Tiger Conservation Plan

Core Zone

(2019-20 to 2029-30)

Sathyamangalam Tiger Reserve

Erode, Tamil Nadu

Tiger Conservation Plan

Core Zone

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Part A: Existing Situation

Chapter 1. Introduction of the Area

1.1. Name, Location, Constitution & Extent

1.1.1. Name

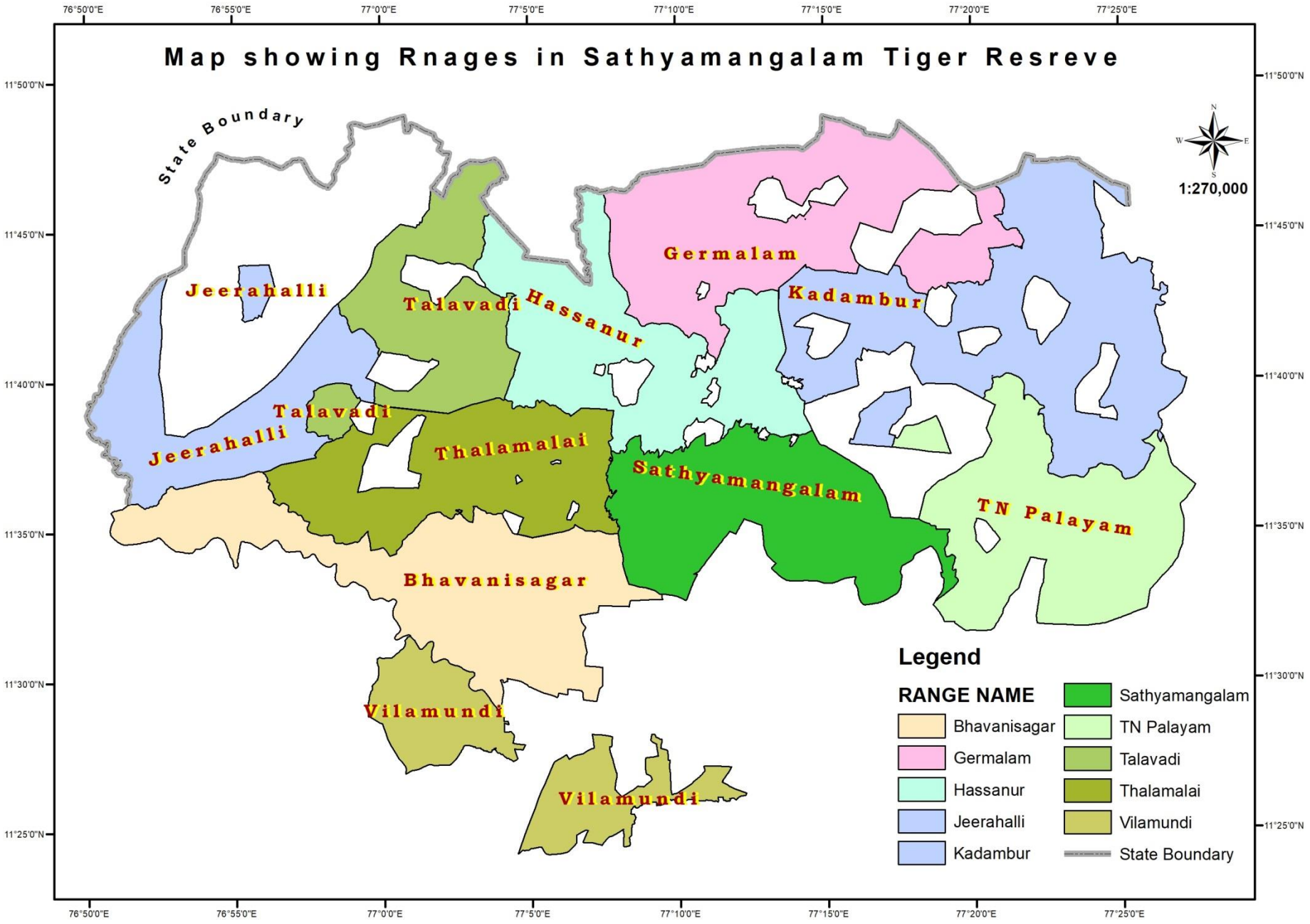
Sathyamangalam Tiger Reserve - Core Zone

1.1.2. Location

The tract falls between the latitudes 11º 26’ 46.21" and 11º 48’ 57.42” and between Longitudes 76º 49' 55.66” and 77º 17’ 18.39” The Tiger Reserve is situated in Sathyamangalam Taluk and Talawady Taluk of Erode District. The Tiger Reserve area covers lower plains of Sathyamangalam Range, Bhavanisagar Range, T. N. Palayam Range and Upper hill plateau of Talamalai Range, Talawady Range, Hasanur Range & Germalam Range.

Sathyamangalam Tiger Reserve is also a confluence of two distinct geographical regions abound with rich biodiversity: Western Ghats and Eastern Ghats. The Tiger Reserve is also part of Nilgiris Biosphere Reserve & Nilgiris – Eastern Ghats Elephant Reserve.

The Core Zone covers the Moyar Valley in Bhavanisagar Range, Talamalai Plateau of Talamalai Range, Hassanur and Talawady and Germalam Ranges and a portion of Sathyamangalam Range.


Map showing Rnages in Sathyamangalam Tiger Resreve
State Boundary
Jeerahalli
Talavadi
Hassanur
Germalam
Kadambur
Talavadi
Jeerahalli
Thalamalai
Sathyamangalam
TN Palayam
Bhavanisagar
Vilamundi
Vilamundi
1:270,000
Legend
RANGE NAME
Bhavanisagar
Germalam
Hassanur
Jeerahalli
Kadambur
Sathyamangalam
TN Palayam
Talavadi
Thalamalai
Vilamundi
State Boundary
76°50'0"E
76°55'0"E
77°0'0"E
77°5'0"E
77°10'0"E
77°15'0"E
77°20'0"E
77°25'0"E
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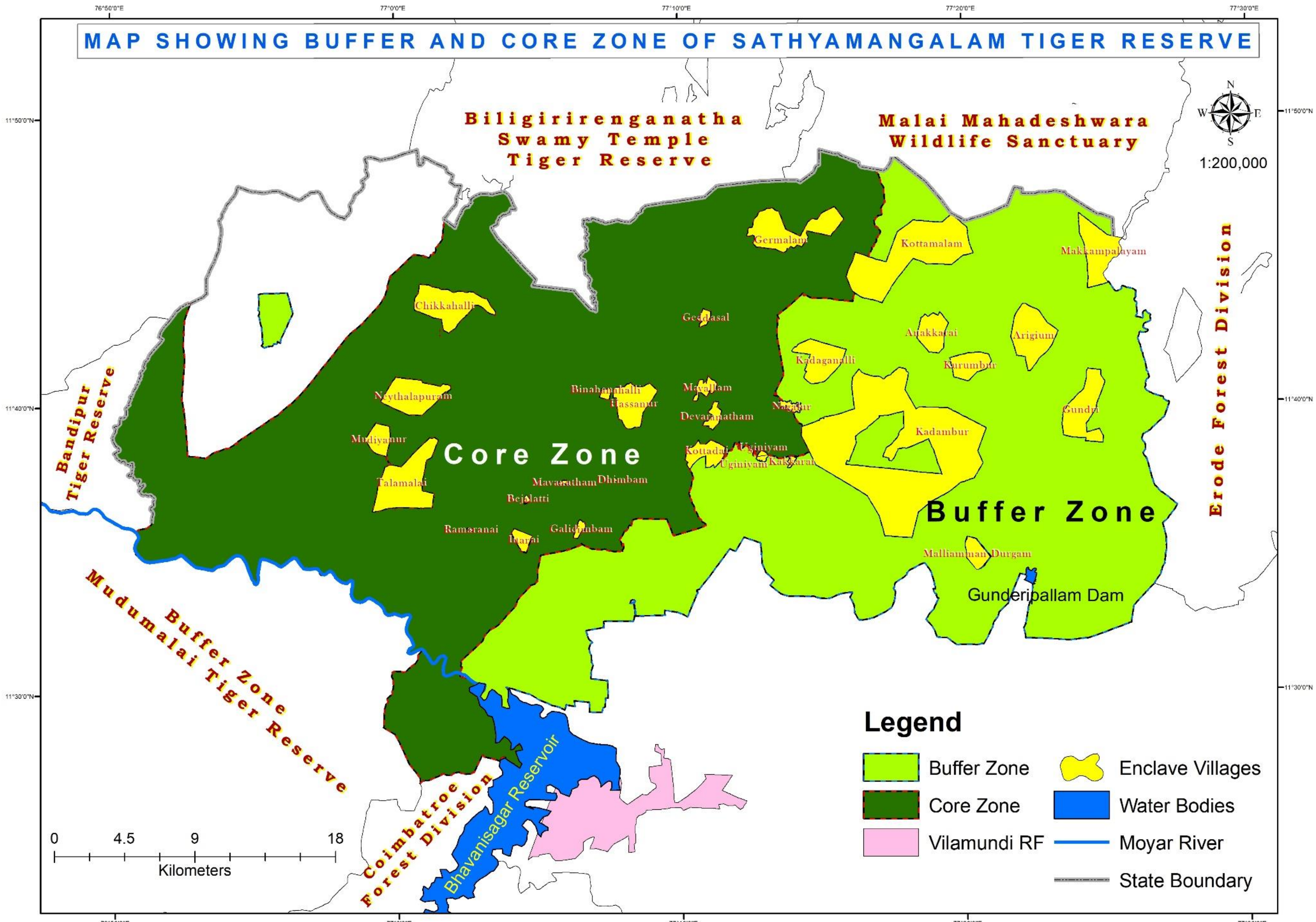
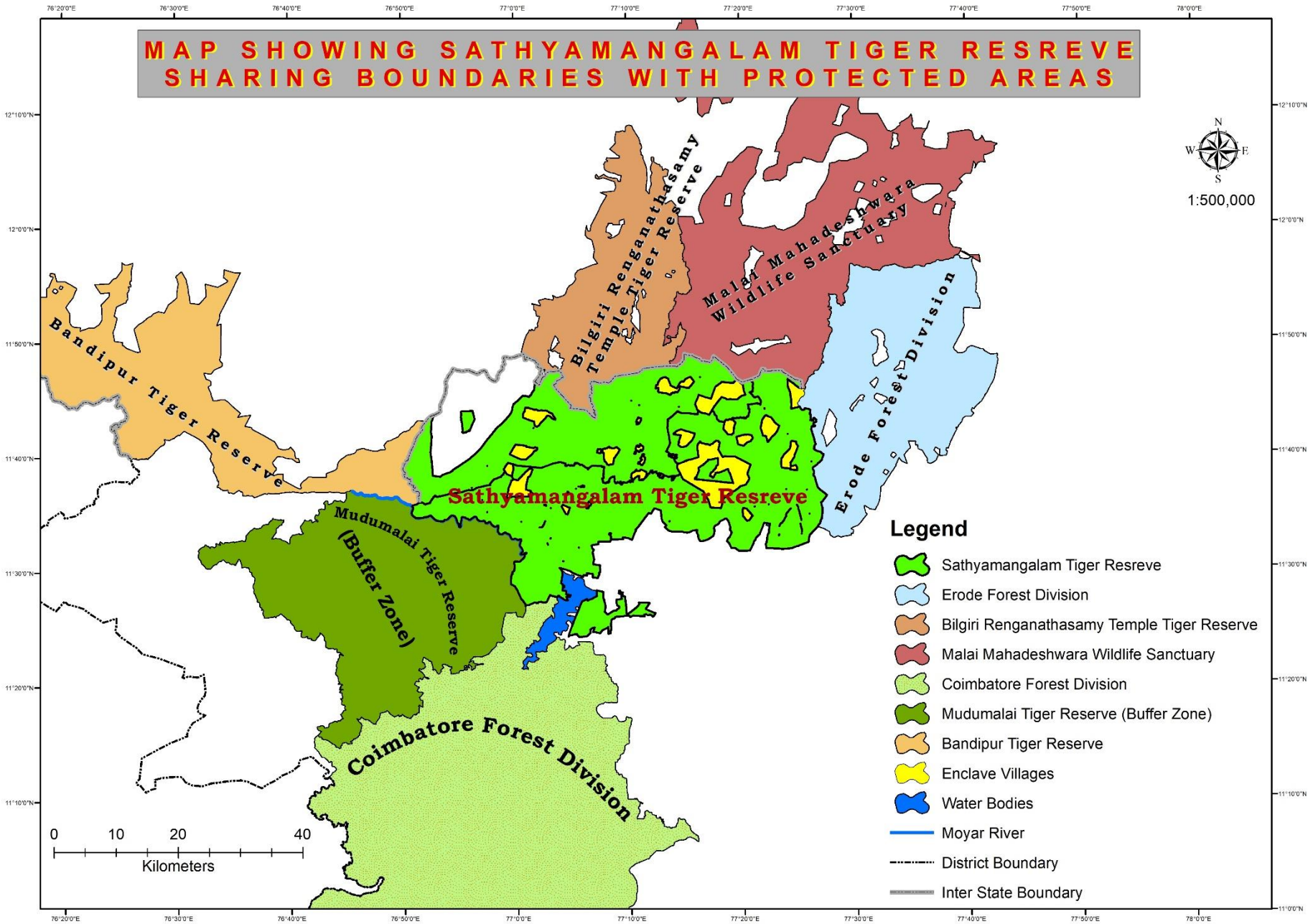
11°35'0"N
11°30'0"N
11°25'0"N


MAP SHOWING BUFFER AND CORE ZONE OF SATHYAMANGALAM TIGER RESERVE
Biligirirenganatha Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
1:200,000
Erode Forest Division
Bandipur Tiger Reserve
Buffer Zone Mudumalai Tiger Reserve
Coimbatroe Forest Division
Bhavanisagar Reservoir
Core Zone
Buffer Zone
Gunderipallam Dam
Germalam
Kottamalam
Makkampalayam
Chikkahalli
Geddasal
Arigium
Kadaganalli
Karumbur
Neythalapuram
Binahanahalli
Hassanur
Devaramatham
Kadambur
Gundri
Mudiyanur
Kottadai
Uginiyam
Talamalai
Mavanatham
Dhimbam
Bejalatti
Ramaranai
Ittarai
Galidimbam
Malliamman Durgam
0 4.5 9 18
Kilometers
Legend
Buffer Zone
Core Zone
Vilamundi RF
Enclave Villages
Water Bodies
Moyar River
State Boundary


MAP SHOWING SATHYAMANGALAM TIGER RESREVE
SHARING BOUNDARIES WITH PROTECTED AREAS
N
W
E
S
1:500,000
Bandipur Tiger Reserve
Bilgiri Renganathasamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
Erode Forest Division
Sathyamangalam Tiger Resreve
Mudumalai Tiger Reserve (Buffer Zone)
Coimbatore Forest Division
0 10 20 40
Kilometers
Legend
Sathyamangalam Tiger Resreve
Erode Forest Division
Bilgiri Renganathasamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
Coimbatore Forest Division
Mudumalai Tiger Reserve (Buffer Zone)
Bandipur Tiger Reserve
Enclave Villages
Water Bodies
Moyar River
District Boundary
Inter State Boundary

1.1.3. Constitution

In 1856, the Forest Department in Tamil Nadu was organized for the first time under the leadership of Dr. Cleghorn. Sathyamangalam, Talamalai and Bhavanisagar were among the forest areas to be brought under the control of the new department in the early years after organization and were placed under the charge of Captain W.H. Morgan with its headquarters at Ootacamund. Later, the Coimbatore North Division was constituted in April 1909 and Sathyamangalam forests were a part of the Division. Sathyamangalam Forest division with a total area of 1,455 sq. km. of reserve forest was formed on 22.08.1980 vide Govt. Order (Ms.) No.999 Forest and Fisheries Dept. dated. 06.08.1980. (Appendix 1).

A portion of the division covering an area of 524.34 km^2 was declared as Sathyamangalam Wildlife Sanctuary in the year 2008. In 2011 the remaining portion of 887.26 $km^2$of Sathyamangalam Division was notified as Sanctuary.

The entire Sathyamangalam Sanctuary area was declared as a Tiger Reserve excluding tribal settlements, i.e., 1, 40,924 ha. *vide* Govt. Order (Ms). No.45 Environment & Forests Dept. dated 15.3.2013 (Appendix 2). The details of Core and Buffer in the notification as mentioned in table 1.1.

Table 1.1: Details Reserve Forests under Core Zones of Sathyamangalam Tiger Reserve

Core Area	Area (ha)
1. Guthiyalathur RF Part	25,083.25
2. Talamalai RF	49,662.53
3. Nilgiri Eastern Slope RF	4,878.15
	79,623.93
Exclude Forest settlement area (7 settlements)	(-) 274.599
	79,349.331

1.1.4. Extent & Boundaries

Area of the Core Zone of Sathyamangalam Tiger Reserve is 79,349.331 ha. The status of entire land comprising the Core area is Reserve Forests which was declared under Sec. 16 of Tamil Nadu Forest Act, 1882 as early as 1896. Core Zone is formed by three Reserve Forest blocks namely, Guthiyalathur (Part), Talamalai (Part) and Nilgiri Eastern Slope.

There are 7 tribal settlements which are located within the Core zone of the Tiger Reserve that are legally notified as Reserve Forests and part of Sathyamangalam wildlife

sanctuary; For these settlements, 274.599 ha of forest land was excluded from notification of Tiger Reserve. In the recent land survey conducted for settlement of claims under Tribal Rights Act, 2006, it is found that 306.89 ha of reserve forest land is in their traditional possession and the same is being subjected to processes laid down under FRA and yet to reach statuary culmination.

The Tiger Reserve shares its Eastern boundary with Erode Forest Division, North-Western boundary with MM Hills Wildlife Sanctuary (erstwhile Kollegal Forest Division) and Northern boundary with Biligiri Rangasamy Tiger Reserve. Nilgiri North and Coimbatore Divisions are on the Southern side, separated by the perennial river Moyar which runs along the Moyar gorge. The details of boundary are given table 1.2.

Table 1. 2 : Details of boundary length with adjacent forest Areas/District Divisions.

Sl. No.	Name of the Adjoining Area	Boundary Length (in km)	Boundary
	Core Zone		
1	Bandipur Tiger Reserve	13.80	West to Tiger Reserve (Core Zone)
2	Biligiri RangasamyTiger Reserve	43.00	North to Tiger Reserve (Core Zone)
3	MM Hills Wildlife Sanctuary (earlier Kollegal Forest Division)	24.30	North to Tiger Reserve (Buffer Zone)
4	Nilgiris North (Buffer of Mudumalai Tiger Reserve)	40.00	South to Tiger Reserve (Core Zone)
	Buffer Zone		
5	Coimbatore Forest Division	06.30	South to Tiger Reserve (Buffer Zone)
6	Erode Forest Division	32.00	East to Tiger Reserve (Buffer Zone)
	Total	159.40 km	

Total Boundary Length of STR	–	296.00 km
Sharing with other PAs / Buffer Zone	–	121.10 km
Sharing with reserve forests	–	38.30 km
Sharing with human habitations	–	136.60 km

1.1.5. Notification

The details of notifications from the inception are narrated below.

A portion of the division covering an area of 524.34 km^2 was declared as Sathyamangalam Wildlife Sanctuary, in Govt. Order (Ms.) No. 122 Environment & Forests Dept. dated 03.11.2008 under section 26 A (1) (b) of the Wildlife (Protection) Act, 1972 (Appendix 3).

In 2011 the remaining portion of 887.26 km^2 was added to the Sanctuary and the whole area was declared as Sathyamangalam Wildlife Sanctuary *vide* Govt. Order (Ms.) No. 93 Environment & Forests Dept. dated 11.08.2011 under section 26A (1) (b) of Wildlife (Protection) Act 1972. (Appendix 4)

The entire Sanctuary area was declared as Tiger Reserve excluding 9 tribal settlements, i.e., 1, 40,840.541 ha. *vide* Govt. Order (Ms). No. 41 Environment & Forests Dept. dated 15.3.2013 (Appendix 2).

79,349.331 ha of Sathyamangalam Sanctuary was declared as Core Zone or Critical Tiger Habitat (CTH) or Core area in Govt. Order (Ms). No. 41 Environment & Forests Dept. dated 15.3.2013. (Appendix 2)

1.2 Approach & Access

Sathyamangalam Tiger Reserve is about 260 km from Bengaluru City, about 68 km from Coimbatore City and about 95 km from Udhagamandalam (Ooty) by road. The hilly part of the Tiger Reserve can be approached by Sathyamangalam-Dhimbam Ghat Road with 27 steep hair-pin bends. The nearest railway station to Sathyamangalam is Coimbatore Junction about 70 km and Erode Junction about 65 km. The nearest airports are Coimbatore (64 km) and Bengaluru (225 km). The nearest town for medical facility, petrol bunks and with other better facilities is Sathyamangalam & Talawady. The nearest township in the state of Karnataka is Chamraj Nagar about 78 km from Sathyamangalam town and about 40 km from Hasanur.

1.3 Statement of Significance

The Sathyamangalam Tiger Reserve is the largest wildlife sanctuary in the state. The Sathyamangalam Tiger Reserve landscape needs to be conserved sustainably and perpetuate the immense values that originate from its existence. The values unique to the Sathyamangalam Tiger Reserve are elicited below.

1. Global Value

It is home for species of faunal significance with 40 species of larger mammals, 15 species of amphibians, 250 species of birds, 30 species of reptiles and 141 species of Butterflies. Of which, most of them are red listed by IUCN, provides hope for the conservation of these species from extinction.

This Tiger Reserve is a store house of floral genetic diversity benefitting the entire man-kind and is declared as part of the Nilgiris biosphere reserve and is endowed with floral species and eco-system diversity that are unique to Eastern Ghats with five unique forest types namely Southern tropical dry thorn forest (6 A /C1), Southern tropical dry mixed deciduous forest (5A/C3), Southern sub-tropical hill forests (8 A/C1), Southern tropical semi evergreen forest (2A/C2), Riparian Forests. About 538 plant species has been recorded with 40 endemic species (endemic to peninsular India), 22 IUCN threatened plant species.

2. National Value

Sathyamangalam Tiger Reserve acts as a massive carbon sink aiding carbon sequestration and climate mitigation. As per the FSI report the volume of standing biomass in Tamil Nadu forest is roughly 123 million cu. m spread over 22,877 sq. km. An estimated 5377 tonnes of biomass, is thus available in the forests of Tamil Nadu per sq. km. Applying the same yardstick, the carbon stock of STR is roughly estimated as 7.5 million tonnes (equivalent to 3.7 million tonnes of carbon). The value of total standing biomass as fuel wood excluding the other ecological roles played by the Forests of Sathyamangalam Tiger Reserve, it is Rs. 2,250 crores calculated at a cost of at Rs. 3,000 per ton of fire wood. It would be at least 10 times higher if all the ecological values are given monetary value. Hence, the conservation of STR is vital to the climate proofing of the surrounding environment, which spreads beyond the boundaries of District, State & Country.

3. Bio-diversity value

It is the home for about 60 numbers of Tigers (rated as endangered by IUCN) constituting one fourth of the Tigers in Tamil Nadu with adequate prey and habitat for its sustainability of the Tigers as a species.

It is a habitat for 800 Elephants (IUCN category – Endangered 2017-2) which is one fifth of state's Elephant population. This landscape is a part of Nilgiri Elephant Reserve notified under Project Elephant.

It is a habitat for one eighth of the state's Leopard (IUCN category – Vulnerable 2017-2) population with 111 unique Leopards identified through camera trapping protocols.

It is a unique habitat where Black buck, Sambar, Chital, Four horned antelope and Barking deer occur as prey species for the carnivores.

It is a habitat for four species of vulture's namely Egyptian vulture, White-rumped vulture, Red necked vulture and Long-billed vulture.

4. Hydrological and Geographical value

Sathyamangalam Tiger Reserve provides Water security to Erode District of Tamil Nadu & Chamraj Nagar District of Karnataka. This landscape is part of the water shed of River Moyar and River Bhavani, which drains into Lower Bhavani Dam. This Dam is the second largest in the state and has 48.5 sq.km of water shed area in the foot hills. It provides irrigation to about 2 lakh ha of farm land in the area. The Talamalai plateau is a major water shed for the dam Swarnavathi in Karnataka.

5. Ethnic Value

The Sathyamangalam Tiger Reserve provides unique ethnic value as a home of ethnic tribes namely Sholagars, Ooralis and Irulas in 9 tribal settlements inside Reserve Forest and 18 tribal settlements as enclave villages in the Tiger Reserve.

6. Historic Value

About 57 places of worship and temples are located in the Tiger Reserve among which 30 places of worship are located in the core area, including most of it with only idols and few structured ones. The Tippu Sultan Cavalry road (Gejalatty to Talamalai) and Tippu Sultan Bridge located at Gejalatty pass is an important historical monument. It is reported that many prehistoric artefacts (Neolithic) have been found in and around the Gajjalhatti pass, Thengumarahada and other tribal hamlets in surrounding places. Near the Gajjalhatti pass, black and red russet-coated potsherds of the Megalithic period have been found.

7. Local Value:

Sathyamangalam Tiger Reserve provides vital habitat connectivity for species in the Nilgiris Eastern Ghats landscape. It is located in the strategic confluence region of the Western Ghats and Eastern Ghats and is sandwiched between biodiversity rich protected areas of Bandipur Tiger Reserve, BRT Tiger Reserve, MM Hills Sanctuary, Mudumalai Tiger Reserve and Territorial divisions of Erode, Coimbatore and Nilgiris North Division, forming a continuous landscape.

The greater Moyar Valley Elephant corridor is located in STR. The habitat connectivity provided by STR to different parts of the landscape surrounding the Sathyamangalam Tiger Reserve facilitates unhindered genetic exchange among many species and forms the nuclear axis of the future conservation of species of the entire Nilgiris - Eastern Ghats landscape.

