सत्यमेव जयते

GOVT. OF MAHARASHTRA

MELGHAT TIGER RESERVE
AMRAVATI

TIGER CONSERVATION PLAN : CORE PLAN

Live And Let Life

Melghat Tiger Reserve

PLAN PERIOD : 2014-15 To 2023-24

PREFACE

Melghat Tiger Reserve (MTR), the part of Satpuda Maikal ranges falls in Amarvati, Akola and Buldhana districts of Vidharbha in Maharashtra. It is one of the 9 Project Tiger declared initially in 1973 by Government of India and came into existence on 22nd Feb, 1974 as the first tiger reserve of Maharashtra. MTR is the store house of biodiversity and tribal culture. MTR is a typical representative of Central Indian Highland forming a part of the Bio-geographic zone '6 E-Deccan Peninsula'– Central Highlands. The reserve forms an important corridor between protected and forests areas of Madhya Pradesh and Maharashtra ensuring contiguity of forests in Satpuras. Melghat Tiger Reserve is predominately inhabited by *Korku* tribes. The *Korkus, Nihals* and *Gaolis* have their own tradition of indigenous ethno botanical knowledge. The gotras of *Korkus* are seen to have been named after trees e.g. Jamunkar, Semalkar etc. which goes to prove the integration of their culture with nature.

The reserve forms a very important catchment to Tapi and Purna river systems with important tributaries like Dolar, Khandu, Sipna, Gadga, Khapra and Wan river. The river Chandrabhaga which originates from Chikhaldara has its watershed in the reserve. The Gavilgarh fort and Vairat points in the Vicinity of Chikhaldara hill station have important historical significance. Crevices in valleys and forts offer good hiding spaces for wildlife. It harbours a viable population of Tiger (*Panthera tigris)* and of the endangered Gaur *(Bos gaurus).* All India Tiger Census, 2010 estimated the presence of about 32-35 tigers in the reserve and it has the potential of supporting 50 tigers based on today's prey base available as estimated by the method of Hayward et.al. The number may go up also depending on the availability prey base, refuge and water in future. It also harbours 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)* There are 37 species of mammals and several species of reptiles, butterflies and insects. The reserve is also very rich in avifauna with 265 species of birds including the recently rediscovered Forest Spotted Owlet (*Athene blewitii).* As many as 1451 species of Spider species, out of a total 39882 Spider from the world are reported in India and Melghat have 204 Spider species. Ecologically sensitive animals like Flying Squirrel is abundantly seen here which is an example of close canopied and dense forest of old growth. The embankments of Tapi, Khapra and some '*doh*' in 'Koktu' valley are also reported to harbour crocodiles and otters.

The floral diversity of Melghat Tiger Reserve consists of 769 plant species 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 Ghat and Satpura, with many endemic species. Some of the Himalayan plant species like *Preistylus constrictus* are also reported here. The rare plants include *Convolvulus flavus, Utricularia striatula, Drosera indica* and many species of orchids like *Vanda tesselata* and *Aerides maculosum.* The northern area receives good rains and has better vegetation growth in lower gentle slopes and valleys. The teak forests dominate the areas and *Bombax ceiba, Zizyphus, Stereospermum, Dalbergia sisso and Diospyros* remain associated with *Tectona grandis* (Teak). The soil of trap origin rich in mineral supports the teak well in the area. The species of NTFP importance are also occurring in the areas and these are *Madhuca latifolia, Emblica officinalis, Terminalia belerica, Terminalia chebula, Eugenia cumini, Aegel marmelos* etc

The National Tiger Conservation Authority had requested the Government of Maharashtra to declare the "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, Govt. of Maharashtra had notified the Critical Tiger Habitat vide notification no. WLP 10-07/CR-297/F-1, dated 27 December 2007. The declared "Critical Tiger Habitat" of 1500.49 sq. km. includes 1. Gugamal NP (361.28 sq. Km.), 2. Melghat WLS (788.75 sq. Km.), 3.Narnala WLS (12.35 sq. Km.), 4. Ambabarwa WLS (127.11 sq. Km.) and 5. Wan WLS (211.00 sq. Km.). Out of this, 1150.03 Sq.Km. (Gugamal and Melghat Sanctuary) belongs to the initially declared Melghat Tiger Reserve on 22nd February 1974. The buffer area of 1268.03 sq. Km. from adjoining territorial divisions of Akola, Buldhana, East and West Melghat was identified and declared by the State Government vide the notification no. WLP 10-10/CR-139/F-1, dated 29th September 2010.

The practice of preparing management plan of protected areas in India had started after National Wildlife Action Plan, 1983. Melghat Tiger Reserve however, been managed according to approved management plan since its inception. The first management plan of MTR was prepared by Shri K. A. Shaikh and Shri V.B. Sawarkar and was operation from 1973-78. Shri M. G. Gogate had prepared plan for 1988-98 and Shri P. J. Thosare for "Multiple Use Area" for 1992-95. The current management plan for the period 2004-05 to 2013-14 was prepared by Shri Ramanuj Choudhry. The first plan had identified the water as limiting factor for tiger and its prey base and the management prescription of soil and water

conservation and habitat protection from fire given accordingly. The ongoing plan gave emphasis on protection and food, shelter and water for suitable dispersal of wild animals and employment generation and reduction of wild animal conflicts in the area. It also aimed at the promotion of eco tourism in the reserve. Choudhry's plan had covered the area of Gugamal National Park (361.28 Sq. Km.), Melghat Sanctuary (788.75 Sq. Km.) and Multiple Use Area (526.90 Sq. Km.). The amendment in Wildlife (Protection) Act 1972 in 2006 (Section 38 V added) proposed the creation of National Tiger Conservation Authority (NTCA) and accordingly NTCA, Ministry of Environment and Forests, Government of India was created. NTCA vide its letter no. F-No PS-MS (NTCA) / 2007 miscle. dated 5th October 2007 issued detailed format and guidelines for preparation of Tiger Conservation Plan (TCP). Accordingly, the draft plan for core and buffer was initially prepared in the year 2010 by Shri A.K. Misra, then the Chief Conservator of Forest and Field Director, MTR. It was deliberated, revised and corrected as per suggestions by then the Chief Conservator of Forest and Field Directors Shri K.P. Singh.TCP was submitted to National Tiger Conservation Authority for approval by Govt. of Maharashtra in the year 2013. The plan was scrutinised by NTCA and some of the queries raised and suggestions given and those were complied in 2014 by the undersigned and resubmitted to NTCA for approval. However, NTCA has further issued some new guidelines to be incorporated in the revised Tiger Conservation Plan in April 2014.

The present "Tiger Conservation Plan (TCP)" has been prepared and revised according to the guidelines issued by the NTCA from time to time and by incorporating the suggestions it has given. The plan period will be for ten years from 2014-2015 in continuation of Choudhary's plan from 2004-2005 to 2013-2014. The plan may be reviewed in between depending on the changing needs of Melghat Tiger Reserve over a period of time and any new directions given and guidelines issued by the NTCA. The present TCP has covered the entire core and buffer areas. It has independent corridor plan, plan for buffer area and eco tourism plan duly approved by Local Advisory Committee (LAC), a multimember body involving professionals, public representatives and local people and headed by Commissioner. The TCP has given emphasis on the protection both by traditional way of foot patrolling and elephant patrolling specially in monsoon seasons, protection camps at vulnerable places, mobile squad and also by proposing aerial monitoring with the help of Unmanned Aerial Vehicles (UAV) and advanced electronic gadgets such as GPS, CCT's camera, PDA etc. The Village Eco Development Committees may also be involved in gathering information and by

having network of the informers. Habitat improvement works such as meadow development, soil and moisture conservation works on watersheds basis, invasive species eradication etc would be undertaken on needs basis. The research works fulfilling the managerial requirements of the MTR would be undertaken to assess the changes in the habitat and bio diversity of the reserve. The mobilisation of the resources by the reserve will be undertaken by promoting eco tourism and arranging organised tours in the reserve. The relocation of the villages from the core areas of the reserve as envisages by the NTCA to have inviolate area on one hand and to provide better living conditions to the tribal on voluntary basis would be another important aspect of management to be taken care off.

The participatory approach of management by involving the locals in all aspect of management would be the basis of habitat management, protections and eco tourism in the reserve. The "Village Eco Development" would be actively involved in all aspect of management. The wildlife management essentially involve the reduction of biotic pressure on the reserve and it would be achieved by providing alternatives such as LPG connections, solar lamp and lights and providing meaningful employment. Melghat Tiger Reserve Conservation Foundation would vigorously pursue the research, eco tourism, assets building and fund raising along with the welfare of the staff of the reserve. The village eco development works will be undertaken in the villages. The traditional food gatherers and hunting communities such as "Pardhies" would be involved in protection and management of the reserve.

Tiger Conservation Plan preparation involves the efforts and hard works of many and similarly the TCP of Melghat Tiger Reserve has also received inputs from all concerned to become an implementable management document after approval. Principal Chief Conservator of Forest (Wildlife), Maharashtra State, Nagpur and Chief Wildlife warden over a period of plan preparation Shri D. C. Pant, Shri A. K. Joshi, Shri S. W. H. Naqvi and the present PCCF (WL), MS, Nagpur Shri Sarjan Bhagat and Add Principal Chief Conservator of Forest (Wildlife) Shri A.K. Saxena, Shri Vinay Sinha, Shri S.H. Patil and Add PCCF (East) Wild life, Nagpur Shri S. S. Mishra, Shri Meipokin Ayyer have given important inputs and suggestions and constantly motivated and guided the Team Melghat to improve upon the plan. Team owe its thanks to all of them for their guidance and encouragement. The constant support to Melghat Tiger Reserve from the Govt of Maharashtra extended by Principal Secretary (Forest), MS, Shri Praveen Pardeshi has been very motivational and we convey the Team Melghat special thanks to him. Shri A. K. Misra and Shri K. P. Singh, then

the Chief Conservator of Forest and Field Directors, Melghat Tiger Reserve deserves thanks for initiating the process of the preparation of Tiger Conservation Plan of MTR and its revision and submission to NTCA, we accordingly convey Team Melghat thanks to both of them. The three Deputy Conservator of Forests of MTR divisions Shri Ravi Wankhede, Shri Umesh Verma, Yuvraj and Reserach Officer, Vishal Patil though the part of Team Melghat yet to be thanked for their hard works and involvements in preparing and revision of TCP. Shri Yuvraj, then the Deputy Conservator of Forest, Sipna Wildlife Division and his Research officer Shri Vishal Patil has taken lot of pains in revising the chapter VII and drafting the corridor plan of the TCP as per the suggestions and guidance of NTCA. All the Team Melghat members in the MTR Directorate, Amravati including Shri Shivaji Bhagat, DFO, Research, Shri R. G. Farkade, Documentation Officer, Shri D.S. Dhotre, the Surveyor, Shri A. R. Nafade, the Kalakar and Shri Praveen Thakre, the Clerk, MTR and all those directly and indirectly contributed and supervised by Shri D.B. Satadeve, the OS, efforts need to be appreciated and to be thanked for their contribution in preparation, finalisation and submission of the Tiger Conservation Plan (TCP) of Melghat Tiger Reserve. Thanks to all of them. In the last but not the least the Team Melghat conveys it's thanks to "Waghobha", the Melghat Tiger who is the cause of action and in the centre of TCP.

Dr. Dinesh Kumar Tyagi,

Chief Conservator of Forest & Field Director

Melghat Tiger Reserve, Amravati

CONTENTS

Para. No.	Particulars	Page No.
	PART- A	
	THE EXISTING SITUATION	
	CHAPTER I	
	1. INTRODUCTION OF AREA	
1.01	Reasons for Revision of the Management Plan	1
1.02	Name, Location, Constitution and Extent	3
1.03	Bio geographic Location	3
1.04	Extents and constitution of Area	3
1.05	Provision in Wildlife (Protection) Act, 1992 for Tiger Conservation Plan	4
1.06	Administrative Control	6
1.07	Legal status of Gugamal National Park and Melghat Sanctuary	7
1.08	History of denitrification of part of Melghat Sanctuary and creation of Multiple Use Area	8
1.09	Writ Petition No. 1748/94 filed by Bombay Environmental Action Group	8
1.10	Legal status of Narnala Sanctuary	9
1.11	Legal status of Ambabarwa Sanctuary	9
1.12	Legal status of Wan Sanctuary	10
1.13	Approach and access	10
1.14	Significance of the area for Tiger Conservation	11
1.15	Ambabarwa Sanctuary	11
1.16	Wan Sanctuary	12
1.17	Narnala Sanctuary	13
1.18	Catchments of 'Tapi' and 'Purna' river	13
1.19	Recreational values	13
1.20	Historical Vairat, Gavilgad and Narnala Forts	14
1.21	Gugamal National Park- A large inviolate area	14
1.22	Unique habitats harboring rare and endangered wildlife	14
1.23	Flora	14
1.24	Indigenous Korku	15
1.25	Rich in avifauna	15
1.26	Home for flying squirrel, Hornbills, Forest Owlets, Vultures and others	15
1.27	Spiders, Values of Melghat Tiger Reserve	17
	CHAPTER II	
	2. BACKGROUND INFORMATION AND ATTRIBUTES	
2.01	Geology, Rock and Soil	19
2.02	Drainage	19
2.03	Geology	19
2.04	Soils	19
2.05	Terrain	19
2.06	Climate	19
2.07	Temperature	20
2.08	Frost	20
2.09	Dew and Fog	20
2.10	Winds	21

2.11	Monitoring of rainfall and Temperature	21
2.12	Hydrology and water sources	21
2.13	Water Management	22
2.14	The vegetation- General description and condition of the forests	23
2.15	Information about past management	24
2.16	Forest Types	25
2.17	Floral bio-diversity	26
2.18	Wild fauna habitats	27
2.19	Evaluation of habitats	27
2.20	Range of wildlife and past studies of fauna	27
2.21	Limiting factors for wildlife	31
2.22	Major conspicuous changes in the habitat since inception	32
2.23	Habitat Study Report	33
	CHAPTER III	
	3. STATUS OF TIGER AND CO PREDATORS	
3.01	Tiger and co-predators	35
3.02	Panther	35
3.03	Wild dog	35
3.04	Sloth Bear	36
3.05	Jungle Cat	36
3.06	Caracal	36
3.07	Ratel	36
3.08	Civets	36
3.09	Indian Fox	37
3.10	Striped Hyena	37
3.11	Jackal	37
3.12	Abundance status	38
3.13	Diet Composition of Major Carnivores	40
3.14	Monitoring of kills in the study area	41
3.15	Study on biological impact of resettlement of three villages in MTR	42
3.16	Prey predators relationship	43
3.17	Studies on food habits and related behavior of tigers and other carnivores in Melghat	44
3.18	Field staff to undertake studies on habitat development	45
3.19	Eco logical stratification of wild fauna	45
3.20	Density and distribution of major herbivores in various regions	46
3.21	Distribution	47
3.22	Population density trends in other tiger habitat	47
3.23	Management intervention and status of protection in various categories of PAs and other areas of MTR	48
3.24	Highest density of tiger in National Park	48
3.25	Assessment of threats	50
	CHAPTER IV	
	4. HISTORY PAST MANAGEMENT AND PRESENT PRACTICES	
4.01	Conservation history	51

4.02	Short descriptions of plan	52
4.03	History of wildlife management in MTR	54
4.04	Critical review of habitat improvement works in past 10 years	56
4.05	Evaluation of conservation practices	57
4.06	Protection and intelligence gathering	58
4.07	Encroachments	60
4.08	Scheduled Tribe and other forest dwellers (recognition of forest right act, 2006)	60
4.09	Poaching and Fishing	62
4.10	Intelligence gathering	62
4.11	Illicit felling	63
4.12	Weed	64
4.13	Reasons for lantana spread	64
4.14	Fire Protection	64
4.15	Faith unto death	65
4.16	Grazing	65
4.17	Eco tourism potential protected area and its sanctuary area	66
4.18	Research and monitoring	68
4.19	The basis, need and scope	69
4.20	Research activities	79
4.21	Wildlife monitoring activities in Melghat Tiger Reserve	71
4.22	Relocation of villages	72
4.23	History of relocation in Melghat Tiger Project Rehabilitation of Bori, Koha, Kund villages in First Phase.	72
4.24	Rehabilitation of Vairat, Churni and Pastalai villages in second phase	73
4.25	Relocation of Amona, Nagartas and Barukheda villages in third phase	76
4.26	The impact on PA due to vacating villages	79
4.27	Impact on human settlement	79
4.28	Scope for research and monitoring	80
4.29	New vistas for nature education and ecotourism	80
4.30	Site specific studies	80
4.31	Administration and organization	80
	CHAPTER V	
	5. LAND USE PATTERN AND CONSERVATION MANAGEMENT ISSUES	
5.01	Land use classification	83
5.02	Socio economic profile of villages	83
5.03	Resource dependence of villages	84
5.04	Human wildlife conflict	85
5.05	Measures to reduce Man-Animal conflict	86

5.06	Sloth Bear- Human Conflict	87
5.07	Cattle kills by Tigers and Leopards	88
5.08	Injuries to human being by wild animals	89
5.09	Assessment of inputs of line agencies/ other departments	90
	PART-II	
	PROPOSED MANAGEMENT	
	CHAPTER VI	
	6. PROPOSED MANAGEMENT VISION, GOALS, OBJECTIVES AND PROBLEMS	
6.01	Introduction	91
6.02	Basis for proposed management	91
6.03	National forest policy, 1988	91
6.04	Vision and management goals	92
6.05	Management objectives	92
6.06	Problems in achieving objectives	93
6.07	Strength, Weaknesses, Opportunities threats Strength	96
6.08	Weaknesses	98
6.09	Opportunities	99
6.10	Threats	99
	CHAPTER VII	
	7. MANAGEMENT STRATEGIES	
7.01	Delineation of Critical Wildlife Habitats and inviolate area	100
7.02	Zone and theme approaches to management strategies	101
7.03	Management of Bio-diversity Conservation Zone	102
7.04	Special objects for management for the Bio-diversity conservation Zone	102
7.05	Management prescriptions for the Bio-diversity conservation Zone.	103
7.06	Unique Habitat Management Zone	104
7.07	Calculation of Carrying Capacity of Tiger in Melghat Tiger Reserve	105
7.08	Prescriptions for Meadow Development	108
7.09	Eradication of Lantana	109
7.10	Water shed Development	109
7.11	Prescriptions for Ballas and Dohs	110
7.12	Voluntary relocation Zone	110
7.13	Prescriptions for relocation Zone	112
7.14	Eco-development	112
7.15	Administrations Zone	115
7.16	Prescriptions for Administrations Zone	115
7.17	Eco-tourism Zone	116
7.18	Existing Eco-tourism Zone in Melghat Tiger Reserve	116
7.19	Identification of New tourism Zone in Melghat Tiger Reserve	117
7.20	Prescription for eco-tourism Zone	118
7.21	Theme Plan	118
7.22	Soil and Moisture Conservation	118
7.23	Protection Strategy	119
7.24	Control of poaching and illicit cutting	119
7.25	Strengthening Communication System	120
7.26	Special Tiger Protection Force	121
7.27	Dog Squad	127

7.28	Fire arms and ammunitions	128
7.29	Wildlife Crime cell	130
7.30	Intelligence Gathering and use of secret service fund	130
7.31	Publicity and awareness	130
7.32	Fire Control	130
7.33	Regulation of Traffic	132
7.34	Transmission line	133
7.35	Animal monitoring	133
7.36	Human Wildlife Conflict	140
	CHAPTER VIII	
	8. RESEARCH, MONITORING AND TRAINING	
8.01	Research priorities	146
8.02	Some important aspect	147
8.03	Research projects	148
8.04	Research cell in the directorate	149
8.05	Monitoring framework	151
8.06	Training need assessment and HRD	151
	CHAPTER IX	
	9. TIGER POPULATION AND HABITAT ASSESSMENT	
9.01 to 9.05	Introduction	152-153
9.06	Daily monitoring and forecasting	154
9.07 9.08	Monitoring of wild animals	154
9.09 9.10	Tiger population estimation and monitoring Frame work I, II, II and IV	158
9.11	Stage: I Special mapping and monitoring tiger prey and habitat	158
9.12	Stage: II Special and attribute data	159
9.13	Stage: III Estimating the population of tiger and its prey	159
9.14	Tiger numbers	159
9.15	Tiger Prey	159
9.16	Stage: IV Intensive monitoring of source populations	159
9.17	Habitat assessment and monitoring framework 3- Sampling for vegetation, human disturbance and ungulate pallets	160
9.18	In 15 m. radius circular plots	161
9.19	In 1 m. radius circular plots	162
9.20	4- Sampling for ungulate pallets	162
9.21	Results of 2010 monitoring exercise	162
9.22 9.23	Spatial database development	163
9.24	Analysis and reporting framework	164
	CHAPTER X	
	10. PROTECTION AND INTELLIGENCE GATHERING	
10.01 10.02	Introduction and major threats	165
10.03	The tiger cell	166
10.04	The strike force/ tiger protection force	167
10.05 to 10.07	Strategy for protection and communication	167 to 168
10.08	Intelligence gathering and enforcement	168 to

10.09		169
	CHAPTER XI	
	11. ECO TOURISM AND INTERPRETATION	
11.01 11.02	Introduction	170
11.03	Organization setup and management	170
11.04	Dos and Don'ts for visitors/ eco tourists coming to MTR	171
11.05 11.06	Role of Tiger Conservation Foundation	172-173
11.07 11.08	Implementation of eco-tourism guidelines	174 to 175
11.09	Park interpretation program	175
11.10	Publicity, Nature education and spread of common conservation message	175
11.10	Signages, wayside exhibits	175
11.11	Pamphlets, Handbills etc.	175
11.12	Maintenance and updating of the reserve website	176
11.13	Wildlife observation equipments	176
11.14	Participation of local people in promoting and managing ecotourism	177
	CHAPTER XII	
	12. MISCELLANEOUS ISSUES	
12.01	Administrative control	178
12.02	Details of staff sanctioned for MTR	178
12.03	The need for strengthening organization setup	179
12.04	Housekeeping of departmental Elephants	179
12.05	Wildlife health monitoring	180
12.06	Mortality Survey	180
	CHAPTER XIII	
	13. ORGANIZATION, ADMINISTRATION AND BUDGET	
13.01	Tiger steering committee	182
13.02 to 13.05	Tiger Conservation Foundation	182to183
13.06	Coordination with line agencies/ departments	184
13.07	Amenities to staff	186
13.08	Fund raising strategies	186
13.09	Schedule of operations	186
13.10	Activity budget	187
	CHAPTER XIV	
	14. MONITORING AND EVALUATION	
14.01	Introduction Criteria	188
14.02	Process	188
14.03	Compartment Histories	188

LIST OF MAPS

Map No.	Particulars
1	Administration Zone of MTR
2	Biodiversity Conservation Zone of MTR
3	Unique Habitat Management Zone of MTR
4	Eco-tourism Zone of MTR
5	Voluntary Relocation Zone of MTR
6	Division Map of MTR
7	Unique Places in MTR
8	Waterholes in MTR
9	Protection Camps in MTR
10	Wireless Stations & Fire Watch Towers in MTR
11	Check-posts in MTR
12	Fire-lines in MTR
13	Road Network
14	Map showing Protected Areas in MTR
15	Map showing Critical Tiger Habitat (Core & Buffer) in MTR
16 & 17	Map showing distribution of Tiger, Leopard, Sloth Bear, Gaur & other species.

LIST OF COMMON ABBREVIATIONS USED IN TIGER CONSERVATION PLAN

ACF: Assistant Conservation of Forests
B & C: Building & Construction
BSI: Botanical Survey of India
CAMPA: Compensatory Afforestation Fund Management Project Authority
CCF: Chief Conservator of Forests
CCT: Continuous Contour Trenches
CCTV: Close Circuit Tele Vision
CD: Compact Disc
CDR: Call Details Record
CSS: Centrally Sponsored Scheme
CTH: Critical Tiger Habitat
CWR: Coppice With Reserve
DCT: Differentiated Contour Trenches
DNA: Deoxyribose Nucleic Acid
DyCF: Deputy Conservator of Forests
EDC: Eco Development Committee
FCA: Forest Conservation Act
FD: Field Director
FPC: Forest Protection Committee
GIS: Geographic Information System.
GNP: Gugamal National Park
GPS: Global Positioning System.
GR: Government Resolution
HQ: Head Quarter
HRD: Human Resources Development
IBA: Important Bird Area
ID: Identification
IUCN: International Union for Conservation of Nature
LAC: Local Advisory Committee
LBS: Loose Boulder Structure
LCD: Liquid Crystal Display
MGNREGS: Mahatma Gandhi National Rural Employment Guarantee Scheme
MOU: Memorandum of Understanding
MPCA: Medicinal Plant Conservation Area
MSEB: Maharashtra State Electricity Board
MSEDL: Maharashtra State Electricity Distribution Limited.
MSL: Mean Sea Level
MTP: Melghat Tiger Project
MTR: Melghat Tiger Reserve
NGI: Non-Governmental Institutions
NGO: Non-Governmental Organization
NTCA: National Tiger Conservation Authority.
NTFP: Non Timber Forest Produce
PA: Protected Area
PESA: Panchayat extension to Scheduled Area Act, 1996.
PIP: Pugmark or Pressure Impression Pads
PT: Project Tiger
PTM: Project Tiger Melghat
PWD: Public Works Department

RRSSC: Regional Remote Sensing Service Centre
SCI: Selection Cum Improvement
SDO: Sub Divisional Officer (Revenue)
SH: State Highway
SRPF: State Reserve Police Force
STPF: Special Tiger Protection Force
TCM: Trench Cum Mound
TCP: Tiger Conservation Plan
VDR: Village District Road
VEDC: Village Eco-Development Committee.
VMP: Vegetation Monitoring Plot
WCC: Wildlife Crime Cell
WCT: Wildlife Conservation Trust
WII: Wildlife Institute of India
WLPA: Wild Life Protection Act
WLS: Wild Life Sanctuary
WRCS: Wildlife Research & Conservation Society, Pune.
WS: Wildlife Sanctuary
ZSI: Zoological Survey of India

PART- A

CHAPTER-I

INTRODUCTION OF THE AREA

1.01 REASONS FOR REVISION OF THE MANAGEMENT PLAN

This Tiger Conservation Plan deals with the forests comprised within the Melghat Sanctuary, Gugamal National Park and the three wild life Sanctuaries namely Wan, Ambabarwa and Narnala of Akot Wildlife Division. These 5 PAs comprise the core zone of MTR. The existing management plan for Melghat Tiger Reserve for the period 2004-05 to 2013-14 covered only the area of Gugamal National Park (361.28 Sq.Km.) Melghat Sanctuary (788.75 Sq.Km.) and Multiple Use Area (528.56 Sq.km.).

Following two developments have necessitated revision of the plan before the expiry: - (i) 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.

(ii) Notification of Critical Tiger Habitat of MTR vide Govt. of Maharashtra notification no. WLP 10-07/CR-297/F-1, dated 27 December 2007 that included the Wan, Ambabarwa and Narnala Sanctuaries to the Critical Tiger Habitat.

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. **(Copy of the notification is given in Appendix no.I)** Vide this notification, following national parks and sanctuaries of the State of Maharashtra, comprising the Tadoba Andhari Tiger Reserve, Pench Tiger Reserve and the Melghat Tiger Reserve were notified as Critical Tiger Habitats.

Sr.No.	**Tiger Reserve and Its Constituent National Park/Sanctuaries**	**Area (Sq.Kms)**	**Notification No.**
(1)	**(2)**	**(3)**	**(4)**
1	***Tadoba Andhari Tiger Reserve***		
	(1) Tadoba NP	116.55	(1) Madhya Pradesh Act No.VII of 1955, No. WLP. 1085/CR-75/F-5 (III), Dated 25-02-1986
	(2) Andhari WLS	509.27	
	Total for Tadoba-Andhari Reserve	**625.82**	
2.	***Pench Tiger Reserve***		
	(1) Pench NP	257.26	(1) No.PGS.1375/121758/F-1, Dated 22-11-1975
	Total for Pench Tiger Reserve	**257.26**	
(1)	**(2)**	**(3)**	**(4)**
3.	***Melghat Tiger Reserve***		
	1. Gugamal NP	361.28	No.WLP.1098/CR-135/F-1, Dated 08-08-2000.
	2. Melghat WLS	788.75	No.WLP.10-2000/CR-41/F-1, Dated 06-11-2000.

	3. Narnala WLS	12.35	No.WLP.1096/CR-279/F-1, Dated 02-05-1997.
	4. Ambabarwa WLS	127.11	No.WLP.1094/CR-123/F-1, Dated 09-04-1997.
	5. Wan WLS	211.00	No.WLP.1097/CR-5/F-1, Dated 27-07-1997.
	Total For Melghat Tiger Reserve	**1500.49**	

The area shown above in the table of Melghat, Wan and Ambabarwa sanctuaries, includes non-forest area also but in the notification issued for the respective sanctuaries, the non-forest area is excluded.

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'** the most magnificent and flagship of the Indian wild species, could sustain a viable population and survive for the eternity. The fascinating landscape, its enchanting beauty and richness leave everlasting imprints on people visiting the area. Melghat Tiger Reserve is one of the earliest 9 Tiger Reserves established by the Government of India and is the First Tiger Reserve to be declared in the State of Maharashtra. It came into being on 22nd February, 1974.

1.02 NAME, LOCATION, CONSTITUTION AND EXTENT.

(i) Name: The area of the Critical Tiger Habitat is 1500.49 Sq.Km. falling in the heart of the Melghat. Out of this, 1150.03 Sq.Km. (Gugamal and Melghat Sanctuary) belongs to the initially declared Melghat Tiger Reserve which was declared on 22nd February 1974 and the remaining area of three Wildlife Sanctuaries namely Wan, Ambabarwa and Narnala, added to it on 27/12/2007 now comprise the core area of the Critical Tiger Habitat of the Melghat Tiger Reserve

(ii) Location: 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. This area is geographically located as below.

Melghat Tiger Reserve.

Latitude: Between 21^0 44^1 N and 21^0 08^1 N

Longitude: Between 76^0 39^1 E and 77^0 31^1 E

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.

1.03 BIO-GEOGRAPHIC LOCATION.

Satpuda Maikal division of Melghat Tiger Reserve is located in 6 E central Highlands Biotic province of "6 Deccan Peninsula" Bio-geographic zone.

1.04 EXTENT AND CONSTITUTION OF AREA

The area of Critical Tiger Habitat extends over 1500.49 Sq.Km. consisting of 5 protected areas namely, Gugamal National Park, Melghat Sanctuary, Narnala, Ambabarwa and Wan Sanctuaries.

The details of the area are as follows.

TABLE NO.1

PROTECTED AREA WISE DISTRIBUTION OF CRITICAL TIGER HABITAT.

Sr.No.	Particulars	Reserve Forest in Sq.Km.	P.F.In Sq.Km.	Non forest area in Sq.Km	Total area in Sq.Km.
1.	Gugamal National Park	361.28	-	-	361.28
2.	Melghat Sanctuary	767.36		21.39	788.75
3.	Wan Sanctuary	205.86		5.14	211.00
4.	Ambabarwa Sanctuary	102.10	22.62	2.39	127.11
5.	Narnala Sanctuary	12.35	-	-	12.35
	Total	**1448.95**	**22.62**	**28.92**	**1500.49**

The details of the above area is given in enclosed Map No.14

Tiger is a territorial animal, partial overlaps of resident male territories in an area also occur. Several female territories do occur in an overlapping manner within the territory of a male tiger. Study and analysis of available research data on tiger ecology indicates 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 area requires an inviolate space of 800-1000 Sq.Km. Tiger being "Umbrella Species" this will also ensure viable population of other wild animals like co predators and prey species thereby ensuring the ecological viability of the entire area/Habitat. This necessitates the creation of buffer area. The buffer area absorbs "shock" of poaching pressure on population of tiger and other wild animals. In case of severe habitat depletion in buffer areas the source population would get targeted and eventually be decimated.

1.05 PROVISION IN WILDLIFE (PROTECTION) ACT 1972 FOR TIGER

CONSERVATION PLAN:-

As per the section 38 (v) of the wildlife (protection) act, 1972 -

"(1) The State Government shall, on the recommendation of the Tiger Conservation Authority, notify an area as a tiger reserve.

(2) The provision of sub-section (2) of section 18, sub section (2), (3) and (4) of section 27, section 30, 32 and clauses (b) and (c) of section 33 of this Act shall, as far as may be, apply in relation to a tiger reserve as they apply in relation to a sanctuary.

(3) The State Government shall prepare a Tiger Conservation Plan including staff development and deployment plan for the proper management of each area referred to in sub-section (1), so as to ensure:-

a) *Protection of tiger reserve and providing site specific habitat inputs for a viable population of tigers, co-predators and prey animals without distorting the natural prey-predator ecological cycle in the habitat;*
b) *ecologically compatible land uses in the tiger reserves and areas linking one protected area or tiger reserve with another for addressing the livelihood concerns of local people, so as to provide dispersal habitats and corridor for spill over population of wild animals from the designated core areas of tiger reserve or from tiger breeding habitats within other protected areas;*
c) *The forestry operations of regular forest divisions and those adjoining tiger reserves are not incompatible with the need of tiger conservation.*

(4) Subject to the provisions contained in this Act, the State Government shall, while preparing a Tiger Conservation Plan, ensure the agricultural, livelihood, developmental and other interests of the people living in tiger bearings forest or a tiger reserve."

The area of Melghat Tiger Reserve is ideal home of tiger as it contains rich flora and fauna with its unique bio-diversity. The area is also rich containing various types of prey base of tiger with number of perennial water bodies, rivers, though with biotic and other interferences, to nurture tiger and other prey base population.

For the creation of buffer zone around Melghat Critical Tiger Habitat a proposal was prepared by Field Director and submitted to Principal Chief Conservator of Forest (wildlife),

Maharashtra State, Nagpur on June, 2010. The proposal has been approved by the State Government vide the notification no. WLP 10-10/CR-139/F-1, dated 29th September 2010 **(copy of the notification is given in Appendix no. II)**. The details of the area in buffer zone are as under.

TABLE NO. 2

DIVISION WISE, AREA WISE STATEMENT OF MELGHAT TIGER RESERVE

Sr No	Name of the Forest Division	Forest area	Non Forest area	Total area	No. of Villages
1	Sipna Wildlife Division, Paratwada	31879.96	3622.14	35502.10	25
2.	Gugamal Wildlife Division, Paratwada	15261.13	2092.96	17354.09	14
3	West Melghat forest Division, Paratwada	22046.62	2337.46	24384.08	12
4	East Melghat forest Division, Paratwada	17508.85	4807.98	22316.83	23
5	Akola forest Division, Akola.	1932.43	15967.48	17899.91	35
6	Buldhana forest Division, Buldhana.	3436.50	5910.16	9346.66	09
	Total	**92065.49**	**34738.18**	**126803.67**	**118**

1.06 ADMINISTRATIVE CONTROL

The entire area of Melghat Tiger Reserve is administratively controlled by Chief Conservator of Forests and Field Director having headquarter at Amravati. The area has been divided into three Wildlife Divisions; namely Sipna Wildlife Division, Paratwada, Gugamal Wildlife Division Paratwada and Akot Wildlife Division Akot. Entire area of the Reserve including the area of Wan, Ambabarwa and Narnala sanctuaries along with 3 Deputy Conservator of Forests and their staff has been put under Directorate through the Government of Maharashtra Order No. WLP/1094/Pra 211/F-1/Dated 26th April 1999 for unified Control.

TABLE NO. 3

DIVISION WISE DISTRIBUTION OF CRITICAL TIGER HABITAT AREA IN M.T.R.

Name of Division	N.P	Sanctuary			Comptt.
		Forest Area in sq. km.	Non Forest Area in sq. km.	Total Area In sq. km.	
1	2	3	4	5	9
Sipna W/L Dn.	Nil	474.65	9.42	484.07	213
Gugamal W/L Dn.	231.39	225.76	9.25	466.40	197
.Akot W/L Dn.	129.89	409.88	10.25	550.02	179
Total of M.T.R. Circle	**361.28**	**1110.29**	**28.92**	**1500.49**	**589**

Total area of Critical Tiger Habitat under Melghat Tiger Reserve is as under-

Gugamal National Park - 361.28 Sq.kms.

Forest area of Sanctuary - 1110.29 Sq.kms.

Non Forest area of Sanctuary - 28.92 Sq.kms.

Total of Critical Tiger Habitat - 1500.49 Sq.kms.

1.07 LEGAL STATUS OF GUGAMAL NATIONAL PARK AND MELGHAT SANCTUA

Govt. of Maharashtra, Revenue& Forests Department vide Gazette Notification No. WLP 1978/10553 (9), F-5, Dated 5th September 1985, declared an area of 1597.23 sq km as Melghat Tiger Sanctuary **(appendix III A)**. Govt. of Maharashtra Revenue & Forests Department vide Notification No./WLP-1086/18061/F-5/Dated 27 November, 1987 declared its intention to constitute an area of 361.80 sq. km. as a National Park **(appendix III B)**. The total area of Melghat Tiger Reserve was enhanced from 1597.23 sq. km. to 1624.30 sq km. on 27.11.1987. Govt. of Maharashtra. Revenue & Forests, Department vide Gazette Notification No. WLP- 1092/Pra-526/ F-5, dated 15.2.1994 reconstituted the area of Melghat Sanctuary to 1150.03 sq km on administrative grounds **(appendix III C)**. Reserve Forest area of Melghat Sanctuary has been finally notified as Melghat Sanctuary vide

Notification No.W.L.P-10-2000, C.R- 41/F- 1/ dated 6th November 2000 admeasuring 767.36 Sq km **(appendix III D)**. Final notification about Gugamal National Park has been issued vide No. WLP-1098/CR-135/F-1/Dated 8th August, 2000 admeasuring 361.28 sq km **(appendix III E).**

1.08 History of denotification of part of Melghat Sanctuary and Creation of Multiple Use Area:

During 1985, Government of Maharashtra vide its notification no. WLP 1978/10553(9), F-5, dated 5th September 1985 issued notification under section 18 of Wildlife (Protection) Act, 1972 declaring its intention to constitute Melghat Tiger Sanctuary extending over an area of 1597.23 sq.km. The prime object of constituting an area as "Melghat Sanctuary" was to create a wildlife habitat which should be free from any biotic interference.

On February 1994, the Government issued another notification delimiting the Sanctuary area to 1150.03 sq.km. on the following grounds-

(i) Constituting Sanctuary necessitated acquisition of 76.63 sq.km. Non-forest land occupied by 58 villages.

(ii) Acquisition of land to such large extent, the resultant shifting of the people, their rehabilitation, requirement of land and funds for rehabilitation for all these activities was a tremendous task.

Therefore, it was necessary to reduce the area of Sanctuary in a shape of a narrow strip on the North-West and North-East encompassing 39 villages and land admeasuring 526.90 sq.km. With the provisions of section 26 A (3) of WLPA, 1972 the change was notified vide G. R. No. WLP-1092/C.No.526/F-5, dated 15th February 1994. As per the revised notification, area of Sanctuary became 1150.03 sq.km. encompassing 22 villages.

1.09 WRIT PETITION NO. 1748/94 FILED BY BOMBAY ENVIRONMENTAL ACTION GROUP:

The notification dated 15th February 1994 was challenged by the Bombay Environmental Action Group and others by filing a writ petition no. 1748/94 in the Nagpur Bench of Mumbai High Court in June 1994 giving the reason that wild animal poaching in the denotified area will increase as it would lack strict protection accorded to sanctuary and twenty four tigers would become devoid of their habitat because of exclusion of the area from sanctuary and forest will be exploited. The Government clarified these points through several affidavits filed in the High Court stating that the

area excluded from the sanctuary will remain part of Tiger Reserve and no commercial felling will be done.

The writ petition was pending in the High Court for a long time. On 1/08/2011 the court passed order in this respect as below, finally disposing off the petition-

"In view of subsequent Notification dated 29/09/2010 we find that the apprehensions expressed by the petitioners are taken care of. It is also clear that if the petitioners are not satisfied with the steps expected to be taken by the respondents in the matter, they can still approach this Court in appropriate matter. Hence, with this liberty to the petitioners, as we find grievances expressed in the petition already redressed, we dispose of the petition as infructuous. However, there shall be no order as to costs. Rule discharged."

1.10 LEGAL STATUS OF NARNALA SANCTUARY

The area comprised in Sanctuary is Reserve Forests notified vide notification No 344 dated 4th November, 1901. An area of 12.35 Sq. Km. was declared as Narnala Wildlife Sanctuary in 1997 as per clause (b) of sub-section (1) of section 26(a) of the Wildlife Protection Act 1972 vide Government of Maharashtra Notification No. WLP/1096/CR-279/F-1 dated 2 ND May 1997.

A copy of the notification is given in **Appendix no. IV.**

1.11 LEGAL STATUS OF AMBABARWA SANCTUARY

The areas comprised in the Sanctuary are Reserved Forests and Protected Forests and cultivation land of ex-forest villages situated in the Sanctuary. Reserve forests included in Ambabarwa Sanctuary were notified along with other forests of Buldhana District as Reserved Forests**.** An area of 102.10 sq km of Reserve forest was declared as Ambabarwa Wildlife Sanctuary in 1997 as per section 26 (A) of Wildlife Protection Act 1972 vide Govt. of Maharashtra Notification No WLP/1094/CR-123/F-1 dated 9th April 1997. Protected Forests of Ambabarwa Sanctuary area were notified, along with other forests of Buldhana District as Protected Forest. The intention to include 22.62 sq km as part of Ambabarwa Sanctuary was made under section 18 (1) of Wildlife Protection Act 1972 vide Government of Maharashtra Notification No. WLP/1094/CR-123/F-1 dated 9th April 1997. A copy of the notification is given in **Appendix no.V.** The private lands included in the

Ambabarwa Sanctuary are the cultivation and *abadi* areas of three ex-forest villages of Ambabarwa, Chunkhadi and Rohinkhidaki of Sangrampur Tehsil. The intention to include these areas as part of Ambabarwa Sanctuary was made under section 18 (1) of Wildlife Protection Act 1972 vide Government of Maharashtra Notification No. WLP/1094/CR-123/F-1 dated 9th April 1997. The final notification to include the cultivation and Abadi area of above 3 villages as a part of Ambabarwa Sanctuary is yet to be issued.

1.12 LEGAL STATUS OF WAN SANCTUARY

The areas comprised in the Sanctuary are Reserve forests and cultivation land of ex-forest villages. The Reserve forests included in Wan Sanctuary were notified along with the other forests of Melghat forests of Amravati District as Reserve forests. An area of 205.86 sq.km of Reserve forest was declared as Wan Wildlife Sanctuary in 1997 as per section 26 (A) of Wildlife Protection Act 1972 vide Govt. of Maharashtra Notification No.WLP/1097/CR-5/F-1 dated 29th July 1997. A copy of the notification is given as **Appendix no. VI A.** The private lands included in the Wan Sanctuary are 5.14 sq.km of cultivation and *gaothan* area of seven ex-forest villages. The intention to include these areas as part of Wan Sanctuary was made under section 18 (1) of Wildlife Protection Act 1972 vide Government of Maharashtra Notification No. WLP/1097/CR-5/F-1 dated 28th July 1997. Final notification to include these areas as a part of Sanctuary is yet to be issued. A copy of the notification is given as **Appendix no. VI B.**

1.13 APPROACH & ACCESS

Melghat Tiger Reserve is approachable by air, railways as well as roads. The nearest air port is Nagpur which is about 255 kms. from Semadoh. Semadoh is the most well known, centrally located village of the Melghat Tiger Reserve. The nearest railway station is Badnera located in the central railway zone on Mumbai-Kolkata route. The distance from Badnera to Semadoh is about 110 kms. Other noteworthy entry points for the Melghat forests is through Harisal and Akot which are located on Amravati-Dharni State highway no. 6 and Akot-Harisal State highway no. 204 respectively. On the Northern side, the nearest railway station is at Khandwa which is at a distance of 75 kms. from Harisal. 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 details of roads in MTR is given in **Appendix no. VII.** The map showing various roads in **M.T.R. is given in Map No. 13.** In Melghat wireless network has been strengthened from time to time. Illegal tree cutting has increased to some extent due to the increased road network. It has posed danger to wildlife also, as threat perception for illicit trade in wild animals and their products has increased. 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.

1.14 SIGNIFICANCE OF THE AREA FOR TIGER COSERVATION

Melghat Tiger Reserve is a typical representative of Central Indian Highland forming a part of the Biogeographic zone '6 E-Deccan Peninsula'– Central Highlands (Rodgers and Panwar, 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.

1.15 AMBABARWA SANCTUARY

Ambabarwa Sanctuary nestles at the foothills of the Satpuda ranges and has all the flora and fauna typical of the central highlands. It can serve as an important corridor between forests of Maharashtra and M.P. It has a rich repository of biodiversity with endangered mammals like Tiger, leopard, wild dog, chaushinga, ratel etc. It is equally rich in birds, reptiles, insects and other invertebrates. The floral composition is also extremely varied with representatives of Southern Tropical Dry deciduous forests under the sub group 5 A-C 16 of the Champion and Seth classification. Most of the species found in Melghat are also seen in Ambabarwa with the only difference being in their abundance. The main species is teak and its associates. Bamboo forms the understory and the ground is covered by a large number of herbs & shrubs. A large number of plants have important medicinal values & thus the area needs to be preserved for its valuable gene pool.

The area is very sensitive from the protection point of view owing to its proximity to the Madhya Pradesh. Also, the large number of villages on the southern side results in very high biotic pressure on the Sanctuary.

1.16 WAN SANCTUARY

Wan Sanctuary includes outer slopes of Satpuda with all its floral and faunal attributes. It comes under the 6 E Satpuda Maikal range of the Deccan peninsula biogeographic zone. It is an extension of the Melghat Tiger Reserve and provides an important corridor between Akola, Amravati and Buldhana districts. It connects the Melghat sanctuary with Narnala Sanctuary and Ambabarwa Sanctuary, providing a large contiguous stretch of protected areas. It has a rich repository of biodiversity with all the major animals of central highlands being found here. Some of the rare and endangered carnivores seen in Wan Sanctuary are Tiger, leopard, wild dogs, sloth bear, leopard cat, rusty spotted cat, desert cat, ratel etc. The common herbivores include chausinga, sambar, chital, nilgai, wild pigs and barking deer. Some Gaur also stray from the adjoining Melghat Sanctuary thus emphasizing the importance of Wan as an extended buffer of Melghat Tiger Reserve now included as in core area of Melghat Tiger Reserve. The list of birds, reptiles, insects and other invertebrates is equally long and impressive. There has been a significant increase in the aquatic life forms after the commissioning of the Wan Dam. The list of aquatic avifauna has also gone up considerably in and around the Wan reservoir, especially in winters when flocks of migratory waterfowl arrive, thus making the area a paradise for bird watchers. The common birds seen in the reservoir area are Brahminy ducks, White necked storks, White ibis, Spotbills, Common teals, etc.

The floral composition is also extremely varied with representatives of Southern Tropical Dry deciduous forests under the sub group 5 A (Southern Tropical Dry Deciduous Forests) of the Champion and Seth classification. Most of the species found in Melghat are also seen in Wan with the only difference being in their abundance. A large number of plants have medicinal importance, thus making the area important from medicinal plant conservation point of view. The *Rosha* grass occurs in abundance in the area.

The area has a large number of unique geological and religious features. The *Mahadev* cave temple at Dhargad is a unique geological structure that has assumed religious importance over the years. It is the scene of a massive pilgrimage during the *Shrawan mas*. The area forms a major catchment of Wan River and has assumed greater significance since the construction of Wan Dam at Wari.

