy. Financial assistance to local people for home stays, hospitality trainings, Registering new gypsies of locals and starting new tourism routes in buffer areas so that locals are able to earn their livelihood amidst the market forces are being taken up.

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CHAPTER-VI

THE PROPOSED MANAGEMENT VISIONS, GOALS, OBJECTIVES AND PROBLEMS

6.1 VISION

1. The vision of this plan is to see Melghat Tiger Reserve as a nationally important site catering to all ecological functions with a healthy and viable breeding population of Tiger in a large inviolate area.
2. To mainstream wildlife conservation in the Tiger Reserve and its surrounding landscape by creating alternative livelihood opportunities for the communities residing within as well as in the vicinity of the Tiger Reserve.
3. To maintain the integrity & sanctity of the entire core of Melghat TR as a part of Melghat-Satpura landscape to promote the long term conservation of Tiger in particular & wildlife in general through effective exchange of genepool in the landscape.

6.2 MANAGEMENT GOALS

To make the core area a safe haven for a healthy breeding population of the tiger, co-predators and prey species and also minimizing biotic interferences in buffer area to give additional protection to core area and to involve forest dependent communities in protection and conservation activities by creating sustainable alternative livelihood opportunities.

6.3 MANAGEMENT OBJECTIVES

1. To protect and conserve native biodiversity to ensure a viable breeding population of tiger, co-predators and its prey base by creating inviolate habitat and facilitating movement of prey base all over the Tiger Reserve so as to extend home range and number of tigers.

2. To ensure healthy habitat for herbivores especially to maintain a viable population of Sambhar (*Cervus unicolor),* Chital *(Axis axis)* and Indian Gaur (*Bos gaurus*) and to enrich the habitat for wildlife so as to reduce human wildlife conflicts in Zone of influence of Melghat Tiger Reserve.
3. To relocate the remaining villages (8 nos. full & 6 Nos. partial) existing in the core area through voluntary relocation & develop this space into well productive meadows.
4. To protect catchment of Sipna, Gadga, Dolar, Khandu, Khapra, Wan rivers and other associated streams for sustainable conservation of basic life support systems.
5. To promote community based eco-tourism in buffer and adjoining area. (Fostering well organized tourism in the landscape).
6. To enhance professional competency of staff through training, capacity building and welfare measures.
7. To promote, facilitate and strengthen long term and need based scientific research, adoption of state of the art technology and monitoring of animals and their habitat, which will form a strong scientifically based decision support system for the Tiger Reserve management.
8. To address the special needs for long term management of Forest Owlet population and habitat through quality research and consequent implementation of prescriptions.

6.4 PROBLEMS IN ACHIEVING OBJECTIVES

Above objectives are examined against anticipated issues/problems, which may hinder partially or fully achieving objectives. These issues and problems anticipated are given as under.

Problems in achieving objective no. 1:

Biotic pressure

Out of the 33 villages in the core area of Melghat, 8 villages are yet to be relocated. These remaining villages in the core and more than 120 villages in the buffer zone of the Reserve have sizable human population. They depend upon natural resources for their

day to day need like agriculture equipment, food security, minor forest produce,fuel wood etc.on the buffer and core zone. The increasing population is putting more and more pressure on resources, causing degradation of forest and habitat.

Poaching

The villages in the vicinity of Melghat Tiger Reserve are tribal dominated and the villagers resort to hunting for subsistence often. The tribals had a traditional practice of hunting during Holi, where they enter the reserve with weapons for hunting of wild animals. At present the customary practice of hunting has considerably reduced due to protection efforts of Forest Department. However, the sporadic hunting / poaching incidences continue to be reported from different parts of the Tiger Reserve. The details of the poaching cases has been discussed in chapter-4.

NTFP Collection

Although there is ban on removal of forest produce from PAs, still illegal collection of NTFP like 'SafedMusli', 'Hirda', 'Amla', 'Baheda', 'Maida Lakdi', 'Lac', 'Charoli' and Gum etc.& Medicinal plants is carried out by the local tribal inhabitants. The major threat is due to over and destructive collection which is degrading the habitat and causing disturbance to wildlife. Removal of fuel wood often involves lopping/cutting down of trees. This destructive harvest has resulted in decline of these trees in the buffer area of the Tiger Reserve. The villagers from the core & buffer area venture into the core area for collection of NTFP, fishing and hunting activities. Further the villages close to the core area also need to be relocated to reduce pressure on the core area especially in the North and North-Eastern part of the core.

Problems in achieving objective no. 2:

Limited meadows

Though plenty of grass is available in the open forest and meadows, the meadows are just about **2%**of the geographical area of the Tiger Reserve. Currently, meadows are being developed in the relocated site to augment the herbivore population. This low proportion of meadows is one of the strong limiting factors for increasing prey base for

sustaining tiger population as per the carrying capacity calculated for the Tiger Reserve. The meadows are also being invaded by woody growth and obnoxious weed species, which reduces overall palatability of grass species.

Grazing

Grazing is a major issue in Melghat. Communities like Gawlis rear lot of unproductive cattle, left for grazing inside the reserve. Cattle population of the villages in the buffer zone surrounding the core is very high, which pose a serious problem of grazing, resulting in disturbance to wildlife, invasion of weeds and destruction of habitat on the fringes of the core. Sometimes, cattle from nearest Madhya Pradesh bordering area also trespass into the reserve area along with the local cattle herd. Domesticated dogs often accompany the graziers into the core area are known to indulge in hunting of wild animals. The dogs also pose threats to the wild animals as a carrier of many diseases along with cattle.

Problems in achieving objective no. 3:

Presence of Village in the core area:

Currently, there are 8 villages yet to be relocated and in 6 villages relocation process is on.

Right of passage.

The villagers in the core area have right of passage for which roads are being connected. This has disturbed the inviolate space for the wild animals in the core area mostly in the Sipna WL division. Sometimes the villagers indulged in hunting and poaching activities in the pretext of their right of passage. Two state highways SH-305 (Paratwada-Chikaldhara-Semadoh) and SH-292 (Dharni-Susarda-Dhulghat-Khatkali) also runs through the heart of the core area of the reserve which has some disturbance for that area.

Problems in achieving objective no. 5:

Tiger centric attitude towards tourism

Tourism in tiger reserve is tiger centric which needs to be shifted to a landscape centric, all biodiversity tourism.

Problems in achieving Objective No. 6:

Working stress and occupational hazards related to working in forests also minimizes the work output of staff. Issues in implementation of prescribed human resource development plan poses hindrance in achieving desired objective.

Problems in achieving Objective No. 7:

Insufficient infrastructures.

Lack of proper laboratory facilities and trained man power is a limiting factor for conducting in-house research and monitoring activities. Annual Research Seminars and Workshops must be organized to foster scientific work and temper in the landscape.

Insufficient database.

Need to have sound Decision Support System (DSS) on wildlife management.

Problems in achieving Objective No. 8:

Illicit felling:

The forest owlet generally nest in burrow of Teak tree which is prone to be felled illegally. Due to indiscriminate felling of teak sometimes the nests are damaged affecting the population of the owlet in a great manner.

Habitat degradation:

Due to rapid decline of habitat quality & change in micro habitat for forest owlet the population are in threat. Research shows that, forest owlet require forest area along with meadows or

agriculture field as part of its ecology. Due use of chemical fertilizer & pesticide the habitat of the forest owlet are shrinking day by day.

Socio economic Condition of the Fringe villages

Poor socio-economic condition of the local people is a major problem for all kinds of disturbances to the biodiversity. For basic needs, the people in the reserve depend on the forest resulting in loss of biodiversity.

6.4STRENGTH-WEAKNESSES-OPPORTUNITIES-THREATS (SWOT) ANALYSES

6.4.1. STRENGTH:

1. **Contiguity of Forests:**

The reserve forests form an important corridor between forest areas of Madhya Pradesh and Maharashtra ensuring contiguity of forests in Satpuras. It beholds one of the viable population of tigers. The tiger distribution in Melghat is contiguous with the population in M.P. forming a Meta population with the Satpuda Tiger Reserve, as the other source population. This is an important tiger country in Central Indian Landscape.

2. Vegetation:

Tectona grandis is the most dominant species in this area. It surpasses all other component species. It is mixed in various proportions with other species. These provide a good shelter and varied source of food to wildlife in all seasons. Bamboo is widespread in the reserve and is often gregarious on hill slopes and in valleys. Bamboo had gregariously flowered in the year 2000. The green leaves as well as tender shoots of bamboo are relished by all the herbivores including Langurs and wild boars. Besides Bamboo, there are 98 grass species identified in the area which mainly occur on the flat top hills and are locally called as “Balla”. The major grass association which dominate the forest floor growth include *Heteropogon contortus/ Heteropogon ritchie, Apludamutica, Schimasulcatum, Schimanervosum, Sorghum sericeum, Centro versum, Themedaquadrivalvis/ Pseudanthis tirialispida* etc. Other grasses which occur is such associations include*Brichiariaracemosa, Hachelochloa granularis, Panicumtripheron*

etc. Depending upon the habitat, certain taxa like *Heteropogon ritchie*, *Spodiopogon rhizophorus*, *Themeda qudrivalvis*, *Sorghum controversum*, shows almost pure patches of growth (above 90%) in local areas of the reserve. *Heteropogon ritchie*, thought to be a rare grass is abundant in the reserve. It is much relished by gaurs.

3. Water Sources:

Water is not a limiting factor for wildlife in MTR. However, wildlife is concentrated around water holes in summer. The Area is well drained by many rivers. Most of the rivers are seasonal and water remains there till February only. The tract has five major drainage systems viz. Khandu, Khapra, Sipna, Gadgaand Dolar. These rivers contribute as the important tributaries of Tapi river which is a perennial river and flows along the Western boundary of the reserve between Kund and Rangubeli for about 6 kms. Some of the depressions in river beds have accumulated water at places locally called as 'dohs'. There are small number of springs which are of perennial nature. Such pools and springs are very important for wild animals and live stock in the area. Water pools in such nullah beds and depressions are supplemented by 15 anicuts at strategic places. Few artificial water bodies like tanks near Tarubanda, Kesarpur, Gullarghat, Malur, Chaurakund, Mehriaam, Chunkhadi, and Ruipathar are significant additions to surface water source because of their close vicinity to habitation. Absence of large surface water bodies has avoided faunal congregations and consequent damage to habitat.

4. Inviolate Area:

There were total 33 villages in core area of MTR where 19 have been relocated and 6 are still in process, while 8 villages are yet to be rehabilitated. The majority of the villagers are willing to be relocated. The area vacated by the rehabilitated villages has become an important tiger habitat now, which demonstrates how tiger acquires new territories with low disturbance.

5. Landscape level connectivity

Melghat act as a connective link between Melghat & Stapura TR of Madhya Pradesh for interstate dispersal of Tiger which facilitate genepool intermixing thereby promoting long-term viable population of tiger in that landscape.

6.4.2 WEAKNESSES:

(i) There are 39 villages in the buffer area under MTR control of the reserve and 8 full village are within the core area of the reserve. These villages have great direct and indirect biotic influence on Melghat Tiger Reserve.

(ii) The northern boundary of Melghat Tiger Reserve runs with Madhya Pradesh State boundary which is mostly devoid of forest cover. This being a long porous boundary, the pressure of poaching and illicit cutting is always on Melghat Tiger Reserve from the M.P. villages.

(iii) Though, there are only two highways but numerous trails exist making more number of entry points. Presently there are 22 entry points namely Semadoh, Harisal, Gullarghat, Domi, Rajapatha, Jarida, Panchdongari, Rangubeli, Kutanga, Memna, Chikhaldara, Khongada, Vairat, Sawariya, Khatkali, Dolar, Shahanur, Zari, Kanjoli, Amona, Wasali, Semba. Such large number of entry points pose difficulty in controlling intruders due to staff limitations.

(iv) Passing of two state highways SH-292& SH 305viz Amravati-Paratwada–Dharni-Burhanpur-Indore and Harisal-Akot also poses threat to the movement of wildlife. Afew accidental deaths and injuries to wild animals by vehicles have been reported on these roads.

(v) Heavy pressure of employment generation for the local people, especially during summer period and throughout the year under MGNREGA and other schemes. To implement MGNREGA scheme, there is staff shortage.

(vi) The hilly and rugged topography of region poses constraints in accessibility of the area. This is more pronounced in monsoon and fire season.

6.4.3. OPPORTUNITIES:

i) The shifting of villages outside the core area will create inviolate space for wild animals and the village site will form meadows which in turn will increase population of herbivores and tigers. Therefore, the potential is very good.

ii) The area from West Melghat and East Melghat Division notified as buffer and made in to an exclusive wildlife division of Melghat Tiger Reserve will further strengthen the wildlife conservation in and outside area.

iii) The increase in tourism will give more employment to adjoining villages in the form of tourist guides, home stays etc. This will become a tool for conservation and protection.

iv) Melghat Tiger Conservation Foundation helps in better protection and management of MTR.

v) Cooperation of established and budding NGOs involved in wildlife conservation is readily available. These linkages are likely to be enhanced in future due to increase awareness and publicity.

6.4.4. THREATS:

Major threats to the area and its resources in the Reserve are as follows-

i) Encroachments for agricultural purposes on wildlife habitats and forest lands by local people on the pretext of FRA.

ii) Illicit cutting of trees for local needs and commercial purposes.

iii) Illegal grazing by local /migratory cattle and other biotic pressures.

iv) Poaching and hunting of wild animals for local as well as commercial purposes.

v) Fires, mostly man made for Mahua /Tendu / local poaching and to scare away the wildlife hamper regeneration of trees.

vi) Illegal removal of non-timber forest produce and valuable medicinal plants.

vii) Illegal traffic of timber, forest produce, wildlife and its products, thanks to long

porous border with M.P.

viii) Local customs, which come in conflict with conservation.

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CHAPTER-7

MANAGEMENTSTRATEGIES

7.1 DELINEATION OF CRITICAL TIGER HABITATS AND INVIOLATE AREAS

Bio-geographic approach for conservation of wildlife and biodiversity (that significant representation of all ecosystem and bio-geographic regions, biomes etc. in the protected area network) is essential. The main cause of decline of the tiger and other endangered fauna in human dominated landscape is competition and conflict with the growing human population and the demand of modern market driven lifestyles as well as the dominance of livestock in the traditional agrarian society of India. The land use pattern is incompatible between man and wildlife, as high density of both adversely affects either way.

The conservation of the flagship species i.e. the top predator of our eco-system ultimately conserves our entire eco-system and biodiversity.

Tiger is a territorial animal, which advertises its presence in an area and maintains a territory. There may be a partial overlap of the territories of two male tigers. However, increase in the degree of overlap may result in infighting. Several female territories do occur in an overlapping manner within the territory of a male tiger.

The tiger land tenure dynamics ensures presence of prime adults in a habitat, which act as source populations, being periodically replaced during old age by young adults from nearby forest areas.

The on-going study (Tiger , its co predator, prey base and their habitat by NTCA and WII) and analysis of available research data on tiger ecology indicate that the minimum population of tigresses in breeding age, which are needed to maintain a viable population of **80-100** tigers (in and around core areas) require an inviolate space of **800 -1200 sq km**. Tiger being an “umbrella species”, this will also ensure viable populations of other wild animals (co-predators, prey) and forest, thereby ensuring the ecological viability of the entire area / habitat.

Based on the demographic parameters and life history traits of tigers population simulation models suggest that if a core area having territories of 20 breeding tigresses were made inviolate, the resultant tiger population with an adequate buffer (multiple use area with eco-sensitive land use) has a very low probability of extinction.

Tigress's territories are determined by prey availability which in turn is dependent on the productivity of the area. The size of this inviolate area depends on the average territory size of tigresses. These range between 40 to 60 km2 within most of the tiger areas in the sub-continent. Thus, for a population of 20 breeding tigresses we need an inviolate area of 800-1200 km2. An ecological sensitive zone of 1000-3000 km2 (buffer, Co-existence area, multiple use area) around this inviolate space is needed for sustenance of dispersal age tigers, surplus breeding age tigers and old displaced tigers. This buffer and the tiger population within it is essential to make the core of 20 breeding females viable for long term, since it sustains the dynamics of source and sink. Such a tiger reserve will sustain a population of 75-100 tigers.

Delineation of Critical Tiger Habitat and inviolate areas in Melghat Tiger Reserve.

Melghat Tiger Reserve consist an area of 2757.97 Sq.km. The Tiger Reserve has been clearly demarcated into core and buffer areas. An area of 1500.49 Sq. km. is declared as Core area or Critical Tiger Habitat as per the Notification No.WLP-10-07/CR-297/F1 Mantralaya, Mumbai, Dated 27th December 2007 of Govt. of Maharashtra. The details of breakup of the critical Tiger habitat or Core area of MTR is already discussed in Chapter-1 vide **Table-1(c) & Table-1(d).**

7.1.1 Appropriateness and adequacy or Inadequacy of Current Core

1500.49 sq. km. area, the core area of Melghat Tiger Reserve has been declared as Critical Tiger Habitat. The Critical Tiger Habitat have been determined as per recommendation of the expert committee constituted for the purpose by the State Government as per the guidelines issued by NTCA as well as provisions under Section 38V of Wildlife Protection Act, 1972. The core area of the Melghat Tiger Reserve is delineated by combining the area of 4 wildlife sanctuaries (Narnala, Wan, Ambabarwa, Melghat) & 1 National park (Gugamal). This provides more inviolate habitat to tiger. It is obvious that the present legal boundary of the Tiger Reserve does not serve as ecological boundary for many species of fauna. To and fro

movement from the adjoining forest areas although not frequent, but reported often. Connectivity is one of the critical factors for Melghat as regards future conservation of tiger and other mega mammals are concerned.