IUCN Status of floral species in Sathyamangalam Tiger Reserve

S. No	Name of the species	Family	Habit	Endemic status	IUCN Threat Status	Distribution Locality
1	*Andrographis serpyllifolia*	Acanthaceae	Herb	EPI		Throughout the forest except Minchicully Valley
2	*Andropogon pumilus*.	Poaceae	Grass	ETN		Talamalai, Hassanur, T N Palayam, Bangalathotti, Thengumarahada, Dhimbam
3	*Argyreia cuneata*	Convolvulaceae	Shrub	EPI		Dhimbam, Minchicully Valley, Kadambur
4	*Argyreia pilosa*	Convolvulaceae	Climber	EPI		Thengumarakada, Hassanur, Sikkakalli
5	*Arisaema leschenaultii*	Araceae	Herb		Vulnerable	Minchicully valley
6	*Arthraxon depressus*	Poaceae	Grass	EPI		Hassanur
7	*Artocarpus hirsutus*	Moraceae	Tree	EPI	Vulnerable	Minchicully Valley, Kadambur
8	*Arundinella ciliate*	Poaceae	Grass	ETN		Hassanur, Dhimbam
9	*Barleria acuminata*	Acanthaceae	Herb	EPI		Hassanur, Dhimbam, Bannari
10	*Barleria cuspidata*	Acanthaceae	Herb	EPI		Bannari
11	*Brachiaria semiundulata*	Poaceae	Grass	EPI		Hassanur
12	*Bridelia crenulata*	Euphorbiaceae	Tree	EPI		Dhimbam, Kadambur
13	*Caralluma indica*	Asclepiadaceae	Herb	EPI		Dry localities near rocky patches in Dry forests
14	*Chionanthus mala-elengi*	Oleaceae	Tree	EPI		Dhimbam, Hassanur, Minchicully Valley

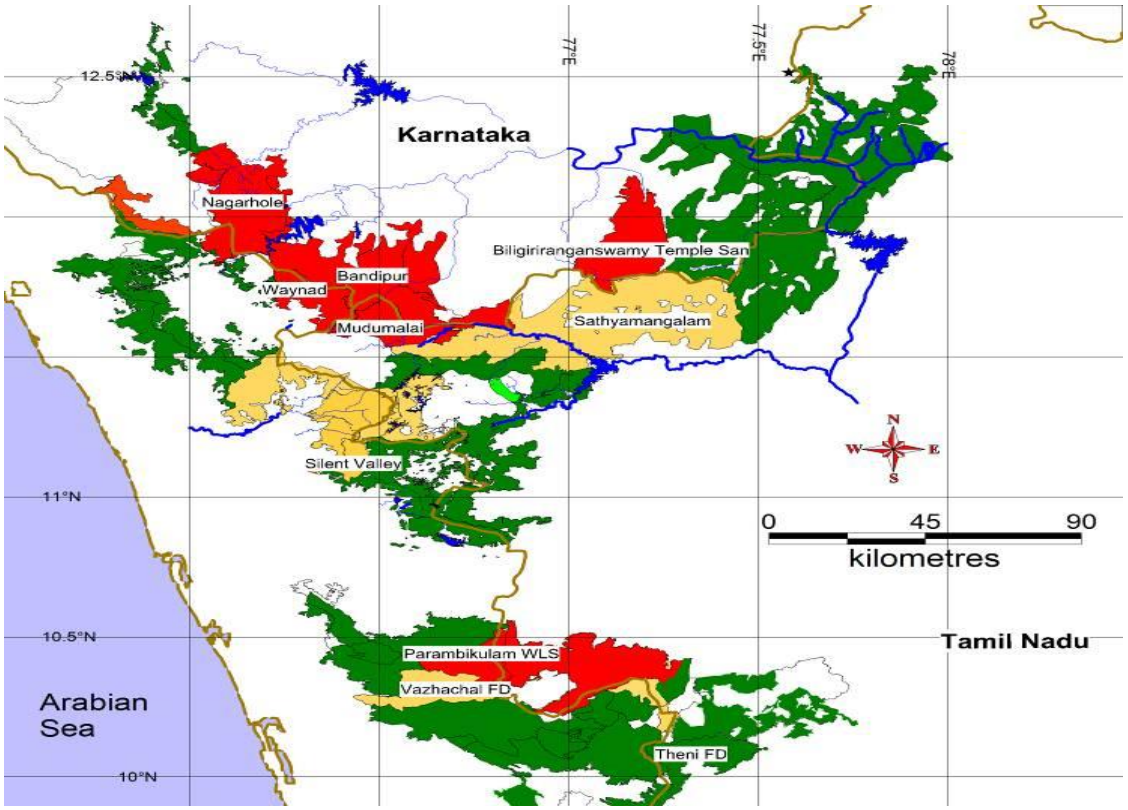
S. No	Name of the species	Family	Habit	Endemic status	IUCN Threat Status	Distribution Locality
15	*Chloroxylon swietenia*	Rutaceae	Tree		Vulnerable	All forest types except West
16	*Cinnamomum macrocarpum*	Lauraceae	Tree		Vulnerable	Minchicully Valley
17	*Cinnamomum malabatrum*	Lauraceae	Tree	EPI		Minchicully Valley
18	*Cinnamomum wightii*	Lauraceae	Tree	EPI	Endangered	Minchicully Valley
19	*Cleome felina*	Capparidaceae	Herb	EPI		Sikkalli, Hassanur
20	*Commelina indehiscens*	Commelinaceae	Herb	EPI		Minchicully Valley
21	*Cryptocarya beddomei*	Lauraceae	Tree	EPI	Vulnerable	Minchicully Valley
22	*Cyanotis tuberosa*	Commelinaceae	Herb	EPI		Dhimbam, Hassanur
23	*Cycas circinalis*	Cycadaceae	Tree		Endangered	Hasanur, Sikkalli, Thekkumaradippo, Thattavadi, Bangalathoytti
24	*Cynodon barberi*	Poaceae	Grass	EPI		Dhimbam, Minchicully Valley
25	*Dalbergia latifolia*.	Fabaceae	Tree		Vulnerable	Minchicully Valley
26	*Diospyros ebenum*	Ebenaceae	Tree		Data deficient	Dhimbam
27	*Dolichandrone atrovirens*	Bignoniaceae	Tree	EPI		Hassanur
28	*Eragrostis unioloides*	Poaceae	Grass	EPI		Hassanur, Common in Riverine Forest
29	*Euonymus indicus*	Celastraceae	Shrub	EPI		Minchicully Valley
30	*Hardwickia binata*	Caesalpiniaceae	Tree	EPI		Talamalai
31	*Isonandra villosa*	Sapotaceae	Tree	EPI	Endangered	Hassanur
32	*Jasminum azoricum* L.	Oleaceae	Climber		Critically endangered	Minchicully Valley

S. No	Name of the species	Family	Habit	Endemic status	IUCN Threat Status	Distribution Locality
33	*Leucas hirta*	Lamiaceae	Herb	EPI		Hassanur
34	*Leucas vestita*	Lamiaceae	Herb	EPI		Minchicully Valley,
35	*Ligustrum perrottetii* DC	Oleaceae	Tree	EPI		Hassanur, Dhimbam, Minchicully Valley
36	*Mangifera indica* L.	Anacardiaceae	Tree		Data deficient	Hasanur, Thekkumara Depo
37	*Nothapodytes nimmoniana*	Icacinaceae	Tree		Endangered	Minchicully Valley
38	*Oberonia santapaui*	Orchidaceae	Epiphyte	EPI		Minchicully Valley
39	*Opuntia ficus – indica*	Cactaceae	Shrub		Data deficient	Bannari
40	*Peperomia dindigulensis*	Piperaceae	Herb	EPI		Minchicully Valley
41	*Piper schmidtii*	Piperaceae	Shrub	EPI		Minchicully Valley, Dhimbam
42	*Pogostemon wightii*	Lamiaceae	Herb	EPI		Minchicully Valley
43	*Pseudarthria viscida*	Fabaceae	Shrub		Near threatened	Minchicully Valley, Hassanur, Kadambour
44	*Psychotria nilgiriensis*	Rubiaceae	Shrub	EPI		Minchicully Valley
45	*Psydrax dicoccos*	Rubiaceae	Tree		Vulnerable	Hasanur, Dhimbam, Bannari
46	*Pterocarpus marsupium*	Fabaceae	Tree		Vulnerable	Hassanur, Thengumaragada, Dhimbam, Bejalatti
47	*Pterocarpus santalinus*	Fabaceae	Tree		Endangered	Bejalatti, Minchicully Valley
48	*Rubus racemosus*	Rosaceae	Climber	EPI		Minchicully Valley, Kadambur
49	*Santalum album*	Santalaceae	Tree		Vulnerable	Hasanur, Dhimbam, Bannari
50	*Schefflera capitata*	Araliaceae	Tree	EPI		Minchicully Valley

S. No	Name of the species	Family	Habit	Endemic status	IUCN Threat Status	Distribution Locality
51	*Shorea roxburghii*	Dipterocarpaceae	Tree	EPI	Endangered	Talamalai, K N Playam
52	*Smithis hirsuta*	Fabaceae	Climber	EPI		Dhimbam
53	*Symplocos cochinchinensis* subsp. *laurina*	Symplocaceae	Tree		Vulnerable	Minchicully Valley
54	*Tragus roxburghii*	Poaceae	Grass	EPI		Thenghumarahada
55	*Vernonia albicans*	Asteraceae	Herb	EPI		Hasanur

EPI – Endemic to Penisular India; ETN – Endemic to Tamil Nadu

STR - Providing Connectivity to Wildlife and its habitats



Sathyamangalam Tiger Reserve – Water Security

Gejalhatti Pass

It is said that through the Palghat pass, three trade routes existed in the Kongu region. To reach Mysore from Palghat, the route via Perur-Danaickenkottai had a pass at Gajjalhatti. During the medieval period, tax was levied for traders on this route. The epigraphic inscriptions of Dananickenkottai confirm this fact.

Later, this pass was said to be repaired by Hyder Ali and Tipu Sultan and the road laid subsequently came to be known as Sultan Road.

The bridge at the Gajjalhatti pass is made of lime and mortar inlaid with thin bricks. There is a depiction of python on both sides of bridge. This part of this bridge was destroyed by British during 1799. From Talamalai a transect road connects Talamalai and Sathyamangalam through Gajalatty pass in front of the road *Ficus* trees have been planted. There is a Tippu Sultan pond (Sultan kulam & Bison kuttai), water and fodder stall which was source of water& feed for cavalry and in few places in the hills the horse stables have been created as evident from the rough stone pillars. In the same areas camping sites for people in transit with cavalry is also seen. Near Gejallati there is a dargha which is known to be the place of burial of five of Tipu's officers as per one source and reportedly looks a Sufi shrine and people of many religious background offer prayers. *(reported by Mr. Arun, local paleonthologist).*

Chapter 2. Background Information and Attributes

Sathyamangalam Tiger Reserve is strategically located in the confluence region of western and Eastern Ghats with varied landscape and equally varied biogeographic features. These features result in diversified landscape, varied flora and fauna.

2.1. Geology, Rock and Soil

The terrain is undulating with elevation ranging from 960 m to 1,266 m in Bhavanisagar, Sathyamangalam, Talawady, Talamalai and Hassanur Ranges. The Northern part of the Tiger Reserve is almost flat in nature. The rock types of the Core area mainly belong to the great gneissic pre-cambrian age. The common metamorphic derivatives found in the reserve are metamorphosed sedimentary rocks such as quartzite, hornblende, amphibolites, pyroxenite and Pyroxene. The rocks acquire reddish tinge (east of the reserve). Metamorphic igneous rock types such as charnockites and granite genesis have widespread occurrence. The charnockites were bluish with greenery look and the most widespread in the hilly forests. The minerals found in the Core area are feldspar, quartzite, magnetite, garnet, and kyanite. The common soil types of the sanctuary are red soils, laterite soils, black cotton soils, and alluvial soils. Soil texture refers to the relative proportion of particles of various sizes.

2.2. Hydrology and Water Sources

The average annual rainfall over a ten-year period is 824 mm for the Core area. The slopes and plains are subjected to hot and dry weather. The average minimum and maximum temperatures are 21.54^0C and 27.02^0C in the plateau and the average minimum and maximum temperatures are 26.24^0 C and 32.84^0 C in the plains respectively. Thus, the climate of the Sathyamangalam Tiger Reserve is warm to moderate.

The Core Zone of Tiger Reserve plateau in general has Northerly aspect and is drained by River Moyar and to an extent by River Bhavani. Most of the stream from the eastern half of the plateau drains into the Suvaranavathy watershed and River Palar while, the streams from West and South West join Moyar. Palar flow North wards along the common boundary of Sathyamangalam and Erode Divisions and joins Cauvery. River Bhavani, which enters into the Division from upper Bhavani through Bhavanisagar Range from South West region. The Central and North-West parts of the plateau are drained by

numerous torrents, streams which flow only during the rainy days and joins River Bhavani. These water bodies serve as a critical water source to wild animals during the dry spell between January and May every year. Most of the animals concentrate along these water sources.

Erode

Tamil Nadu Region & Basin Details

Catchment:

Each basin has been delineated into Catchment, which are constituted by a single major river, by a group of small rivers or a major tributary of the major rivers like Vellar. The Catchment in Erode District is as follows:

No.	Basin Code No.	Rivers Covered by the Basin	Area – Sq. km	Districts Covered
1	4B2	Amaravathi to Stanley Reservoir	22689.205	Madurai, Trichy, Coimbatore, Salem Nilgiris
2	4B3	Stanley Reservoir to Krishnaraja sagar	5627.845	Coimbatore, Mysore, Salam, Bangalore

Sub Catchment:

Each catchment has been delineated into sub-catchment which are constituted by a single river, by a group of small rivers or a major tributary of the major rivers. The Sub Catchment in Erode District is as follows:

No.	Sub catchment Code No.	Rivers Covered by the Basin	Area – Sq. km	Districts Covered
1	4B2A	Amaravati	8440.429	Trichy, Coimbatore, Erode
2	4B2B	Noyal	4349.982	Trichy, Coimbatore, Erode
3	4B2C	L. B. Nangank Confl to Stanley	5021.660	Salem, Coimbatore, Erode
4	4B2D	Bhavani	4877.134	Nilgiris, Coimbatore, Erode
5	4B3A	R. B. Stanley Reservoir to Krishnarajasagar	1686.140	Coimbatore, Mysore, Salem

The watershed details of Erode District as delineated by Agricultural Engineering Department of Tamil Nadu is given above. Accordingly, there are 2 catchments, 5 sub catchments and 15 watersheds, out of which 8 watersheds lie in Sathyamangalam Tiger Reserve.

1. Dams / Perennial Streams

1. River Bhavani

Bhavani River originates from Nilgiri hills of the Western Ghats, enters the Silent Valley National Park in Kerala and flows towards Tamil Nadu. Bhavani is a 217 kilometre (135 mi) long perennial river fed mostly by the South-West monsoon and supplemented by the North-East monsoon. Its watershed drains an area of 0.62 million hectares (2,400 sq mi) spread over Tamil Nadu (87%), Kerala (9%) and Karnataka (4%). The main river courses majorly through Coimbatore District and Erode District in Tamil Nadu. About 90 per cent of the river's water is used for agriculture irrigation.

2. River Moyar:

River Moyar is a major tributary of River Bhavani. About 30 kilometres (19 mi) downstream, Moyar River, a major tributary originating in Mudumalai National Park, flows in from the North-West, where it drains the valley between the Northern slopes of the Nilgiris and the Southern slopes of Talamalai Plateau and drains into Bhavanisagar Reservoir (Lower Bhavani).

3. Bhavanisagar Dam:

It is located on the Bhavani River in Erode district, Tamil Nadu. The reservoir is at the periphery of reserved forests in Core Zone of Bhavanisagar Range of the Reserve which perennial source of water for wild animals. The dam is one of the largest earthen dams in the world. The dam is situated some 16 km (9.9 mi) west of Sathyamangalam and 35 km (22 mi) from Gobichettipalayam. The Lower Bhavani Project was the first major irrigation project initiated in India after independence in 1948. It was completed by 1955 and opened for use in 1956. The dam is 8 km (5.0 mi) long and 40 m (130 ft) high. The full reservoir level is 120 ft (37 m) and the dam has a capacity of 32.8×109 cu ft (930×106 m3).

Major Streams

Swarnavathi & Halibidha Halla are the major streams. The Suvarnavathi is one of the Southern tributaries of the R. Kaveri. This river, also called Honnuhole (Honhole), begins from Nasurghat hills in Mysore. From the place of its origin to where it converges with Kaveri, the Suvarnavathi is about 88 km long.

Minor Streams

Doddakombai pallam, Karuvanrayan pallam, Kodampalli pallam, Kadapparaipallam, Balapaduga hallah, Adalthipallam, Thattapallam are some of the minor streams.

Pond

Being a low rainfall zone a number of ponds have been developed over the years for water requirements of domestic cattle and wildlife. Some of the ponds are Badagalli kuttai, Desanthira kuttai, Asagan Kuttai, Malla goundan kuttai, Doddamudugarai kuttai, Mavanatham kuttai, Alamalai Kuttai, Kakkarai Kuttai, Lakkadar Kuttai, Chatrakarai Kuttai, Alamarathu Kuttai, Kumbeswara Kuttai, Ammalakarai Kuttai, Joganalla Kuttai, Thavara Karai Kuttai, Bison Kuttai, Periya Kuttai, Siddeswaran Kuttai, Kemparai Kuttai, Palakaradu Kuttai, Kathirikombai Kuttai, Lakkepallam kuttai, Kumari maduvu, etc.,

2.3. Vegetation Cover Types

A wide variety of habitat types can be seen from eastern to western part of the Core area. The vegetation types fall under Western Ghat Mountains (Province V B) as per the Bio-geographic classification, done by the Wildlife Institute of India. The Common Vegetation Types found in the Core area are classified as per Champion & Seth 1968.

Southern Tropical Dry Thorn Forest (6 A/C1)
Southern Tropical Dry Mixed Deciduous Forest (5A/C3)
Southern Tropical Semi Evergreen Forest (2A/C2)
Southern Sub Tropical Hill Forests (8A /C1) and
Dry Tropical Riparian Forest. (5 / ISI)

2.3.1. Southern Tropical Dry Thorn Forest

This forest type is prevalent in plains and the foothills and in the Western fringes of the Talamalai plateau receiving poor rainfall (600 – 800 mm). Soil is shallow, thin and stony. Thorny Acacias, Albizias and hardwood species constitute this type. Trees are stunted, short boled and with low branching crowns. Lower storey is not well defined and comprises of xerophytic shrub growth. *Zizyphus* and Euphorbias can be seen in abundance. The flora of the Top canopy and second storey are enlisted below,

Occurrence of sandal trees is quite sparse. Even among the sandal tree population, it is seen that most of them are quite immature with hardly any heartwood. Presence of *Anogeissus latifolia* and *Soymida febrifuga* in this forest type indicates merging of this type of forest with deciduous forest type.

The following degraded stages are commonly seen.

a. Southern thorn scrubs 6A/C2/DS I

b. Southern Euphorbia scrub 6A/C2/DS 2

In these degraded types, the forests are very open and stunted. Forest species of Euphorbias such as *E. tirucalli, E. antiquorum, Dodonaia viscosa, Cassia auriculata, Calotropis procera, Opuntia dillenii* and grasses such as *Cymbopogan coloratus, Aristida hystrix* are commonly noticed.

2.3.2. Southern Tropical Dry Mixed Deciduous Forests (5A/C3)

This is the most common forest climax type met within this division. This type of forest occurs almost in the entire plateau, with slight variations in the component of species due to edaphic and climatic factors. The terrain is flat and undulating and at elevation ranges between 700-1200 m. The rainfall varies from 800-1500 mm. It merges with thorn forests wherever the rainfall drops below 800-875 mm. Presence of bamboos and sandal is largely confined to this type of forests. The outer slopes and peripheral belt of the plateau are regularly ravaged by fires and show a different composition. Repeated burning has caused retrogression of the forests to “Dry Savannah type”. Wherever fire sweeps the slope, *Anogeissus* springs up along with its associates. In localities where fires have not been severe, *Anogeissus* is found in association with *Pterocarpus marsupium* or *Chloroxylon swietenia*.

Sandal is a species of deciduous associate formations and it is a transitory species occurring in a pre-climax vegetation. Conditions conducive for its growth and dissemination are found in Talamalai, Hassanur valley and Talamalai plateau. It grows in patches of varying density and size and is found growing in almost every type of soil - on rich loam near Geddesal, on slopes of black clayey soil near Hassanur and in arid soils in Talamalai RF. Sandal is completely absent in moist and fertile localities such as Minchikuli valley. Profuse natural regeneration of sandal under Lantana and near *Ziziphus* tree is a noteworthy factor. The floristic of the dry mixed deciduous forests are

The following degradation stages can be distinguished in the main types of forests.

Dry deciduous scrubs (DS1)

Dry savannah forests (DS2)

Euphorbia scrub type (DS3)

Dry deciduous Scrub (DS 1)

This is represented by low broken shrubby growth 3-6 m high with tree species such as *Pterocarpus, Albizzia, Terminalia, Chloroxylon* etc. Many of the shrubs are distasteful to cattle (*Gymnosporia, Dodoneae* etc). Therefore, thorny undergrowth (*Randia, Atalantia, Flacourtia, Carrissa*) occurs in abundance. Thin grasses occur throughout the open areas.

Savannah Forests (DS 2)

Trees are found in isolated or in small patches amidst heavy grass, with fire resistant plants also persisting. The trees have short boles, usually crooked and unsound. Phoenix is particularly characteristic of this forest type. Other species are *Anogeissus latifolia, Pterocarpus marsupium, Shorea talura, Terminalia chebula, Emblica officinalis, Phoenix humilis, Cymbopogon coloratus*

2.3.3. Southern Tropical Semi-Evergreen Forests (2A/C2)

This forest type occurs in a transition zone at an elevation of 1200 m between the dry deciduous forests and subtropical hill forests or as an edaphic sub-climax in few favourable moist pockets. This type is met within Minchukuli valley. As this type is an intermediary between tropical evergreen and moist deciduous forests, the dominance of both are usually found mixed. Soil is generally an argillaceous loam with plenty of humus. The vegetation is dense and tends to be semi evergreen.

2.3.4. Southern Sub Tropical Hill Forests (8A / C1)

The occurrence of this type is confined to hilltops generally above an altitude of 1,600 m. with rainfall of well over 2,000 mm. The forests are enveloped by mist and gets the benefit of precipitation from the regular streams of cloud gliding over these hills during monsoons. This is commonly referred to as the hill shola forest and is very characteristic in its shapely appearance – small extends of rounded sholas surrounded

by rolling grasslands. From vantage points they present a vista of smooth green hilltops contrasting with the patches of dense forests. This can be observed on Minchukuly and on the range of lofty hills running continuous to the Billigiri Ranganatha Swamy Tiger Reserve.

It can be aptly described as “Stunted rain forest”, similar to tropical rain forest but not so luxuriant, the trees being smaller with less shapely boles and often festooned with herbaceous and cryptogamic epiphytes. The branches of the trees are heavily moss laden which provides the ideal substratum for the growth of these epiphytes especially orchids and ferns. A dense under-growth of *Strobilanthes* is frequently present. *Cyrotococumtrigonum*, *Desmodium* species, *Centella* species and *Strobilanthesheyneanus* occur abundantly as ground vegetation and they together form a green carpet. *Eugenia* (*Syzigium*) is the characteristic genus with associates from Lauraceae and Melastomaceae.

These isolated and small patches of shola are surrounded by vast stretches of grassland, obviously created by the uncontrolled sweeping fires of the past, which have pushed the sholas to the verge of extinction. Thus this grassland can be taken as a degradation stage derived from the sub-tropical evergreen by burning and grazing and maintained in that stage by periodic burning. Just outside the sholas above an elevation of 1,250 m there is an association of *Phoenix humilis*, *Artemisia vulgaris* and *Hypericum musorense*.

They merge with the bald hill tops above and with the moist deciduous forests below.

The flouristics of the sub-tropical hill forest are:

I) *Syzigium cumini*(vf), Glochidion neilgherrense (f), Meliosma wightii(f), Elaeocarpus serratus (f), M. arnottiana (f), Mallotus albus (c), M.simplicifolia (c), Machilus macarantha (c) , Symplocos laurina (c) , Mallotus philippinensis (c), Sterculia guttata (o) , Heptapleurum racemosum (o) , Salix ichnostachya (o).*

II) *Ixora notoniana (vf), Cinnamomum wightii (vf), Vibernum acuminatum (vf), Macaranga peltata (f), Vernonia monosis (f), Sideroxylon tomentosum (c), Pittosporum floribundum (c), Meliosma microcarpa (c), Litsea deccanensis (c) Trema orientalis (c), Calycopteris floribunda (o).*

III) *Mahonia leschenaultii (a), Strobilanthes species (a), Eupatorium glandulosum (a), Maesa perrtottetiana (vf) Rubus racemosus (vf), Pavetta indica (f), Solanum giganteum (c), Clerodendron viscosum (c), Allophylus cobbe (c), Zizyphus rugosa (c), Lobelia species (c), Rauwolfia densiflora (o), Chasalia curviflora (o), Pogostemon benghalensis (o),*

IV) *a) Desmodium pulchellum (a), Centella asiatica (a), Strobilanthes heyneanus (a) Strobilanthes foliosus (a), (b) Cyrtococcum trigonum.*

V) *Jasminum rottlerianum (c), Smilax aspera (a), Dioscorea bulbifera (c), Deami extensa (o), Fagraea obovata* (o), Woody climber.

Epiphytes:

Oberonia brauoniana, Dendrobium macrostachyum, Bulb phyllum species, Eria species, Aerides cylindricum, Diplocentrum recurvum, Saccalobium species, Hoya pauciflora.

2.3.5. Dry Tropical Riverine Forest (5 / ISI)

Along the water courses, streams and river banks a well-marked narrow fringe of large trees are present. The trees are widely spaced with smaller trees and shrubs between and often with much coarse grass.

Repeated fire occurrence holds back the seral progression at an earlier stage than it would otherwise attain. Excessive grazing and illicit felling have equally contributed to it. Stunted scattered tree growth with tall coarse grass and *Phoenix humilis* as under growth bear testimony to this.

2.4. Wild Fauna, Habitats and Trophic Niches

Sathyamangalam Tiger Reserve is blessed with rich variety of wildlife. There are about 60 Tigers, 111 Leopards, 25 Hyenas and about 800 -1000 elephants in the whole of Sathyamangalam forests including core and buffer. This Tiger Reserve is endowed with over 40 species of larger mammals, over 225 species of birds and 30 species of reptiles, 15 species of amphibians and 10 species of fishes. The important endangered species are: Tiger, Leopard, Elephant, Gaur, Black Buck, Four Horned Antelope, Hyena, Sloth bear, Mugger Crocodile and White Backed Vulture.

2.4.1. Viverrids

The **Common Palm Civet (*Paradoxurus hermaphrodites*) or Toddy Cat** has widespread distribution in the Tiger habitats and most easily visible of all the civets. **Small Indian Civets (*Viverricula indica*)** is nocturnal, mostly terrestrial and Insectivores. They inhabit holes in the ground, under rocks or in thick bush. They are found in Talamalai Plateau and Hassanur plateau.

2.4.2. Herpestids:

There are five species of mongoose of them, three species, viz., **Grey mongoose (*Herpestes edwardsii*), Stripe-necked mongoose (*Herpestes vitticollis*) and Ruddy mongoose (*Herpestes smithi*)** are found in the Tiger Reserve. They are commonly seen in almost all habitat types. **Ruddy mongoose** is mostly confined to Hasanur Range. Road kills are the serious threats to most of the mongoose species. **Honey badger. *(Mellivora capensis)*** has been recorded in one of the camera trap in Germalam Range.

2.4.3. Otters

Two species of Otters are known to be present in Sathyamangalam Tiger Reserve. **Eurasian Otter (*Lutra lutra*)** is a typical species of the otter subfamily. Brown above and cream below, these long, slender creatures are well equipped for their aquatic habits. **Smooth coated otter (*Lutrogale perspicillata*).** The smooth coated otter are relatively large for otters. This is social and hunt in groups.

2.4.4. Ursids

Sloth Bear (*Melursus ursinus)*

The species is frequently cited in upper plateau of Hassanur, Talamalai & Germalam and widely distributed all over the Tiger Reserve.