1.17 NARNALA SANCTUARY

Narnala Sanctuary is a continuation of Gavilgarh range of Satpuda hills as a corridor between the Melghat Sanctuary and Wan Sanctuary. In fact, it acts as a gateway of Melghat from the southern side. The hill of Narnala situated at about 1000 meter above MSL the Narnala fort consists of 3 separate forts of Jaffrabad in the East, Narnala in the centre and Telyagarh in the west. The fort covers 392 acres of land with a wall perimeter of 24 miles (36Kms). It is said to have 22 gates and 36 buruj towers or bastions. The area has an excellent rain water harvesting and drainage system built on the fort plateau which is worth admiration. A total of 22 large tank and numerous smaller tanks are connected in such a manner that the overflow of water from tanks situated at a higher elevation goes into tanks at lower elevation and so on, thus ensuring that no drop of rain water is allowed to go waste. The area is having valuable endemic species like Sandal and the Medicinal plants like safed Musli, Shatawari. Most of the major mammals which are sighted in Narnala include Tiger, Leopard, Sloth Bear, Sambar, Chital etc. The bird life is also very rich with a large number of migratory waterfowl seen in the perennial waterbodies situated on the Narnala plateau. A large number of raptors are also seen on the crags and cliffs.

1.18 CATCHMENTS TO 'TAPI' AND 'PURNA' RIVERS

The Reserve forms a very important catchment to Tapi and Purna river systems with important tributaries like Dolar, Khandu, Sipna, Gadga, Khapra and Wan Rivers. The Chandrabhaga River which originates from Chikhaldara has its watershed in the reserve. The basic life support systems that the area beholds in terms of conserving soil, water and clean air, it serves as life-line for the people of Amravati and Akola districts.

1.19 RECREATIONAL VALUES.

Forest of this Reserve hold tremendous scope in recreation as well as education in its lush green vegetation, diverse fauna and hilly and rugged terrain. The area is visited by a number of tourists from all walks of life who try to fathom the enticing realms of these pristine forests. They try to quench their thirst of knowledge in ethno botany, birds and butterfly identification, nature photography, wilderness experience and nature awareness.

They also get attracted towards trekking, nature trails, scenic landscapes, culture of tribal people etc. However, the tourist inflow is low in comparison to its tourism potential owing to various reasons, main being poor sighting of wildlife.

1.20 HISTORICAL VAIRAT, GAVILGARH AND NARNALA FORTS

The Gavilgarh fort and Vairat points in the Vicinity of Chikhaldara hill station, which is on the fringe of Tiger Reserve boundary, have important historical significance. The Narnala fort situated in Narnala Sanctuary is an ancient fortress in hills in north of Akot taluk. People from all over the state of Maharashtra visit the Narnala fort. The fort is easily accessible throughout the year. The area has an excellent rain water harvesting and drainage system built on the fort plateau which is worth admiring. Crevices in valleys and forts offer good hiding spaces for wildlife.

1.21 GUGAMAL NATIONAL PARK – A LARGE INVIOLATE AREA

Vast track of Gugamal National Park has no villages and is completely free from any kind of human disturbance. As a result, this area has become a true representative of a 'nature reserve' where nature is at its best. Unlike other Reserves entry is strictly restricted for humans here. Contiguity of forests provides great importance to this area for the long-term conservation goals at landscape level.

1.22 UNIQUE HABITATS HARBOURING RARE AND ENDANGERED WILDLIFE

The Tiger Reserve forms an important extension of the Satpuda hills into the West with its typical geological formations. It harbors a viable 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)* There are 37 species of mammals and several species of reptiles, butterflies and insects. The reserve is also very rich in avifauna

with 265 species of birds including the recently rediscovered Forest Spotted Owlet (*Athene blewitii).*

1.23 FLORA

More than 769 naturalized 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 *Preistylus constrictus* are also reported here. The rare plants include *Convolvulus flavus, Utricularia striatula, Drosera indica* and many species of orchids like *Vanda tesselata* and *Aerides maculosum.*

1.24 INDIGENOUS 'KORKU'

The forests of Melghat are predominately inhabited by *Korku* tribes who pose the best example of how to live a sustainable living in the vicinity of forests. They have a sense of belongingness to these forests and that is why, it has still retained its serenity, whereas other adjoining forest areas are fast loosing their days of glory.

The *Korkus, Nihals* and *Gaolis* have their own indigenous ethnobotanical knowledge, which can teach a few things to the modern scientists. The tribal population inhabiting Melghat have very diverse and rich cultural heritage which has its coexistence with the flora and fauna of the surrounding forests. The Gotras of *Korkus* are seen to have been named after trees e.g. Jamunkar, Semalkar etc. which goes to prove the integration of their culture with nature.

1.25 RICH IN AVIFAUNA

The area 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.

1.26 HOME FOR FLYING SQUIRREL, HORNBILLS, FOREST OWLET AND OTHERS

There are many species of reptiles, butterflies, insects, fishes inhabiting this Reserve. 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. 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 which are fast disappearing, probably, because of some mysterious microbial disease or indiscriminate use of pesticides and insecticides is noticed in Panchbol and Bhimkund areas, though rarely. The embankments of Tapi, Khapra and some '*doh*' in 'Koktu' valley are also reported to harbour Crocodiles and Otter.

1.27 SPIDERS

As many as 1451 species of Spider species, out of a total 39882 Spider from the world are reported in India. At present 204 Spider species have been recorded in Melghat.

TABLE NO - 4

VAULES OF MELGHAT TIGER RESERVE

Sr. No.	Value	Illustration
i	Treasure of rich and varied "Bio-diversity" and "Gene-pool."	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. 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. Lesser Kestrel, Forest owlet Crimson Fronted Barbet, Malabar whistling thrush, White backed vulture and long billed vulture. **Flora** • Temperate species: *Geranium mascatense, Senecio chrysanthemoides, Peristyluys constrictus, Apium graveolens.* • Endemic species: *Achyranthes coynei, Ceropegia oculata Aquatic species. Ceratophyllum demersum, Hydrilla verticillata, Aeschynomene indica, Sesbania bispinosa, Smithia conferta.* Orchids: *Vanda tessellata, Aerides Maculosum, Habenaria grandifloriformis, H. roxburghii, H. plantaginea*. • **Rare Species:** *Convolvulus flavus, Utricularia striatula, Drosera indica.*
ii	Ecologically sensitive and provider of basic life support systems in terms of soil, water and clean air.	Catchment area of 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. (The total environmental value of MTR works out tobe an astronomical Rs. 1,29,000 crores)
iii	Economically very valuable and productive forests.	Timber, fuel wood, bamboo, medicinal plants, NTFPs, value works out to be Rs. 5870 crores Employment Potential for about 10, 00,000 man days per year for local people throughout the year.

iv	High potential for scientific research and study	Scope for research on rare and medicinal plants, wild animals, their inter relationships, Pre-predator relationship, ecological dynamic etc. 61 vegetation monitoring plots in the area apart from silvicultural plots. 23 technical bulletins published and ongoing work on 5 Major mammals viz. Sloth bear, Bison, Wild dogs, Hyena and Chowsinga.
v	Scope for Nature education and values of natural Ecosystem.	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)
vi	Conceptually designed well protected core.	Ideal example of a protected area with a completely undisturbed real core of 361 Sq.km. surrounded by a large buffer. The exclusion of all biotic interference from the core has resulted in making it a real benchmark for providing comparison with other PAs as envisaged in the National Wildlife Action Plan 1983.
vii	Eco- tourism	Wilderness experience, bird watching, observing wild animal, nature photography and trekking. Important destination on the tourist itinerary of Maharashtra. Visited by more than 30,000 Indian and foreign visitors every year. Though this number is well below its potential.
viii	Physical	Scenic landscape, geological features typical of Satpudas.
ix	Cultural	Home to more than 27000 tribals (Korku, Gaoli and Nihal) provides unique opportunity to get an insight into the eco-friendly tribal tribal culture, the Korkus being one of the few tribes who worship Tiger as a God.
x	Religious	Temples like Dhargad temple, Dolaram baba temple, Narnala shrine.
xi	Historical	Narnala fort, Gavilgarh fort of archeological importance in the vicinity of MTR, Rest houses of British era like Rangubeli, Chunkhadi, Tarubanda, Dhargad, Dhakna, 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 up to 40 wild dogs, explanation of biological control of langur population etc. History of scientific forest management since 1893 when the first Working plan was written.
xii	Unique and enchanting topographical diversity	The first, the oldest and the largest Tiger Reserve of Maharashtra, unique blending of multiple high hills and deep valleys with terrain and vegetation changing at close intervals. Melghat means where the hills meet.

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CHAPTER II

BACKGROUND INFORMATION AND ATTRIBUTES

2. 01 GEOLOGY, ROCK & SOIL

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.*"

2.02 DRAINAGE

Area is drained by Khandu, Khapra, Sipna, Gadga and Dolar rivers which are tributaries of TAPI. Main ridge of Gavilgarh hills forms a water divide between TAPI and PURNA rivers.

2.03 GEOLOGY

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.

2.04 SOILS

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, laccustrine sediments with porous, pitted, clayey to alluvium calcarious, 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) LATERITIC LOAM

Lateritic loam generally occurs on hill tops and plateau and is noticed around 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.

2.05 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.

2.06 CLIMATE

Climate is tropical. December is the coldest month, when night temperature may go up to 5 ^{0}C and May is hottest month (47 ^{0}C). 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.

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.

2.07 TEMPERATURE

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 some-times heavy dew and occasional frost. The average mean maximum annual temperature is 46^0 c and the average mean minimum annual temperature is 4^0 c.

2.08 FROST

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*).

2.09 DEW AND FOG

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 known in the area. Chikhaldara, Makhala plateau, Ghatang to Koktoo experience prolonged fogs in rainy and winter seasons.

2.10 WINDS

Winds are generally light to moderate. There is no record of severe storm or cyclone of any consequence in the area. 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.

2.11 MONITORING OF RAINFALL AND TEMPERATURE

Presently weather monitoring stations in Project Tiger area are operational at Vairat, Tarubandha, Semadoh, Koktu, Bori, Jarida and Rangubeli. Establishment of other stations at Wan and Ambabarwa Sanctuaries would be worthwhile to the whole project Tiger area.

2.12 HYDROLOGY AND WATER SOURCES

NATURE AND DISTRIBUTION OF WATER SOURCES

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. 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 Western boundary of the reserve between Kund and Rangubeli for about 6 kms. Numerous depressions in river beds have accumulated water at places locally called as '***dohs***'. There are small numbers 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 *nalla* 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, 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 river reservoir at Wari. The presence of Wan dam, with its watershed acts as a good source of groundwater. With the relocation of Nagartas villages in 2011, it is poised to 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 river 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.

2.13 WATER MANAGEMENT

Since erstwhile core area i.e. Gugamal National Park of the Tiger Reserve only remained under the administrative control of the Directorate, concentrated efforts for creating water resources like construction of bandharas, anicuts, and wire mesh structures were taken up in the area till 1999. It is only after 1999, when the remaining area of the project was transferred to the directorate under unified control, the focus for creating new water resources and taking up soil and moisture conservation measures in remaining areas shifted here. However, due to constraints of funding most of the area in the buffer zone (area handed over to Melghat Tiger Reserve after 1999) still remains or is in dire need for development of water resources. The areas like Hatru, Chaurakund, Jarida, Dhakna even part of Raipur, Semadoh, Harisal, still remain to be covered as for as development of adequate water resources is concerned. Further for want of adequate funds, cleaning of large number of existing water holes, desilting of anicuts etc. also has been lagging behind in many parts of the Reserve.

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. Artificial water

development attempts in the form of bore wells for fulfilling consumption needs of inhabitants in multiple use area are just at satisfactory level. Much needs to be done in this regard. Most of the natural waterholes are over burdened with domestic cattle. Wildlife populations suffer from poisoning for fishing. Major poisoning is done by using urea and pesticides. The occasional use of pesticides and insecticides and natural fish poisons like three bark or fruits and seldom use of dynamites render the water holes hazardous at times. Many water holes are tapped for fish and by the end of winter the water scarcity attains pinching situation. Augmenting water on compensatory ground i.e. making available alternative waterholes for the cattle and the wild fauna needs to be taken up on priority. Desilting of water holes, protection from poisoning, restricting use by domestic cattle and cleaning of water holes may also improve the situation. Daily monitoring of waterholes in summer, initiated since 2010, has yielded encouraging results. It needs to be continued.

2.14 THE VEGETATION: GENERAL DESCRIPTION AND CONDITION OF THE FORESTS.

The forests of Melghat Tiger Project are classified as "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 specie rather resistant to fire. The species with corky bark like Semal (*Bombax ceiba*) survives the fire and their percentage in the stand increases. Fire and biotic interference have increased the percentage of species like *Zizyphus, Stereospermum, Dalbergia sissoo* and *Diospyros* in the forests because of their capacity to produce root sucker, an adventitious shoot from extensively branched under ground root

system. 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 and Dhakna 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 (*Ougeinia oogeinensis*)

2.15 INFORMATION ABOUT PAST MANAGEMENT:

West Melghat Division working plan (2008-09 to 2017-18) mentioned that in the year 1884 the Commissioner of Berar ordered that certain teak trees be selected and conserved in the forests. The selected trees were marked with red paint and not allowed to be felled by the local population. A small establishment costing Rs. 32.50 per month was sanctioned for the purpose and a written report in 1884 shows that over 12,900 teak trees were selected and marked by the year 1862 within the limits of 14 villages where the best Teak timber was found. These villages were situated in the areas now comprising Semadoh range and part of old Raipur Range. These areas still contain best of teak forests, at present part of it is with project tiger.

It is mentioned in the working plans prepared for Melghat forests that natural regeneration of teak is inadequate. The main reasons for the poor natural regeneration appears to be fires and heavy uncontrolled grazing. Due to fire teak dies back and coppices next year. It is reported that teak establishment is fairly better than miscellaneous species.

All the past working plans prepared for Melghat forests mention that “the method of treatment was aimed at the production of big sized timber. The natural regeneration and advance growth of teak, wherever present, was to be helped to grow up and it was to be supplemented by as much planting as possible.” Therefore no open space remained in the area for the development of a

good patch of grasses like that in Terai region. This has resulted in availability of less habitat for the herbivore population. In all the working plans written for Melghat area, no emphasis is made upon the impact of teak crop on wildlife.

2.16 FOREST TYPES:

For the purpose of description, the forests are distinguished in the following sub types, according to Champion and Seth‘s classification-

Forest Types	Champion and Seth’s classification
Sub group 5 A	Southern Tropical Dry deciduous forests
a) Climax types	
i) 5A/C1 i) 5A/C1 a ii) 5A/C1b ii) 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 s 1	Dry tropical riverine forests.
e) Working plan type i) Tiwas forests ii) Mixed forests.	Edaphic-biotic type.

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 National Park as well as areas undisturbed and free from human use have recorded a density of 25 to 28 floral species per hectare. Where as the areas which were disturbed near habitation or the areas on degraded ridges or plateaus have shown density of 12-15 species 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.

2.17 FLORAL BIODIVERSITY-

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 *Preistylus constrictus* are also reported here. The rare plants include *Convolvulus flavus*, *Utricularia striatula*, *Drosera indica* and many species of orchids like *Vanda tessellata* and *Aerides maculosum.* 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. *Peristylus constrictus, Apium graveolens, Morchella conica, Geranium mascatense, Senecio chryanthemoides* are such examples. Species with extremely restricted distribution, *Achyranthes coynei* or the species *Ceropegia oculata* 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 *Sruithia bigemia*, 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,Peristylus constrictus, Opium graveolens.*
* **Endemic species**: *Achyranthes coynei, Ceropegia oculata* Aquatic species. *Ceratophyllum demersum, Hydrilla vorticillata, Aeschynomene indica, Sesbania*

bispinosa, Smithia canferta.

Orchids: *Vanda tessellata, Aerides Macculosum,*

Habenaria grandifloriformis, H. roxburghii,

H. plantaginea.

*** Rare species**: *Convolvulus flavus, Utricularia*

striatula, Drosera indica.

The list of common Trees, Shrubs, Herbs, Climbers and grasses is given in **Appendix No. VIII.**

2.18 WILD FAUNA HABITATS

The area of Melghat being thickly forested and less populated, harbors myriad of faunal components. The common Langur, Rhesus monkey, Gaur, Tiger, Panther, Jungle Cat, Hyena, Jackal, Fox, Wild dogs, Sloth bear, Ratel, Wild pig, Hare, Porcupine, Mongoose, Otter, Sambar, Chital, Barking deer, Blue bull, Four horned antelope are common in Melghat Forests. (See Map No. 16 & 17)

2.19 EVALUATION OF HABITATS

The ocular data about habitat availability and their evaluation indicates that the major tract of the Critical Tiger Habitat area is a good habitat for major mammalian and avian population. The presence of 25 (2 under rehabilitation) 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.

2.20 RANGE OF WILDLIFE AND PAST STUDIES OF FAUNA.

Multifarious efforts to conserve the biodiversity of the area in general, and the "tiger" in particular, has over the past 30 years, resulted in flourishing faunal and floral components in this area. Enforcement of the provisions in the Wildlife (Protection) Act 1972 and strict vigil by the Project Tiger Staff and Local Forest Department personnel has brought in encouraging results. Today, there exists no human settlement in the National Park area.

It may be mentioned that prior to these intensive systematic surveys, information on faunal component, mainly for higher mammals alone was available, which is summarized for the year 1983-

1993. This detailed data is the outcome of yearly census of large animals conducted in the Tiger Reserve by the State Forest Department (Kirpekar 1994). Approximately 250 species of Birds were recorded from here, for which a checklist was published (Sawarkar 1988) and (Anonymous 1994?). Amongst other vertebrate groups, including reptiles and Pisces, stray records are available. 16 species of snakes, 5 species of lizards (Anonymous, 1997) and 24 species of fishes (Gujar 1992) were so far known to exist. The Gazetteer of District Amravati (P. Setu Madhav Rao, 1968) enumerated the wildlife from Melghat, which includes mainly the big games. The current scientific names for those are provided here. Red monkey or lal makad, *Macaca mulatta mulatta* (Zimmermann); black monkey, *Semnopithecus entellus entellus* (Dufresne); jackal (Canis aureus) Linn; wild dog, *Cuon alpinus* (Pallas); sloth beer*, Melursus ursinus* (Shaw); badger or ratel, *Mellivora capensis* (Schreder); otter, *Lutragale perspicillat* (Geoffroy); mongoose, *Herpestes edwardsii edwardssi* (Geoffroy) and *H. smithii smithii* Gray; Hyaena, h*yaena hyaena* (Linn.); udmanjar*, Paradoxurus h. hermaphroditus* (Pallas) and *Viverricula indica indica* (Desmarest); jungle cat, *Felis chaus affinis* Gray panther, *Panthera pardus fusca* (Meyer); wild pig, *Sus scrofa, cristatus* wanger; chital, *Axix axis axis* (Erxeleben); sambar, *Cervus unicolor niger* Blainville; barking deer, *Muntiacus muntjak aureus* (H.Smith); Indian bison or gaur, *Bos gaurus* Smith; Blue bull, *Boselaphus tragocamelus* (Phallus); black buck, *Antelope cervicapra cervicapra* (Linn); porcupines, *Hystrix indica* Kerr, common Indian hare, *Lepus nigricollis nigricollis* Cuvier and fishes (19 species), snakes (14 species). However, there seems to be no published information available on still smaller vertebrate species and invertebrate fauna like Mollusca, crustacean, arachnid, centipedes, chilopoda, insects etc.

Melghat was declared as the Tiger Reserve in the year 1974 amongst those 9 established at the first instance. Immediately the area acquired prime importance and slowly attracted attention of scientists and armatures as well, who tried to understand faunal components present here. Publications like 'An Annotated Bibliography on Tigers' (1989); Fauna of Tiger Reserves an Overview (Director. Z.S.I., 1993); two decades of Project Tiger, Past Present and Future (Anonymous 1992); Assessment Report Project Tiger Melghat 1974-1994 (Kirpekar, 1994), checklist of Birds of Melghat and various leaflets and booklets contained information on some faunal aspects. However, their focus remained on large and medium sized mammals, birds, and to some extent reptiles and fishes.

With an aim to inventories available fauna in Melghat Tiger Reserve and to collect samples for their confirmed identification, Western Regional Station, Pune of the Zoological Survey of India, conducted faunistic Survey of Melghat Tiger Project area during the year 1991-1996. A total

of 13 surveys were conducted by the Scientists of WRS, Pune, during the period. Several examples belonging to as many as 39 different groups of animals were collected. Observations alone were recorded on higher vertebrates (mammals, reptiles and birds). No collection for these animals was made. The faunal diversity (Number of species and higher taxonomic categories) is mentioned in Table 1. Results of these studies has been published by ZSI, separately in the volume No. 19 under the Conservation Area Survey Series, Director, Zoological Survey of India (ed.) (in Press). Collection of faunal samples was worked out mainly by scientists of Western Regional Station, Zoological Survey of India, Pune. Specialists from other regional stations and institutions also identified few groups. List of faunal groups and present address of the specialists is presented here. **Mammalia and Reptillia-** Dr. M.S. Pradhan; **Aves**- Dr. A.S. Mahabal; **Amphibia-** S. S. Kamble; **Pisces and Centipeds-** Dr. B.E. Yadav; **Lepidoptera-** Dr. R.M. Sharma and Shri C. Radhakrishnan; **Orthoptera-** Dr. P.P. Kulkarni and Dr. M.S. Shishodia; **Homoptera : Aphidoidea-** Dr. P.P. Kulkarni; **Diptera : Cecidomyiidae-** Dr. R. M. Sharma; **Odonata-** Dr. P.P. Kulkarni and Dr. M. Prasad ; **Aquatic Hemiptera-** Dr. G. Thirumalai and Dr. R.M. Sharma; **Arachnida : Scorpionida, Araneae and Sloifugi-** Dr. D.B. Bastawade; **Cladocera-** Dr. P.D. Rane; **Mollusca-**Dr. S.G. Patil. A summery of the results highlighting important achievements and total number of species recorded in each group are presented here. Apart from the collection worked out here, rest of the faunal samples are well preserved and kept in National Zoological collection at WRS, ZSI, Pune. An account of 742 species will be provided in the document of fauna of Melghat by the Zoological Survey of India (In press).

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 amounts to 5 species. However a total of 15 species (including 5 mentioned earlier) are reported in the 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.

12) **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.

13) **Amphibia:** 8 species of amphibian are available, included under 7 genera and 4 families.

14) **Aves:** Birds. Considerable work on birds of Melghat Tiger Reserve was published earlier. The checklist included 253 species of birds which was published by Project Tiger Reserve. The present study raised this total to 263 species. As many as 16 orders, 9 subfamilies and 167 genera are represented here. Out of these birds five species viz. Indian White backed Vulture, Indian Long-billed Vulture, Osprey, Indian Peafowl and Forest Owlet are falling under Schedule I, Part III (Birds) and Grey Jungle Fowl under Schedule II, Part II of Wildlife (Protection) Act, 1972. Further Green Munia (Family: Estrildidae) is an endemic to Central India and is also recorded from Melghat.

15) **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.

16) **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).

Table-5

Composition of fauna of Melghat Tiger Reserve (Surveys by Z.S.I., W.R.S., Pune)

Sr. No.	Name of the Group	Order	Families	Genera	Species/ Sub Species	New Records for Melghat	Species/ Sub Species
1	CLADOCERA	1	5	19	29	29	1
2	MOLLUSCA- Fresh Water	1	9	11	23	23	-
3	SCOLOPENDRA ARACHNIDA	1	1	5	15	10	-
4	Araneae	1	16	26	14	14	-
5	Scorpions	1	3	6	8	8	-
6	Soilfugida INSECTA	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	-	-

2.21 LIMITING FACTORS FOR WILDLIFE-

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

(i) 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.

(ii) 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 in the 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, at least 10-15 major anicuts have been constructed which are perennial water source for the wildlife. List of these anicuts are given in **no. appendix IX.** 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.

(iii) 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.

(iv) BIOTIC PRESSURE-

There are 25 (2 under rehabilitation) villages in critical tiger habitat of MTR. The population estimation is as under.

- Total human population- 15,000
- Total cattle population- 30,000

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.

2.22 MAJOR CONSPICUOUS CHANGES IN THE HABITAT SINCE INCEPTION

As per the study of Forest Cover in Tiger Reserves of India- Status and Changes report published by FSI and Project Tiger Directorate in April 2006, the density wise forest cover for assessment years 1997, 2000 and 2002 along with the changes during 1997-2002 as assessed in this study is given in the following table. It is seen that there has been no change in forest cover since 1997.

TABLE NO- 6

FOREST COVER IN MELGHAT TIGER RESERVE (1997-2002)

(AREA IN SQ.KM.)

	Assessment Year			Net Change (1997-2002)
	1997	2000	2002	
(A) Very Dense Forest	508	508	508	-
(B) Moderately Dense Forest	707	707	707	-
(C) Open Forest	270	270	270	-
Total of (A+B+C)	1485	1485	1485	-

Scrub	1	1	1	-
Non-Forest	191	191	191	-
Total Area	1677	1677	1677	

2.23 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. The schedule of programme is given in **appendix no. X.** Based upon the phytosociological 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. This suggestion is reiterated.

(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 "Additions to 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. Later on Ms. Aparna Watwe, Research Assistant, Botanical Survey of India identified 58 species in Melghat Tiger Reserve.

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CHAPTER III

STATUS OF TIGER AND CO-PREDATORS

3.01 TIGER AND CO-PREDATORS-

The tiger is one of the most magnificent of cats occurring in the Reserve. The Indian tiger is now confined to the sub-continent of India. It is a chestnut colored well striped animal with a short coat. Tigers prey on many animals, especially wild boar, Sambar and other deer, antelopes, young gaur and porcupines. They are nocturnal. Cattle lifting by tigers in the region are not uncommon. Tigers mate during cold weather. Usually two to three cubs are born in litter which may stay with their mother till they are almost fully grown. Sexual maturity is attained at 3 years of age by the tigress and at 4 by the tiger. The period of gestation is said to be fifteen to sixteen weeks. The life span of Tiger is estimated to be about 20 years. Important tiger areas in Melghat Tiger Reserve are Chikhaldara plateau, Semadoh, Raipur, Narnala, Dhakna, and Ambabarwa.

3.02 PANTHER:

The panther is much smaller than the Tiger. Panthers are very highly adaptive and live in any type of country. A typical panther from the Indian peninsula is a sleek short-haired animal with a fulvous or bright fulvous coat marked with small close-set black rosettes. The Panther's diet is more varied than that of the Tiger. They seem to prefer monkeys, peafowl and domestic dogs. They also eat birds, reptiles and crabs. Panthers breed all the year round. In captivity the female produces the first litter when 2 1/2 to 4 years of age. Gestation period vary from 87 to 94 days. Panthers are found throughout the Melghat Tiger Reserve.

3.03 WILD DOG:

Wild dog is characterized by pointed muzzle, erect ears, bushy tail, rufous coat and slender limbs. All their bodily features are adapted to their special way of hunting for food. Like Wolves, wild dogs are social animals, going about in packs. They usually hunt during day. Their prey is traced

by scent and pursued at sight. As to breeding habits, the main breeding season in the peninsula is between November and December, the majority of cubs, usually 4-6, are born in January and February, in a cave, under rock, or in an earth. Several females may breed in a colony. These are found in Chaurakund, Semadoh, Narnala, Harisal, Tarubanda etc.

3.04 SLOTH BEAR-

Sloth bears live where there is sufficient forests to provide food, and favor places where outcroppings of rock and tumbled boulders offer them shelter during the hot weather and the rains. They come out before sunset, hunt for food all night and retire in the morning. In cloudy and cool weather they may be up and about by day, and in places remote from human interference they are less rigidly nocturnal. Their food consist of fruits like mangoes, jambul, ber and insects, termites in particular. They feed on fruits such as wild figs, Tendu, mangoes, Jambul, ber, insects, and termites in particular, honey, and during March and April on the fallen succulents flowers of Moha. They are expert tree climbers. Their mating time is usually in the hot weather. The locals show much fear, for the animal as it is known to attack unprovoked. These are common throughout the Melghat Tiger Reserve.

3.05 JUNGLE CAT:

With its long legs and comparatively short tail the jungle cat has a very distinctive appearance. Its pale green eyes give it a coldly cruel expression. The jungle cat is frequently about by day, more usually in the mornings and evenings. Its movements in the open are much like those of a small panther. It preys on small mammals, birds and when near villages on poultry. These animals are common in grassy areas and scrub country.

3.06 CARACAL:

The caracal has broad head and tufted ears of the lynx. An uncommon elusive animal, fast approaching extinction in India. It is a creature of desert and scrub jungle, where it preys on birds, rodents, antelope, and small deer.

3.07 RATEL:

They resemble the bear in looks and the habit of digging holes. They prefer hilly and broken county. The diet is substantially a diet of flesh. The Ratel preys on mammals, birds, reptiles, and insects, and varies its food with fruit and honey. Those living near villages take to raiding poultry.

3.08 CIVETS:

Two species occur in the region, the small Indian civet and the common palm civet.

Small Indian civet: A tawny grey or greyish brown animal lined and streaked on back and croup; spotted more or less in rows along the flanks. There are usually some cross bars on the neck. Dry or moist conditions make no difference to the choice of habitat of this civet, but it keeps out of heavy forest and prefers long grass or scrub to live in. It shelter in holes or under rocks or lies up in grass of under bushes. They seek their food in trees or on the ground, killing birds and small mammals and feeding also on fruit.

Common Palm Civet: A black or blackish-brown civet with long coarse hair. This civet is more common and abundant in well-wooed regions. It lives much on trees, lying curled up by day among the branches or in a hole in the trunk. They seek their food at night, in trees or on the ground, killing birds and small mammals and feeding also on fruit.

3.09 INDIAN FOX:

This is the common fox of the Indian plains, a pretty, slender-limbed animal, smaller and slimmer in build than the Red Fox; distinctive in the black tip to its tail. The Indian Fox keeps to open country and rarely enters forests. It is common in the waste and scrub of our desert zone, but not in true desert. Many live in cultivated lands, bordering irrigation channels. The main breeding season is the cold weather. The cubs, usually four in number, are raised in the burrow, but mother and young are rarely seen. Cubbing time is between February and April. The gestation period is 50-53 days and the young weigh at birth 52 to 65 gm. and have a total length of 18-19 cm.

3.10 STRIPED HYENA

A dog-like build, massive head and fore-body, weak hindquarters and a heavy dorsal crest of long hairs, sharply defined from the rest of the coat, distinguish the hyena. Its color varies from

cream, buff, or tawny to the grey or dirty white of the harsh scanty summer coat. Transverse stripes on body and limbs usually well defined, less so in the full winter coat. The animal is usually seen in the vicinity of villages. It is nocturnal. It is principally a scavenger and known to feed on Panther and Tiger kills.

3.11 JACKAL:

Highly adaptive, the jackal may be seen in all types of country in dense forests or scrub. It is nocturnal. The animal is fairly common in the reserve. Cubs are born at any time in the year, usually in a hole in the ground, in a drain, or any natural shelter. The duration of life is about 12 years.

3.12 ABUNDANCE STATUS:

In last decade several new techniques and methodologies of tiger and prey population over large regions have been developed. These technologies have been actually carried out during field surveys to monitor tiger and prey population at landscape scales. Such a project was also initiated in the Melghat Tiger Reserve by Centre for Wildlife Studies involving local volunteer naturalists in 2002-05. The objective of the project was to carry out advance level monitoring of wildlife by using state of the art population monitoring tools, as well as to generate distributional range map of tigers. The study was carried out predominantly in Gugamal National Park. The project implemented by the institute "Distribution and Dynamics of Tiger and Prey Population in Maharashtra". The final technical report submitted by CWLS in December 2005. The abstract results are given below:-

Total number of camera trap locations	60
Sampling effort	896 trap nights
Number of sampling occasions	15

Camera trap polygon area	203 km2
Estimated sampled area including buffer	360 km2
Number of individually identified tigers	15
Estimated animal density for tiger in the sampled area	6.7 tigers/100 km2

In 2005 the monitoring of tigers, co-predators and prey as per the instructions of NTCA was carried out using the newer methodology. The field data collection on the transact lines was done by the forest department and analysis of the data was done by the Wildlife Institute and NTCA. This was circulated by the NTCA in November 2008. This report for the Melghat Tiger Reserve mentions as follows-

"Melghat comprising a part of the Satpuda Landscape, having a recorded tiger presence in 1,828 km^2, supporting a population of 30 ($\pm$1 se range 21-39) tigers. 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." Phase IV monitoring carried out in 2012 & 2013 by camera trap method revealed the presence of 29 & 32 tigers respectively.

A study titled "Monitoring and Prey Populations in Melghat Tiger Reserve" by the Wildlife Research and Conservation Society, Pune. The WRCS submitted its final technical report in 2009. The study aimed at the importance of annual monitoring of tiger, its co-predators and their prey species in tiger reserves. Melghat Tiger Reserve has the potential for long term conservation of tigers in Maharashtra. The line transect survey conducted by WRCS indicates that Chital detections are increasing over the years. The biomass contributions of Chital in the diet of tiger, leopard and wild dog is also increasing. This is an important finding as Chital are not commonly found in Melghat. The study was carried out in an area of 360 sq.km. Most of the area falls in the core zone of the Tiger Reserve. The following activities were carried out in the study.

1) Estimation of prey density.

2) Estimation of relative abundance of the tiger and co-predator by Scat Encounter Rate Sampling.

3) Generate diet profile of the major carnivores found in MTR.

Ten herbivore species were detected during the transect walks. The species-wise number of encounters is given in Table 7. Prey densities estimated for this year's transects are compared with those reported in previous studies in Table 8. Scat encounter rates for major carnivores are compared between the years (2005, 2006 and 2008, 2014) in Table 9.

Table No. 7

Number of Detections for Species Encountered During Line Transect Survey

Species	**No. of detections**
Sambar	57
Gaur	46
Muntjac	22
Hanuman Langer	228
Four-horned Antelope	8
Nilgai	10
Wild Pig	6
Chital	5
Rhesus Macaque	5
Sloth Beer	7

Table No. 8

Herbivore Density Estimation from 2003 to 2013

Species	Prey Density (/km^2)					
	2003	**2006**	**2008**	**2010**	**2012**	**2013**
Sambar	2.7	1.99	1.94	2.18	0.9286	1.2685
Gaur	1.0	1.25	1.73	1.57	1.074	0.5036
Muntjac	0.6	0.43	0.43	-	0.9774	1.4187
Hanuman Langur	-	16.68	15.09	-	1.4290	0.6489
Four-horned Antelope	0.5	-	-	-	-	-

Table No. 9

Carnivore Scat Encounter Rate in Melghat from 2005 to 2014

Carnivore	Encounter Rate (/10km)			
	2005	**2006**	**2008**	**2014**
Tiger	1.69	1.73	1.93	4.83
Leopard	5.24	2.76	2.24	3.33
Wild Dog	1.96	1.00	2.91	0.82

3.13 DIET COMPOSITION OF MAJOR CARNIVORES

The percent biomass contribution by top four prey species in diet of tiger, leopard and wild dog for 2006 and 2008 is compared in Table 10. Gaur occurs in substantial percentage only in the diet of the tiger. The leopard's diet consist of higher percentage of small species such as hare and

rodents and has a relatively diverse diet. Sambar and muntjac occur to a substantial extent in diet of all the three carnivores. Considering its low population density, chital is found to occur in remarkably high percentage in diet of wild dog.

Table No. 10

Comparison of Percent Prey Biomass in Carnivore Diet in Melghat Tiger Reserve

Carnivore	Percent Biomass Contribution (2006)	Percent Biomass Contribution (2008)
Tiger	Sambar, gaur, muntjac and four-horned antelope (80.4%)	Sambar, gaur, muntjac and cattle (81.54%)
Leopard	Sambar, muntjac, rodent and langur (81.9%)	Sambar, muntjac, chital and four-horned antelope (60.6%)
Wild Dog	Sambar, muntjac and four-horned antelope and langur (88.67%)	Sambar, chital, muntjac and four-horned antelope (94.62%)

3.14 MONITORING OF KILLS IN THE STUDY AREA

Twenty kills were recorded and inspected during the study period. Table 5 gives the break-up by prey and predator species. Many kills were traced because of information provided by the Forest Department and hence consisted of cattle kills, which are given cash compensation by the Forest Department. A fair number of kills were also of wild prey. This exercise needs to be continued in future years to increase the data set so that reliable conclusions can be made about the kill practices of the major carnivores.

TABLE NO. 11

COMPOSITION OF PREY BIOMASS OF TIGER, LEOPARD, WILD DOG IN MTR

Predator	Prey		
	Cattle	Sambar	Wild pig
Tiger	7	3	1
Leopard	4	-	-
Wild Dog	-	5	-

The same study was also conducted by the Envirosearch, Pune in year 2006, the dietary analysis revealed that tiger feed on 11 different prey species, leopards on 10 different species while the wild dog scats had remains of 8 different prey species.

Latest exercise for monitoring of wild animals was carried out in January, 2010 using the same methodology. Field data was collected by the forest department and submitted to the Wildlife Institute of India. This report published by Wildlife Institute of India indicates a very positive trend in tiger population and mentions as follows- "This is one of the most important tiger landscapes of Maharashtra since it forms a source within the larger Melghat-Satpuda landscape of over 12700 sq.km. Melghat's connectivity with forests of Betul and East Nimar (Madhya Pradesh) need to be ensured by protection and restoration of forests in the Tehsils of Melghat and Chikhaldara in Amravati district. Tiger occupancy within the Melghat landscape was 2343 sq.km. with a population estimate between 30-39 tigers showing an improvement over estimates of 2006."

The result from 2014 All India Tiger Estimation is awaited.

3.15 STUDY ON BIOLOGICAL IMPACT OF RESETTLEMENT OF THREE VILLAGES IN MELGHAT TIGER RESERVE

Three villages namely Bori, Koha and Kund were rehabilitated in 2001-2003 from Melghat Tiger Reserve at Rajurgirwapur in Akot Tehsil of Akola District. The study mainly based on the large line transect data collected by MTR staff during 2006 and 2010, the selected ungulate and ungulate carnivore data was considered for this study. The observations are based on following points.

- Villages may create an impact on surrounding tiger habitat through human and livestock population and the livestock confine their movements within 10 km. from their settlements. Considering this, all transects surveyed in 2006 and 2010 within 10 km. periphery of three resettled villages were categorized as "shifted".
- The transects in entire Gugamal National Park were categorized as "undisturbed".
- The area of Melghat Sanctuary consisting of remaining 19 villages categorized as "disturbed".

Table shows the number of Transects Surveyed in Each Scenario.

Scenario	Transects year

	2006	2010
Disturbed	151	147
Shifted	39	39
Undisturbed	80	78
Total	260	264

A general linear model (GLM) was used to test whether mean carnivore and ungulate sign counts have a significant impact on the three scenarios and year. The study has following results.

i) In the interval between 2006 and 2010, tiger sign increased more rapidly in the areas from which villages had been removed than in the adjacent sanctuary areas, while more modest increases were seen in the undisturbed GNP.

ii) Increase in Sloth Bear sign from 2006 to 2010 under all scenarios, but the increase was most marked in the areas from which villages had been shifted.

iii) Increase in dhole sign from 2006 to 2010 under all scenarios, but the increase most marked in the areas from which villages had been shifted.

iv) Increase in leopard sign from 2006 to 2010 under disturbed and shifted scenario but no change was observed in undisturbed areas.

Overall it is observed that, the shifted area recorded highest carnivore sign than the other two scenarios. Similar results were found for the number of herbivore signs in the respective areas.

The study says that after eight years from the resettlement of villages the ecology at the resettled sites has restored and started showing outcome of the biological process in absence of the anthropogenic pressures. In his report he comes to the conclusion that the relocation of three villages has had a positive biological impact on the conservation of tigers and tiger prey. The study says that future resettlement of the remaining villages from the core of the disturbed Melghat Sanctuary should be encouraged and expected that it would show similar benefits for tiger conservation in Melghat Tiger Reserve.

3.16 PREY-PREDATOR RELATIONSHIP

As tiger is a specialized hunter, its breeding success, social organization and territorial dominance is affected by distribution and abundance of prey.

The major species of prey are as follows.

(1) Monkeys (a) Rhesus macaque (b) Common Langur.
(2) Gaur or Indian Bison
(3) Nilgai or Blue-Bull or Rohi
(4) Sambar
(5) Barking deer
(6) Wild boar
(7) The Indian Hare.

Other wild animals such as Peacock, grey jungle fowl porcupine, Chausinga along with domestic livestock also form occasional prey species. Density per sq.km. estimated in 2010 in Central India Landscape sampled in Melghat, Pench and Tadoba Tiger Reserve sites with 103 special replicates and 1340 km. length show the group density (all ungulates, Langur and peafowls) 20.66 with standard error of 1.85. The ungulate density was around 11.10 with standard error of 1.18. The group density of Gaur was 0.56, Sambar 2.45, Chital 5.36, and Wild Pigs 1.02.

3.17 STUDIES ON FOOD HABITS AND RELATED BEHAVIOUR OF TIGERS AND OTHER CARNIVORES IN MELGHATS

Several studies have been carried out on food habits of tigers and other carnivores and are well documented. Studies on food habits of carnivores and herbivores through scat analysis (Koppikar and Sabnis 1979; Shirbhate 2006) and population dispersal, densities and trends (Choudhary 2004, Karanth at 2005, Kulkarni and Mehta 2004) have been done in Melghat too by researchers from State Universities or Staff and Officers of the Project Directorate. These studies indicate that density of tigers is relatively good in well protected and largely inviolate areas and prey as well as biodiversity also shows encouraging trends. However the studies need to be regularly done and backed by scientific analysis of data to ensure wider acceptance and follow up in the context of present day challenges to save the tigers and their natural habitats. A study was done by

Zoology Dept. of SGBA University in 2004, in Multiple Use Area of villages, Jarida, Hatru, Chunkhedi, Harisal and Chaurakund by collection of fecal samples. Through the study of prey remains like pieces of bones, hairs, hooves etc. it was found that Sambar and Chital contribute 31.4 and 28.2 percent respectively of the samples. Cattle remains were found in 0.64% and Langur 1.8% of the samples. It was also found that tigers feed on small animals like pangolin, porcupine and hare also to some small extent (9%). This study concluded that fecal samples of tigers can be a better tool to know the prey-predator relationship, qualitatively as well as quantitatively.

1) Kirpekar (2004) has given given an assessment report of Project Tiger Melghat from 1974 to 1994 in which he threw light on increasing food scarcity.

2) Choudhary (2004) studied the density of tiger in National Park, Sanctuary and Multiple Use Area of MTR, compared the conditions of habitats in three categories of the areas which dictated their prey base and survival.

3) Karanth and Sambhakumar of Centre for Wildlife Studies, Bangalore report Distribution And Dynamics of Tiger and Prey Population In Maharashtra submitted in December 2005, studied distribution of tigers in MTR from 2002-2005 and found that density of tiger in core area of MTR was about 6.7 tigers per 100 sq.km.

4) Mehta and Kulkarni (2006) studied the prey density in MTR through transect survey.

5) Shirbhate (2006) studied the parasitism in wild animals in Melghat Tiger Reserve and recorded the possible infection along with possible hosts and references in wild animals. Carpological analysis of the samples indicated that parasitism was highly prevalent among many of the herbivores and carnivores in Melghat. Out of the 545 cat samples examined, 42.38% were observed positive for parasites. He also studied food preferences of tigers, leopards and herbivores in Melghat by analyzing the 98 scat samples and concluded that main prey of tiger in MTR was Sambar followed by wild boar and barking deer.

6) A study on monitoring tiger and prey populations in Melghat Tiger Reserve was done by wildlife Research and Conservation Society, Pune in 2009. The submitted their final technical report in the year 2009. The main objective of the study was-

1) Estimate abundance of prey animals of the tiger by line transect sampling.

2) Estimate relative abundance of the tiger by scat encounter rate sampling

3) Generate diet profile of the large carnivores found in Reserve

4) Monitoring cattle kills by the tiger and other large carnivores in the Tiger Reserve.

3.18 FIELD STAFF TO UNDERTAKE STUDIES ON HABITAT DEVELOPMENT

It is always the objectives of MTR directorate to promote the staff in conducting the studies of various issues related to wildlife conservation, tiger habitat, availability or required quantity of prey-base etc. The staff has undergone the studies and training and camera trap method, handling of GPS instruments etc.

3.19 ECOLOGICAL STRATIFICATION OF WILD FAUNA

Wild herbivores in the reserve have been observed to have liking with regard to plant species they prefer as food or even shelter. *Heteropogon Ritchie,* a grass species seems to enjoy positive co-relation with distribution of Gaurs due to the shelter owing to its height and thick growth that it offers to the shy animal. Similarly, amongst shrubs *Securinego virosa (Pithondi),* which provides green forage in pinch period towards the end of summer, also seems to have positive association with the distribution of Gaur and Sambar. *Helecteres isora (Muradsheng)* another well-distributed shrub seems to have positive correlation with distribution of Sambar. Occurrence of certain animals in different altitudinal zones with unequal densities indicates that there exists a gradient of habitat preference. Though most of the wild animals are specialized to exploit different altitudinal zones, some of them exhibit occupational preference in the middle hills, it is seen that Sambar, Gaur, Barking Deer, Wild Pigs and Chausinga normally remain confined to the middle hills, which offers secluded shelter to these animals. This topographic zone is away from the habitations and is least disturbed. Domestic cattle rarely share the water and forage. This zone is rich in floral diversity, which assures adequate palatable forage to the wild herbivores. Odum (1963) formulated a general law which states that the greatest diversity occurs in the moderate and middle range of a physical gradient. High incidence of tree species per ha and wide varieties of grass, shrubs and herbs have enriched the fodder resources of this zone. The upper hills provide a bleak habitat for the wildlife. High altitude faunal habitats are comprised of grassy balds *(Baldas)* with sparse tree growth, flanked by steep slopes and as such have limited potential to hold on the wildlife. Also the scanty water supply lessens the congeniality of this type of habitat. The lower hill zone is under constant pressure for firewood, grazing etc. by the local populace and as such has low habitat preference index. The Gaur, Sambar and Wild Pigs are at the minimum density whereas this habitat is favored most by Nilgai and Chital. Nilgai ranges in the open glades amidst woodlands. Chital

avoid hilly terrain and thicker forests as these obscure fleeing at the maximum speed. Hence in Melghat, Chital are found normally in lower hill zone with gentle slopes.

The gradient situations are inseparable from the altitudinal zones and affect, in combination, the wildlife distribution. The moderate and gentle slopes facilitate free movement of animals without exhaustion. All these factors favor middle hills with moderate slopes to be an ecologically viable biome. This zone with habitat preference index may, therefore, be prioritized for concerted management efforts.

The food habit study indicates that large prey like Sambar and Gaur contributed about 70% of tiger diet. Medium sized prey like chital and wild boar contributes 22% and remaining prey species contributes about 9% of the diet. Sambar, chital and wild boar forms important prey of all the three predators.

3.20 DENSITY AND DISTRIBUTION OF MAJOR HERBIVORES IN VARIOUS REGIONS (BASED ON 2010 and 2013 ESTIMATION):-

The total number of herbivores was not counted in the 2010 and 2013 estimation. However, the animals noticed while walking on the transects were counted. Though, these figures do not give the total population of herbivores, these are indicators of the population density.

NUMBER OF ANIMALS COUNTED ON THE TRANSECT LINES.