7.2 ZONE AND THEME APPROACHES TO MANAGEMENT STRATEGIES

The "zone" and "theme" approaches have been adopted in the proposed management strategies of Melghat Tiger Reserve. A Zone, is an area of specific management category distinguishable on account of its objectives. The number and kind of zones required, depends on objectives and how different the objectives are with respect to each other, so as to necessitate separation of strategies by areas. Zones, cannot be planned in isolation, but must relate realistically to the surrounding areas of other zones and where relevant, to areas outside the PA. Using the GIS technology, all the zones have been worked out considering vegetation, physiography and Park administrative infrastructure boundaries. Various managerial situations and needs can be taken care of by an effective combination of the "zone" and "theme" plans. Under this approach, several specific objectives and problems relevant to an identified part of the PA can be recognised as a "management zone". This management zone would have its own measures and strategies. Furthermore, several objectives and different problems, created by a combination of factors, can be tackled by a "theme strategy" under which measures can be prescribed for the entire area.

7.2.1 ZONE PLANS

The Core area is divided into the following zones.

1. Biodiversity Enrichment Zone
2. Unique Habitats Management Zone
3. Voluntary Relocation Zone
4. Eco-tourism and Interpretation Zone.

7.2.1.1 BIODIVERSITY ENRICHMENT ZONE (need to demarcate)

Melghat has long history of heavily worked forest block especially removal of large volume of teak and replanted with monoculture based teak in all the worked compartment. The productive and accessible areas of Melghat are mostly visible with luxuriant

monoculture teak plantation which are from wildlife management point of view . not much significant.

A study done in the Anamalai TR (Harikrishnan, 2012) suggests that succession is arrested in mature teak stand. The studies shows that there was no significant change in tree species (>20 cm gbh) richness, density and composition. Seedling and sapling species richness decreased rapidly with increasing distance from the edge and then remained constant when the centre of the plantation was approached. Therefore, native tree species had little success in penetrating and establishing in the plantations. Therefore, the anticipated gain of improved habitats for wild flora and fauna because of the abandonment of plantation forestry practices is marginal. In their present state these teak plantations add little value in supporting, let alone increasing, the prey and predator population of Melghat TR.

Constitution:

The area under teak monoculture plantation will be taken up for biodiversity enrichment.

Objective:

The forestry operations in teak plantations inside the PAs were abandoned with the premise, that the native forest species would replace teak and the original tree diversity would be restored over time. The anticipated gain of this measure was improvement of the habitat for wild flora and fauna.

Strategies:

- Biodiversity enrichment measures like enrichment planting with Bamboo, Ficus and other Misc spp. by thinning of the teak trees shall be carried out on experimental basis and experimental plots will be created for this purpose. Based on the results further course of action shall be decided.
- Many a times, illicitly felled timber is seized in core . According to Supreme court order dated 14.02.2000, there is a complete restriction on removal of dead, diseased, dying or wind fallen trees, drift wood and grasses, etc from any National Park or Wildlife Sanctuary. And owing to this, even the seized timber are left unattended in the protected area without any action being taken. Such timber can be used for core activities related to protection like

construction of watch towers, machans, protection camp etc within the boundaries of the protected areas, thus not in violation of Supreme court order.

- Some times massive wind fall of trees have also been observed (eg In the monsoon of 2022 in Dakhna range of Gugamal Wildlife Division, around 3000 trees were found fallen due to heavy winds on hilly areas. Similar such instance had been witnessed in 2011 at Semadoh range of Sipna division, along the Harisal-Semadoh road). In such cases, too these materials can be used for core activities related to protection like construction of watch towers, machans, protection camp etc within the boundaries of the protected areas, thus not in violation of Supreme court order.
- A periodic monitoring of the sites where prescribed actions are carried out needs to be done to see if intended biodiversity enrichment is happening or not.

7.2.1.3 UNIQUEHABITATSMANAGEMENTZONE

Constitution:

The Melghat Tiger Reserve is a land of Rugged terrain with lots of unique habitats in the Satpuda Maikal Range. In the Melghat Tiger Reserve, the highest point is Vairatwhichis1178 meter from MSL. The vast difference in elevation is also reflected in extreme weather /climatic conditions. Owing to these marked differences in climate, the habitat also varies in great scales.

(a) Ballas:

In Melghat, one of the unique habitats is ‘balla’ i.e. open grasslands on plateaus where herbivores generally move during monsoon and winters. These areas are identified and protection camps are established for patrolling and conservation of biodiversity of these areas. Ballas are to be completely protected from fire, weeds and grazing.

(b) Doh:

Another unique habitat in Melghat is ‘doh’ where the pool of water stagnates along

the rivers. Dohs are perennial source of water for wildlife during pinch period. Because of presence of moisture in these patches, green grasses are available in summer and herbivores tend to move in these areas. The 'doh' areas are identified and regular de-siltation activities are done to increase the availability of water. Protection camps are also established in these areas for effective protection and conservation of the unique habitat. Dohs are to be monitored for water quality and prevention of poisoning using pH meter or litmus paper etc.if any for fishing by the locals.

(c) Riparian vegetation:

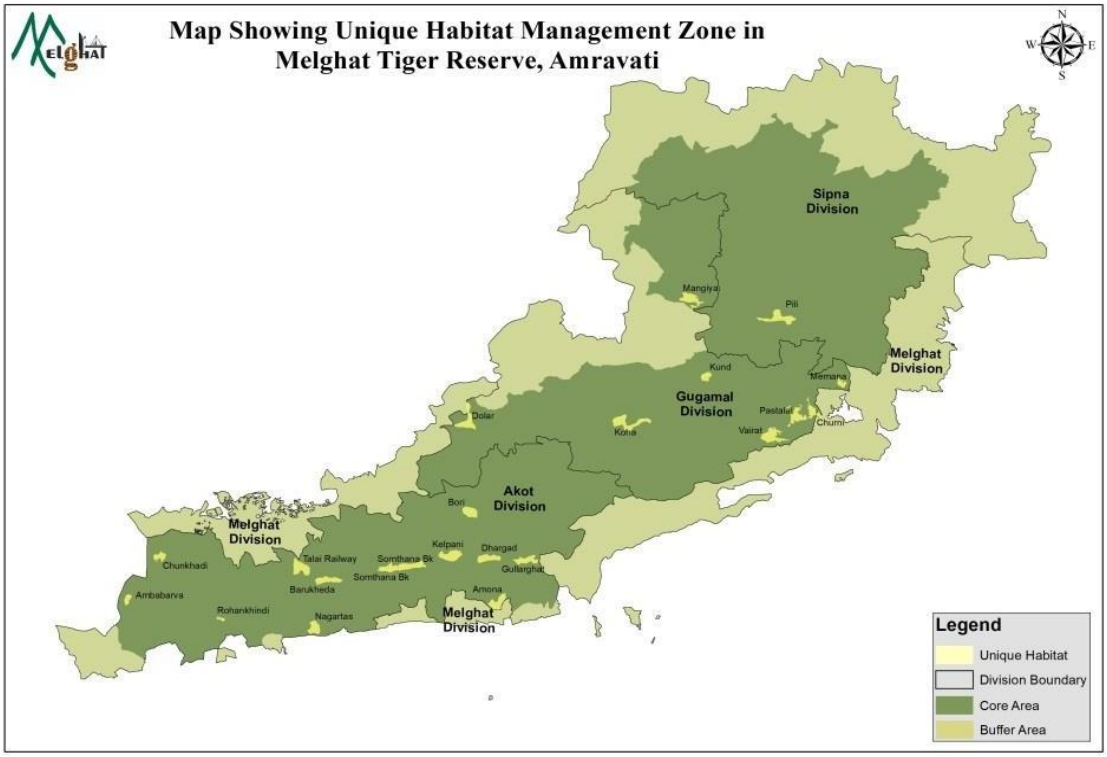
The riparian ecosystem is considered as a functionally dominant component of a terrestrial landscape (Tabacchi et al., 1998). Riparian zones have been reported as some of the most species-rich and most productive systems (Malanson, 1993). Riparian forests have unique vegetation and species diversity (Bachan, 2010). Riparian zones help to maintain the continuity of the forests and act as a corridor for the migration of many animal groups.

As the riparian ecosystems are much sensitive to human influence and are mainly degraded by human disturbances (NRC, 1992), they are considered as a potentially threatened ecosystem (Malanson, 1993). There are few unique riparian vegetation patches either on the narrow valleys which are hotspots of diversity, viz., chikhlam, kolaam, amrai, etc. These riparian areas are prone to erosion, weed infestation, and grazing. These sites are specifically protected by providing protection camps within 2 km.

(d) Meadows:

The relocated village sites are mostly in the valley and all of them are unique habitats that presents on opportunity to be developed as a meadows in which meadow management is being done scientifically.

Map-7(a): Showing unique habitat Zone of Melghat TR



Objective:

To Protect & conserve the unique habitat like Ballas, Doh, Riparian & meadows as it is carrying unique ecological significance in maintaining the biodiversity of the landscape through providing critical life sustaining services like food, water & cover for the wildlife.

7.2.1.2 VOLUNTARYRELOCATIONZONE

Inviolate area is necessary in order to increase the breeding population of tigers. In the core area of Melghat Tiger Reserve (MTR), there were 33 villages. These 33 villages exerted a lot of pressure on the natural resources of the Reserve for domestic as well as livelihood needs. The 33 villages are distributed in all three divisions of Melghat. These communities inside the core area occupy the valley regions of Melghat, which are otherwise prime habitat for wild animals.

Hence, the relocation of these villages is important. In Melghat Tiger Reserve till 2022-23, 19 villages have been relocated based on the guidelines of the National Tiger Conservation Authority and the Government of Maharashtra issued from time to time.

Constitution:

This zone consisting the area of the remaining 8 villages namely Retyakheda, Semadoh, Madizadap, Makhala, Raypur, Boratyakheda, Dhakana, Adhav.

Objective:

The prime objective to eliminate the human disturbance from the core area with an objective to expand the inviolate area safe for Tiger breeding and conducive for the other wildlife.

Strategies:

- **For Relocation**
    - It is advisable to start relocation after at least 70% of the eligible families are willing to relocate (definition of family as per 3.11.2012 Rehabilitation GR of Maharashtra and subsequent modifications if any).
    - Ensure that all rights under The Recognition of Forest rights act, 2006 has been recognized. Ensure that no rights are pending at sub divisional, district or divisional level.
    - Now DCF can request Divisional commissioner to issue notification as per section 11 under Maharashtra Project Affected Persons Rehabilitation act 1999. This date becomes important to identify beneficiaries and estimate valuation of immovable properties.
    - An attested copy of records such as Form 8A, D1 register & ration card, Election Voter list, Dakal karij register of schools need to be kept with Forest department to identify the beneficiaries and prevent fake claims. Identified beneficiaries list need to be certified by District Rehabilitation committee constituted as per 3.11.2012 Rehabilitation GR of Maharashtra.
    - Survey of whole village for properties like house, farm land, fruit trees, and any other immovable property attached with land needs to be done in presence of beneficiary and concerned agency. Photographic and drone recordings of these properties need to be kept with forest department for evaluation purposes at a later stage. Also RFO and ACF attested panchnamas during the surveys of immovable property need to be kept to prevent later stage frivolous claims.
    - Valuations as per sec 26 to 30 of RFC-LARR act 2013 needs to be certified by District Rehabilitation committee constituted as per 3.11.2012 Rehabilitation GR of Maharashtra.
    - Actual relocation of villagers should not be started until sufficient funds are available with the division. (Incase of Option I)

- In case of Option 2, in addition to funds, District Rehabilitation Committee (constituted as per 3.11.2012 Rehabilitation GR of Maharashtra) needs to prepare a proper village resettlement plan with focus on identification of lands, provisioning of facilities and convergence of government schemes. Relocation should be started after this. In option 2, there are also issues when people are settled down in new lands. If the land where people are being settled is a agricultural land, it must be ensured that the land is converted into Non Agricultural (NA) land by SDO based on the maps certified by Town planning authority. Incase of non agricultural lands like (E class, F class etc), ensure that the lands are allotted through the District Collector.

- **Strategies in areas partially relocated**
  - It is observed that villagers tend to illicitly fell trees during the process of relocation, to build temporary homes (for getting house evaluation), to take logs along with them while moving out of forests etc. So need to have a special focus on compartments around such areas and regular beat inspection needs to be done.
  - For lands from which people have been relocated, need to get 'taba pavti' from the revenue department and also ensure that the land ownership needs to be mutated in favour of Forest department through SDO (in 7/12 record). (It is advisable to release 50% of the sanctioned agriculture valuation only after the mutation procedure is complete and there is no other encumbrances like bank loan payments). Immediately after that, section 4 proposal on the land needs to be sent to government to initiate RF declaration process.
  - Ensure that no new encroachments are being done by the villagers who are yet to be relocated on such lands.
  - Devise a strategy to ensure the cattle are also taken by the people when they move out of their lands to reduce the intended objective of relocation (reducing grazing pressure)

- **Post Relocation strategies in areas which are relocated**
  - The area will be left blank and maintained as a meadow. Ensure that woodland succession doesn't take place in these meadows. If the identified meadow areas have pole crops invading, ensure that barring few fruit bearing and shade species, the other needs to be removed to ensure the objective of relocation and creating habitat mosaics for wildlife.
  - Non fodder species and fruit bearing species will be suitably pruned to achieve wildlife management objectives.

- Parallely, efforts need to be taken to remove invasive species from these meadows. For these following strategies need to be taken
    - Most of the meadows (erstwhile villages) are in the basin(lower elevations) which are surrounded by hilly areas on all sides. Most of the invasives like Ran tulas (Hyptis suaveolens), Rai munia (Lantana camara), Ran modi (Eupatorium sps), Gokhru, are present both in meadows and in these hilly areas. Due to fund shortages and improper planning, Invasive species are removed in the meadows only, leaving the hilly areas untreated. As a result, the seeds of these species on the hilly areas are washed into the meadows during the rainy season, defeating the purpose. So parallel to invasive removal in meadows, adjoining hill slopes need to be treated for effective invasive control.
    - In meadows, invasive species removal need to be started after onset of monsoons (as removal is easier on wet lands). It is better to start with Lantana removal (as hyptis takes some time to be visible in the meadows). Once Hyptis becomes visible its removal should be started by second week of August and completed before October first week (objective is to remove even before seed sets in the plant). As removal shifts to next area, palatable seeds/ rhizomes of palatable grasses and leguminous plants should be broadcasted in the treated areas. For this, it is important to maintain seed plots in meadows from which seeds can be collected during November-January.
    - For species like Dinanath (Pennisetum pedicellatum), the grass is not visible unless it flowers, but by the time one completes the removal works, the seeds have already fallen in the meadows. So the strategy should be to identify such patches in the present year, take the polygon and work those areas during the next year.
    - There are also native species which dominate and spread profusely (become a weed) and are also unpalatable. This includes Ran jowari (Sorghum sps), Karvi (Strobilanthes callosus), For Ran jowari and Karvi, weed removal should be completed before flowering (October). But for Karvi (found in Gugamal), a strip can be maintained around meadow areas and as it remain evergreen and acts as a fire barrier.
    - Also on meadows, habitat mosaics can also be tried – in a meadow area, majority of the grasses can be maintained by cutting while some patches can be burnt to see how the grasses respond. However in areas of potential forest owlet locations burning must not be practised as the prey of the owlet is on these meadows.

- Water conservation measures can be taken up in meadows with the objective on – no siltation in existing water bodies near meadows and providing sufficient water resource for wildlife residing in the meadows

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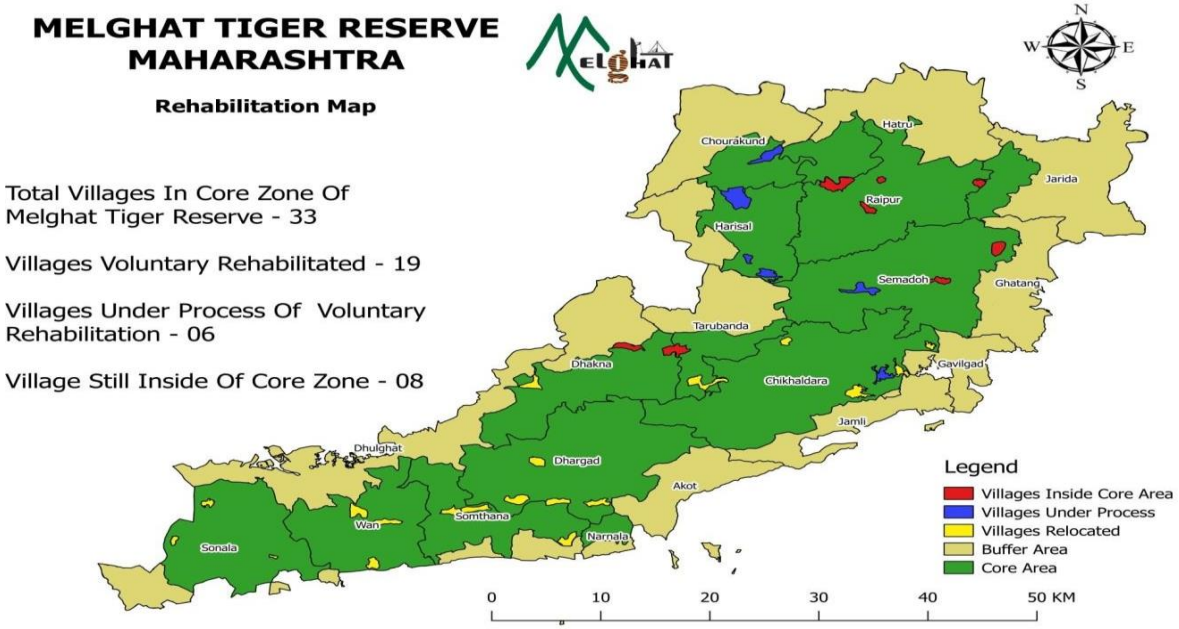


Map-7(b): Showing Voluntary relocation Zone

7.2.1.5 ECO-TOURISMANDINTERPRETATIONZONE.

The Ecotourism plan of Melghat Tiger Reserve laid down a detailed set of framework based on the following guidelines:

i. The revised guidelines issued by the National Tiger Conservation Authority, Ministry of Environment & Forest, Govt. of India, New Delhi vide its letter No. 15-31/2012-NTCA dated15/10/2012, issued in accordance with the decision given by the Honourable Supreme Courtin special leave to Appeal Civil suitNo.21339/2011dated16/10/2012.