2.4.5. Canids & Hyenas

There are seven species of canids distributed in India and two species of this family is found in Sathyamangalam Tiger Reserve viz., wild dog (*Cuon alpinus*) and Jackal (*Canis aureus*). The Dhole is a highly social animal, living large clans without rigid dominance hierarchies and containing multiple breeding female. Widely distributed through out Sathyamangalam Tiger Reserve and its population is stable

and good**. Jackal (*Canis aureus*)** is sighted very rarely in the landscape though few decades it was abundantly distributed. Poaching is a serious threat, which has eliminated the native jackal population. Elsewhere commensalism has been reported between Tiger & jackal. Jackal presence is a direct indicator of carnivore abundance. In 2011, jackal was captured in the camera traps, near Konghalli Temple, after that in 2017 September another individual was captured in camera trap in Germalam Range. **Striped Hyena (*Hyaena hyaena*)** are present in Moyar Valley of Bhavanisagar Range, Talamalai Plateau. Though a scavenger, it has been observed that the animal also ambushes chital.

2.4.6. Proboscids

Elephant (Elephas maximus)

Elephant density is almost 0.5 per sq. km from different estimations. Elephants are distributed all over the Tiger Reserve.

2.4.7. Bovids

Gaur (Bos gaurus) is widely distributed in the Tiger Reserve. Talamalai plateau has highest population. Gaur is recorded to be the favorite prey for Tiger.

2.4.8. Antelopes

Two species of antelopes are occurring in Sathyamangalam Tiger Reserve. They are four-horned antelope (*Tetracerus quadricornis)* and Black-buck (*Antelope cervicapra)*. **Black-buck (Antelope cervicapra)** is distributed from Belmeen kadavu to entire Moyar valley and small patches in Talamalai Plateau. The estimated population of black buck in the recent census was 700-750 individuals. Black buck is a main prey for Leopards in Moyar Valley as seen from kills. A small population is available in segur plateau near Mavanalla. **Four-horned antelope (*Tetracerus quadricornis*)** is frequently spotted in Gettavady, Belathur, Talamalai of Talamalai plateau.

2.4.9. Cervids:

There are twelve species of deer found in India, out of which four species are found in Sathyamangalam Tiger Reserve. They are Chital, Sambar, Barking deer

and Mouse deer. **Sambar (Rusa unicolor)** is very commonly seen all over the landscape. Favourite prey for Tigers & Leopards. Poaching for meat is a threat. **Spotted Deer (*Axis axis*)** is widely distributed, this is a common prey species for Tiger & Leopard and the main prey in Moyar valley for Tigers. **Barking Deer (Muntiacus muntjak)** habitat includes rain forests, areas of dense vegetation, hilly country, and monsoon forests. They like to be close to a water source. It is found in Talamalai, Hassanur and Germalam Ranges. This species is a good prey for Leopard.

2.4.10. Avifauna

The Tiger Reserve has got a wide variety of bird species. In 2009, 207 bird species were recorded. This includes highly endangered species such as painted sand grouse, White backed Vulture, Brown fish owl and a variety of woodpeckers. Hornbills play an important role in dispersal of seeds. Malabar whistling thrush, and Jungle fowl are the other important bird species found in Sathyamangalam Tiger Reserve. **Vultures**. India has nine species of vultures in the wild of which four species i.e. White-backed Vulture, Long billed Vulture, Red-headed Vultures and Egyptian Vulture are found in the reserve. **White-Backed Vultures (*Gyps bengalensis*)** are typically medium sized vulture with un-feathered head and neck, very broad wings and short tail feathers. It has white neck ruff. The adults whitish back, rump and under wing coverts contrasts with the otherwise dark plumage. They found large numbers in the western part of the reserve, nesting of this species also observed in the riverine border between Sigur RF and Talamalai RF. **Long Billed Vultures (*Gyps indicus*)** are a typical vulture, with a bald head, very broad wings and short tail feathers. It is smaller and less heavily built than the Eurasian Griffon. It also lacks the whitish median covert bar. The species breeds mainly on cliffs, but is known to use trees to build nests. Long billed vultures are rarely sighted in this reserve. **Red-Headed Vulture (*Sarcogyps calvus*)** also known as the Asian King vulture is usually found in the open country, deciduous forests and cultivated areas. The adult has a prominent deep red to orange naked head and the juvenile being of paler red. **Egyptian Vulture (*Neophorn percnopterus*)** also called the white scavenger vulture or pharaohs chicken. Egptyian vulture feed mainly on carrion but are opportunistic and will prey on small mammals, birds and reptiles.

2.4.11. Reptiles:

The forests of this Reserve are home to a variety of poisonous and non-poisonous snakes. Cobras like Spectacled Cobra (*Naja naja*), Cobra (*Naja tripudians*), Vipers such as South Indian Saw Scaled Viper (*Echis carinatus carinatus*), Russel's Viper (*Doboia russelii*), Horse shoe pit Viper (*Trimeresurus strigatus*), Krait, Bronze head vine snake (*Ahetulla perroteti),* Perrotet's Shield tail snake (*Plectrurus perroteti*), Black spotted kikri snake (*Oligodon venusutum) are* the poisonous snakes commonly sighted. **Crocodiles (*Crocodilus palustris),*** the mugger or marsh crocodile species is found in the Moyar river. The Moyar river is said to be the only place in the state where the natural population of marsh crocodile live and breed. **Indian Monitor Lizard (*Varanus varanus*)** have long necks, powerful tails and claws, and well developed limbs. Monitor lizards are as a rule, almost entirely carnivores. It is commonly found in Sathyamangalam Tiger Reserve.

2.4.12. Fishes

The following are some of the commercial fishes seen in Moyar. Mahseer, Rohu (*Labeo rohita),* Mirgal (*Cirrhinus mrigala),* Cat fish (*Mystus armatus),* Catla (*Catla catla),* Mirror Carp (*Cyprinus carpio specularius),* Scale Carp (*Cyprinus carpio cummunis) and* Grass Carp (*Hypopththalmichthys molitrix).*

2.5 Major Conspicuous Changes in the Habitat since Inception

The Sathyamangalam Tiger Reserve was erstwhile Sathyamangalam Forest Division. The core and buffer zone of STR has been carved solely out of the erstwhile Sathyamangalam Forest Division. These forests have been subjected to many management approaches as per the demands of the time over the past many decades. The Forests were earlier operated for fuel wood coupes to cater to the fuel wood requirements until 1980s. The forest were also selectively harvested for sandal wood in the past. Post 1980 the degraded patches were planted with eucalyptus in upper plateau in tune with the focus in plantation forestry at that point of time.

1. The forest of Sathyamangalam were originally worked for fuel wood coupes. Unregulated grazing and fire wood collection lead to severe degradation of landscape over a period of time. The degradation also lead to accelerated soil

erosion and formation of gullies, particularly in the lower slopes. The forest of Sathyamangalam were once famous for sandalwood extraction and a sandalwood depot was formed in Sathyamangalam during the year 1919. The sandalwood of Sathyamangalam was totally eliminated due to large scale illicit felling over past three decades. The notorious forest brigand Veerappan and his gang systematically annihilated sandalwood from the landscape. The depletion of sandalwood lead to severe degradation of the entire landscape. Conversion of natural forests to eucalyptus plantations also led to the degradation of native forest in the upper plateau. The eucalyptus plantations altered the water balance of the native habitat causing a deletarious effect on native species. Due to degradation of the forest, due to degradation of the forests, weeds like *Prosopis, Lantana, Eupatorium, Opuntia* proliferated and altered the species composition and structure of the forests. Annual forest fire have also been a serious habitat modifier. Poaching for meat and for small trade have been rampant in the past. There had been unregulated removal of medicinal plants. The starting point of conservation of this landscape can be attributed to the advent of TamilNadu Afforestation Programme (TAP) in Sathyamangalam Forest Division from 1997. The JFMCs formed under the TAP worked close with the Forest Department in promoting natural regeneration of the reserved forests. 43 Village Forest Committees were formed under Tamil Nadu Afforestation Project (20 in Phase-I and 23 in Phase-II of TAP).

The project made huge investment for providing alternate employment to reduce resource dependency. Various measures such as plantation activities of native species, soil conservation measures and reduction of forest dependency through alternative employment generation, socio-economic development of forest dependent villages were undertaken. These activities resulted in totally transforming the conservation scenario and the forest cover since the inception of TAP has been on the rise as evident from the Forest Survey of India report.

The forest cover over the year as per FSI report in the Erode District is tabulated below;

Year	% of Forest Cover	Year	% of Forest Cover	Year	% of Forest Cover
1999	24.55	2005	27.17	2011	26.86
2001	26.15	2007	26.98		

2003	27.17	2009	26.98		

Rise in per capita income of the communities in plains coupled with easily availability of LPGs resulted in bringing down the biotic interference to large extent. Many number of Checkdams and percolation ponds were built under TAP which become micro hotspots for faunal congregation during pinch periods. The percolation ponds created under TAP and other schemes over the years largely supported the water requirement of wildlife in the landscape. However, the benefits of the conservation due to reduction in the anthropogenic activity was offset by the spreading of invasive mainly Prosopis and lantana.

The Sathyamangalam Forests were declared as Sanctuary in two spells i.e., 2008 and 2011. Immediately after that i.e., 2013, it was declared as Tiger Reserve. As such habitat management and wildlife conservation activities have not been taken up as a concentrated activity in the past. Later on, National Afforestation Project was under taken on minor scale.

As the forest cover return the wildlife population also rebounded. There was an increase in human wildlife conflict after the year 2005. The Forest Department in Tamil Nadu undertook many habitat management measures to mitigate human wildlife conflict during the last 5 year plan period. Formation of solar fencing for 130 kms and elephant proof trenches for 122 kms were under taken in Sathyamangalam Tiger Reserve and these activities improved the quality of the habitat. A series of percolation ponds and artificial water bodies were developed. There were also sporadic efforts to remove weeds.

Meanwhile various developments took place in the agriculture sector in the hills and plains. Developments such as sale of tribal lands to outsiders, formation of road networks, increase in vehicular traffic, encroachment of Bhavanisagar water spread areas, etc., have contributed to new and different type threats such as habitat fragmentation, habitat degradation in fringes and selective poaching.

Since the declaration of the area as Tiger Reserve the efforts have been made to improve the habitat quality through removal of invasive alien species, reduction and moderation of anthropogenic effects, control of forest fires, and improvement of soil moisture conservation measures.

Chapter 3. Status of Tiger and Co-Predators

3.1. Distribution

The Sathyamangalam Core area is 79,349.331 ha and its diverse landscape is a rich habitat for Tigers and its prey base. Tigers are distributed all over the core zone. The highest density of Tigers is highest in Thengumarahada area of Bhavanisagar Range, Hasanur plateau of Hasanur Division followed by medium density in Talamalai plateau. The distribution of Tigers is indicated in the Map 3.1. below. The present data shows that the male Tigers occupy a range of 50 to 60 sq. km and female 20 to 35 sq. km. WTI's field team conducted field level data collection that revealed 1,277 km^2 of the forest area which is about 87% of the forest division is used by the Tiger. Genotype data from 50 different individuals from Sathyamangalam (18), Bandipur Tiger Reserve (BTR) (14), Anamalai Tiger Reserve (ATR) (13) and Kalakkad - Mundanthurai Tiger Reserve (KMTR) (5) were analysed by CCMB in 2010 to compare the Tigers of Sathyamangalam with three geographically distinct populations in and near the Western Ghats. The analysis showed consistent and close clustering of the Sathyamangalam Tigers. The study revealed that the STR Tigers showed some level of admixture with the BTR population but are distinctly different from the ATR and KMTR populations.

Leopards are also distributed all over the core zone and its highest density is in Hasanur and Dhimbam. Hyena is less than 50 in number and distributed in moyar valley. Wild dog is distributed all over the core zone. Occupancy maps has been generated using the data collected from camera traps.

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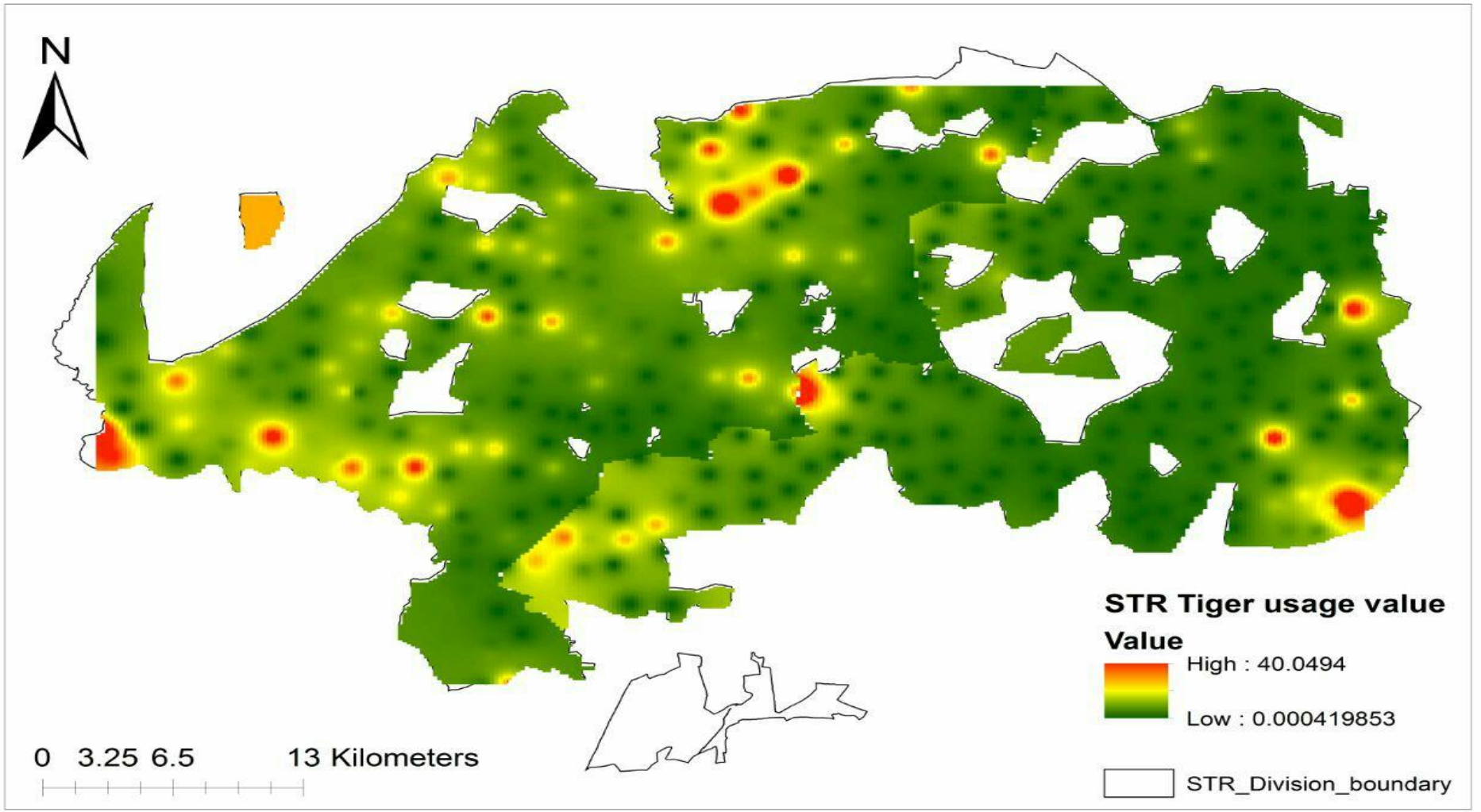
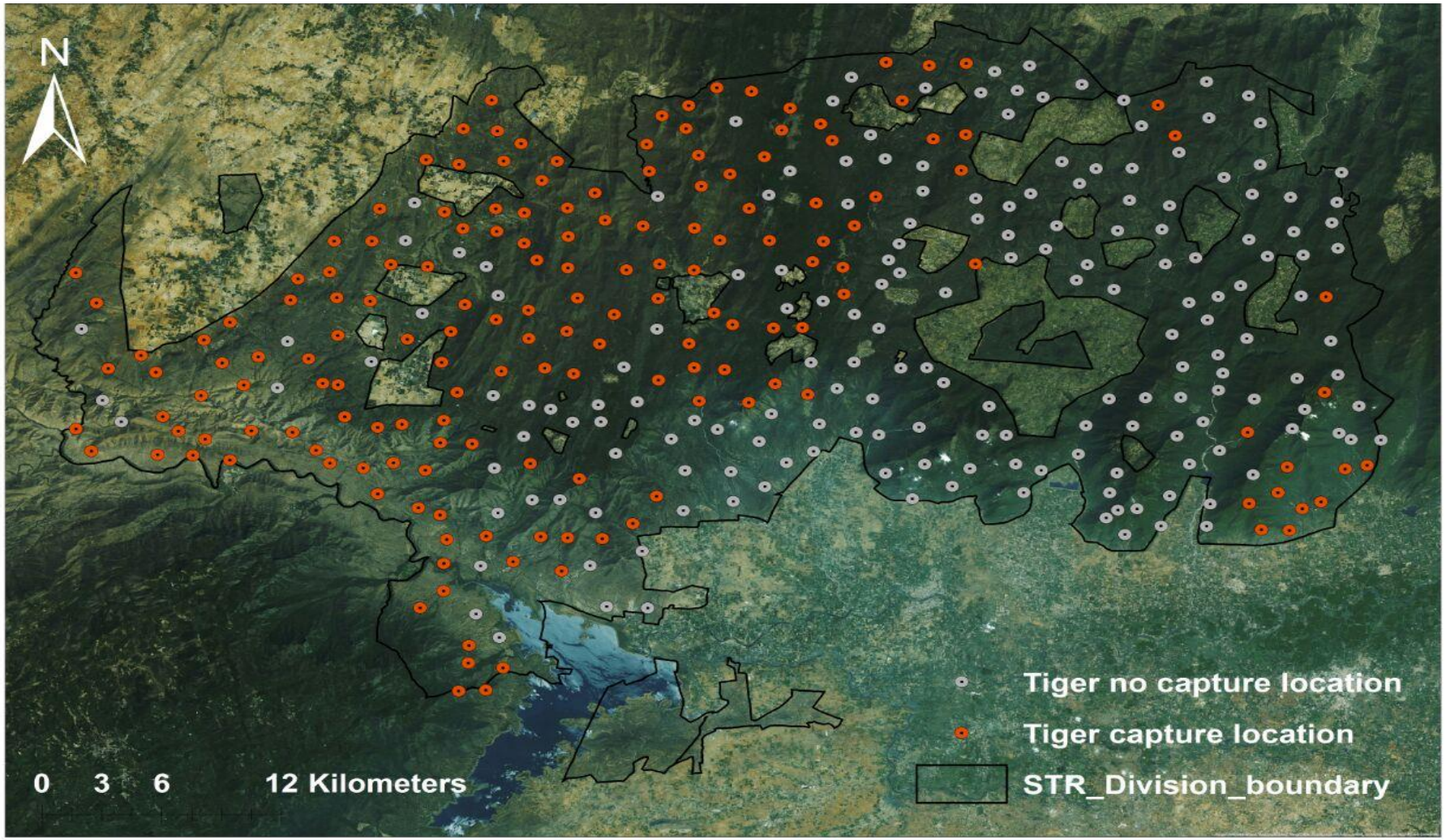
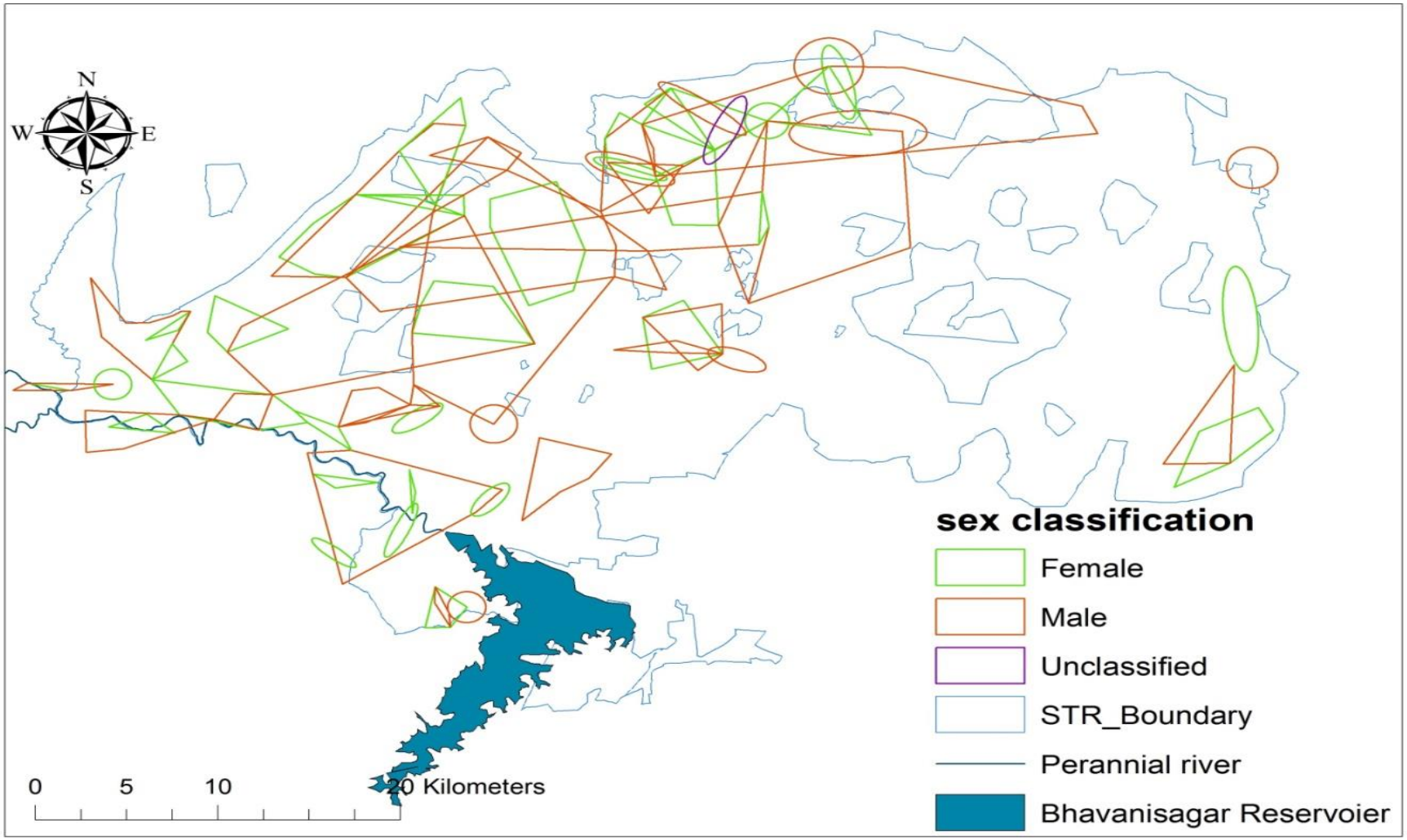
3.1. Map showing tiger occupancy in Sathyamangalam Tiger Reserve



3.2. Map showing tiger capture location in camera trap



3.3. Map showing Tiger – Male & Female Range in Sathyamangalam Tiger Reserve



3.2. Abundance Status

Tiger

The scientific estimation of distribution of tigers were under taken in the year 2013 & 2014 in core zone and in the year 2015 in the buffer zone. The entire exercise was co-ordinated with the help of WWF – India team based at Coimbatore. The non-availability of the trap cameras restricted the scale of deployment of camera traps. In the year 2016 with the available cameras, entire core was taken up as two blocks for the Tiger estimation exercise. STR phase IV camera trap Tiger monitoring was undertaken full area (August 2017 to October 2017). Sathyamangalam Tiger Reserve was covered into two blocks within sixty days.

Table 3.1: Tiger estimation through camera trap exercise in STR

S. No.	Year of sampling	Number of locations	Number of Tiger	Number of Leopard	Number of hyena
1	2010-11	15	15	9	13
2	2011-12	65	33	12	18
3	2013-14	223	54	66	20
3	2015-16	153	11 (only buffer)	45	1 (Buffer area)
4	2016-17	149	51 (11 cubs)	--	--
5	2017-18	358	55		Entire area

Table 3.2: Results of 2017, phase IV exercise in STR

Block	Total Location	Total Tiger	Male	Female	Cubs	Unclassified
I	175	42	15	27	11	--
II	181	13	6	5	--	2
Total	356	55	21	32	11	2

The minimum population of Tiger in STR as per 2017 estimation including core and buffer is 55. In core zone 16 males, 29 females and 2 unidentified tigers have been recorded in the phase IV estimation. At an estimated population of 45 Tigers in core the density of Tiger is 5.6/100 km^2.

3.2.1. Carrying capacity of Tigers (Hayward's Formula)

The carrying capacity of Tigers might increase if the habitat available to them is increased in terms of undisturbed ecosystem with required prey densities. The current carrying capacity of Tiger is estimated as follows,

Carrying capacity of Tigers using Hayward's formula (equation of Hayward et.al (2007)

Carrying capacity of Tiger in tropical and dry deciduous forests like STR is calculated below using the following equation:

Y = -2.158+0.377x (where Y= Log of predicted predator density)

X = Log of preferred prey biomass

Table 3.3: Carrying Capacity of predator density using the prey density of Phase IV monitoring assessment of Sathyamangalam Tiger Reserve - 2014

Prey species	Average Density	3/4th of average female weight	Prey Biomass / sq.km
Chital	30.8	30.00	924.00
Gaur	6.10	300.00	1,830.00
Sambar	5.70	150.00	855.00
Wild pig	3.50	40.00	140.00
Total	46.10	520.00	3,749.00

Preferred prey biomass = 3,749.00

Therefore, x = log of 3749.00 = 3.5739

Carrying capacity of Predator density for available prey

= -2.158 + 0.377 * (3.5739)

= - 0.81069

= antilog of – 0.81069 = 0.1546 / sq. km

Carrying capacity of Tiger per sq. km = 0.1546 Tiger

Therefore 0.1546 x 100 = 15.46/100 sq.km

Therefore, carrying capacity of Tiger per 100 km^2 comes to about 15 as per the above calculation. Thus, the carrying capacity for core zone of 800 sq. km is 120 Tigers against the present level of 40 to 50 Tigers in core zone.

3.2.2. Leopard Occupancy

It is widely distributed predator in the Sathyamangalam Tiger Reserve. From the past camera trap exercises from 2013 to 2015, 68 Leopards have been recorded in the core zone of 800 km^2, this gives a density of 8.5/100 km^2. 35 males, 30

females and 13 unidentified Leopards were recorded in the period 2013 to 2015 in the core zone.

3.2.3. Striped Hyena:

During the camera trap studies from the year 2014-16 Hyena were also captured in the camera traps. In the case of Hyenas, it was able to distinguish between individuals based on stripe patterns on the body. A total of 26 individually identified Hyenas were recorded in the Tiger Reserve and 12 in adjacent Segur Plateau. (19 were recorded on Moyar Valley and 7 in Talamalai-Bannari area)

During the year 2010-11, 13 Hyenas, in 2011-12, 18 Hyenas, 2013-14, 20 Hyenas were recorded in the camera trapping exercises during Tiger population estimation.