Name of wild animal	Sipna wildlife dn.		Gugamal wildlife dn.		Akot wildlife dn.	
	2010	2013	2010	2013	2010	2013
Chital	24	35	219	68	03	260
Sambar	190	187	337	108	09	212
Blue bull	115	54	48	24	20	03
Bison	100	240	261	117	34	168
Barking deer	238	155	195	132	21	152
Chausinga	02	0	03	0	00	2
Wild pig	917	747	487	294	54	201
Langur	614	1350	340	292	1319	1211
Monkey	2962	341	2145	376	253	407
Hare	69	7	47	13	00	03
Peacock	315	292	339	146	25	145

3.21 DISTRIBUTION-

Chital is found in Bori, Dhargad, Dhakna, Chaurakund, Harisal, Raipur, Malur area of the Melghat Tiger Reserve. Sambar is found all over the Melghat Tiger Reserve area. Nilgai or Blue bulls are confined to the Dhakna, Chaurakund, Raipur, Koha area of the Melghat Tiger Reserve. Bisons are seen in the Semadoh, Raipur, Koha, Kund, Chikhaldara, Chaurakund, Bori, Koktoo area of the Melghat Tiger Reserve. Barking deers are found all over the Melghat Tiger Reserve area. Wild boars are seen in the forests in village vicinity. Langurs and Monkeys are the common species of the Melghat Tiger Reserve and found in abundance. Peacocks and Hares are also very common in Melghat Tiger Reserve and found every where in the area.

3.22 POPULATION DENSITY TRENDS IN OTHER TIGER HABITATS

In the areas rich in prey base throughout the year, such as Chitwan National Park (Nepal), female tiger density varies between 10 to 39 Sq.km. per tiger and male tiger density ranges between 13 to 105 Sq.km. per tiger (Sunquist, 1981). High quality tropical habitat can support 7 to 12 tigers within 100 Sq. km. (Karanth, 1991). Tiger density for Nagarhole (India), Ranthambore (India), Kanha (India), has been found as 11.65, 10.00 and 6.92/100 Sq. km (Karanth, 1993). The prey biomass in Nagarhole is estimated as 7658 kilograms/sq., km. (Karanth, 1991).

In all protected areas and Tiger Reserves, biotic interferences, like cattle grazing and uses of PA resources by human population, it is largely believed, plays a significant role in determining the density of tiger populations as also the occurrence and growth of natural prey biomass. The available records, however, do not reveal how the tiger population behaves and grows along with the prey base, as biotic pressures including the cattle grazing and human uses are eliminated from the Protected Area and Tiger Reserves through various managerial practices aimed at eliminating such biotic factors, in addition to improving the habitat welfare factors like meadow and water resources developments.

3.23 MANAGEMENT INTERVENTIONS AND STATUS OF PROTECTION IN VARIOUS CATEGORIES OF PAs AND OTHER AREAS OF MELGHAT TIGER RESERVE:

The Gugamal National Park enjoys highest degree of protection and effort has been made to bring the natural eco-system at play here as far as possible. No grazing, no visitation except by research staff, no tourism and no removal or harvesting of NTFP, plants, grasses or water resources is allowed in the area. The area is fully protected through gates on all sides. Fire is also strictly controlled. No villages exist inside and three villages falling on the boundaries have also been shifted few years back. No thoroughfares, except a highway which has very low frequency of traffic flow without stops in the areas, exist in the area. Employment Guarantee Scheme and other schemes which are labor intensive and require migratory labor are not taken up in the area, to keep it free from any human disturbances. Maintenance of fire lines and roads is done carefully by calling day labors from outside area and no camps of villagers are allowed in the area. Intruders, if any, are apprehended expeditiously by the protection staff posted in various camps in the area.

The Melghat Sanctuary spread over 788 sq.km. has 22 villages inside, out of which, 3 have been shifted few years back and 2 are under process of rehabilitation. The villages inflict a serious impact on this PA with the existence of 27,000 human and over 25,000 cattle populations, which are spread all over. Tourist complexes in Semadoh, Kolkaz and Harisal which are open for visitation and vehicular movement for most of the year, are part of Sanctuary area. A highway passes through the area which carries lot of traffic during night hours. In other areas normally traffic is closed between sunset and sunrise and an effort is made to control the movement through various Check gates maintained at all entry points.

3.24 HIGHEST DENSITY OF TIGER IN NATIONAL PARK:

The density of tigers as well as prey biomass is highest in the National Park. The range varies between 15 to 17 sq.km. per tiger giving a density of 6 to 7 tigers/100 sq.km. The result derived from the 'pugmark analysis' method followed in the Reserve scrupulously, compare well with the results given for the area through 'capture recapture' method used by Centre for Wildlife Studies (Karanth and Samba Kumar, 2002). The major prey base of Sambar and gaur is also highest in the area. The density of gaur biomass only is 977 and average for major prey is 1370 kg/sq.km. in the area. This testifies that complete protection to tiger habitats and keeping it free from human as well as cattle uses can give a tiger density as high as 7 to 8 tigers per 100 sq.km. even in hilly and difficult terrains like that of Melghat. The growth in population of wildlife could further be encouraged through spread of factors like meadows and water resources developments. However, keeping in view the history of protection and management in Gugamal National Park for last 30 years, it is seen that the biggest factor which counts for growth of tiger population in a habitat is the elimination of biotic disturbances. This is evident from the fact that the Melghat Sanctuary which has good distribution of water holes and even meadows and open areas which form edges and are frequented by wildlife, has not shown growth in the population as witnessed in the National Park Area.

The density of tigers in Sanctuary remains at an average less than 3 tigers per 100 sq.km. where as the prey base, particularly of bison also has low density, the average for major spp. being 400 kg/sq.km. almost one third of that in the National Park. The reason for this decline in the Sanctuary could be attributed to the disturbances caused by the local human use, heavy cattle grazing and heavy traffic movement. The situation may change after villages are shifted, cattle grazing is stopped and highway is shifted from the area. The other factor which could be effectively

counted in favor of the high wildlife density in the National Park is that whereas the sanctuary area along with erstwhile multiple use area surrounding it was under dual control till 1999, the National Park has been fully managed by the Tiger Project personnel from the beginning of the Tiger Project now for 3 decades and as a result not only the process of elimination of biotic pressures was systematically taken up here, the development of water resources and other habitat development works were also taken up regularly which manifested in terms of increase in tiger populations. The density of tigers in Wan, Ambabarwa and Narnala Sanctuaries is very low at 1.5 tigers per 100 sq.km. and prey biomass is dismally low at 60 kg per sq.km. The density of tigers in this area is 4.5 times lower and that for herbivores is 22 times lower than the density in core area. The gaur, which are indicators of disturbance free index in an area are not resident here and stray from neighboring Melghat Sanctuary. This scenario is gradually changing towards more positive trends, with the shifting of Amona, Nagartas and Barukheda and stoppage of fishing from Wari Dam, the Wan Sanctuary is poised for a drastic up lift.

3.25 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-

(i) Encroachment for agricultural purposes on wildlife habitats and forest lands by local people.

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

(iii) Illicit grazing by local/migratory cattle.

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

(v) Fires, mostly man made for collection of NTFP/ Mahua/ Tendu/ local poaching etc.

(vi) Illegal removal of non-timber forest produce and valuable medicinal plant

(vii) Cultural practices of local tribals, particularly in fire season, of moving in large groups from one tribal deity to another, covering far flung areas and setting of fire while camping.

(viii) Fire are also caused to scare away the wild animals, while moving in forest areas by the local villagers.

(ix) Long porous border with adjoining Madhya Pradesh.

(x) Heavy vehicular traffic on the passing State Highways.

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CHAPTER- IV

HISTORY OF PAST MANAGEMENT AND PRESENT PRACTICES

4.01 CONSERVATION HISTORY

Till British had taken administration of Melghat tehsil under their control in 1853, there was no forest administration. The forests were irregularly exploited by *Korku* for trade in forest produce in plains. Large areas were under shifting cultivation. Britishers started reservation of forests and completed it by 1913. This reservation of forests gradually brought the indiscriminate fellings under control. The Reserved Forest was worked under Improvement Felling up to 1935. From 1936 to 1955 the forests were worked under Stein's plan which prescribed Uniform System in the better quality teak forests and Coppice with Reserve in comparatively poor quality forests. Remote and under stocked areas were not subjected to any type of regular working. Sharma's plan which came into force in 1956 also followed the working principle of Stein's plan. Sharma's plan was revised by Joshi.

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

a) Bugshaw's 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 (1915-1916 to 1935-1936)
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)

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 into

preponderance of teak of good quality. The CWR system was with the objective of producing small timber to meet the requirement of local villages.

4.02 SHORT DESCRIPTIONS OF THE PLAN:

The earliest available information 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. Steins 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.

Sharma's plan reveals that natural regeneration was becoming scarce. Stray, but very small patches having natural regeneration were sometimes met with in the low lying fully stocked forests. Scattered seedlings of teak were found in parts of Gugamal and Khirpani ranges. In Salai and Tiwas forests however, natural regeneration was either scanty or totally absent.

Joshi's working plan shows that in Tiwas forests the regenerations was observed to be absent while in Salai forest it was generally very scanty. For teak forests the plan says "Natural regeneration is some deficient through stray, very small patches of reproduction are sometimes observed in the fully stocked forests". The present observations, however shows that natural regenerations is almost inadequate everywhere.

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 over time.

Findings:

1) 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.
2) Teak, presumably, over drafted on the soil and this over drafting became more and more pronounced as the various negative factors working in the area increased in their intensity as well as influence with the passage of time. 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, and the overall low level of competence of man to handle nature have led to the present stage of almost complete lack of regeneration in Melghat.

3) The various observations made in Melghats 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 at an 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.

Again the negative impact in this regard of the fact of meeting plantation targets in Sharma's working plan period by uprooting stumps from the forest area itself cannot be overstressed. The increase in the area of blanks by 1.5 times in the last 20 years also indicates a decrease in the spatial heterogeneity of flora in such area.

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 come up in due course.

(**Melghat:** An ecological perspective by A. K. Jha, IFS published in Technical Bulletin No. XXV symposium on Three Decades of Project Tiger in Melghat.)

4.03 HISTORY OF WILDLIFE MANAGEMENT IN MELGHAT TIGER RESERVE.

Since the constitution of MTR in 1974, the important management interventions/ landmarks are as follows-

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.

1985 Declaration of Melghat 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.Gogate for the period 1988-1998 to ensure maintenance of viable population of tiger for scientific, economic, aesthetic, cultural and ecological values.

1988 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 Melghat 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)/2182/03-04 Nagpur dated 6th November 2003.

2007 Nature Interpretation Centre, Semadoh renovated.

2007 Declaration of Critical Tiger Habitat in Melghat Tiger Reserve (1500.49 sq.km.)

2009 Registration of "Melghat Tiger Reserve Conservation Foundation."

2010 Notification of buffer zone (area 1268.03 sq.km.)

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 throughout 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, Kolkaz game Sanctuary. The Wildlife (Protection) Act, 1972 has come into force in the State of Maharashtra with effect from 1st 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 Chief Wildlife Preservation Officer during 1968-69. 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, dated 2/8/1972. 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.

4.04 CRITICAL REVIEW OF HABITAT IMPROVEMENT WORKS IN PAST 10 YEARS-

The main emphasis during the management plan period was given on Habitat Improvement works like-

1) Desiltation of the existing anicuts, cement bandharas and all water resources natural as well as artificial occurring in the area. The anicuts, which need special repair like grouping etc. were also repaired and maintained.

2) Strict vigilance for protecting the area from fire were maintained.

3) Maintenance of existing grasslands and natural openings.

4) Works like soil and moisture conservation, nalla bunding etc. in an intensive manner on watershed basis with a view to arrest soil erosion induce optimum water conservation in the area were maintained to enhance the bio-diversity and the gene pool available in the area.

5) The fire protection works, check gate management, patrolling and establishment of protection camps were carried out during the plan period.

6) Research and monitoring works, exercises for population estimation and maintenance of boundaries.

7) Removal of Lantana and other obnoxious weeds.

8) Vaccination of cattle.

9) To reduce the biotic pressure and control human use of the area as far as possible.

10) Controlled grazing.

The details of the expenditure for 10 years are given below:-

TABLE NO- 12

TABLE SHOWING EXPENDITURE INCCURED UNDER CSS.

(Rs. In Lakh)

Sr. No.	Year	Sanctioned grant	Released grant	Expenditure
1	2004-05	155.90	134.03	132.07
2	2005-06	292.58	268.78	268.78
3	2006-07	252.61	250.31	239.80
4	2007-08	260.05	260.05	243.33
5	2008-09	251.984	237.16	222.38
6	2009-10	296.74	252.78	221.05
7	2010-11	383.06	383.06	338.84
8	2011-12	544.93	432.63	432.63
9	2012-13	516.28	516.28	516.28
10	2013-14	493.57	493.57	493.57

4.05 EVALUATION OF CONSERVATION PRACTICES

The thrust of all managerial practices under Project Tiger has been to protect the eco-system by mitigating the adverse limiting factors induced by human action. 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 since 1985 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 water holes at suitable places and weed eradication works were also taken up which led to increase of wildlife in entire Project Area. **Commercial forestry i.e. tree felling has been stopped since 1987, Tendu leaves collection since 1992 and bamboo exploitation has been stooped since 1995.** 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 limited 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 elimination of cattle camps. The following table indicates the data of cattle kill for last 5 years.

TABLE NO – 13

DETAILS OF CATTLE KILL CASES IN MELGHAT TIGER RESERVE 2006 – 07 TO 2010-11

Year	No. of cases	No. of animal killed	Compensation given
2006-07	145	163	6,20,125/-
2007-08	198	192	6,57,040/-
2008-09	235	249	7,43,333/-
2009-10	140	142	4,24000/-
2010-11	150	154	5,63,153/-

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. As has been explained in chapter II, due to hilly and rugged terrain, a number of rivers and their tributaries, the nature of river, 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 under state plan and MGNREGS. A network of wireless and a few cellphones is in operation for effective communication which helps in controlling the wildlife crimes. Regular workshops, awareness campaigns are carried out by the directorate for capacity building of staff and to seek cooperation of local people. Increased protection in last few years has also discouraged villagers from poaching.

4.06 PROTECTION AND INTELLIGENCE GATHERING

The Melghat Tiger Reserve in the past enjoyed, to some extent, a 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 Rajdeobaba 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 inroads were made into Melghat. In 1969 with the conversion of forest villages into revenue villages, to facilitate communications and for providing facilities, road network was extended even to the remotest village. With the spectre of malnutrition looming large, network of roads connecting even the remotest village in Melghat with the involvement of B. & C. department by constructing bridges, culverts etc, and even tarred roads was enhanced. As a result, the two State highways along with the tar roads developed to connect various villages and towns like Dharni, Paratwada, Akot, and Chikhaldara, Semadoh has become a growing market place. Owing to its hilly 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 project area through tar roads or all weather roads in the guise of development and 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 villages have 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 and
(iii) At Dharni on Paratwada-Dharni-Burhanpur road.
(iv) At Harisal, Semadoh on Paratwada-Dharni road.
(v) At Koha and Khatkali on Akot-Dharni road.
(vi) Zari on way to Wan.
(vii) Wasali on way to Ambabarwa.
(viii) At Memna on way to Chikhaldara-Semadoh.

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 may be posted as per necessity. Road barriers have been erected in some cases. Maintaining of the Nakas is getting increasingly difficult in view of shortage of staff and laborers, many field posts lying vacant for some reasons or be other, and the belligerent attitude of the passers by.

4.07 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.

(ii) Carrying out new encroachment, if suitable.

According to the policy of the state Govt. vide their G.R. dated 31 March 78 all encroachment on forest land from 1/4/72 to 31st March 78 were to be regularized by adopting the following procedure.

(i) Preparing list of encroachments by F.D.

(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 5th Oct. 80.

As the Forest conservation Act, 1980 came in to operation in the state since 1980, 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.

4.08 THE SCHEDULED TRIBES AND OTHER TRADITIONAL FOREST DWELERS (RECOGNITION OF FOREST RIGHTS) ACT, 2006

"The scheduled tribes and other traditional forest dwellers (recognition of forest rights) act, 2006" which came into force on January 1, 2008, to regularise the enchrochments on forest land by tribles/ Forest dwellers prior December, 2005 puts duties on the forest dwellers and the holders of any forest rights, Gram Sabhas 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 areas are adequately protected:

(c)ensure that habitat of forest dwelling Scheduled Tribes and other traditional forest dwellers is preserved from any for 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 NO - 14

THE STATUS OF THE CLAIMS RECEIVED TILL MAY 2013 IS GIVEN IN THE FOLLOWING TABLE.

Name of the division	Claims received	Claims admitted	Forest land involved (ha.)
Sipna	1002	297	642.08
Gugamal	157	28	57.11
Akot	0	0	0

"THE SCHEDULED TRIBES AND OTHER TRADITIONAL FOREST DWELERS (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. Encroachments in last 3 to 4 years have been increased and the action of timely eviction is taken by department.

4.09 POACHING AND FISHING

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 and may be regarded subsistence poaching.

TABLE NO - 15

THE DATA REGARDING POACHING CASES IN MELGHAT TIGER RESERVE 2006 -07 T0 2010-11

Year	No. of poaching cases			No. of animals		
	Tigers	Leopards	Others	Tigers	Leopards	Others
2006-07	2	3	4	2	3	3 + fishing
2007-08	-	-	-	-	-	-
2008-09	-	-	-	-	-	-
2009-10	-	-	3	-	-	3
2010-11	-	-	4	-	-	18

4.09 Fishing is a favorite activity but it becomes an illegal activity in the Sanctuary area, the locals are often found violating the rules here. Sometimes, the poisoning of water holes is also done to facilitate fishing. In the summer season, if it not prevented on waterholes, it becomes a serious problem for the wildlife. Therefore, a regular vigil on the waterholes needs to be maintained. Of the meager natural food resource available to the locals, fish, is an important component which even provides recreation, besides food source to the tribals. In some season, the fish caught is so much that traders from Dharni-Paratwada come down to purchase the catch and take it for sale in markets at Harisal-Dharni and Paratwada. Generally it is in form of smoked/ roasted fish which can remain palatable for a longer period.

4.10 INTELLIGENCE GATHERING

Since these activities are carried out by tribal, the local intelligence gathering is a very difficult task. The tribal are very close-knit community; they do not open up to outsiders. Introvert nature and fear of social boycott makes intelligence gathering very difficult.

4.11 ILLICIT FELLING

Except for the fringes and area adjoining original Rayatwadi areas, the scale of illicit felling in rest of the area is very low, though the trend of increase in certain pockets is cause for concern. This activity is indulged in by people living on the fringes as well as by the people living within. The prominent areas of illicit felling are M.P. border in Jarida range, southern boundary of Wan Sanctuary, western boundary of Harisal and Dhakna range. The following table shows the figures of illicit felling for last 5 years.

TABLE NO – 16

ILLICIT FELLING CASES IN MELGHAT TIGER RESERVE 2006 -07 T0 2010-11

Year	No. illicitly felled trees	Loss in Rs.
2006	2231	8,89,441/-
2007	2861	17,25,630/-
2008	3812	15,44,583/-
2009	3794	40,56,434/-
2010	3805	15,60,744/-

One successful operation for retrieving the illicit material from East Khandukheda, and East Ghana Beats of Jarida range of Sipna wildlife division was carried out in November 2009 and yielded Rs. 16, 29,000/- lakh worth material. Total 490 trees were illicitly felled by the notorious villages of Ghana, Koylari, Kanheri, Pachdongri, Kalapandhari amounting to Rs. 16, 32,510/- was recovered. To control over the illicit felling in the area, a massive operation was implemented and the villages Kanheri, Panchdongri were raided and the material amounting to Rs. 4, 47,000/- was recovered. Material nearby stumps amounting to Rs. 9,59,200/- was also seized and brought at Jarida Range Head quarter. During the operation SRPF group was deployed under the supervision of forest officers to conduct the raids in the year. Negligent staff was removed from the beats and enquiry against them was started immediately. This one operation has discouraged the illicit fellers and their

middlemen to a large extent and its positive effects are seen till now. Such occasional operation need to be undertaken occasionally when SRPF is available and staff could be deployed.

4.12 WEED:-

Weed infestation especially that of Lantana, Bhandar, Cassia tora and Rantulsi is of great concern in the area. They hinder regeneration of useful plant species and grasses, reduce grazing potential by extending their extent and also act as fire hazard. Lantana infestation is more in the area of Koha, Vairat, Kund, Rangrao, Dolar, Patulda, Adhav, some parts of Wan and Semadoh, Pili and in Semadoh tourism zone. Vairat and its nearby areas are prominent sloth bear areas. Rantulsi infestations is more on north and western side from Khokmar up to Dabiya. There is urgent need to tackle these weeds and Lantana on priority. This will yield improved fodder potential of the area as well as regeneration prospects for useful species. Lantana is an exotic species brought from Mexico via Srilanka. It has tree under story in many places. Its roots are shallow but spread horizontally up to 4 meters. It is also very good soil binding species. It has acclimatized in Melghat forests. Its fruits are eaten by birds and sloth bear. It is very good shelter for jungle fowl, pea fowl and many other wild animals. The dense lantana infestations near villages has also provided a cover for the wild animals like sloth bear, thus increasing the chances of conflicts between wild animal and human beings. Uprooting of lantana was carried out since the year 2000 in Melghat under employment guarantee scheme. At present the activity of uprooting lantana is stopped due to non availability of funds.

4.13 REASONS FOR LANTANA SPREAD

Regular fire and uncontrolled grazing near by villages is the main reasons for lantana spread in Melghat. Lantana has virtually invaded all the tropical and sub-tropical regions of India. Attempts have been made to control Lantana by physical, chemical, biological methods, but there is no success either in its control or the prevention of its spread. No effective management strategy is yet available for containment of this obnoxious weed.

4.14 FIRE PROTECTION

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 leaf litter.

(iii) Intense biotic pressure.

(iv) Cultural practices of tribal, particularly in month of May.

(v) For getting a good grass growth, the local villagers start the fires.

(vi) For collection of NTFP

(vii) To scare away the wild animals in night, the villagers carry torches of bamboo. This gives rise to numerous fires.

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, non availability of conveyance to reach the spot and late reporting of fire occurrence has been a cause for sacrificing large chunks of forests to fires every year.

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

TABLE NO- 17

FIRE INCIDENCES IN MELGHAT TIGER RESERVE 2006 -07 T0 2010-11

Year	No. of fire incidences	Area affected (Ha.)	Percentage of area affected
2007	218	9903	6.59
2008	253	12253	8.16
2009	305	13234	8.82
2010	179	5855	3.90
2011	180	6292	4.19

The division wise length of fire line in Melghat Tiger Reserve is given in the **appendix no. XI**.

4.15 FAITH UNTO DEATH

In extinguishing the fire, the forest staff has to brave adverse odds and sometimes putting their lives in danger. It is worth mentioning that in memory of Forest Ranger Nazir Mohammed who served for twenty years in Melghat Forest Division and who was severely burnt while extinguishing forest fire on date 15/02/1935 died on 23/02/1935 in Amravati hospital, a stone memorial is erected

at Harisal bus stand to remind others of his courage and devotion to duty. His tale of courage and sacrifice will be a source of inspiration to serving foresters of future.

4.16 GRAZING:

Grazing is prohibited in Gugamal National Park. Though, in sanctuary areas rotational grazing is 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 Gaoli community and many a times the management fails to control grazing. 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. Local politicians also support the public. The main argument of the public is that unless there is no alternative, they have no place to go. The Melghat Tiger Reserve is ill-equipped to handle the heavy pressure. Keeping this in view, villages from the sanctuary area need to be shifted as early as possible.

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

Semadoh, where the first Nature Interpretation Center of the Project Tiger was established, is 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 such as Centre for Environmental Education, shall be involved in this process and upgraded, interactive displays should 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 back yard. It has very good potential for large scale investment as it is on fringe of core-buffer area and up gradation as an ecotourism

centre. So far it is lying neglected. If developed, it may provide many livelihood opportunity to people of 3-4 villages.

Interpretation center at Gullarghat has been established to create and disseminate awareness of local medicinal plants. This also needs to be upgraded by using latest displays. So far it is also neglected and has lot of potential in view of large tourist inflow particularly during monsoon in Dhargad temple nearby. After the relocation of Dhargad, Gullarghat and Kelpani villages in near future, it may become a big attraction as Jungle Safari.

Interpretation Center at Amravati has been established for meeting the needs of nature education to urban population and as a gateway to Melghat. This needs to be upgraded in future as per the technology advancement and funds availability. Chikhaldara plateau which is a fine hill station in Amravati district, is adjacent to the Project Area and is a major tourist attraction, especially during summer holidays. About 2.5 km. to the South-West to Chikhaldara lies the Gavilgad fort built in 1426 A.D. by Ahmed Shah, the Bahamani Ruler of Deccan for strengthening his northern frontier in order to prevent inroads during his southern wars. Its name implies to its having been at one time like Gavilgad, the stronghold of a local *Gaoli* Chieftain before the advent of the Bahamanis. Apart from the fort, which commands several splendid views, Chikhaldara offers a host of 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 are as under:

(i) Vairat Point: - also called sunset point, is at a distance of about ten 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 kingVirat with whom the Pandavas are supposed to have resided during the period of their exile. Chandrabhaga River rises just below the Vairat plateau.

(ii) The Makhala road offers 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) Kolkaz and surrounding forest. Rakhidoh or Rakshadoh and Dia *doh* near Kolkaz.

(v) Narnala fort: history mentions that in 1426 A.D. when Ahmed Shah built the Gavilgad fort, he also repaired the Narnala fort. This implies that the later is an older fort and, like Gavilgad, it too played an important role in the history of mediaeval Berar.

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

(vii) Ambabarwa Sanctuary In linkage with Shegaon: Shegaon is now the best tourist spot developed in Vidarbha region. The frequency of tourist visiting Shegaon is tremendous due to its pilgrimage value and picnic spot Anand Sagar developed by the Sant Gajanan Maharaj Sansthan at Shegaon. Ambabarwa Sanctuary is about- 65 kms. from Shegaon and it can be another tourist spot for the tourist coming at Shegaon by integrating it with the Shegaon Circuit.

(viii)Mahadeo temple near Dhargad: Apart 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.

The annual tourist inflow is given below:

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

Considering the vastness, varied and scenic landscape, number of tourist is very low and mainly concentrated to weekends and vacations.

4.18 RESEARCH AND MONITORING

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 the reserve and their population dynamics. Occurrence of a particular species and its proliferation is governed by interplay of various factors and at the same time, various managerial practices which produce their own impacts on vegetation as well as wildlife and may bring in growth or decay of habitats. 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. For this important work presently, there is a Research Cell in the directorate, which needs to be strengthened and equipped to cope up with the increasing responsibilities and expectations on the research front and various outputs required for taking correct management decisions. The Melghat Tiger Conservation Foundation, which came into being from 2010, has a major role to play in attracting researchers, scholars and naturalists.

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 a regular system of monitoring of wildlife through patrolling, protection camps, waterhole supervision and regular annual monitoring exercise is being done. Of late GPS and camera traps are being used regularly and a data base is being developed. The capacity building session for the staff on various aspects are regularly taken up. This needs further improvement.

4.19 THE BASIS, NEED AND SCOPE

The knowledge of ecology of plants and animals in the reserve will form the basis for rational and scientific management of the Reserve. The present need is to know about population ecology of the animals. This would involve estimation of number of animals in a population and analysis of the mechanism, which regulates animal population dynamics. Thus it would be necessary to collect data on reproduction, recruitment, mortality and movements of animals. A detailed study on the behavior of the tiger and the effect of other disturbing factors on the distribution and reproduction of tiger also needs to be made. Prey and predator relationships and extent of competition amongst predators, sharing of home ranges and dispersal of tiger populations along with prey base from within the reserve to adjoining areas also require special attention. Effects of fire and grazing on vegetation and wildlife will form an important study which will throw light on changing ecosystem or successional adaptations in the reserve. The goals of research as well as various aspects of management cannot be achieved, unless staff and officers are well equipped with knowledge on the subject and are exposed to different aspects of management solutions in different context. In view of the large number of untrained and unmotivated staff, there is enough scope for induction of short term training courses and exposure visits to different wildlife areas within the country as well as abroad.

4.20 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 dated August 8, 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 are as follows-

TABLE NO - 18

ON GOING RESEARCH PROJECT MELGHAT TIGER RESERVE

1	Evaluation of trophic status assessment of some natural water holes from Melghat Tiger Reserve, Amravati. Year 2006.	By Dr. Dinesh Khedkar, Amravati.
2	Genesis and composition of Humus in Melghat Tiger Reserve and its impact of Biodiversity. (Year 2006)	By Shri. V. S. Mangle, Chikhaldara.
3	An Inventory of the spider fauna of Maharashtra understanding the diversity habitat and distribution of Spiders in the wild at Radhanagari, Koyna, Tansa, Yawal, Andhari Wildlife Sanctuary, Pench National Park, Melghat. (Year 2007)	By Shri Sanjay Molur, Coimbatore,
4	Digital inventory of medicinal plant Resources of Maharashtra. Year 2009.	By Dr. (Miss) P. Y. Bhogaonkar, Principal Project Investigator, Rajiv Gandhi Science and Technology Commission, Govt. of Maharashtra.
5	Landscape genetics of large carnivores in Satpura Maikal Landscape in India. Year 2009.	By Shri Sandeep Sharma and Trishna Dutta, 4/59 Rishinager Ujjain (MP)
6	Study of Biodiversity, abundance and habitat association of coleopteran species in Melghat Tiger Reserve. (Year 2009)	By Shri Vaibhav Thakre, Research Student, Dept. of Zoology Government Vidharbha Institute of Science and Humanities, Amravati.
7	Bio diversity documentation and socio economic development study of resettled villages in Melghat Tiger Reserve. (Year 2009.)	By Shri Kishor Rithe, Satpuda Foundation, Amravati.
8	Permission to study bryophytic flora of	By Shri Tushar Wankhade,

	Melghat Forest. (Year 2010)	SGB Amravati University.
9	DNA Barcoding of Aquatic coleopteran of Melghat region using mitochondrial COI gene (Year 2010)	By Goby George, Amravati.
10	Permission to conduct research in Melghat Forest on "Status and Distribution Survey and Strategic Planning for Malabar Pied Hornbill in MTR" (August 2011)	By Dr. A. G. Wagh, Shri Shivaji Science College, Amravati
11	Collection of data and collection of scat of tiger for the Project "An assessment of genetic structure of tiger population in Central India Forest." (Year 2011)	Dr. Ajit Kumar, Bangalore.

4.21 WILDLIFE MONITORING ACTIVITIES IN MELGHAT TIGER RESERVE.

MONITORING OF WILD ANIMAL POPULATION:

Up to 2005, 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. Recent major monitoring exercise was carried out in 2010 (January-February) as per the new directives. The results have been published by NTCA in May-2011 and are available on their website. The results show a positive and improved trends in major parameters of managements.

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 or

dry nullah width on which the PIP is made. GPS coordinates of all PIP's need to be recorded. The detailed instructions for the field staff in local language is attached at **Appendix no. XII.**

(ii) The tiger data sheets

(iii) Direct tiger sighting report, through wireless

The details of Technical Bulletins as well as publication by Researchers is given in **Appendix no. XIII.**

4.22 RELOCATION OF VILLAGES

In State of Maharashtra and Central Indian landscape, Melghat is the prime and most significant. Melghat has almost contiguous habitat for Tigers conservation with an area of 2027.40 Sq.Km. fully under the control of Tiger Project Directorate. Out of this Gugamal National Park is free from the villages, Melghat Sanctuary has 22 villages (Out of 22 villages 7 villages are rehabilitated and 1 Kelpani is under process of rehabilitation), Ambabarwa Sanctuary has 3 villages and Wan Sanctuary has 6 villages (out of 6 villages 5 villages are Rehabilitated) within it. In addition, 39 villages surround it as they exist in the Buffer Area under the MTR management. Thus the condition of natural habitat is far from ideal as for as sanctuaries are concerned, as existing 25 villages exert biotic pressure and seriously jeopardize the situation. Unless timely measures are taken to shift these villages, neither long term conservation goals would be achieved nor the present 25 villages will be able to get the fruits of developmental activities. For safeguarding precious gene pool and diverse fauna and flora in the area concerted efforts have to be taken to eliminate human interference, for which the only option is relocation of existing villages. Relocation of villages involves resettlement and rehabilitation keeping in view the socio economic lifestyle of the affected people.

4.23 HISTORY OF RELOCATION IN MELGHAT TIGER PROJECT-

REHABILITATION OF BORI, KOHA, KUND VILLAGES IN FIRST PHASE

Bori village has been rehabilitated in 2001-02, Koha and Kund villages in 2002-03. Efforts were made to rehabilitate them ideally. The three villages namely Bori, Koha, Kund were shifted at Rajurgirwapur Tehsil Akot, Dist. Akola as per the provisions G.R. No. WLP-1099/FC-191/F-1, Dated

17-7-2000. The shifting of Bori, Koha, Kund, was done entirely from state funds. It was an ideal relocation, where all the necessary amenities were provided to the villages, rendering them a contented lot. This is tabulated below-

Sr.No.	Facilities Provided	Bori	Koha	Kund
1	2	3	4	5
1	Gaothan	provided	provided	provided
2	Plot for house	provided	provided	provided
3	Funds for construction of house	provided	provided	provided
4	Approach road and internal roads	provided	provided	provided
5	Land for cultivation No. of families	20	36	33
6	Permanent drinking water supply	provided	provided	provided
7	Electricity supply	provided	provided	provided
8	Drainage system	provided	provided	provided
9	Burial ground	provided	provided	provided
10	Primary school	provided	provided	provided
11	Anganwadi	provided	provided	provided
12	Dispensary	provided	provided	provided
13	Bus service	provided	provided	provided
14	Fair price shop	provided	provided	provided
15	Loan facilities	provided	provided	provided
16	Bank facilities	provided	provided	provided

4.24 REHABILITATION OF VAIRAT, CHURNI AND PASTALAI VILLAGES IN SECOND PHASE

After completion of Ist phase of Rehabilitation the Vairat, Churni and Pastalai villages were taken up for rehabilitation. It was planned to rehabilitate Vairat, Churni and Pastalai villages at Ghatladki, Waroli in Chandur Bazar Tehsil and Eklaspur in Achalpur Tehsil of Amravati District. Proposal under Forest Conservation Act, 1980 was got sanctioned by the Govt. of India vide letter No.8-121/2002/FC/Dated 12-06-2003. In the State of Maharashtra, the process of rehabilitation of

villages from Sanctuary and National Park are covered under **"Maharashtra Project Affected Person Rehabilitation Act 1999".**

The important provisions in the act are given below-

i) 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 concerned department of Govt. of Maharashtra by entering an agreement with the project authority or body.

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

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

iv) Chapter III deals with the Rehabilitation of Affected Persons. As per section 10 (3), the State Govt. shall provide civic amenities in the prescribed scale and manner in the new Gaothan or in the extended part of any existing Gaothan established for the purpose of rehabilitation of affected persons and the list of amenities to be provided as given in the act.

v) Section 11 deals with areas of affected and benefited zone to be notified.

vi) Section 14 deals with the power to purchase or acquire land for the purpose of this act.

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

Rehabilitation process of these three villages in phase II was started in the year 2003. Total 152 families were to be relocated from these 3 villages and an amount of Rs. 109 lakh was sanctioned by the Central Government. But due to some technical problems as well as lack of coordination between the implementing agencies the process of relocation could not be completed. In the year 2009 the relocation of these villages was again initiated through coordination with Revenue Department and implementing agencies. The villagers from Pastalai showed unwillingness to settle at Ghatladki, the site selected for rehabilitation. Therefore the process of rehabilitation of Pastalai not started and only Churni and Vairat are taken up for rehabilitation. And the rehabilitation of these villages is being carried out as per the number of families confirmed by S. D. O., Dharni vide his letter no. 249, dated 6/03/2007. Due to increase in the financial target for Gaothan and public amenities, a demand of Rs. 1.90 crore was made to the Govt. in the year 2010, the State

Government released Rs. 1.60 crores in 2010-11. From the available grant, out of 70 families, 69 families from Vairat and Churni have been rehabilitated at Narsala,Ghatladki, Wadgaon & Borala. The rest 1 Family .

The present position of the rehabilitation of Vairat and Churni is as below:

Sr. No.	Name of village	Total no. of families	Rehabilitated families at				Remarks
			Ghatladki	Narsala	Borala	Vadgaon	
1	Vairat	37 + 32 addi. **69**	47	15	0	7	-
2	Churni	33 + 22 addi. **55**	51	2	1	0	One families is unwilling for rehabilitation efforts are being taken up for their willingness for rehabilitation.
	Total	**124**	**98**	**17**	**1**	**7**	

The amenities are made available to the rehabilitated families as per the G. R. No. WLP-1099 /FC-191/F-1, dated 17 July, 2000 at the respective villages.

TABLE NO - 19

TABLE SHOWING THE DISTRIBUTION OF AGRICULTURAL LAND TO THE VILLAGERS OF VAIRAT AND CHURNI AT REHABILITATED PLACE.

Name of Village	Total no. of families	Village where relocated	No. of land holder families, distribution of agriculture land		No. of land less families, distribution of agriculture land		Total	
			No.	Area	No.	Area	No.	Area
Churni	33	Ghatladki	11	49.71	14	14.00	25	63.71
		Waroli	2	11.14	3	3.0	5	14.14
		Borala	2	3.66	1	1.00	3	4.66
		Total	**15**	**64.51**	**18**	**18.00**	**33**	**82.51**
Vairat	37	Eklaspur	9.5	32.76	-	-	9.5	32.76

		Simbora	1	6.22	-	-	1	6.22
		Waroli	6	28.00	8	8.00	14	36.00
		Parsapur	0.50	2.91	1	1.00	1.5	3.91
		Wadgaon	1	1.53	10	10.00	11	11.53
		Total	**18**	**71.42**	**19**	**19.00**	**37**	**90.42**

For the two landless families 2 ha. area is yet to be distributed.

TABLE NO - 20

TABLE SHOWING DISTRIBUTION OF PLOTS TO THE VILLAGERS OF VAIRAT AND CHURNI-

Name of Village	Total no. of families	Village where relocated	Land holder families, distribution of plots		Land less families, distribution of plots		Total
			Plot distributed	Balance to be distributed	Plot distributed	Balance to be distributed	
Churni	33	Ghatladki	13	0	17+22	0	**52**
		Waroli	-	-	-	-	**-**
		Borala	-	-	1	0	**1**
		Narsala	2	0	-	-	**2**
		Total	**15**	**0**	**18+22**	**0**	**55**
Vairat	37	Narsala	11	-	4	-	**15**
		Ghatladki	7	-	10+32	-	**49**
		Wadgaon	-	-	5	0	**5**
		Total	**18**	**0**	**19+32**	**0**	**69**

For the rehabilitation of Vairat and Churni the following area of forest from the Amravati division was selected and deforested for the purpose of rehabilitation.

1) Ghatladki- 151.893 ha. C class

2) Waroli- 113.087 ha. C class

3) Simbora- 58.21 ha. R.F.

Total 323.19 ha.

4.25 RELOCATION OF AMONA, NAGARTAS AND BARUKHEDA IN THIRD PHASE.

As per guidelines issued by the NTCA in February 2008 survey was carried out in the villages for rehabilitation and the villagers were asked to give option (i.e. option I and option II) whichever they are willing to opt. After completion of this process the whole record has been submitted to SDO Dharni for further action. The details of option I and option II are given below.

Out of the 18 villages, a proposal of relocation of 16 villages was prepared and submitted to the Central Government for sanction on the basis of guidelines for relocation vide no. 3-1/2003-PT, dated 26/02/2008 (given in **Appendix no. XIV).**

Details of these villages are as follows:-

TABLE NO - 21

LIST OF VILLAGES THAT PREFERRED OPTION I FOR REHABILITATION IN MELGHAT TIGER RESERVE.

District	Name of Sanctuary	Village Preferred Option-I	No. of Families
Amravati	**Melghat Sanctuary**	Dhargad	141
		Kelpani	287
		Rora	128
		Semadoh	634
		Madizadap	73
		Chopan	110
		Pili	172
		Retyakheda	99
	Total		**1644**
Amravati	**Wan Sanctuary**	Amona	79
		Nagartas	66
		Somthana(Bk)	131
		Somthana(Kd)	156

		Talai	178
		Barukheda	236
	Total	**6**	**846**
Buldhana	**Ambabarwa Sanctuary**	Ambabarwa	117
		Chunkhedi	112
		Rohinkhidki	215
	Total	**3**	**444**

In these 16 villages total no. of families are 2611 and the requisition for grant was made amounting to Rs. 261.10 crores.

Village who preferred option-I & option-II Jointly for Rehabilitation in Melghat Tiger Reserve.

TABLE NO – 22

LIST OF VILLAGES THAT PREFERRED COMBINATION OF OPTION I AND OPTION II FOR REHABILITATION IN MELGHAT TIGER RESERVE

District	Name of Sanctuary	Villagers Preferred Option-I & Option-II	No. of Families	Remarks
1	**2**	**3**	**4**	**5**
Amravati	Melghat	Pastalai	82	No. of families fit or unfit is yet to decided. It is under process through SDO Dharni
		Mangia	254	
		Memna	65	
		Malur	201	
		Gullarghat	185	
		Dolar	70	
		Makhala	348	
		Raipur	399	
		Boryakheda	250	It is a part of main village Raipur
		Dhakna	187	Survey could not be done due to non-cooperation of villagers
		Adhao	10	
		Total	**2041**	
Buldhana	**Wan**	Golai Total 11 villages		Gaothan is outside the village hence not proposed for rehabilitation

Central Government released grant of Rs. 18.86 crores for relocation in the year 2010-11 and through this grant, the relocation of Amona and Nagartas has been completed. Rs. 15.66 crores were also released by State Govt. from the 13th finance commission funds for the relocation of Madizadap and Chopan village in Sipna Wildlife Division, Paratwada. After due survey and visit by the Forest and Revenue officials to these two villages, the villagers conveyed to the officials about their unwillingness for relocation. Therefore the amount sanctioned for these two villages was utilized for relocation of Barukheda village in Akot wildlife division and diversion was got approved vide Govt. G. R. no. Revenue and Forest Dept. no. WLP-1011/file 54/F-1, dated 7/5/11.

A proposal amounting to Rs. 70.70 crores for the relocation of Dhargad, Pili, Rora, Retyakheda and Somthana (B.) villages, total families 707 has been sent to the Principal Chief Conservator of Forests (wildlife), M. S. Nagpur during the financial year 2011-12.

141 families from Dhargad and 37 families from Barukheda was relocated during the year 2011-12.

During 2012-13, 158 families from Gullarghat village was relocated and 176 families from Somthana (Bk.) and 248 families from Somthana (Kh.) are relocated during 2013-14 & 2014-15.

In the year 2014-15 rehabilitation of Kelpani village is under process.

4.26 THE IMPACT ON PA DUE TO VACATING VILLAGES-

Human inhabitations in the area have mostly been established in fertile lands with assured water supply. Such sites within sanctuary are limited and therefore, are ecologically very significant. Flat grounds along major nullah can support

Riparian flora and faunal attributes and such attributes are getting completely lost, over a period of time due to presence of intensive agricultural practices by villages. Thus, seriously affecting the ecological process of the area resulting in degradation of riparian habitats, which needs to be restored urgently (Pili, Semadoh on Sipna banks).

In Melghat context, one hectare of such land is capable of providing 7 to 10 tones fodder, which in turn can easily support wild herbivores say almost 2 cattle units per ha. Relocation of Bori, Koha, Kund in the year 2001-2003 and Amona, Nagartas, Barukheda in 2011 have amply

demonstrated the benefits of relocation, especially to the wild herbivores and consequently to the whole ecosystem. Population of Chital has distinctly increased after relocation of Bori. The relocation of Amona, Nagartas, and Barukheda villages in the year 2011, the vacated land is now available for the wild animals and the reports about wild animal sighting are obtained from the area. Relocation of villages will not only make available the existing area of cultivation and "Gaothan" as well as the area under villages impact zone directly to wild animals it would also remove the competition as the cattle within the villages which are presently driving sustenance over the area equivalent to radius of 2 to 3 km. around existing villages would also get removed.

4.27 IMPACT ON HUMAN SETTLEMENTS-

Shifting of Bori, Koha, and Kund villages at Rajur Girwarpur in Akot Tehsil, it is observed that the people of these villages have improved their living standards. Developed in education, social as well as change in life style. Production of agriculture has also increased. Due to availability of veterinary care, the production of milk as well as dairy products has also increased. The shifting of Barukheda, Amona, Nagartas, Vairat, Churni, and Pastalai will also show the results as that of Bori, Koha, and Kund. Laborers are also getting sufficient work at the relocated sites.

4.28 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 and with and without human presence.

4.29 NEW VISTAS FOR NATURE EDUCATION AND ECO-TOURISM-

Most of the Melghat terrain is undulating which is a serious impediment to wildlife viewing and enjoyment. Open meadows available from these sites will therefore open awareness and may be utilized to harvest eco-tourism potentials.

4.30 SITE SPECIFIC STUDIES-

Shri Kishor Rithe, Satpuda Foundation, Amravati did study on "Bio-diversity documentation and socio economic development study of resettled villages in Melghat Tiger Reserve (year 2009). The report is given on para 3.19.

The studies in this respect from researchers, NGOs are welcome by the directorate and the directorate will ensure to promote the activities by researchers as well as NGOs.

4.31 ADMINISTRATION AND ORGANIZATION

At present, the Melghat Tiger Reserve is headed by a Field Director. This post has being upgraded to the level of Chief Conservator of Forests since May 2011. He is over all in charge of the Melghat Tiger Reserve, based at Amravati. The Melghat Tiger Reserve is under the supervision of Principal Chief Conservator of Forests (Wildlife) Nagpur. Under the jurisdiction of F.D., Melghat Tiger Reserve there are three divisions namely Sipna Wildlife Division, Gugamal Wildlife Division both with head quarter at Paratwada and Akot Wildlife Division, Akot with head quarter at Akot. There are two ACF's 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, 3 in Gugamal Wildlife Division and 5 in Akot 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 NO - 23

THE ORGANIZATION SETUP BEFORE UNIFIED CONTROL (1999)

Division	Ranges & average	Rounds & average	Beats & average area

	area	area	
Conservator of Forest & Field Director, MTR Amravati	4	15	66
	404.75	107.94	24.53

TABLE NO - 24

THE ORGANIZATION SETUP AFTER UNIFIED CONTROL (1999)

Division	Ranges & average area	Rounds & average area	Beats & average area
Sipna wildlife division, paratwada	5	20	66
	167.81	41.95	12.71
Gugamal wildlife division, paratwada	4	16	62
	209.46	52.36	13.51
Akot wildlife division, Akot	4	10	31
	87.61	35.04	11.30
Directorate Average	13	46	159
	155.95	44.07	12.75

TABLE NO - 25

THE ORGANIZATION SETUP FROM 1 OCTOBER 2005

Division	Ranges & average area	Rounds & average area	Beats & average area
Sipna wildlife division, paratwada	5	31	96
	167.81	27.06	8.74
Gugamal wildlife division, paratwada	5	24	87
	167.89	34.97	9.64
Akot wildlife division,	4	13	46

Akot	87.61	26.95	7.61
Directorate Average	14	68	229
	144.81	29.81	8.85

TABLE NO – 25 A

THE ORGANIZATION SETUP FROM 2011-12

Division	Ranges & average area	Rounds & average area	Beats & average area
Sipna wildlife division, paratwada	5	31	96
	167.82	27.07	8.74
Gugamal wildlife division, paratwada	3	18	67
	231.31	35.55	9.55
Akot wildlife division, Akot	5	19	66
	110.00	28.95	8.33
Directorate Average	13	68	229
	156.08	29.84	8.86

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 Majoors over a long period, creating many vacancies in the field.