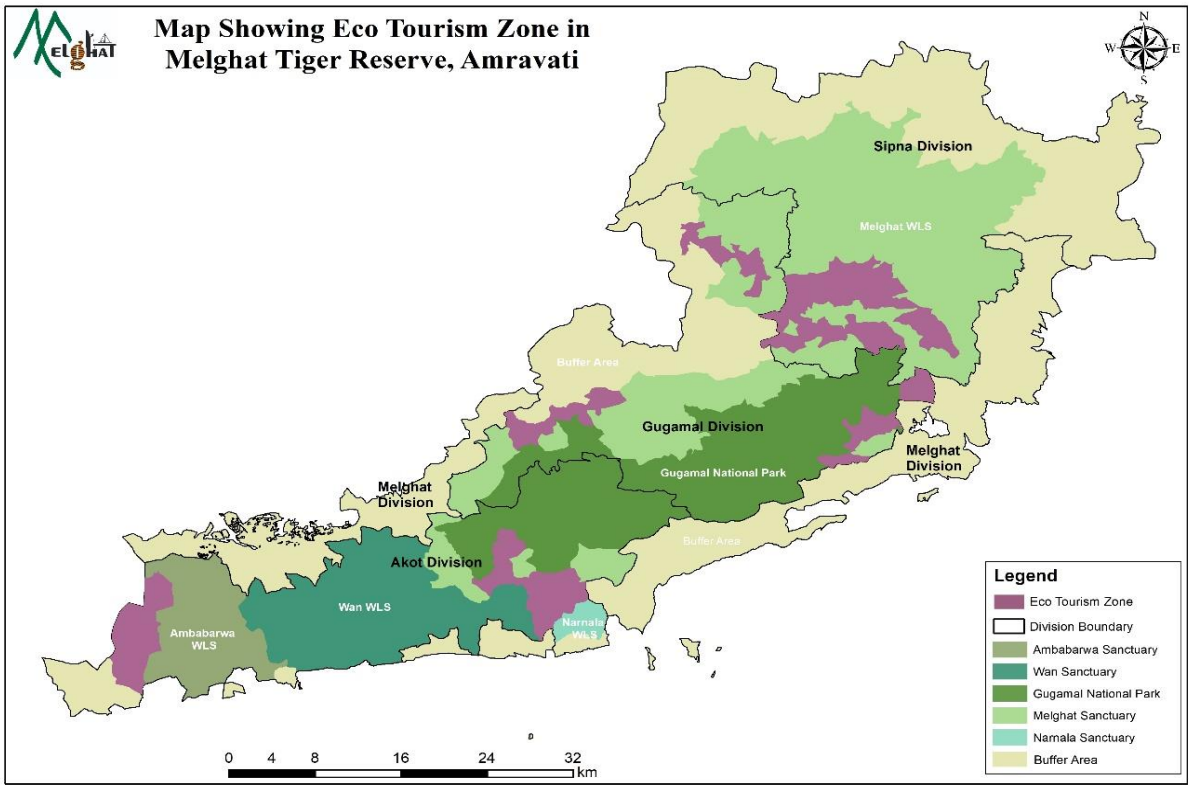
ii. The revised Eco–Tourism Policy declared by the Govt. of Maharashtra vide its Resolution No. WLP -2012/C.N. 309/F-1, Mantralaya, Mumbai, Revenue & Forest Department, dated09/11/2012.

Constitution:

Melghat Tiger Reserve has 2757.06 sq. km. area of which 1500.49 sq.k m is critical tiger habitat area (core area). The proposed area under eco-tourism is190.03sq.km. which is12.66 % of total core area of MTR. The details Ecotourism Plan of Melghat Tiger Reserve is discussed in Chapter No.9 of this Plan.

Table-7(a): Area details of Ecotourism Zone of Melghat TR

Abstract			
Name of Tourism zone	**Forest Area in Core in Ha.**	**Non Forest in Core in Ha.**	**Total in Ha.**
Semadoh-Harisal	10347.17	136.23	10483.4
Narnala	795.97	0.00	795.97
Ambabarwa	1893.37	49.03	1942.40
Wan-Dhargad-Gullarghat	3669.77	233.13	3902.90
Chikhaldara	1587.15	291.45	1878.60
Grand Total	**18293.43**	**709.84**	**19003.27**
			Say 190 Sq. Km.



Map-7(c): Ecotourism Zone of Melghat TR

Objectives:

- Highlight the heritage value of India's wilderness, especially the tiger, as an indicator of biodiversity of protected areas.
- Build environment and cultural awareness and respect for nature and culture.
- Facilitate the sustainability of ecotourism enterprises and activities.
- Provide livelihood opportunities to local communities and benefit sharing.
- Use indigenously produced and ecologically sustainable materials for tourism activities.
- Tiger conservation in ecologically sensitive Central Indian landscapes.
- Capacity building of local communities in planning, providing, and managing ecotourism facilities.
- Conservation, education, and training.
- Proper monitoring and evaluation of the impact of ecotourism in the protected areas

from time to time, through the Local Advisory committee as constituted by the State Govt.

Strategies:

The details of strategies for Ecotourism Zone of MTR arecomprehensively discussedinChapter-9 of this Plan.

7.2.2 THEME PLANS

The goal of the plan is to restore, maintain and enhance the biodiversity, habitat and conservation value of the Reserve so as to ensure perpetuation of the tiger as flagship species. This can be ensured through a multifaceted approach to the complexity of the problems noticed at the time of management. Theme plans include the activities those are common to more than one zone. They are:

1. Protection (Security Plan)
2. Fire Protection
3. Theme Plan for Wildlife Health Surveillance
4. Theme Plan for Management of Avifauna and other lesser fauna
5. Conflict Management
6. Theme plan for Lantana removal

7.2.2.1 THEME FOR PROTECTION (SECURITY PLAN)

The theme plan for protection (Security Plan) will be for the entire Melghat Tiger Reserve over 2757.97sq km (both core and buffer area).

The protection is one of the most important activities in the biodiversity conservation of the Reserve. It lays stress on defence against interference, damage or destruction of any kind by the human beings and the cattle including illicit felling, grazing, NTFP collection, poaching, encroachment and fire etc. However, the following factors militate against efforts of Park management in ensuring protection:

1. The Park is surrounded by large number of human habitations both inside & outside the park.
2. The poverty and unemployment in the fringe areas coupled with the demand for the forest and wild animal products exerts a considerable pressure on the Park.
3. Inadequacy of skilled manpower resources.
4. Inadequate intelligence network for providing timely information about impending activities.
5. Difficulty in detection and prosecution of cases.
6. General lack of education, awareness, understanding and support from the fringe communities.
7. Hunting by tribal.
8. Difficult terrain and connectivity.

Objectives

1) To maintain and conserve bio diversity by providing efficient protection
2) To maintain and conserve viable population of tiger and its prey species
3) To check illegal harvesting of NTFP and fuel wood
4) To check biotic pressure
5) To enhance capacity building of staff
6) To provide infrastructure for protection
7) To provide efficient monitoring system.

Problems in achieving the objectives

1. Inadequate staff and infrastructure.
2. Patrolling is difficult in monsoon
3. Destructive and illegal collection of NTFP

4. Inadequate coordination and cooperation with other law enforcement agencies and administration
5. Inadequate arms and ammunitions.
6. Lack of special training for combing and scientific patrolling.

Strategy

The overall patrolling strategy of the Tiger Reserve includes the following features:

- Staff / camps listed with duty allocation and route chart
- The teams are equipped with mobile wireless sets and firearms
- The patrolling teams systematically cover the One Sq.km. grid area allotted in different Beats.
- Special instructions/ provisions for squads
- Surveillance: hotels, tourist points, vehicles, bus stand, trains and other means of transportation on the fringe of the park and nearby towns.
- Surveillance of traditional hunters
- Coordination with local police
- Sanctioning Protection Assistants for patrolling
- Improving Communication Networking
- Preparation of daily schedule
- Regular checking of market
- Surprise checking of barriers
- Preparation of "crime maps" with periodic updating with update in Beat information System.
- Monitoring cattle kill, human kill, injury incidences and crop raiding
- Monitoring issues relating to compensation
- Monitoring water points near habitation
- Preparation of crime gang dossiers at range level
- Preparation of individual crime dossiers
- Monitoring of habitual offenders

- Preparation of monthly Crime Map on 1:50,000 scale indicating location of each crime with date.
- Conveying progress to Field Director/ Dy. Director on a daily basis through wireless
- Deviating from routine schedule during emergencies
- Taking note of offences registered in local police station
- Using tape recorder/ camera etc. to record evidences
- Special monitoring of water holes near human habitation during the pinch period
- Surveillance of half eaten carcasses of livestock on account of carnivore depredation to be carried out to eliminate the possibilities of poisoning for retaliatory killing by local people.
- Continuous monitoring of the area where more than three incidents of livestock depredation are reported within a fortnight.
- Village level crime register to be maintained at the EDCs level to keep track of villagers involved in wildlife offences.
- Maintaining list of vehicles passing through manned barrier and surprise check by senior officer at such point every month.

Administrative Units

The Melghat Tiger Reserve has been reorganized into 4 separate wildlife Divisions namely Sipna WL Division, Akot WL Division, Gugamal WL Division and Melghat WL Division which are managed by independent DCF. All these Divisions are under the overall control of the Field Director, Melghat Tiger Reserve, Amravati. The respective DCF of Tiger Reserve looks after protection and management of the entire Tiger Reserve area i.e 2757.97 Sq. Km. The area statement thus comes as below:

Table-7(b): Area statement of MTR

Sl. No.	Name of the Division	Area in ha.		
		Core	Buffer	Total
1	Sipna Wildlife Division, Paratwada	48407.6	35502.1	83909.7
2	Gugamal Wildlife Division, Chikhaldara	46640.7	17354.1	63994.8
3	Akot Wildlife Division, Akot	55002.2	26190	81192.2
4	Melghat Wildlife Division, Paratwada	0	46700.9	46700.9

5	**Total (Melghat TR)**	**150050**	**125747**	**275798**

The other administrative units having jurisdiction over Melghat Tiger Reserve have been detailed below.

Table No-7-(c): administrative units of Melghat Tiger Reserve

Division	**Range**	**Round**	**Beat**
Sipna Wildlife Division, Paratwada	5	31	96
Gugamal Wildlife Division, Chikhaldara	4	18	67
Akot Wildlife Division, Akot	5	19	71
Melghat Wildlife Division, Paratwada	5	16	53
Total (Melghat TR)	19	84	287

Anti-poaching camps

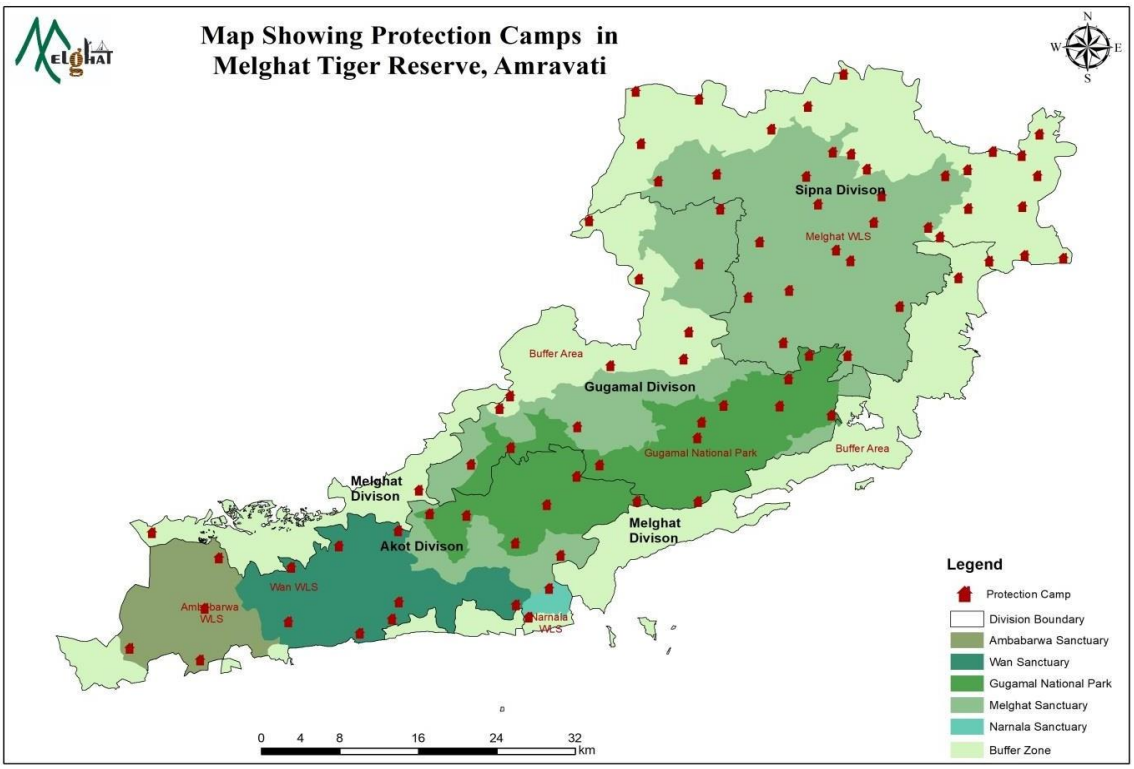
In MTR there are 104 protection camps each covering 30-40 Km^2 .Each camp has 3-4 personnel. The terrain is difficult and the area to be patrolled is very large. It limits the effectiveness of patrolling. Hence number of protection camps will be increased to desired levels to reduce the effective areaofpatrollingto15km^2. The selection of sites for camps should be based on a High offence risk map (prepared by mapping POR cases for illicit felling, poaching, fishing and grazing).

The existing anti-poaching camps have to be maintained. All the camps will be require full staff strength of at least one Departmental staff and four nos. of daily wage Protection Assistants equipped with self protection gadgets and walkie-talkies. All the protection camps will be made full-proof equipped with basic communication facilities and amenities like wireless sets, hand held sets, solar lights and charging equipment, drinking water, toilets and fencing around the camp.

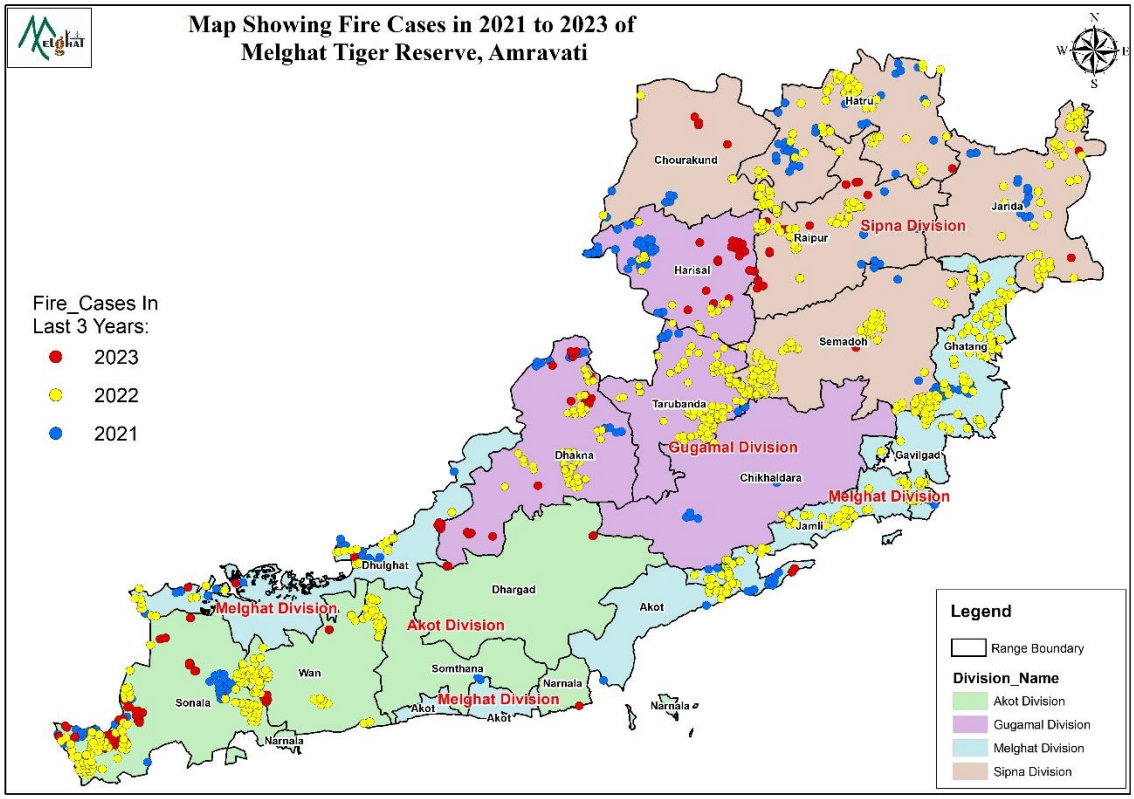
Apart from the above, temporary camps will be established in shape of *machans*or other low cost camps at vantage locations as per field requirement in specific occasions like fire season or *Shikar* control. The annual maintenance of camp sheds including

furnishing; uniform etc will be assessed by DCF which will be incorporated in the Annual Plans.