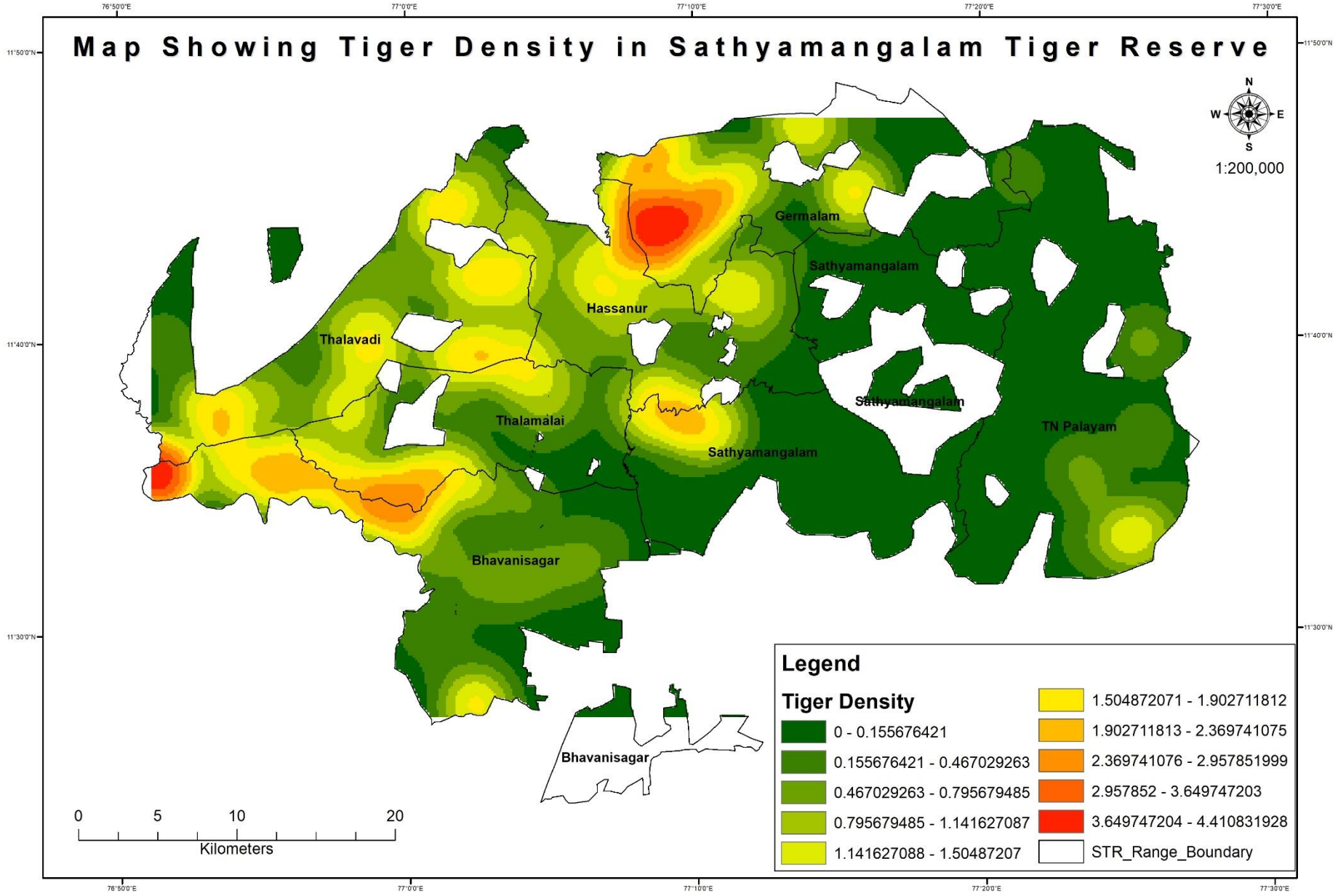
3.2.4. Wild Dogs:

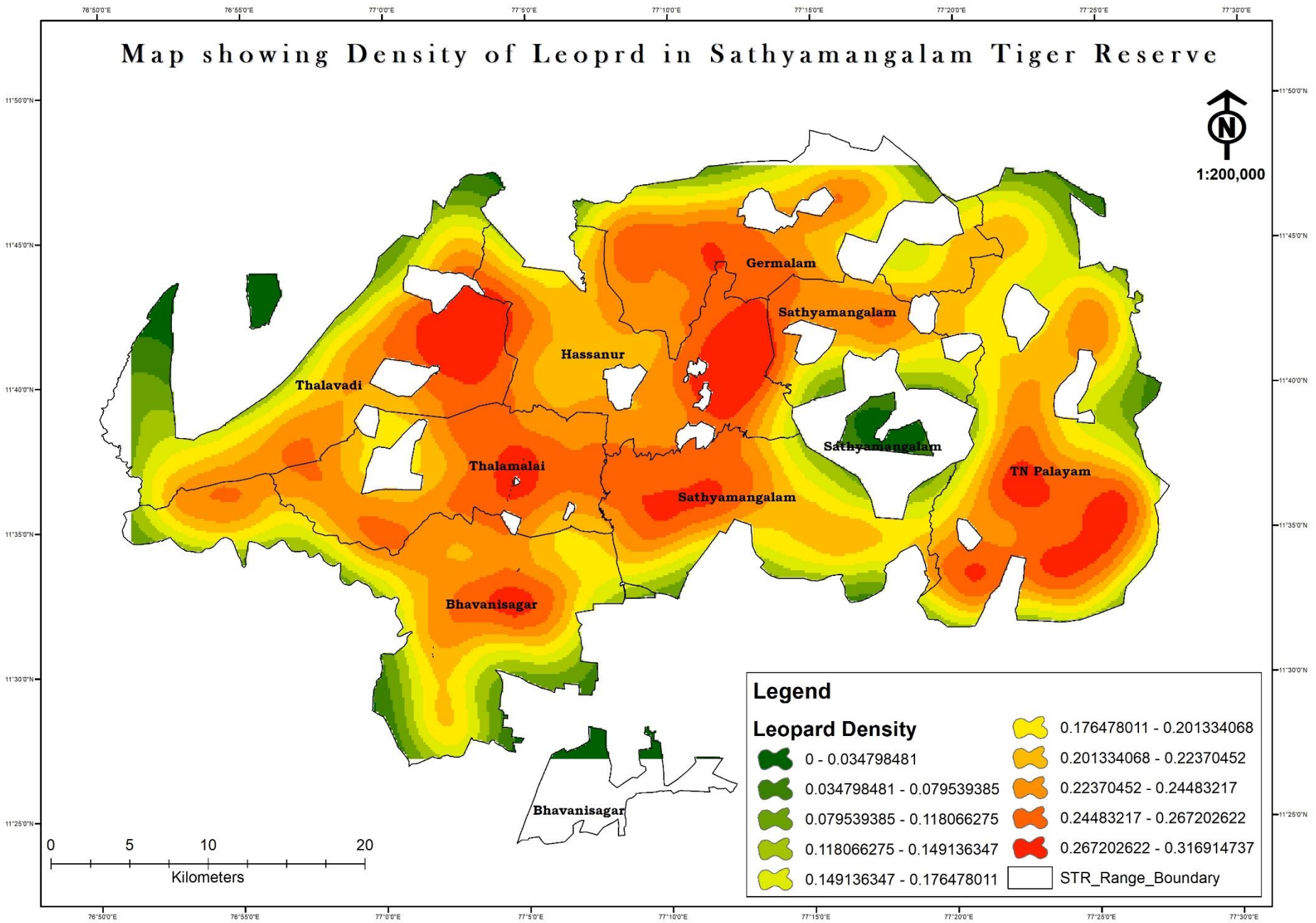
During the camera trap studies, Wild Dogs were trapped on numerous occasions but they could not be individually identified due to lack of clear markings. Several packs operating in different parts of the Tiger Reserve have been observed.

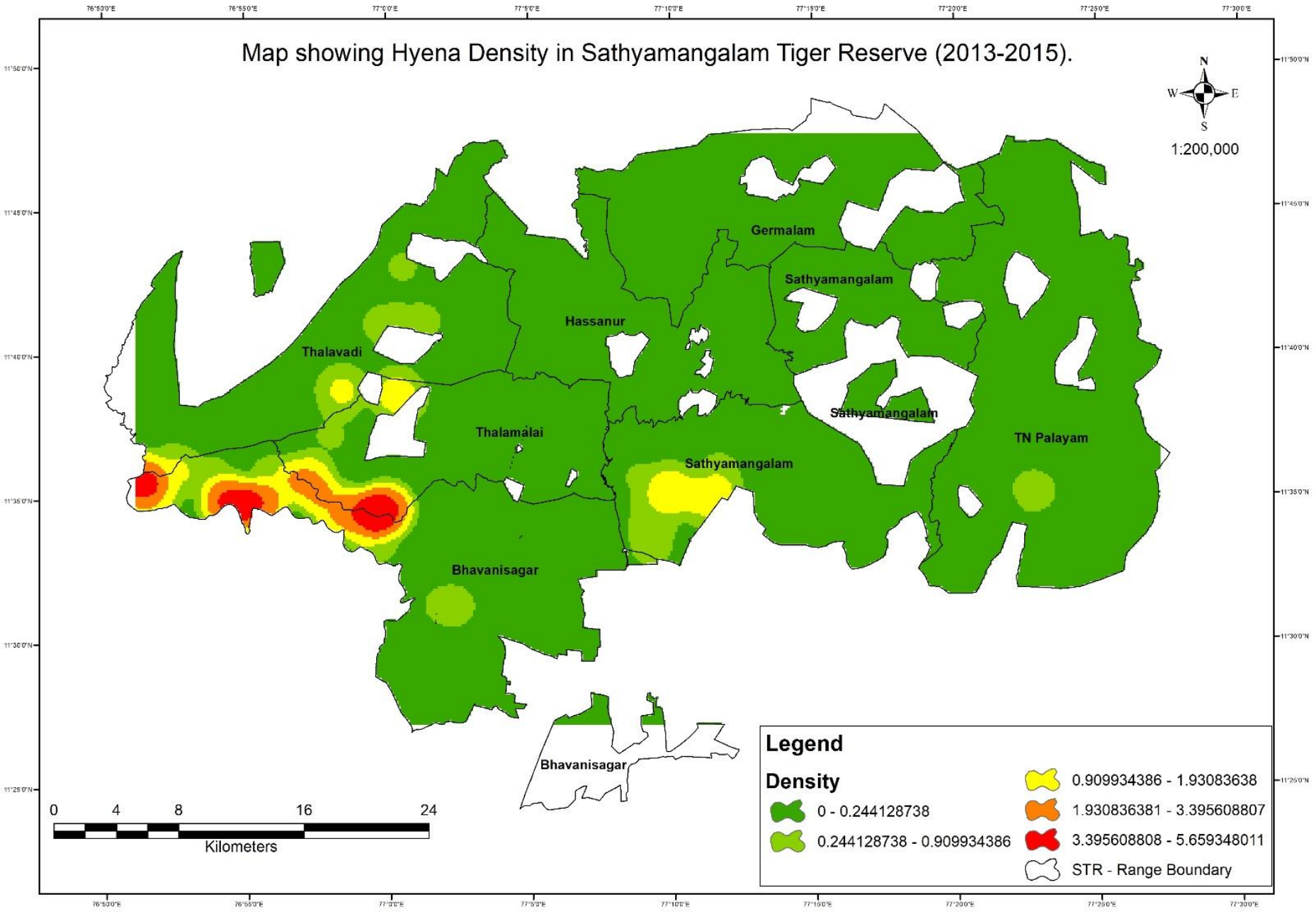
3.2.5. Jackal:

Throughout the study (2013-16) only two pictures of Jackals were obtained and only from the Talamalai Plateau. Jackals were also never recorded during any of the field visits or during the herbivores population estimation surveys. This species has virtually become locally extinct in STR and the causes for that needs to be investigated. The camera trapping exercise clearly shows that this species is very rare or absent in much of STR and is currently very rare even in Talamalai Plateau.

(This Jackal image was captured in 2017, Germalam range, Germalam east beat, Location -Nerlarubu).


Map Showing Tiger Density in Sathyamangalam Tiger Reserve
76°50'0"E
77°0'0"E
77°10'0"E
77°20'0"E
77°30'0"E
11°50'0"N
11°40'0"N
11°30'0"N
N
W
E
S
1:200,000
Germalam
Sathyamangalam
Hassanur
Thalavadi
Thalamalai
Sathyamangalam
Sathyamangalam
TN Palayam
Bhavanisagar
Bhavanisagar
0
5
10
20
Kilometers
Legend
Tiger Density
0 - 0.155676421
0.155676421 - 0.467029263
0.467029263 - 0.795679485
0.795679485 - 1.141627087
1.141627088 - 1.50487207
1.504872071 - 1.902711812
1.902711813 - 2.369741075
2.369741076 - 2.957851999
2.957852 - 3.649747203
3.649747204 - 4.410831928
STR_Range_Boundary


Map showing Density of Leoprd in Sathyamangalam Tiger Reserve
1:200,000
Germalam
Sathyamangalam
Hassanur
Thalavadi
Thalamalai
Sathyamangalam
Sathyamangalam
TN Palayam
Bhavanisagar
Bhavanisagar
0 5 10 20
Kilometers
Legend
Leopard Density
0 - 0.034798481
0.034798481 - 0.079539385
0.079539385 - 0.118066275
0.118066275 - 0.149136347
0.149136347 - 0.176478011
0.176478011 - 0.201334068
0.201334068 - 0.22370452
0.22370452 - 0.24483217
0.24483217 - 0.267202622
0.267202622 - 0.316914737
STR_Range_Boundary


Map showing Hyena Density in Sathyamangalam Tiger Reserve (2013-2015).
N
W
E
S
1:200,000
Germalam
Sathyamangalam
Hassanur
Thalavadi
Thalamalai
Sathyamangalam
Sathyamangalam
TN Palayam
Bhavanisagar
Bhavanisagar
0
4
8
16
24
Kilometers
Legend
Density
0 - 0.244128738
0.244128738 - 0.909934386
0.909934386 - 1.93083638
1.930836381 - 3.395608807
3.395608808 - 5.659348011
STR - Range Boundary

3.3. Prey-Predator Relationships

After the formation of Tiger Reserve, the abundance of prey density in the Tiger Reserve was estimated in **2014** and data was recorded from 44 line transacts spread over the core zone of the Sathyamangalam Tiger Reserve. Line transect (2km) was demarcated in all the beats and this transect lines traversed through variety of prey species habitat. There were 44 transects sampled in entire Tiger reserve and each transect represented a beat, all the transects were marked in 2 kilometre and data were collected in 6 replicates. The sampling effort is 540 kilometres and 541 numbers of sightings recorded, including all animals. The high proportion of sighting was Chital (195) followed by Gaur (82) and Sambar (72) and all the remaining herbivore less than 35 sightings.

This data was analysed in the DISTANCE programme and the abundance of prey species was calculated. This estimation revealed that Chital abundance was 30.8/km^2 followed by Gaur 6.1/km^2 and Sambar 5.7/km^2. Based on sightings analysed, the result of the prey estimation exercise is given in table No 3.5.

Table 3.5: Prey species estimate in 2014 in STR

Species	Model	ESW (SE)	No. Groups Detected	Mean Group size (SE)	Median Group Size	Detection Probability	Encounter Rate	Group Density (SE)	Individual Density/km (SE)
Elephant	Half Normal+ Cosine	35.0±4.66	32	2.2±0.28	1	0.44	0.06	0.8±0.23	1.9± 0.56
Gaur	Hazard rate+ Cosine	35.9±3.58	80	2.9±0.32	2	0.24	0.15	2.1 ± 0.42	6.1±1.42
Sambar	Half Normal+ Cosine	25.8±1.83	72	2.7±0.40	2	0.25	0.13	2.6±0.51	5.7±1.23
Chital	Uniform+ Cosine	49.9 ±1.58	193	8.59±0.64	4	0.37	0.36	3.6±0.28	30.8±3.33
Barking deer	Uniform+ Cosine	25±0.92	30	1.1±0.06	1	0.50	0.06	1.1±0.29	1.26±0.34
Wild pig	Uniform+ Cosine	50±5.83	27	7.0±1.37	4	0.50	0.05	0.5±0.11	3.5±1.04
Black Napped Hare	Hazard rate+ Cosine	16.3±2.94	32	1.2±0.08	1	0.33	0.06	1.8±0.67	2.2±0.81
Grey Langur	Uniform +Cosine	37.5±4.84	22	5.72±0.99	5	0.50	0.041	0.5±0.30	3.1±1.79

The estimates indicate good prey density and a good mix of large, medium and small prey, which would be ideal for a mixed large predator community.

3.4. Assessment of Threats

Habitat degradation due to invasive species is a primary threat to the conservation of Tiger, co-predator and prey species. Anthropogenic activities such as cultivation in dam spread area, fire wood collection, grazing of cattle is also a serious threat. Wildlife poaching/hunting is also a significant threat. Retaliatory poisoning / killing of problem animals in conflict situations is also another serious threat. Frequent human movement in linear intrusions are also a serious threat. Water is a severe limitation in the upper hills of the core zone and is an acute problem especially during pinch period of summers. Huge movement of tourists in the form of religious tourism is also another serious threat. Rising human wildlife conflict has resulted in reduction in stake holder tolerance level and is a serious threat. Fire is also a serious threat in the landscape. Cultivation in dam spread area is another serious threat. Human activities in enclosure villages and enclosures such as STF camp, EB camp are also a threat.

3.4.1. Wildlife Poaching

About 300 cases of wildlife poaching has been registered in Sathyamangalam Tiger Reserve and the scenario is given in Appendix 6.

3.4.1.1. Carnivore Poaching:

The entire STR landscape is very vulnerable to carnivore poaching. In 2015, 2016 and 2017, 3 cases have been recorded where 3 Tigers were killed. In 2 cases it was confirmed that some of the Tribals were lured to poach tigers by poisoning of the kill. The intelligence information shows that some of the tribals in the landscape have been engaged in poaching of Tigers and Leopards over the years. The modus operandi is to track a Tiger's kill, apply organo-phosphorous pesticides, track the dead carnivore, remove the skin and canines and deep burry the carcass. Such body parts have been sold in the past to petty traders from where the body parts reach traders with larger network. Poaching of leopards for skin and canines is also a serious threat in this landscape. Illegal trade of carnivore parts such as claws, skin has been recorded in the past.

Retaliatory poisoning is reported in the past though not recorded. The available intelligence input suggests that, in the past, natural kills / cattle kills have been poisoned in few instances in order to obtain the trophies for illegal trade. However, after the formation of Tiger Reserve, these activities have been kept under close watch by the Tiger Reserve management. Prevalence of illegal country

weapons, usage of wire traps, poisoning by urea etc., for poaching are serious threats. Accidental death of leopard in wire trap set for small game poaching has also been recorded in the past.

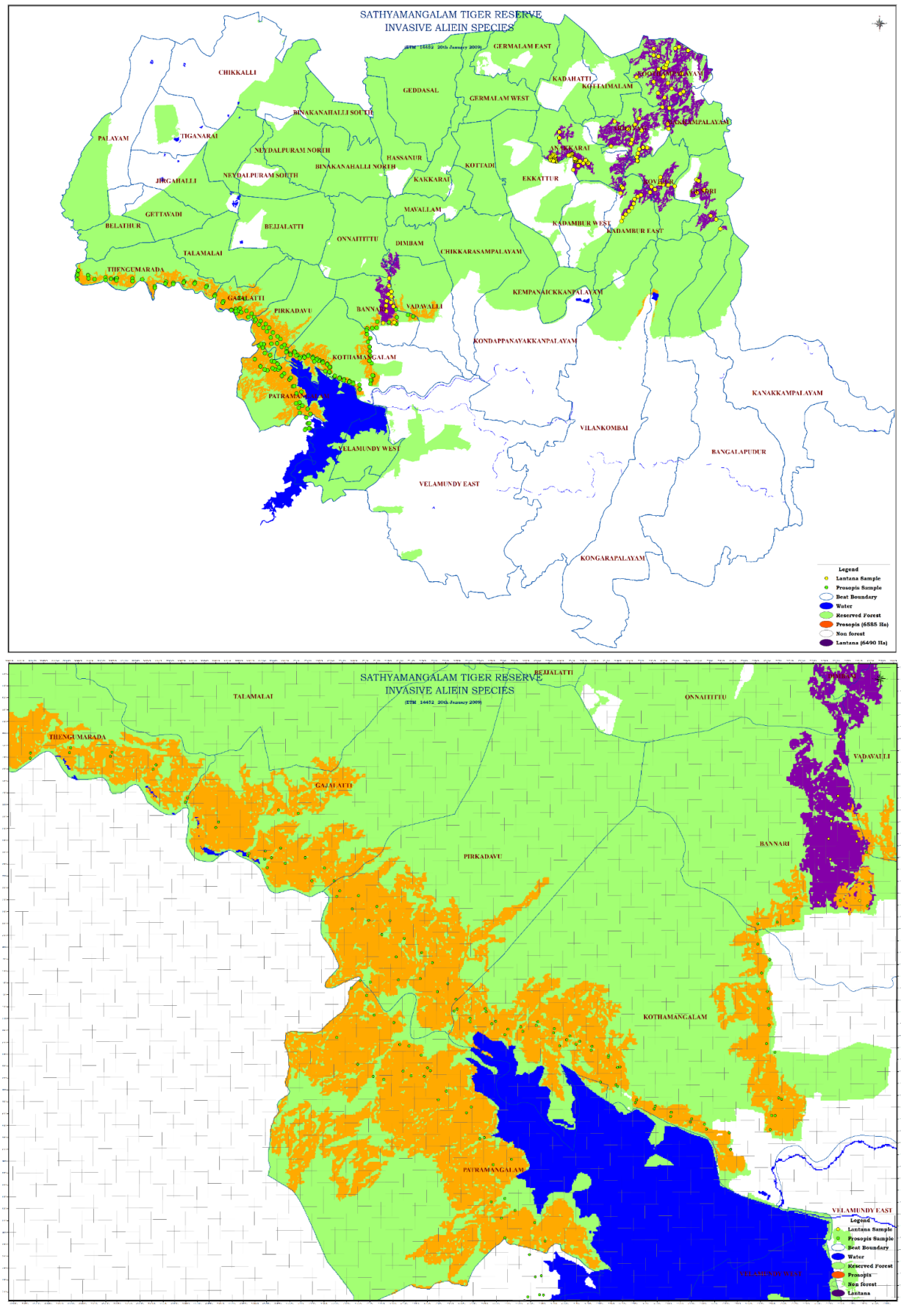
Poaching of other animals

Chitals, Sambar& Barking deers are poached for meat in the landscape. The common poaching techniques use of trap wires, snares, urea poisoning and shooting with country guns. Gaurs are also poached for their meat. Pangolins are also poached for their meat and scales. The details of offenses recorded in the past are given in Appendix 9.

3.4.1.2. Habitat Degradation due to invasives

The habitat has been severally degraded for the years due to multiple factors. Invasion of alien species, demand for fuel and fodder, man-made fires have been main reasons for degradation of habitat other than climatic variations especially deficient rainfall.Invasive weeds are a serious problem in the landscape. Among the most prominent weeds that are having an adverse impact are *Prosopis juliflora*, *Lantana camara, Senna spectabilis, Parthenium*and *Euphatoriumodoratum* in the dry deciduous area and also to a lesser extent in the thorn forest.

Prosopis juliflora is changing the vegetation structure of this area and removal of this invasive species is a very important component of conservation of the landscape. It is predominately found in Bhavanisagar & Sathyamangalam Ranges of Sathyamangalam Division. In the Moyar Valley and Sathyamangalam – Bannari region, the presence and spread of *Prosopis juliflora* is detrimental to prey and predator conservation. Large areas of open thorn forest are converted into dense *Prosopis* stands due to weed invasion. This change is likely to have an adverse impact on Black-buck & Spotted Deer which prefer more open areas. About 15,000 ha has been estimated to be invaded by Prosopis. (shown in map below)



Lantana in particular has taken over large areas in the landscape and the most obvious impact is the conversion of grasslands into *Lantana* covered scrub.

More than 30% (around 7,000 ha) of the area in upper Hassanur plateau is invaded by *Lantana camara* intensively. It is predominantely found in Germalam, Hassanur, Talawady and Talamalai Ranges. These weeds obstruct movement of wildlife fragmenting habitats and loss of foraging area.The species has a negative impact on regeneration of native species. Large areas of native grass lands in Hasanur plateau has been overtaken by invasion of Lantana (shown in map).

There are about 1,589.33 ha of Eucalyptus plantations in this core zone of upper plateau. It is predominantely spread in Talamalai, Hasanur and Germalam Ranges.

Sl. No.	Common Name	Area in ha
1.	Eucalyptus hybrid	1,270.63
2.	*Eucalyptus grandis*	303.70
3.	*Eucalyptus torriliana*	5.00
4.	*Eucalyptus camaldulensis*	10.00
	Total	**1.589.33**

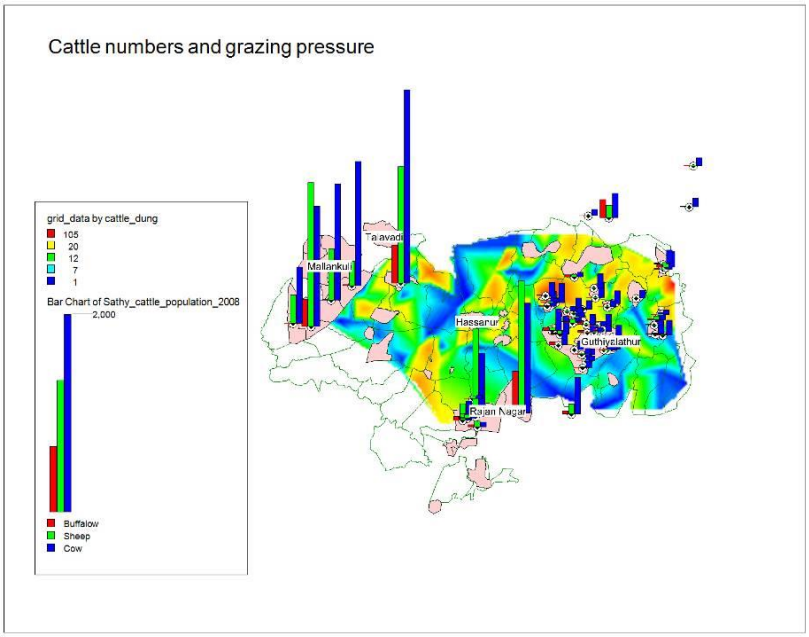
Invasion of *Opuntia stricta in Thengumarahada – Talamalai and grasslands of Hasanur*is another major threat.

Cassia spectabilis (Senna) which is dominant in Hassanur Range of Hassanur Division, is spread to an area of around 500 ha is another major threat to the habitat.

3.4.2. Anthropogenic Pressure

Continued habitat degradation remains a major threat in the Core zone of the Tiger Reserve. Cattle grazing is rampant in Core zone.Grazing of domestic cattle restricts the fodder availability of wildlife, more so during the critical pinch periods of summer. Cattle also competes with the wildlife for water in forest areas and the competition severely affects the wildlife. Over-grazing results in reduced grass cover which along with soil compaction reduces water retention and percolation capacity of the area. Trampling increases soil erosion and further enhances quick run off of rain water.The movement of graziers within the forests also leads to human wildlife conflict as graziers has been attached and injured / killed by wildlife. Diseases brought about by domestic animals pose a serious threat to both large carnivores and their prey species. Cattle borne diseases like Foot & Mouth Diseases, Anthrax, black quarter and haemorrhagic septicaemia major threat to wildlife. Fuel wood

collection in the reserved forest is a serious threat resulting in degradation of forests in the fringes.