In view of the above the organization setup proposed in year 2009 has been submitted to PCCF office. This is given in **appendix XV**.

At present, out of this proposed reorganization, the Dhargad range has been taken away from Gugamal division and has been attached to Akot wildlife division since, 31st May 2011 vide PCCF (WL), M. S., Nagpur Sec.22(4)/estt./611/2011-12, dated 31/05/2011. Rest of the reorganization is under consideration.

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CHAPTER- V

LAND USE PATTERNS AND CONSERVATION MANAGEMENT ISSUES.

5.01 LAND USE CLASSIFICATION

The Critical Tiger Habitat of the reserve consists of mostly reserve forests and few patches of non forest areas. The details of the area are given in Table No.1 Chapter I. Presently there are 19 villages (2 villages under process of rehabilitation) inside Melghat Sanctuary, 3 in Ambabarwa Sanctuary and 3 in Wan Sanctuary. The land use of these villages consists of agriculture. Agriculture in tribal blocks of Dharni and Chikhaldara has a cropping pattern where Rice, Jowar are main crops. Wheat, pulses, gram, sesame (*Til*), horticulture crops, sunflower are grown on a smaller scale. Agriculture is the principal activity of the tribal and non-tribal people in this area, which is included in Integrated Tribal Development Project (ITDP) area. The agriculture is primitive and has no concern for long term productivity of the land. On slopes, this results in heavy soil erosion. In hilly areas where light soils prevail, lesser millets like '*Kodo*', '*Kutki*', '*Sawa*', '*Gadmal*' and '*Jagni*', an oil seed, are grown. 'Soya bean' is being increasingly sown. Mixed cropping is followed as an assurance against unpredictable monsoon. Use of high yielding varieties as also use of fertilizers, insecticides and pesticides is gradually catching up in the area. The land is normally low yielding, marginally productive and crops are rain dependent. The farmers are mostly on the brink of subsistence level. Therefore, dependence of these communities on forest resources is heavy and has adverse effect on conservation.

The details of human populations and cattle, village wise are given in **Appendix No. XVI.**

5.02 SOCIO ECONOMIC PROFILE OF VILLAGES.

Inhabitants are mostly scheduled tribes and include Korku, Gonds and Nihal. Balai is a scheduled cast community of Melghat. Remaining population consist of traditional grazier community, the Gaolis. The communities are dependent on agricultural produce and also they are traditional forest dwellers. The villagers are marginal farmers and depend upon the forests for their requirement of small timber, grazing and firewood. They are also involved in poaching of herbivores

like Sambar, Chital, and Nilgai etc. Fishing is also common in Korku dominated villages. The statistics of poaching and grazing are given in the **Appendix no**.**XVII.**

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.

5.03 RESOURCE DEPENDENCE OF VILLAGES

The 73rd Amendment to the Constitution of India has immense significance for the management of natural resources. The Constitution (Seventy Third Amendment) Act, 1992 is incorporated as Part IX of the Constitution and provides that there shall be constituted in every State, Panchayat at the village, intermediate and district levels. Provisions of the Panchayat (Extension to Schedule Areas) Act, 1996 (PESA) further extends the scope of the Act to include Scheduled areas. Very importantly, PESA stipulates that the State Legislature shall endow ownership of NTFPs to the Gram Sabha and Panchayats at appropriate levels [section 4(m) (ii)]. However, this provision did not extend to Protected Areas (PAs) as the provisions of the Wildlife (protection) Act, 1972 regulates the activities in National Park and sanctuaries and extraction of NTFP's are based on the nature of settlement and the rights that are admitted as also the requirement of wildlife management as provided in the Wildlife (Protection) Act, 1972. Further, in order to meet the requirements of the new constitutional provisions, the Government of Maharashtra amended its earlier Acts to Maharashtra Transfer of Ownership of NTFP in Scheduled Areas and the Maharashtra Minor Forest Produce (regulation of Trade) (Amendment) Act, 1997. This Act vested the Panchayats with ownership of NTFP in the respective areas, excluding areas that are notified as national parks and sanctuaries. A gazette notification to this effect was issued on 29/12/1997.

By virtue of the order of the Supreme Court on 14/2/2000 (in I.A. 548 in W.P. (c) 202 of 1995) all rights and concessions, even if granted previously, have been stayed. The same has been further clarified by the Ministry of Environment and Forests through a circular (F. No. 2-1/2003-FC)

wherein it is stated "that rights and concessions cannot be enjoyed in the PAs (meaning national park/sanctuary) in view of the orders of the Supreme Court dated 14/02/2002".

Whereas, the forest areas have been scientifically managed and protected since over 150 year, the increasing population of human as well as cattle in the villages inside Melghat Sanctuary as well as the Wan, Ambabarwa and Narnala Sanctuaries, has affected the growth and maintenance of forests which have deteriorated fast owing to their overuse of grazing as well as for meeting out day to day needs of fuel wood, fodder and small timber. The village in buffer area, also some time sneak in the core area for collecting NTFP firewood, grazing etc. To desist the villagers from such activities, the management has to engage them on gainful wage works and other ecofriendly livelihood options. In order to ensure well being and effective sustenance of the inhabitants of this area, it has become imperative on the part of the Government departments including Melghat Tiger Reserve to provide employment and wages to the inhabitants through various schemes of development and mostly through MGNREGA. This objective is being achieved by undertaking protection related and ecodevelopment related activities. In a way, the villagers are totally dependent on Melghat Tiger Reserve for their livelihood. Over the passage of time, various types of usage works have been introduced for providing sufficient employment to local villagers for the whole year round. This includes works under Habitat improvement, watershed development and protection activities, Construction of LBS (Loose Boulder Structure) DCT, CCT, Vantaa, Gabian structure, Road repairs, fire protection etc. form a bulk of activity. The village youths are being imparted training for developing various entrepreneurship traits to encourage them for taking up new jobs, particularly as guide for tourism activities. Health checkups and diagnostic camps for villagers as well as their livestock are organized by the MTR as per availability of funds.

5.04 HUMAN WILDLIFE CONFLICT.

In any protected area, the human component plays an important role. People residing in and around the protected area, influence the wildlife. The number of people, their life style has direct bearing on the wildlife population. Traditionally Korus have been drawing their sustenance mainly from forestry works. Their life style has been influenced by stopping of timber harvesting activity in recent past and therefore at present they don't have round the year employment. They do occasional poaching of herbivores like Chital and Sambar which affect the availability of food for the carnivora. Though Gonds are comparatively less in number, they indulge in poaching on higher scale. They even resort to killing of Gaur. Fishing and catching crabs from water sources is a very common pass time for these people. Nihals also indulge in poaching and they are known to eat meat of even dead animals found

in forest. Thus they also reduce the food availability for carnivores. However, in last two years, such practices are on decline due to increasing protection measures and spread of legal and conservation issues among villagers.

The crop damage by the wildlife is not common. However the communities practicing agriculture near the forests area suffer from crop damages by wild animals. This brings the villagers in conflict with wildlife. If their crops are raided frequently or their cattle is killed, then they poison the carcasses which leads to death of Tiger or Leopard. Such cases are also not common now. Sometimes the wild herbivores are killed or trapped for protecting their crops. Many times, forest fires seemed to have originated in the agriculture fields. Gaolis, mostly grazers have their total dependence on forests for fodder needs and grazing. This brings their cattle as easy targets for carnivores. The life style of Gaoli community is not compatible with conservation needs of the Tiger reserve and the long term objectives of the area. The factors mentioned above are the main reason for man-animal conflict in the area.

Damage by the wild animals in the area is mainly in the form of-

i) Cattle kills by Tigers and Leopards.

Year	No. of Cases	Compentation paid
2010-11	15	5,63,153/-
2011-12	210	11,29,382/-
2012-13	116	9,58,000/-
2013-14	94	2,74,397/-

ii) Injuries to human beings by Tigers, Leopards, Sloth bears, Hyenas etc.

Year	No. of Cases	Compentation paid
2010-11	9	8,05,807/-
2011-12	6	3,51,000/-
2012-13	8	2,59,000/-
2013-14	12	11,85,000/-

iii) Crop damages by Wild boars, Nilgai and Sambar

Year	No. of Cases	Compentation paid
2010-11	9	21,940/-
2011-12	21	28,950/-
2012-13	17	28,750/-
2013-14	11	32,992/-

5.05 MEASURES TO REDUCE MAN-ANIMAL CONFLICT:-

Regular awareness campaigns through posters, seminars, workshops and informal discussion with the people shall be regularly done and following points highlighted:-

1) While wandering in the forest, one must be alert.
2) Avoid areas where wildlife is usually seen.
3) Do not dump the food waste or other garbage around the villages to avoid attracting wildlife like bear.
4) Do not allow the bushes of lantana and similar species around or close to the village, so that no wildlife is attracted there for food or shelter.
5) Visit the crop fields or move in the night time with at least 2-3 companions.
6) Do not go inside the forests, especially on the water holes in summer where wildlife usually visits.
7) To distract the wildlife one should make, certain loud noise, whistling or humming should, while walking alone on the forest path or trail.
8) If wildlife with its cubs is seen nearby the village, alert others not to go towards that direction and inform nearest forest officials.
9) Avoid walking in the forest or entering in early mornings or evening times.
10) The cattle should be safely kept in the cowsheds in night.
11) Do not make crowd when wildlife enters the village, rather give it a safe passage.
12) Do not walk towards the place where kills of animals are lying.
13) Stray animals such dogs, fowls, etc. should not be wandering around and inside the villages as these attract carnivores, particularly Leopards.

5.06 SLOTH BEAR – HUMAN CONFLICT:

Sloth bear – human conflicts appear to be on the rise in many parts of India and seen correlated with increased human encroachment and disturbance as well as habit degradation. In Melghat there are more number of incidence reported of attack by Sloth bear on human beings, in comparison to Tiger and Panther. This is more common during rainy season when sighting of wildlife becomes poor and food for bears becomes scarce and they move towards villages.

Four Persons Died in Sloth Bear Attack in Melghat in a span of ½ hour on August 2010 in Jarida.

Unparalleled in the history of Melghat, such type of major casualty never happened in the past. There are some incidences of attack of Sloth bear in which number of persons were injured or one person died in the attack of Sloth bear. On the 4th August 2010, in a small village Jarida (also the range H.Q.) located in the Buffer zone of Melghat Tiger Reserve, a lone bear wandered in to the

village around 9.00 p.m. and killed four people, including one forest guard Abhishek Wakode who joined on the same day in Jarida range. The bear also injured two persons. The reason for happening such incidence may be that the bear was confronted by few villagers (i.e. throwing stones and other objects, and chasing the bear). While passing through its usual track in the night. As the news spread, more villagers, in the dark of night, tried to scare away the bear and the bear was caught in a continuing fight or flight situation. When its escape was continually cut off, it reacted by attacking violently as the bear felt its life was in danger.

The injured and the legal heirs of 4 dead persons were given compensation as per the provisions of the G. R. dated 2/07/2010 of State Government. In addition to this the Forest Guard. Abhishek Wakode's legal heirs were given compensation of Rs. 1.00 lac from NTCA and also the contribution done by the staff of MTR and Amravati Circle.

5.07 CATTLE KILLS BY TIGERS AND LEOPARDS

Fairly large number of cattle are killed by Tigers and Leopards in the area. This is because large number of cattle are going for grazing and afford easy prey to carnivores. Thick Lantana undergrowth also facilitates ambushing of cattle by Tigers and Leopards. The kills are distributed in whole of Melghat. These are compensated by the department as per the provisions in the G. R. of Maharashtra State Govt. 02/09/ 2013. (The details of the G.R. are given in **Appendix no. XVIII**). The salient points are as follows:-

Subject to certain conditions, the compensation would be paid as follows:-

(i) Crop compensation

Sr. No.	Item		Compensation to be given
1	Crop loss up to Rs. 2000/-		Full amount but not less than Rs. 700/-
2	Crop loss Rs. 2001/- to 10,000/-		Rs. 2000/- + 75% amount of the additional loss (Not more than Rs.8000/-)
3	Loss Rs. 10,000/- above.		Rs. 8000/- + 40% amount of the additional loss (Not more than Rs. 18,000/-)
4	Sugarcane		Rs. 400/- per Mt.
Items			
1	Fruit Trees	Coconut	Rs. 2400/- Per tree
2		Supari	Rs. 1400/- Per tree

3		Grafted Mango	Rs. 1800/- Per tree
4		Bananas	Rs. 60/- Per tree
5	Other Fruit Trees		Rs. 250/- Per tree

(iii) Compensation to be given to the injured person or legal heir of the dead person:-

As per GR date 30/03/2013

Sr. No.	Particulars	Compensation to be given
1	If the person is dead or permanently disabled	Rs. 5, 00,000/- (Rs. Five lakh only)
2	If the person sustains major injury.	Rs. 4,00,000/- (Rs. Four lakh only)
3	If the person get minor injury.	Actual expenditure incurred on the treatment. If the injured person gets treatment in private hospital, not more than Rs. 1,00,000/-.

(iii) Compensation to be given to the owner cattle:-

Sr. No.	Name of the livestock	Compensation to be given
1	Death of Cow, Buffalo and Bullock	75% of the market value or Rs. 10,000/- (Rs. Ten Thousand only) whichever is less.
2	Death of Goat, Sheep, and other livestock.	75% of the market value or Rs. 3,000/- (Rs. Three Thousand only) whichever is less.
3	Permanent disability to the Cow, Buffalo, Bullock	50% of the market value or Rs. 3,000/- whichever is less.
4	Injury to Cow, Buffalo, Bullock, Sheep, Goat and other livestock.	Actual expenditure incurred on treatment. The compensation will be limited to 25% of the market value or Rs. 1000/- per Cattle whichever is less. The compensation should be paid on the basis of certificate given by Veterinary Doctor.

5.08 INJURIES TO HUMAN BEINGS BY WILD ANIMALS

A few incidences of injuries to human beings by wild animals are also noticed in the area. The number of incidences in last few years are given below:-

TABLE NO – 26

DETAILS OF HUMAN - ANIMAL CONFLICT CASES IN MELGHAT TIGER RESERVE 2005-06 TO 2010 - 11

Year	No. of Injured/dead person		Compensation amount paid
	Injured	Dead	
2005-06	5	-	4,00,000/-
2006-07	2	-	12,500/-
2007-08	6	3	9,08,000/-
2008-09	6	3	5,90,435/-
2009-10	4	-	50,000/-
2010-11	5	4	8,06,000/-
2011-12	6	0	3,51,000/-
2012-13	7	1	2,59,000/-
2013-14	12	0	11,85,000/-

5.09 ASSESSMENTS OF INPUTS OF LINE AGENCIES/OTHER DEPARTMENTS

Rural Development Programmes are being implemented through *Zilla Parishad* and other Govt. Departments. The works mainly undertaken relate to health, education, communication, veterinary care, agriculture, water supply, electric supply, tribal development etc. The Revenue department takes care of provision of ration, maintaining law and order, keeping of land records and distribution of grains etc. The integrated Tribal Development Project by the Tribal Development Department has started various programme such as running of tribal schools, subsidies on agricultural, distribution of implements and equipments, improved variety of seeds, improved varieties of cattle and various other community works. Regular coordination of these works by Revenue Dept. is taken.

In an all-out effort to develop this area for the wellbeing of local tribal various Govt. agencies undertake works of such nature which would have deleterious impact over compensation issues over the area. For example, owing to the inaccessibility of this area, 100% connectivity by all season roads was undertaken as a drive by PWD. This resulted in cases of breaching of Forest (Conservation) Act 1980. The fact that more inroads in the fragile and remote area of forests are likely to make it open and accessible for the outsiders and organized poachers and would encourage poaching and illicit felling in the area is completely ignored by such agencies while pushing for the road development.

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PART - II

CHAPTER NO. VI

THE PROPOSED MANAGEMENT
VISION GOALS, OBJECTIVES AND PROBLEMS

6.01 INTRODUCTION

The Wildlife Protection Act, 1972 (amendment 2006) makes it mandatory for the State Govt. to prepare a tiger conservation plan of core area as well as buffer area of the Tiger Project. While preparing such plan, the State Govt. shall ensure the agricultural, livelihood, developmental and other interests of the people living in and around the tiger reserve. The core area would be the critical, inviolate area and the buffer area would be the peripheral area which would foster in coexistence with local people while safeguarding the integrity of the core. National Tiger Conservation Authority technical bulletin NTCA/01/07 lists out the approach to conservation planning and various management interventions for tiger conservation.

6.02 BASIS FOR PROPOSED MANAGEMENT

The ecological significance and physical attributes of the area along with the problems and constraints faced by the management to crave for preservation and conservation of the project area as given in the Part-A of the 'plan' would form the basis for proposed management strategies. At the same time, the policies, principles and rules and regulations laid down by National forest Policy, 1988; Wildlife Action Plan, 2002 and guidelines issued by Govt. of India (NTCA) from time to time, would also have to be kept in mind while formulating the specific objectives and strategies for the management of the area in question. A brief description about these policy documents, in relation to wildlife conservation, is given as below.

6.03 NATIONAL FOREST POLICY, 1988

The National Forest Policy emphasizes the need for affording protection to animal kingdom and particularly to rare species, which are fast disappearing. While expressing its serious concern about the menace of continuous grazing on the same areas by large herds, it mentions that such grazing is destructive of the better strains of grasses and leads to deterioration of the grass complex. This is more important from wildlife point of view as

uncontrolled and excessive grazing results in degradation of meadows and loss of food for herbivores. Therefore, efforts should be made to introduce rotational grazing.

On tribal people and forests, the policy emphasizes need for associating tribal people closely in protection and development of forests and provide gainful employment to people living in and around forests. Family oriented schemes for improving the status of tribal beneficiaries and undertaking of integrated area developmental programs to meet the needs of tribal economy, including provision of alternative sources of domestic emergency on a subsidized basis to reduce pressure on existing forest area. It also says that adequate grazing fees should be levied to discourage people in forest areas from maintaining large herds of non-essential livestock. The policy also mentions that the encroachment on forest lands should be arrested and no regularization of existing encroachment should be done. Keeping in view of the destruction on large scale of standing trees and fodder and natural regeneration, special precaution and improved practices should be adopted to control fires.

6.04 VISION

The conservation of Tiger, co-predator, preybese and the habitat & it's biodiversity and development of local communities

MANAGEMENT GOALS:

The management goals of this Tiger Conservation Plan are:-

(i) To prevent the extinction of the wild Tigers and to maintain viable free ranging tiger population.

(ii) To preserve, for all times, the unique and representative areas of biological significance contained in the reserve as a national heritage for the benefit, education and enjoyment of people.

(iii) To preserve the 'biological diversity' and 'gene pool' contained in biogeographic Sub division of Satpuda Maikal, occurring in central highlands of Deccan Peninsula.

6.05 MANAGEMENT OBJECTIVES:-

(i) Protection of tiger reserve and providing site specific habitat inputs for sustaining a viable population of tigers, co-predators and prey animals without distorting the natural prey-predators ecological cycle in the habitat;

(ii) To relocate the remaining villages existing in Melghat Sanctuary, Wan Sanctuary and Ambabarwa Sanctuary as recommended by the settlement officer and develop areas so available into productive grasslands and meadows.

(iii) To protect catchment of Sipna, Gaga, Dollar, Chand, Khapra, Wan rivers and other associated streams for sustainable conservation of basic life support systems.

(v) To create awareness and endeavor to establish strong long term linkages between local people and management through meets, *exhibits, melas, prabhat pheries,* workshops, sports, cultural programmes and other celebrations to be organized on occasions like Wildlife Week, World Forestry/ Environment/ Foundation day etc. with local people being kept in focus with a view to develop the mutual trust and love which inspires everyone for displaying strong compassion for wildlife.

6.06 PROBLEMS IN ACHIEVING OBJECTIVES

The project area lacks in natural openings and well-developed grasslands and meadows and as a result, adequate habitat edges do not occur in the area. Direct effect of the deficiency in terms of grasslands and water resources is that the herbivore population in the area, except predominance of Gaur and Sambar in certain areas, is inadequate. As a result, the main predators like Tigers and Panthers depend for part of their food requirement on cattle grazing in the area. This becomes a major source of conflict between the cattle owners, that is-'*Gaolis'* and the 'tiger', and hence the management.

The increasing threat for wildlife poaching and illicit cutting, in the whole area in general, and the core and specific areas assigned for special management in particular, demand young, willing and trained forestry personnel who can patrol the areas with courage, conviction and use arms as well as intelligence wherever required with a view to control effectively the menace of poaching whether by locals or by outsiders. Tripartite MOU between Ministry of Environment and Forest Govt. of India, Government of Maharashtra, and Field Director, Melghat Tiger Reserve signed in July 2009, also puts an obligation on the Government to fill all the vacancies by suitably fit and motivated personnel. The personnel engaged in protection have to be motivated and trained professionally in befriending local people, be sensitive to the demands of their service as well as to the needs and problems of the local people. The personnel and the staff posted in the area largely consists of over aged, unwilling and untrained people who are either regularly pressing for the outside postings or are in a restive mood to pass away quietly their wildlife term of 3 to 4 years. Absenteeism of long

duration is a regular feature. Maximum efforts of the management for HRD is directed to this issue only.

The area of Core is threatened regularly by local intruders on the western as well as eastern side, particularly from villages viz. Dolar, Savrya, Bhandum, Dhakna, Adhao, Gullarghat, Dhargad, Vairat, Dhamangaon, Wadgaon, Deogaon, Jamli, Ambapati, Talai and Ambabarwa etc. for poaching of herbivores and the grazing. When confronted and booked for these offences, these people *gherao* and threaten the staff with dire consequences. The cattle, which are seized, are collectively got freed from the staff and sometimes even local politicians join the people in beating as well as threatening the staff. Several cases involving severe conflicts between local people, local leaders and staff have been registered with the police. To harass the staff, sometime false cases under Atrocities Act against tribal, are also slapped on the staff.

The increased traffic on the two state highways passing through heart of the area and one passing even through core as well as development of other all weather roads, connecting Dharni, Akot, Achalpur to almost all parts of the reserve have made the entire area accessible and prone to illicit trade and trafficking in wildlife and medicinal plants or its parts and derivatives, now, which was otherwise considered safe and inaccessible about 15 to 20 years ago. The increased traffic through these roads poses serious threats and if not regulated and checked for arms, suspicious visitors, intruders and other evidences, it could lead to serious incidences of poaching and illegal trafficking.

The area is very rich in biodiversity and contains many wild varieties 'gene pool' elements and medicinal plants including very valuable NTFP like '*Safed Musli', 'Hirda', 'Aonla', 'Baheda', 'Maida Lakdi', 'Lakh', 'Charoli'* and *Gum* etc. which may attract traders involved in illicit sale of related items and sometimes even non-suspecting researchers also. The lack of knowledge, awareness and unwillingness to accept the challenge by the ground level staff is the biggest hindrance in the way of putting a check on this kind of illicit trade, even though, check gates are established on all entry points.

There are still 25 villages (2 villages under rehabilitation) in the critical habitat area and are required to be managed on the basis of guidelines of project tiger. Since remaining 23 villages from Sanctuary are proposed to be shifted, creation of permanent assets and implementation of scheme under eco-development can not be taken up in majority of the areas. As a result of this, it is difficult to motivate and convince them about their active

participation in the management and protection of area. The problems related with these villages will not be solved unless either the rules and regulations for Sanctuary are compromised with or the villages are rehabilitated, expeditiously. The villages being remote, the fruits of development as far as line agencies like *Zila Parishad*, Tribal Development, and Agriculture etc. are concerned, do not reach them as contemplated under the schemes of government.

Due to sensitivity of the area, in the wake of malnutrition deaths of tribal children in the past, number of line agencies of the govt. department as well as the NGOs work in the area for the economic & social wellbeing of the tribal. However, the lack of well coordinated and focused approach among developmental agencies for taking up development works, many a times they work at cross purpose and so far as forest and wildlife department is concerned, they consider it almost inimical to tribal welfare. This result in serious apprehensions in political as well as social circles, and create an environment which is not conducive for forest and wildlife conservation and implementation of FCA as well as WLPA which are considered blocking the developmental works in such an environment. Unless efforts for creation of awareness and dovetailing the approach for nature & wildlife conservation with various tribal development schemes are made at the highest level in govt., these problems will continue to create conflict situations between forest staff, line agencies and the local people. Further, whereas the other line agencies have access to larger slice of funds in the name of tribal development, the management engaged in protecting their natural homes, is almost starved.

The area falling under Melghat Tiger Reserve is prone to malnutrition and infant mortality owing to its remoteness, local tribal customers and traditions, low literacy rates and lac of employment in monsoon season. The connectivity of the area is also badly affected due to heavy rains and hilly terrain. The efforts are being made by park authorities to provide employment to the local tribal by undertaking works of soil and moisture conservation, meadow development, protection etc. under various schemes. Other line departments working in the adjoining area and forest department in buffer areas are undertaking various works and schemes for all round economic development of the local people. It is imperative that for tiger conservation and welfare of the locals Melghat Tiger authorities should be provided corpus fund created by pulling the funds from different Government Department.

Lack of trained and adequately educated and interested personnel in the research wing as well as the field level has been a serious stumbling block for carrying out successfully the

research works like monitoring of vegetation plots, enlisting of rare and endangered species and further the cause of conservation regarding medicinal plants and even monitoring the impact of various managerial practices. The objectives set in this direction may not be achieved again if adequate attention is not paid to the special needs of the research wing in the Directorate.

After unified control in May 1999 with a large chunk of area of 2027 sq.km, all consisting of almost dense forests and valuable diversity, the directorate faces the serious problem for want of adequate personnel for planning, monitoring and documenting the developmental activities as well as wildlife crimes. The newly created divisions are also not well equipped as far as supervisory staff is concerned, particularly in view of increasing load of MGNAREGA works which they have to implement *per force* in view of the employment needs of the tribal population staying within the project area.

The availability of funds for habitat development as well as protection works has been very erratic, irrational and untimely. Though after unified control, the project area under the administrative and technical control of the directorate has increased to about six times, which in turn amounts to increase in protection and development of responsibilities many fold, the budgetary allocations under non-salary components of plan as well as non-plan heads have not shown any substantial increase and contrary to expectations, in some cases it has decreased causing thereby serious problems in shouldering the responsibilities that the directorate is expected to. For want of funds, the British era rest houses, network of seasonal roads, residential quarters and labor sheds handed over to the directorate in large numbers, are all almost about to collapse and get lost in oblivion. The money available for fire protection and anti poaching activities is not assured, as a result of which it is next to impossible to carry out necessary operations regarding establishment of firewatchers for fire protection works, laborers on protection camps and laborers for protection squads.

6.07 STRENGTHS-WEAKNESSES-OPPORTUNITIES –THREATS

STRENGTH

1. CONTIGUITY OF FORESTS:

The reserve forests forms 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, Apluda mutica, Schima sulcatum, Schima nervosum, Sorghum sericeum, centroversum, Themenda quadrivalvis/ Pseudanthistiria Iispida etc.* other grasses which occur is such associations include *Brichiaria racemosa, Hachelochloa granularis, Panicum tripheron 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, Gadga and 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. Map no. 8 indicating water resource availability is attached.

4. INVIOLATE AREA:

There is no village in Gugamal National Park, whereas Melghat Sanctuary has 19 villages (2 villages under rehabilitation) and Ambabarwa Sanctuary 3 villages respectively with relocation of 3 villages from Wan in 2011, the no. of villages in Wan is now 3 only. The process of rehabilitation of these villages is in the progress. The majority of the villagers are willing to be relocated.

6.08 WEAKNESSES

(i) There are 39 villages in the buffer area under MTR control of the reserve and 25 villages (2 villages under rehabilitation) 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 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, Gallagher, Dome, Rajapatha, Jarida, Panchdongari, Rangubeli, Kutanga, Memna, Chikhaldara, Khongada, Bairat 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) The ground staff is faced with a problem of remaining stuck to their posting in Melghat area for more than a reasonable period, even up to 15 to20 years against their will. This naturally has an adverse bearing on their performance in comparison to their counterparts in the plain area.

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

(vi) 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, staff is not allotted on the lines of territorial wing of department even though the quantum of work is very heavy.

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

6.09 OPPORTUNITIES:

1. 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.

2. The area from West Melghat and East Melghat Division notified as buffer of Melghat Tiger Reserve will further strengthen the wildlife conservation in and outside area.

3. If wildlife sighting improve by proper management, the tourism will also increase. The increased tourism will give more employment to adjoining villages in the form of tourist guides, tourist resorts etc. This will become a tool for conservation and protection.

4. With the formation of Tiger Conservation Foundation, the MTR management is likely to be strengthened.

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

6.10 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. Many times it is instigated by local leaders.

(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 are detrimental to conservation.

(ix) At present most of villages are willing to relocate. But if the funds are not provided in sufficient quantity, the real returns to the villagers may diminish leading to change their mentality for relocation.

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CHAPTER VII

MANAGEMENT STRATEGIES.

7.01 DELINEATION OF CRITICAL TIGER HABITATS AND INVIOLATE AREA.

As per the provision of the Wildlife (Protection) Amendment Act, 2006 No.39 of dated 3rd September 2006, section 38(v) (4) (i) the expression "Tiger Reserve" includes critical tiger habitat areas of National Parks and Sanctuaries, where it has been established, on the basis of scientific and objective criteria that such areas are required to be managed as inviolate for the purpose of tiger conservation, without affecting the rights of scheduled tribes or such other forest dwellers and notified as such by the State Government in Consultation with an expert committee constituted for the purpose. The Government of Maharashtra has issued a notification no.WLP-10-07/CR-297/F1 Mantralaya Mumbai Dated 27th December 2007. As per this notification following areas of Melghat Tiger Reserve have been declared as Critical Tiger Habitats.

Sr. No.	Tiger Reserve and Its constitutional National	Area (Sq.Km.)	Notification no.

	Park/Sanctuaries.		
1.	Melghat Tiger Reserve		
	1. Gugamal NP	361.28	No.WLP.1098/CR-135/F-1, Dated 8-08-2000.
	2. Melghat WLS	788.75	No.WLP.10-2000/CR-41/F-1, Dated 6-11-2000.
	3. Narnala WLS	12.35	No.WLP1096/CR-279/F-1, Dated 02-05-1997
	4. Ambabarwa WLS	127.11	No.WLP.1094/CR-123/F-1, Dated 09-04-1997.
	5. Wan WLS	211.00	1. NoWLP.1097/CR-5/F-1, Dated 28-07-1997 2. No.WLP.1097/CR-5/F-1, Dated 29-07-1997 (205.86 Sq.Km.)
	Total For Melghat TR.	**1500.49**	

The details of notification of forest areas as National Parks and Sanctuaries have been explained in chapter I. The final notification of non-forest areas coming under the sanctuaries is to be issued after rehabilitation and taking possession of the area. The beats and compartments, sanctuary wise, is given in **Appendix No. XIX.**

7.02 ZONE AND THEME APPROACHES TO MANAGEMENT STRATEGIES.

The entire area under the plan is divided into five different zones keeping each zone identifiable and distinguishable owing to its special objects and specific management needs.

(i) BIO-DIVERSITY CONSERVATION ZONE

(ii) UNIQUE HABITAT MANAGEMENT ZONE

iii) VOLUNTARY RELOCATION ZONE

iv) ADMINISTRATION ZONE

iii) ECO-TOURISM ZONE

TABLE NO - 27

THE AREA DETAILS OF THE ABOVE FIVE ZONES ARE GIVEN IN FOLLOWING TABLE.

Sr. no.	Zonation	Area (ha.)		Total area (ha.)	No. of Comptt. included
		Forest	Non Forest		
i)	Bio – Diversity conservation zone	110722.66	98.03	110820.69	439
ii)	Unique habitat management zone	3405.51	261.49	3667.00	11
iii)	Eco-tourism zone	18303.15	672.22	18975.37	80
iv)	Administrative Zone	0.00	31.25	31.25	-
v)	Voluntary relocation zone	14725.36	1830.82	16556.18	59
	Grand Total	**147156.68**	**2893.81**	**150050.49**	**589**

(Note: Some area of administration zone is out of core area. Actual total area is 51.75 ha.)

The enclosed **Map no. 1 to 5** shows the distribution of areas.

Each zone will have special objects and commensurate management prescriptions to achieve this objective.

7.03 MANAGEMENT OF BIO-DIVERSITY CONSERVATION ZONE-

CONSTITUTION- The zone includes the entire area of Gugamal National Park and majority of Narnala Sanctuary. It also constitutes the major portion of Melghat, Wan and Ambabarwa Sanctuaries. Following table shows the areas which come under this zone:-

CONSTITUTION OF THE AREA See Map No. 2

Name of Zone	Area (ha.)		Total area (ha.)	No. of Comptt. included
	Forest	Non Forest		
Melghat Sanctuary & Gugamal N.P.	86293.20	0.00	86293.20	373
Wan Sanctuary	15537.07	98.03	15635.10	53
Ambabarwa Sanctuary	8453.29	0.00	8453.29	11
Narnala Sanctuary	439.10	0.00	439.10	2
Total	**110722.66**	**98.03**	**110820.69**	**439**

7.04 SPECIAL OBJECT OF MANAGEMENT FOR THE BIO-DIVERSITY CONSERVATION ZONE

The following special objects are set for the management of this zone:-

i) To keep the area inviolate and disturbance free and protect it from fire, illicit grazing, illicit felling, encroachments and poaching and similar acts of habitat destructions in order to Conserve Tiger and its prey base .

ii) To maintain and develop the bio-diversities of the area.

iii) To maintain the infrastructure including the network of roads, wireless network and protection camps to ensure adequate protection of the area.

iv) To monitor the growth, succession and related changes in vegetation, behavior, number and population dynamics of wild animals and assess the impact of managerial practices over a period of time and to encourage research in these aspects.

v) To conserve the area as a representative of the biodiversity and ‘gene pool’ contained in the Satpuda Maikal Bio-geographic zone of central High Lands.

vi) To take up soil and moisture conservation works with a view to arrest soil erosion.

7.05 MANAGEMENT PRESCRIPTIONS FOR THE BIO-DIVERSITY CONSERVATION ZONE -

i) The boundary of the zone will be demarcated and marked by erecting boundary pillars as per instructions issued from time to time keeping in view the guidelines by Principal Chief Conservator of Forests, M. S. Nagpur vide his letter no. CF/LR/68/2001, dated 29/5/2001 and CF/LR/SR-34/153/2002-03, dated 21/6/2002, (Given in **Appendix no. XX)**.

ii) Illicit felling, poaching, fire, encroachment, grazing etc. will be totally stopped. Strict vigilance during the monsoon months will be ensured by group patrolling through round headquarters and protection camps. Patrolling by Elephants during monsoon will be carried out for reaching in inaccessible areas.

iii) Restricted entry of the people in accordance with the section 27 of the Wildlife (Protection) Act, 1972, will be imposed. For this purpose, the check Nakas at Dhondri-Aam, Bori, Koha, Vairat, Kund, Dollar, Zari, Talai, Shemba, Wasali and Shahanur will be maintained. If necessary, additional gates will be erected after permission of the Field Director Melghat Tiger Reserve.

iv) The soil and moisture conservation works will be according to slope i.e. upper riches, middle riches and lower riches. At the upper riches loose bolder structure works will be taken up. On the middle riches the loose bolder structures, small earthen bandharas and gabian structures will be taken up and lower riches cement bandh, earthern bandharas, forest tank will be taken up. These works will be carried out as per the suitability of site. The treatment map will be prepared accordingly and works will be carried out. The contour trenching works (CCT/ DCT) shall prohibited as it exposes soil which accelerates the soil erosion in a terrain like Melghat which has high rain fall.

v) The existing grass lands and natural breaks in the canopy will be maintained as such.

vi) Strict vigilance for protecting the area from fire will be maintained.

vii) The wildlife population will be monitored regularly as per the instructions issued by National Tiger Conservation Authority and the Field Director.

viii) Eradication of weeds especially Lantana (Lantana Camera), Rantulas (Ocimum Canum Orthosiphon), and Gokharu (Tribuls Terrestris),

ix) No collection of NTFP.

x) The participation of local people will be ensured in all works specially patrolling & fire protection.

xi) The nature education, awareness and eliciting the local people support for protection shall be under taken regularly.

xii) To plant suitable fruit trees, grasses and browsing species at suitable sites. The details of instructions in this regard issued by Chief Conservator of Forests and Field Director, Melghat Tiger Reserve in local language are given in **Appendix no.XXI.**

7.06 UNIQUE HABITAT MANAGEMENT ZONE

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 Vairat which is 1178 meter from MSL. The vast difference in elevation is also reflected in extreme weather / climatic conditions in Melghat owing to these marked differences in climate, the habitat also varies in great scales.

7.06 (a) In Melghat, one of the unique habitats is **'balla'** i.e. open grasslands on plateau 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 complitly protected from fire and grazing.

7.06 (b) Another unique habitat in Melghat is **'doh'** where the pool of water stagnates along the rivers. This is a perennial source's 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 desiltation 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 poisoing etc. if any for fishing by the locals.

7.06 (c) There are few unique riparian vegetation patches either on the balla or narrow valleys which are hotspots of diversity viz., chikhlam, kolaam, amrai, etc. These sites are specifically protected by providing protection camps within 2 km. (See **Annexure No. XXX**)

CONSTITUTION OF ZONE See Map No. 3 & 7.

Name of Zone	Area (ha.)		Total area (ha.)	No. of Comptt. included
	Forest	Non Forest		
Melghat Sanctuary & Gugamal N.P.	1486.68	147.72	1634.40	6
Wan Sanctuary	1918.83	116.77	2035.60	5
Ambabarwa Sanctuary	0.00	0.00	0.00	-
Narnala Sanctuary	0.00	0.00	0.00	-

Total	**3405.51**	**264.49**	**3670.00**	**11**

The relocated village sites are mostly in the valley and all of them are unique habitats that presents on opportunity to develop as a meadows on which meadow management is being done scientifically with guidance from Botanist of Chikhaldara College. (See Map No. 14: Meadow Development Sites) In the last 4 years, 900 hectares of meadow is developed and the results are very encouraging. The justification for a meadow management in unique habitat is derived by calculating the carrying capacity of the tiger population based on Hayward's et.al. 2007 and the details are as follows:

7.07 CALCULATION OF CARRYING CAPICITY OF TIGER IN MELGHAT TIGER RESERVE

Carrying capacity of a species in an environment in the maximum population size of the species that the environment can sustain indefinitely given the food, habitat water and other amenities, available. Carrying capacity of a protected area regarding its non-predator species depends on habitat condition, water, climate, prey base available and anthropogenic disturbances. It varies and goes up and down depending on the variation in the given factors.

Carrying capacity for any predator (in this case tiger) in a Protected Area may be calculated based on an available Prey Biomass present in that particular Protected Area (PA) (Hayward data 2007).The most common prey species in MTR is Sambar, Gaur, Wild Boar, Barking Deer, Chital, Nilgai etc. The **3**/4th the average body weight of female of all species were taken to calculate the average bio-mass of MTR available for the Predator and the density of prey base is taken from Phase-IV Monitoring for Tiger and its prey species.

Table showing the average female body weight of Prey base

Sr. No.	Species	Average Female Body Weight	3/4th of Body Weight
A	Sambar	181	136
B	Wild Pig	57	42.75
C	Gaur	590	442.5

D	Chital	70	52.5
E	Nilgai	345	258.75

Table showing the density of prey base of MTR as taken from Phase-IV monitoring

Sr. No.	Species	Minimum Density per square Kilometer
A	Sambar	1.2685
B	Wild Pig	0.1712
C	Gaur	0.5036
D	Chital	0.9274
E	Nilgai	0.3670

Table showing the prey bio-mass available per sq. km in MTR

Sr. No.	Species	3/4th of Body Weight X	Minimum Density per square Kilometer Y	Prey Biomass X x Y
A	Sambar	136	1.2685	**172.20**
B	Wild Pig	42.75	0.1712	**7.3188**
C	Gaur	442.5	0.5036	**222.843**
D	Chital	52.5	0.9274	**48.69**
E	Nilgai	258.75	0.3670	**94.96**
			TOTAL PREY BIOMASS per sq.km.	**546.0118**

E.g. Prey Biomass for Sambar= 3/4th of Body weight of Female Sambar X Density per square kilometer

Total available prey biomass per square kilometer in MTR = 546.0118.

Equation from Hayward's et.al. 2007:

y = -1.363 + 0.152x

Where y = log 10 of maximum carrying capacity of predator density for the available prey.

X= log10 of prey biomass per unit area per sq.km.

Putting the values in above equation we get

Y= -1.363 + .152 (log10 546.018)

Solving the equation we get;

Y = -1.363 + 0.152 (2.74)

Y = -1.363 + 0.416

Y is log 10 of maximum carrying capacity.

Y = log10 (-0.947)

Y = 0.02365 per square kilometer.

So in MTR, maximum carrying capacity of Tiger is as follows:

Per Square Kilometer	0.02365
Per 100 Sq. Km.	2.365
For whole MTR; 2029 SQ.KM.	47.985

During All India Tiger Estimation 2010-11, estimated tiger population for MTR is in the range of **30-39.**

The minimum number of tigers identified from actual camera trap photographs in Phase-IV in the year 2013 were **32** and 2012 were **29.**

The minimum numbers of tigers identified in MTR are definitely less than the viable tiger population that can exist (2010-11 WII-NTCA estimate) in the 2029 sq. km. landscape of MTR consisting of 1500 sq. km of Core and 529 sq. km. of Buffer.

The present prey biomass may support more Tigers in MTR as estimated using Hayward's formula. We must take into account one important fact that "**present Prey Biomass per unit area per sq. km. supports not only tigers but also the Leopards, the Wild Dogs, the Hyenas and the Jackals.'**

So the Tiger has to share its prey biomass with these co-predators. This explains the overall less density of tigers in MTR as after sharing of prey biomass, limited biomass is available to tigers, the main predators.

The kill cases or depredations by tigers of domestic cattle especially in the sanctuary area and buffer area clearly shows inadequacy of wild prey biomass or very low density of wild prey biomass per unit area of the landscape.

In MTR, there is a pocket (500-600 sq.km.) which supports high density of prey as well as predators in a landscape which is best of its kind in the world i.e. heaven for tigers like Gugamal National Park and surrounding areas of Chikhaldara, Dhargad and Dhakna Ranges. In this pocket very less or no management interventions are required. This pocket alone supports more than 75% to 80 % of tiger population of MTR.

But at the same time there are many pockets (more than 1000 sq.km. in total) where there is ample chance for augmenting the habitat conditions to increase the prey biomass by means of soil and moisture conservation, water augmentation, meadow development, fire protection and weed eradication.

In these pockets 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 Prey biomass and palatable grasses & vegetation. Management interventions are necessary to augment the water resources and palatable grasses in the sanctuary area or buffer area. Growth of palatable grasses will foster the herbivore population growth. Once the prey biomass increases it will definitely support high density of predator; in this case the Tiger.

7.08 MANEGEMENT PRESCRIPTIONS FOR MEADOW DEVELOPMENT:

A systematic approach will be adopted to develop meadows on the lands of relocated villages. The prescriptions are as below:-

1) The area will be demarcated.
2) A 10 meter wide fire line will be cleared surrounding the area for strict fire protection.
3) Removal of weed species like (*Lantana Camera*), Rantulas (*Ocimum Canum* Orthosiphon), and Gokharu (*Tribuls Terrestris*), Karvi (*Strobilanthus callosus*), Parthenium (*Parthenium hysteriphorus*), etc. will be done from the area.
4) A treatment map of the area will be prepared showing the area to be treated by various prescriptions as follows.
    A. Area having 25 degree slope.
    B. Areas with good tree growth and gentle slope.
    C. Areas around nala, water bodies, streams, rivers etc.
    D. Area of grass land.

Treatments for each area will be as follows:-

Area A: - Protection and Soil and moisture conservation works like nala-bunding, stone fencing and check dams etc. as per site requirement will be carried out.

Area B:-

1) The removal of seedlings of Teak, Palas, Haldu, Eucalyptus, Dhawada, Ain and other non-fodder species from the area and the wild fruit species will be suitably pruned.

2) Cutting back of coppice shoots of above species will be taken up every year after the rainy season.

3) For the removal of trees, the procedure of regular coupe working will be adopted.

Area C:-

Trees, bushes and shrubs over the nala and other water bodies will not be removed and it will be retained for soil and moisture conservation as well as from shelter point of view for wildlife.

Area D:-

1) The area will be developed for fodder production.

2) The cutting and burning practices of the grassland management will be followed. The blocks size should be around of 10 Ha. considering the terrain in Melghat region.

3) After every 5 years the meadows will be assessed from the point of view of the growth of palatable and unpalatable grasses. The suitable patches will be put under augmented regeneration.

Augmented Regeneration:-

In order to achieve a good regeneration of grasses in the meadow, some blocks will be closed for grazing by ungulates by using artificial barriers. Depending upon the regeneration status of herbs and grasses, 10-15 ha. area will be closed for a two year rotation period in one operation.

7.09 ERADICATION OF INVASIVE SPECIES

On the basis of critical assessment of the biological and ecological attributes of Lantana Amit Love, Suresh Babu and C. R. Babu of Centre of Environmental Management of Degraded Ecosystem, School of Environmental Studies, University of Delhi has developed a new management practices of lantana eradication. The new strategy involves:

(i) Its removal by cut root stock method.

(ii) Weeding of saplings from beneath the trees used for perching by generalist birds that disperse the seeds throughout their home range and from surface drainage channels originating from the area covered by such trees.

(iii) Ecological restoration of weed free landscapes, preferably the grassland, or forest communities according to the needs of stakeholders to prevent reinvasion by the same species for secondary invasion by another alien species.

The new strategy developed has been implemented successfully in demonstration plots of 2-5 ha. at the Corbett Tiger Reserve (Uttarakhand), Kalesar National Park (Haryana) and Satpuda Tiger Reserve (Madhya Pradesh) (The details are given in **Appendix no. XXIII**).The above experiment may also be implemented in MTR as a part of management practice.

For Rantulas (Ocimum Canum Orthosiphon), Gokharu (Tribuls Terrestris), etc. will be removed manually after rainy season.

7.10 WATERSHED DEVELOPMENT:-

Watershed management is integral part of wildlife habitat management. Therefore, watershed management will be based on ridge to valley concept. The area of Melghat Tiger Reserve falls under Tapi and its tributaries watersheds. The object of taking soil and moisture conservation

works, nalla bunding, Cement Bandharas, Gabian Structures etc. in an intensive manner on watershed basis is to arrest soil erosion and induce optimum water conservation in the area to maintain and enhance the bio-diversity and the gene pool of the area. "Integrated watersheds Development Works" which would include plantation of bamboos, fruits and other trees, digging, desilting of water ponds, vantalis, bandharas, anicuts will be taken of in the areas. The soil and moisture works like loose boulder structure, CCT, DCT, vantalis, earthen bandharas are being taken up in the area under varies scheme of State and Center.