Duty charts must be pasted on camps indicating night halts of forest guards and foresters which should be checked periodically. Wireless based night attendance must also be instituted and reviewed periodically. In addition a duty chart for majoors need to be prepared listing specific works to be carried seasonally and enforced. Such works can include removal of invasive around camps, preparation of PIP, regular maintenance of roads, water holes, fire lines etc.



Map-7(e): Protection camp of MTR



Map-7(f): Fire Prone Zone Map of MTR

Map-7(g): Poaching risk zone of MTR

7.2.2.1.1 Patrolling

Patrolling inside Melghat Tiger Reserve is regularly monitored with the help of an application called MSTrIPES developed by NTCA and a patrol mandate of 30 km every week for Foret Guard and 20 km every week for Forester is expected to be met. The application can be used to monitor both quantity and quality of patrolling done by staff both foot as well as vehicle mode. The application has to be installed on mobile phones and distributed to every Beat. Time to time trainings to be organized to field staff to make them familiar with use of application.

Extensive patrolling on foot and on vehicle is of paramount importance. The Patrolling should be focused on following sensitive spots -

a. Water Sources and their approaches and signs of poisoning if any.

b. Saltlicks and their approaches and signs of poisoning if any.

c. Post monsoon nala beds need to be patrolled to check illegal fishing and signs of poisoning if any.

d. Fire sensitive areas

e. Checking the water holes outside the TR during summer season - Laying out impression pad near water point in villages to ascertain the presence of carnivores in the area.

f. Signs of human presence

g. Cattle kill by tiger

h. Snares, traps etc

i. Along buffer areas and forest boundaries, to coordinate with MSEB officials for joint transmission line patrolling to detect illegal tapping of electric lines for electrocuting of wild animals. Also a whatsapp group for reporting of trip incidents need to be there and patrol teams should visit such areas immediately.

The following schedule of patrolling is prescribed.

- Protection camps patrol team should cover all the compartments every fortnight.
- Range officer should join any of the patrol team once in every week.
- DCFs to join randomly patrol team once in every fortnight.

There are 104 anti-poaching camps with housed staff. All of these camps are to be provided with solar lights, drinking water etc. and solar fencing to protect structures wild animals and wireless network connection. For drinking water, water filters have need to be provided to all the anti-poaching camps.

Each camp will maintain

1. one patrolling register,
2. one duty register and
3. one wireless register
4. Visitor register
5. Seasonal activity
6. PIP register

7. Form No.06 (NTCA)
8. Form No.42 (NTCA)
9. MSTrIPES Mobile application.

Details of the daily patrolling including the time, routes and area covered and all important observations will be recorded in the patrolling register. Wireless register will be maintained for recording of all wireless messages received and sent. All the registers will be periodically checked by all the superior officers starting from the Foresters to the DCF.

Similarly, the Range Officer must chalk out foot patrolling programmes with all the anti-poaching squads of his Range every week mentioning daily routes. These routes can be surprisedly inspected by senior officers. Also the protection camps must have a black board where guards going on patrol must mention the time and names of members who left for patrolling. Regularly DCF must inspect the seasonal activity register to see if the specified activities are performed.

MONSOON PATROLLING

Melghat Tiger Reserve becomes more vulnerable to illicit felling and poaching during monsoon as large part of the park becomes inaccessible and mobility of staff is considerably impaired. To meet these challenges a special protection strategy for monsoon is required. Keeping the ground reality in mind, and to make optimum use of available resources to achieve best result towards protection of Tiger Reserve following strategy is made out for the monsoon.

Strategy

The following strategy will be adopted

A. **Install camera traps (preferably black flash ones) across tiger reserve which need to be checked every fortnight to detect illegal entry for fishing, poaching in the tiger reserve. Prioritize roads near nalas, near huge water bodies like dams, where people come for fishing and trapping crabs; Ballas where grazing camps are a possibility;**
B. **Deployment of Protection labourers in all the anti-poaching camps.**

C. **Prevention of poaching through intensive awareness drives with special emphasis on identified village Haats (weekly markets)**

D. Collection of intelligence secretly with the available experience, from the dossiers list and counter acting effectively and timely through available resources.

E. Use of state of the art technologies to monitor wildlife trade and other illegal activities on different platforms like social media.

F. The provision for preventive detention of habitual offenders during poaching and fire sensitive periods may be explored.

Deployment of Protection Assistants in The Anti-Poaching Camps

1. **Organisation of Anti-poaching camps**

Currently, there are 104 anti-poaching camps covering the entire area of the Tiger Reserve. Each camp will have 4 **Camp labour/temporary watcher** drawn from surrounding villages, preferably from the buffer area villages which are not near the camps. The **Camp labour/temporary watcher** should be given patrolling gears like camouflage uniform, shoes, caps, rain coats, winter dress, lathis, torch etc.

If the DCF feels that the staff strength need to be changed due to field conditions or other logistic problems it can be done based on field requirements. All the camps will be supplied with first-aid kits with medicine and accessories. In case of emergency, the injured will be transported to the nearest hospital by the departmental vehicles. Wherever staff head quarters are present inside forest areas, a vehicle needs to be stationed for emergency purposes. Also Wifi facilities need to be ensured for such colony areas inside the forest area.

2. **Patrolling pattern (on foot)**

All the regular staff and Protection Assistants will be in proper camouflage uniform. Details of the daily patrolling including the time, routes and area covered and all important observations will be recorded in the patrolling register. Wireless register will be maintained for recording of all wireless messages received and sent. All the

registers will be periodically checked by all the superior officers starting from the Foresters to the DCF.

Similarly, the Range Officer must chalk out foot patrolling programmes with all the anti-poaching squads of his Range every week mentioning daily routes. These routes can be surprisedly inspected by senior officers. Also the protection camps must have a black board where guards going on patrol must mention the time and names of members who left for patrolling. Regularly DCF must inspect the seasonal activity register to see if the specified activities are performed.

On completion of the day's work, they will mention their observations in their camp Register. During patrolling staff should use mobile phones installed with MSTrIPES application/ GPS apps/GPS devices and record all observations as features described in the application. The patrolling data needs to be submitted to Division office every week. At Division office data should be analyzed by trained data analysis assistants using desktop based analysis software before 10th of the month. A copy of analyzed data should be submitted to NTCA as well as PCCF (WL) and CWLW, Maharashtra.

3. **Vehicle patrolling.**

The vehicles used inside Tiger Reserve are mostly Govt. owned vehicles. All the vehicles should only be used for patrolling and protection related activities. During patrolling it is mandatory to use MSTrIPES/GPS application for proper monitoring of vehicle usage. Vehicle patrolling should be mainly done in sensitive areas which are nearer to villages. Vehicles should be driven by experience drivers and regularly maintain properly.

All the Range Officer has to be provided with 4WD vehicles for plying in the difficult terrain. All DCFs and Field Director also need to be provided with 4WD all terrain vehicles for protection. All Range Office campus should have proper place to keep the vehicle to protect them from rain and sunlight. All patrolling vehicles should be installed with GPS tracking devices to monitor their movement.

4. En-route Interception

The DCF will ensure that all the routes used by the timber smugglers outside the core area of Tiger Reserve are patrolled with the Divisional mobile squads and all the Forest check-gates function in right earnest. The DCFs will keep vigil on known poacher-villages and collect information from local haats about poaching plans. Any information on movement would be passed on to the adjacent Ranges/ camps both in buffer and core area and special vigil would be kept on movement of poachers. Having prior knowledge of movement of locals for poaching and illicit felling is most important part of our protection strategy and will be given topmost priority with all sincerity and devotion.

5. **VHF communication**

There will not be any negligence in transmission of message from the field VHF stations directly to the monitoring cell at Headquarters i.e. FD office. VHF set of territorial frequency has also been installed at "Vairat" to facilitate communication between Core and Buffer camps. It will be ensured that all the camps are equipped with VHF. All the staff i.e. Range Officers and Foresters, while in the field, should have the walkie-talkie with them. Requirement of VHF sets to be brought to the notice of Field Director.

6. Collection of intelligence

Secret payment /awards to informer can bring advance information on poachers, etc. and can be a very effective tool in protection. The field staff would cultivate such contacts. Payment can be met from secret funds and other sources. Special care will be taken to track the movement of unidentified persons moving in the fringe area, as during monsoon, poachers from outside states like Madya pradesh have come for poaching of RBT, Leopard in the past.

The List of villages suspected to be involved in poaching / poisoning both inside MTR & outside MTR must be documented and mapped for circulation among staffs.

7. Monitoring

The movement of the staff in the camp will be monitored with the help of advanced technologies and also by traditional methods. Every staff during patrolling should use MSTrIPES application/GPS app/GPS devices and record the data. At the end of the month the data should be analysed at Division office and the information should be used for improving the patrolling efficiency. Meanwhile the concerned Forest Guard/Forester of the Beat/Section should review patrolling on a daily basis and would be checked regularly by the concerned Range Officer. Each camp will have five registers (i) VHF message register, (ii) Attendance register (both for regular staff and casual labourers) and (iii) Patrolling register (Detailed day to day observations are to be noted), (iv) Form No.6, (v) Form no.42, (VI) MSTrIPES Mobile data. All the registers will be updated daily and produced on demand by any visiting supervising officer, who will sign it after entering his observations.

A. Strike Force

A group of 8 to 10 staff would be ready round the clock at each Range Hq. to act as striking force and move whenever required by the RO. If sufficient staff are not available, the Range officer shall requisition staff from other camps or even other nearby Ranges.

1. Modus operandi of strike force

The staff stationed in each camp will thoroughly cover the area assigned to them by foot, day or night, as required. In case of any incidence of poaching/presence of poachers, they will contact the nearest camp who will contact the Range headquarters immediately. The Range Officer will mobilize the staff from within his Range (and neighboring Ranges if the situation so warrants) and immediately proceed to the spot to combat the poachers. Unidentified person will not be allowed inside the sanctuary

and, if noticed, they will be detained and the Range Officer will conduct enquiry and immediately report to the concerned DCF of the outcome of such enquiry.

2. Deployment of vehicles

In order to ensure movement of the striking force, one vehicle for each Range has been provided for all the Ranges. They would be authorized to use hired vehicles. The DCFs may hire vehicles to deal with emergency situations with permission from the Field Director, MTR, Amaravati in case sufficient Govt. vehicles are not available with them.

C. Monitoring of Patrolling

Daily monitoring

Every Range Officer of MTR shall report to the concerned Asst. Conservator of Forests at 8:00 pm over VHF regarding the daily monitoring report of his range.

Asst. Conservator of Forests shall report to the concerned DCF on receipt of the information.

Monthly monitoring

Mandatory monitoring duties to be performed every month at the level of executive field functionaries are outlined below:

Forest Guard/Beat Officer

Apart from regular monitoring of the anti-poaching camps in his beat jurisdiction / areas allotted under his charge, each Forest Guard shall lead the patrolling team at least four days in a week (16 days in a month) with 25% night patrolling.

Also once in a fortnight, Forest guard must patrol the adjacent villages and forest boundaries adjacent to them and monthly report needs to be submitted mentioning encroachments, boundary pillar status, illicit activity in villages, movement of suspicious people in the village etc

Forester/Round Officer

Apart from regular monitoring of the anti-poaching camps in his section / areas allotted under his charge, each Forester shall lead the patrolling team at least twice a week (8 times a month), of which 25% of the time shall be spent in night patrolling. Forester should also organize group patrolling along with beat guards in sensitive beats.

Also once in a month, Forest guard must patrol the adjacent villages and forest boundaries adjacent to them and monthly report needs to be submitted mentioning encroachments, boundary pillar status, illicit activity in villages, movement of suspicious people in the village etc

The Forester shall personally check and exhaustively review every camp under his jurisdiction at least once a week and submit a report to the RFO.

Range Officer

Apart from regular monitoring of the anti-poaching camps in his range jurisdiction / areas allotted under his charge, each Range Officer shall lead the patrolling team at least four times in a month , of which 25% of the time shall be spent on night patrolling.

The Range Officer shall personally check and exhaustively review every camp under his jurisdiction at least once a month and submit a report to the ACF, who in turn shall incorporate his observations and submit it to the DCF.

Night patrolling dates are to be fixed at random by the Range Officers in consultation with the ACFs.

DCF/ ACFs can ask for surprise patrolling during any given day of the month.

Asst. Conservator of Forests

The ACF shall visit all camps in the division within 3 months and shall submit a report to the DCF. He will lead the patrolling duty twice a month, once during day and another during the night.

Deputy Conservator of Forests

The DCF shall personally review all the camps under his jurisdiction within 6 months.

Co-ordination Meetings

1. There shall be a Tiger Reserve Level Conference of all buffer and core area DCF MTR along with their ACFs and Range Officers chaired by the Field Director, MTR on the 10th of every alternate month or any such convenient date.
2. There should also be an Inter state meeting of all divisions sharing the boundary with MTR every year.
3. Tiger Cell Meetings need to be organized at least once in 3 months at district level.

JOINT PATROLLING WITH POLICE

The vastness of area and degree of pressure on Melghat require co-ordination with police officials and a strategy to be in place for joint patrolling with police staff. The following programme is proposed for joint patrolling by police and forest staff to prevent poaching and timber smuggling within Melghat Tiger Reserve which will be followed on regular basis every year.

1. There will be monthly Sub-Divisional level coordination meeting between Range Officers and Police Inspector to be chaired by concerned Sub-Divisional Police Officer. DCFs will plan out and coordinate such meetings.
2. DCFs will take initiatives and will make planning for joint patrolling of timber smuggling routes.
3. Meetings of forest and police officials will be held before commencement of *Holi/ Purnima* for planning out strategies to check this mass hunting activity. Such strategies will also be adopted during other vulnerable periods like festive occasions as the mass hunting is more or less linked to the rituals of the tribal.
4. Activities of infamous poachers and timber smugglers will be kept a close watch.
5. Authorised house raids of known poachers, timber smugglers will be made jointly by forest and police officials which will be done more frequently before ***Holi*** **for seizure of illegal arms in possession.**

6. Flag march in the suspected villages will be done jointly by forest and police staff frequently. The list of suspected villages involved in poaching and illicit felling shall be prepared every year by the concerned DCF.

CHECK NAKAS

To check illegal entries, pilferage of natural resources and regulate the entry to TR the existing check gates will be maintained. There are 71 manned check gates are in place at different sensitive points to check the illegal activities. The details list of the check gates on the entry routes to have been given in **Annexure-9**.

These gates will be strengthened to effect proper checking of all vehicles and people entering through these gates, may be tourist, bonafide inhabitants, business vehicles etc. Close circuit camera have been installed at check gate for surveillance of people and vehicles passing through the gate. Vigil needs to be kept on following issues

- No matches or any fire igniting material needs to be carried inside forest during fire season
- Check for illegal timber being stacked in trucks on which labour/cattle are being transited
- Check for season specific NTFPs like salai, tendu etc

ROADS

Managing road infrastructure is one of the important security strategy in an terrain like Melghat. All the forest roads/ patrolling roads which are kachha/murrum roads need to be maintained and The thumb rule to be followed is all roads need to be motorable atleast by the end of November. To achieve this following needs to be ensured

- **Pre-monsoon works**
  - Objective is to ensure that run off water doesn't flow on the roads(thus erode it). So drains need to be developed and maintained along all roads that are adjacent to slopes, so that water from slopes move through the drains. For water flowing on the roads, cross drains

need to be made at appropriate locations (where the road is sloping into the drain) so that water flows back to the drain. (Cross drains are structures made on the road by excavating the soil profile and pitching it with stone). However such stones get filled with sand/soil in 10-15 days defeating the purpose. Hence such cross drains need to be redug and repitched with stones every 15 days. Also such drains prevent run off from affecting the new grasses that are establishing on the forest roads (otherwise runoff water generally washes away the grass seedlings). The idea is grasses rhizome network once established will prevent future erosion of roads. This also becomes important when actual road repairs are being done after rains (will be discussed below)

- In cases where water falls/ smaller nala crosses roads, a different strategy needs to be employed.