3.4.3. Human Animal conflict

In Sathyamangalam Tiger Reserve, Human-wildlife conflict is a serious threat. Cattle lifting by Tigers and Leopards are common in Talamalai, Talawady areas. Crop depredation by Elephants &Wild Boar is common all over the core zone.Some of the drivers of human elephant conflict are crop pattern (sugarcane, banana, paddy, coconut etc.,), habitat degradation, habitat fragmentation, longer period of dry season. Human-Animal conflict is a serious phenomenon in Bhavanisagar, Talawady, Talamalai areas. Human wildlife conflict results in injury death / death of victims, loss / damage to properties and crops. Conflicts also result in injuries and death of wildlife due to electrocution, retaliate poisoning, snares, etc., It has been discussed in detail under chapter 5.4.

3.4.4. Linear intrusions

Linear intrusions are a major threat. The road kills of wildlife that happen in Sathyamangalam- Mysore road is matter of grave concern. The traffic load in the many roads that traverse through inside forest areas is also a serious problem in securing an inviolate areas.

3.4.5. Religious tourism

In STR landscape religious tourism also is a serious threat as many number of religious shrines are located inside the forest areas. The largest damage to the STR is though the large scale congregation of devotees during the karuvannarayar festival where goat sacrifice is also made.

3.4.6. Fire

Forest Fires are also a serious threat in the STR. Fires cause large scale damage to the wildlife habitat in summer where the fodder and water resources are already under weather induced stress.

3.4.7. Cultivation in Dam spread area

Large scale illegal cultivation is taking place in the waterspread is of the Bhavanisagar dam. The entire water spread area is a reserve forest and consequently wildlife sanctuary and also part of the tiger reserve. About 440 ha are subjected to cultivation in the water spread area when the water recedes by encroachers. The activities of the encroachers deny availability of prime habitat to the wildlife, illegal fencing and chemical poisoning is also a serious threat.

3.4.8. Human activities in enclosures

The presence of the numerous enclosure villages in core are at present have a negative effect on conservation due to anthropogenic activities that are incompatible with the requirements of atypical tiger habitat.

Chapter 4. History of Past Management and Present Practices

4.1. Conservation History

The Sathyamangalam Tiger Reserve was erstwhile Sathyamangalam Forest Division. The core and buffer zone of STR has been carved solely out of the erstwhile Sathyamangalam Forest Division.

The Sathyamangalam Tiger Reserve area was earlier in the Coimbatore District and formed a part of ancient Kongu Nadu. The history dates back to the Sangam Era. In early days this area was occupied by the tribes. Subsequently, the region was ruled by Cheras, Cholas, Chalukyas, and Pandiyas etc. The Gangas ruled Kongunadu from 405 AD to 870 AD. Chola King Aditya-I conquered and occupied the area and the Cholas ruled until 1299. Then for a short period it was under Pandiyan dynasty before coming under Sultans of Delhi. Kings of Vijayanagar conquered it in 1368 and Nayakas appointed by Vijayanagar Kings ruled it upto 1700 when it fell to Mysore Rulers. Hyder Ali conquered it and then it was ruled by his successor Tippu Sultan. Tippu Sultan had a special affection for forests. He gained intimate knowledge about the forests of this landscape and appreciated the potential value of sandal trees. Sandalwood was declared ‘Royal Tree’ in Sultan’s domain and in order to protect it effectively, Forest Guards called ‘Nayyars’ were employed. With the defeat and death of Tippu Sultan, the area passed on to East India Company in 1799. No special attention was paid to the Forest still 1859 when Forest Department was organized for the first time. Smuggling of Sandalwood was prevalent at that time and it was smuggled to West Coast by Moplahs and Kurumbas.

The Forest Department was constituted in 1859 with Dr. Cleghorn as Conservator of Forests. Major Morgan with head quarters at Ootacamund (present Udhagamandalam) had control over Sathyamangalam forest area. The forests were thoroughly explored by Mr. Peetin1884 – 1885 in connection with selection of reserved forests. Organized exploitation of Sandal was taken up during1860–1861, by Captain W.H.Morgan, who took up as Conservator of Forests with headquarters at Ootacamund. Periodical cutting of Sandal trees, which have developed heart wood and show symptoms of top drying, was ordered to be removed. There is no record to show exploitation of timber, bamboos and other forest produce.

North Coimbatore was constituted as a division in 1879 – 1880. On 1st April 1880 Anamalai region, known as South Coimbatore was amalgamated with North Coimbatore and the composite division was called Coimbatore division. In1882–

1883 this was again divided into North and South Coimbatore divisions. In1884–1885 the North Coimbatore comprised of 3 Ranges, viz., Kollegal with one Ranger, One Forester and nine Forest Guards; and Sathyamangalam and Bhavani Range having one Ranger, one Forester and eight Forest Guards in each Range. Prior to 1892, the Talamalai Range (presently Talamalai, Talavady and Hasanur Ranges) formed part of Sathyamangalam Range, but in December 1898, it was made as Talamalai Range, an independent Range under a Range Officer.

In April 1909 North and South Coimbatore Divisions were further divided in four divisions, namely North, South, Central Coimbatore Division and Kollegal Division. The then North Coimbatore Division consisted of Sathyamangalam, Talamalai and Bhavani Ranges.

On 22nd August 1980, the Sathyamangalam and Talamalai Ranges were carved out of the North Coimbatore Division and constituted as Sathyamangalam Division with the headquarters at Sathyamangalam.

Subsequently, Sathyamangalam Range was bifurcated into Sathyamangalam and Thookkanayakkan palayam Ranges on 07-10-1989 mainly for more effective protection to sandal wealth and natural forests.

Kothamangalam Range was formed later with head quarters at Kothamangalam near Bhavanisagar having jurisdiction upto Talamalai on the western side of the Mysore Road. Hasanur Range was formed by bifurcating further the Sathyamangalam Range on the plateau side from Dhimbam in the Guthiyalathur R.F. Kothamangalam Range was abolished and reorganized as Bhavanisagar Range after the transfer of area from Erode Division to the Sathyamangalam Division.

Till 1932 the division was not covered by working schemes. Forest produce was exploited in unscientific and unsystematic manner.

The first comprehensive Working Plan was written by Thiru C.R. Ranganathan embracing the erstwhile North Coimbatore Division, in 1932. It was revised by Thiru. V.S. Krishnaswamy and the revised plan came into effect in 1942. A separate Working circle to cover sandal growing in patta lands and un reserves were brought under this circle for systematic working. This plan constituted a fuel working circle of 65,340 acres with 26 felling circle, practically all areas along the reserve margins and plains where growth was adequate and terrain favourable were included in the Working Circle. Certain trees were reserved from felling.

Thiru. Mohamed Hussein revised this plan later during 1956 and the plan created 16 felling series for Sathyamangalam, Talamalai and Anthiyur (earlier Bhavani Range) Ranges.

Thiru. S. John Joseph I.F.S. revised the above plan in 1961. This was revision of earlier two plans and prepared for composite North Coimbatore Division as constituted in 1961. Survey numbers where sandal was owned by the Government, from those pattadar were separated and prescribed quick settlement of protection charges and payments of patta sandal. This plan provided planting of *Dendrocalamus strictus* and *Bambusa arundinacea* over an area of about 2,200 ha at spacing of 6m x 6m in 7 blocks and the inter spaces were to be planted with Eucalyptus at an espacement of 1.5m.

Thiru S. John Joseph's plan was revised by Thiru J. C. Kala, I.F.S., with effect from 1980-90. The prescriptions of this plan were followed in the newly formed Sathyamangalam Division from 1980. Between 1986 and 1988, Sixty-one ha of fruit farms have been raised near Bannari of Sathyamangalam Range under the Minor Forest Produce category. The species include Vila, Nelli, Naval, Pala, Elanthai, Seetha, Mango and Tamarind. Except for a patch of wood apple of about 15 ha. the other species have failed, may be due to excessive grazing.

Subsequently, Working Plan for Sathyamangalam Division was written by Thiru R. Gunasekaran IFS., for the period of 1990 to 2000.

From 2000 to 2013 the focus was on Biodiversity conservation working circles, Wildlife Management Working circle, Forest Protection working circle were various prescriptions was given for Wildlife conservation.

The working circles practiced in the past working plan are furnished below

Sl.No	Names of working circles	Area (ha)
1	Eco-Development Working Circle	2881.00
2	Watershed Management Working Circle	3017.30
3	Fuel Development Working Circle	300.00
4	Fodder Development Working Circle	150.00
5	Sandalwood Working Circle	63,197.07
6	Minor Forest Produce Working Circle	whole Division
7.	Industrial Wood Management Circle	2,818.45

Sl.No	Names of working circles	Area (ha)
8	Bamboo Working Circle	45,561.16
9	Wildlife Management Working Circle	whole Division
10	Tribal Resources Development Working Circle	whole Division

Conservation was given, major impetus through prescriptions in eco-development circle, wildlife management circle, fodder development working circle and water shed management circle.

Declaration as wildlife sanctuary

1) On the basis of many studies that highlighted the wildlife value of the area the lower plains & hills of the Sathyamangalam Forest Division covering an area of 524.34 sq.km was declared as Wildlife Sanctuary in Government Order (Ms) No.122 dated 03.11.2008 under Sec. 26A of the Wildlife (Protection) Act, 1972. Management plan for the sanctuary was prepared by Thiru. S. Ramasaubrmanian, IFS for the period from 2010 to 2020.
2) The upper hills of the Sathyamangalam Forest Division covering an area of 930.96 sq.km was remaining as reserved forest till 2011. Management plan for this portion was prepared by Thiru. K. Panneerselvam, IFS., for the period from 2011 to 2021.
3) Out of this remaining reserved forest portion, 88,726 ha was later declared as Wildlife Sanctuary in Govt. Order (Ms). No. 93 Environment & Forests Dept. dated 11.08.2011 under section 26A (1) (b) of Wildlife (Protection) Act 1972.

Declaration as Tiger Reserve

4) The entire Sathyamangalam Sanctuary area of 1,40,840.54 ha was declared as a Tiger Reserve except settlements vide Govt. Order (Ms). No.41Environment & Forests Dept. dated 15.3.2013. This Tiger Conservation plan replaces all earlier Management Plan and Working Plan. It has to be noted that the tribal settlements in the reserved forests have been notified as Sanctuary but, the same has not been included within the Tiger Reserve as per the policy decision of the State Government to accommodate the Tribal communities. So out of total area declared as Wildlife sanctuary 1,40,840.54 ha area only has been declared as Tiger Reserve and Hassanur Forest Division was carved out of erstwhile Sathyamangalam Forest Division.

4.2. Habitat Management

Before Tiger Reserve declaration, habitat was managed through prescriptions from working plan officer under the working circles like biodiversity working circles, soil moisture conservation working circle, JFM working circle, wildlife management working circle, protection working circle, etc., The major habitat improvement programme was the implementation of Tamil Nadu Afforestation Projects in 43 project areas of 300 ha each. After declaration of wildlife sanctuary funds were obtained from Government of India under sanctuary support scheme and few activities such as invasive alien species removal, SMC works, fire protection works were carried out for habitat improvement. Some habitat management activities were also been carried out under State schemes like Fodder improvement, Asian Elephant anti-depredation scheme and under Tamil Nadu Biodiversity Conservation & Greening Project (TBGP). As such the impact of habitat management is negligible other than the activities carried out in Tamil Nadu Afforestation Project. Grazing continued to be unregulated. NTFP extraction was carried out through the tribal VFCs. Fire management was done through state and central sponsored schemes.

It has to be recorded that focused efforts for wildlife habitat management in this landscape has began only from 2013-14 with funding support from NTCA.Habitat development works prescribed under the indicative plan were carried out like de-silting, formation of water holding structures, invasive alien species removal, regeneration of swamps, fire management activities etc., from the angle of wildlife habitat management.

STR is a wildlife sanctuary still in its infancy as it was notified as wildlife sanctuary in 2008 & 2011 only. It is the youngest Tiger Reserve in Tamil Nadu and declared as Tiger Reserve during 2013.As the core zone of the Tiger Reserve vast in extent, habitat management activities carried out has been very minimal. Investment and efforts have to put in place for completely securing the habitat for Tiger Conservation.

4.3. Protection and Intelligence Gathering

Protection in STR is at present very good. The protection operation and intelligence collection has been carried out in the landscape through a network of forest staff and special units such as ACF protection squad, Forest Protection squad range.

Close coordination is done with other intelligence agencies including state police department, Special Task force, Narcotics wing etc. intelligence is also regularly shared between STR, BRT, Mudumalai tiger reserves.

After declaration of STR as Tiger Reserve, protection has been prime focus in the reserve. 15 Anti-poaching Camps are employed in protection operations in Core Zone with the total strength of 90 anti-poaching watchers. These ant poaching watchers undertake regular patrolling operations which are monitored closely. Special combing operations in vulnerable areas are regularly undertaken. Regular intelligence collection is undertaken. Informers have been set up in key locations to pre-empt offences. A large number of seizure of illegal weapons have already been undertaken. A regular watch on the movement of habitual offenders is undertaken by the field units, regular checking of vehicles is undertaken at inter-state boundaries. Movement of suspected Bavaria poachers at present is carefully monitored. In vulnerable locations the check posts have been established. Buses moving through the forest areas are regularly monitored. Street plays have been conducted in vulnerable locations sensitising the communities against poaching of wild animals for meat .similarly awareness programs have been conducted .A Wildlife Crime Control Unit (WICCU) with retired forest staff was formed during 2014 and information about protection threats are collected from various sources and shared with deputy directors and field director.

After the formation of the tiger reserve in 2013 a pangolin trade racket and a carnivore trade racket has been busted and vital information on the modus operandi and the network has been obtained.

4.4. Tourism & Interpretation

Before formation of Tiger Reserve tourism was limited only to religious shrines and few locations in the hills.There are number of religious temples available within the existing core area of the Tiger Reserve. Karuvannarayar temple, Gejalatty Darga in Bhavanisagar Range, Kongalli Temple in Talavadi Range are important major pilgrimage places. Pilgrims visit to those of religious places on specific days and festivals. The important religious temples located with the core area of the Reserve are given in Appendix 5.

Trekking for interest groups were permitted by the District Forest Officer in the established trekking routes like Dhimbam, Sorgam, Huligerepatty, Alamalaikoil, Konursamykovil, Jodikarai, Gettavadi, Belathur, Talamalai – Marigudi, etc.,

Sathyamangalam Forest Division launched eco-tourism initiative during 2006-07 in which nature trail programmes were initiated and a nature interpretation centre was created in Hassanur under the banner of “Elephant Valley Eco-tourism” in co-ordination with VFCs and its federation.

After formation of Tiger Reserve eco-tourism activities have been carried out for facilitation of religious tourism and safari tours in Bhavanisagar – Thengumarahada route, Dhimbam Road, Jerahalli, Shooting lodge, Huligerepatty, Yettukattibetta and Talamalai road in existing safari roads. Trekking is also permitted for organized groups and students. A used vehicle was purchased by the Sathyamangalam Tiger Reserve for conducting eco-tourism. Interpretation centres at present is being revamped at Hasanur, Bhavanisagar and Sathymangalam Ranges.

At present eco-tourism facilities are minimum in the Tiger Reserve for the nature lovers. Visitors stay at available existing accommodation facilities are with bare minimum facilities. All buildings have to be improved with additional logistic and infrastructure facilities. Further, new facilities will be created for tourism purposes in other areas adjoining to the boundary of Tiger Reserve.

4.5. Research & Monitoring

Various research works have been done in the Sathyamangalam by many research institutions like Wildlife Institute of India (WII), WWF India-Programme (AREAS & NEG Scheme), CCMB, Hyderabad, Salim Ali Centre for Ornithology and Natural History (SACON), Coimbatore, Wildlife Trust of India (WTI), Keystone Foundation, Kothagiri and OSAI, Coimbatore, and University students doing Ph.D.

The above institutions have worked in the Sathyamangalam on the following major themes:

1. Landscape Approach with villagers’ participation
2. Human dimensions affecting the forests
3. Endangered Species Conservation Program
4. Assessment of Tiger Population using Camera Traps and Scat analysis
5. Imparting training on capacity and skill development for the front line field staff
6. Conservation and Awareness Program for various stakeholders
7. Preparation Eco Development Committee and Micro Plan for villages

The details of some of the important research works which are used for PA management in Sathyamangalam Tiger Reserve are listed below.

Sl. No.	Project Title	Institution
1.	Connectivity between Tiger population and also to collect scat sampling	National Centre for Biological Sciences, TATA Institute of Fundamental Research Bangalore. - Dr. Uma Ramakrishnan
2.	To carryout research study on Conservation of Otters through community participation in river Moyar flow.	Madras Crocodile Bank Trust/Centre for Herpeto logy, Chennai - K. Narasimmarajan,
3.	Study on floristic study of Sathyamangalam Tiger Reserve	Pondichery university, Department of Ecology & Environmental Sciences, Pondichery. - Miss. M. Sathya
4.	Study on Feeding ecology, Occupancy index and Conservation threats to critically endangered Gyps Vultures	Government Arts College, Udhagamandalam - Dr. B. Ramakrishnan
5.	Study and survey on the "Humpback / orange finned" Mashseer in the Moyar & Bhavani of Sathyamangalam Tiger Reserve.	Wildlife Association of South India, Bangalore - Mr. Susheel
6.	Survey on trade off analysis in Elephant corridors of Tamilnadu state & collection of secondary data on Human elephant conflict	Tamil Nadu Agricultural Universtity, Coimbatore. - Miss. Yasoda Gayathari
7.	Human-wild animal conflict with special reference to Elephant	Mangai Natarajan, Thoraipakkam Chennai. -
8.	Survey on current status of Indian Star Tortoies at Sathyamangalam Wildlife Sanctuary	Wildlife Trust of India, Noida - Abhishek Narayanan
9.	Ecology of Sloth bear (Melursus ursinus) at Sathyamangalam Wildlife Sanctuary	Department of Zoology & Wildlife Biology, AVC College, Mannampandal - Dr. Sharmila & D. Mahendar Reddy
10.	Assessment of the status of Tiger and its prey in Sathyamangalam Wildlife Sanctuary	Wildlife Trust of India, Noida - Mr. A. Mathews Nixon Armstrong

Thus, many of the research institutions and NGOs have participated in the overall management activities of the STR for its better scientific implementation of programme and HRD of the field staff. It is also noticed that various institutions and nature enthusiastic have shown a keen interest voluntarily to support the conservation program for Sathyamangalam Tiger Reserve. After the formation of

Tiger Reserve, monitoring of Vulture occupancy abundance has been undertaken by involving professional bird watchers, vegetation assessment has been done under TBGP, minor studies by JRF and research scholars has been permitted for various topics of flora and fauna for which final publications are due.

After formation of Tiger Reserve monitoring of Tiger population has been done in Phase IV protocols and the details has already been discussed in Chapter No. 3. Annual 8 day protocols have also been under taken through transact sampling and the prey base is being monitored.

4.6. Relocation of villages

As it is a new Tiger Reserve relocation of villages have not taken place. As such all the tribal habitations which are existing as enclosure within the Tiger Reserve such as Mavanatham, Ramaranai, Uppupallam, Nandhipuram, Geddasal, Nagalur, Uginium are excluded from the notification of Tiger Reserve. Apart from this there are many number of revenue tribal settlements like Bejallatty, Malliammandurgam, Makkampalayam, Ittarai etc. as enclosures. In the long run it is advisable to develop major part of the core inviolate by resorting to voluntary relocation of existing villages permanently.

4.7. Administration & Organization

This Tiger Reserve is under Administrative control of Tamil Nadu Forest Department. The Member Secretary of the National Tiger Conservation Authority, New Delhi is guiding the project implementation under the advice of steering committee. Additional Principal Chief Conservator of Forests (Project Tiger) is Controlling Officer for the four Tiger Reserves in Tamil Nadu. The Field Director at Erode is responsible for all the operations in the reserve which includes Forest Management, Research and other allied activities. He is under the administrative control of Principal Chief Conservator of Forests, Chennai as well as Principal Chief Conservator of Forests and Chief Wildlife Warden. The Field Director in the rank of Chief Conservator of Forests is assisted by the Deputy Directors at the rank of District Forest Officers at Sathyamangalam and Hassanur and 7 Territorial Forest Range officers out of which 6 Territorial Ranges fall in Core Zone, 1 Territorial Range in Buffer Zone. In addition there are 3 Functional Ranges (2 Squad and 1 Eco-development Range). The Erode Forest Division and Bamboo Special Division, Gobichettipalayam is also under the Administrative control of the Field Director.

Recently, all the Ranges in Tiger Reserve have been bifurcated and 3 more territorial ranges has been formed with 2 additional territorial ranges in

Sathyamangalam Forest Division and 1 additional territorial range in Hassanur Division.

Table showing the area of Forest Ranges before and after bifurcation.

Sl. No.	Name of the Range	Area (in Ha)	
		Before Bifurcation	**After Bifurcation**
1.	Sathyamangalam	23918.54	16519.94
2.	Bhavanisagar	24242.17	14984.87
3.	Talamalai	11476.92	11476.92
4.	T. N. Palayam	28493.93	16128.37
5.	Hassanur	16486.75	16486.75
6.	Germalam	18032.59	18032.59
7.	Talavady	22880.02	11529.86
8.	Kadambur	--	19764.16
9.	Vilamundi	--	9257.30
10.	Jeerahally	--	11350.16
Total		**145530.92**	**145530.92**

Chapter 5. Land Use Patterns & Conservation – Management Issues

5.1. Land use classification

The land use classification of Erode District is illustrated below:

Table 5.1: Land Utilization

Fasli: 1424

Sl. No.	Classification	(Area in Hectares)
1.	Forest	227511
2.	Barren and Uncultivable uses	6270
3.	Land put to Non-Agricultural uses	53340
4.	Cultivable Waste	1731
5.	Permanent Pastures and Other Grazing Land	101
6.	Land Under Miscellaneous Tree Crops and Groves not included in Net Area sown	1004
7.	Current Fallows	60269
8.	Other Fallow Land	43350
9.	Net Area Sown	178687
10.	Geographical Area according to Village Records	572264
11	Total Cropped Area	199349
12.	Area cropped more than once	20662

Source: "G" Return – Fasli - 1424

Of the total geographical area of the District, Forest constitute 27.7% of the area. The Tiger Reserve has 1408 sq. km of reserved forest and Erode Division has 820.72 sq. km of reserved forest areas. Agriculture is the major activity in the district with the district standing first in the production of turmeric.

Table 5.2: Cultivable area and principal crops in Erode District

Total Cultivated Area	**194385.465 (Hec)**
Net Area Sown	176561.635 (Hec.)
Area Sown more than once	**17823.830 (Hec.)**
Area and Production of Area (Hec.)	
Principal Crops Paddy (Rice)	 34340
Millets and Other Cereals	59748.105
Pulses	5776.245
Sugarcane (Gur)	22333
Groundnut	20517
Gingelly	5640
Cotton	795
	(2015-16 Data)

Roughly 50% of the total Geographical Area of the District is under crop cultivation. Out of the Total Cropped Area, Net Area sown constitutes 89.63% and Area Sown more than once works out to 11.56% of the Net Area Sown. Out of the Total Cropped Area, Food crops claim 59.72 % and Non Food Crops claim 40.28 % *(source District statistical hand book)*.

5.2. Socio Economic Profile of the Villages:

The list of villages adjoining the core area and the villages enclosed within the core area are enlisted in annexure 17. The Erode District in which Sathyamangalam Tiger Reserve is located records an area of 5722 Sq. Km, accounting for about 4.4% of the Total Area of the State. As per 2011 Census, it has a population of 22,51,744 persons which constituted 3.1 % in the Total State population. As per 2011 census the population of Scheduled Caste and Scheduled Tribes constitutes 25.97% of the total population of the district. Population Density is 391 persons per Sq. Km. as against 555 in the State. The Literacy of the District is 72.58 % as against the 65.44 % of the State according to 2011 Census. Erode District has 375 Revenue Villages spread over in 14 Community Development Blocks located in 6 Taluks.

There are about 18 tribal enclave hamlets inside the Reserved Forests of Core Zone with a population of 1088 families. In addition to this, 16 enclave villages are located within the core zone as separate revenue enclaves.

Sl. No.	Details	No.	Area (in ha)	Families	Population
1	Revenue Villages (Non-tribal)	16	4,270.99	2,281	8,155
2	Tribal hamlets (Revenue Villages)	11	12,637.90	732	3,044
3	Tribal hamlets (Reserve Forests)	7	306.89	356	1,427

There are about 34 hamlets / villages/settlements situated as separate enclaves within the core zone of the Tiger Reserve. Kurumbas, Sholagas, Irulas and Ooralis are tribal living within the Reserve. Out of these 34 hamlets, 16 are Non tribal hamlets and 18 are tribal villages.

The core zone consists of 3 development blocks viz Sathy block, Bhavanisagar block and talawady block. Talawady block has only 0.03 MPI (Multidimensional Poverty Index) value and 0.275 HDI (Human Development Index) value and has a lowest rank of 15 in HDI and MPI. Sathy block and bhavanisgar blocks are also ranked 14 and 13 in MPI and 10 and 14 in HDI. As such the forested landscape has the lowest human development indicators of erode district.

Table 5.3 Consolidation of HDI, GII, CDI and MPI INDICES, 2013-14

S. No.	Block	HDI		GII		CDI		MPI	
		Index Value	Rank	Index Value	Rank	Index Value	Rank	Index Value	Rank
1	Ammapettai	0.535	12	0.01	9	0.70	8	0.53	11
2	Anthiyur	0.604	9	0.01	2	0.50	14	0.55	12
3	Bhavani	0.667	7	0.04	10	0.69	9	0.41	7
4	Bhavanisagar	0.434	14	0.06	15	0.65	12	0.60	13
5	Chennimalai	0.536	11	0.01	7	0.66	10	0.31	3
6	Erode	0.786	2	0.01	1	0.87	2	0.24	2
7	Gobichettipalayam	0.619	8	0.05	11	0.75	6	0.42	8
8	Kodumudi	0.706	3	0.01	8	0.82	3	0.33	5
9	Modakurichi	0.677	6	0.05	13	0.75	4	0.36	6
10	Nambiyur	0.455	13	0.01	4	0.66	11	0.51	10
11	Perundurai	0.682	5	0.01	6	0.75	5	0.43	9
12	Sathyamangalam	0.556	10	0.01	3	0.46	15	0.62	14
13	Thalavadi	0.275	15	0.06	14	0.59	13	0.87	15
14	Thukkanaickenpalayam	0.687	4	0.01	9	0.70	7	0.32	4
15	Erode Municipal Corporation	0.949	1	0.01	2	0.91	1	0.03	1

28.5% of households in Bhavanisagar block, 30.98% in Sathy block and 41.2% in Talawady block fall under BPL categories. There are about 13331 (Bhavanisagar), 27787 (SATHY), 13970 (Talawady), agricultural labourers in the three blocks that cover the villages abutting the core zone. The scheduled tribe population is about 159 (Bhavanisagar), 7757 (SATHY), 5900 (Talawady), in the three blocks that cover the villages abutting the core zone.16.99 % households in Talawady block and 80% households in Sathy and 40% households in Bhavanisagar blocks have sanitation facilities in their homes. The literacy percentage is Bhavanisagar is 55% SATHY is 59% and Talawady is 62% respectively.