7.11 MANEGEMRNT PRESCRIPTIONS FOR BALLA, DOHS AND RIPARIAN ZONE

Protection of the unique habitat viz., 'Balla', 'Doh' and riparian zone is important for the conservation of bio diversity of these areas. Protection camps should be established on these unique habitat patches to protect against, illicit felling, MFP collection, poaching etc. All the standard monitoring protocols should be followed. These balla are occupied by Nomadic community of Melghat called 'Gavlis' for pasturing of livestock. The temporary tents of Gavlis are called **'hetis'**. The 'balla' are pastured by Gavalis largely during monsoon i.e. June to October. During this period, the protection strategy should be specially designed by proper Annual Monsoon Plan proposed by respective Division and duly approved by the Field Director. (See **Annexure: XXXXIII – List of Ballas/Grasslands/Open Spaces**)

In Doh and riparian zones moisture availability throughout the year makes a conducive atmosphere for the presence of green forages. This makes herbivores like gaur, sambar, barking deer etc. to conglomerate in the area. Hence during summer season, strict protection should be ensured with the help of Special Summer Protection Plan to arrest the poaching of herbivores by local tribes especially during the festivals like Holi.

In order to retain the soil moisture, regular soil moisture conservation works in doh and riparian zone should be carried out. Regular desilting of dohs is necessary to conserve the micro flora and micro fauna of the unique habitat. (See **Annexure: XXXXII)**

A special focus will be given to enumerate the changes that happen in the unique habitat by involving, local researchers and universities such as Sant Gadge Baba University, Amravati.

7.12 VOLUNTARY RELOCATION ZONE

CONSTITUTION OF THE AREA- See Map No. 5

Name of Zone	Area (ha.)		Total area (ha.)	No. of Comptt. included
	Forest	Non Forest		
Melghat Sanctuary & Gugamal N.P.	9831.90	1445.80	11277.70	44
Wan Sanctuary	874.09	174.51	1048.60	3
Ambabarwa Sanctuary	4019.37	238.76	4258.13	12
Narnala Sanctuary	0.00	0.00	0.00	-
Total	**14725.36**	**1859.07**	**16584.43**	**59**

In the core area of Melghat Tiger Reserve (MTR), there were 33 villages. These 33 villages exerted lot of dependence on the natural resources of the Reserve for the domestic as well as livelihood needs. The 33 villages are distributed in all the 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 are important. In Melghat Tiger Reserve since 2000- 01 to 2012-13, 12 villages have been relocated based on the guidelines of the National Tiger Conservation Authority and Government of Maharashtra issued from time to time. In Melghat, inviolate area is necessary in order to increase the breeding population of tiger.

Area of Constitution:-

Name of the Sanctuary	Name of the village	Area included in zone (ha.)	Remarks
Melghat	1. Vairat	636.10	
	2. Pastalai	669.70	
	3. Churni	255.00	
	4. Memna	845.40	
	5. Semadoh	1207.20	
	6. Makhala	1802.40	
	7. Madizadap	2036.30	
	8. Pili	1193.50	
	9. Raipur	2145.30	
	10. Adhao	1315.60	
	11. Dhakna	598.90	
	12. Gullarghat	762.00	

	13. Dhargad	798.50	
	14. Kelpani	934.00	
	15. Dolar	697.70	
Total Melghat Sanctuary		**12805.20**	
Wan	1. Somthana Kd.	948.60	
	2. Somthana Bk.	595.70	
	3. Talai	879.70	
	4. Golai	565.80	
	5. Barukheda	647.10	
	6. Nagartas	213.40	
	7. Amona	1067.20	
Total Wan Sanctuary		**4917.50**	
Ambabarwa	1. Chunkhedi	814.63	
	2. Ambabarwa	1180.86	
	3. Rohinkhidaki	886.24	
Total Ambabarwa Sanctuary		**2881.73**	
Grand Total of Three Sanctuaries		**20604.43**	

7.13 MANEGEMENT PRESCRIPTIONS:-

The relocation of villages from inside the core area of Melghat Tiger Reserve will be voluntary. The relocation of villages has to be done strictly based on the guidelines of the National Tiger Conservation Authority and Government of Maharashtra issued from time to time.

Before the relocation and rehabilitation process all the rights have to be settled as per the provisions of the Recognition of the Forest Right of Scheduled Tribes and Other Traditional Forest Dwellers Act, 2006. In the rehabilitation process all possible help has to be rendered to the communities in view of their vulnerability to the outside world.

However, in the State of Maharashtra, even if a village is relocated in rehabilitation under option I, all the amenities like purchase of plot for house construction, connecting roads, internal

roads, drinking water facilities, electricity, school etc. are provided with active involvement of all the District agencies. This practice should be continued in the villages that are proposed for voluntary relocation.

7.14 ECO- DEVELOPMENT:

BACKGROUND

The Protected Areas (PAs) in Maharashtra, as elsewhere in India, exist as islands amidst the sea of humanity. The PAs are recognized as repositories of biological diversity of an area and they are therefore, created for the basic purpose of conservation on biodiversity. However, the people living in an around PAs depend upon the PA resources for their substance often having negative impact upon the park resources. On the other hand, the creation of PAs also effect local communities by restricting their access to the PA for collection of various forest produces and by causing damage to the life and property of local people by wild animal living in the PAs. Therefore, Eco-deveopment is envisaged as strategy of PA management to address PA-people issues for reducing the negative impact of people on the PAs and their all-round development. The strategy seeks to incorporate local people in planning, management and protection of PAs to achieve the objective of biodiversity conservation.

Melghat Tiger Reserve is burdened with pressure of grazing, fuel wood and NTFP collection from villages inside the core area and few villages on the fringes. To desist the villages from entering inside the zone for their day to day needs and to provide alternative livelihood to the villages, the activities under the Eco-Development Programme shall be for utilization of resources of local people supplemented by eco-development measures aimed at restoration of rural ecosystem to a level of self-sufficiency as early as possible in order that pressures of resources needs on protected area are effectively mitigated.

The eco-development programme was introduced in Melghat Tiger Reserve for the first time during 1992-93 in five villages (1) Kelpani (2) Bori (3) Dhargad (4) Gullarghat (5) Khatkali. This programme was continued up to 1996-97 and was found suitable for the betterment of people and even habitat development works in nearby areas. Villages also gave good response to this programme. On the basis of this experience the second phase of eco-development was executed in other 6 villages namely (1) Chunkhadi (2) Bicchukheda (3) Nawalgaon (4) Madizadap (5) Khandukheda. It was continued up to 1999-2000 with the same response from the villages. In third phase, other 6 villages namely Hatru, Sarwarkheda, Chilati, Simori, Domi and Ruipathar, were taken

up for this programme in 2000-01. In 2001-2002, 12 villages were taken up out of which 5 villages were tackled during 2001-02 and 2002-03. The village eco – development activities have been continuous in the reserve.

It is proposed that this activity should be geared up in Melghat Tiger Reserve. As this programme effectively provides remedies to problems of prime concern to wildlife, the provision for basic amenities and reducing crop damage and man-animal conflict, its scope and operation must be extended to cover as many villages as possible with the following objectives.

(i) To reduce negative impacts of the local people on the PAs and PAs on the local people.

(ii) To enhance the acceptability of PAs by the local communities.

(iii) To improve the standard of living of village communities by developing alternative subsistence and income generation opportunities

(iv) To involve local people in planning, implementation, monitoring and evaluation of the eco-development programmes.

(v) To improve participation of local people in the management of PAs and bio-diversity conservation.

(vi) To improve the productivity of land by suitable land development measures.

ACTIVITIES TO BE TAKEN UNDER ECO-DEVELOPMENT SCHEME:

The main activities to be included under village eco-development programme are as follows. These are only indicative and more innovative activities may also be devised as and when required.

- Activities directly enhancing the protection, regeneration and productivity of resources in PAs and low impact tourism.
- Activities outside PAs for improving the productivity of NWFP in adjoining forest, agriculture lands, horticulture, sericulture, apiculture, cottage industry, low impact tourism and development of alternative income generation programmes.
- Activities which support sustainable alternative to unsustainable use of forest resources adjoining PAs.

G.R. DATED 5/10/2011 ISSUED BY THE STATE GOVT. ON ECODEVELOPMEMT.

Government of Maharashtra issued G.R. dated 5/10/2011 regarding strengthening of Joint Forest Management Committees and linking with Gram Sabha, retention of forts in the forest areas.

The G.R. issued with the following objects-

- Continuous protection, conversation and management of country's forests and through this development of villages in all respects.
- Protection and management of forest in better way and they should be developed as productive unit and to promote this achievement through management villages masses.
- Forests will be the main support of development and through this efforts will be taken for the development of the area forever.
- The demand of forests produce, fuel wood, small timber, grass and employment of the rural and Adiwasi people will be fulfilled by planning forests and non-forests land development.
- Doing forest conservation management and giving information on forest tourism to the tourists.

FORMATION OF ECO-DEVELOPMENT COMMITTEES

There are 39 villages in the buffer area of Melghat Tiger Reserve and 23 villages in the Critical Tiger Habitat. 23 villages are from the Melghat Sanctuary, Ambabarwa and Wan Sanctuary. These villages though are proposed for relocation however till their relocation happens, the eco development activity will be undertaken in these villages also.

The committees will be formed as per the G. R. and the micro plans of each villages will be prepared. Micro plan will consist of sites specific activities as decided by the village Eco development committee. Accordingly the provisions made for each activity the works will be carried out. Rs. 20 lac are proposed to each village.

TABLE

The villages to be undertaken each year from Critical Tiger Habitat are given below.

Sr. No.	Year	No. of villages	Allocation of funds for each village
1	2011-12	7	20 lac
2	2012-13	7	20 lac
3	2013-14	9	20 lac

7.15 ADMINISTRATION ZONE:-

AREA OF CONSTITUTION:- See Map No. 1

Name of Zone	Area (ha.)		Total area (ha.)	No. of Comptt. included
	Forest	Non Forest		
Melghat Sanctuary & Gugamal N.P.	0.00	25.25	25.25	-
Wan Sanctuary	0.00	2.00	2.00	-
Ambabarwa Sanctuary	0.00	3.00	3.00	-
Narnala Sanctuary	0.00	1.00	1.00	-
Total	**0.00**	**31.25**	**31.25**	**-**

The administration zone includes all the small patches of areas VIZ, Range offices, Residential Quarters, Rest Houses, Dispensaries, Wireless Stations etc., and other infrastructures which are used for the administration of Melghat Tiger Reserve. **(See Annexure: XXXII & XXXXI) See Map No. 1**

7.16 MANEGEMENT PRESCRIPTIONS:-

In the Administrative zone, all types of civil works can be taken up for the repairs and maintenance of infrastructure in consensus with legal provisions. The

dilapidated building have to be dismantled and written off and new building should be constructed against it proper fencing and basic amenities like drinking water facility, solar electrification, toilet etc. has to be taken up in administration zone.

7.17 ECOTOURISM ZONE

CONSTITUTION OF AREA:- See Map No. 4

Name of Zone	Area (ha.)		Total area (ha.)	No. of Comptt. included
	Forest	Non Forest		
Melghat Sanctuary & Gugamal N.P.	15613.81	623.19	16237.00	68
Wan Sanctuary	1893.37	49.03	1942.40	7
Ambabarwa Sanctuary	0.00	0.00	0.00	-
Narnala Sanctuary	795.97	0.00	795.97	5
Total	**18303.15**	**672.22**	**18975.37**	**80**

The Eco tourism plan of Melghat Tiger Reserve laid down a detail set of frame work based on following guidelines:

- 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 dated **15/10/2012**, issued in accordance with the decision given by the Honorable Supreme Court in special leave to Appeal Civil suit No. 21339/2011 dated **16/10/2012**.
- 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, dated 09/11/2012.

7.18 EXISTING TOURISM ZONE IN MELGHAT TIGER RESERVE

As per the sanctioned management Plan of Melghat Tiger Reserve for the period 2004 – 2005 to 2013 – 14 written by Shri. Ramanuj Chaudhary for Gugamal National Park 361.28 Sq. Km., Melghat Sanctuary 767.36 Sq. Km. and multiple use Area 469.75 Sq. Km. the area under tourism zone identified was 151.83 sq. km. and given under.

Sr. No.	Name of proposed Area	Tourism Area	Area	No. of Comptt.
1	Melghat Sanctuary	Semadoh tourism Area	58.67 sq.km.	26

2	Melghat Sanctuary	Harisal tourism Area	48.57 sq.km.	22
3	Melghat Sanctuary	Gullarghat tourism Area	21.42 sq.km.	8
4	Gugamal National Park	Chikhaldara tourism Area	06.67 sq.km.	2
5	Melghat Sanctuary	Harisal tourism Area	16.50 sq.km.	7
	Total		**151.83 sq.km.**	**65**

7.19 IDENTIFICATION OF PROPOSED TOURISM AREA IN CORE REGION

The 3 Sanctuarys viz a viz Narnala, Wan & Ambabarva where added to Melghat Tiger Reserve after management plan of MTR written by Dr. Ramanuj Chaudhari. The areas identified for Eco-tourism in the abow Sanctuary as per the existing management plan written by Dr. Rai's were as under.

Sr. No.	Name of proposed Area	Tourism Area	Area	No. of Comptt.
1	Narnala Wildlife Sanctuary	Narnala tourism zone	2.03 sq.km.	3
2	Wan Wildlife Sanctrary	Wan tourism zone	32.08 sq.km.	11
3	Ambabarva Wildlife Sanctuary	Gullarghat tourism Area	21.26 sq.km.	8
	Total		**55.37 sq.km.**	**22**

The existing eco-tourism zone of Dr. Ramanuj Chaudhari's plan of Gugamal National park and Melghat Sanctuary was (151.83 sq. km.) and Dr. Rai's plan of Narnala, Wan & Ambabarva sanctuarys was (55.37 sq. km.) the total area of eco-tourism zone was (207.20 sq.km.) In this Tiger conservation plan (TCP) of MTR, the eco-tourism area reorgenazied and it comes 189.75 sq.km. as given in the following table.

The following Eco-tourism zones are identified for proposed ecotourism activity.

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	10483.40
Narnala	795.97	0.00	795.97
Wan	1893.37	49.03	1942.40
Dhargad-Gullarghat	3669.77	233.13	3902.90
Chikhaldara	1587.15	291.45	1878.60
Grand Total	**18293.43**	**709.84**	**19003.27**
			Say 190.03 Sq. Km.

Melghat Tiger Reserve has 2029.06 sq. km. area of which 1500.49 sq. km is critical tiger habitat area (core area). The proposed area under ecotourism is **190.03 sq. km.** which is **12.66 %** of total core area of MTR. See Map No. 4

The Ecotourism Sub-Plan of Melghat Tiger Reserve has been prepared and got approved on 17th December 2012 by Local Advisory Committee headed by Divisional Commissioner, as prescribed by the Govt. of Maharashtra vide its Resolution No. WLP -2012/C.N. 309/F-1, Mantralaya, Mumbai, Revenue & Forest Department, dated 09/11/2012. The Ecotourism Sub-Plan of Melghat Tiger Reserve is attached as an annexure to Tiger Conservation Plan.

SPECIAL OBJECTS OF MANAGEMENT-

- Highlight the heritage value of India's wilderness specially tiger as indicator of biodiversity of protected areas.
- Build environment & cultural awareness and respect to nature and culture.
- Facilitate the sustainability of ecotourism enterprises & activities.
- Provide livelihood opportunities to local communities and benefit sharing.
- Use indigenously locally 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.

7.20 PRESCREPTIONS FOR ECO-TOURISM ZONE

The details are given in Eco-Tourism sub plan of Melghat Tiger Reserve which is sanctioned by LAC (Local Advisory Committee) as per guidelines of NTCA.

7.21 Theme Plan:-

The following strategies are proposed to meet the objectives of management and these strategies have to be followed for the entire area of MTR.

7.22 Soil and Moisture Conservation:-

The aim should be to cut off the run of and retain all the rainwater so that sub – soil moisture and vegetation improves and there is better forage for wild animals. For this purpose, watershed approach has to be adopted. A systematic approach is necessary which will include combination of soil moisture conservation works like inverted bunds, gully plugging, Gabion structures, Check dams, loose boulder structures, earthen dams, anicuts, Cement Bandharas desiltation, contour trenches etc.

In MTR, there are 561 natural water holes & 167 artificial water holes which are perennial **(see Annexure no: XXXIII – List of Perennial water holes and Map No. 8**). Regularly these natural water holes have to be desilted to increase the water holding capacity and simultaneously, the catchment areas of these identified natural water sources have to be treated to arrest run off. All along the nullah and river suitable SMC works can be taken up. For the purpose of identification of suitable SMC work, the help of Regional Remote Sensing Service Center (RRSSC) of ISRO, Nagpur can be sought. The RRSSC, Nagpur has already proposed the potential sites for check dams in Dhargad Range of Akot division based on the following criteria like Narrow valleys with close centers, so that evaporation loss will be minimum, away from the existing water holes, valleys with gentle slope along the bed, mainly second or third order streams with sufficient catchments, less submergence of Forests, catchment with less erosion potential etc.

7.23 Protection Strategy:-

All the area of MTR has to be protected against all the illegal and biotic interferences in order to reduce the biotic degradation to improve the wildlife habitat and ultimately to conserve the biodiversity of Melghat.

7.24 Control of Poaching and Illicit Felling

Protection Camps:-

The protection camps at strategic places have to be established. In each round, at least one protection camp has to be established and each camp will protect on area of 30-40 sq. km. area. In Melghat Tiger Reserve there are 78 Protection camp **(see Annexure no: XXXIV) (See Map No. 9: Location of protection camp)**

In each protection camp, there should be four daily wage laborers who are EDC members of the local village and are selected by EDC for every three months. Along with four daily wage laborers, one guard / Forester should be on duty for 3 days in rotation for each protection camp. The sensitive locations like water holes, animal trails, fort paths, natural salt lick area, areas, caver, cliffs etc., are to be identified and displayed in each protection camp. Based on such information the patrolling routes are identified and extensive foot patrolling should be taken up to protect the habitat. In each protection camp, in every month, Group patrolling should be taken up involving all the forest Guards, Forester and daily wage laborers of the round. All the observations of the patrolling should be entered in patrolling register as prescribed by the National Tiger Conservation Authority.

(See Annexure no. XXXV Performa of Patrolling Register)

The protection camps have to be converted in to a permanent building with proper fencing, Solar light, Drinking water facility, Toilet, Walkie talkie, arms and ammunitions, field guides on legal issues, Forensic kits, first aid kits etc. Efforts should be taken to provide free ration or special allowance for free ration during monsoon for the staffs of protection camps exercising their duties in inaccessible areas.

Aerial monitoring and use of newer technologies:

The use of modern tools and upcoming techniques has been the integral part of the wildlife research and management. The use of wireless, GPS, radio collars and telemetry are some of the examples of use of modern available techniques in wildlife conservation and management. The endangered species which have high commercial values as elephants, rhino and tigers are on the hit list of

poachers. In Melghat Tiger Reserve, the tiger poaching incident of 2013 at Dhakna has proved that poaching of tigers has national and international connections and therefore the advanced sophisticated technological solutions are required. The **UAV or Unmanned Aerial Vehicles or Drones** have been used in the western countries for surveillance, population monitoring and crisis management. Denel Dynamics, a South Africa based defence manufacturer, provided a high tech drone to help rangers to locate poachers in Kruger National Park. NTCA and WII with the help of WWF had undertaken test flight in Kaziranga Tiger Reserve to monitor wildlife movement and prevent poaching in the past however, in India UAV are yet to be integrated with wildlife management. The use of this technology in forest and wildlife management will be a game changer in wildlife management offering enhanced effectiveness in protection and variety of conservation and management issues.

UAV use is very useful in Project Tiger Reserve area where the rugged and undulating terrain makes it difficult to the park authority to move and keep the watch on the entire area round the clock. It will act as "eye in sky". The use of GPS, GIS, Night vision etc will help in better protection and conservation of the Tiger and its prey base along with other bio diversity of Melghat Tiger Reserve. It is proposed to undertake the pilot project of use of UAV and other modern technologies in Melghat Tiger Reserve in present plan period and according budgetary provision has been made.

7.25 STRENGTHENING COMMUNICATION SYSTEM:-

Connectivity through roads is a serious bottleneck in MTR especially during Monsoon. From the protection point, the strategic roads and routes have to be identified and effort should be taken to maintain the roads with construction of culverts, metalling of roads in black cotton patches etc.

(See Annexure VII -List of strategic roads See Map No. 13)

In MTR, the wireless system is the life line of communication. There are 47 base stations, 160 Walkie talkie, 19 mobile vehicles and 3 repeater stations. **(See Annexure No XXXXI & Map No. 10)** In order to have effective communication throughout the year, solar electrification of all base stations and repeater station is necessary. All the communication through wireless system should be registered in proper printed register.

The Annual Maintenance of wireless system should be done regularly in order to have effective communication. The secret codes for maintaining the confidentiality of the messages

passed should be encouraged. Regular capacity building of staffs should be done on the use and maintenance of wireless station.

In all the 13 ranges of MTR, vehicles are available at Range Forest Offices to ensure effective patrolling. All the patrolling vehicles have to be installed with wireless set and other firefighting equipment.

In MTR, there are 4 elephants available only for patrolling. Elephant patrolling is very effective during monsoon seasons. The sensitive routes identified as per the Annual Monsoon Protection Plan have to be patrolled by elephants. **(See Annexure no. XXXVI: Details of elephant in MTR with location)**

A service register of each elephant has to be maintained. The service register should mention the following.

- Date of birth / Details of capture / abandoned from wild.
- Parentage
- Age & height at the beginning of each year.
- Working capacity / use.
- Details of location.
- Diet.
- Veterinary records.

7.26 SPECIAL TIGER PROTECTION FORCE:

Tiger Protection has become difficult as the work of protection, development and tourism is entrusted to same field staff. The Central Government in pursuance of directives given in Tiger Task Force recommendation had initiated the constitution of Special Tiger Protection Force solely for purpose of protection on the line of Special Force. The norms for each company of STPF with infrastructure and other machinery is fixed by Central Government.

Central Assistance (100%) would be provided to States under the ongoing. Centrally Sponsored Scheme of Project Tiger for raising, arming and deploying the STPF.

Description of the STPF

(A) **Name of the Force :**

Special Tiger Protection Force (STPF) Melghat Tiger Reserve (Maharashtra)

(B) **Composition of the Force :**

(i) The STPF will not be an "Armed Force of the Union", but a modest, dedicated force comprising of forest personnel as suited to tiger reserve, not conforming to the large scale of Central Force.

(ii) The STPF would be comprised of 1 company, and would be a specialized force with its own structure and composition as required for Melghat Tiger Reserve (Maharashtra)

(iii) In all the STPF would comprise of 121personnel in 1 company for deploying in Melghat Tiger Reserve (Maharashtra)

(iv) The company (of 121personnel) of the STPF would be headed by the Tiger Force Assistant Conservator of Forests and three Tiger Force Range Officers.

(v) The STPF personnel would serve in the force till the age of 40 years, and should be later absorbed by the Forest Department and posts outside the Tiger Reserve, while ensuring new, suitable substitutes. In State having more than one tiger reserve, the STPF personnel would normally be posted in a reserve for minimum tenure of three years.

(vi) In all, there would be 108 Special Tiger Guards in a company, who would be equivalent to the rank of a regular Forest Guards in the state Forest Department. To deploy local forest dwelling people like Korkus, Gonds, Balai, Gawali etc. 30% of this strength should be drawn from such local people by outsourcing through an authorized service provider. Such outsourced staff would be entitled to the same salary and other emoluments through the service provider, as regular Forest Guards of the STPF. However, there should be a relaxation of educational qualifications to provide scope for this outsourcing arrangement.

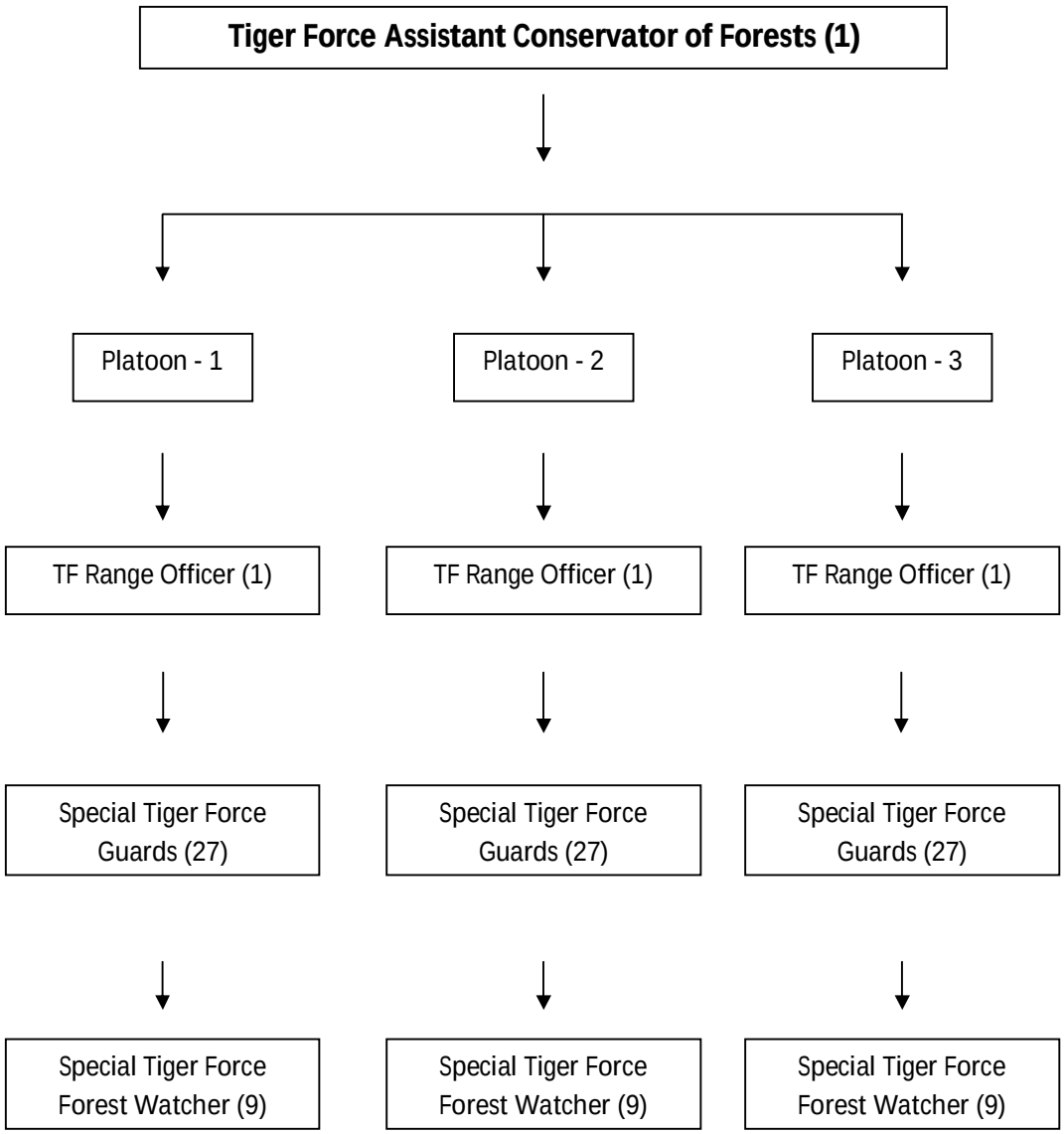
(vii) Six Drivers and 3 Cleaners will also be recruited for vehicles.

(C) **Structure of a company :**

(i) Each company would comprise of three platoons, with each platoon under a Tiger Reserve Force Range Officer assisted by 36 Special Tiger Force Guards.

STRUCTURE OF A COY

(Total Strength 111 +1)



The cost details relating to salary, procurement of vehicles, arms and ammunition, infrastructure are provided in annexure – I to V

(D) **Overall command and control :**

(i) The Tiger Force Assistant Conservator of Forests in-charge of the STPF and other personnel would work under the overall control and supervision of the Field Director of

a Tiger Reserve. The administrative as well as operational command of the said Force would remain with the Field Director of the tiger reserve, who will be the appointing / disciplinary authority also. The NTCA would be required to pay the deployment charges to the State Government or reimburse such costs relating to STPF on the lines of India Reserve Battalion. The reimbursement / payment would be 100% central assistance from the NTCA.

(ii) In the situation of an emergency, the Ministry of Environment and Forest, GOI would have the authority to transfer the STPF companies from one place to another using the first right to call. The Government of India will also have full authority to ask the State Government to make the companies available for deployment elsewhere in other tiger reserve within the State, or in sensitive interstate borders for tiger protection. It will also have the right to decide the number of companies to be posted in each tiger reserve.

(E) **Recruitment**

i) The recruiting authority for the STPF would be the local Forest Department of the State.

ii) Recruitment of the posts of Special Tiger force Guards of the STPF companies would be done by locally from the State where the Tiger Reserve is situated, while the Tiger Force Assistant Conservator of Forest and the Tiger Force Range Forest Officer would be appointed to the force on deputation from the State Forest Department.

iii) On attainment of the age of 40 years, STPF personnel would be transferred out of the Tiger Reserve to other units of the State Forest Department.

iv) 30% of Special Tiger Guards in the STPF would be deployed through outsourcing from the local forest dwelling people like Korkus, Gonds, Balai, Gawali etc. to provide scope for the same, the educational qualification prescribed for a Forest Guard should be suitably relaxed.

v) Suitable recruitment rules should be formed by State Government to fulfill above requirement.

(F) Legal immunity to STPF for discharging the official mandate:

i) The STPF personnel, being forest officers, will have policing powers as conferred to them by law.

ii) The State Government would be required to confer powers to the STPF personnel under sub- section (3) of section 197 of the Code of Criminal procedure 1973 (2 of 1974), and all power enabling it in that behalf, the power to use fire arms to combat tiger poaching and related offence within the tiger habitat, through a notification, In this context, sub- section (2) of Section 197 of the Code of Criminal Procedure, 1973 (2 of 1974) should be made applicable to all personnel of the STPF.

iii) Whenever, firing is resorted to by the STPF personnel, each such incident shall be enquired into by the Executive Magistrate; any proceeding, including instituting a criminal case or arrest can be invited only if it is held, as a result of the Magisterial Enquiry, that the use of fire arms has been unnecessary. unwarranted and excessive, only after such report has been accepted by the Government after due examination.

(G) **Other features:**

(i) The STPF, not being an "Armed Force of Union", would be used only for tiger and Tiger resume protection, and under no circumstances would be requisitioned in aid of Civil Authority, for any other district work.

(ii) The initial finding support for raising, arming and deploying the STPF would be provided from the one time grant given to the National Tiger Conservation Authority (NTCA), and would be supported subsequently in an ongoing manner through grants provided to the said Authority.

(iii) The Field Director of the Tiger Reserve would be required to provide monthly reports on the deployment/initiatives done by the STPF to the NTCA.

(H) Financial implications:

(i) The total Recurring Cost (per annum/per company) works out to Rs. 40296200/- (Rs.4.03 crore). (Rs. Four Crore three lakh only)

(ii) The total Non-recurring Cost (per company) works out to Rs. 1, 66, 82.002/- (Rs.1.67 crore).

(I) Training:

(i) The STPF companies would receive special training from the State Police Department as well as the Central Paramilitary Forces, based on a special syllabus for skill development, combating poaching, and enabling intelligence based enforcement in a forest terrain.

(ii) The training of the STPF would on the pattern of a syllabus of basic training which would be prescribed by the Ministry of Environment and Forests, on the basis of the ongoing syllabus prescribed by the Ministry of Home Affairs for the India Reserve Battalion.

(iii) Arrangements will be made for regular training of STPF in collaboration with the available resources.

(iv) Specialized trainings would be provided in enforcement procedures by noted agencies including international visits if the need arises.

(J) Deployment of STPF:

During the initial phase, the STPF would be deployed in 13 sensitive tiger reserve of the country, having considerable source populations of tiger, based on the outcome of the all India tiger estimation using the refined methodology.

FINANCIAL, IMPLICATION OF STPF PER ANNUM (Salary etc.)

(1 Company 3 platoons)

Sr. No	Designation	Strength	Pay scale	Mean Pay	Grade Pay	D-A (72%)	Ration Money Allow-ance	Kit Maintenance Allowance washing Allowance	Total per person per month	Total for year
1	Asst Conservator of Forests	1	PB-3 Rs 15600-39100	27350	5400	23580	0	300	56630	679560
2	Range Forest Officer	3	PB-2 Rs 9300-34800	22050	4400	19050	860	60	46420	1671120
3	Forest Guards & Forest Watcher	81 27	PB- 1 Rs. 5200-20200	12700	1800	10440	860	60	25860	33514560
4	Driver 3 for LMV 2 for Truck 1 for Ambulance	6	PB-1 Rs. 5200-20200	12700	1900	10512	860	60	26032	1874304
5	Cleaner 2 for Truck 1 for Ambulance	3	PB- 1 Rs. 4440-7440	12000	1300	9580	860	60	23800	856656
	Total	**121**		**86800**	**14800**	**73162**	**3440**	**540**	**178742**	**38596200**

FINANCIAL IMPLICATION OF STPF VEHICLE PROCURMENT

(Per company) (Amount in Rs.)

No. of Platoons	Type of Vehicle	Total Number	Cost for Vehicle	Total Recurring cost
3	Motor Cycle	6	65000	**390000**
	Light	3	500000	**1500000**
	Truck	2	1000000	**2000000**
	Ambulance	1	1000000	**1000000**
	Total	**12**	**2565000**	**4890000**

FINANCIAL, IMPLICATION FOR ARMS AMMUNITION

(Per company) (Amount in Rs.)

Sr. No.	Name of Weapon/ammunition	Rate	Number	Cost
1	Rifle 5.56 mm INSAS	25775	112	2886800
2	Carbine 9 m IAIDP	10934	3	32802
3	Pistol 9 mm Auto IAI Action Skeleton	11600	3	34800
4	Day Vision Binoculars	40000	5	200000
5	Night Vision Binoculars	100000	5	500000

6	Carts SA Ball 9 mm	13	20000	260000
7	Carts SA Ball 9 mm for Pistol	13	25200	327600
	Total	**188335**	**45328**	**4242002**

FINANCIAL, IMPLICATION FOR INFRSTRUCTURE

(Per company) (Amount in Rs.)

Sr. No.	Building	Number	Total Cost
1	ACF Quarter	1	7,50,000
2	RFO Quarter	3	21,50,000
3	40 Men Barrack	1	15,00,000
4	Mess	1	10,00,000
5	Office Building	1	6,00,000
6	Parade Ground/Play Ground	1	1500000
	Total	**8**	**75,00,000**

FINANCIAL, IMPLICATION FOR RAISING NEW ESTABLISHMENT

(Per company) (Amount in Rs.)

Recurring cost (salary etc.)	Recurring cost for uniform maintenance	Recurring cost for vehicle maintenance	Procurement of ammunition	Total Recurring cost
38596200	200000	1000000	500000	**40296200 (Rs. 4.03 crore)**

Non – Recurring Cost Infrastructure	Tentage	Procurement of Arms Ammunition/equipment	Procurement of Vehicle	Total recurring cost
7500000	50000	4242002	4890000	**16682002** **(Rs.1.67 crore)**

The vast area, rugged terrain, sporadic human habitations, porous boundary with Madhya Pradesh makes Melghat Tiger Reserve vulnerable to illicit activities like poaching, hunting etc. Hence a Special Tiger Protection Force is necessary.

7.27 Dog Squad:-

A full pledged dog squad is necessary for scientific and effective crime detection and investigation. As a protection strategy a Dog squad is proposed to be stationed at Paratwada or Harisal. A regular training has to be conducted for sniffer dogs and trainers with the help of Police department.

7.28 Fire arms and Ammunitions:-

Fire arms and ammunitions with the frontline staff acts as a deterrent against the poachers. It also gives confidence among staffs to tackle the poachers.

All the officers and staffs provided with the weapons should be imparted regular firing practice with the help of SRPF Amravati. The Maintenance of the refuse Guns should be done regularly and monthly update on the use of ammunitions should be kept at each division office. Armory will be established at the range level.

Tiger poaching is an organized trade. To combat this challenge, use of modern techniques and tools is necessary. A wildlife crime cell should be established.

7.29 Wildlife Crime Cell:-

Gugamal Wildlife Division on 4th March 2013 faced organized tiger poaching case. The case investigations led to realization of international network of poachers

and smugglers. During the investigation it was found that there is a perpetual need of specialized facility which can handle wildlife crimes professionally.

INITIATIVE:

A wildlife crime cell was started and inaugurated on 10/10/2013 by CCF Melghat Tiger Project and CCF, Terr. Amravati in Paratwada.

It consists of:

1. Office for ACF (Protection), Gugamal Wildlife Division, MTP, Paratwada
2. A Laptop and Computer for CDR data analysis
3. Online Government Massage Facility (eSMS)
4. Legal Forum of Advocates for free consulting
5. Video Statement Facility
6. Electronically surveillance Custody Room (including Toilet-Bathroom)
7. Metal Detector, Spy video and audio instruments

The Gugamal Division staff has been trained in cyber cell operations. The staff has been also trained in fingerprint lifting and analysis, modus operandi of offenders. They are also trained in fire-arm weapon handling and firing.

The Gugamal Division is also maintaining detailed bio-data of offenders. The data consist of photographs, fingerprints, ID copies, names and addresses and records of previous cases.

The division also maintains the Call Detail Records (CDR), Subscribers Data Records of poachers and smugglers.

ACHEIVEMENTS OF WILDLIFE CRIME CELL:

In Dhakna Case, W.C.C. could arrest 13 offenders. A trial is under process of 3 complaint cases with strong evidences of poaching.

In Ghatang Tiger Poaching Case and Nagpur Tiger trading case, W.C.C. could identify and locate 30 offenders which led to their arrest and prosecution. W.C.C. led the raid in Delhi in which 3 hardcore smugglers along with tiger bone set and 52.75 lakh RS cash.

W.C.C. led numerous raids all over India including Jabalpur (MP), Pune (MH), Parli Vaijnath (MH), Delhi, Sonepat (HR), Tirupati (AP), Vizag (AP), Paratwada (MH), Amravati (MH) based on tower locations of offenders.

The poachers are tech-savvy. All the offenders arrested were using mobile phones. They also switched the phones and simcards as and when feared of tracking. A notorious poacher who was also wanted to CBI switched 36 mobile phones in four month period. In the end he was tracked down to Vizananagaram (A.P.) and was arrested by Gugamal Division.

FUTURE STRENGTHENING OF W. C. C.:

The wildlife offenders belong to various castes, religions and ethnicity. Recent news claimed that ULFA (Assam), Indian Mujahidin (Uttarakhand) have entered in wildlife crimes to get easy capital for terrorist activities. To make an upgraded approach, W.C.C. has proposed future requirement to strengthen it.

It includes:

1. Creation of conference hall @ Gugamal div for training and meetings
2. Forensic lab
3. Hardware and software purchase
4. Training of staff
5. Law library
6. Wildlife crime helpline

7.30 Intelligence Gathering and use of Sector Service Fund:-

Melghat Tiger Reserve is surrounded with more than 100 villages and two major State Highway are passing through it. It is very necessary to keep vigilance on poachers and intelligence gathering is a challenging job for officials of MTR. It was very necessary for intelligence gathering backed by adequate funding on the line of Secret Service Funds as of the Police Department.

The Government of Maharashtra issued notification for rules about Secret Service Funds for Forest Department, dated 22nd January 2013. The controlling officers are empowered to sanction the awards and prizes for the persons helping in intelligence gathering and detecting wildlife offences. Range Forest Officer who is the officer at field directly into contact with public is empowered for sanctioning the Prizes. Chief Conservator of Forests & Field Director, MTR, Amravati is specially empowered for prizes of awards.

7.31 PUBLICITY AND AWARENESS:-

Eliciting the public support for the protection of the MTR would be a complimentary effort for the action taken by the Forest Department. Adequate effort should be taken in the form of print and electronic media to create awareness among the public on need to conserve wildlife and its habitat, share information with wildlife authorities regarding any illicit activities. For this purpose a toll free number which can be dialed even from a mobile number should be in place and these numbers have to be prominently displayed at all Government offices, public place, vehicle etc. Alert SMS can also be given to the registered mobile numbers with the authorities using the special Toll Free facility.

7.32 Fire Control

In this area the fire season starts from mid-February to the mid of June. During this season, the area is subjected to incendiary fires. Consequently the young crop and dead and fallen trees are likely to be burnt, in spite of exercising vigilant control and advance fire protective measures.

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

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 November – 15th of February However, adequate funds are necessary to take up fire line maintenance at necessary to take fire line maintenance at appropriate time. **See Map No. 12.**

In the recent years, EDCs are encouraged for maintenance of fire lines. The Range Forest Officer signs MOU with the EDC for fire line work with terms and conditions. The practice should be promoted in order to have the local community support in the control of Forest Fire of Melghat. **(See Annexure No. XXXVIII)**

Fire Detection:-

Fire detection is done through a network of watch towers.

See Annexure no. XXXIX: List of watch tower. **Map No.10**

Fire Protection Squad:-

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 leaf litter.

iii) Intense biotic pressure.

iv) Cultural practices of tribal, particularly in month of May.

v) For getting a good grass growth, the local villagers kindle the fires.

vi) For collection of NTFP

vii) To scare away the wild animal in night, the villagers carry torches of bamboo. This given rise to numerous fires. 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, non-availability of conveyance to reach the spot and late reporting of fire occurrence has been a cause for sacrificing large chunks of forests to fires every year.

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

Year	No. of Fire incidences	Area affected (ha.)	Percentage of area affected
2007	218	9903	6.59
2008	253	12253	8.16
2009	305	13234	8.82
2010	179	5855	3.90
2011	180	6292	4.19
2012	398	19340	7.40
2013	99	2644	1.10
2014	83	1514	0.57

The division wise length of fire line in Melghat Tiger Reserve is given in the appendix no. XXXVII

Use of Blower:-

The dry deciduous leaf litter is a big that for spread of fire. To control the spread of fire, clearing of patches devoid of any leaf litter is important for this purpose, air blowers have to the deployed at all range headquarters or fire protection squad the use of blower considerably reduces consumption of time and energy in fighting the fire.

Fire Vulnerability Areas:-

Based on the burnt area or fire incidences, closeness to village, temples, roads etc.; the fire vulnerability Map of MTR is proposed. The mapping was done by RRSSC, Nagpur and maps are being prepared. Intensive fire control measures including involvement of EDCs should be carried out in vulnerable areas.

7.33 Regulation of Traffic:-

In the core area of Melghat Tiger Reserve, there are State Highways, VDR and other District Road. The details of road network are given in Map no. 18. For location of Check-Posts **see Annexure No. XXXXIV**. In order to control traffic in SH 6 which runs between Semadoh & Harisal, two check posts have been established are Semadoh and Harisal. The two checks post are manned 24x7 with infrastructures like Walkie – talkie, CCTV camera etc. The Maintenance of register and other infrastructures should be proper. The register should include the details of vehicle, origin, destination, materials transported etc. on the SH6, there have been incidences of road kill. To stop the road kill of wild animals, the night traffic should be regulated with the permission of Chief Wildlife warden. Presently, the vehicles have regulated entry between 22:00 to 06:00 hrs. with entry permitted after every 2 hrs. as a convoy system. The present practices have to be followed with the involvement of local youths of the EDC of Semadoh, Pili, Mangia and Harisal. The wild animal crosses the State Highway No.6 towards river Sipna in the west during pinch period. The animal trails have to be identified and efforts should be taken to have speed breakers at vulnerable points. Proper signages displaying the speed limit and other prohibited activities in Tiger Reserve area, should be done along the highway. A Special Highway patrol squad may be deployed during festival seasons like Holi to regulate the traffic.

7.34 Transmission lines:-

The electric transmission lines are used for hunting and poaching by local communities. This is a serious issue not only to the targeted herbivores like Sambar, Wild Boars etc. but also for carnivores like Tiger & Leopard, which may get killed accidentally.

In the core area of MTR, the transmission lines runs through a distance of 96.40 km. [**See Annexure no.: XXXX**) These lines have to be maintained properly by Maharashtra State Electricity Board (T & D) with proper permission from Forest Department to avoid any accidental death. The Transmission lines have to be patrolled regularly especially during the crop seasons along the village fringes and maintained by the concerned beat Guard. Any trip record of electricity during odd hours should be immediately reported to the Forest Department by MSEB. These issues should be a regular agenda in the District Tiger Cell meeting.

7.35 Animal Monitoring:-

Up to 2005, the tiger population monitoring was normally a total count (census) of countrywide tiger population every 4 years and within tiger reserve, every year. The census was based on intensive monitoring of tigers within an area identifying individual tigers by visual

inspection of pugmarks, tracing/plaster cast. This methodology has come under the severe criticism. Major limitation of this techniques are (i) it relies on subjective (expert Knowledge) identification of tigers based on their pugmarks. (ii) The pugmarks of a tiger are likely to vary within substrate, tracings/casts and the tiger's gait: (iii) it is not possible to obtain pugmarks of tigers from all tiger occupied landscapes, and (iv) the method attempts a total count of all tigers.

An alternative proposed by tiger biologists is to use individually identified tiger by camera traps in a capture recapture statistical framework to estimate tiger densities. The other two potential methods that can be used in smaller sample areas for monitoring source tiger populations are the individual identification of tigers from digital images of their pugmarks and tiger DNA profiles obtained from scats and other noninvasive techniques. In 2005 a new methodology was directed to be followed by WII and NTCA "Methodology for estimating and monitoring tigers, their co-predators, prey base and habitat" by Y.V.Jhala, Qamar Qureshi (both faculty members WII) and Rajesh Gopal, Member Secretary, NTCA & Project Tiger is given below.

STAGE I: SPATIAL MAPPING AND MONITORING OF TIGERS, PREY AND HABITAT.

This stage consists of mapping of forest beat taking it as unit of sampling. The sampling is systematically distributed in all beats of tiger occupied forests. The detailed methodological approach for sampling is given in the field guide by Jhala and Qureshi 2004. The target data are extremely easy to collect and requires minimum technical analysis and inference. Since several replicate surveys will be undertaken in each beat, we shall be able to model tiger occupancy, detect probability of tiger signs, and relative sign density at a high spatial and attribute data like human density, livestock density, road network, topographical features, forest type and cover, meteorological data, poaching pressures and landscape characteristics will be used as covariates to model tiger occupancy and relative abundance in a landscape and individual forest patches. Time series analysis of the data at a larger spatial resolution is likely to have sufficient precision for monitoring spatial occupancy of tigers in association with changes in tiger prey, habitat quality and anthropogenic pressures.

STAGE II: SPATIAL AND ATTRIBUTE DATA

The spatial and a spatial data that are likely to influence tiger occupancy of a landscape is used for modeling in a GIS domain. The vegetation map, terrain model, night light satellite data,

drainage, transportation network, forest cover, climate data, Normalized difference Vegetation Index, livestock abundance, human density, socio-economic parameters, etc. is used for modeling habitat condition and tiger occupancy. Beat-wise vegetation sampling is done to generate broad vegetation map. This modeling helps in determining current spatial distribution of tigers, potential habitats, threats to crucial linkages between occupied landscape and conservation planning.

STAGE III: ESTIMATING THE POPULATION OF TIGERS AND ITS PREY

The computation of tiger density by using camera traps, is done. The inputs of all the three stages are computed and relationship equation of tiger density to habitat characters and ground survey is developed. Statistical computation of the ground survey data, habitat character data and relationship equation gives the estimation of Tiger Population.

TIGER NUMBERS

Tiger conservation unit is stratified into tiger conservation sign abundance classes of high, medium, low and no tiger sign at the beat and larger spatial resolution. (Range 100 Sq.km) All known techniques of tiger density estimates are used depending on the logistic possibility within each landscape; capture-recapture based on camera traps, mark-recapture based on pugmarks, and DNA profile obtained from tiger scat. These densities will then be extrapolated for the areas under various density classes within the landscape to arrive at a tiger population estimate.