- In the image you can see a water fall crossing a road. Normally such a water flow erodes away the road

leaving it unmotorable. To avoid this a gabion across the nala where water reaches the road has been built to trap the silt and to reduce thespeed of water flow. The water which

escapes the gabion can still erode when it reaches road and here a cross drain is built by excavating the part of road where nala crosses and pitched with stones. The slow moving water then flows through the stones keeping the road motorable.

- On bigger streams, flush causeways need to be developed. Flush causeways are concrete roads across nala. Along upstream of the river 3 or 4 gabions should be constructed to prevent silting and minimise water speed which might damage the flush causeway. Along downstream boulders can be placed close to the wall of flush causeway (as shown in the image below) to prevent scouring by water flowing down the flush causeway.

  Also many a times, water erodes the sides of nala and also roads leading to the flush

causeway. In such cases gabion wall can be made on either side of the nala and also gabion rapta can be done on mud roads leading to flush causeway.(as seen below)

- In roads with Black cotton soil patches, excavate the soil and do stone pitching/gabion rapta to make them motorable even during rains.
- Even on the roads where gullies run in the middle of the road, the gully can be pitched with stones to prevent erosion.

- **Post Monsoon Works**
  - Immediately after rains, road repair works need to be started. The general observation is that JCBs are used to repair roads. But in this process the entire top soil is disturbed and with that the entire grass rhizome network which traditionally holds the soil. So it is prescribed that
    - First grasses need to be cut for visibility without any mechanical removal by JCB.
    - Then assess where the gullies are formed in road and just pitch stones in them leaving the grasses intact on the roads. After pitching, murum needs to be put over the stones so that you have a mix of grass-stone pitched murum road.
    - This will ensure that the cost of road repairs come down and reduces future erosion and need for maintenance in the subsequent years.

VEHICLES

Currently, there are about 78 vehicles are present for patrolling & protection purpose. The protection related existing vehicles have been detailed in **Annexure-10**. At present some of the Range Officers have been provided with four wheeler vehicles. New four wheel driven vehicles are required in all most all the Ranges of Tiger Reserve replacing the existing old vehicles which are giving trouble running in difficult terrain. Most of the vehicles have become old which will be gradually replaced within the plan period

The existing vehicles need annual maintenance according to necessity.

COMMUNICATION

The communication needs to be strengthened to apprehend the offender, red alert, seeking additional assistance, informing the various officers depending on the gravity of the case including inter division and interstate. The list of wireless stations, in Tiger Reserve has been discussed in Chapter-4 &given in **Annexure-6.**

Internet connectivity shall be established at least at each Range Headquarter for effective communication at priority basis. Later, all sub ordinate offices may be brought under such connections. .In future based on availability advanced technology may be used to provide internet and telecommunication facilities to remote areas of Tiger Reserve to enhance living condition of staff and to provide advanced protection technologies.

E-SURVEILLANCE

E- surveillane (e-Eye) systems will be installed at strategic locations and boundary areas for 24/7 remote surveillance. The e-Eye is network of remotely operated high-end long range cameras with thermal and motion sensors are placed on top of towers, these sensors collect information and transfer it to a central control room, where all the processing and filtering of data takes place. Data is further transferred securely to the

headquarters after processing, thus live feed is available at headquarters. All the sensors and cameras can be controlled from a Web Application at the headquarters and central control room.

Features: The e-Eye system will have the following capabilities

- 24X7 Live Surveillance with recording.
- Detection and alert about forest fire.
- Human Interference detection and alerting.
- Habitat destruction i.e. cutting of trees, grazing can be tracked and appropriate alarms are raised.
- Animal movement alerting includes tiger, deers, blue bull groups and cattles etc.
- Helps in planning and decision making as all the activities are summarised in the form of reports.
- Trespass of Cattle and human beings.
- Detection of vehicles and tracking within the restricted areas.

ARMS AND AMMUNITIONS

The list of arms and ammunitions available with the Divisions is furnished herewith.

Table No- 7(d): Up to date List of Fire Arms and Ammunitions4 which are in working condition.

Sl. No.	Name of equipment	Number	Ammunitions
1.	SLR rifle	37	10950
2.	Insas Rifle	14	6000
3.	Pistol	43	1859
4.	Pump Action Gun	37	1220

The Maharashtra State Govt. has provided immunity to the forest staff against criminal action in case of use of fire arm in the line of immunity given to police officials under the provisions of Section 197 of Cr.PC providing immunity from prosecution without prior sanction. Regular training of field staff on use and maintenance of fire arms will be organised.

The arms and ammunitions with the Tiger Reserve has been upgraded with procurement of Glock 17 Pistols, INSAS Rifle, SLR, Pump Action guns and other advanced weapons for use by frontline staff during patrolling and anti-poaching operations.

7.2.2.1.2 INTELLIGENCE GATHERING

Intelligence networking is a very important pre-requisite for prevention of crime as well as for follow-up after the crime has taken place. Intelligence deals with all things, which should be known in advance for taking actions in the direction of crime prevention. In this process after gathering the information, it is evaluated, analysed and used in the decision making. Advance information is key to success for prevention of crime and this emanates from intelligence. It is almost axiomatic that no poaching can occur without the passive knowledge or active help of villagers living in and around the Tiger Reserve. While the villagers do come to know about poaching activities around their area, they are not willing to inform the Tiger Reserve Management for three reasons.

1. The General lack of rapport between officials and the villagers
2. Fear of reprisals by the culprits involved in poaching
3. Hostility among the villages against the administration which have put severe restriction on the use of the forest for their basic needs- grazing, firewood, small timber and collection of NTFP for livelihood.

The poachers and criminals need protection, hideouts and information about movement of animals and Tiger Reserve staff. Therefore most pertinent point at Tiger Reserve level is building bridges for trust between the Tiger Reserve and the local people.

The prescription for building bridges and trust are prescribed in Chapter-9, Plan for Eco Development & Ecotourism.

Collection of Information

The Range Officer, Strike Force and Territorial Range Officer will maintain a directory of phones from locals in fringes, residential areas of offenders, teachers, students, people's representatives, NGOs and generate informers which may lead to informers in due course. The Range Officer, Strike Force and Territorial Range Officers will list the informer names and maintain and also provide the same to DCF /Field Director. The Range Officer Strike Force/Range Officer, DCF/ Territorial DFOs/Field Director will provide a code to informers and keep it confidential. In no circumstances the informers shall be exposed to Public or any law enforcement agency.

Rewards for providing information

The motivation of persons providing intelligence information could be varied and needs to be treated accordingly. A credible reward system is the sheet anchor for generation of information. There need to establish and operate a cash reward system for providing information. The reward should be just, appropriate and made on the spot. As is being done in Customs Department, payment of rewards should vary according to the value of the items recovered by the information. Payment should be delinked from the disposal of cases in the Court; Rewards should be paid to all giving information, including Forest and Wildlife officials. Cash rewards should be payable for:

a. Information leading to the seizure of wildlife products and arrest of the offenders.

b. Information leading to successful prosecution of cases in courts; and

c. Information pertaining to the organization, modus operandi and other details of gangs indulging in wildlife trade.

The DCF will take action to implement the provision of relevant rules under WPA-1972 admissible from time to time for the payment of rewards.

7.2.2.1.3 SETTING UP OF LEGAL CELL:

In present practice, the dealing of the court cases is not much effective and the offenders are mostly acquitted for want of effective follow-up. Due to lack of proper attention, most of the court cases become weak resulting in the acquittal of the accused persons.

To avoid the repetition of such situations in future, a **Court Liaison Unit** shall be constituted for the Tiger Reserve.

To ensure the regular attendance on fixed dates in cause-listed cases, a special team of staff along with appointment of panel lawyer shall be identified and earmarked for this purpose. The team shall be entrusted with the job of attending the court regularly and report to the Field Director from time to time. The team would also inform the concerned staff to take necessary actions in such case, required from time to time. The team would also coordinate with APP/PP and maintain the necessary records for every individual case. The **Legal Cell** shall consist of

(i) One Ranger as In-charge

(ii) Forester/ Forest guards, one each for the courts having jurisdiction

(iii) One Lower Division Clerk at Tiger Reserve headquarters to maintain the necessary records.

(iv) Provision to hire/consult subject matter specialist whenever required.

The Legal Cell shall function at the office of the Field Director, Melghat Tiger Reserve, Amaravati. The Cell will coordinate with the Division Headquarters.

7.2.2.1.4 THE STRIKE FORCE

The leader of the strike force will be the Range Officer, Enforcement; the other members of strike force will be two Foresters and four Forest Guards. The Force will be fully equipped with vehicle, arms/ammunition, communication equipment, funds for

intelligence gathering, etc. The Strike Force will be given training on intelligence gathering, identification of wildlife articles, investigation, etc.

Duties and Responsibilities:

- Rapid action and response on receipt of any information related to illegal activities.
- Liaison with the territorial Range Officers and assist in protection.
- Liaison with EDCs to gather information on intelligence.
- Inspire confidence in people who want to provide secret information.
- Liaison with staff of anti-poaching camps.
- Sharing information with the territorial Range Officers on illicit activities.
- Maintain a secret record with the details of informers, information received, etc.
- Inform the DCFs, Field Director, MTR of any illegal activity and red alert to the anti-poaching camps.
- The Range Officer, Strike Force will be assigned any other duties related to protection.

7.2.2.1.5 THE SPECIAL TIGER PROTECTION FORCE

This is a centrally Sponsored Scheme of NTCA for deployment of a force with specialised training to be deployed as Tiger Protection Force. For Melghat Tiger Reserve NTCA have approved for a 112 member STPF consisting of 108 Forest Guards, 3 Forest Rangers and one ACF to come on deputation from existing cadre. The STPF was made functional in the year 2016.

Currently, all the STPF are absorbed into the department as regular Forest Guard vide department G.R no.FST-03/22/920.F-4, dtd.03.01.2023

7.2.2.1.6 STRENGTHENING OF DOG SQUAD

Currently, there is 1 sniffer dog of German Shepherd Breed are in place, one is at Paratwada with professional dog handler trained from the department. The dogs are helping in detection of poisoning spots as well as in search operation of wild animal articles. More dog squads may be recruited based on requirement. The breeds which are

suitable for climate of Melghat may be given preference. Dog kennel for the Squad may be established at strategic locations under each Range to effectively utilize the services of the dog Squad.

7.2.2.1.7 THE TIGER CELL

A Tiger cell at district level as detailed below is proposed for Melghat Tiger Reserve

Composition:

1. Superintendent of Police Chairman
2. DCF, Gugamal WL Division Member
3. DCF Sipna WL Division Member
4. DCF, Akot WL Division Member
5. DCF, Melghat WL Division Member
6. DFO, Melghat Tiger Reserve Member Secretary

Duties and Responsibilities:

- Monitoring the investigation of cases relating to tiger and leopards.
- Conduct Surveys on poached animals, identify and document trade routes and Market forces.
- Liaison with crime control bureau and other agencies in respect of tiger/leopard poaching and intelligence sharing.
- Rewards for candid informers, excellent performance, etc.
- Monitoring the human wildlife conflict cases by Tiger

One staff from each Range will be designated to coordinate between Range Office and Division office regarding any issues related to tiger and leopard management. The Tiger Cell will meet at least once in six months. Tiger Cell can invite experts if needed in any of its meeting. The proceedings of the meeting will be submitted to the Field Director.

7.2.2.1.8 STREANGTHENING OF WILDLIFE CRIME CELL

Presently, the wildlife crime cell of MTR is functioning infield Directorate Office.

The duties of the WCC will be,

- Gathering information relating to offenders and modus operandi.
- Maintain a database of criminals and habitual offenders
- To establish an intelligence network
- Monitor the progress of pending court cases related to wildlife offences
- Collaborate with the Wildlife Crime Control Bureau, local NGOs, the Police

department under guidance and direction of senior officers.

The crime cell of MTR is empowered with the following advancement with special approval of the Home Dept., Govt. Of Maharashtra.

- Mobile tracking
- CDR generation.
- Surveillance over Social Networking site for wildlife trade and offences
- Tracking of suspicious Email IDs
- Phone Tapping (with special permissions from the Home secretary Govt. of Maharashtra)
- Recovery of data from Email accounts, Social network accounts and handsets
- Cloning of SIM, spying instruments and softwares.

The following things are proposed for further strengthening of the crime cell like Forensic Lab, Conference Hall, up-gradation of Cyber Cell, website creation, Dog squad etc.

7.2.2.1.8 STAFF WELFARE

The following staff welfare measures are being undertaken for the staff working in Melghat Tiger Reserve.

1. Project allowance for all categories of staff.
2. Women rest houses
3. Supply of medicine kits, mosquito nets, water filters and radio sets to all protection camps.
4. Steps will be taken for providing food allowance or dry ration to all the protection assistants working in side Melghat.
5. Life and health insurance coverage for frontline staff.
6. Pursue for special incentive/allowance for staff those are posted in interior core areas.
7. Periodic health camps

7.2.2.1.9 CAPACITY BUILDING FOR PROTECTION OF TIGER, CO-PREDATOR AND PREY SPECIES

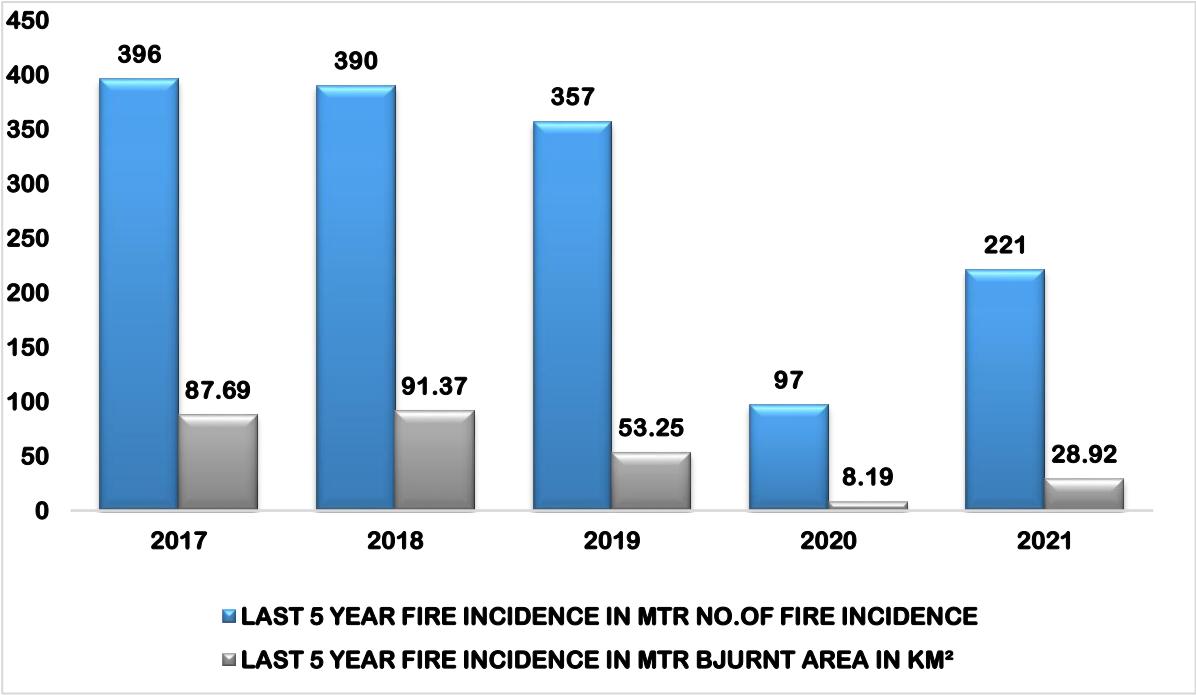
The DCF /Field Director will take the following actions for the upgrading the knowledge of Executive and Protective Staff.

- Conduct regular trainings/ workshops on wildlife management, habitat management, Census and monitoring techniques of flora and fauna, wildlife crime and its legal proceedings, human-wildlife conflict management modern tools and techniques etc. and other relevant aspects.
- All the Beats and camps will be supplied with Standard Operating Procedures (SOPs), Guidelines issued by NTCA, MoEF& CC, Govt.of India, Maharastra Forest Department, Chief Wildlife Warden, Maharastra and other Agencies in Marathi language.
- Relevant books on wildlife management and criminal investigation shall be supplied at Beat level.

- The Beat Information System developed for better management at Beat level shall be regularly updated every three or four years.
- All the Range Officers and Anti-poaching camps will be supplied with Toposheet showing the problems areas.
- Every Year after general transfer, the Executive & Protective staff would be placed in the Field after due orientation explaining their responsibility, strategies to be adopted etc.
- The DCF / Field Director will arrange training related to Protection.
- DCF will maintain record of incidents related to poaching, illegal trade, confiscation etc. on tiger and other wildlife species, map location and discuss in annual meetings with Executive, Protective staff and Tiger Protection Force to take suitable measures for future.
- Refresher courses for staff on forest & wildlife laws and other laws relating to forest & wildlife offences will be organised in a regular manner. The training and capacity building data base for each frontline staff shall be maintained at Division level for ensuring training to each and every staff.