Table 5.4 Workers in Agriculture Sector

Sl. No	Block	Total workers		Cultivators		Agri Labourers	
		2001	2011	2001	2011	2001	2011
1	Ammapettai	77236	75800	18679	15037	33508	38101
2	Anthiyur	72763	78172	18116	16714	27340	27372
3	Bhavani	94166	102837	13271	11705	28589	30900
4	Bhavanisagar	51867	57100	9836	9417	13944	13331
5	Chennimalai	59976	58751	10549	8840	12052	11750
6	Erode	196791	30999	8259	3381	14235	6794
7	Gobichettipalayam	102404	105458	15219	12497	38009	33963
8	Kodumudi	64527	65993	17093	15804	26480	26764
9	Modakurichi	84725	88076	21603	18564	31884	31888
10	Nambiyur	57473	56486	14589	14622	17316	16251
11	Perundurai	79550	85376	16689	14106	19701	21264
12	Sathyamangalam	77782	87992	16196	14499	27141	27787
13	Thalavadi	28935	33989	7871	8663	6258	13970
14	Thukkanaickenpalayam	51569	49872	8224	6525	27140	24676
15	Erode Municipal Corporation	-	218872	-	3002	-	6603
	District	1099764	1195773	196194	173376	323597	331414

Table 5.5 Percentage of BPL Households (2003)

Sl. No.	Block	% of BPL Families
1	Ammapettai	36.89
2	Anthiyur	32.79
3	Bhavani	29.82
4	Bhavanisagar	28.55
5	Chennimalai	33.21
6	Erode	24.96
7	Gobichettipalayam	29.40
8	Kodumudi	29.67
9	Modakurichi	27.63
10	Nambiyur	24.89
11	Perundurai	30.75
12	Sathyamangalam	30.98
13	Thalavadi	41.12
14	Thukkanaickenpalayam	40.20
15	Erode Municipal Corporation	30.42
	District	31.42

The Socio Economic status of the villages in the Sathyamangalam Tiger Reserve has been documented in “Human dimensions of Forest Degradation in the Sathyamangalam Landscape” by Principal Investigators Narendran Kodandapani PhD, N. Satheesh IFS, Ashutosh Samant Singhar IFS, K. Raj Kumar IFS,

- The mean family size in the Sathyamangalam landscape is estimated between 2.5 to 5.5. The mean number of males/family was highest in Germalam (2.75) and the least in Nandipuram (1.6).
- The mean number of females/family was highest in Kembanur (3.2) and the least in Nandipuram (1).

- The mean land holding with tenure in the Sathyamangalam landscape is highest in the village Kalidimbam (2.05 acres) and households in several villages did not possess any land holding under tenure at all.
- The mean land holding without tenure in the Sathyamangalam landscape is highest in the village Kembanur (3.6 acres) and households in several villages did not possess any land holding without tenure at all.
- A variety of crops are cultivated in the various villages in the Sathyamangalam landscape, the number of crops cultivated in the various villages ranges from 3 to 11.
- Substantially higher number of crops are cultivated in the villages, Germalam, Geddesal, and Devarnatham. The number of crops cultivated in the various villages ranged from 2 to 8.
- Almost all villages reported the application of chemicals and fertilizers for cultivation in the present...
- There are significant differences in several socio-economic variables among the different villages in the Sathyamangalam landscape. Most villages in the landscape are homogenous in their composition in terms of the land holdings, the land tenure, small land sizes, and occupations involved in.
- Greater than 70% of households in all villages across the landscape engaged in wage labour. Households either worked in the landscape or travelled to neighboring areas in search of wage labour.
- Greater than 90% of households in all villages engaged in some form of agriculture, either for subsistence or for cash.
- However in four villages, Bungalathotti, Hasanur, Mavalam, and Muthiyanur, < 50% of households engaged in agriculture.
- The ethnicity of the majority of the villages in the landscape, included various indigenous groups, > 90% of households in several villages included indigenous communities. However, certain villages had either fewer or no indigenous communities.

- The villages with no indigenous communities were Hosetti and Muthiyanur, villages with < 50% of the households with indigenous communities included Neithalapuram, Devarnatham, and Germalam.
- Regarding, the percentage wage labourers, when there are fewer opportunities to work outside the village, residents have little choice but to extract natural resources from the forest in order to meet income needs. Dependence on forests is determined by the extent of forest area available and the natural resources within these forests, the opportunity for other more remunerative occupations, and the social composition (Chauhan et al. 2008).

5.3. Resource Dependency of the Villagers:

Villagers and Tribal as such consume a variety of services from the forest resources and are dependent on forest for their livelihood requirements.

5.3.1. Grazing

Communities have traditionally dependent upon the reserved forests for grazing needs due to very narrow window of rainfall availability for growing in-farm fodder crops. As such the grazing activity is prevalent in the belt of around 2-3 kms of every villages. According to Animal Husbandry Department sources, there are over 45,000 cows and buffaloes in the hilly parts in Hasanur, Kadambur and Bargur areas.

Most of the villagers prefer to rear native breed s due to the low maintenance costs. They are unable to meet the cost of fodder, and hence rely in the opportunity they get to let the cattle graze on forest land.

Table 5.6: Tribal population and cattle population in the Forest Settlements (enclaves) intervening in the Core Area

Sl. No	Name of the settlements	Area (ha.)	No. of families	Population	Cattle	Buffalo	Sheep	Goat
1	Mavanatham	38.07	80	260	55		10	25
2	Ramaranai	12.15	13	48	12		5	10

Sl. No	Name of the settlements	Area (ha.)	No. of families	Population	Cattle	Buffalo	Sheep	Goat
3	Uppupallam	8.29	8	43	20		10	10
4	Nandhipuram	6.24	14	47	15			15
5	Geddesal	57.95	90	380	110	20		
6	Uginium	62.57	65	270	60		10	25
7	Nagalur	121.62	86	379	70		25	30
	Total	306.89	356	1,427	342	20	60	115

Table 5.7: Tribal population and cattle population in the Revenue Hamlets (enclaves) intervening in the Core Area

Sl. No.	Name of the settlements	Area (ha.)	No. of families	Population	Cattle	Buffalo	Sheep	Goat
1	Ittarai	55.00	66	295	80	15		32
2	Bejalatti	28.75	52	173	100	10		25
3	Kalidhimbam	110.00	35	130	95	5		30
4	BangalaDoddi	2,844.20	120	487	35	10		30
5	AllapuramDoddi	2,529.16	55	350	55			15
6	Balapadugai	3,271.24	49	223	89	5	20	18
7	Kalmandipuram & SolagarDoddi	3,649.65	40	250	170	30	25	35
8	Centre Doddi	45.25	111	376	110	20		10
9	Kuliyada	41.25	32	130	40		40	15
10	Kanakkarai	31.80	90	378	15			10

Sl. No.	Name of the settlements	Area (ha.)	No. of families	Population	Cattle	Buffalo	Sheep	Goat
11	Orathi	31.60	82	252	30			35
	Total	12,637.9	732	3,044	819	95	95	255

5.3.2. NTFP

NTFP such as honey, *Terminalia chebula*, amla, jungle mango, soapnut, Phoenix grass etc., were collected by the tribal through different societies in the past which was their main livelihood support in the form of wages and sale. Through G.O. No. 79 Environment & Forests Department, Dated: 29.04.2003, 28 tribal NTFP committees were formed for organized collection and sale of NTFP and a list of which is given below. However after the formation of Tiger Reserve, the NTFP collection is curtailed as per the statutory provisions under Wildlife Protection Act and tribal are collecting Date leaves for their bonafide purpose.

A study conducted before the formation of Tiger Reserve titled “Human dimensions of Forest Degradation in the Sathyamangalam Landscape” by Principal Investigators Narendran Kodandapani PhD, N. Satheesh IFS, Ashutosh Samant Singhar IFS, K. Raj Kumar IFS, gives a pen picture of NTFP collection scenario.

- Households engaged in the collection of NTFPs in several villages across the landscape. Most households collected fruits and other parts of between 5 and 10 species; however, in two villages Hosetti and Muthiyanur, no NTFPs were gathered. The maximum number (7) of NTFPs extracted in the Sathyamangalam landscape was in the villages Bejalatti, Kembanur, and Vilankombai.
- Four dominant NTFPs were extracted in the landscape, they included, *Phyllanthus emblica*, *Terminalia chebula*, *Phoenix loureiroi* species, and honey.
- The mean quantity of *Phyllanthus emblica* collected/HH/trip in the Sathyamangalam landscape was highest in the village Geddesal (84 kg/trip) and the least quantity collected/HH/trip was in Kembanur (30 kg/trip). 10-y ago, the mean quantity of *Phyllanthus emblica* collected/HH/trip in the Sathyamangalam landscape was highest in the

village Geddesal (120 kg/trip) and the least quantity collected/HH/trip was in Kembanur (38 kg/trip).

- The mean quantity of *Terminalia chebula* collected/HH/trip in the Sathyamangalam landscape was highest in the village Geddesal (52 kg/trip) and the least quantity collected/HH/trip was in Mavalam (2.5 kg/trip).
- The mean quantity of *Phoenix loureiroi* species collected/HH/trip in the Sathyamangalam landscape in the present is highest in the village Neithalapuram (46 kg/trip) and the least quantity collected/HH/trip was in Kuliyada (15 kg/trip). 10 year ago the mean quantity of *Phoenix loureiroi* species collected/HH/trip in the Sathyamangalam landscape was highest in the village Neithalapuram (70 kg/trip) and the least quantity collected/HH/trip was in Kuliyada (18 kg/trip).

5.3.3. The mean quantity of honey collected/HH/trip in the Sathyamangalam landscape in the present was highest in the village Geddesal (11 l/trip) and the least quantity collected/HH/trip was in Devarnatham (0.2 l/trip). Fire Wood

A study conducted before the formation of Tiger Reserve titled “Human dimensions of Forest Degradation in the Sathyamangalam Landscape” by Principal Investigators Narendran Kodandapani PhD, N. Satheesh IFS, Ashutosh Samant Singhar IFS, K. Raj Kumar IFS, gives a pen picture of fire wood collection scenario.

- The mean number of firewood bundles collected per week in the Sathyamangalam landscape in the present is highest in the village Vilankombai (7) and the least number of firewood bundles collected/week was in Nandipuram (1.2).
- The mean distance travelled to collect firewood in the Sathyamangalam landscape in the present is highest in the village Bangalathotti (2.9 km) and the least distance travelled to collect firewood was in Kembanur (0.6 km). 10 years ago the mean distance travelled to collect firewood in the Sathyamangalam landscape was highest in the village Bangalathotti (1.6 km) and the least distance travelled to collect firewood was in Kembanur (0.4 km).

Firewood:

At present, the tribal in the upper hills are depending upon the Tiger Reserve for Fire wood collection for their home needs. After the formation of Tiger Reserve more than 500 numbers of families have already been provided with LPGs in core area through various schemes.

5.4. Human Wildlife Conflict

The human wildlife conflict has been a serious concern in Sathyamangalam Tiger Reserve and continues to be so. The conflicts cause casualties to the property and life of the communities on one hand and cause wildlife deaths on the other hand.

A separate theme plan for managing Human wildlife conflict is detailed under Chapter7.2.2 and status of conflicts is also explained in Chapter 5 of Buffer Zone plan as per NTCA–TCP template and the same is applicable for Core Zone also.

Among carnivores cattle lifting are a serious issue. Other conflict problem species are elephants, wild boars, deers and peacock which engage in crop depredation. Wild boar crop damage is a serious problem all over the landscape. Of late injuries due to wild boars are also recorded. In the long run population studies have to be under taken and the issue dealt with under section 11 of Wildlife Protection Act wherever found required.

Few cases of attacks by bears have been recorded in the past in Sathyamangalam Tiger Reserve and they are mostly accidental attacks on surprise encounters in interior forest areas

Human-Elephant conflict is a serious concern in the Tiger Reserve management. Efficient management of human elephant conflict is a very serious factor in securing the good will and participation of communities in Tiger conservation.

Drivers of human-elephant conflict are as follows;

i) Non availability of drinking water in the water holes in the forest areas force the elephants to move out from the habitats and because of this, they enter patta lands adjoining to the RF boundary and raid the crops.

ii) Changed cultivation practices and cropping pattern also have led to this conflict. The farmers have switched over to commercial crops like sugarcane and banana, which are palatable to elephants. In the past, cultivation was not intensive and most of the lands adjoining to the forests are left without any cultivation. But now every land is cultivated up to the boundary of the reserve. So naturally when the elephants move along the migratory paths or during their daily movement, they enter the patta lands. Some of the farmers have erected electric power or solar power fence along the boundary lines;

iii) The tribes and the people living in the villages adjoining to the forests move inside the forests for the purpose of NTFP collection, grazing, firewood collection, accidentally encounter with animals and lose their lives.

The HEC problem is prevalent all over the Tiger Reserve and is very acute in Bhavanisagar, Talawady, T.N. Palayam and Sathyamangalam Ranges.

Table 5.8: Status of human animal conflict between 2008 and 2015

Year	No of deaths	No of injuries	Cattle killed	Crop damage
2008 – 2009	8	3	1	47
2009 – 2010	10	2	--	10
2010 – 2011	6	11	--	1
2011 – 2012	6	17	1	67
2012 – 2013	3	1	--	2
2013 – 2014	16	11	6	91
2014 – 2015	10	10	3	130
2015 - 2016	7	8	9	75

Table 5.9: Details of compensation paid for various issues of Human Animal Conflict

Year	No of Deaths	No of Injuries	Cattle Killed	Crop Damage	Total Compensation Paid (Rs)
2008 – 2009	4	0	0	17	5,64,500
2009 – 2010	10	2	--	10	11,42,000
2010 – 2011	6	11	--	1	10,22,000
2011 – 2012	6	17	1	67	19,04,000
2012 – 2013	3	1	--	2	3,97,000

Year	No of Deaths	No of Injuries	Cattle Killed	Crop Damage	Total Compensation Paid (Rs)
2013 – 2014	16	11	6	91	63,79,000
2014 – 2015	10	10	3	130	62,67,000
2015 - 2016	7	8	9	75	36,42,800

5.5. Assessment of Inputs of line Agencies/ Other Departments

Presently the tiger reserve is in touch with other line departments like District Rural Development Agency (DRDA), Animal Husbandry, Sericulture, Highway, Electricity Board, Tribal Welfare Development, Revenue, Transport, Health, Local bodies etc., in management of the reserve. District Level Coordination meeting is conducted by District Collector with all line department officers as part of Joint Forest Management where the members of the EDCs, JFMCs, and TAP Villages attend this meeting for grievance redressal and channelizing line department activities in JFM villages on priority basis once in 3 months.

Part B: The Proposed Management

Chapter. 6. Vision, Goals, Objectives and Problems

6.1. Vision

Conserving the biodiversity of Sathyamangalam Tiger Reserve in the bio-strategic 'Nilgiris-Eastern Ghat Landscape', to nurture the source population of Tigers by maintaining viable populations of Tiger, co-predators, prey and all associated floral and faunal diversity with committed protection efforts, effective management and active co-operation of stakeholders.

Mission

To maintain the ecological health, integrity, and productivity of the Sathyamangalam Tiger Reserve, through conservation of Tiger as a flagship species supporting local biodiversity values for the benefit of local communities and future generations in line with our cultural and socio-economic context.

6.2. Management Goals

1. Long term conservation of Tiger, its co-predators and prey through specific management interventions and strengthening protection of floral and faunal diversity of the reserve.
2. Prevent habitat degradation through biotic interferences and improve health of forest eco-systems through eco-development.
3. Ensure restoration of native ecological processes for sustainable ecosystem services.

6.3. Management Objectives

1. To protect the biodiversity richness of Sathyamangalam Tiger Reserve landscape and to undertake population monitoring of Tigers, its co-predators and prey in the Reserve on regular basis adopting approved protocols and methods.

2. To undertake proactive, preventive, site specific and dedicated action against major habitat degradation from anthropological pressures.
3. To manage eco-tourism and religious tourism and facilitate involvement of local population in landscape conservation through eco-development.
4. To encourage tribal consultation, to reduce dependence on the natural resources of the area and facilitate tribal development in the forest fringes.
5. To undertake required Research and Monitoring activities to enhance knowledge base about the biodiversity richness of the Reserve and to identify strategies for effective management of the Reserve.
6. To address human-wildlife conflict issues through public consultation and awareness by combining prevention and mitigation measures.

6.4. Problems in Achieving Objectives

The broad problems in achieving objectives and issues and the strategies to address the same are narrated below.

Objectives	Problems & Issues	Broad Strategies
1. To protect the biodiversity richness of Sathyamangalam Tiger Reserve landscape and to undertake population monitoring of Tigers, its co-predators and prey in the Reserve on regular basis adopting approved	1. Shortage of frontline staff & poor capacity of staff 2. Lack of equipment, fund & infrastructure 3. Lack of research support 4. Lack of appropriate scientific methodology & techniques.	a) Capacity and skill of frontline staff to be enhanced by periodical training b) Procurement of sufficient equipment and training the frontline staff. c) Trends in population of such species is monitored through Phase IV protocol prescribed by the NTCA a) Required research and monitoring is encouraged

Objectives	Problems & Issues	Broad Strategies
protocols and methods.		
2. To undertake proactive, preventive, site specific and dedicated action against major habitat degradation from anthropological pressures.	1. Poaching by local communities of prey and predators. 2. Long Inter- State porous border prone for poaching attempts 3. Lack of support of local people 4. Vast and tough terrain 5. Spread of exotics & invasive species 6. Considerable size of Eucalyptus plantations in Core Zone. 7. Lower economic & social status of local people 8. Frequent fire occurrences	a) Implementing eco-development activities b) Permanent anti-poaching camp at vulnerable locations c) Developing strong law enforcement mechanism. d) Enhancing capacity of staff and local people Effective and enhanced interstate coordination and dialogue e) Phased removal of invasive alien species and scientific restoration of native vegetation. f) Awareness generation& involving local communities in fire prevention & control and incentivizing local communities through eco-tourism. g) Improving infrastructure and facilities, in terms of quality and quantity h) Enhancing the skill & capacity of frontline staff
3. To regularize eco-tourism and religious tourism and to facilitate involvement of local population in landscape conservation through eco-development.	1. Areas for tourism are limited in the Reserve 2. Unregulated tourism in the name of pilgrimage visitations Local people's support to conservation is lacking 3. Absence of proper existing mechanism to regulate tourism. 4. Lack of infrastructure like accommodation, vehicles etc., to cater the needs of tourists.	b) Wherever feasible low impact eco-tourism will be attempted c) Local communities will be involved in the efforts and ensure benefit-flow d) Tourism will be regulated as per the Tourism Guidelines prescribed by the NTCA e) Necessary infrastructure such as dormitory, eco-huts, vehicles and other visitor facilities will be created in the adjacent revenue lands without affecting sanctity of the core zone. f) Existing and new committees will be formed and utilized to promote the tourism in tune with Eco-tourism policy and

Objectives	Problems & Issues	Broad Strategies
		guidelines prescribed by the NTCA.
4. To encourage tribal consultation, to reduce dependence on the natural resources of the area and facilitate tribal development in the forest fringes.	1. Poor understanding of local people about need of forest & wildlife conservation and the role they can play in the process 2. Support to conservation is inadequate.	a) Mass awareness and education activities are undertaken utilizing various media through active engagement of local and other experienced NGOs b) Publicity boards are erected at vantage locations c) Information materials are developed and distributed
5. To undertake required Research and Monitoring activities to enhance knowledge base about the biodiversity richness of the Reserve and to identify strategies for effective management of the Reserve.	1. Insufficient Research information 2. Monitoring of wildlife population is being done but use of robust method is to be followed 3. Technically qualified personnel are inadequate.	a) Research and monitoring agenda for the Reserve is developed through a consultative workshop recommendation on long and short term projects and mode of collaboration b) Proven and widely accepted methods and protocols are followed c) Required technical manpower like Biologist, ecologist and Sociologist are in place to assist the Reserve management
6. To address human-wildlife conflict issues through public consultation and awareness by combining prevention and mitigation measures.	1. Low rainfall coupled with fire during dry period aggravates the conflict situation 2. Large-scale invasion of exotic weeds and Eucalyptus plantations competes with ground flora and affect quality and quantity of fodder 3. Raising of preferred crops such as Banana, Sugarcane, coconut etc., along the peripheral agricultural fields	a) Improvement of habitat both in terms of fodder quality and availability of fodder &water during the pinch period b) Removal of exotic weeds in a phased manner c) Payment of timely & matching compensations to the affected parties d) Motivating farmers for crop pattern change e) Application of modern scientific studies and techniques to manage conflict issues. f) Economic uplifting of local people and discouraging feral cattle.

6.5. Strengths – Weaknesses – Opportunities – Threats (SWOT) Analysis

SWOT Analysis	
Strength	**Weakness**
- Affinity towards wildlife among tribal inspite of human dominated landscape - Large contiguous patch and Great Moyar Valley as landscape connectivity - Buffer as wildlife sanctuary - Landscape connectivity between rich Tiger habitats offering genetic exchange & genetic contiguity and dispersal opportunities. - Rich species diversity across diversified landscape. - Varied eco-system diversity - Perennial rivers & reservoirs / dams - Rich conservation history - Dedicated staff strength & existing infrastructure - Wildlife friendly tribal community - Low anthropogenic activities in interior patches - Existing JFM institutions in the landscape as a support to their income generation activities - Low Human – Wildlife conflict per unit area - Existing cultural heritage	- Anthropogenic activities / resource dependency in fringes - Linear intrusions - Low wildlife centric management infrastructure - Land Degradation & water scarcity - Invasive Weeds - Lack of awareness among communities for protected area management aspects - Religious activities - Hostile summer weather long pinch period - No sufficient database on past wildlife interactions with the habitats - Low Eco-tourism infrastructure - Water spread area of Bhavanisagar Dam with illegal cultivation - Vacancy in the cadre of frontline staff and lack of homogenous blend of experienced and young staff - Lack of data base on wildlife dynamics, flora and human dimensions. - Presence of more number of enclave villages
Opportunities	**Threats**
- Starting afresh, building strong foundations towards protected area management associated eco-development - Opportunity of investment on key strategic needs of local people in enclaves of sanctuary - Building a strong wildlife cadre with wildlife centric infrastructure, capacity building of staff and conservation awareness among all stake holders - Providing key role to the communities by creation of alternative employment opportunities through protection, planned eco-development & eco-tourism. - Already existing biological diversity, a clear show piece - Developing landscape wildlife & cultural tourism in a scientific way - Bringing about scientific wildlife conservation practices - Tiger foundation trust – a key tool in enhancing management efficacy through generation of revenue to meet exigent conservation field requirements	- Retrofitting existing activities in conservation framework - Invasive Alien species and loss of fodder to wild animals - Mostly man-made fire due to their belief and myth - Presence of quarries - Linear intrusions – National Highways 209, State Highways and other major roads - NTFP collection - Poaching for bush meat - Luring from external traders and middlemen for trophies and meat - Grazing, stray cattle and fuel wood needs - Habitual offenders and their connectivity across states for wildlife trade - Encroachment

Chapter. 7. Management Strategies

7.1. Delineation of Critical Wildlife Habitats and Inviolate Areas

The proposal for formation of committee to declare critical wildlife habitat and inviolate areas in Sathyamangalam Tiger Reserve has been sent vide Chief Conservator of Forests & Field Director, Sathyamangalam Tiger Reserve's Ref. No. D/1194/2018, Dated: 07.03.2018 & 12.06.2018 and proceedings of the Principal Chief Conservator of Forests & Chief Wildlife Warden for for the formation of the committee is received vide Ref. No.WL5/5077/2018, Dated: 06.08.2018. Necessary delineation process have been initiated and the conditions of critical wildlife habitats and inviolate areas as per the FRA guidelines will be adhered accordingly.

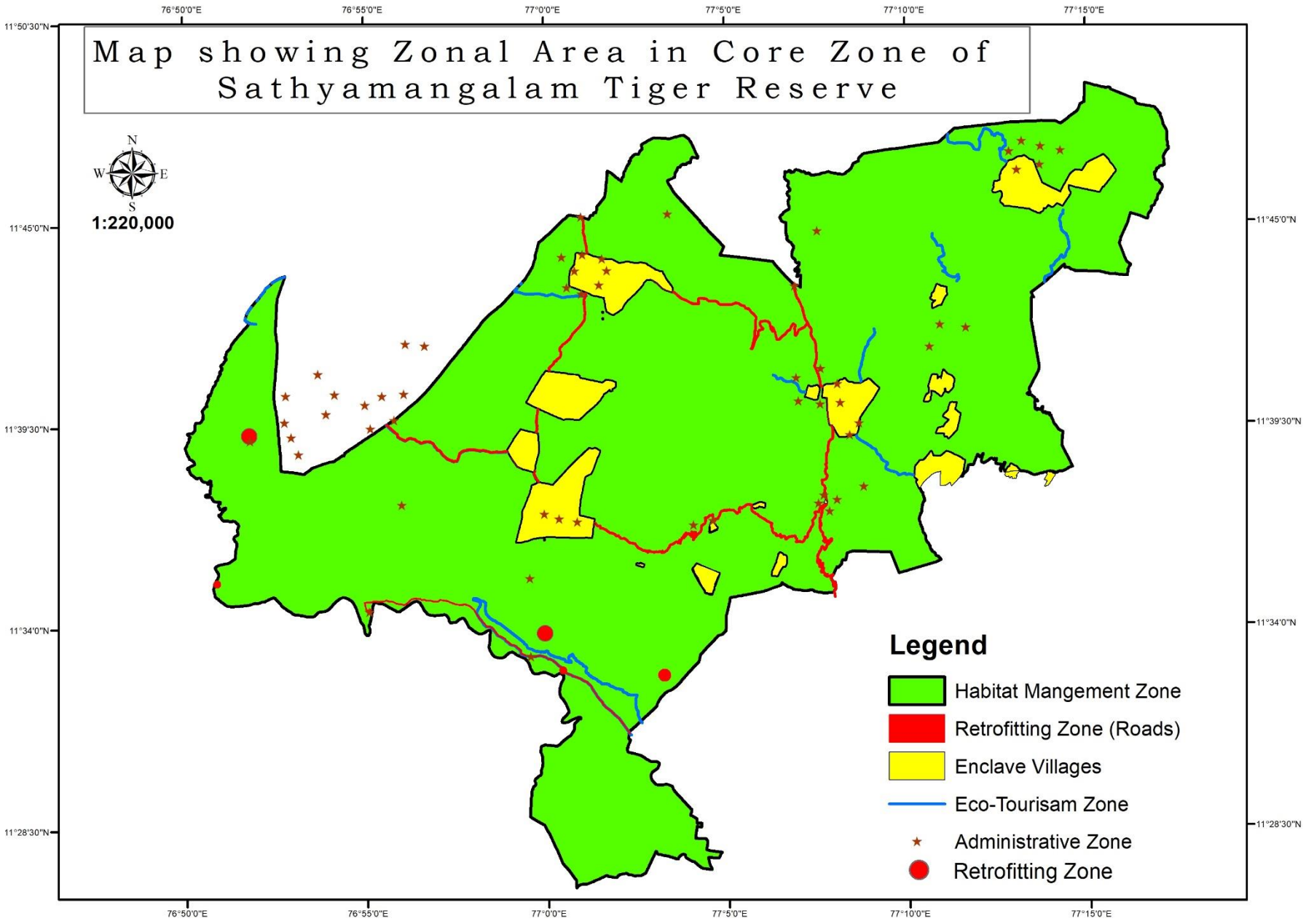
7.2. Zone and Theme Approaches to Management Strategies

A zone is an area wherein management strategies, distinguishable on account of its objectives, will be applied. Thematic execution of strategies would be encompassed into Theme plans, which would be overlapping in distribution. Existing vegetation types, present management practices, distribution of prey and predators are considered while defining / delineating different zones.