TIGER PREY:

Stage I of the protocol reports encounter rates on line transect sufficient for monitoring trends in ungulate population and site specific occupancies. Pellet group counts on transects serve as an index to the presence of ungulate species and pellet relative abundance, especially in disturbed areas where actual sightings may be difficult.

STAGE IV: INTENSIVE MONITORING OF SOURCE POPULATIONS

It is expected to monitor source population of tigers in the reserve by following methodology.

I PHOTO REGISTRATION OF TIGERS:

Pictures individual tigers obtained by camera traps or by regular cameras should be maintained in the form of a photo identity album. Records should be kept on the location, condition

breeding status, injury, etc. and associated tigers whenever a tiger is sighted. This will provide crude data on ranging patterns, demography and mortality.

II TIGER PUGMARKS AND OTHER SIGNS:

Regular monitoring of tiger signs (pugmarks tracings, plaster casts, etc.) should be undertaken in every beat at a weekly interval within monthly compilation of data. With experience and exposure to the resident tigers and their pugmarks, the forest staff may be able to identify individual tigers from their track set characteristics. Sign surveys and individual tiger monitoring should become a regular task for every guard as practiced in MTR. The monthly data should be mapped and maintained to analyze trends.

III MONITORING BY TELEMETRY IN SELECT AREAS:

Use of modern technology of VHF, GPS and satellite telemetry to study and monitor aspects of demography, meta-population dynamics (dispersal, ranging patterns), mortality, predation ecology and behavior is expected. In all source population, tiger abundance and density should be estimated using camera traps, digital images of pugmarks and /or DNA profile from non – invasive methods biannually. The project Tiger directorate will play the overall supervisory and coordination role for all the phases and tasks under each phase of the monitoring.

HABITAT ASSESSMENT AND MONITORING FRAMEWORK:

SAMPLING FOR VEGETATION, HUMAN DISTURBANCE, AND UNGULATE PELLETS

To quantify the habitat parameters and determine relative abundance of ungulates, sampling will be done along the same line transect on which ungulate encounter rates were estimated. For economy of time and effort it would be possible to first sample the line transect during early morning hours for ungulate encounter rate and then while returning along the same line, sample for vegetation and ungulate pellets. Sampling for vegetation, ungulate dung and human disturbance will be done only once on a transect. Important points of this sampling will be as follows:

1) A beat will be the sampling unit and sampling will be done along the established line transect.
2) The beginning and end point coordinates of the line transect need to be recorded using a GPS unit.

3) The same principle of laying line transects as explained in the section on ungulate encounter rates is applicable here also.

4) Vegetation would need to be sampled every 400 m along the transect.

5) The vegetation would need to be quantified visually at the following categories for each plot.

IN 15 M. RADIUS CIRCULAR PLOT

1) Broad vegetation type and associated terrain type e.g. mixed teak forest on Hill terrain, Sal forest on flat land, etc.

2) Within a distance of approximately 15m of the observe the five most Dominant trees need to be listed in the order of dominance (abundance).

3) The observer needs to list the 5 most dominant shrub species in order of dominance (abundance) within 15m of the location. He needs to categorize shrub density (under-story vegetation) as absent, very low, medium, and dense. Shrubs will be assessed on five point scale (0 to 4) i.e. absent to most abundant for density estimation.

4) If weeds are present, their abundance needs to be scored on 0 to 4 scale (o being absent and 4 high abundance) and the three most common weeds seen in 15m need to be listed in order of abundance.

5) Within the same 15 m distance the observer needs to record number of signs of looping, wood cutting, and presence/absence of human foot trail.

6) The observer needs to visually quantify the canopy cover at the location. The observer should subjectively classify the proportion of the sky above him that is covered by canopy foliage and categorize it into <0.1, 0.1-0.2, 0.2-0.4, 0.4-0.6, 0.6-0.8,>0.8 canopy cover.

7) A mention needs to be made in the data sheet regarding the number of permanent human settlements, human population, and livestock population present in the beat (to the best of his knowledge)

8) A mention needs to be made based on the observer's knowledge if any non-timber forest product is collected from the beat. If yes, which NTFP and to score the magnitude of collection on a 5 point scale(0-no collection 4-high rate of collection)

IN 1 M RADIUS CIRCULAR PLOT

The observer needs to use a 2m long stick to define an imaginary circle around him with the stick as the diameter. Within this circular plot (2m diameter) the observer needs to a) quantify the percent ground cover, i.e. the proportion of the ground covered by herbs, grasses, littler, and bare ground, b) List the 3 most dominant grass species in order of dominance.

SAMPLING FOR UNGULATE PELLETS

Ungulate abundance will also be indexed by enumerating their fecal pellets. This exercise will be done on the same line transect that has been sampled for ungulate encounter rate. To save time, this exercise could be done after the line transect has been sampled in the early morning for ungulate encounters.

i) At every 400m along the transect (line of walk) the observer needs to sample an area of 2m by 20m, perpendicular to the transect for quantifying ungulate pellets. This is done by using the 2m long stick held at the centre horizontally in his hand and by walking slowly, 20m right and left of the transect alternately at every 400m .

ii) All ungulate pellets encountered need to be recognized to ungulate species and recorded in appropriate columns of the attached data sheet (see Appendix-3). The number of fecal pellets needs to be counted. In cases where the pellets occur in large heaps, then they should be categorized into the following categories: A (50-100), B (100-200) and C (>200).

iii) In areas where small livestock like sheep and goat are known to be grazed, it is possible that fecal pellets of these can be confused with wild ungulates especially those of chital. In such areas, a mention needs to be made that goat or sheep graze the area.

iv) In the last row of the data sheet the observer needs to report if ungulate/animal listed in the data sheet occurs in the sampled beat to the best of his knowledge irrespective of whether its pellets/dung were recorded in the plots.

RESULTS OF 2010 MONITORING EXERCISE:

In the year 2010, the exercise of all India monitoring of tiger, co-predator, prey and their habitat was carried out. On the basis of the data submitted to the Wildlife Institute of India, Dehradun, a team of researchers comprising Mr. Narsimmharajan, Mr. Abhinash Parida, Bidyut Barman, Subhasish Mahato, Lalthanpuia, Anirudha Vasava was send to Melghat Tiger Reserve to access the population of tigers as well as herbivores. The study started in the month of October

2010 and ended in the month of April 2011. The area selected for tiger estimation was 396-461 sq.km. with 48 camera points. The details of estimation are given in table below.

VARIABLES	ESTIMATION	STANDARD ERROR
EFFECTIVE TRAPPING AREA (ETA) Km2	427	(394-461)*
CAMERA POINTS	48	-
NO. OF TRAP NIGHTS	2544	-
UNIQUE INDIVIDUAL (M t + 1)	12	-
POPULATION ESTIMATE (N)	13	2.16
D DENSITY ESTIMATE	3.04	0.75
D MLSECR	2.29	0.68

In the report of NTCA published in 2011, following remarks about Melghat Tiger Reserve are quoted:-

"This is one of the most important tiger landscapes of Maharashtra since it forms a source within the larger Melghat-Satpuda landscape of over 12,700 km2. Melghat's connectivity with forests of Betul and East Nimar (Madhya Pradesh) need to be ensured by protection and restoration of forests in the tehsils of Melghat and Chikhaldara in Amravati District (Fig 2. MP1.3). Tiger occupancy within the Melghat landscape was 2,343 km2 with a population estimate between 30-39 tigers showing an improvement of over estimates of 2006."

Species/ Category	ER	seER	Den	Se Den	ESW	Se ESW	Grp Den	se Grp Den	P
All Prey	1.83	0.16	107.74	9.95	44.20	0.79	20.66	1.85	0.26
Ungulates	1.08	0.11	51.24	5.68	48.82	1.47	11.10	1.18	0.33
Cervids	0.93	0.10	42.31	4.87	52.42	1.54	8.82	0.97	0.35
Gaur	0.05	0.01	2.55	0.63	43.79	3.48	0.56	0.11	0.58
Sambar	0.24	0.02	5.34	0.57	49.59	2.13	2.45	0.25	0.41
Chital	0.59	0.09	37.00	6.06	55.27	1.44	5.36	0.85	0.37

Nilgai	0.07	0.01	1.38	0.30	50.85	5.92	0.70	0.14	0.36
Barking deer	0.04	0.01	0.61	0.15	38.18	4.21	0.49	0.11	0.39
Wildpig	0.08	0.01	5.83	1.11	40.11	1.32	1.02	0.15	0.50
Peafowl	0.12	0.02	3.42	0.58	37.38	2.76	1.58	0.26	0.29

ER: Encounter Rate, seER: Standard Error of ER, Den: Density, Se Den: Standard Error Density, ESW: Estimated Strip Width, Se ESW: Standard Error of ESW, Grp Den: Group Density, se Grp Den: Standard Error of Group Density, P: Parameter.

SPATIAL DATABASE DEVELOPMENT:

The process given in previous paragraphs will form the basis of development of data. The help of GPS/GIS will be taken up to develop the database. The help of Wildlife Institute of India, prominent Non Government Organizations would be taken up in this activity.

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 files will 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 return of mortality of Tiger and Leopard will be submitted to the directorate through divisions.

vii) The monthly return of poaching of Tiger and other wild animal will be submitted to the directorate.

ANALYSIS AND REPORTING FRAMEWORK:

Data received as above will be analyzed for distribution of animals, habitat, sighting etc. The data will be forwarded to Chief Conservator of Forests, Principal Chief Conservator of Forests and National Tiger Conservation Authority. This analysis can be easily and effectively done on a GIS platform. The directorate would strive to develop such facilities in the circle office, along with the regular training of staff. The Digital Maps already prepared in collaboration with RRSSC, Nagpur would be very handy in this regard. This will be regularly updated with necessary information so that they become a handy tool in the hands of management for timely managerial interventions.

7.36 HUMAN WILDLIFE CONFLICT.

In any protected area, the human component plays an important role. People residing in and around the protected area, influence the wildlife. The number of people, their life style has direct bearing on the wildlife population. Traditionally Korkus have been drawing their sustenance mainly from forestry works. Their life style has been influenced by stopping of timber harvesting activity in recent past and therefore at present they don't have round the year employment. They do occasional poaching of herbivores like Chital and Sambar which affect the availability of food for the carnivora. Though Gonds are comparatively less in number, they indulge in poaching on higher scale. They even resort to killing of Gaur. Fishing and catching crabs from water sources is a very common pass time for these people. Nihals also indulge in poaching and they are known to eat meat of even dead animals found in forest. Thus they also reduce the food availability for carnivores. However, in last two years, such practices are on decline due to increasing protection measures and spread of legal and conservation issues among villagers.

The crop damage by the wildlife is not common. However the communities practicing agriculture near the forests area suffer from crop damages by wild animals. This brings the villagers in conflict with wildlife. If their crops are raided frequently or their cattle is killed, then they poison the carcasses which leads to death of Tiger or Leopard. Such cases are also not common now. Sometimes the wild herbivores are killed or trapped for protecting their crops. Many times, forest fires seemed to have originated in the agriculture fields. Gaolis, mostly grazers have their total dependence on forests for fodder needs and grazing. This brings their cattle as easy targets for carnivores. The life style of Gaoli community is not compatible with conservation needs of the Tiger reserve and the long term objectives of the area. The factors mentioned above are the main reason for man-animal conflict in the area.

Damage by the wild animals in the area is mainly in the form of-

i) Cattle kills by Tigers and Leopards. In the year 2010-11, 157 cases of cattle kill happened which were compensated by Rs. 5.63 lakhs.

ii) Injuries to human beings by Tigers, Leopards, Sloth bears, Hyenas etc.

iii) Crop damages by Wild boars, Nilgai and Sambar.

MEASURES TO REDUCE MAN-ANIMAL CONFLICT:-

Regular awareness campaigns through posters, seminars, workshops and informal discussion with the people shall be regularly done and following points highlighted:-

1) While wandering in the forest, one must be alert.
2) Avoid areas where wildlife is usually seen.
3) Do not dump the food waste or other garbage around the villages to avoid attracting wildlife like bear.
4) Do not allow the bushes of lantana and similar species around or close to the village, so that no wildlife is attracted there for food or shelter.
5) Visit the crop fields or move in the night time with at least 2-3 companions.
6) Do not go inside the forests, especially on the water holes in summer where wildlife usually visits.
7) To distract the wildlife one should make, certain loud noise, whistling or humming should, while walking alone on the forest path or trail.
8) If wildlife with its cubs is seen nearby the village, alert others not to go towards that direction and inform nearest forest officials.
9) Avoid walking in the forest or entering in early mornings or evening times.
10) The cattle should be safely kept in the cowsheds in night.
11) Do not make crowd when wildlife enters the village, rather give it a safe passage.
12) Do not walk towards the place where kills of animals are lying.
13) Stray animals such dogs, fowls, etc. should not be wandering around and inside the villages as these attract carnivores, particularly Leopards.
14) Solar Fencing at selected and vulnerable places.
15) Change in cultural practices.
16) Crop insurance
17) Protection squad during cropping season.
18) Prompt settlement of crop damage and Tiger kill cases.

SLOTH BEAR – HUMAN CONFLICT:

Sloth bear – human conflicts appear to be on the rise in many parts of India and seen correlated with increased human encroachment and disturbance as well as habit degradation. In Melghat there are more number of incidences reported of attack by Sloth bear on human beings, in comparison to Tiger and Panther. This is more common during rainy season when sighting of wildlife becomes poor and food for bears becomes scarce and they move towards villages.

Four Persons Died in Sloth Bear Attack in Melghat in a span of ½ hour on August 2010 in Jarida.

Unparalleled in the history of Melghat, such type of major casualty never happened in the past. There are some incidences of attack of Sloth bear in which numbers of persons were injured or one person died in the attack of Sloth bear. On the 4th August 2010, in a small village Jarida (also the range H.Q.) located in the Buffer zone of Melghat Tiger Reserve, a lone bear wandered in to the village around 9.00 p.m. and killed four people, including one forest guard Abhishek Wakode who joined on the same day in Jarida range. The bear also injured two persons. The reason for happening such incidence may be that the bear was confronted by few villagers (i.e. throwing stones and other objects, and chasing the bear). While passing through its usual track in the night. As the news spread, more villagers, in the dark of night, tried to scare away the bear and the bear was caught in a continuing fight or flight situation. When its escape was continually cut off, it reacted by attacking violently as the bear felt its life was in danger.

The injured and the legal heirs of 4 dead persons were given compensation as per the provisions of the G. R. dated 2/07/2010 of State Government. In addition to this the Forest Guard. Abhishek Wakode's legal heirs were given compensation of Rs. 1.00 lac from NTCA and also the contribution done by the staff of MTR and Amravati Circle.

Cattle kills by Tigers and Leopards

Fairly large number of cattle are killed by Tigers and Leopards in the area. This is because large number of cattle are going for grazing and afford easy prey to carnivores. Thick Lantana undergrowth also facilitates ambushing of cattle by Tigers and Leopards. The kills are distributed in whole of Melghat. These are compensated by the department as per the provisions in the G. R. of Maharashtra State Govt. 02/07/ 2010, 30/03/2013 & 05/09/2013 The salient points are as follows:-

Subject to certain conditions, the compensation would be paid as follows:-

(i) Crop compensation

Sr. No.	Item		Compensation to be given
1	Crop loss up to Rs. 2000/-		Full amount but not less than Rs. 700/-
2	Crop loss Rs. 2001/- to 10,000/-		Rs. 2000/- + 75% amount of the additional loss (Not more than Rs.8000/-)
3	Loss Rs. 10,000/- above.		Rs. 8000/- + 40% amount of the additional loss (Not more than Rs. 18,000/-)
4	Sugarcane		Rs. 400/- per Mt.
Items			
1	Fruit Trees	Coconut	Rs. 2400/- Per tree
2		Supari	Rs. 1400/- Per tree
3		Grafted Mango	Rs. 1800/- Per tree
4		Bananas	Rs. 60/- Per tree
5	Other Fruit Trees		Rs. 250/- Per tree

(ii) Compensation to be given to the injured person or legal heir of the dead person:-

Sr. No.	Particulars	Compensation to be given
1	If the person is dead	Rs. 5,00,000/- (Rs. Five lakh only)
2	If the person is permanently disabled	Rs. 4, 00,000/- (Rs. Four lakh only)
3	If the person get major injury.	Actual expenditure incurred on the treatment. If the injured person gets treatment in private hospital, not more than Rs. 1, 00,000/-.

(iii) Compensation to be given to the owner cattle:-

Sr. No.	Name of the livestock	Compensation to be given
1	Death of Cow, Buffalo and Bullock	75% of the market value or Rs. 10,000/- (Rs. Ten Thousand only) whichever is less.
2	Death of Goat, Sheep, and other livestock.	75% of the market value or Rs. 3,000/- (Rs. Three Thousand only) whichever is less.
3	Permanent disability to the Cow, Buffalo, Bullock	50% of the market value or Rs. 3,000/- whichever is less.
4	Injury to Cow, Buffalo, Bullock, Sheep, Goat and other livestock.	Actual expenditure incurred on treatment. The compensation will be limited to 25% of the market value or Rs. 1000/- per Cattle whichever is less. The compensation should be paid on the basis of certificate given by Veterinary Doctor.

NUMBERS OF LIVE STOCK KILLED AND COMPENSATION PAID IN LAST 10 YEARS

Sr. No	Year	By Tiger	By Leopard	Compensation paid
1	2002	92	16	163451
2	2003	63	20	161151
3	2004	50	26	187650
4	2005	80	33	147876
5	2006	62	20	177575
6	2007	31	14	272500
7	2008	106	89	362196
8	2009	96	72	212486
9	2010	106	79	276718
10	2011	178	69	369048
11	2012	78	56	522882

NUMBERS OF CASES OF CROP DAMAGE

Sr. No	Year	Area	Number of Cases	Compensation paid
1	2002	0	0	0
2	2003	0	0	0
3	2004	0	0	0
4	2005	0	0	0
5	2006	0	0	0
6	2007	5.62	03	0
7	2008	0	0	0
8	2009	0	0	0
9	2010	8.27	09	18540
10	2011	39.81	25	65640
11	2012	17.78	17	14950

INJURIES TO HUMAN BEINGS BY WILD ANIMALS

A few incidences of injuries to human beings by wild animals are also noticed in the area. The number of incidences in last few years are given below:-

Year	No. of Injured/dead person		Compensation amount paid
	Injured	Dead	
2002-03	9	1	27,000
2003-04	3	1	27,000
2004-05	7	0	17,272
2005-06	5	-	4,00,000/-
2006-07	2	-	12,500/-
2007-08	6	3	9,08,000/-
2008-09	6	3	5,90,435/-
2009-10	4	-	50,000/-
2010-11	5	4	8,06,000/-
2011-12	6	0	3,51,000/-
2012-13	7	1	2,59,000/-
2013-14	12	0	11,85,000/-

CHAPTER VIII

RESEARCH, MONITORING AND TRAINING

RESEARCH PRIORITIES:

8.01 Research is an important and integral part of wildlife management. The knowledge of ecology of plants and animals in the reserve will form the basis for rational and scientific management of the reserve. The research in following areas on priority is essential for Melghat Tiger Reserve.

i) Estimation of number of animals in a population and analysis of the mechanism, which regulates animal population dynamics. For this it requires collection of data on reproduction, recruitment, mortality and movement of animals.

ii) Study on behavior of the tiger and the effect of other disturbing factors on the distribution and reproduction of tiger.

iii) Prey predators relationship and extent of competition amongst predators, sharing of home ranges and dispersal of tiger population along with prey base from within the reserve to adjoining areas requires special attention.

iv) Effect of fire and grazing on vegetation and wildlife which will throw light on changing ecosystem or successional adaptations of the reserve.

v) Man animal conflict and its mitigation.

vi) Regular analysis of scat of large carnivores will yield much insight into their diet profile.

RESEARCH IN TIGER AND WILDLIFE CONSERVATION IN MTR

The resource conservation like education represents an idea which cannot be perceived by our sensory system but its force can be felt and effect can be perceived. Therefore, the idea of conservation is an abstraction but its force and effects are real and it is dependent upon the establishment of a scientifically sound foundation combining research, management and education. There are many ecological concept which requires research inputs and to evolve conceptual system rather than accumulation of data. These concepts are habitat, nich3, homestead or home range, population process, productivity, homing, sociality, competition, natural regeneration, distribution pattern etc. The vital requirement of wildlife conservation is population and its welfare. Habitat is of fundamental importance of a species population. It is a mixture of ingredients essential to the

satisfaction of vital needs of species. The ingredients or component an animal uses to satisfy its vital needs may be termed as niches. These may be food niche, shelter niche or specialised needs for successful reproduction. The habitat comprised of number of food niches and shelter niches. The knowledge of habitat and its included niches are essential for habitat management and their adequacy of these niches determine the carrying capacity of a habitat. The population distribution through the habitat is equally important. Homing and home range or homestead are interdependent and similar to cause and effect relationship. The knowledge of upper and lower limit of home range is essential for setting the limit of protected areas. Similarly the knowledge of food, shelter and other vital niches used by species in a habitat may give the basis of habitat improvement works to reduce the deficiency of niches used by the species. The research is the nourishments for effective management and similarly management also opens many lines for further research.

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 ativities in the reserve.

8.02 **Some important aspects which need to be covered are as given below:**

i. Faunistic and floristic survey of the Reserve with special reference to the wildlife covered under various schedules appended to amended Wildlife (Protection) Act, 1972 and also other endangered, threatened and key species. Special efforts should be taken to mark location of important species such as large carnivores, in the forest area with the help of GPS.

ii. Field survey to assess the status of flora and fauna as per IUCN Red Data listing.

iii. Regeneration survey of reserve with special emphasis on rare, endemic and endangered plants and wildlife spp. This research activity should lay particular focus on the flora, which the wild animals feed on especially in the scarcity / pinch period.

iv. Feeding habits, preferences of the important carnivora through monitoring of hairs of prey animals with the help of scat analysis.

v. Feeding habits, preferences of important herbivorous wild animals with special reference to scarcity / pinch period.

vi. Assessment and identification of territories and home range of important carnivores in the reserve and also seasonal fluctuations / migrations involved in it.

vii. Study of the behavioral patterns of wild animals.

viii. Surveillance and monitoring of wildlife health and impact of domestic cattle of wildlife.

ix. Survey of waterholes, wallows and salt licks in order to test its hygiene with respect to infestation by helminthes, harmful protozoans etc.

x. Research activities related to ecological development /restoration of village land / agriculture area wherefrom villages have be relocated and its use by the wild animals.

xi. Regular studies of meadows to assess the proportion of palatable vis-a-vis non palatable grasses and other fodder species.

RESEARCH PROJECTS:

8.03 Wildlife research is a major activity in Melghat Tiger Reserve. It is essential to develop research and monitoring facilities further which would provide a scientific understanding of wildlife problems and habitat required for their management and ensure appropriate habitat utilization. Research and monitoring activities on various aspects of wildlife management and wildlife health in the reserve may be taken up. Some important aspects which need to be covered are as given below:

i) Faunistic and floristic survey of the Reserve with special reference to the Wildlife covered under various schedules appended to amended Wildlife (Protection) Act, 1972 and also other endangered, threatened and key species.
Special efforts would be taken to mark location of important species in the Forest area with the help of GPS.

ii) Field survey to assess the status of flora and fauna as per IUCN Red Data listing.

iii) Regeneration survey of reserve with special emphasis on rare, endemic and endangered plants and wildlife species. This research activity should lay particular focus on the flora, which the wild animals feed on, especially in the scarcity / pinch period.

iv) Feeding habits, preferences of the important carnivore through monitoring of hairs of prey animals with the help of scat analysis.

v) Feeding habits, preferences of important herbivorous wild animals with special reference to scarcity / pinch period.

vi) Assessment and identification of territories and home range of important carnivores in the

Reserve and also seasonal fluctuations / migrations involved in it.

vii) Study of the behavioral patterns of wild animals.

viii) Surveillance and monitoring of wildlife health and impact of domestic cattle on wildlife.

It is to be emphasized that the list is not exhaustive. Interested students and researchers from universities, NGOs, NGIs would be encouraged to do quality research which would primarily be aimed at solving management problem of Melghat Tiger Reserve. The directorate would permit and facilitate the visits and observations including collection of fecal matter, plant specimens and like evidences needed for furthering the cause of research. Due verification about authenticity of researchers will be done and if necessary, a MOU may be signed with researcher concerned. As far as local universities are concerned, a certificate from head of the department should be sufficient. Some of the research can be done by individuals on their own initiative as part of their academic activity. Rest can be got done as contracted work. For contractual works and NGOs, prior approval from the Chief Wildlife Warden may be sought wherever it is felt necessary by the directorate. However, it would be made obligatory for every agency doing research activity in the Melghat Tiger Reserve to submit interim and final reports about their findings to the Melghat Tiger Reserve management.

To carry out the research activity in MTR, the funds under CAMPA and other schemes will be utilized.

RESEARCH CELL IN THE DIRECTORATE:

8.04 As discussed in para 4.28, 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.

The resource conservation like education represents an idea which cannot be perceived by our sensory system but its force can be felt and effect can be perceived. Therefore, the idea of conservation is an abstraction but its force and effects are real and it is dependent upon the establishment of a scientifically sound foundation combining research, management and education. There are many ecological concept which requires research inputs and to evolve conceptual system

rather than accumulation of data. These concepts are habitat, nich3, homestead or home range, population process, productivity, homing, sociality, competition, natural regeneration, distribution pattern etc. The vital requirement of wildlife conservation is population and its welfare. Habitat is of fundamental importance of a species population. It is a mixture of ingredients essential to the satisfaction of vital needs of species. The ingredients or component an animal uses to satisfy its vital needs may be termed as niches. These may be food niche, shelter niche or specialised needs for successful reproduction. The habitat comprised of number of food niches and shelter niches. The knowledge of habitat and its included niches are essential for habitat management and their adequacy of these niches determine the carrying capacity of a habitat. The population distribution through the habitat is equally important. Homing and home range or homestead are interdependent and similar to cause and effect relationship. The knowledge of upper and lower limit of home range is essential for setting the limit of protected areas. Similarly the knowledge of food, shelter and other vital niches used by species in a habitat may give the basis of habitat improvement works to reduce the deficiency of niches used by the species. The research is the nourishments for effective management and similarly management also opens many lines for further research.

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 ativities in the reserve.

RESERCH PROJECT GOING ON IN 2014-15

1) Mophotaxonomy and biochemical analysis of hyphomycentes fungi from Amravati District.
2) Owls and Owlet species in Melghat Tiger Reserve.
3) Forest Owlet in Dhargad and Chikhaldara Range.
4) Biodiversity states of Arbuscular mycorrizal fungi in Melghat Forest of Satpuda terrain with special reference to grasses.
5) Study of entophytic mycoflora of medicinal plant from Melghat Forest Dist. Amravati.
6) Study of Littes microfungi from Melghat Forest Dist. Amravati.
7) Studies on In-vitro propagation of Rare Medicinal plants from Vidarbha region.
8) Study of food habits and prey preferences of owls in Melghat Tiger Reserve.
9) Monitoring of vegetation plots and Medicinal plant conservation areas in MTR
10) Ecological impact of rehabilitation at vacated sites in the tiger reserves
11) Impact of eco-development activies in villages of MTR

RESERCH PROJECT PROPOSED IN 2014-15

1) Monitoring and documentation of vegetation monitoring plots & MPCA.
2) Rehabilitation and its impact on MTR and relocated villages.
3) Study of Forests Owlet in MTR.
4) Impact of Eco-development activities on villages in MTR

8.05 MONITORING FRAME WORK

Monitoring is a continuous process in management. Following things need to be monitored continuously.

1) Wild animal population (Population estimation)
2) Vegetation monitoring plots and preservation plots.
3) Wildlife health.
4) Impact of Ecotourism.
5) Water availability and its sources.
6) Impact of local people and their dependency on the protected area.
7) Weather data.

8.06 TRAINING NEEDS ASSESSMENT AND HRD

The problem of staff has been explained in chapter VI. Due to the remoteness of the area and difficult living conditions, the field staff is unwilling to be posted in Melghat Tiger Reserve. If a person is posted, he tries to get the order cancelled and does not report for duty. Many persons in this area since last 10-15 years are demotivated and show no interest in their field work. The Melghat Tiger Reserve has to execute the work through such work force. Many persons are posted in the wildlife areas for the first time having no orientation of the wildlife management. Considering all these difficulties, a regular schedule of training, both long term and short term, will be prepared and implemented. Such trainings shall be a proper mix of wildlife related subjects, personal development and motivation as well as survival needs of living in the interior, wild areas.

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CHAPTER IX

TIGER POPULATION AND HABITAT ASSESSMENT.

INTRODUCTION

9.01 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.

9.02 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), the figures give general trend of population. The estimation of tiger and leopard from 1989 to 2005 are as given below:

Name of the Critical Tiger Habitat area	**Tiger**						**Leopard**					
	1989	1993	1997	2001	2005	2007	1989	1993	1997	2001	2005	2007
Gugamal National Park	77	21	28	20	30	25	0	13	26	14	23	19
Melghat wildlife Sanc.		51	31	32	31	28	68	44	30	33	37	43
Narnala wildlife Sanc.	0	0	0	2	1	1	0	0	0	9	3	3
Wan Sanctuary	0	0	0	4	4	1	0	0	0	6	9	5
Ambabarwa W/L Sanc.	0	0	0	1	1	0	0	0	0	2	2	7
Total	**77**	**72**	**59**	**61**	**67**	**55**	**68**	**57**	**56**	**64**	**74**	**77**

9.03 In 2006 as a part of national level all India monitoring of tiger, co-predators, prey and their habitat, the estimation was carried out. In this exercise, three phase approach was used to sample habitats. The phase I data collection to estimate occupancy and relative abundance of Tigers, Co-predators and Prey through sign and encounter rates was done by the field staff of Melghat Tiger Reserve. The analysis of this data was done by the Wildlife Institution of India. In addition, Centre for Wildlife studies carried out a study using capture/ recapture technique using camera traps. The results of these studies have been given in chapter III.

9.04 In 2010, the exercise of all India monitoring of tiger, co-predators, prey and their habitat, was carried out, data has been compiled and submitted to the Wildlife Institute of India. The field data collection showed tiger occupancy in almost all the areas of the Critical Tiger Habitat of the Melghat Tiger Reserve. The carnivore signs for tiger collected during the exercise indicated the presence of tiger in 55 beats out of 87 beats of Gugamal division and 63 beats out of 96 in Sipna division. The result of these exercise carried out in 2010 for Melghat Tiger Reserve, are given in para 9.21. The number of herbivores sighted on the transect is given below for Sipna, Gugamal and Akot divisions of Melghat Tiger Reserve.

Name of wild animal	Sipna wildlife dn.	Gugamal wildlife dn.	Akot wildlife dn.
Chital	24	219	03
Sambar	190	337	09
Blue bull	115	48	20
Bison	100	261	34
Barking deer	238	195	21
Chausinga	02	03	00
Wild pig	917	487	54
Langur	614	340	1319
Monkey	2962	2145	253
Hare	69	47	00

Peacock	315	339	25

It may be noted that above figures are the actual animals or the number of animals sighted during the data collection along transact line. Therefore, this is only a sample of the total population and indicates only a trend of various wildlife populations.

9.05 A look at the population figures obtained though Block Count Method reveals that there is a large-scale variation in major population like Gaur, Sambar, Nilgai, Chousinga and even Barking Deer and no realistic trends can be predicted. This could be because of two reasons viz.

(i) The prescription that wild animals are distributed randomly and uniformly over the area is not true in most of the cases of herbivores like Gaur, Sambar, and Nilgai etc. who occupy habitats based on the characteristic and unique features. Such variations are high in Melghat.

(ii) The method itself requires serious precautions while using the method for counting animals seen on the line transects and its analysis through spread sheets and elimination of double counting through mechanical methods requires high level of competence and caution, the lack of which could affect the results, adversely.

9.06 DAILY MONITORING AND FORECASTING

Melghat Tiger Reserve support a good population of tiger. The conservation of tiger is the most important factor from the Foresters point of view in rugged and hilly terrain such as Melghat. It is, therefore, necessary to intensively monitor tiger and its associated components of prey and habitat attributes on continuous basis. A format is prescribed by NTCA for daily monitoring. This will strengthen the supervision at field level and also generate information on regular basis for evaluation of the tiger occupancy. The analyzed information is to be sent to NTCA monthly.

MONITORING OF WILD ANIMALS

9.07 On the basis of the guidelines issued by NTCA the following steps have been taken by the project directorate for wildlife monitoring in the area.

1) MONITORING TIGERS, COPREDATORS, PREY AND THEIR HABITATS-

This is discussed in para 9.09.

2) MORTALITY REPORT OF TIGER/ LEOPARD:-

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.

3) DATA SHEET FOR MONITORING TIGER:-

As per the instructions issued by NTCA, the monitoring of tiger is done in the area. For this a data sheet has been prepared. The beat guard is instructed to collect the data in the last week of every month moving in his beat. The information on the following evidences is being obtained are pugmark, scat, scrape, vocalization and direct sighting. (The details of the Performa is given in **Appendix No. XXIII)**

9.08 In addition to the above instructions, considering the difficult terrain, poor sighting of animals and absenteeism of staff, a systematic protocol has been developed by the Field Directorate and it is implemented strictly. Relating to each activity of protection, the following instructions have been issued by the directorate.

1) INSTRUCTIONS ON PREVENTION OF POACHING PROCEDURE FOR PATROLLING:-

The detailed instructions have been issued by the directorate to prevent the poaching of wild animals in the area during summer as well as in Rainy Season. During summer season during the patrolling, emphasis is given on water shortage in the area and possibility of poisoning of water holes in the remote areas. In rainy season the area of Melghat can not be easily accessible and therefore patrolling in the area is not much effective. The poachers may become active and the possibility of poaching of wild animals can not be overlooked. Actions to be taken during the rainy season to prevent poaching are given in the instructions. (Copy of instructions issued in local language by the Field Director is given in **Appendix no. XXIV)** The format of patrolling register is also given in Appendix.

Table showing illicit felling in MTR (Year 2002 to 2013)

Sr. No.	Year	No. of trees felled (Teak & Other)	Cu. M.	Loss in Rs.
1	2002	3729	435.343	1702363
2	2003	3848	430.470	2201254
3	2004	3332	243.842	1412096
4	2005	3479	172.393	1023537
5	2006	2231	83.852	889441
6	2007	2861	149.218	1725630
7	2008	3812	150.721	1544583
8	2009	3794	256.852	4056434
9	2010	3805	160.451	1560744
10	2011	3374	122.363	927530
11	2012	2835	140.820	11,88,662/-
12	2013	3493	196.589	19,55,705/-

Table showing offence cases in MTR (from 2002-03 to 2011-12 Up-ton Dec. 2011)

Sr. No.	Type of offence	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12 (up to Dec.11)
1	Illicit felling	425	476	360	390	373	413	571	475	608	505
2	Encroachment	12	10	10	84	66	79	6	75	20	9
3	Illicit transit	17	47	38	19	27	42	74	102	63	87
4	Wildlife	18	10	12	17	24	12	14	20	5	15
5	Fire	114	182	121	217	239	334	568	309	149	112
6	Unauthorized grazing	32	16	42	46	61	93	103	36	34	34
7	Other	35	77	51	45	44	41	30	31	38	18
	Total	653	818	634	818	834	1014	1366	1048	917	780

Table showing offence cases Pending in Court (December 2011)

Sr. No.	Type of Offence	Sipna WL Division	Gugamal WL Division	Akot WL Division	Total
1	Illicit felling	55	3	33	91
2	Encroachment	11	41	58	110
3	Illicit transit	05	1	9	15
4	Wildlife	41	10	12	63
5	Fire	-	1	5	6

6	Unauthorized grazing	04	9	8	21
7	Other	01	3	7	11
	Total	**117**	**68**	**132**	**317**

2) ESTABLISHMENT OF PROTECTION CAMPS AND ITS MANAGEMENT:-

The staff at the protection camp are given duty chart along with the maps showing routes of patrolling. They have to keep the record of the existence of herbivores and tigers during patrolling on daily basis in a register issued to them. This register is examined by the supervisory officers during their visits to the camps.

3) PRESSURE IMPRESSION PAD FOR MONITORING CARNIVORES AND HERBIVORES AND THEIR HABITAT:

This is discussed in para 4.35.

4) DIRECT SIGHTING REPORT:-

A system of daily monitoring of tiger through direct sighting had been initiated in Melghat Tiger Reserve since 2005. The information of direct sighting of tiger/leopard by the staff, villagers, and tourists is collected at the nearest check posts, wireless stations. The collected information is given through wireless system to Divisional Headquarter and the Directorate. Research Officer at the directorate maintains the record of direct sighting both on a map and in a register.

5) MONITORING OF WATERHOLES DURING FIRE SEASON:-

Instructions have been issued by the Directorate to locate the existing waterholes in the area, range wise, along with their GPS readings, the area availability of water and its period and their safe upkeep on daily basis. The Performa of keeping records of waterholes is also been given in the instructions. This has been very effective in controlling the cases of poisoning and saving precious lives.

(Copy of instructions issued in local language by the Field Director is given in **Appendix no. XXV** and list of a waterholes natural and artificial along with GPS location is given in **Appendix no. XXVI.)**

6) HABITAT DEVELOPMENT FOR WILDLIFE:-

The area of the project tiger is mostly dry deciduous and occupied by teak. During summer the surface area is mostly covered by leaf litter and in other season, due to the shadow of big trees, the growth of grass species is poor and not substantial, which is the main food of herbivores. Grazing by domestic animals, weed growth, burning of palatable grasses in fires and growth of non palatable grasses lead to non availability of good and palatable grasses for wild animals. Instructions have been issued to the field staff to locate the open scrub areas, beat wise, along with their GPS reading to develop such open areas by introducing grass species for the herbivores.

These instructions should be followed strictly by the field staff and regularly monitored by superior officers.

TIGER POPULATION ESTIMATION AND MONITORING:

9.09 FRAMEWORK (PHASE I, II, III AND IV)

Up to 2005, the tiger population monitoring was normally a total count (census) of countrywide tiger population every 4 years and within tiger reserve, every year. The census was based on intensive monitoring of tigers within an area identifying individual tigers by visual inspection of pugmarks, tracing/plaster cast. This methodology has come under the severe criticism. Major limitation of this techniques are (i) it relies on subjective (expert Knowledge) identification of tigers based on their pugmarks. (ii) The pugmarks of a tiger are likely to vary within substrate, tracings/casts and the tigers gait: (iii) it is not possible to obtain pugmarks of tigers from all tiger occupied landscapes, and (iv) the method attempts a total count of all tigers.

9.10 An alternative proposed by tiger biologists is to use individually identified tiger by camera traps in a capture recapture statistical framework to estimate tiger densities. The other two potential methods that can be used in smaller sample areas for monitoring source tiger populations are the individual identification of tigers from digital images of their pugmarks and tiger DNA profiles obtained from scats and other noninvasive techniques. In 2005 a new methodology was directed to be followed by WII and NTCA "Methodology for estimating and monitoring tiger status and their co-

predators, prey base and habitat" by Y.V.Jhala, Qamar Qureshi (both faculty members WII) and Rajesh Gopal, Director, Project Tigers is given below.

STAGE I: SPATIAL MAPPING AND MONITORING OF TIGERS, PREY AND HABITAT.

9.11 This stage consists of mapping of forest beat taking it as unit of sampling. The sampling is systematically distributed in all beats of tiger occupied forests. The detailed methodological approach for sampling is given in the field guide by Jhala and Qureshi 2004. The target data are extremely easy to collect and requires minimum technical analysis and inference. Since several replicate surveys will be undertaken in each beat, we shall be able to model tiger occupancy, detect probability of tiger signs, and relative sign density at a high spatial and attribute data like human density, livestock density, road network, topographical features, forest type and cover, meteorological data, poaching pressures and landscape characteristics will be used as covariates to model tiger occupancy and relative abundance in a landscape and individual forest patches. Time series analysis of the data at a larger spatial resolution is likely to have sufficient precision for monitoring spatial occupancy of tigers in association with changes in tiger prey, habitat quality and anthropogenic pressures.

STAGE II: SPATIAL AND ATTRIBUTE DATA

9.12 The spatial and a spatial data that are likely to influence tiger occupancy of a landscape is used for modeling in a GIS domain. The vegetation map, terrain model, night light satellite data, drainage, transportation network, forest cover, climate data, Normalized Differential Vegetation Index, livestock abundance, human density, socio-economic parameters, etc. is used for modeling habitat condition and tiger occupancy. Beat-wise vegetation sampling is done to generate broad vegetation map. This modeling helps in determining current spatial distribution of tigers, potential habitats, threats to crucial linkages between occupied landscape and conservation planning.

STAGE III: ESTIMATING THE POPULATION OF TIGERS AND ITS PREY

9.13 The computation of tiger density by using camera traps, is done. The inputs of all the three stages are computed and relationship equation of tiger density to habitat characters and ground survey is developed. Statistical computation of the ground survey data, habitat character data and relationship equation gives the estimation of Tiger Population.

TIGER NUMBERS

9.14 Tiger conservation unit is stratified into tiger conservation sign abundance classes of high, medium, low and no tiger sign at the beat and larger spatial resolution. (Range 100 Sq.Km.). All known techniques of tiger density estimates are used depending on the logistic possibility within each landscape; capture-recapture based on camera traps, mark-recapture based on pugmarks, and DNA profile obtained from tiger scat. These densities will then be extrapolated for the areas under various density classes within the landscape to arrive at a tiger population estimate.

TIGER PREY:

9.15 Stage I of the protocol reports encounter rates on line transect sufficient for monitoring trends in ungulate population and site specific occupancies. Pellet group counts on transects serve as an index to the presence of ungulate species and pellet relative abundance, especially in disturbed areas where actual sightings may be difficult.

STAGE IV: INTENSIVE MONITORING OF SOURCE POPULATIONS

9.16 It is expected to monitor source population of tigers in the reserve by following methodology.

I PHOTO REGISTRATION OF TIGERS:

Pictures individual tigers obtained by camera traps or by regular cameras should be maintained in the form of a photo identity album. Records should be kept on the location, condition breeding status, injury, etc and associated tigers whenever a tiger is sighted. This will provide crude data on ranging patterns, demography and mortality.

II TIGER PUGMARKS AND OTHER SIGNS:

Regular monitoring of tiger signs (pugmarks tracings, plaster casts, etc.) should be undertaken in every beat at a weekly interval within monthly compilation of data. With experience and exposure to the resident tigers and their pugmarks, the forest staff may be able to identify individual tigers from their track set characteristics. Sign surveys and individual tiger monitoring should become a regular task for every guard as practiced in MTR. The monthly data should be mapped and maintained to analyze trends.

III MONITORING BY TELEMETRY IN SELECT AREAS:

Use of modern technology of VHF, GPS and satellite telemetry to study and monitor aspects of demography, metapopulation dynamics (dispersal, ranging patterns), mortality, predation ecology and behavior is expected. In all source population, tiger abundance and density should be estimated using camera traps, digital images of pugmarks and /or DNA profile from non – invasive methods biannually. The project Tiger directorate will play the overall supervisory and coordination role for all the phases and tasks under each phase of the monitoring.

HABITAT ASSESSMENT AND MONITORING FRAMEWORK:

9.17 3-SAMPLING FOR VEGETATION, HUMAN DISTURBANCE, AND UNGULATE PELLETS

To quantify the habitat parameters and determine relative abundance of ungulates, sampling will be done along the same line transect on which ungulate encounter rates were estimated. For economy of time and effort it would be possible to first sample the line transect during early morning hours for ungulate encounter rate and then while returning along the same line, sample for vegetation and ungulate pellets. Sampling for vegetation, ungulate dung and human disturbance will be done only once on a transect. Important points of this sampling will be as follows:

6) A beat will be the sampling unit and sampling will be done along the established line transect.
7) The beginning and end point coordinates of the line transect need to be recorded using a GPS unit.

8) The same principle of laying line transects as explained in the section on ungulate encounter rates is applicable here also.

9) Vegetation would need to be sampled every 400 m along the transect.

10) The vegetation would need to be quantified visually at the following categories for each plot.

9.18 IN 15 M. RADIUS CIRCULAR PLOT

1) Broad vegetation type and associated terrain type e.g. mixed teak forest on Hill terrain, sal forest on flat land, etc.

2) Within a distance of approximately 15m of the observe the five most dominant trees need to be listed in the order of dominance (abundance) (see Figure4).

3) The observer needs to list the 5 most dominant shrub species in order of dominance (abundance) within 15m of the location. He needs to categorize shrub density (under-story vegetation) as absent, very low, medium, and dense. Shrubs will be assessed on five point scale (0 to 4 i.e. absent to most abundant for density estimation.

4) If weeds are present, their abundance needs to be scored on 0 to 4 scale (o being absent and 4 high abundance) and the three most common weeds seen in 15m need to be listed in order of abundance.

5) Within the same 15 m distance the observer needs to record number of signs of looping, wood cutting, and presence/absence of human foot trail.

6) The observer needs to visually quantify the canopy cover at the location. The observer should subjectively classify the proportion of the sky above him that is covered by canopy foliage and categorize it into <0.1, 0.1-0.2, 0.2-0.4, 0.4-0.6, 0.6-0.8,>0.8 canopy cover

7) A mention needs to be made in the data sheet regarding the number of permanent human settlements, human population, and livestock population present in the beat (to the best of his knowledge)

8) A mention needs to be made based on the observer's knowledge if any non timber forest product is collected from the beat. If yes, which NTFP and to score the magnitude of collection on a 5 point scale(0-no collection 4-high rate of collection)

9.19 IN 1 M RADIUS CIRCULAR PLOT

The observer needs to use a 2m long stick to define an imaginary circle around him with the stick as the diameter. Within this circular plot (2m diameter) the observer needs to a) quantify the percent ground cover, i.e. the proportion of the ground covered by herbs, grasses, littler, and bare ground,, b) List the 3 most dominant grass species in order of dominance .

9.20 4-SAMPLING FOR UNGULATE PELLETS

Ungulate abundance will also be indexed by enumerating their fecal pellets. This exercise will be done on the same line transect that has been sampled for ungulate encounter rate. To save time, this exercise could be done after the line transect has been sampled in the early morning for ungulate encounters.

i) At every 400m along the transect (line of walk) the observer needs to sample an area of 2m by 20m, perpendicular to the transect for quantifying ungulate pellets. This is done by using the 2m long stick held at the centre horizontally in his hand and by walking slowly, 20m right and left of the transect alternately at every 400m (see Figure 7).

ii) All ungulate pellets encountered need to be recognized to ungulate species and recorded in appropriate columns of the attached data sheet (see Appendix-3). The number of fecal pellets needs to be counted. In cases where the pellets occur in large heaps, then they should be categorized into the following categories: A (50-100), B(100-200) and C(>200).

iii) In areas where small livestock like sheep and goat are known to be grazed, it is possible that fecal pellets of these can be confused with wild ungulates especially those of chital. In such areas, a mention needs to be made that goat or sheep graze the area.

iv) In the last row of the data sheet the observer needs to report if ungulate/animal listed in the data sheet occurs in the sampled beat to the best of his knowledge irrespective of whether its pellets/dung were recorded in the plots.