7.2.2.1.10 SECURITY AUDITING

The DCF/ Field Director will conduct quarterly security audit and generate report. The audit will include review of offence case detection, fate of prosecution cases up to 5 years back, availability and adequacy of protection infrastructure, equipment etc. The annual report of security audit shall be placed before Steering Committee/ Governing Body of Foundation.



7.2.2.2 THEME PLAN FOR FIRE MANAGEMENT

(Graph showing Fire incidence Vis-à-vis Area Burnt of Last 5 year (2017-2021) in MTR)(change graph)

The forest fires along-with unregulated grazing have been acknowledged as the main causes of degradations of forest eco-systems and wildlife habitat. It directly affects the fodder availability and also kills the helpless wild animals especially the micro-fauna, reptiles, etc. It also exposes the soil to erosion and, hence, causes habitat degradation in the process. Due to deciduous nature of the forests, the grasses, weeds and falling leaves and twigs forms a thick layer of undergrowth which is highly inflammable in nature. The availability of water also becomes scarce during summers causing further hardships in its timely check and control.

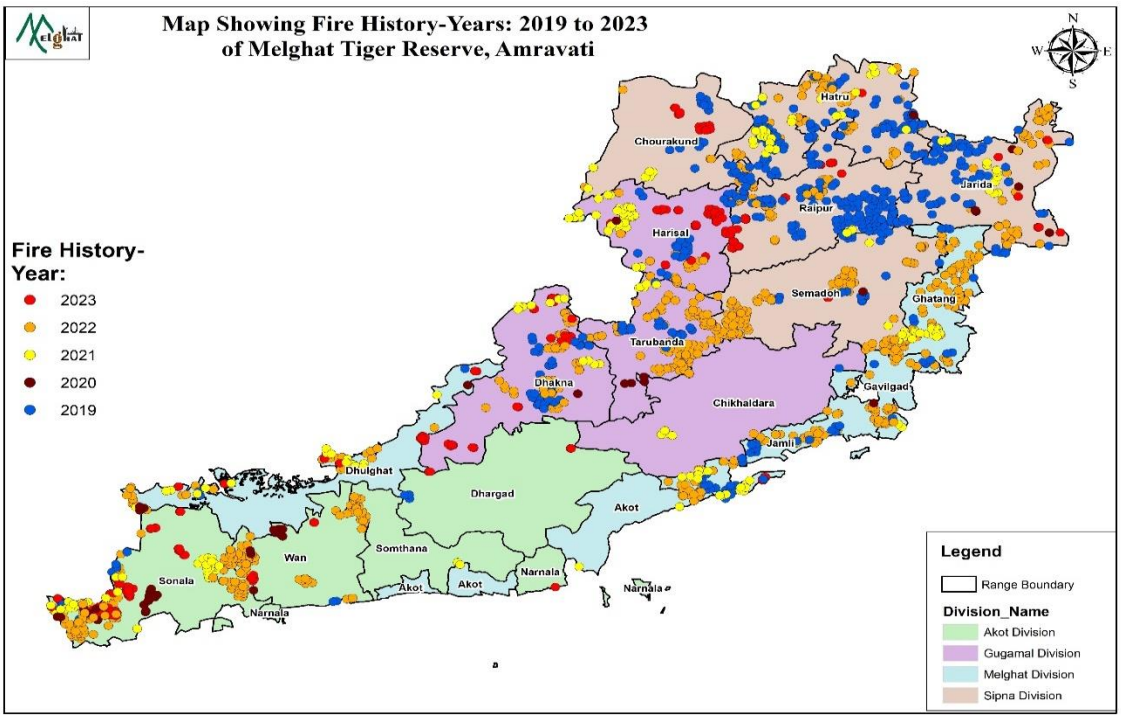
All fires originate through human agency. Majority of them are caused by locals for promoting new flush of grass for cattle grazing, clearing of forest floor in order to facilitate NTFP collection like Tendu, Mahua, collection of gum from Salai (Boswelia

serrata). Many of the fires are set as a means of revenge against forest department for not allowing cattle grazing, firewood collection and prosecuting under forest offence. Any delay in engaging local tribal as fire watchers during fire season is also leading to fire as this work with department is one of the major and easy sources of income for those people. Sometimes fire accidentally breaks out during annual fire line creation operation due to strong wind or insufficient attention

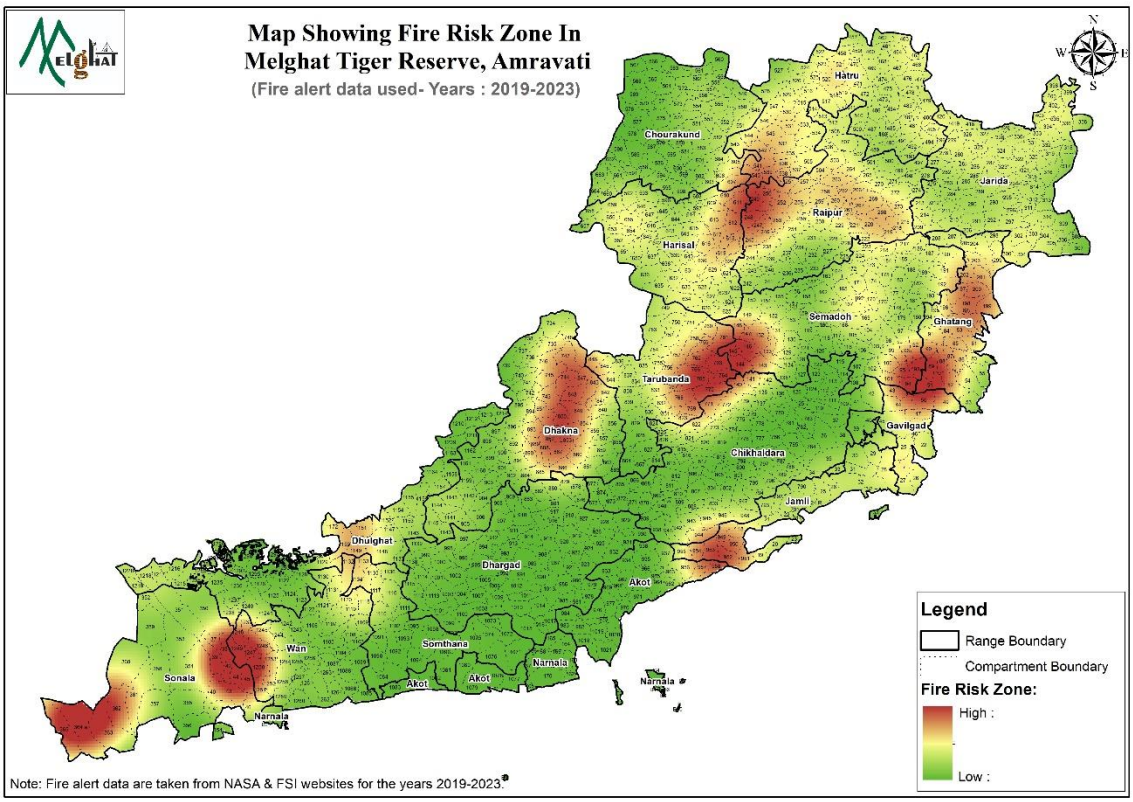
Normally, the period from 15th February to 15th June (till the on-set of monsoons) is observed as the fire season, every year. Because the area is basically dry deciduous forest and there is lot of combustible material on the ground which can get ignited rapidly.

Fire Vulnerability Areas (change maps)

Based on the burnt area or fire incidences, POR cases booked, closeness to village, temples, roads etc. the fire vulnerability Map of MTR should be prepared. Intensive fire control measures including involvement of EDCs should be carried out in vulnerable areas. Temporary fire watch towers and camps need to be situated in places of high sensitivity as per the map prepared.



Map-7(i): Forest fire history of MTR



Map-7(j): Forest Fire Risk Map/ Fire Sensitivity map of MTR

Fire Detection

Fire detection is done through a network of watch towers. Effective use of FSI & NASA website for detection of fire points on near real time basis. e-Eyes (see theme plan for protection) will be established at strategic locations for effective fire detection. The list of Watch tower has been furnished in **Annexure-4.**

Maintenance of Fire line

In Melghat Tiger Reserve 4296.795 km. of fire line is present and it is annually maintained by cutting the bushes in the specified width and burning after drying. Every year, the maintenance of fire line is done from the month of 15th of December– 15th of February. However it also occurs many a times that parts of MTR are wet even after

February 15(due to unseasonal rains) and in these pockets, fire line operations need to continue after intimating to the Field director, maximum upto ten days.

However due to dry deciduous tracts dominated by teak, leaves continue to fall well into March-April and hence regular maintenance of fire lines need to be incorporated in plans. Adequate funds are necessary to take up fire line maintenance at appropriate time too. The details of fire line has been discussed in Chapter-4 & list of fire lines has been furnished in **Annexure-3.**

These Fire lines shall be classified into, the following categories in order of priority.

a) A -Class Fire lines: These Fire lines comprise of the external boundary of the MTR. The prescribed width is 30 Meters. These are the prominent Fire lines, which have been prescribed for clearing, burning and maintenance every year on priority basis.

b) B -Class Fire lines: These Fire lines includes internal boundaries and roads within the MTR areas. These Fire lines help localize the fires in areas of its origin. The prescribed width is 12 meters. In case of roads 6 Meters along both sides. These Fire lines have also been prescribed clearing, burning and maintenance, every year.

c) C -Class Fire lines: It includes the remaining Fire lines including the internal boundaries of compartments and coupe lines. Its prescribed width is 6 Meters. These Fire lines have been prescribed for maintenance on the basis of situational necessity and the availability of funds.

However in addition to traditional fire lines, in mountains tracts with high fire risk, belts of fire lines can be taken along ridge lines to reduce the possibility of fire spread.

Creation of awareness:

Round the year relationships need to be maintained with locals but from October, active measures need to be taken. Arrangement of sports events, playing of movies in villages etc need to be taken to keep people occupied. Also regular flying of drones at different time intervals in peripheries of sensitive areas to create a sense of deterrence in minds of villagers can be tried.

Provision of Award/Reward/incentives:

The motto will be to prevent forest fire by motivating and winning the heart of the people through incentives. VEDCs will be engaged and incentives shall be given to the committees/villages showing active involvement in fire protection in their area. The list of VEDCs, Organisations, Institutions and individuals with commendable effort in wildlife and forest protection shall be nominated for Division, District, State and National level awards.

Deployment of fire watchers:

Sufficient numbers of fire watchers will be deployed on the fire lines those will patrol over the area to give information on incidences of fire to the nearest camps.

Deployment of informers:

In the villages accustomed to *poaching* by kindling fire, spies are to be engaged to keep track of the poachers and pass on the information to the concerned forest officials in the field.

Engagement of local communities

EDC members shall be engaged as fire watchers and rewards mechanisms shall be constituted for fire detection and fire control efforts. Villages with zero fire incidents shall also be rewarded financially.

FIRE FIGHTING MEASURES

Technological intervention.

1. Remote Sensing and GIS Application.

- The GIS Cell& Divisional control room shall monitor the Satellite data on forest fire points available on various online platforms like Van Agni Geo portal of Forest Survey of India (FSI), BHUVAN Forest Fire Disaster Services of Indian Geo

Platform of Indian Space Research Organisation (ISRO), Fires Information for Resource Management System (FIRMS) of National Aeronautics and Space Administration (NASA) of USA. These Platforms utilize the data obtained from censors on Satellites like Aqua-MODIS, Terra-MODDIS, S-NPP VIIRS, JPSS, NOAA-VIIRS, etc. Monitoring fire points by the Fire Cell of the MTR will save the delay in prompt action to combat forest fire. The fire points will be contained before they expand to large scale forest fires.

- Fire vulnerable grids, Beats, villages shall be mapped periodically to prepare fire vulnerability map.
- Mohua flower (Madhucalatifolia) collection is one of the major causes of forest fire. All mahua trees shall be mapped using GIS for control burning operation before onset of fire season.

2. Thermal Scanner

- Thermal Scanner may be used to detect the smouldering fire in standing dead trees, fallen logs on the ground and also the fires that are not visible to the naked human eye. This would reduce the repeat fie points by satellite at the same locations.

3. Drones

- Drones may be deployed to detect and plan out fire fighting operation on ground especially in difficult inaccessible terrain. It would also be helpful in assessing the area damaged by forest fire.

4. Fire Blowers.

- Fire blowers shall be deployed to create fire lines by blowing away the leaf litter on the ground which would prevent further spread of fire in forest.

5. Others

- Other advanced state of the art technologies may be deployed to minimise damages caused by forest fire as well as to avoid any casualty during fire fighting operation.

Coordination with Line Departments and District Administration.

A Comprehensive District Action Plan under the Chairmanship of the Collector and District Magistrate, Amaravati, Akola & Buldhana may be made for better coordination in case of combating forest fire. Modern equipment, technological advancement and other resources are being effectively utilized for fire fighting with proper training and mock drills to the frontline staff and fire watchers. Widespread awareness campaigns are also organized with help of various stakeholders or line departments including sports activities in the fringe villages &to create awareness amongst the villagers in and around the Tiger Reserve.

Post-fire operations

In spite of all the precautions, if fire break out, immediate steps to be taken to extinguish it and the burnt area to be measured and mapped out, the loss to be assessed and the reasons for fire along with responsibility need to be fixed.

Safety

Fire-fighting is a hazardous task. Every precaution shall be taken to prevent injury to the fire-fighting crew. The fire-fighting crew shall be properly equipped with a first-aid kit. Fire-fighting crew shall be supplied with fire-resistant clothing. Fire fighting mock drills shall be organised before the onset of fire season to prevent injury to staff while dousing fire.

Monitoring and evaluation:

In order to monitor the programme, control rooms in the Division and Range Offices will be used. In the MTR headquarters a daily monitoring register has been kept where all the cases of fire incidence along with the action taken will be reported. After the fire season is over, post fire assessment needs to be done. Outstanding performance of any officer/ staff/ labourer/ village committees will get suitable recognition.

Fire burnt area information need to be generated will be utilized while planning fire protection for the ensuing year.

Table No-7(e): pro-forma for reporting the fire burnt area(NEED TO PUT MH PROFORMA)

Sl. no & date	Range	Locality	Extent affected by fire in ha	Nature of damage	Loss if any	Whether fire has been put off	Remarks

7.2.2.3 THEME PLAN FOR WILDLIFE HEALTH SURVEILLANCE

The National Wildlife Action Plan (2017-31) highlights the need to maintain surveillance for both endemic and emerging diseases, and counter the potential spread of zoonotic diseases by way of interactions between wild animals, humans and domestic animals. The common diseases infecting the wild animals are the Rinder pest, Canine distemper, Bovine tuberculosis, Anthrax and Foot and Mouth disease.

Objectives of Management

- Ensure that cattle in periphery areas are vaccinated for FMD, Lumpy, and any other bovine diseases. In case of spread of Bovid diseases in villages, monitor wild Bovids like Gaurs for chances of infection.
- Feral dogs are generally vaccinated with 9 in 1 vaccines, vaccine for Canince Distemper etc but all these require annual recapture which can becostly. So Anti-Birth Control is a better option.
- Detect the disease causing pathogens in time and check the spread of infectious diseases in the MTR areas and its zone of influence.
- Make people aware about the infectious diseases common to livestock populations and precautionary measures to check its spread to other cattle and wild animals.

- Devise mechanism to ensure regular periodic surveillance of wild animal's health Management Prescriptions.

- Veterinary team headed by a wildlife veterinarian shall be created and will be entrusted with the responsibility of wildlife health surveillance. The veterinary team would prepare and execute the wildlife health program, comprising, components such as the health standards, information management and dissemination, render technical advice and coordination of resources.
- To assess the 'infection load' and spread of diseases, the veterinary team shall conduct periodic surveys to estimate cattle populations, collect blood and tissue samples (during post-mortems of animals that die due to natural causes or road accidents) and dung samples from cattle and wild herbivores, and get the samples analysed for prevalence of diseases. These efforts will be aimed at creating a baseline on the prevalence of FMD and other diseases in the region, investigating the cause of mortalities of wild herbivores, and finding ways to reduce the interface between wild and domestic animals.
- Water sources and habitats frequented by wild animals', especially, the ungulate species shall be kept free from domestic cattle.
- Undertake annual vaccination of all the livestock populations, compulsorily, in buffer zone areas and the enclaved villages for common diseases such as the Render pest, Foot and Mouth disease, Anthrax, Rabies, Canine distemper, etc. to prevent the spread of these diseases.
- A basic stock of requisite equipment, drugs, tranquilizers, sedatives, narcotics, anaesthetics, anti-dotes etc. shall be kept to deal with contingencies, in this regard.
- Field staff shall be trained by animal husbandry department or Nagpur veterinary college so that they can know the symptoms of major diseases in wild animals and can take remedial measures in time. The field staff shall be trained to enable them to collect samples of scats and excreta of wild animals as well as to provide first aid to wild animals, in case of accidents.
- Liaison with outside agencies such as NGOs, Zoos, and Agricultural Universities to facilitate wildlife health surveillance. Local animal husbandry department and Nagpur veterinary college can be involved in health management programme.

Gaur Health monitoring

Experts believe that gaurs are more prone to infectious diseases due to their genetic similarity to domestic cattle. Past records also indicate that gaur populations have succumbed to epidemics of FMD, rinderpest and anthrax, and went locally extinct (for instance in Bandavgargh TR).