7.2.1. Zone Plans

The Zonation plans will have exclusive areas for management. In order to maintain the integrity of critical wildlife habitat and to make the core inviolate for maintaining the source population of Tigers, following five zones are proposed in the Core Zone for the period ten years from 2019-2020 to 2029-2030.

1. Zone plan for Habitat management
2. Zone plan for Retrofitting measures
3. Zone plan for Eco-tourism
4. Zone plan for Administrative zone
5. Zone plan for Enclaves & zone of Influence


Map showing Zonal Area in Core Zone of Sathyamangalam Tiger Reserve
N
W
E
S
1:220,000
76°50'0"E
76°55'0"E
77°0'0"E
77°5'0"E
77°10'0"E
77°15'0"E
11°50'30"N
11°45'0"N
11°39'30"N
11°34'0"N
11°28'30"N
Legend
Habitat Mangement Zone
Retrofitting Zone (Roads)
Enclave Villages
Eco-Tourisam Zone
Administrative Zone
Retrofitting Zone

Details of area covered under Zone plan:

Sl. No.	Name of the Zone plan	Area covered in Ha
1.	Zone plan for Habitat management	76729
2.	Zone plan for Retrofitting measures	1165
3.	Zone plan for Eco-tourism	350
4.	Zone plan for Administrative zone	75
5.	Zone plan for Enclaves & zone of Influence	1030
	Total area	**79,349**

Core Zone: -

Area of the Core Zone of Sathyamangalam Tiger Reserve is 79,349.331 ha. The status of entire land comprising the Core area is Reserve Forests which was declared under Sec. 16 of Tamil Nadu Forest Act, 1882 as early as 1896. Core Zone is formed by three Reserve Forest blocks namely, Guthiyalathur (Part), Talamalai (Part) and Nilgiri Eastern Slope.

There are 11 tribal enclave hamlets and 7 tribal settlements located within the Core zone of the Tiger Reserve that are legally notified as Reserve Forests and part of Sathyamangalam wildlife sanctuary; For these settlements, 274.599 ha of forest land was excluded from notification of Tiger Reserve. In the recent land survey conducted for settlement of claims under Tribal Rights Act, 2006, it is found that 306.89 ha of reserve forest land is in their traditional possession and the same is being subjected to processes laid down under FRA and yet to reach statutory culmination.

The Tiger Reserve shares its Eastern boundary with Erode Forest Division, North-Western boundary with MM Hills Wildlife Sanctuary (erstwhile Kollegal Forest Division) and Northern boundary with Biligiri Rangasamy Tiger Reserve. Nilgiri North and Coimbatore Divisions are on the Southern side, separated by the perennial river Moyar which runs along the Moyar gorge.

7.2.1.1. Zone Plan for Habitat Management: -

As per the guidelines of NTCA, the approach to habitat management intervention is classified based on the tiger occupancy, diversity of habitats, prey base availability, invasion of exotic plants into the tiger habitat, etc.,

The zone plan for habitat management will apply to the entire core zone of the Tiger Reserve. The habitat of the Sathyamangalam Tiger Reserve at present remains largely degraded due to various historical factors. This area was declared as wildlife sanctuary only in the year 2011 and no wildlife centric management has been undertaken until then. The entire habitat in the core zone is affected by various degradation drivers and systematic efforts have to be undertaken to restore the habitats to its native state.

Habitat management measures will be taken up to restore the habitats to its optimal state of function. As discussed earlier the potential tiger population is 115 i.e. almost double of the present population status. For this purpose the habitat which has got great potential to hold higher prey base needs to be treated with various management actions.

The critical issues that require management intervention and treatment for habitat improvement are identified as

7.2.1.1.1. Invasive species removal,

7.2.1.1.2. Water management,

7.2.1.1.3. Soil & moisture conservation,

7.2.1.1.4. Fire management (mentioned in detailed under Chapter 10.4).

7.2.1.1.5. Artificial regeneration.

7.2.1.1.1. Invasive / Exotic Species removal

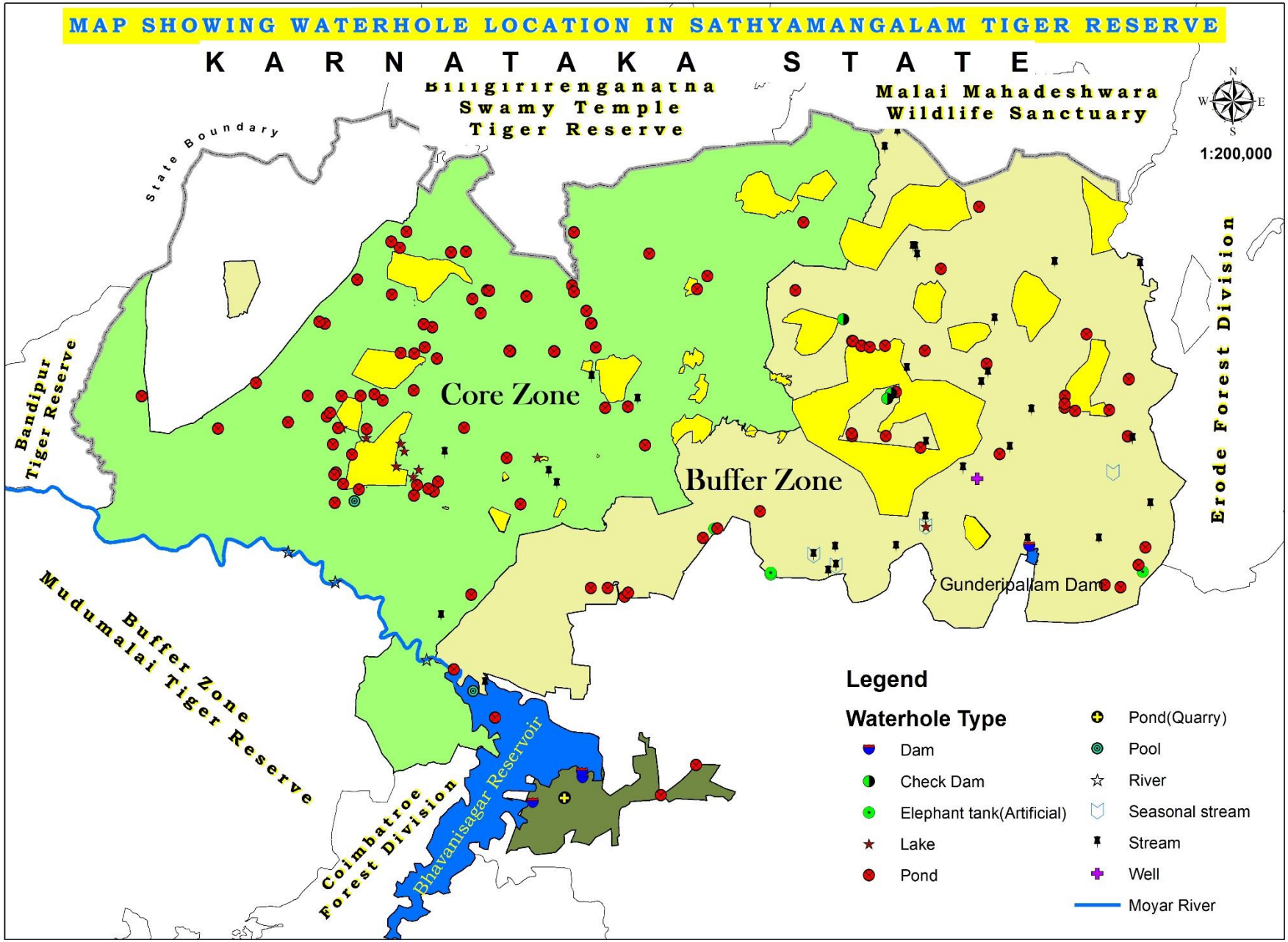
The habitat in the core zone is severely stressed by the occupation and expansion of invasive alien species. In this 5 year plan it is proposed to take measures to eliminate these invasive alien species which are a great threat due to factors such as habitat degradation due to excessive land scape incompatible, wiping out of native biodiversity, wiping out of native fodder species, physical barriers for movement of wild animals, fire hazards, thick barrier for vultures to identify their prospective carcass, severe stress habitat availability of angulates over which the predator population depends and scope of future invasion of virgin forest areas.

The invasive species targeted during the five plan are, 1. *Prosopis juliflora* (mesquite), 2. *Lantana camera* (mukkuthi poo), 3. *Opuntia dillenii* (chappathi kalli), 4. *Senna spectabilis, 5. Eupatorium odaratum, 6. Parthenium* spp and in addition to the above eucalyptus species which is an exotic but non-invasive, will also be treated under zone plan.

As invasion of exotic species is the major threat to the present habitat all possible efforts will be taken to reduce the spread of exotic species and to refill the available space with palatable native grass and fodder species. VFC & EDC intervention will be encouraged to remove exotic weeds on regular basis so as to create employment opportunities to Forest dependent villages as well as provide opportunity for earning additional income to such village organizations. The role of Tiger Conservation Foundation will also be encouraged to facilitate the weed removal process as well as to try options for creating opportunities for regular income to Foundation. A strategic plan to harvest maximum ecological benefit from such resources.

7.2.1.1.2. Water Management

This zone experiences very dry conditions during most part of the years. Except for the perennial Moyar River and a few water holes, most of the other water sources and waterholes are dry during most part of the year. All efforts towards strengthening the perennial water sources (both lentic and lotic) will be taken to upkeep the important source of survival for wild animals. In addition, all possible efforts will be encouraged to add more artificial water bodies to facilitate even spread of water sources all over the Forest area to provide water rich environment for wild animals. It will also be addressed to ensure regular maintenance of both artificial and natural water sources to ensure better use of available resources.


MAP SHOWING WATERHOLE LOCATION IN SATHYAMANGALAM TIGER RESERVE
K A R N A T A K A S T A T E
Biligirirenganatna Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
State Boundary
1:200,000
Bandipur Tiger Reserve
Core Zone
Buffer Zone
Erode Forest Division
Gunderipallam Dam
Buffer Zone Mudumalai Tiger Reserve
Coimbatroe Forest Division
Bhavanisagar Reservoir
Legend
Waterhole Type
Dam
Check Dam
Elephant tank(Artificial)
Lake
Pond
Pond(Quarry)
Pool
River
Seasonal stream
Stream
Well
Moyar River

7.2.1.1.3. Soil Erosion Control & Moisture Conservation Management

The soil on the upper slopes of Talamalai RF, especially in the degraded, alkaline areas, show lot of erosion of the top soil resulting in rill formation and subsequently gully formations. The problem is more obvious in Northern portion of Moyar Valley. Therefore, prevention of loss of soil and conservation of water remains one of the important objectives in this sub-zone. It should be a primary objective to treat the watershed in such a manner so as to maximize prevention of loss of soil and conserve water. Therefore, it is prescribed for holistic treatment of micro watersheds in this zone with various vegetative and mechanical means to achieve the objectives of stabilizing the watershed by preventing loss of soil and by improving the vegetation. Gully control by forming contour bunds, compartmental bunds, vegetative barriers, check dams, percolation ponds, causeways are some of the measures to be carried out to ensure soil moisture conservation in the area.

7.2.1.1.4. Artificial Regeneration

Artificial regeneration prescribed in this zone is mainly for the resurrection of degraded habitats. The regeneration works to be taken up will contribute much to the establishment of well-treated watershed and for Prosopis removed areas. Thus the treatments proposed in these zones are for the better habitat management. The following planting programmes are proposed generally.

In the degraded forests, especially slopes, gap planting with water catchment drains will be taken up to recreate all native vegetation and for fodder plants. In the other potentially productive areas, suitable package of practice will be followed to raise vegetation that yield fruits for wildlife and to aid natural regeneration to improve the health and vitality of the forests. If needed, irrigated plantations of vital species may be may be taken upon trial basis.

Native fodder species, bird nesting species, native species which are locally extinct like sandal will be selectively regenerated separate measures will be undertaken to develop grass lands and grass meadows etc.,

7.2.1.2. Zone Plan for Retrofitting Measures:

7.2.1.2.1. Special Task Force Training Camp:

Special Task Force an organization created in Mangalapatti to an extent of 1 ha area with the prime objective of nabbing the notorious forest brigand Veerappan. STF has succeeded in this job with execution of “operation cocoon” in the year 2004. After that, STF has gradually transformed into a specialized training institution in Jungle operations. There is a training camp with tents and other infrastructure at Mangalapatti on the banks of the river Moyar. Camera trap studies reveals that forest areas of Mangalapatti and Gejalatti are home for 16 different Tigers in this landscape. In the interest of conservation of Tigers and other endangered wildlife like Hyena, Vultures and Leopard this STF’s camp must be shifted to a new area of buffer zone of Sathyamangalam Tiger Reserve or Mudumalai Tiger Reserve and present infra-structure must be totally dismantled in due course. Action has already been initiated by Principal Chief Conservator of Forests to address the Government on this issue and that shall be followed up vigorously.

7.2.1.2.2. Retrofitting TNEB assets & field station at Gejjalatty

1. A field station was established during the year 1952 in area of 0.72 ha in Bhavanisagar Range limits. This has become a serious source of disturbance by giving space for anti-social elements to stay and operate and also to the wildlife due to its strategic location in core. At present there are 3 staff quarters that are vacant out of the total 4, these vacant quarters either to be dismantled or to be handed over to Forest Department for protection purposes.

2. Tower lines of power transmission run through the core zone of the Tiger Reserve adequate safety measures and ground clearance as per various statutory need to be under taken by the TNEB so as to prevent any accidental death / injury of wildlife.

7.2.1.2.3. Retrofitting linear intrusions

The Tiger Reserve is bisected (South to North and East to West) by main roads that link to major highways / Sathyamangalam – Bannari Road. The traffic is extremely heavy along these roads. Animals cross these roads on a daily basis for food and water and as such there is a need to address the need for animals to cross these roads.

These roads also are the cause of several road kills of wild animals and many animals have died in the past. The problem can be addressed through the use of over-passes or under-passes at critical locations and also by limiting speed and regulating traffic at night on certain roads. Any further expansion of the road network or a major increase in traffic can be detrimental to the conservation of Tiger Reserve owing to predictable increase in movement of vehicles. The entry and exit of vehicles will be noted for all reference and regulations.

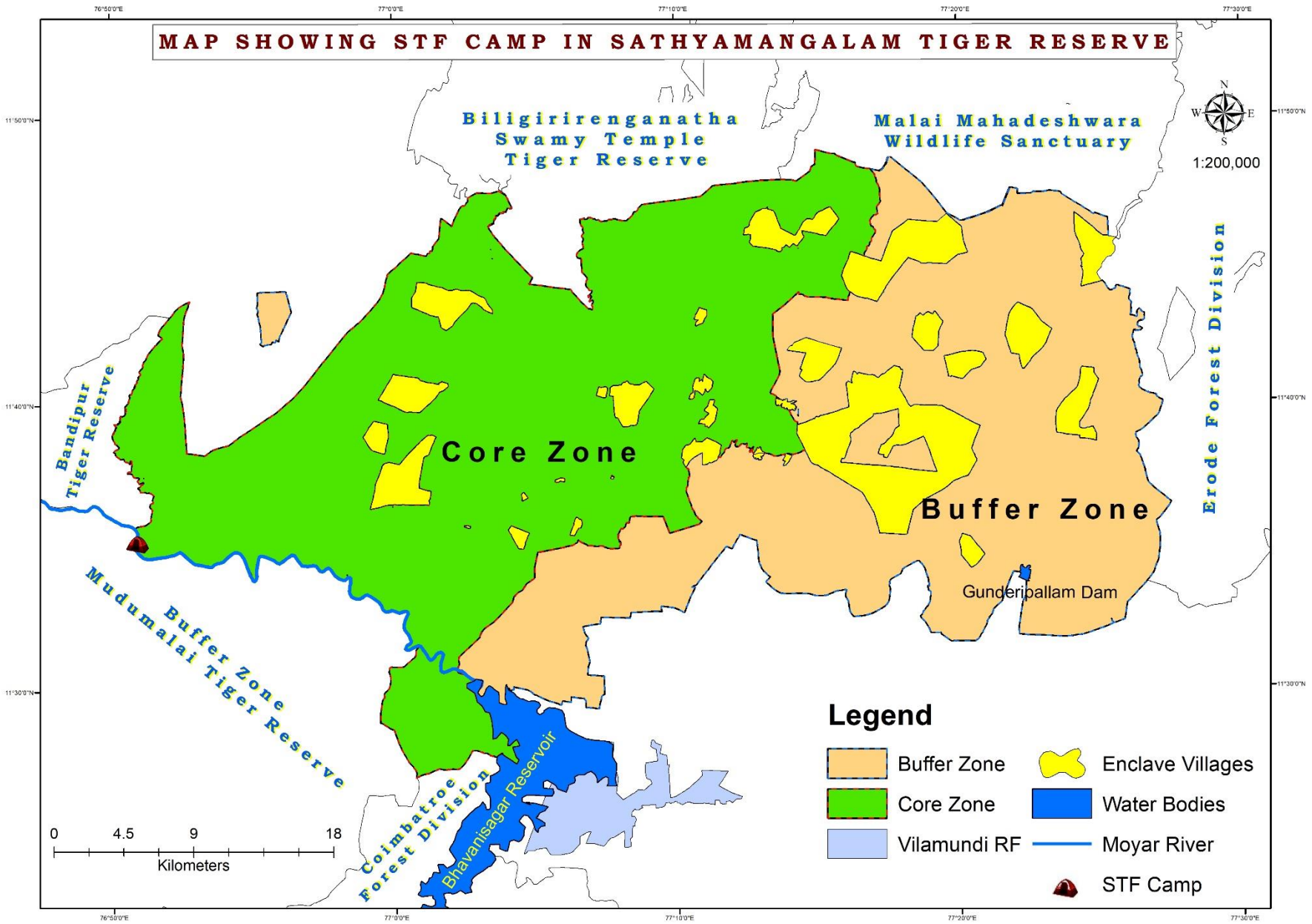
In the recent period due to continuous persuasion with the District Administration regarding the requirement for regulating road traffic in Bannari – Dhimbam – Hassanur (Karapallam) NH 209, District Gazette notification has been published on 23 November 2018 and 07 January 2019 to have conditions for vehicle movement as well as for collecting entry fee for the vehicles using Tiger Reserve area. All the critically located check posts in the Tiger Reserve are now having CCTV camera facility as well as IVS (Intelligence Video Surveillance) systems for intensive 24X7 monitoring of entry and exit of vehicles and outsiders. It would be very much relevant to upgrade and strengthen the monitoring technology along all the linear developments inside the Tiger Reserve to have better control over vehicle movement as well as outsiders.

Wildlife Institute of India, Dehradun's guidelines on Eco-friendly measures to mitigate impact of Linear infrastructure on wildlife may be followed. The major linear infrastructures available in Sathyamangalam Tiger Reserve are as follows.

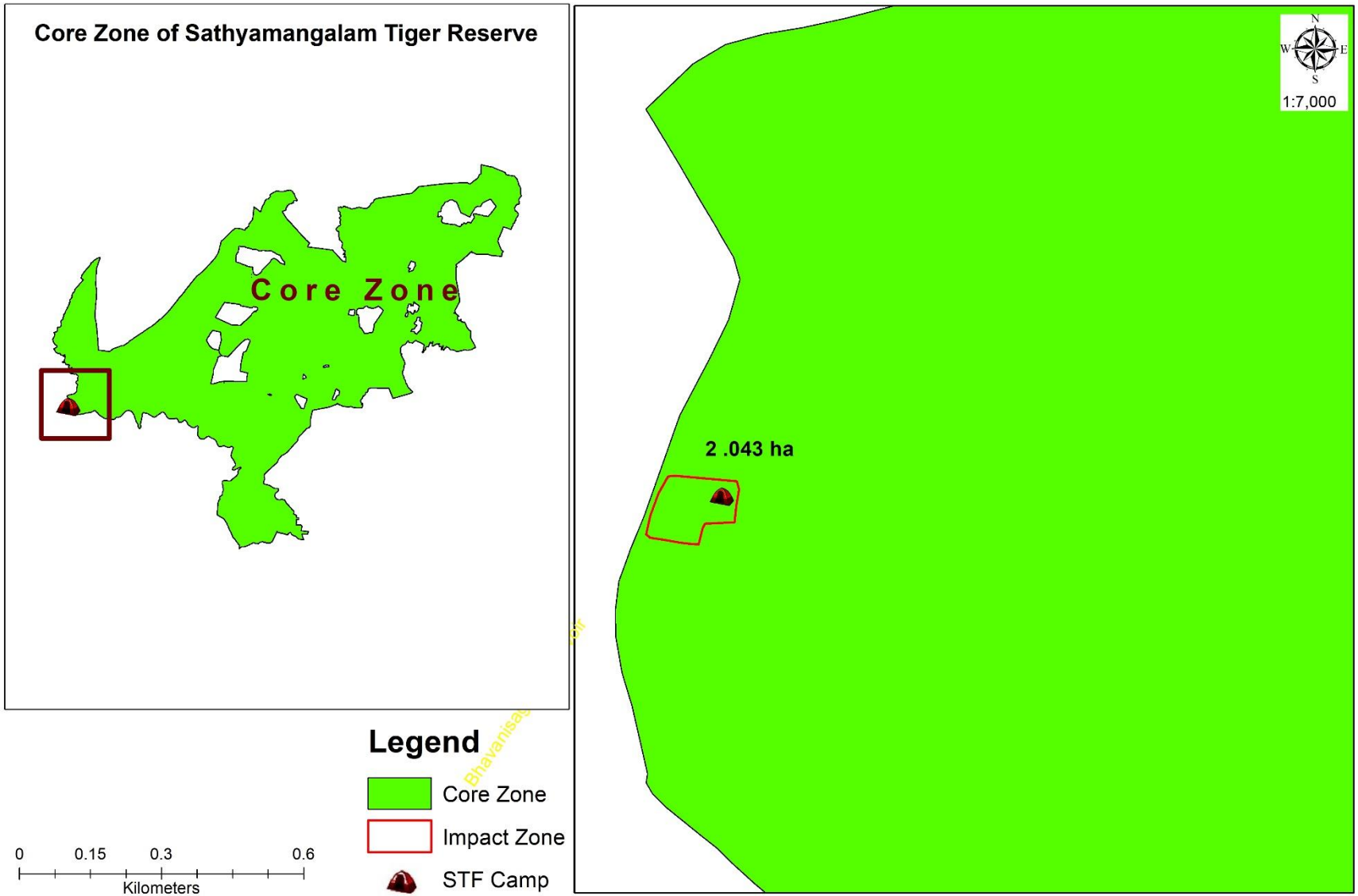
Sl. No.	Name of the Road	Total length	Impact width	Total area
1.	National Highway 209	28 km	100 m	280 ha
2.	Dhimbam to Talamalai	24 km	100 m	240 ha
3.	Sujjalkuttai to Thengumarahada	28 km	100 m	280 ha
4.	Sujjalkuttai to Kallampalayam	15 km	100 m	150 ha
5.	Kollegal – Mavallam to Kottadai	29 km	50 m	145 ha
6.	Kumbaragundi to Talawady	8 km	50 m	40 ha
7.	Talawady to Neithalapuram	6 km	50 m	30 ha
	Total	**138 km**		**1165 ha**

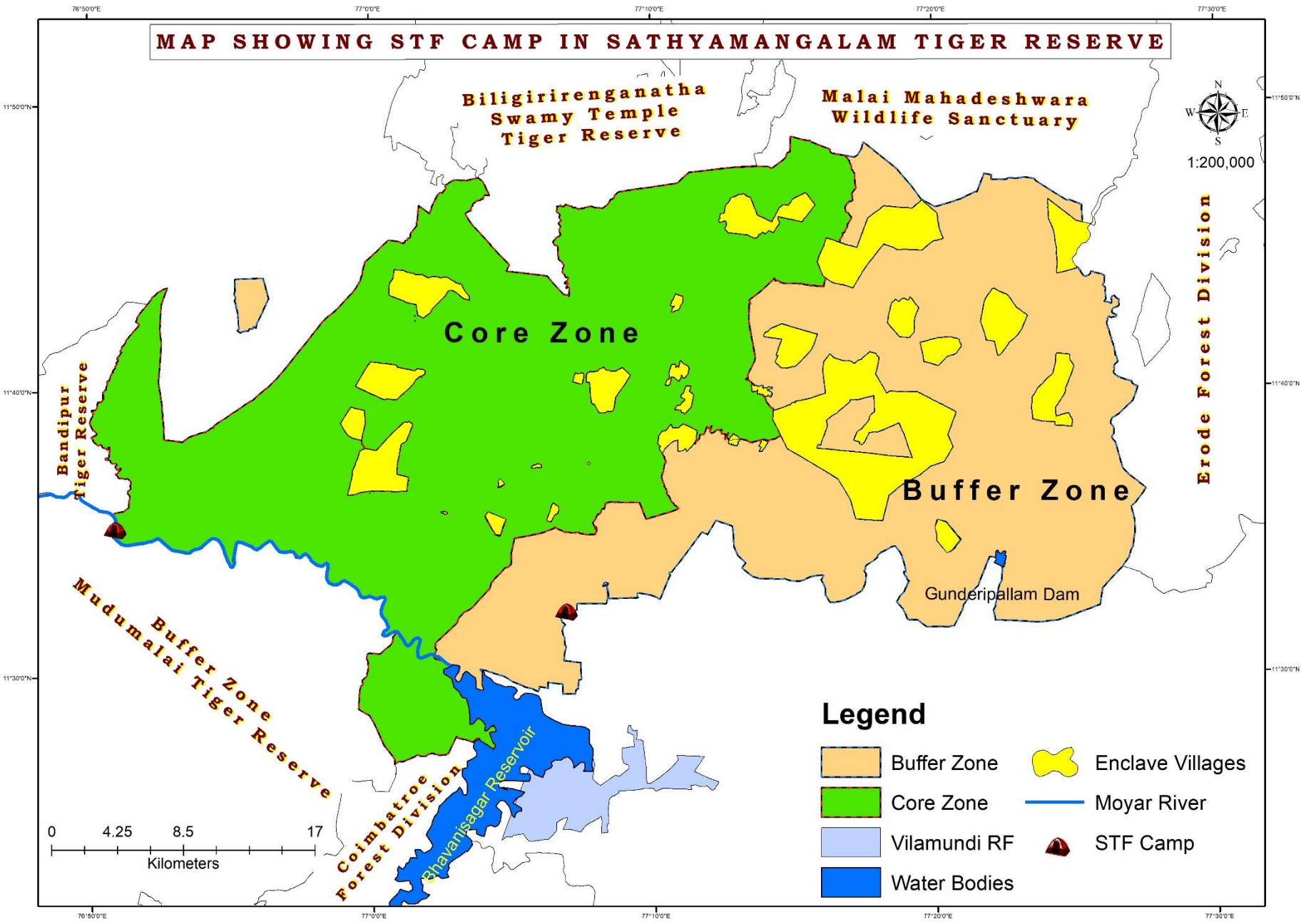
7.2.1.3. Zone plan for Eco Tourism

As per the guidelines issued by the **NTCA** under section 38O(1)(c) of the Wildlife (Protection) Act, 1972, dated 15th October 2012, in the Preamble has been mentioned that, Tourism in the form of ecotourism has **the potential to enhance public awareness, education, and wildlife conservation, while providing nature-compatible local livelihoods and greater incomes** for a large number of people living around natural ecosystem which can help to contribute directly to the protection of wildlife or forest areas, while making the local community stake holders and owners in the process, and vide 1.3 it has been stated that, "1.3 **Tourism, when practiced appropriately, is an important economic and educational activity**. It has the scope to link to a wider constituency and build conservation support while raising awareness about the worth and fragility of such ecosystems in the public at large. It also promote the non-consumptive use of wilderness areas, for the benefit of local communities living around and dependent on these fragile landscapes. A detailed Eco-tourism plan is dealt in Chapter 11 of Core Zone plan.