RESULTS OF 2010 MONITORING EXERCISE:

9.21 In the year 2010, the exercise of all India monitoring of tiger, co-predator, prey and their habitat was carried out. On the basis of the data submitted to the Wildlife Institute of India, Dehradun a team of researchers comprising Mr. Narsimmharajan, Mr. Abhinash Parida, Bidyut Barman, Subhasish Mahato, Lalthanpuia, Anirudha Vasava was send to Melghat Tiger Reserve to access the population of tigers as well as herbivores. The study started in the month of October 2010 and ended in the month of April 2011. The area selected for tiger estimation was 396-461 sq.km. with 48 camera points. The details of estimation are given in table below.

VARIABLES	ESTIMATION	STANDARD ERROR
EFFECTIVE TRAPPING AREA (ETA) Km2	427	(394-461)*
CAMERA POINTS	48	-
NO. OF TRAP NIGHTS	2544	-
UNIQUE INDIVIDUAL (M t + 1)	12	-
POPULATION ESTIMATE (N)	13	2.16
D DENSITY ESTIMATE	3.04	0.75
D MLSECR	2.29	0.68

In the report of NTCA published in 2011, following remarks about Melghat Tiger Reserve are quoted:-

"This is one of the most important tiger landscapes of Maharashtra since it forms a source within the larger Melghat-Satpura landscape of over 12,700 km2. Melghat's connectivity with forests of Betul and East Nimar (Madhya Pradesh) need to be ensured by protection and restoration of forests in the tehsils of Melghat and Chikhaldara in Amravati District (Fig 2. MP1.3). Tiger occupancy within the Melghat landscape was 2,343 km2 with a population estimate between 30-39 tigers showing an improvement of over estimates of 2006."

Species/ Category	ER	seER	Den	Se Den	ESW	Se ESW	Grp Den	seGrp Den	P
All Prey	1.83	0.16	107.74	9.95	44.20	0.79	20.66	1.85	0.26

Ungulates	1.08	0.11	51.24	5.68	48.82	1.47	11.10	1.18	0.33
Cervids	0.93	0.10	42.31	4.87	52.42	1.54	8.82	0.97	0.35
Gaur	0.05	0.01	2.55	0.63	43.79	3.48	0.56	0.11	0.58
Sambar	0.24	0.02	5.34	0.57	49.59	2.13	2.45	0.25	0.41
Chital	0.59	0.09	37.00	6.06	55.27	1.44	5.36	0.85	0.37
Nilgai	0.07	0.01	1.38	0.30	50.85	5.92	0.70	0.14	0.36
Barking deer	0.04	0.01	0.61	0.15	38.18	4.21	0.49	0.11	0.39
Wild pig	0.08	0.01	5.83	1.11	40.11	1.32	1.02	0.15	0.50
Peafowl	0.12	0.02	3.42	0.58	37.38	2.76	1.58	0.26	0.29

SPATIAL DATABASE DEVELOPMENT:

9.22 The process given in previous paragraphs will form the basis of development of data. The help of GPS/GIS will be taken up to develop the database. The help of Wildlife Institute of India, prominent Non Government Organizations would be taken up in this activity.

9.23 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 files will 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 return of mortality of Tiger and Leopard will be submitted to the directorate through divisions.

(vii) The monthly return of poaching of Tiger and other wild animal will be submitted to the directorate.

ANALYSES AND REPORTING FRAMEWORK:

9.24 Data received as above will be analyzed for distribution of animals, habitat, sighting etc. The data will be forwarded to Chief Conservator of Forests, Principal Chief Conservator of Forests and National Tiger Conservation Authority. This analysis can be easily and effectively done on a GIS platform. The directorate would strive to develop such facilities in the circle office, along with the regular training of staff. The Digital Maps already prepared in collaboration with RRSA, Nagpur would be very handy in this regard. This will be regularly updated with necessary information so that they become a handy tool in the hands of management for timely managerial interventions.

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CHAPTER X

PROTECTION AND INTELLIGENCE GATHERING

INTRODUCTION AND MAJOR THREATS

10.01 Protection is the top priority activity for the management of the Tiger Reserve. The major threats have been given in chapter VI.

The Protection strategy involves

2) Regular Beat inspection to prevent & detect any offence.
3) Local people participation in protection & prevention of offences by way of EDC.
4) Intelligence gathering and system of incentive by way of secret funds.
5) Coordination & exchange of information with Police & others in Tiger Cells & Cyber Cell.
6) Protection camps for patrolling specially in Monsoon.
7) Special Tiger Protection Force. (STPF)

10.02 Effective measures to control the problem of felling grazing, fire, encroachment, poaching etc.:-

(i) Strengthening of control mechanism and check nakas established at every entry point of M.T.R. and provision of sufficient staff for checking the vehicles and visitors should done on priority. Equipments like wireless communication, hand sets, fire arms etc. should be added adequately and maintained in top condition.

(ii) Legal advisers have been appointed to take action against offenders.

(iii) The regular beat inspections, surprise checks by supervisory staff and mobile squad, effective checks on gates must be followed and Monitored effectively by the Dy. C.F. and other officers.

(iv) Secret fund system of rewards and incentives for staff as well as people who cooperate and excel in protection is being implemented.

(v) Eco-development Committees and their active involvement and cooperation in fire, grazing, encroachment, raids, and intelligence gathering will be taken by protection staff.

(v) The Foresters, Range Forest Officers and supervisory officers will regularly monitor the

P.O.R.s issued by the beat guards

(vi) 'Station Register' is to be kept for recording of movements of staff and observations by the patrolling party. It should be checked monthly by A.C.F. concerned and used by Dy. C.F. / A.C.F. and protection strategy planned accordingly.

(vii) The meetings and awareness campaign with a view to inform villagers and members of Eco-Development committees/F.P.C.s about the provisions of Indian Forest Act, Wildlife (Protection) Act and Forest Conservation Act which provide serious punishment for violation of provisions and also burden the visitors and locals with certain duties in respect of forest protection will be regularly organized and undertaken.

(viii) Village committees/individuals who are found regularly violating forest and wildlife related laws and regulations should be prepared & thus grazing permits & other concessions should be cancelled along with social conserve in the meetings.

(ix) Protection Camps at strategic places, though already established, shall be further strengthened. It is to be ensured that adequate number of staff deployed stays there and foot patrols the area regularly. Special incentives may be sanctioned for the staff and labor staying in such remote camps, especially during monsoons.

(x) The area has good network of wireless and recent addition of wireless sets have been provided for patrolling staff. It shall be ensured that sets are maintained and used effectively for the purpose. The satellite phone is also made available at the place.

(xi) Minitrucks and vans for patrols by ground staff are available in all ranges and are being used for patrolling and protection. Melghat Tiger Reserve Conservation Foundation in collaboration of WCT has provided the protection kits to all the protection camps, services could be solicited through NGOs, national and international organization and interested individuals. Such possibility shall be explored routinely.

(xii) The arms have been provided to the protection camps. The regular camps will be organized for mock use and maintenance of arms.

(xiii) Capacity building of staff in enforcement of protection laws will regularly be under taken.

THE TIGER CELL

1**0.03** The tiger cells have been established at state level under Additional Director General of Police, Maharashtra State with Principal Chief Conservator of Forests (Wildlife), Maharashtra State as Co-chairman and Chief Conservator of Forests (Wildlife) as member secretary as per Government of Maharashtra G.R. No WLP-10-2000/C.N.10/F-1/Mumbai Dated 28th September 2006. For Amravati Revenue Division Dy. Conservator of Forests, Amravati is the member secretary, Special Inspector of General, Amravati as chairman and Chief Conservator of Forests (Territorial) Yavatmal and Chief Conservator of Forests & Field Director, Project Tiger Melghat, Amravati are the members. The meetings of this cell is being taken up as per the schedule given in the G.R. No. WLP 10-2000/CN-10/F-1/Mumbai dated 30/3/2007. In addition, a district level tiger cell is also formed. The issues such as interstate border poaching, protection, seizures, patrolling strategies are discussed in the meeting. The platform of tiger cell provides an effective means of cooperation and coordination

and exchange of information among two enforcement department and help in curbing the illegal activities.

SPECIAL TIGER PROTECTION FORCE. (STPF)

The proposal for creating / establishment of STPF with 112 staff have been submitted to PCCF (Wild life) & Chief wildlife warden to take approval of State Government & NTCA.

1**0.04** In Melghat Tiger Reserve, at present there are 2 Assistant Conservator of Forests (mobile squads) in 2 divisions. One at Dhakna in Gugamal Wildlife Division and other at Akot in Akot Wildlife Division. Vehicles such as Gypsy, Mini Truck and Pick up Van are provided to them along with 2-3 Forest Guards and Labors. Mobile phone, Walkie Talkie and Handsets have been provided to them and their day to day mobility programme is being provided to them from the division office. In addition to this a group of Ex. Army men is also being utilized since 2005. They are posted in deep forest areas along with staff and labors. They are also given day to day monitoring programme and a daily reporting of work to be informed to the Division Office.

PROTECTION CAMP.

10.05 For effective foot patrols and covering the remote and sensitive areas regularly, establishment of "Protection Camps" at strategic points have been established in MTR. At these protection camps 1 Forest Guard or Forester and 3-4 Labors are made to stay for night halt as well as for patrolling in the surrounding area during day time. There are about 75 protection camps in MTR. Out of these 29 are permanent in nature. The remaining are also proposed for up gradation as permanent structure in a phased manner. The protection camps are also being provided with basic amenities & protection to it for better efficiency of staff.

COMMUNICATION

1**0.06** The present system of wireless network is being strengthened by replacing old instruments and also conversion low Band frequency to High Band frequency. The mobile Telephone services are also being provided to field staff so that they remain in constant touch with each other.

AERIAL MONITORING AND USE OF NEWER TECHNOLOGIES:

The use of modern tools and upcoming techniques has been the integral part of the wildlife research and management. The use of wireless, GPS, radio collars and telemetry are some of the examples of use of modern available techniques in wildlife conservation and management. The endangered species which have high commercial values as elephants, rhino and tigers are on the hit list of poachers. In Melghat Tiger Reserve, the tiger poaching incident of 2013 at Dhakna has proved that poaching of tigers has national and international connections and therefore the advanced sophisticated technological solutions are required. The **UAV or Unmanned Aerial Vehicles or Drones** have been used in the western countries for surveillance, population monitoring and crisis management. Denel Dynamics, a South Africa based defence manufacturer, provided a high tech drone to help rangers to locate poachers in Kruger National Park. NTCA and WII with the help of WWF had undertaken test flight in Kaziranga Tiger Reserve to monitor wildlife movement and prevent poaching in the past however, in India UAV are yet to be integrated with wildlife management. The use of this technology in forest and wildlife management will be a game changer in wildlife management offering enhanced effectiveness in protection and variety of conservation and management issues.

UAV use is very useful in Project Tiger Reserve area where the rugged and undulating terrain makes it difficult to the park authority to move and keep the watch on the entire area round the clock. It will act as “eye in sky”. The use of GPS, GIS, Night vision etc will help in better protection and conservation of the Tiger and its prey base along with other bio diversity of Melghat Tiger Reserve. It is proposed to undertake the pilot project of use of UAV and other modern technologies in Melghat Tiger Reserve in present plan period and according budgetary provision has been made.

1**0.07** Regular beat inspection and identification of vulnerable beats will be carried out regularly so as to keep watch over the illicit cutting and other illegal activities preferably from the M.P. border area. Besides this active involvement of local people will be taken in protection of the area.

INTELLIGENCE GATHERING AND ENFORCEMENT:

10.08 The people living in and around M.T.R. have valuable information about illegal activities. However, lack of proper communication mechanism prevents the flow of information. Staff should be trained in information gathering techniques with the help of police personnel. In Melghat, due to predominant tribal population and the prevalent tribal culture as a very closely knit society, the intelligence gathering is very difficult. Cyber Crime Cell a small special unit establishment at Paratwada will be used for intelligence gathering and all Call Details Records (CDR) data. The effectiveness of CDR data has been established in cracking of Tiger poaching gang network operated in Nagpur & adjoining areas of Vidarbha and Bahelias from Katni (Madhya Pradesh)

10.09 The staff will be trained in crime detection, filing proper preliminary reports, procedures to be followed during inquiry and interrogative techniques and methodologies, essential requirements for filling complaints, production of offenders in the court of law, collection, handling and forwarding of material and documental evidence. The services of police Officers, Legal advocates will be utilized for this purpose.

AIR SURVEILLANCE OF THE RESERVE: - It is proposed to have air surveillance with the help of UAV (Unmanned Air vehicle) or hot balloons as the terrain of the reserve supports the idea (UAV) surveillance can be taken up with the help of Ministry of Defence.

CHAPTER XI

ECO-TOURISM AND INTERPRETATION.

11.01 The IUCN Eco-tourism Programme *defines* **'Eco-tourism'** as **"Environmentally responsible travel and visitation to relatively undisturbed natural areas in order to enjoy and appreciate nature, that promotes conservation, has low visitor impact and provides for beneficially active Socio economic involvement of local population".**

The eco-tourism, if controlled and regulated and keeps in tune with provisions of Act and policies on wildlife conservation, it could prove to be an effective tool for management for eliciting public support, and also, provide ample opportunities to people for nature and wildlife viewing as well as enjoyment in sustainable manner as envisaged in the objectives set for Tiger Project areas.

11.02 Melghat Tiger Reserve is famous for its Wilderness experience, bird watching, observing wild animals, nature photography and tracking. Chikhaldara in Melghat is an important destination on the tourist itinerary of Maharashtra. Following table shows the details of tourist inflow in Melghat Tiger Reserve.

Year	No. of visitors	Revenue received Rs.
2010-11	49,950	19,23,767
2011-12	22,410	9,60,955

ORGANISATION SETUP AND MANAGEMENT

11.03 Semadoh and Harisal tourism zones and Nature Interpretation Centre Semadoh have already been explained in chapter VII. Other important areas of tourism attraction in the core area are:

1) Narnala fort

2) Wan Sanctuary

3) Dhargad Temple

4) In addition, the drive along the roads offers a picturesque view of hills, valleys, rivers and other beautiful view points.

The ecotourism facilities and services, as far as possible shall be managed by the local villagers. The local villagers shall be encouraged to form committees and should take to it as a livelihood option. Home stay facilities may be developed in selected houses in village. Protection staff shall not be engaged in ecotourism activities, except the regulation.

DO'S AND DON'TS FOR VISITORS/ECO-TOURISTS COMING TO MTR

11.04 Conduct of visitors, inside the wilderness areas like Sanctuary should be governed by some easy and simple to follow set of rules about which the visitor should be clearly and prominently informed before entering into forests for wildlife viewing, undertaking nature walks like trekking or even while staying in tourist accommodations. The visitors should also be enlightened about *pros and cons* of undesirable misconduct.

(a) DO'S- Following Dos and Don'ts are prescribed for effective follow up by the visitors coming to MTR. The visitors coming to the area should follow the following set of rules.

(i) Shooting with camera with proper permit.
(ii) Observing silence, desisting from playing of radios, tape recorders, blowing of horns etc.
(iii) Moving in forest with proper permit.
(iv) Accompanied by registered guide.
(v) Avoiding movement in restricted areas.
(iv) Sticking to the instructions of the guide/forest personnel.
(vii) Normally using bio degradable material.
(viii) Observing rules regulations and orders in force in accommodation areas or areas designated for tourists.
(ix) Booking in advance of the tourist accommodation.
(x) Timely payments of all the fees due.
(xi) Driving at a controlled speed and respect the rights of way for wild animals.
(xii) Showing courtesy, respect and cooperation for reserve rules and staff on duty.

(b) DON'TS- The following is the list of activities, which will attract action under provisions of various laws. The visitors are advised to desist from such type of activities, which may constitute offence under relevant Acts and Reserve rules and for which they may be charged for misconduct.

(i) Smoking of Cigarette, Cigar or Bidi, kindling of fire or leaving fire unextinguished in forests.

(ii) Playing of music, through radio, tape recorder, making unnecessary noises at undesirable volume.

(iii) Moving in forest area without proper guide.

(iv) Non-following of regulations like getting down from vehicle in wild without permission.

(v) Littering of forest floor or accommodation area with garbage or throwing non-biodegradable material.

(vi) Teasing, pelting stones, hurling objects etc at wild animals or chasing, yelling at wild animals.

(vii) Inflicting injuries or cutting of trees, plucking of plants, its parts, uprooting plants etc.

(viii) Using camera without proper permission.

(ix) Using flashguns, flashlights in night.

(x) Speeding of vehicle beyond the desired speed limit.

(xi) Contaminating or poisoning of important habitat resources like waterholes, saltlicks, wallows etc.

(xii) Moving in restricted area and after closure period.

(xiii) Use of perfumes or strong smelling chemicals.

(xiv) Accompanying with pet animals.

(xv) Carrying arms.

(xvi) Picking and bagging of anything lying on the floor of forests.

(xvii) Trapping, plucking or carrying off any flora, fauna or their part.

(xviii) Indulging in boozing, alcoholism or drugs.

(xix) Indulging in immoral activities.

(xx) Bribing officials or government personnel.

(xxi) Not paying dues in time.

(xxii) Causing disturbance in the campus.

(xxiii) Non return or stealing of articles from library, accommodation, museum etc.

(xxiv) Causing damage to property of MTR.

(xxv) Drawing graffiti or painting walls, trees etc.

(xxvi) Camping in forests without proper permits.

(xxvii) Wearing clothing with vibrant colors.

ROLE OF TIGER CONSERVATION FOUNDATION

11.05 Melghat Tiger Conservation Foundation has been established in Melghat Tiger Reserve since 2009 and has started working from 2010. Tiger Conservation Foundation will assist the Eco-tourism promotion in the Melghat Tiger Reserve as a part of developing awareness as a nature education and livelihood for local people.

11.06 The number of tourist coming to Melghat is small considering the vastness of the area. The potential for enhancing this activity is very good. At present, there is no issue of Eco-tourism activity as per the carrying capacity of the park, the number being much below the carrying capacity. However, in future depending on the number of visitors the carrying capacity will be calculated and implemented.

MELGHAT TIGER RESERVE CONSERVATION FOUNDATION:

Government of Maharashtra, Revenue and Forest Department decided to constitute the Melghat Tiger Reserve Conservation Foundation as per the requirement of section 38 X of the Wild life (Protection) Act, 1970 and accordingly issued the Govt Resolution no: WLP-10-08 / CR-19/ F-1 dated 21-08-2008. Melghat Tiger Reserve Conservation Foundation was constituted and registered under Mumbai Public Trust Act, 1950 as a public trust bearing **registration number no E-548 dated 10.02-2009**. The Governing Body of the foundation framed the rules and regulations on 26-08-2009 and these were concurred by Govt of Maharashtra on 9-06-2010. The objectives of Melghat Tiger Reserve Conservation Foundation listed and collated are—

a) Facilitate ecological, economical, social and cultural development in the tiger reserve and adjoining landscape.
b) To provide support to safeguard natural environment in the tiger reserve and relevant place in the adjoining areas.
c) To support eco development, eco tourism, research, environmental education, training, management in related fields to support the implementing agency
d) To facilitate the creation and maintenance of such assets as deemed necessary.
e) To solicit technical, financial, social and other supports from diverse sources in conformity of the law
f) Anything incidental or ancillary to the above mentioned objectives.

The achievements of the above objectives largely depend on the generation and availability of the revenue with Melghat Tiger Reserve Conservation Foundation. Melghat Tiger Reserve conservation Foundation at present generates the revenue of RS 17-20 lakh per annum from gate receipts, rooms and dormitories charges etc. Therefore, it is proposed to organise revenue generation events with the help of various agencies operated in the market and to request the various donors to donate funds to the foundation. Melghat Tiger Reserve Conservation Foundation has been exempted under 80 G (5) (vi) of the Income Tax Act, 1961 since 1-04-2014. It is also proposed to organise package tours for visitors in Melghat Tiger Reserve with the help of private tour operators to boost eco tourism in the reserve and also employment to the locals. The LPG gas agency and Petrol pump will be established in the reserve to distribute LPG cylinders to the already LPG connection giving beneficiaries as well as to the local people. The petrol / diesel will also be distributed to the park vehicles and to the locals. These activities on one hand will generate the good will for the park authority as well as revenue to the foundation.

IMPLEMENTATION OF ECO-TOURISM GUIDELINES:

11.07 (I) Government of Maharashtra has issued eco-tourism policy guidelines vide G.R.No. WLP 1002/C.No.53/F-1 Dt. 20th February 2008. (The details of G.R. are given **Appendix No. XXVII**) This G.R. gives the details of eco tourism policy to be implemented in the state. Tourist is instructed to follow the rules and regulations while moving in the protected area. They will be instructed not to move in the Protected Area without proper guide. Littering of forest floor or accommodation area with garbage or throwing non- biodegradable material is not allowed in park area. Playing of music, through radio, tape recorder, making unnecessary noise at undesirable volume will not be allowed. Teasing, pelting stones, hurling objects etc. at wild animals or chasing, yelling at wild animals will be restricted and punished etc. There is a great scope for local tribal tourism activity. Local tribal are presently working as tourist guides in the area. They give valuable information to tourist about forests and wildlife and their importance. Being aware of the rules and regulations they also take care of maintaining the discipline in the tourists.

(II) 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 dated **15/10/2012**, issued in accordance with the decision given by the Honorable Supreme Court in special leave to Appeal Civil suit No. 21339/2011 dated **16/10/2012**.

(III) 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, dated 09/11/2012.

Considering the guidelines issued by NTCA and the GRs issued by the State Govt. with respect to Eco-Tourism a detailed Eco-Tourism sub plan of Melghat Tiger Reserve has been prepared and enclosed as annexure.

11.08 While new rest houses can not be constructed in the Critical Tiger Habitat, old rest houses shall be maintained, for the protection & park authorities.

PARK INTERPRETATION PROGRAM:

11.09 Interpretation and conservation education facilities are located at Semadoh, and are being developed at Harisal, Gullarghat, Amravati, and Shahanur. Special significance is attached to this Nature Interpretation Centre owing to their location at different places and also different themes around which these have been conceptualized and are being developed.

PUBLICITY, NATURE EDUCATION AND SPREAD OF COMMON CONSERVATION MESSAGE

11.10 SIGNAGES, WAYSIDE EXHIBITS

Signage is a strong interpretation medium, which comes under unattended services of various forms. Informative signages would be fixed in and around the place where tourists stay, for their guidance. Similarly, signages for facilitating support to visitors as well as for making them aware of prohibitions, dos and don'ts would be fixed up on strategic locations. Points of interests from conservation point of view on Nature trails would be suitably highlighted with the help of informative exhibits. Large sized signboards may be erected in places like Amravati, Paratwada, Chikhaldara, Akot etc to make people aware of the PA and its importance. The theme depicted on such hoardings would be properly edited and need for

short and focused messages would be ensured. All messages would be given in the name of M.T.R. and no individual offices/ posts would be indicated.

11.11 PAMPHLETS / HANDBILLS/ BROCHURES/CHECKLISTS ETC

Field staff would be encouraged to share their experiences and ideas in the quarterly news magazine **"Melvyagrah'.** Well illustrated and informative booklet may also be brought out as a prized publication with collaboration from interested organizations. There is a need to bring out regularly the brochure, which may provide handy information to the visitors at a glance. A number of thematic brochures, leaflets would be brought out including information about trek routes, nature trails, need based publications like eliciting people's support for the fire protection, conservation of nature etc. Existing checklist of birds would be reprinted with suitable illustrations. Existing Checklists of medicinal plants, butterflies and moths, fishes, places of interest, religious tourism may also be revised periodically. Suitable publicity material like T-Shirts, Caps, Stickers, Posters, Badges, Momentos etc. may be designed and created with an objective of spreading the message of conservation of nature and attributes of Melghat Tiger Reserve. As far as possible, this would be facilitated by involving local people. Stalls of such suitably priced articles would be established near the interpretation centers dotting the Melghat Tiger Reserve area.

MAINTENANCE AND UPDATING OF THE RESERVE WEBSITE AND LINKING WITH STATE DEPARTMENT AS WELL AS TIGER PROJECT WEBSITE, NEW DELHI.

11.12 Matching steps with a rapidly advancing world in the field of cyber technology, a website ***www.melghattiger.gov.in*** on Melghat Tiger Reserve has been created and launched in February, 2010. This is being updated regularly.

11.13 WILDLIFE OBSERVATION EQUIPMENTS

As existing binoculars are not up to the standard, additional binoculars of suitable magnifications and need may be procured. Night vision binoculars may also be procured to facilitate the study on movement of wild animals in dark hours. It would facilitate needs of serious tourists as well as researchers. LCD projectors along with computer systems are

needed to satiate need of interpretation, presentation on modern lines at all interpretation centers, Divisional and Directorate Offices. Spotting scopes are also needed to study behavior of bird life, wild animals. Telescopes may be used to study night sky for the tourists. Need based CDs, video cassettes would also be procured keeping in view the need to deploy management aspects related to visitors as well as the local populace. There is a need to procure digital video camera, which would be used in field only to capture various events in wilderness as and when they happen. Procurement of cameras with suitable lenses and used by specialized personnel would go a long way in capturing the ever dynamic forest and its denizens.

A library of all the slides, videocassettes, floppies, and photographs would be prepared which should be arranged thematically and can be used accordingly for presentation or as per need. The old projectors and other audio visual aids would be suitably maintained and if essential be phased out with the passage of time and replaced with modern equipments.

PARTICIPATION OF LOCAL PEOPLE IN PROMOTING AND MANAGING ECO-TOURISM

11.14 Active participation of the local people in the eco tourism, interpretation and conservation education activities provided in this plan is significant with a view to-

(i) Develop direct stake of local people in promoting the tourism activity.

(ii) Ensure long term continuation of the activities for sustained economic gains and exposure to outside world.

(iii) Ensure that the income generated goes directly to the local people.

(iv) Ensure ploughing back of the income for further promoting the activity.

(v) Avoid failures due to inconsistent fund flow and delays or siphoning due to procedural hassles.

(vi) Raise economic status of the local people and thus reduce their dependence on the forest resources and lead to self sustenance.

(vii) Further the cause of conservation by making the conserved area as a resource for earning money through eco-tourism.

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CHAPTER XII

MISCELLANEOUS ISSUES

12.01 Administrative Control

The Melghat Tiger Reserve is headed by a Field Director, who is of the rank of Chief Conservator of Forest. He is overall in charge of the Melghat Tiger Reserve.

12.02 Details of staff sanctioned for MTR-

Sr. No.	Designation	Sanctioned Post	C.C.F. & F.D	Dy.C.F. Sipna	Dy.C.F. Gugamal	Dy.C.F. Akot
1	C.C.F. & Field Director	01	01	-	-	-
2	Dy. C.F.	03	-	01	01	01
3	Research Officer (A.C.F.)	01	01	-	-	-
4	Nature Interpretation Officer (A.C.F.)	01	01	-	-	-
5	Asstt. Conservator of Forest	04	-	01	01	02
6	Nature Interpretation Center (R.F.O.)	03	01	01	-	01
7	Range Forest Officer (Mobile Squad)	02	-	-	01	01
8	Technical Asstt. (R.F.O.)	03	-	01	01	01

9	Documentation Officer (R.F.O.)	01	01	-	-	-
10	R.F.O. (Ranges)	13	00	05	03	05
11	Sectional Engineer	01	01	-	-	-
12	Assistant Medical Officer	01	-	-	01	-
13	Artist	01	01	-	-	-
14	Forester	93	-	39	25	29
15	Forest Guard	277	02	112	77	86
16	Surveyor	03	01	-	01	01
17	Wireless Technician	01	-	-	01	-
18	Museum Assistant	01	-	-	01	-
19	Mahavat	06	-	03	02	01
20	Jr. Statistical Assistant	01	01	-	-	-
21	Office Superintended	01	-	-	-	-
22	Chief Accountant	04	01	01	01	01
23	Stenographer (Higher Grade)	01	01	-	-	-
24	Accountants	16	04	04	04	04
25	Clerks	48	11	13	11	13
26	Drivers	25	02	09	07	07
27	Mid wife	01	-	-	01	-
28	Ward boy	01	-	-	01	-
29	Characutter	06	-	03	01	01
30	Daftari	01	01	-	-	-
31	Naik	01	01	-	-	-
32	Mali	04	-	03	01	-
33	Peon	13	03	03	04	03
34	Dak Runner	01	01	-	-	-

35	Chowkidar	10	01	06	02	01
36	Khansama	03	-	01	01	01
37	Sweeper	06	-	05	01	-
38	Water Man	02	-	-	01	01
39	Cleaner	05	-	04	01	-
40	Forest labour	36	-	16	13	07
41	Armed Police	01	-	-	-	-
	Total	**603**	**38**	**231**	**165**	**169**

12.03 The Need for Strengthening Organizational Set-up

After unified control over the entire area of Melghat Tiger Reserve circle coming in to effect, the workload at administrative and direction division level has increased tremendously in terms of works and responsibilities regarding administration and control of staff spread in their division as well as protection of the valuable resource spread in 2027.39 sq.km. of the hilly and undulating area which is prone to major threats for illicit cutting, poaching and grazing. Whereas, after unified control, the direct responsibilities for protecting and managing the area have increased about sevenfold, the corresponding increase in extent and quality of staff as well as funds has not occurred, and therefore, a rational view would reveal that funding as well as staff availability is not commensurate with added responsibilities. It is therefore; urgently felt that some sprucing up of existing staff upwards is essentially required.

A detailed plan in this respect has been submitted to Principal Chief Conservator of Forest (Wildlife), Maharashtra State, Nagpur in 2009.

HOUSE KEEPING OF DEPARTMENTAL ELEPHANTS.

12.04 Melghat Tiger Reserve is having 2 elephants. There elephants are since the opening of Melghat Tiger Reserve. These elephants are used for patrolling during monsoon in the remote areas of the reserve when the communication by roads becomes difficult. Elephants are often used for elephant riding for tourists during winter and summer at Semadoh tourism complex. The fee for

elephant riding is Rs 20 per person. For the caretaking of elephant *Mahavat* and *Characutter* have been posted.

The ration of elephant is fixed as per the diet given by the veterinary doctor. The ration is as mentioned below.

1) 10 kg Atta 2) 1 kg Jaggery 3) 250 gm salt 4) 100ml edible oil. This ration is for the one adult elephant.

The elephants are freed in the night for feeding in adjoining forest area and bring back to the nearest camp by the *characutter* in the morning.

Regular examination of health of elephants is being carried out by local veterinary doctors provision is also being for the chopping operation of elephant.

12.05 WILDLIFE HEALTH MONITORING:

As per see 33 A of wildlife (Protection) Act 1972 the livestock kept in or within 5 kms of Sanctuary are required to be immunized. In MTR regular camps are being organized for vaccination of domestic cattle with the help of Veterinary Dept. of Zilla Parishad. Necessary vehicular facilities are also being provided during vaccination process. This is to insure the wildlife from contracting any disease from cattle. There is no record of major wildlife disease in the area. Any suspicious death of wild animal is to be checked with the help of local Veterinary Doctor.

MORTALITY SURVEY:

12.06 The field staff is instructed to report about the death of wild animals whether suspicious or natural to the nearest senior officer. To the extent possible the postmortem of the dead animal is being carried out by the local Veterinary Doctor of Zilla Parishad or States Government. The case of death reported by the veterinary officer also helps in investigation of death of wild animal. A regular monthly return of mortality of wild animals along with cause of death is submitted to Principal Chief Conservator of Forests (Wildlife).

MORTALITY REPORT OF TIGERS IN PAST GIVEN BELOW:

Year	Date	Range	No of Tiger M/F	Cause of death
2002-03	3/02/2003	Harisal	1 and 4 cubs	Electrocution
2003-04	-	-	-	-
2004-05	-	-	-	-
2005-06	8/2/2006	Wan	1	Natural
2006-07	28/1/2007	Raipur	1	Poaching by trapping

	24/1/2007	Hatru	1	Poaching by trapping
	2/02/2007	Jarida	1	Poaching by trapping
2007-08	9/2/2008	Chikhaldara	1	Natural
2008-09	-	-	-	-
2009-10	-	-	-	-

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CHAPTER XIII

ORGANIZATION, ADMINISTRATION AND BUDGET.

TIGER STEERING COMMITTEE:

13.01 The Wildlife(Protection) Amendment Act, 2006 dated 3rd September 2006 Chapter-IVB, Section 38U provides for constitution of steering committee by State Government for ensuring co-ordination monitoring, protection and conservation of tiger, co-predators and prey animals within the tiger range states.

(a) The Chief Minister : Chairperson

(b) The Minister in-charge of Wild Life : Vice-Chairperson

(c) Such number of official members not exceeding five including at least two Field Directors of tiger reserve or Director of National Park and one from the State Government's Departments dealing with tribal affairs;

(d) Three experts or professionals having qualifications and experience in conservation of wild life of which at least one shall be from the field of tribal development;

(e) Two members from the State's Tribal Advisory Council;

(f) One representative each from State Government's Departments dealing with Panchayati Raj and Social Justice and Empowerment;

(g) Chief Wildlife Warden of the State shall be the Member-Secretary, ex officio

The Steering Committee for Maharashtra State is constituted vide letter Dt.

13.08.2008

TIGER CONSERVATION FOUNDATION:

13.02 The Wildlife (Protection) Amendment Act, 2006 No.39 of 2006, dated 3rd September 2006 Chapter-IVB, Section 38X provides for establishment of tiger conservation foundation for tiger reserves within the State to facilitate and support their management for conservation of tiger and bio-diversity and to take initiatives in eco development by involvement of people in such development process.

MELGHAT TIGER RESERVE CONSERVATION FOUNDATION:

13.03 Government of Maharashtra, Revenue and Forest Department decided to constitute the Melghat Tiger Reserve Conservation Foundation as per the requirement of section 38 X of the Wild life (Protection) Act, 1970 and accordingly issued the Govt Resolution no: WLP-10-08 / CR-19/ F-1 dated 21-08-2008. Melghat Tiger Reserve Conservation Foundation was constituted and registered under Mumbai Public Trust Act, 1950 as a public trust bearing **registration number no E-548 dated 10.02-2009**. The Governing Body of the foundation framed the rules and regulations on 26-08-2009 and these were concurred by Govt of Maharashtra on 9-06-2010. The objectives of Melghat Tiger Reserve Conservation Foundation listed and collated are—

g) Facilitate ecological, economical, social and cultural development in the tiger reserve and adjoining landscape.
h) To provide support to safeguard natural environment in the tiger reserve and relevant place in the adjoining areas.
i) To support eco development, eco tourism, research, environmental education, training, management in related fields to support the implementing agency
j) To facilitate the creation and maintenance of such assets as deemed necessary.
k) To solicit technical, financial, social and other supports from diverse sources in conformity of the law
l) Anything incidental or ancillary to the above mentioned objectives.

13.04 The achievements of the above objectives largely depend on the generation and availability of the revenue with Melghat Tiger Reserve Conservation Foundation. Melghat Tiger Reserve conservation Foundation at present generates the revenue of RS 17-20 lakh per annum from gate

receipts, rooms and dormitories charges etc. Therefore, it is proposed to organise revenue generation events with the help of various agencies operated in the market and to request the various donors to donate funds to the foundation. Melghat Tiger Reserve Conservation Foundation has been exempted under **80 G (5) (vi) of the Income Tax Act, 1961 since 1-04-2014. (See Annexure XXXXIX)** It is also proposed to organise package tours for visitors in Melghat Tiger Reserve with the help of private tour operators to boost eco tourism in the reserve and also employment to the locals. The LPG gas agency and Petrol pump will be established in the reserve to distribute LPG cylinders to the already LPG connection giving beneficiaries as well as to the local people. The petrol / diesel will also be distributed to the park vehicles and to the locals. These activities on one hand will generate the good will for the park authority as well as revenue to the foundation.

13.05 Government of Maharashtra vide their letter no. WLP1009/CR.56/F-1, Revenue and Forest Department, dated 17 August 2011 has given approval to the Operational Manual of Melghat Tiger Conservation Foundation. With this approval, Melghat Tiger Conservation foundation has became functional and various activities for meeting its objectives will be initiated shortly.

The Foundation, may undertake various activities related to mainstreaming of conservation: eco development, staff welfare, visitor regulation, field research, facilitating eco development committees for market access, conducting capacity building programs, ecotourism and Joint Forest Management.

13.06 COORDINATION WITH LINE AGENCIES / DEPARTMENTS.

CO-ORDINATION OF FOLLOWING AGENCIES IS REQUIRED FOR MANAGEMENT.

1. REVENUE DEPARTMENT:

The revenue department takes care of provision of ration, maintaining law and order, keeping of land records and distribution of grains etc to the people residing in the area.

For rehabilitation of villages co-ordination with Revenue Department is most essential. The collector is Chairman of committee at District Level for the rehabilitation process. Various government agencies like P.W.D., irrigation, Land records Z.P. Health, Education and Tribal development, MSEDL are required for rehabilitation process and the co ordination of these

department can only be obtained through the collector. Similarly, Divisional Commissioner is the Chairman of the Divisional Level Monitoring committee with Field Director as Member Secretary.

After the settlement of cases under Tribal Rights Acts, the demarcation and settlement is to be done in coordination with revenue authorities and in case the claims are rejected, the eviction is to be done forthwith.

1. ZILLA PARISHAD :

Zilla Parishad plays an important role in development of villages. Various activities like public health, minor irrigation, village roads, and animal husbandry are taken up by Zilla parishad. Other activities like sericulture, water harvesting structure, soil and moisture conservation works etc are implemented by Z.P.

2. POLICE DEPARTMENT :

Forest and conservation of wildlife is an important task. Interstate poachers and also local poachers are involved in poaching and their activity is day by day increasing. To control over this co operation of Police Department is a must. Joint patrolling with Police Department is necessary. This issue has also been discussed in the Divisional Tiger cell committee and District Level Tiger cell committee and accordingly the programme is finalized.

4. CO-ORDINATION WITH M.P. FOREST DEPARTMENT:

For the interstate poaching in Maharashtra and Madhya Pradesh senior officers from M.P. and Maharashtra should meet in 3 months to discuss the issue of interstate poaching. At present, these meetings are not regular. However, increased coordination with MP Forest Dept. will be useful both for MP as well as for Maharashtra, in view of large porous border with Madhya Pradesh.

5. ANIMAL HUSBANDRY DEPARTMENT:

The co-ordination with Animal Husbandry department is required for vaccination of the cattle of inside and fringe villages. In case of death of animals in offence cases, unknown causes, sickness of animals etc. the postmortem is required to be done to ascertain the cause of death. In such cases the help of local veterinary officer is required to be taken. In case of man animal conflict, a team of officers must have a veterinary expert while tranquilizing the animals.

6. FOREST DEPARTMENT:

The project tiger area is surrounded by West Melghat Division Paratwada and East Melghat Division Chikhaldara and also some part of Buldhana Division. The coordination of these divisions is necessary to control over poaching as well as spreading of fire through these division. In view of large number of villages in the buffer area, but under the jurisdiction of territorial forest divisions, the cooperation these divisions is very necessary for effective protection strategy.

AMENITIES TO STAFF. :

13.07 Most of staff in Melghat Tiger Reserve is placed in remote and inaccessible areas, which do not have adequate facilities for residence, water supplies, electricity, transport and schools. Also, most of the ground staff once posted in such remote areas is not replaced or substituted despite his repeated requests and urgency for meeting his personal obligations like marriage of daughters, higher education for children and treatment for ailing partners or other family members. A special transfer and placement policy needs to be worked out for remote areas such Melghat Tiger Reserve.

However, the following things needs to be done in respect of the staff, for the time being.

(i) The staff, which has spent more than 15 years in the reserve should be given choice posting and

Allowed to move outside the reserve.

(ii) The placement of officers and staff in the Reserve should preferably be by their choice and once posted, they should be allowed to continue for a period of minimum 5 years unless they are required to be replaced due to misconduct.

(iii) Transit accommodation facilities for the families and wards of the staff posted in remote areas should be provided at Paratwada and Amravati with a view to facilitate education to their children.

13.08 FUND RAISING STRATEGIES:

Funds for the management will be raised as per the guidelines for Tiger Conservation fund (TCF). The gate money will be used for development activities. It is proposed to use the money received from sale of seized timber etc. for eco-development activities of villages (Section 29 and Section 35(6) of Wildlife (Protection) Act, 1972 provides for removal of any forest produce for the better management of wildlife their in an use of such produce for meeting bona fide needs of the people leaving in an around the Sanctuary and National Park respectively).

13.09 SCHEDULE OF OPERATIONS:

The Schedule of operation is as follows

1. Rehabilitation of Villages.
2. 1/5 Boundary demarcation.
3. Proposed roads
4. Proposed buildings
5. Proposed works of creation of water sources.
6. Proposed meadow development in forests.
7. Proposed meadow development in evicted village.
8. Proposed soil and moisture conservation works.
9. Clearing fire lines.

The schedule is given in appropriate appendices.

13.10 ACTIVITY BUDGET:

The budget for implementation of Tiger Conservation Plan comes from three sources.

1. Government of India Centrally Sponsored Scheme Project Tiger from NTCA.
2. State Government Plan Scheme like Eco development etc.
3. State Government Non-plan Funds.

The details of annual budget to implement the prescription of the Tiger Conservation Plan is given in **Appendix no. XXVIII.** The Budget for 10 years amounting Rs 108,348.02 lakhs.

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CHAPTER XIV.

MONITORING AND EVALUATION.

14.01 Monitoring and evaluation of the activity is an important part of any plan for further improvement. The following criteria are prescribed for monitoring and evaluation of the activities proposed in this plan.

CRITERIA:

The criteria of monitoring and evaluation are of 2 types.

1. Physical.
2. Qualitative

The physical criteria consists of completion of physical activity of any work e.g. Creation of a meadow or a water source is a physical criteria. However the durability of the meadow or the retention of water in water source and use of the meadow by herbivore or the use of water source by wild animals is the qualitative criteria needs a close observation for over a time period.

14.02 PROCESS

SUBMISSION OF CONTROL FORMS

Three sets of control forms would be prepared and two sets would be sent annually to the office of the Chief Conservator of Forests & Field Director, Melghat Tiger Reserve not later than 1st October of each year.

COMPARTMENT HISTORIES

14.03 Compartment histories will be maintained in the forms as shown in **Appendix No. XXIX.** Each compartment will have a separate file for keeping its record. The Range forest officers will fill in two copies in the columns in the compartment history forms every year in July, which after due scrutiny by the ACF will be submitted to the respective Dy. Conservator of forests (wildlife), Melghat Tiger Project, Sipna wildlife division Paratwada, Gugamal wildlife division Paratwada and Akot wildlife division Akot. After verification and counter signature, one copy will be returned to the Range forest officer for record keeping at his end.

DIVISIONAL NOTE BOOK

Some important events will be recorded in divisional notebook. This will include arrival of winter water foul at various wetlands, water availability in pinch period, status of health of wild animal, fire damages, poaching of wild animals, etc.