Hence intermixing of gaur and cattle population needs to be monitored based on radio collaring to help understand spatial overlap and disease transmission probability.

Protocol for surveillance shall be formed and dung samples needs to be collected periodically and analysed for TB and other diseases.

7.2.2.4 THEME PLAN FOR CONSERVATION OF AVIFAUNA

Melghat tiger reserve has a diverse population of bird life with 265 species. Because of the role it plays in its conservation, it is categorized prominently under Global Important Bird Area (IBA). Species like Lesser kestrel, Forest owlet, Green munia, White Backed Vulture and Long Billed Vulture are reported from here. The congregative bird species include Blossom Headed Parakeet, Rose Ringed Parakeet. Biome Restricted species conforming to Biome 10:B24 Indian Peninsula Tropical Moist Forest include Crimson Fronted Barbet and Malabar whistling thrush whereas the Biome 11: Indo Malayan Dry Zone includes 39 bird species.

Ecologically sensitive animals like Flying Squirrel is abundantly seen here which is an example of close canopied and dense forest of old growth. Inhabitation by Grey Hornbills also supports this authentication. Pied hornbill is also reported in the area. MTR is home to 15 species of owls. Forest owlet, once thought to be extinct, has reappeared here in one of the prominent forests of the reserve, where it was rediscovered after a significant gap of many years. Long billed and White Backed Vultures had been reported in past nesting in Panchbol , Bhimkund, Dolar, Patulda areas. Over time the sighting of the vultures has not been reported. MTR is also home to honey badgers though no study has done so far regarding their habitat, ecology and population.

Objectives of Management

The prime objectives set forth for management of avifauna of the MTR under this Theme Plan have been prescribed, as follows,

- Identify threatened species of birds i.e. forest owlet, vultures, etc.
- Conserve the avifaunal bio-diversity of the MTR by protecting its habitat conditions, especially, the water bodies, riparian areas, edges, nallas, streams and meadows.
- Prepare inventory of avifauna of the MTR and its seasonal variations.
    - Generate awareness about the conservation value and ecological role of avifauna in maintenance of natural habitat conditions and ecological balance.

Management Prescriptions

The prescriptions for conservation of the rich Avi-fauna of the MTR and its habitat have been prescribed, as follows.

- A detailed research project shall be commissioned in association with reputed institutions such as BNHS, WII, SACON, to study the habitat, ecology and population status of endemic and threatened avifauna. Base line data will be generated from the research and long term continuous monitoring of critical parameters will be carried out.
- Large size trees, cliffs, escarpments and caverns shall be identified and protected to provide sites for roosting and nesting of threatened and endemic species. Vegetation along streams, rivulets and nallas shall be monitored for roosting and nesting behaviour of avifauna.
- Nesting trees of threatened species such as forest owlet will be marked, geo tagged and protected.
- Streams and water courses shall be identified with a view to improve habitat conditions by creating water pools and niches and planting amphibious, aquatic and bank vegetation along them.
- Training shall be imparted to the frontline staff in identifying birds, birdcalls, bird signs, bird estimation and avifaunal biology.
- Viable symptoms of any epidemic affecting native fauna shall be monitored and reported at regular intervals to ensure the safety of native fauna.

Re-populating MTR with vultures

Scavengers such as vultures eliminate harmful substances from the environment, mitigating the spread of disease that may otherwise impact not only local food webs, but potentially human health and the economy.

Vultures, which exclusively eat dead animal carcasses, are particularly effective at removing pathogens and toxins in the environment because they rapidly consume carrion before it decays and their stomachs contain an incredibly potent acid that destroys many of the harmful substances found in dead animals.

According to previous records and surveys in vidharba, there were four species of vultures i.e Egyptian vulture (Neophronpercnopterus), Indian White backed Vulture (Gyps bengalensis), Indian vulture (Gyps indicus) and Red headed vulture (Sacrogypscalvus). There were two breeding colonies reported from the high cliffs around Chikaldara. In 2012 Cinereous vulture (Aegypius monachus) was reported from MTR. Since last decade no sighting of vultures was recorded in Melghat. The reason for the disappearance of vultures from Melghat is not known.

Prescriptions

- A long term plan for reintroduction and conservation of vulture in MTR will be formulated in association with BNHS, WII or Vulture Research Centre, Pinjore after relevant guidelines for translocation are followed.
- The potential roosting and nesting sites of the vultures shall be identified and protected.
- In the villages present in side and in the vicinity of MTR, awareness creation regarding ill effects and illegal use of NSAID such as Diclofenac for cattle will be conducted regularly and the availability and use of such drugs will be monitored and reported.

7.2.2.5 THEME PLAN FOR CONFLICT MANAGEMENT

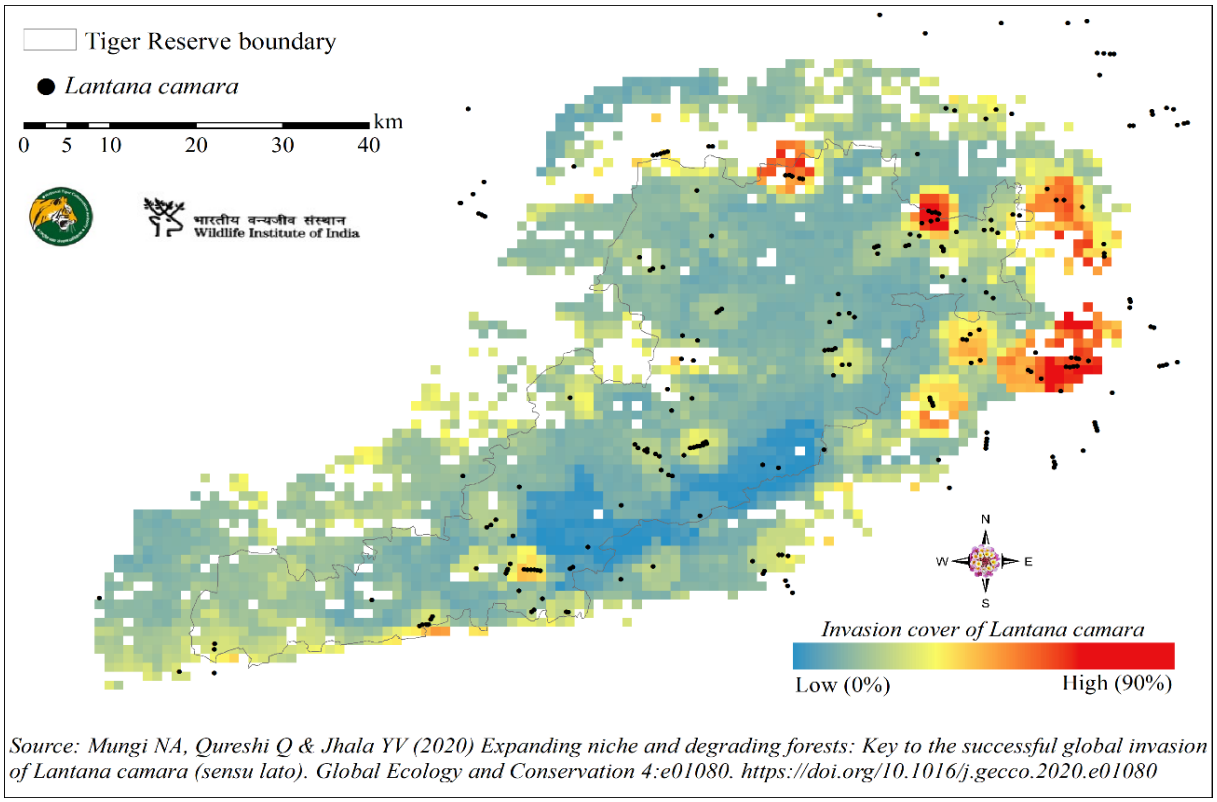
Human-wildlife conflict has been part of human existence since time immemorial. It has been depicted in cave painting and has also been finely portrayed in folk lore. These conflicts are a real stumbling block for conservation and need to be dealt with very carefully

to minimise their ill effects. Human-wildlife conflict normally presents itself in the form of crop damage/raiding, loss of life and property, cattle lifting and spread of fear. The main species identified with conflict are sloth bear, ungulates, blue bull, wild boar and large carnivores. Keeping in view the complexity of situation and the past experiences the following measures are suggested.

- The human-wildlife conflict hot spots should be identified and sensitivity map will be prepared. Special micro-plans should be prepared for these areas along with the EDC's. The emphasis should be on mitigation of conflict with active support of villagers.
- Sloth bear is the animal most in conflict in Melghat. Almost all cases of sloth bear attack are due to surprise chance encounter at very close range during dawn or dusk hours and especially during monsoon season. Awareness creation regarding behaviour and activity patterns of sloth bears is crucial for avoiding conflicts. Sloth bears are also attracted by garbage dumps in human settlements during pinch periods. So emphasising on importance of keeping the villages free of garbage is very important.
- Loss of human life and property is hard to predict. Thus creation of rapid response teams seems to be the only option. Rapid Response Team should consist of a small group of well-equipped and trained employees stationed at strategic locations.
- These teams should compulsorily be given training in emergency healthcare, disaster management, crowd management, animal rescue, use of modern technique like camera trapping, modern communication, and UAVs.
- Help of local NGO's can be sought in making the villagers aware of dangers of entering in a wildlife rich area, animal behaviour and the precautions required to be taken by the villagers.
- Ex-gratia distribution mechanism should be swift and transparent to pacify the victims and to avoid retaliatory killings. A mobile application will be developed for registering conflict cases and real time tracking of status of compensation payment.
- Some important drugs like – anti-venom, anti-rabies etc., which are not readily available in the market should be kept in stock at identified locations. Local villagers should be given access to these drugs to win support for conservation.

7.2.2.6 THEME PLAN FOR LANTANA ERADICATION

The existing plan of Lantana eradication work will be continue with the same prescription, However, some the salient actionable points for lantana eradication is being recommended in this Plan, which can be implemented religiously,



Source: Mungi NA, Qureshi Q & Jhala YV (2020) Expanding niche and degrading forests: Key to the successful global invasion of Lantana camara (sensu lato). Global Ecology and Conservation 4:e01080. https://doi.org/10.1016/j.gecco.2020.e01080

i. Removal of Lantana shall be done following Dr. C.R Babu prescription (Root stock cutting method).

ii. Removal need to be started after onset of monsoons (as removal is easier on wet lands). Due to fund shortages and improper planning, Lantana is often removed in the meadows only, leaving the hilly areas untreated. As a result, the seeds of these species on the hilly areas are washed into the meadows during the rainy season, defeating the purpose. So parallel to lantana removal in meadows, adjoining hill slopes need to be treated for effective invasive control.

iii. Also once Lantana is removed, experience suggests that other invasive species like Hyptis (Ran tulas) takes over. Hence active sowing/broadcasting of palatable grass seeds, bamboo and other fast growing fodder species can be done to consolidate the land. However

invasive species are bound to come the next year, hence planning for removing other invasive species along with second year lantana removal needs to be done.

iv. Establishment of a proper grass nursery at *Lantana* invaded ranges is advised for regular supply of the seeds to the restoration site. Seeds of grasses like *Dicanthium annulatum(marvel), Apluda mutica (Moti tura), Heteropogon contortus (Kusal, Themeda quadrivalvis (Gondal)) etc* can be collected from the field during fruiting season and broadcasted with seed ball. For best result, the entire inflorescence can be cut and tightly bundled and placed it in the restoration site at regular interval and germination shall be monitored during monsoon.

v. All operation shall be made in time bound manner. Any scheduled operation should not be skipped because of unavailability of funds. Ad hoc arrangement of funds shall be made from the Tiger Conservation Foundation for the same.

vi. Rigorous monitoring shall be made with proper photography and laying vegetation plot periodically.

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CHAPTER-8

RESEARCH, MONITORING AND TRAINING

8.1 RESEARCH AND MONITORING

The National Wildlife Action Plan: 2017-31 stressed about the need of Research & Monitoring in all protected areas due to the rising incidence of climate change, habitat fragmentation, pressure on the ecosystem, plants and animal population. Research could be the tools for a better understanding of nature, its functions and to enable optimum or sustainable utilisation of its resources, as well as to evaluate the conservation status of species and habitats and the extent of impact of conservation endeavours undertaken in the current scenario of recurring extreme event, global warming, recurring event of forest fire, rapid spread Invasive Alien Species , habitat alteration & emergence of fatal diseases. The document envisaged that the scientific staff of the reserves would undertake basic research programmes aimed at evaluating systematic factors and influences, for devising pragmatic management practices to cover specific population and the entire ecosystem. Research constitutes a very important aspect of effective management of wildlife protected areas. Research based wildlife management is crucial for the success of any Tiger Reserve. This is a legitimate activity, and must be compatible with the objectives of wildlife management in the protected area. The Tiger Reserve should have a clear wildlife research policy based on the following priorities.

8.1.1 RESEARCH PRIORITIES

Wildlife management is a mix of field craft and science based on field research. Research in the Tiger Reserve shall focus on the critical information needs, which are by and large common to most of our Protected Areas. Professional researchers working in isolation on topics or species relating to their field of interest can contribute very little for fostering wildlife management. The research shall be “problem solving studies”, based on a consultative process involving PA management. Some “pressure points” for PA management are common to most of our PAs, and in addition to the on-going small term projects, wildlife research in Melghat Tiger Reserve should preferably focus on these aspects are mentioned in the table below;.

Table- 8(a): List of Focus area of Research in Melghat Tiger Reserve

PA Managerial Priorities	Research Areas
A) **Values Relating to PA :** 1. Ecological/ Regional landscape	- Regional changes in species abundance, richness &diversity - Changes in species occupancy - Effect on water table - Habitat fragmentation - Endangered species: prey base, age/ sex ratio, biomass computation, life table computation, body condition
2. Habitat degradation	- Types of exotic/invasive infestation - Control/Eradication methods - Zone of influence of the villagers in core area and their impact on vegetation, animals.
3. Livestock depredation by carnivores &crop damage by wild ungulates	- Reasons for livestock depredation - Percentage of livestock in the food-spectrum of carnivores - Reasons for crop damage.
4. Habitat management practices	- Biodiversity conservation vis-a-vis management practices in-vogue. - Effective grassland/meadow management techniques, restoration of post relocated sites into grasslands, nutritional status of indigenous grasses and legumes etc. - Assessment of water availability to the animals etc.
5. Poaching	- Magnitude - Modus operandi (variations) - Wildlife crime intelligence and networking

	- Wildlife crime prevention - Efficacy of various wildlife crime prevention measures
6. Fire	- Nature and efficacy of existing preventive and control measures - Changes in the habitat due to fire - Changes in animal use pattern due to fire
7. Insects as agents of ecological change	- Impact (magnitude) - Ecological changes - Periodicity
8. In-situ conservation	- Founder population size - Translocation
9. Eco-tourism	- Involvement of host-communities - Mechanism - Impact assessment - Assessment of vehicular pollution & impact on wildlife abundance.
10. Climate change	- Impact of climate change on vegetation structure, composition & animal behaviour. - Long term monitoring of physical parameter of climate like Temperature, Rainfall &relative humidity etc.
10. Jurisprudence	- Morphological studies - Biochemical studies - DNA fingerprinting

11. Wildlife disease	- Landscape epidemiology studies - Health and monitoring both of wild animals and village livestock
12. Animal monitoring and estimation techniques	- Customization of software suited to Melghat setting - Estimation procedures, indices for various species - Home range studies
B) Biotic Pressure on PAs: Vision beyond the PA Interface problems	- Effect of existing land use - Mechanism/ strategy to mitigate ill effects - Magnitude of crop damage outside PAs - Methods for mitigation - Decadal population growth in impact zones outside PAs (human/ cattle) - Resource use pattern of indigenous people - Impact of PAs on indigenous people - Community role in conservation - Levels of sustainable use - Grazing impact - Regeneration status in right burdened forests - Impact of rights and concessions on habitat quality - Socio-economics of indigenous community - Resource requirements of indigenous people & dependencies - Traditional knowledge & occupation of indigenous communities - Impact assessment of Eco-development woks - Impact of Tourism

FUTURE STRATEGY FOR RESEARCH IN MELGHAT

A. Development of Infrastructure

i. Strengthening of Research Cell at Directorate

Research cell in the directorate needs to be strengthened, the research cell needs support, knowledge from the technical expertise and hence it is decided to engage Research Fellow on contract basis for carrying out specific studies as well as monitoring the various research activities presently going on.

Melghat Tiger Reserve will undertake research activities own its own depending upon the field requirements. It will have close linkages with local colleges and universities undertaking various research activities related to species conservation and wildlife management. Therefore, a budgetary provision has been made in the plan for undertaking research activities in the reserve.

ii. Research Labs/Facilities at Directorate:

The park has no basic facilities for research. It is proposed to establish one main Research lab at the premises of Field Director's Office at Amaravati. Basic equipment like- computers with GIS facility, refrigerator, deep-freezer, microscopes, oven, weighing machine, veterinary instruments etc. for research shall be provided. The additional instruments like- vehicle etc. required for different field research would be procured. There is an urgent need for carrying out systematic and basic research related to habitat, herbivore and carnivore status, population density, habitat use pattern etc. and impact of various works being carried out in and around the Protected Area.

To conduct these research activities there shall be a full time Research Officer, Researcher, Assistants & biologist shall be sanctioned. Students may be allowed to carry out internship and PhD research work on relevant topics inside Melghat Tiger Reserve.

iii. Establishment of Automated weather Stations

Automatic weather stations shall be installed at each of the Round headquarter for long term monitoring of weather parameters.