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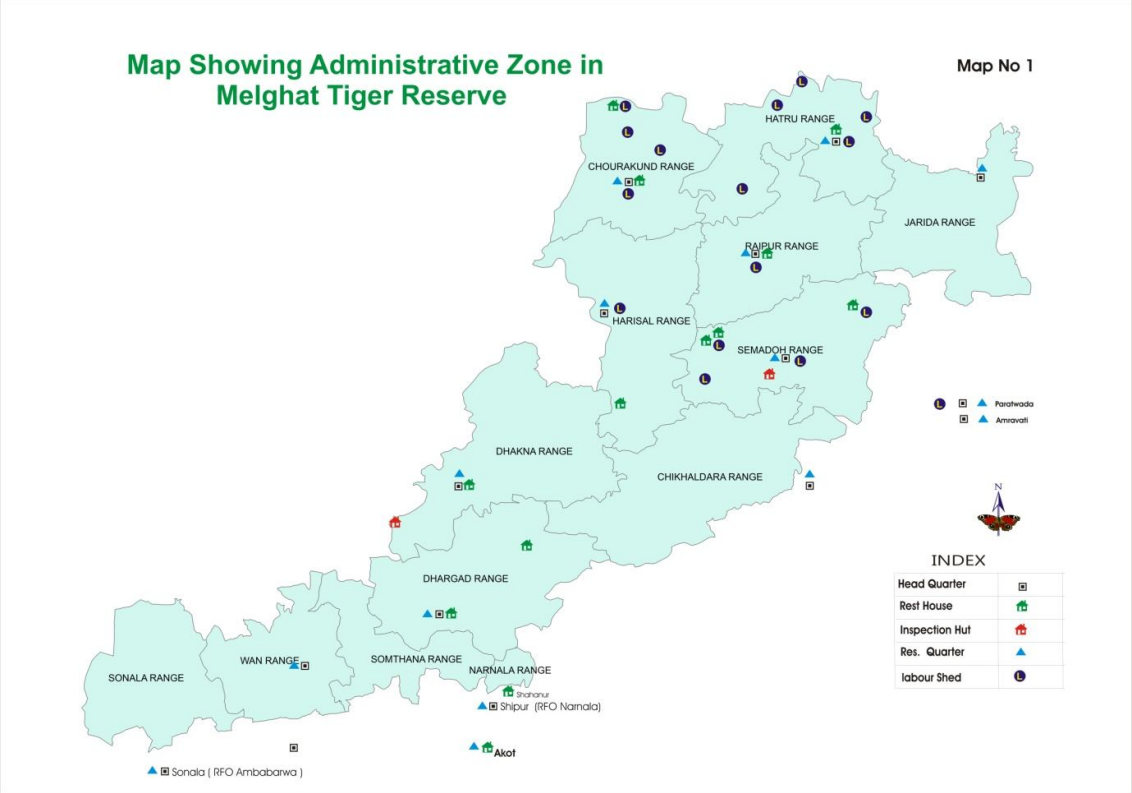
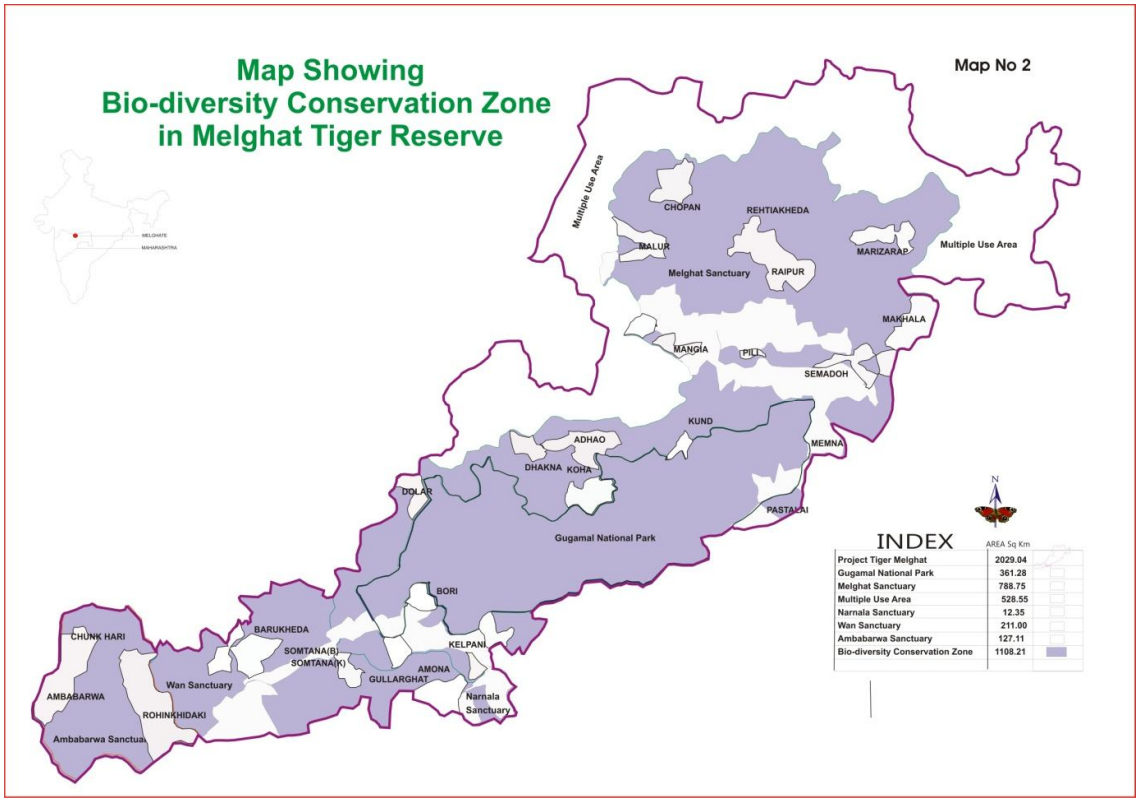
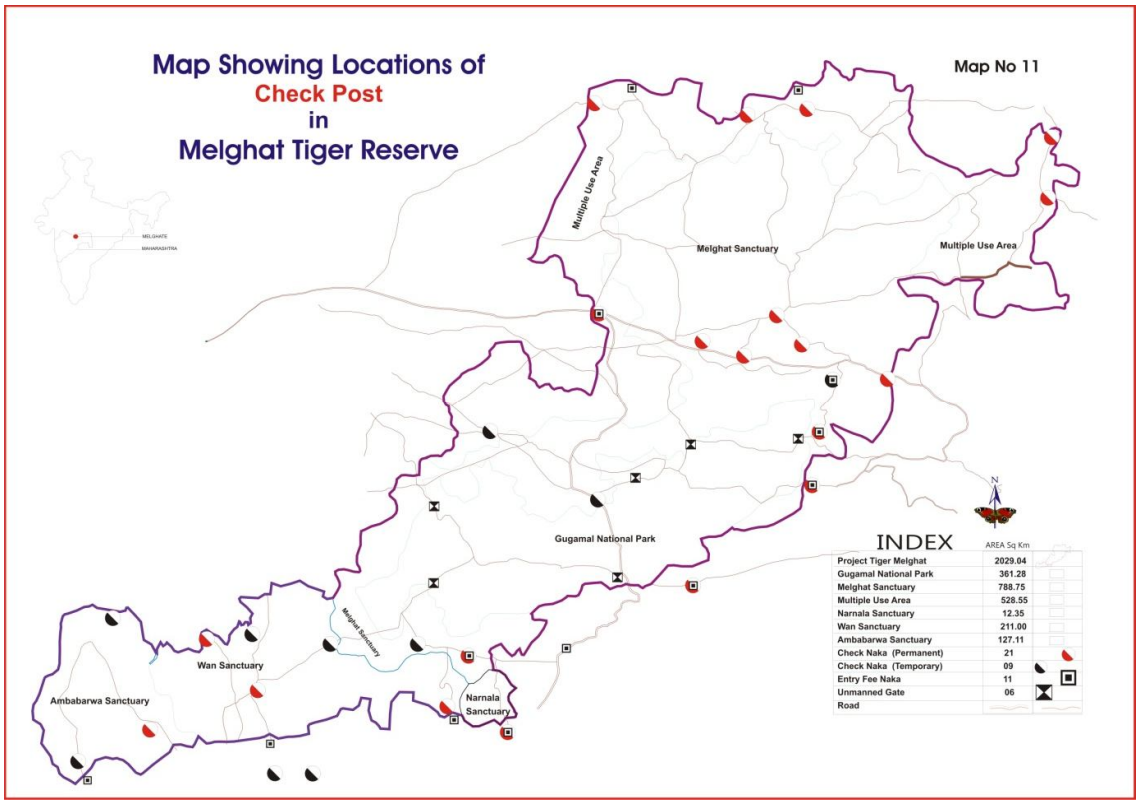
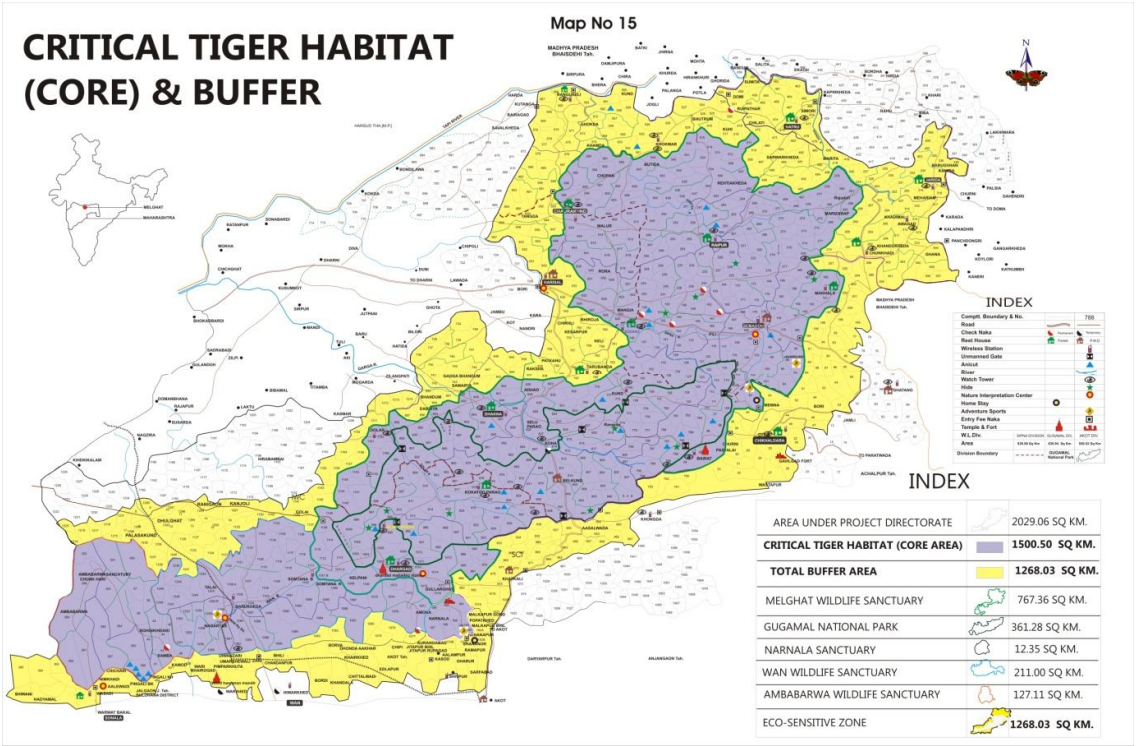

Map Showing Administrative Zone in Melghat Tiger Reserve
Map No 1
HATRU RANGE
CHOURAKUND RANGE
JARIDA RANGE
RAIPUR RANGE
HARISAL RANGE
SEMADOH RANGE
DHAKNA RANGE
CHIKHALDARA RANGE
DHARGAD RANGE
SONALA RANGE
WAN RANGE
SOMTHANA RANGE
NARNALA RANGE
Shahanur
Shipur (RFO Narnala)
Akot
Sonala (RFO Ambabarwa)
Paratwada
Amravati
N
INDEX
Head Quarter
Rest House
Inspection Hut
Res. Quarter
labour Shed

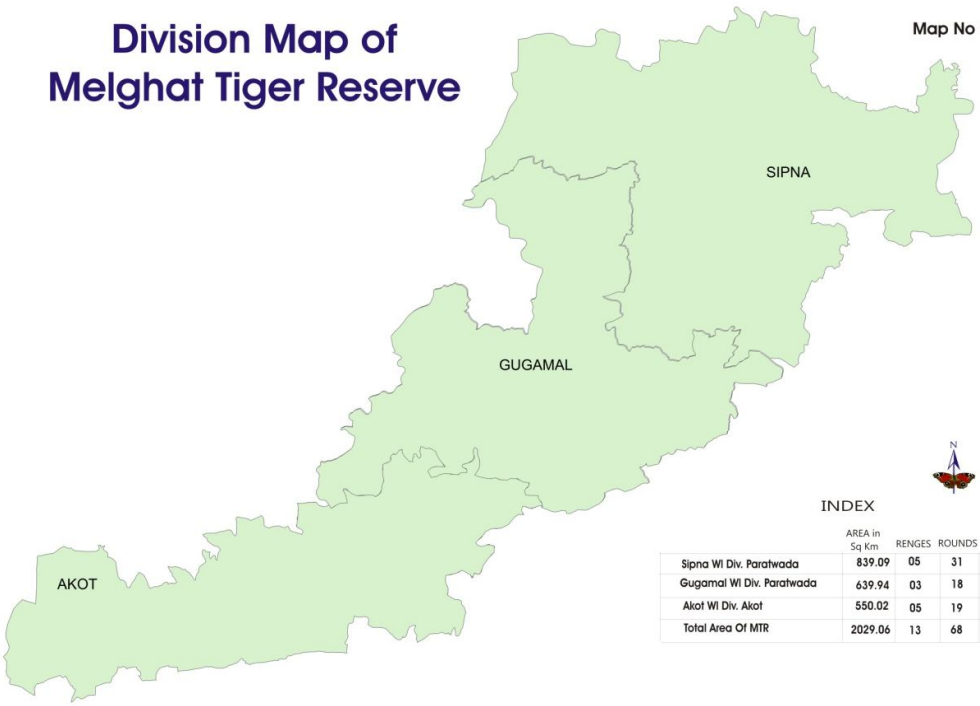

Map Showing
Bio-diversity Conservation Zone
in Melghat Tiger Reserve
Map No 2
MELGHATE
MAHARASHTRA
Multiple Use Area
CHOPAN
REHTIAKHEDA
MALUR
MARIZARAP
Multiple Use Area
Melghat Sanctuary
RAIPUR
MAKHALA
MANGIA
PILI
SEMADOH
KUND
ADHAO
MEMNA
DHAKNA
KOHA
DOLAR
PASTALAI
Gugamal National Park
BORI
CHUNK HARI
BARUKHEDA
SOMTANA(B)
SOMTANA(K)
KELPANI
AMONA
GULLARGHAT
Wan Sanctuary
AMBABARWA
ROHINKHIDAKI
Narnala Sanctuary
Ambabarwa Sanctuary
N
INDEX
AREA Sq Km
Project Tiger Melghat 2029.04
Gugamal National Park 361.28
Melghat Sanctuary 788.75
Multiple Use Area 528.55
Narnala Sanctuary 12.35
Wan Sanctuary 211.00
Ambabarwa Sanctuary 127.11
Bio-diversity Conservation Zone 1108.21


Map Showing Locations of
Check Post
in
Melghat Tiger Reserve
Map No 11
Multiple Use Area
Melghat Sanctuary
Multiple Use Area
Gugamal National Park
Melghat Sanctuary
Wan Sanctuary
Ambabarwa Sanctuary
Narnala Sanctuary
N
INDEX
AREA Sq Km
Project Tiger Melghat 2029.04
Gugamal National Park 361.28
Melghat Sanctuary 788.75
Multiple Use Area 528.55
Narnala Sanctuary 12.35
Wan Sanctuary 211.00
Ambabarwa Sanctuary 127.11
Check Naka (Permanent) 21
Check Naka (Temporary) 09
Entry Fee Naka 11
Unmanned Gate 06
Road


CRITICAL TIGER HABITAT
(CORE) & BUFFER
Map No 15
N
INDEX
INDEX
AREA UNDER PROJECT DIRECTORATE 2029.06 SQ KM.
CRITICAL TIGER HABITAT (CORE AREA) 1500.50 SQ KM.
TOTAL BUFFER AREA 1268.03 SQ KM.
MELGHAT WILDLIFE SANCTUARY 767.36 SQ KM.
GUGAMAL NATIONAL PARK 361.28 SQ KM.
NARNALA SANCTUARY 12.35 SQ KM.
WAN WILDLIFE SANCTUARY 211.00 SQ KM.
AMBABARWA WILDLIFE SANCTUARY 127.11 SQ KM.
ECO-SENSITIVE ZONE 1268.03 SQ KM.

Division Map of Melghat Tiger Reserve

Map No 6

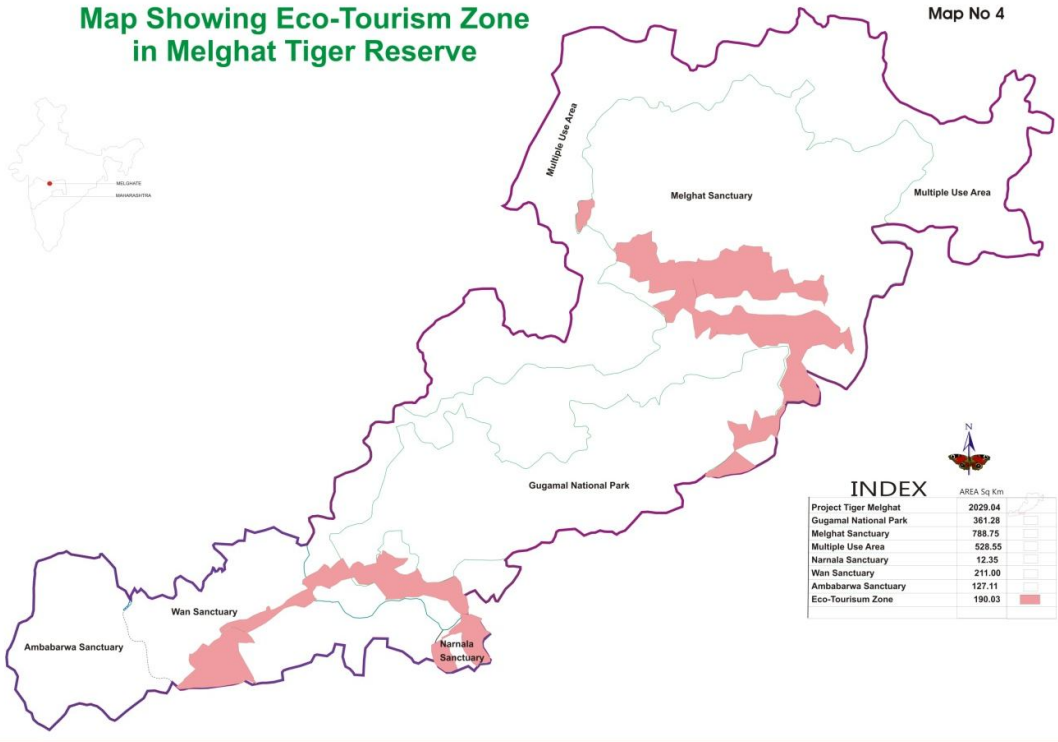


INDEX

	AREA in Sq Km	RENGES	ROUNDS	BEETS
Sipna WI Div. Paratwada	839.09	05	31	96
Gugamal WI Div. Paratwada	639.94	03	18	67
Akot WI Div. Akot	550.02	05	19	66
Total Area Of MTR	2029.06	13	68	229

Map Showing Eco-Tourism Zone in Melghat Tiger Reserve

Map No 4

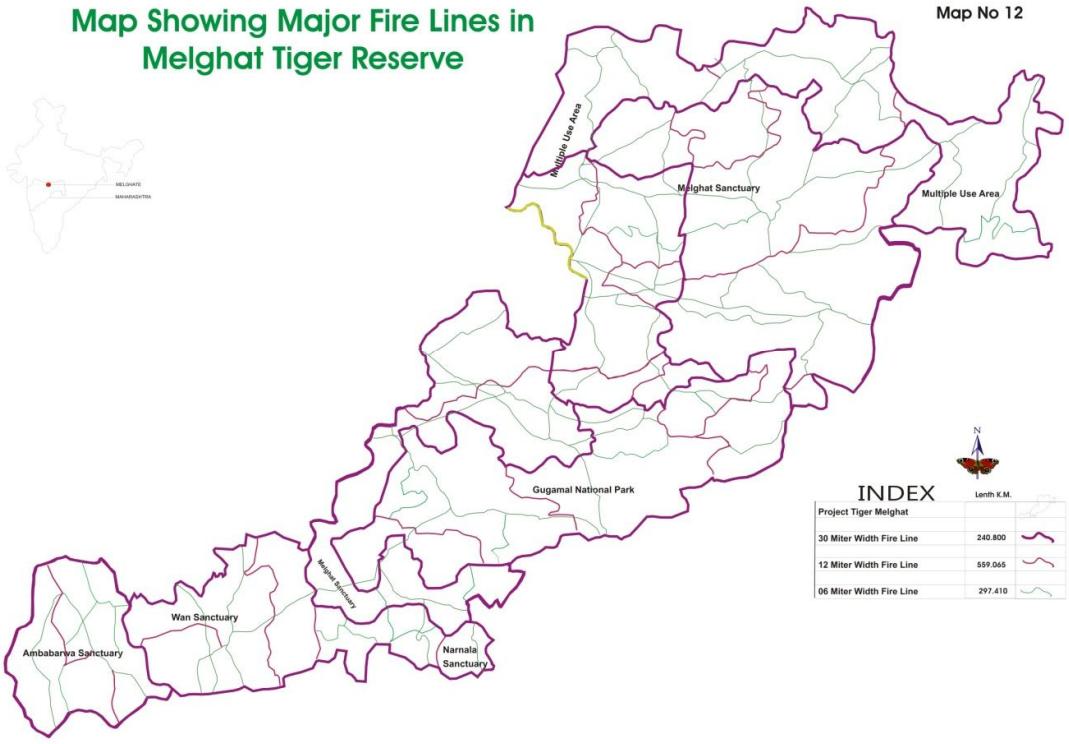


INDEX

	AREA Sq Km
Project Tiger Melghat	2029.04
Gugamal National Park	361.28
Melghat Sanctuary	788.75
Multiple Use Area	528.55
Narnala Sanctuary	12.35
Wan Sanctuary	211.00
Ambabarwa Sanctuary	127.11
Eco-Tourisum Zone	190.03

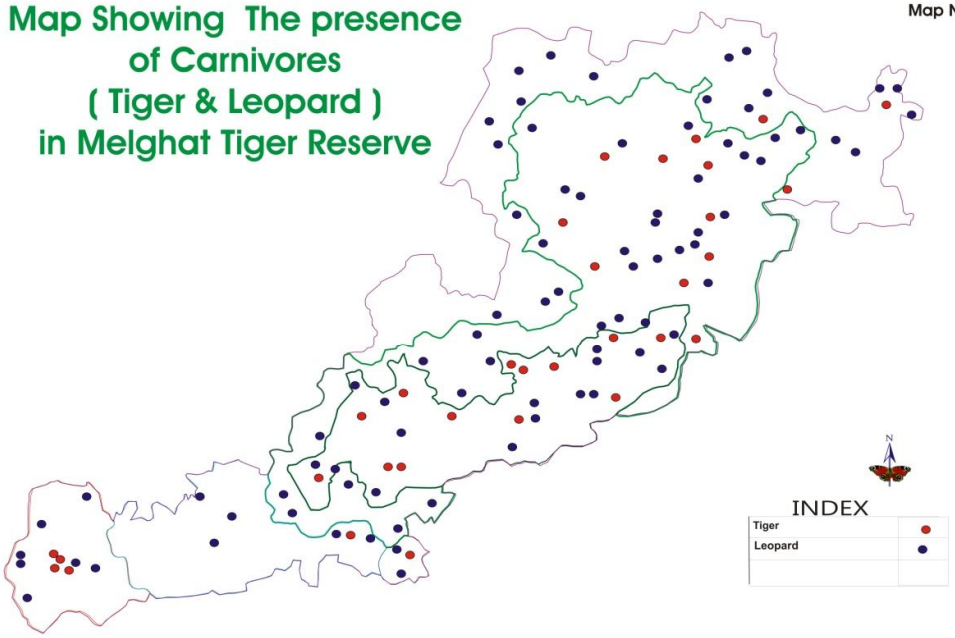
Map Showing Major Fire Lines in Melghat Tiger Reserve

Map No 12



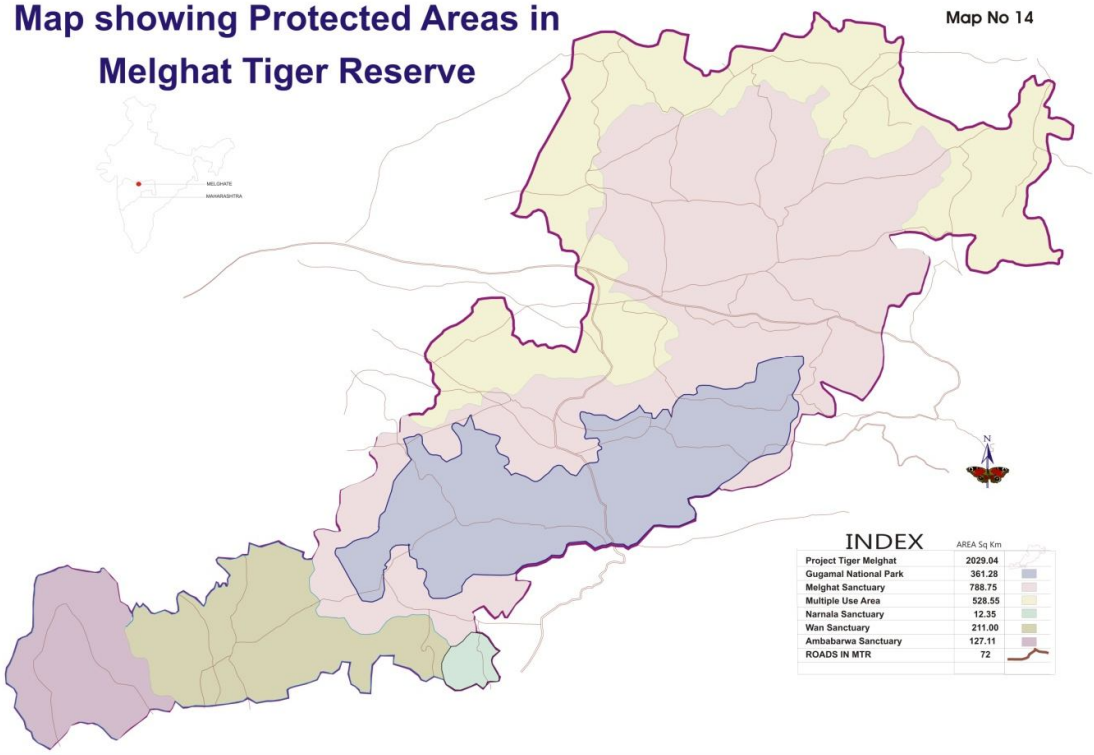
Map Showing The presence of Carnivores (Tiger & Leopard) in Melghat Tiger Reserve

Map No 16



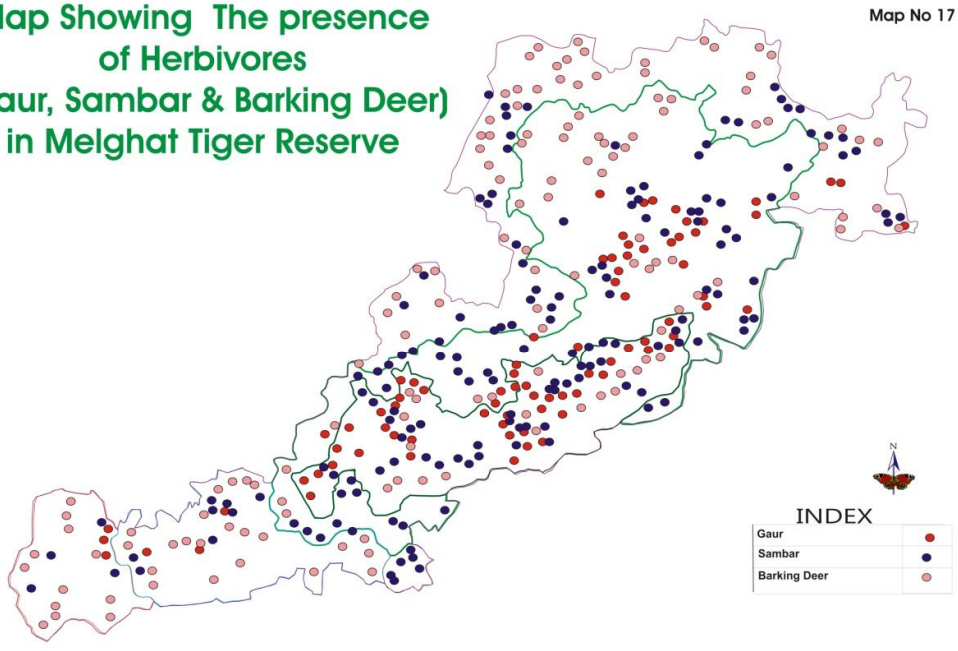
Map showing Protected Areas in Melghat Tiger Reserve

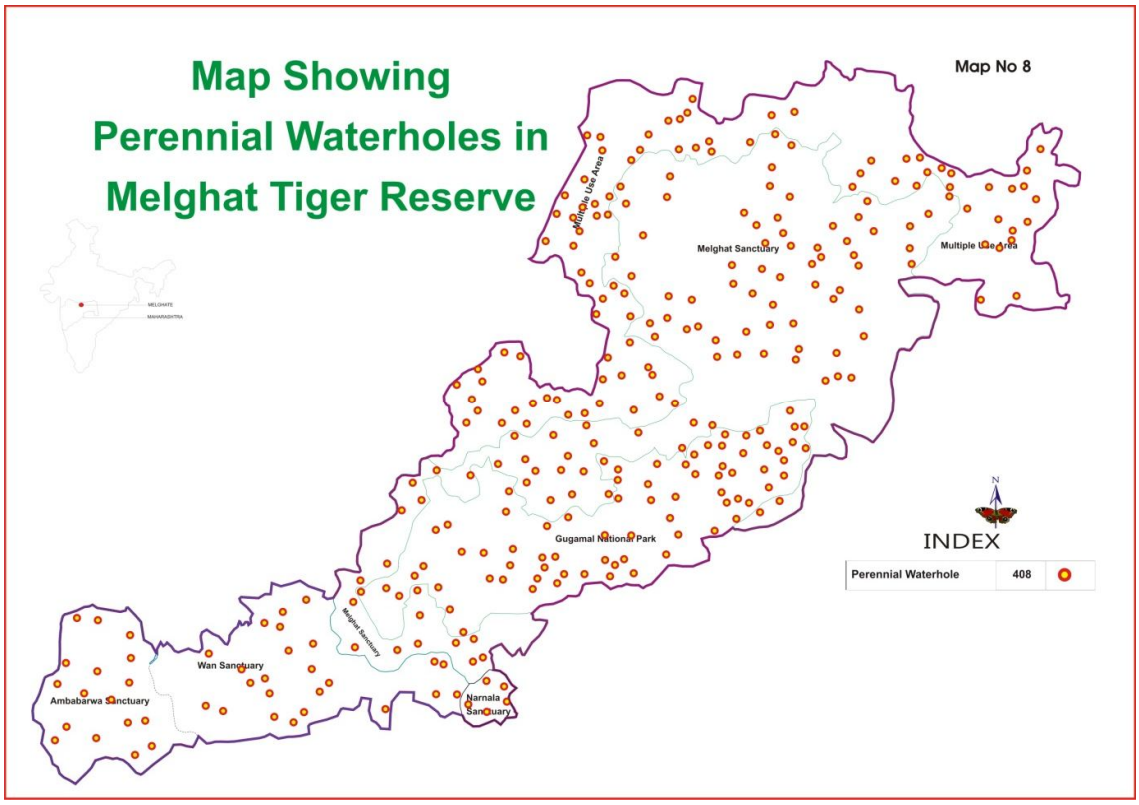
Map No 14

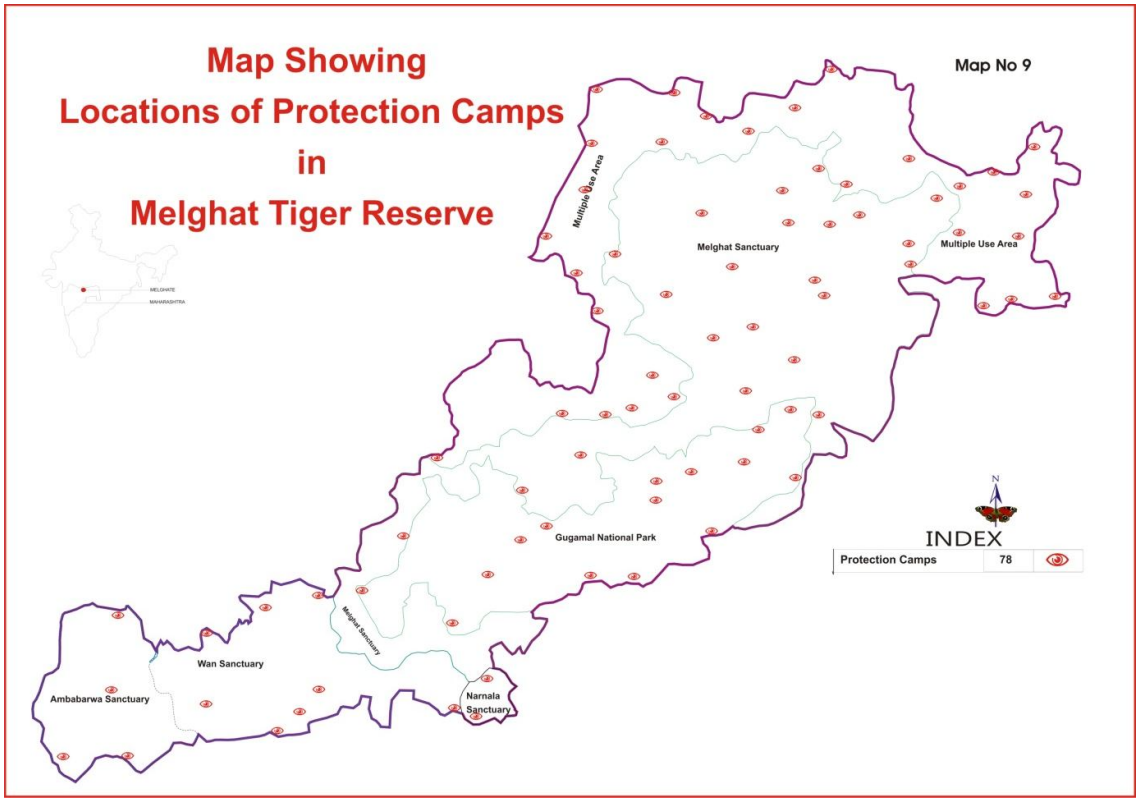


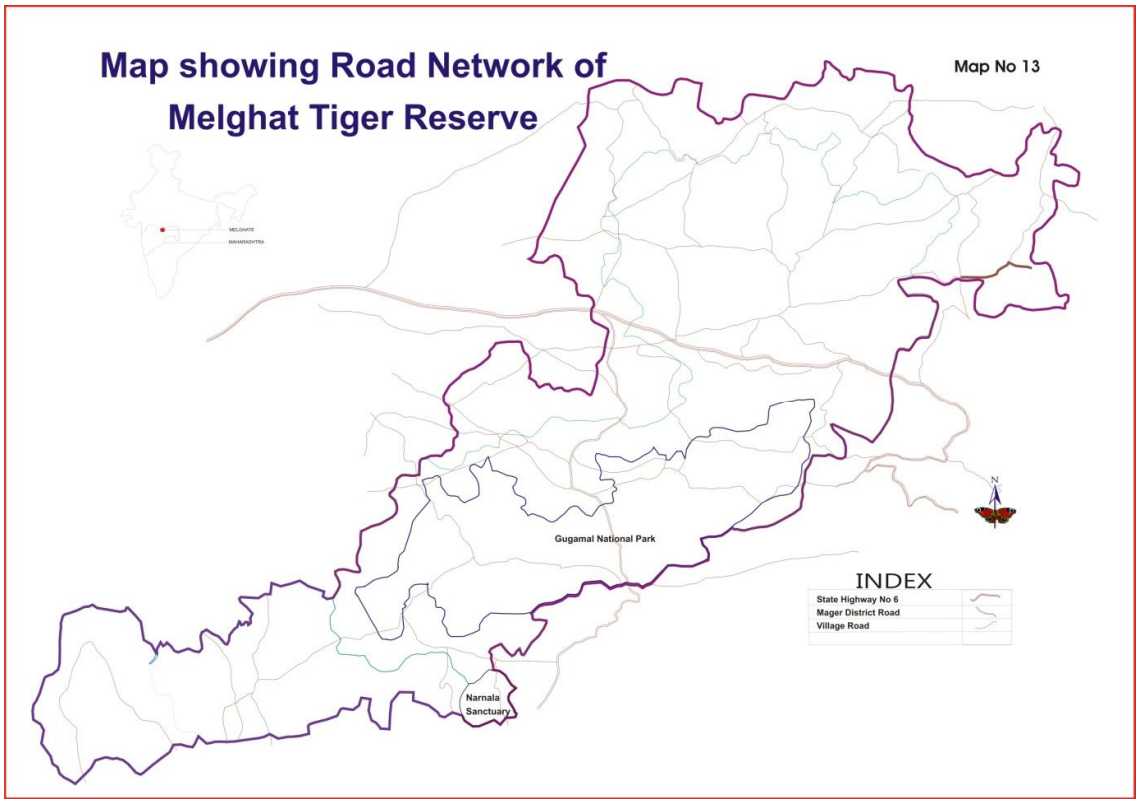
Map Showing The presence of Herbivores (Gaur, Sambar & Barking Deer) in Melghat Tiger Reserve

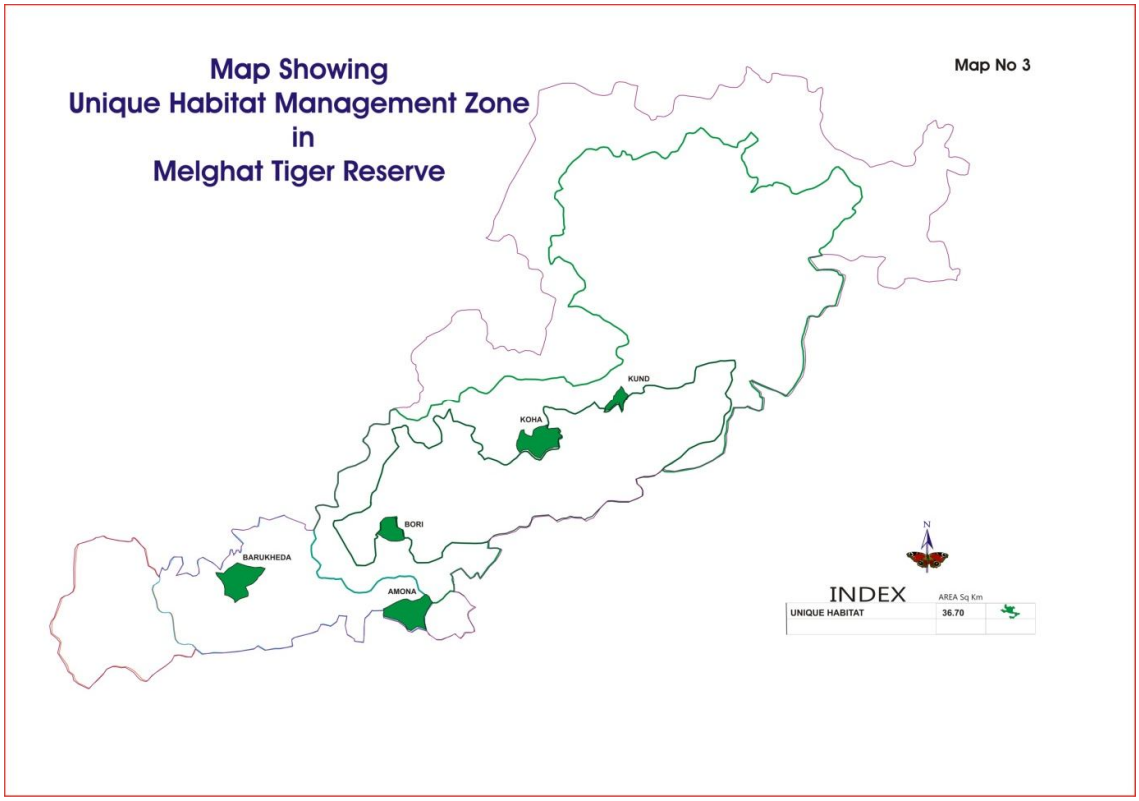
Map No 17

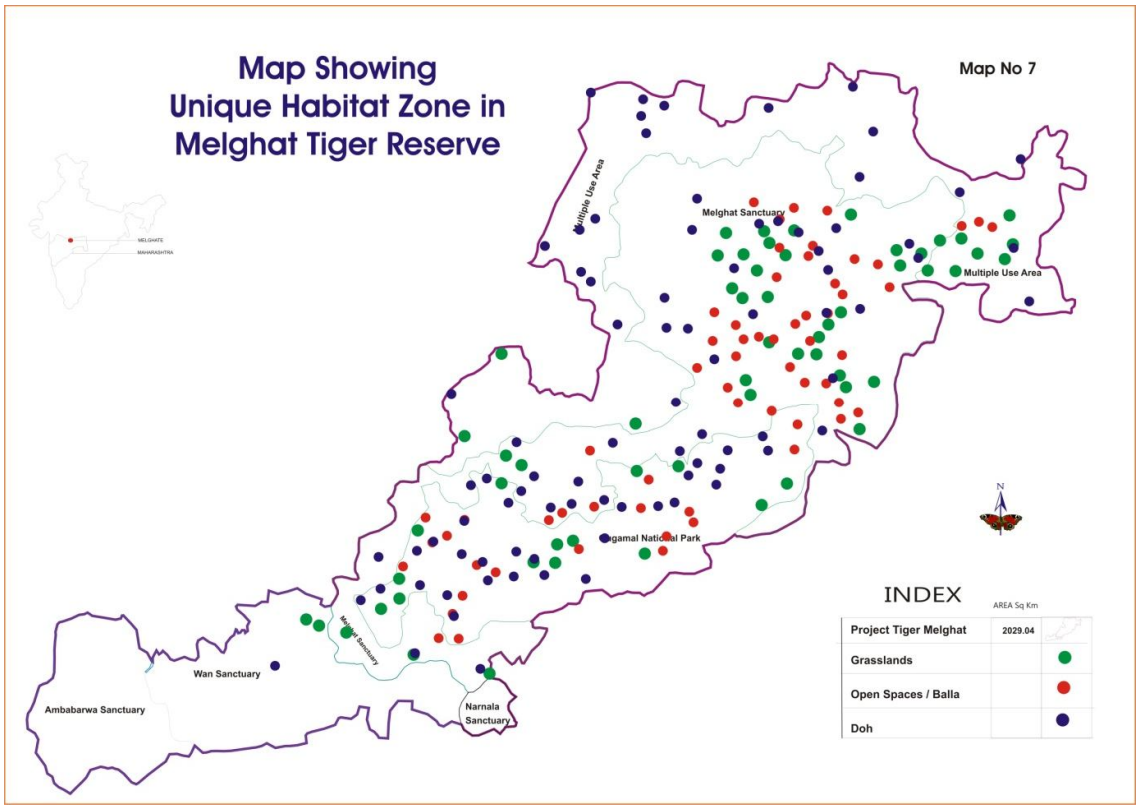


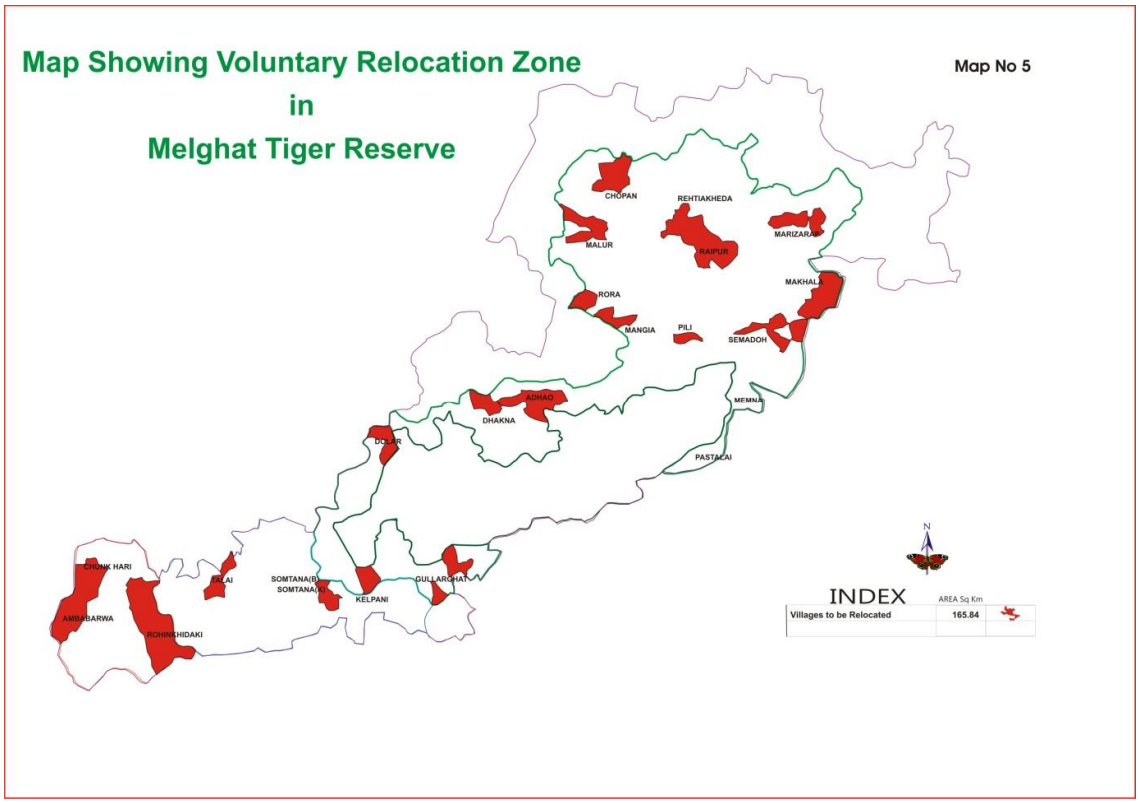

Map Showing
Perennial Waterholes in
Melghat Tiger Reserve
Map No 8
Multiple Use Area
Melghat Sanctuary
Multiple Use Area
Gugamal National Park
Melghat Sanctuary
Wan Sanctuary
Ambabarwa Sanctuary
Narnala Sanctuary
INDEX
Perennial Waterhole 408

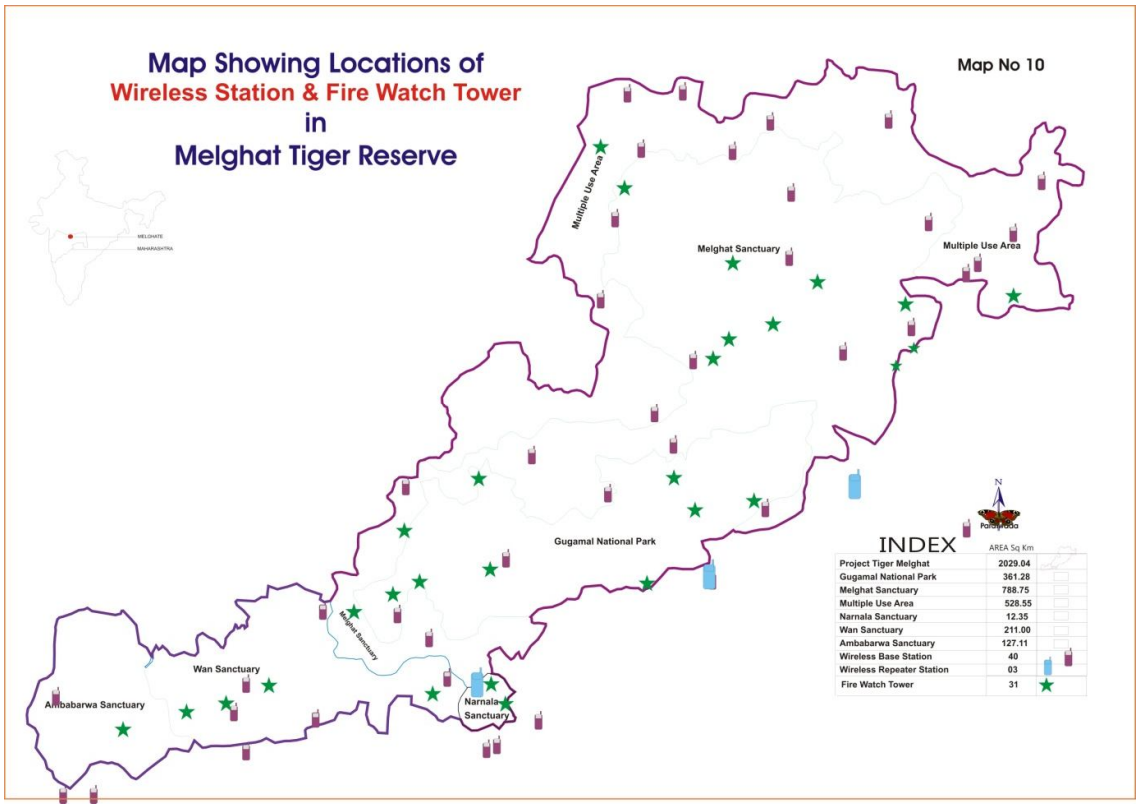

Map Showing
Locations of Protection Camps
in
Melghat Tiger Reserve
Map No 9
Multiple Use Area
Melghat Sanctuary
Multiple Use Area
Gugamal National Park
Melghat Sanctuary
Wan Sanctuary
Ambabarwa Sanctuary
Narnala Sanctuary
INDEX
Protection Camps 78


Map showing Road Network of
Melghat Tiger Reserve
Map No 13
MELGHATE
MAHARASHTRA
Gugamal National Park
Narnala
Sanctuary
N
INDEX
State Highway No 6
Mager District Road
Village Road


Map Showing
Unique Habitat Management Zone
in
Melghat Tiger Reserve
Map No 3
KUND
KOHA
BORI
BARUKHEDA
AMONA
N
INDEX
AREA Sq Km
UNIQUE HABITAT
36.70


Map Showing
Unique Habitat Zone in
Melghat Tiger Reserve
Map No 7
MELGHATE
MAHARASHTRA
Multiple Use Area
Melghat Sanctuary
Multiple Use Area
Gugamal National Park
Wan Sanctuary
Melghat Sanctuary
Ambabarwa Sanctuary
Narnala Sanctuary
N
INDEX
AREA Sq Km
Project Tiger Melghat 2029.04
Grasslands
Open Spaces / Balla
Doh


Map Showing Voluntary Relocation Zone
in
Melghat Tiger Reserve
Map No 5
CHOPAN
REHTIAKHEDA
MARIZARA
MALUR
RAIPUR
MAKHALA
RORA
MANGIA
PILI
SEMADOH
ADHAO
DHAKNA
MEMNA
PASTACAI
CHUNK HARI
SOMTANA(R)
SOMTANA(K)
GULLARGHAT
KELPANI
AMBABARWA
ROHINKHIDAKI
N
INDEX
AREA Sq Km
Villages to be Relocated 165.84


Map Showing Locations of
Wireless Station & Fire Watch Tower
in
Melghat Tiger Reserve
Map No 10
MELGHATE
MAHARASHTRA
Multiple Use Area
Melghat Sanctuary
Multiple Use Area
Gugamal National Park
Melghat Sanctuary
Wan Sanctuary
Ambabarwa Sanctuary
Narnala Sanctuary
N
Palampada
INDEX
AREA Sq Km
Project Tiger Melghat 2029.04
Gugamal National Park 361.28
Melghat Sanctuary 788.75
Multiple Use Area 528.55
Narnala Sanctuary 12.35
Wan Sanctuary 211.00
Ambabarwa Sanctuary 127.11
Wireless Base Station 40
Wireless Repeater Station 03
Fire Watch Tower 31