B. Constitution of Research Advisory Committee

A Park Level Research Committee for Melghat Tiger Reserve shall be constituted with the following members who will scrutinize the proposals as per law and forward it to CWLW and Biodiversity Board for the final decision (as and where necessary).

(i) The Field Director, Melghat TR	Chairman
(ii) Faculty, Amravati University (2 nos)	Member
(iii) Veterinary Officer of Melghat TR	Member
(iv) DCF, Sipna WL Division	Member
(v) DCF, Gugamal WL Division	Member
(vi) DCF, Akot WL Division	Member
(vii) DFO, Melghat Buffer Division	Member
(viii) DFO, Melghat Tiger Reserve	Member Secretary

The Committee shall have the following main activities: -

(a) To finalize the selection/identification of relevant research based studies.

(b) To review the progress of research activities carried out for the Melghat Tiger Reserve

(c) Provide suggestion/recommendations for improvement and smooth functioning of the research activities.

The meeting shall be arranged as per the requirement, but at least once in six months.

8.2. RESEARCH PROJECTS

The list of research projects carried out in Melghat Tiger Reserve in 2014-15 to 2023-24 has been given in **Annexure -11.**

The Research activities in the Tiger Reserve were confined to traditional research on forest and wildlife. In the changing scenario it is necessary that the scope of such research should extend to the micro flora and fauna as they are also part and parcel of the biosphere. It also is desired to engulf the socio-economic condition of the people and forest crimes within its sphere. Most of the research works to be spelt out in this chapter will be confined to the flora and fauna of the Reserve. As such the attention is drawn to the following field for research.

- Determination of bio-diversity richness along with the micro flora and micro fauna.
- The carrying capacity of different wild animals, their food habits
- The health of wild animals with special reference to the elephants
- The nutrition content of different edible plant species taken by the wildlife.
- The effect of fire both conducive and adverse to the forests.
- Eradication of weeds like *Lantana, Eupatorium* from the forests.
- Ground water table
- Ethno-botany i.e. various plants used by the local people, their distribution and status.
- Socio-economic condition of the people inside the PA and its impact on management.
- Forest and wildlife crime, their trend, causes and remedies.

Strategies

The following strategies will be adopted for the purpose of research.

- Strengthening of existing research cell with GIS laboratory and monitoring cell at Office of the Field Director, Melghat Tiger Reserve, Amaravati under a Research Officer with one GIS Analyst and Computer Operator with required infrastructure like building, Soil Testing kits, Computer, Cameras, Binoculars, Microscopes and other instruments.
- The help of Sociologist, wildlife expert and Criminologist will be taken.
- The existing cyber cell/Tiger cell at Field Director Office will coordinate with the research cell from time to time. The Cell will monitor the crime up-to-date position of

prosecution process and outlining the procedure for preparation of case record for prosecution.

- Maintenance of existing 61 nos. of vegetation plots sample plots to study the impact of biotic interference, growth statics of plants and succession.
- All the transact lines laid to monitor herbivores, their signs; the habitat features will be permanently maintained and observations on signs of wildlife be recorded in a register at frequent intervals.
- All data recorded from the field on day to day basis shall be transmitted to the research cell & shall be digitized for periodic analysis of the data. Computer data on animal sighting, herd size of each species, movement pattern, plant phenology and fire incidence will be recorded and analysed to give inputs for future management.

Research project proposed in the current plan period 2024-25 to 2033-34

i. Detail on study of habitat for reintroduction of vulture in MTR.

ii. Home range, Dietary habits, and other ecological studies on Forest owlet.

iii. Home range, Dietary habits, and other ecological studies on Tigers, Co predators and Prey

iv. Study of management interventions for fire and impact on fire regime on local ecology

v. Study of impact of SMC works on aquatic ecology

vi. Monitoring and documentation of vegetation monitoring plots.

vii. Long term monitoring of temperature, humidity & rainfall in MTR.

viii. Study on impact of climate change on vegetation composition & structure.

ix. Study on impact of climate change on animal abundance, ecology & behaviour.

x. Study on short & long term impact of tourism in Melghat.

xi. Study on determination of vehicular pollution inside MTR due to plying vehicles in various state highways.

xii. Impact of vehicular movement inside MTR on animal abundance and distribution.

xiii. Determination of carrying capacity of MTR for sustainable tourism.

xiv. Impact of Eco-development activities on villages in MTR.

The above lists is not exhaustive. Based on the proposal receipt from various research organisation & as per the requirement of the TR authority may undertake the research programme subject to availability of funds & utility of the research as well.

Linkage with Academic agencies

The research work will be taken up in collaboration with Rastra sant Tukadoji Maharaj Nagpur University, Universities in Amaravati, SACON, Coimbatore, National Centre for Biological Studies(NCBS), Wildlife Institute of India, Dehradun, Anthropological Survey of India, Zoological Survey of India, Botanical Survey of India, Bombay Natural History Society to name a few.

8.2 MONITORING FRAMEWORK

The Reserve has a good network of forest camps covering all vegetation cover types and habitats of wildlife. A photographic album of ground flora covering many species of grasses, herbs and forbs shall be prepared and distributed to all field staff involved in the day to day monitoring to facilitate easy identification of species from the management point of view. The data generated from such continuous monitoring shall later be inferred/ analysed into very interesting trends, and bases for species-specific and habitat specific planning in the Tiger Reserve. Each Forest Guard in-charge of the respective camp must fill in the requisite information derived from the daylong patrolling of his beat. This would lead to the generation of a lot of data on the basic parameters required for managing a wildlife protected area.

Physical- physical monitoring is as important as biological monitoring. By physical monitoring we can monitor following issues:

a. Patrolling camps

b. Park boundary

c. encroachment

d. unauthorized entry of people

e. monitoring of patrolling parties who are engaged for protection and physical monitoring

f. Animal health by direct sighting

g. Waterhole/salt-licks/grasslands/animal trail etc. monitoring

h. Siltation in water bodies

i. Rate of erosion in the banks of streams

j. Change in rainfall pattern and change in diurnal/ seasonal variation of temperature

Biological-

The Park Management will ensure that the monitoring of biological resources form a basic routine activity in protected area management, and it is the principal way in which the management can identify trends or changes, and so gauge the effectiveness of its managerial inputs. The management shall strive to include a number of useful monitoring activities in the routine duties of the staff, as well as regular annual estimation of wildlife, counts and other activities.

8.2.1 TIGER POPULATION & HABITAT ASSESSMENT

Melghat Tiger Project and its adjoining landscape is an important constituent of Central Indian landscape having tiger occupancy. As per the National Tiger Conservation Authority and Wildlife Institute of India studies in the Central Indian landscape, the tiger population is distributed in 17 populations. The Central Indian

Landscape complex consists of 11 separate landscapes out of which 4 have potential to sustain meta-population of tiger. Melghat landscape is one of these four.

Melghat Tiger Reserve was declared in 1974.Since then, the tiger and other wild animal population have been estimated at various periods. Though these assessments were based on the conventional method of population estimation (Pugmark method and waterhole counting).

Since, 2006 in every 4 years the All India Tiger Estimation (AITE) is being carried out in which both Tiger population estimation & Ecological monitoring is being carried out as per the standard protocol developed by the NTCA. Melghat has witnessed 5th phase of AITE recently in 2022-23 preceded by 2006, 2010, 2014 & 2018 AITE. Permanent line transacts, Camera trap locations are already in place for carried out these periodic monitoring exercise systematically.

Park authority should ensure the effective utilization of MSTrIPES for regular monitoring & recording of data in digital platform through the app. All sighting both direct & indirect shall be recorded using the app and same also be jotted in the camp.

The ecological monitoring of flora and fauna shall be rigorously done through MSTrIPES during Phase-IV exercise in every 6 month as per the NTCA protocol. The details of protocols of both Tiger population Estimation & Habitat assessment is available in NTCA official website **www.ntca.gov.in**. The data obtained through the exercise shall be analysed every time & compared with the preceding exercises to appreciate the change. Factors like change in Vegetation, Human Disturbance and Ungulate Pellets will be taken into consideration.

8.2.1.1 DAILY MONITORING & FORECASTING

Melghat Tiger Reserve is a connecting link between Maharashtra & Madhya Pradesh for interstate dispersal of tiger which is extremely crucial for long term conservation of tigers at landscape level. Prescribed format for daily monitoring is enclosed. The park manager will get this data daily by wireless and should monitor daily basis.

The Format of Patrolling Camp Register for Routine Ecological Monitoring& Biological monitoring has been prescribed by NTCA vide Form **No.6 & Form No. 42**. These forms are appended herewith in **Annexure- 12**for ready reference.

8.2.1.2TIGER POPULATION ESTIMATION & MONITORING FRAMEWORK (PHASE-I, II, III & IV)

Tiger population is being estimated following the standard guidelines and protocols developed by NTCA. The entire TR has been divided into 2 KM² grid and all the camera trap location has been standardized & kept in record. The park authority shall ensure the timely conduct of the AITE & Phase-IV exercise (Pre Monsoon & Post Monsoon). Sufficient camera trap shall be procured to conduct the camera trapping exercise in effective manner. Apart from the Periodic monitoring regular monitoring of Tiger & other animals shall be carried out through placing camera in sensitive places and important tiger bearing area to get regular updates about the particular individuals. All the field staffs shall be adequately trained regarding handling of camera and recording of data.

The details of guidelines for population Estimation & monitoring is available in NTCA website www.ntca.gov.in.

8.2.1.3 SPATIAL DATABASE DEVELOPMENT

During the regular patrolling the emphasis of the staff will be protection and wildlife monitoring. With regards to wildlife monitoring the activities to be carried out and the information to be generated and transmitted will be as follows:

(i) PIP- This exercise is to be carried out and the information is to be generated at beat guard level and compiled at the range level.

(ii) Tiger ID file swill be created and updated and compiled at range and divisions level.

(iii) Tiger and Leopard sightings will be communicated to the division and directorate by wireless message.

(iv) The observations of kills/waterholes/ trails will be noticed. Trap camera are to be installed to identify and monitor individual tiger.

(v) The information regarding the direct and indirect signs of tiger will be collected in last week of every month and sent to National Tiger Conservation Authority through Directorate.

(vi) Monthly reports of mortality of Tiger and Leopard will be submitted to the directorate through divisions.

(vii) The monthly reports of poaching of Tiger and other wild animal will be submitted to the directorate.

8.2.1.4 WILDLIFE HEATH MONITORING

It should be done regularly as there is danger of spread of epidemic through domestic cattle grazing in the Reserve. Water Samples should be regularly tested and adequate measures shall be taken to sanitize the water as and when needed. Survey of adjacent fringed villages should be done to know about the spread of any epidemic. Vaccination of fringe cattle against F.M.D., Anthrax, H.S & B.Q, etc. should be ensured at suitable intervals by the veterinary unit in cooperation with the local veterinary department.

8.2.1.5 MORTALITY SURVEY

Daily monitoring of mortality report relating to tiger and leopard has been initiated in Melghat since 2005.The data is collected on wireless system and the record is maintained both at the Division and Directorate.

The field staff during their regular patrol in their respective beat area needs to look for death of all animals including natural kill by a carnivore and report to the

concerned range officer on a daily basis. Each range office to maintain a mortality survey register and death details to be entered then and there and an abstract of same fact in a specified format with digital photograph submitted to the office of the field director. In case of other natural death (other than kill by a carnivore), death due to diseases and poaching should be immediately informed to the DCF who will act as per relevant NTCA guidelines. Subsequently the fact also should report to the O/o the Field Director, MTR.

Periodical training to the Forest Field staff for collection of details on mortality need to be given regularly to maintain proper records by the wildlife health monitoring and Forest Veterinary Unit.

The Standard Operating Procedure for Tiger Mortality & Carcass dealing with Anthrax issued by NTCA shall be scrupulously while dealing the mortality in such cases.

8.2.1.6 ANALYSES AND REPORTING FRAMEWORK-

The data taken from field to be compiled TR/Landscape-wise and send to WII for further analysis and results. Arrangements may be made at FD level to analyses the data through imparting training to the Tiger cell staffs.

8.3 TRAINING

8.3.1 TRAINING PROGRAMMES

Training forms an important aspect for all levels in the administration, which results in generation of better and innovative ideas leading to enhanced conservation and managerial measures. There is a lack of intensive training in almost all the strata, which will address important practical and day-to-day issues facing the frontline men in particular. Training is essential to increase the managerial capability and technical skill of the staff. Present days Protected Areas planning and management is a highly technical science bringing together the theory of several diverse disciplines, i.e., ecology, forestry, geography, wildlife Training should be carried out in an organized and structured manner in order to achieve optimum result. It should be organized for the different levels of staff.

It should address the specific needs, duties and responsibilities carried out by the staff.

The challenging wildlife conservation scenario today requires committed wildlife managers who possess scientific competence and social awareness aided by communication skills. They also need sharp detection and enforcement capabilities against organised criminal elements nursed by big-money illegal trade. Accomplished wildlife biologists and social scientists are also necessary. Frontline staff equally must have similar skills at the grassroots level. The current capacity building and personnel management planning, HRD and management measures need to be greatly strengthened to meet these challenges. Training programmes aimed at upgrading the skill levels of the staff to match these challenges have to be part of routine rather than exception.

The field staff at the level of Foresters, Forest Guards and Protection Assistant and the anti-poaching watchers to be trained regularly in wildlife monitoring works, Camera trapping, organizing and conducting wildlife census work, recording population structure of wild animals like chital, Sambar, elephant and gaur on a regular basis when they go for their perambulation.

They should also be trained in taking photograph of tiger and leopard pugmarks for further analysis to identify individual animals. They need to be trained to use the modern equipment like range finders, field compass, Global Positioning System (GPS) etc. And to use this equipment in their regular work like fire mapping and plantation mapping etc. They will be also be trained to distinguish various predator scats. Further analysis of predator scats collected by field staff will reveal food habit of carnivores. They need to also be trained to collect the jaw bones from predator kills to assess the age of animals killed by predators.

8.3.1 ON THE JOB TRAINING

Effective management of wildlife and their habitat requires rigorous training in wildlife management. Specialised Training & theme based internal training modules of

short duration shall be organized at regular interval for the frontline staffs which will be helpful in achieving the desired skill and capacity of the staffs.

Specialized trainings like MSTrIPES, Drone training, Arms & weapon handling training, Dog squad training, Animal rescue & release training, Grassland management, intelligence gathering training, firefighting training, wildlife monitoring training& theme based modules like Census techniques for Mugger, Birds & Elephants, Orchid identification & restoration, field Botanization, Forest law, Road & Infra maintenance, AITE, Phase-IV monitoring, Camera trapping etc. shall be conducted as a part of internal training programme of the TR.

They will be given refresher courses at least once in a year's interval. The course need be conducted with the help of experienced field Biologists. Case study based demonstration that forest and wildlife conservation and ecologically sound rural development are mutually complementary can be arranged.

The training workshops need to be conducted in Wildlife crime investigation, recording evidences, preparation of charge-sheets, and trial of offences for successful prosecution. This needs to be done with the help of local judiciary, the police and other law enforcement agencies, apart from certain NGO's working in the field.

8.3.2 FORMAL TRAINING COURSES

Table No.8(b): Formal Training courses for various Forest Officials in various state/ National Level Training Institute.

Sl. No.	Name of the Course	Duration	Eligibility
1	Post Graduate diploma course in Advance Wildlife management at W.I.I.	10 months	DCF/ACF
2	Certificate course in Wildlife management at W.I.I., Dehradun	03 month	RFO

3	Wildlife Management Training in State training school as prescribed by W.I.I.	03 month	Forester/ F.G.
4	Wireless operation and Weapon training/intelligence gathering/ Cyber crime at Police Academy	-	CAF/RFO/ Forester/ F.G.
5	Tourism management, receptionist, interpretation and environmental education at C.E.E., Ahmadabad	-	ACF/FRO
6	Wildlife health, Chemical immobilization, application of power fencing etc. at W.I.I, Dehradun	-	FRO/RO
7	Capsule courses in Wildlife		CCF/CF
8	Remote sensing at IIRS at Dehradun	10 months	
9	Decision Support system (DSS) & e-Green Watch	03	ACF/DCF/CF
10	Application of Drone/DGPS in Forest Survey and Demarcation	05	DCF/ACF/ROs
11	Refreshing Course at CASFoS, Dehradun/Coimbatore/Burnihat	3-7 days	ACF/ RFO

8.3.3 ESTABLISHMENT OF LEARNING CENTRE

A learning Centre/Wildlife Training center can be created at Partavada close to the premises of transit Treatment Centre or Wildlife Rescue & Rehabilitation Centre for imparting regular training to the field staffs on various aspects of wildlife management as discussed earlier in this chapter. The Rescue resources of Rescue center also can be integrated with the training center for effective learning experience. Biological specimens of various animals of Melghats, can be kept over there. Apart from that pugmarks and hoof marks of various animals, herbarium specimens of plant specimens should be kept. A complete library set up shall be made in the training center for referencing various wildlife related literature by the trainee. Field staff should be asked to visit and make use of the Centre. Fund provisioning for the same may be made from the foundation or state Plan. A model training manual needs to be prescribed incorporating all the above programmes.

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