MAP SHOWING STF CAMP IN SATHYAMANGALAM TIGER RESERVE
Biligirirenganatha Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
Erode Forest Division
Bandipur Tiger Reserve
Core Zone
Buffer Zone
Gunderipallam Dam
Mudumalai Tiger Reserve
Buffer Zone
Coimbatroe Forest Division
Bhavanisagar Reservoir
1:200,000
0 4.5 9 18
Kilometers
Legend
Buffer Zone
Core Zone
Vilamundi RF
Enclave Villages
Water Bodies
Moyar River
STF Camp

MAP SHOWING STF CAMP IMPACT ZONE IN SATHYAMANGALAM TIGER RESERVE




MAP SHOWING STF CAMP IN SATHYAMANGALAM TIGER RESERVE
Biligirirenganatha Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
Core Zone
Buffer Zone
Bandipur Tiger Reserve
Erode Forest Division
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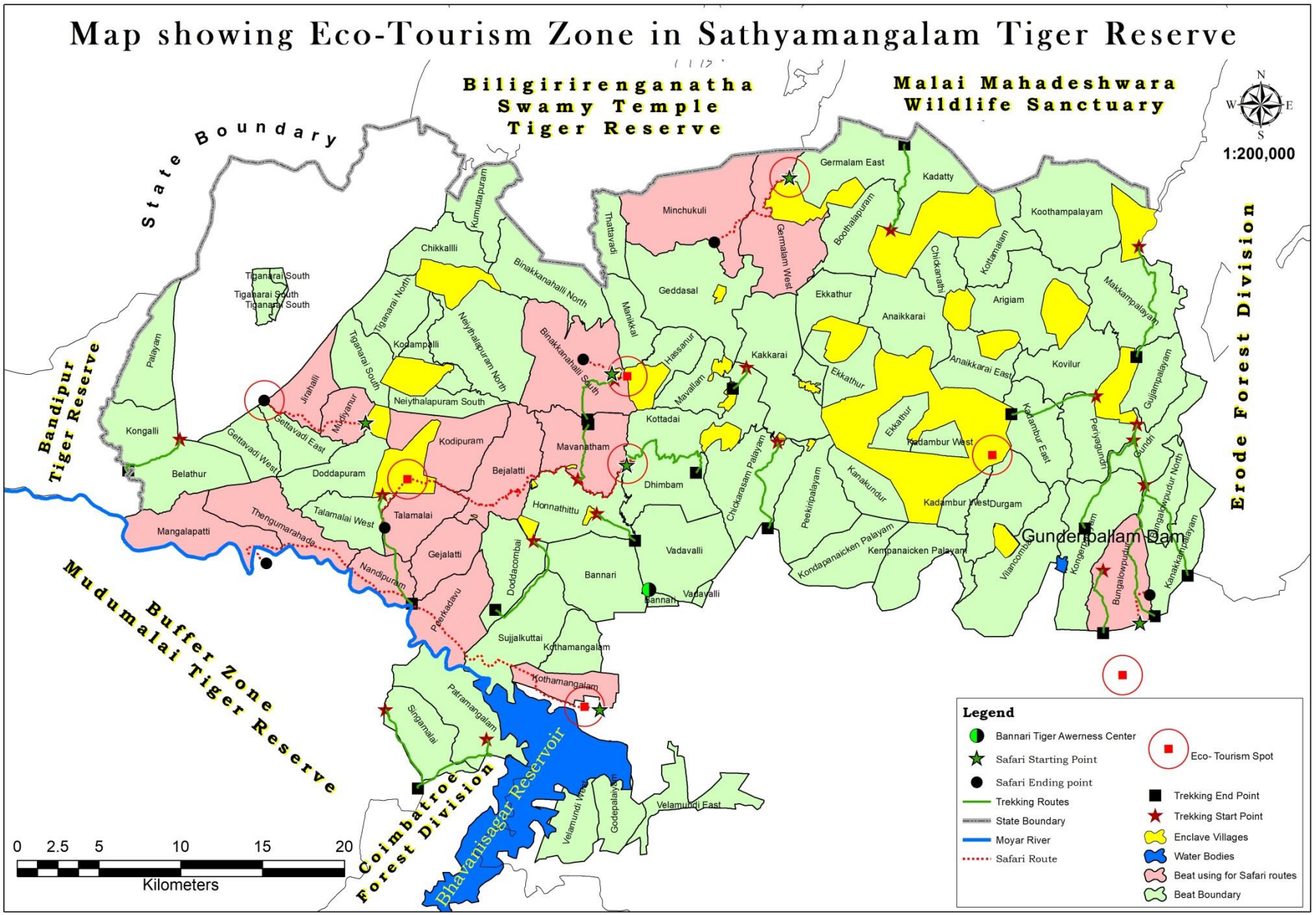
Buffer Zone Mudumalai Tiger Reserve
Coimbatroe Forest Division
Bhavanisagar Reservoir
1:200,000
0 4.25 8.5 17
Kilometers
Legend
Buffer Zone
Core Zone
Vilamundi RF
Water Bodies
Enclave Villages
Moyar River
STF Camp


Map showing Eco-Tourism Zone in Sathyamangalam Tiger Reserve
Biligirirenganatha Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
State Boundary
Bandipur Tiger Reserve
Mudumalai Tiger Reserve
Buffer Zone
Coimbatore Forest Division
Erode Forest Division
Bhavanisagar Reservoir
Gundenpalam Dam
N
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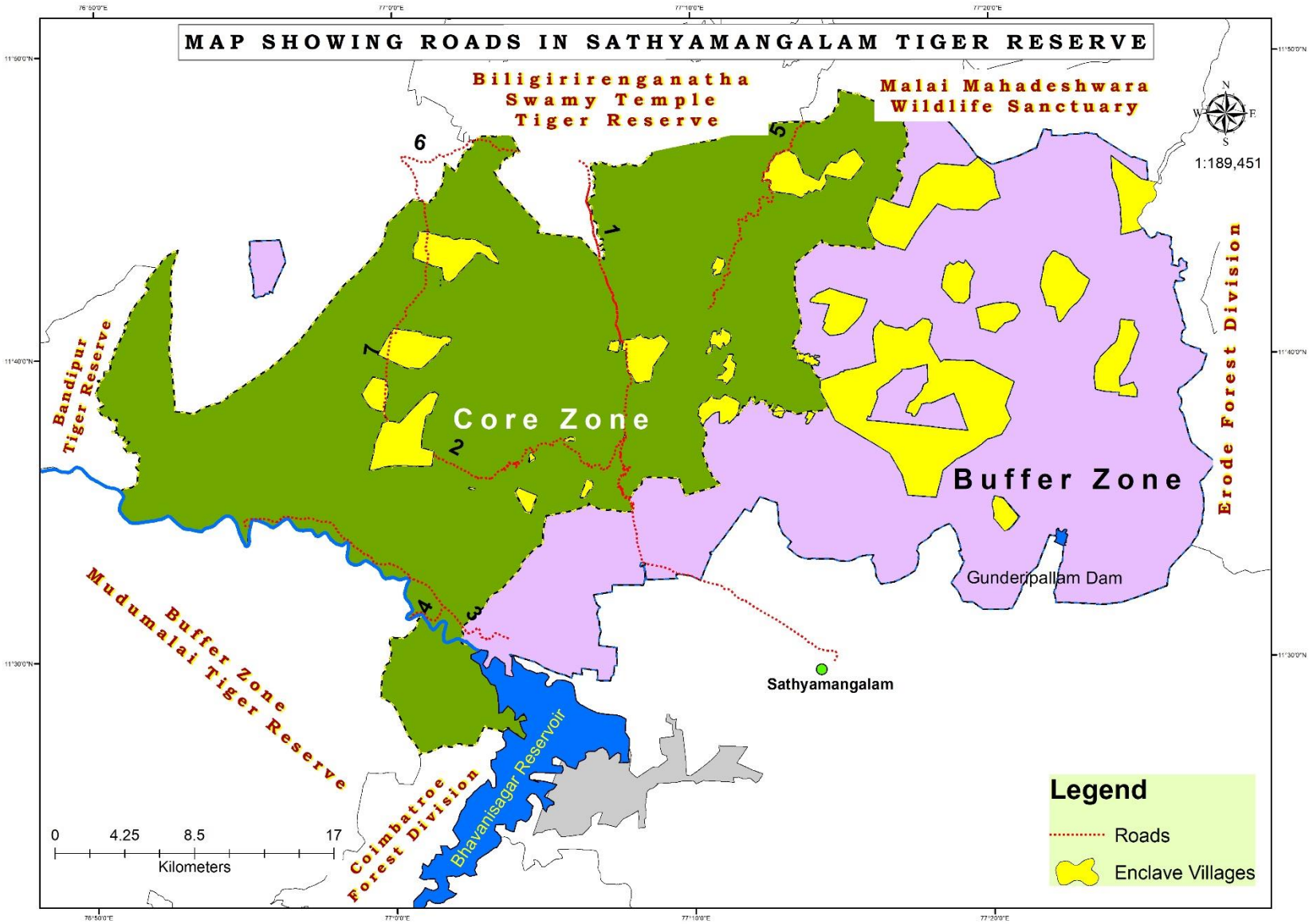
1:200,000
0 2.5 5 10 15 20
Kilometers
Legend
Bannari Tiger Awerness Center
Safari Starting Point
Safari Ending point
Trekking Routes
State Boundary
Moyar River
Safari Route
Eco- Tourism Spot
Trekking End Point
Trekking Start Point
Enclave Villages
Water Bodies
Beat using for Safari routes
Beat Boundary



1.	National Highway 209	2.	Dhimbam to Talamalai	3.	Sujjalkuttai to Thengumarahada	4.	Sujjalkuttai to Kallampalayam
5.	Kollegal – Mavallam to Kottadai	6.	Kumbaragundi to Talawady	7.	Talawady to Neithalapuram		

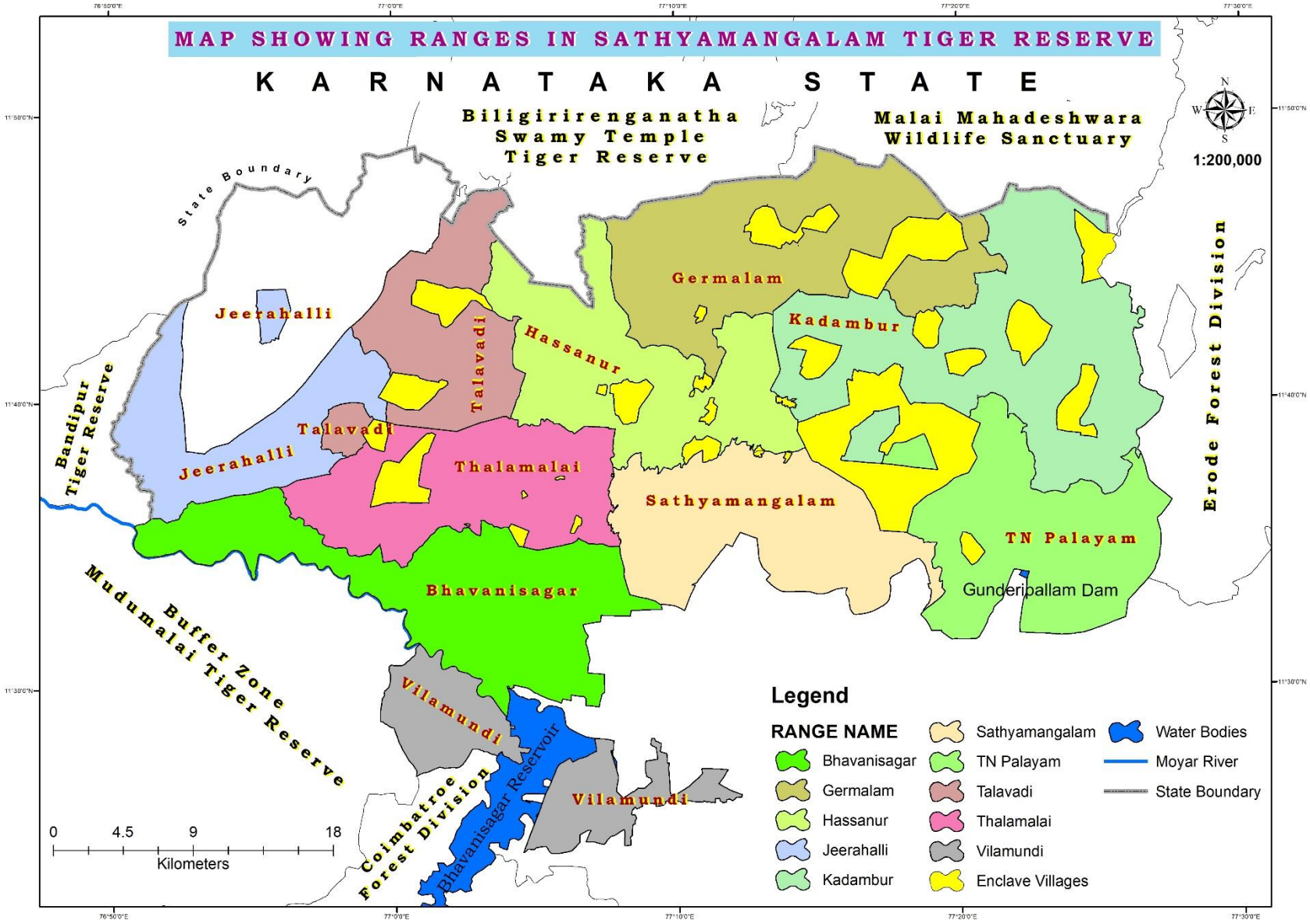
7.2.1.4. Zone Plan for Administrative Zone

Recently, after bifurcation of the existing 10 Forest Ranges in STR, the number of Ranges in the Sathyamangalam Tiger Reserve has increased to 14 Nos. from 01.04.2019. Presently, 10 number of territorial Ranges, 2 Eco-development Ranges and 2 Squad Ranges are existing in Sathyamangalam Tiger Reserve. The basic required infrastructure for Range office, Forest Range Officer and Staff quarters are to be made available for all Ranges to facilitate staying of field team in headquarters and perform their field duties efficiently. In addition, it is also required to provide conveyance infrastructure such as vehicles, camper, water tankers to all Divisions for better performance.

The present infrastructure is grossly inadequate and new staff quarters, training centres, meeting halls, office buildings, inspection sheds, dormitories, rest houses, staff recreation centre, staff canteen along with up-gradation of approach path, adequate fencing, support facilities like water, electricity, car sheds, bus sheds, vehicle sheds, approaching roads etc., are to be created. For instance, there is no range and staff quarters accommodation in Sathyamangalam, Talamalai, Germalam, the same has to be built on priority basis. Annual maintenance of the infrastructure & other assets in the administrative zone are a must and must be carried out on priority.

Purchase of computers & peripherals, software, photo copier, printers, office store necessities, projectors, sound systems, broadband facilities, data cards, mapping software like Arc GIS, provisions for stationary in all Ranges, Deputy Director's office, Field Director's office is to be made as per requirement every year.

For functioning of office of Field Director, Deputy Directors, Forest Range Officers, Monitoring Cells, Veterinary Units, Foundation office and other official units, engaging of computer operators, qualified data entry operators, technical assistants, biologists, research assistants, drivers, rest house cooks, night security and other contract staff needs to be regularly engaged for functioning of administrative matters and the existing provisions should also be continued. Further, provision for maintenance of software, computers & peripherals is highly essential with regular budget allocation.


MAP SHOWING RANGES IN SATHYAMANGALAM TIGER RESERVE
K A R N A T A K A S T A T E
Biligirirenganatha Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
State Boundary
Bandipur Tiger Reserve
Jeerahalli
Talavadi
Hassanur
Germalam
Kadambur
Thalamalai
Sathyamangalam
TN Palayam
Bhavanisagar
Vilamundi
Erode Forest Division
Gunderipallam Dam
Mudumalai Tiger Reserve
Buffer Zone
Coimbatroe Forest Division
Bhavanisagar Reservoir
1:200,000
0 4.5 9 18
Kilometers
Legend
RANGE NAME
Bhavanisagar
Germalam
Hassanur
Jeerahalli
Kadambur
Sathyamangalam
TN Palayam
Talavadi
Thalamalai
Vilamundi
Enclave Villages
Water Bodies
Moyar River
State Boundary

7.2.1.5. Zone plan for enclaves & zone of influence

All revenue villages adjoining the core are part of zone of influence, they need to be incorporated as a major stake holder in park management. Regular trainings and meetings have to be held with major stake holders like farmers, women, students, teachers, media, few NGOs, temple priests, tourists and others time to time. Permitted – Regulated need to be covered.

There are about 11 tribal enclave hamlets and 7 tribal settlements inside the Core Zone of Tiger Reserve where about 1,088 families reside. These hamlets cover an area of 12,637.90 ha of patta lands and 306.89 ha of forest lands under their possession. In addition to this, 16 enclave villages are located within the core zone as separate revenue enclaves.

Apart from this there are about 140 villages falling in the 5 km periphery of Tiger Reserve boundary. The details of their resource dependency are explained in Para Chapter V, 5.2, 5.3 and population details of each hamlet is given in Table 5.5, Table 5.6, Table 5.7.

Sl. No.	Details	No.	Area (in ha)	Families	Population
1	Revenue Villages (Non-tribal)	16	4,270.99	2,281	8,155
2	Tribal hamlets (Revenue Villages)	11	12,637.90	732	3,044
3	Tribal hamlets (Reserve Forests)	7	306.89	356	1,427

All these enclosures and villages are given specific rights during reserved forest notification like Right to Places of Worship, Right of Way to settlements, enclosures & connecting adjacent villages, Right of way to burial grounds in few enclosures, Right to water from River Moyar and other specific rights in few cases. The list of gazette notification copies with rights for all reserved forests in Sathyamangalam Tiger Reserve is enclosed as Appendix 11.

Resource dependency on core area for NTFP collection by the villagers will be discouraged with development of alternative livelihood opportunities. At present, employment opportunities for tribals are restricted to fire tracing works during December to March and few are employed as Anti-poaching watchers, Eco Sanitary

Watchers, tiger & elephant trackers, Eco Watchers, Fire watchers, Eco tone watchers, etc.,

In future, they can be engaged as eco-guides, drivers, interpretation centre maintenance staff, reception staff, catering, trekking guides, etc., Further, both existing & newly formed eco-development committees should be given financial assistance every year through different projects, funding agencies for supporting income generation activities like vermi composting, apiary, mushroom cultivation, disposable containers manufacturing, lantana furniture manufacture, value addition of raw materials for consumable & non-consumable items, art & hand crafts etc. Wherever applicable the forest right act needs to be implemented in the enclave villages. Grazing needs to be eliminated in the longer run by series of measures such as awareness creation and alternate income generations in addition to supporting agricultural development. The agricultural activities in this enclave villages need to be undertaken in a compatible manner so that wildlife are not in any way affected. In the long run voluntary relocation of tribal villages of the enclosed villages need to be considered, wherever villagers come forward. These villages also will be supported by the Tiger Reserve management to deal with the human wildlife conflict in a scientific manner. A close watch needs to be kept on the developmental activities and land use changes in these villages to ensure that no developmental activities is detrimental to the objectives of the conservation. Massive awareness needs to be created in the revenue villages regarding the need for conservation of Tigers in this landscape and the role of communities in development of STR.

It is essential to involve local communities, especially from the tribal populations living in these villages in protection of Tiger Reserves by way of eco development initiatives. Existing village level JFM institutions created under Tamil Nadu Afforestation Project and NAP, the tribal VFC committees for NTFP collections, will be the tool for engaging communities in conservation. The role of the JFMCs in conservation of the landscape has been dealt in detail in chapter no.8.1 in buffer zone plan. The same is applicable here. Wherever required new eco-development committees will be formed.

7.2.1.5.1. Zone plan for Consolidation

The Sathyamangalam Tiger Reserve is has enclaved many villages inside its Tiger Reserve area and also surrounded by number of villages. Because of such large number of villages in and around Tiger Reserve, the possibilities of poaching, encroachment and other illegal activities will be high. Hence, it is highly required to demarcate the boundary of the Tiger Reserve that it shares with fringe villages in and around Tiger Reserve. For this purpose, a detailed beat level study is required by utilizing satellite imaginery data and intense field survey. Intense field survey includes collection of Patta, Chitta adangal, A register & B register for all the villages in the forest fringes so as to create Beat document. Also, apart from utilizing satellite images it is also required to undergo drone base studies and survey studies at the Forest boundary.

7.2.2. Theme Plans

Management action aimed in achieving the Tiger Conservation Plan's mandate for STR is being classified under the following major themes. Following Theme Plan is proposed to be included:

- Theme Plan for Protection
- Theme Plan for Tiger Monitoring
- Theme Plan for Conservation of Elephant corridors
- Theme Plan for Endangered species conservation

7.2.2.1. Theme Plan for Protection

This theme plan covers entire core area of 793.493 km^2. Protection is the topmost priority of management of Sathyamangalam Tiger Reserve. STR being the largest wildlife sanctuary in the state and flanked by forest and non-forest patches of Karnataka and forest and non-forest patches of Coimbatore and Nilgiris District is very vulnerable from the protection point of view. **STR is also vulnerable for poaching as it is the most human dominated Tiger landscape of Tamil Nadu.**

A unique and hitherto successful approach to protection in STR has been the active involvement of local indigenous people in patrolling and anti-poaching monitoring. A network of 25 anti-poaching camps has been established in the most

sensitive locations of STR out of which 15 are in core zone and rest are in buffer, which is also sanctuary and within tiger reserve. Each camp is manned by rotational teams of 6 anti-poaching watchers from the local community, preferably tribals for a period of 6 days on rotation. The watchers cover approximately 8-10 km^2 per day on foot patrolling, and record both anthropogenic as well as wildlife evidences and recordings made in the registers maintained in each camp. The anti-poaching camps are connected with wireless network and reports are obtained and monitored on daily basis, weekly basis and monthly basis at different levels and are consolidated at Tiger Monitoring Cell, Sathyamangalam.

As a precursor to establishment of an efficient protection mechanism, following 'Security Plan' has been compiled based on unique prevailing conditions in STR, for strict compliance during the plan period.

1) Security Plan

Any security plan developed for a protected area has to take into account the threat profile of the area and the sources of the threats. Based on the past experience, the threats pertaining to Sathyamangalam Tiger Reserve have been short-listed as 1. Poaching (Hunting, Retaliatory Poisoning, Snaring etc.,), 2. Invasive Alien Species, 3. Linear Intrusions; Road kills especially on NH 209, 4. Anthropogenic pressure (Enclosures, illegal grazing, firewood removal, etc.,), 5. Religious Tourism, 6. Human –Wildlife Conflict, 7. Encroachment (including Back Water Cultivation), 8. STF & E.B Station, 9. Legal enforcement difficulties (Large Area, porous boundary & Lack of manpower & less APC's), 10. Fire

Security Plan is therefore, prepared keeping these threats in mind, making use of existing resources as well as suggesting improvements, where necessary. Detailed scheme of operations, flow charts etc. are given in the following paragraphs to codify and document methodology to be adopted for strict compliance.

Resource Mapping: -The Forest Range Officer with staff or research personnel shall gather all vital information which would be useful for the safety of subordinates as also for protection. Towards this end, he shall undertake a "*Resource Mapping*" by collecting and recording the following information, which shall also be displayed at

the range headquarters and check posts. The information to be gathered shall include:

i) Details of the facilities to address welfare and emergency issues.

ii) Location of Police stations with telephone numbers.

iii) Details of Field Director, Deputy Directors and other sub-ordinate officers of Sathyamangalam Tiger Reserve and neighbouring protected areas.

iv) Contact details including rank, location of office of the authorities of the Electricity Board who are concerned with maintenance of High Tension and Transmission lines for emergencies.

v) Telephone numbers and location of nearest bus stands and taxi stands must be collected. This is to monitor escape of poachers and in case of any incident.

vi) Location of heavy duty equipment like crane, JCB etc., may be recorded which would be useful in case of accidents, natural calamities.

vii) There shall be a record of details of vehicles available within the Tiger Reserve, including location and telephone numbers to reach them in case of emergencies.

Planning Protection Methodology

Major achievements in protection over the years have been mainly due to the system of anti-poaching camps manned by anti-poaching watchers (APWs). These anti-poaching camps are stationed in most sensitive and vulnerable areas of STR. Camp activities and prescriptions for effective implementation and effective protection are described below:

Though the present system of anti-poaching camps and their functioning in general are good, yet there is scope for improvement. Towards this, following prescriptions are given for compliance.

1) Use smart patrolling software like M-STrIPES for integrating data with other protection parameters for effective monitoring and to reduce human bias.

2) There are presently 16 anti-poaching camps in the Core area. 25 Nos. of additional anti-poaching camps are required for addressing the protection issues intensively. The facilities for the infrastructure have to be improved in older structures and should be with advanced provisions for new structure.

3) Maintain liaison with other enforcement agencies namely Police, Special Task Force (STF), Q Branch, Prohibition Enforcement Wing, etc.

4) Prepare codified manual for day-to-day operations of anti-poaching camp through Forest Range Officer and the same shall be displayed both in the camps and the Forest Range Offices.

5) Prepare protocol for field patrol to visit important water holes, wildlife areas and regular offence areas to monitor direct and indirect evidences of animal movement as well as outsider movement.

6) Joint Patrol approach shall be carried out whenever required with the adjoining Forest Divisions wherever the tigers are moving in search of prey / water to ensure their safety. This Joint Patrolling shall be held at least once a month, which would ensure “source-sink “dynamics of tiger population functions effortlessly.

7) Preparation of Standard Operating Procedure (SOP) for execution of protection works at Range level including the plan of protection measures, schedule of operation, execution of works, maintenance of records (criminal profile dossier, etc.,).

8) Establishment of Control Room at Bannari near Sathyamangalam to have better connectivity with the field teams on the job in the remotest corners of the Tiger Reserve. A reserve team will be kept ready to address the emergencies immediately based on the request from the Forest Range Officers concerned.

9) Maintain good wireless network to monitor the happenings in the field on real time basis.

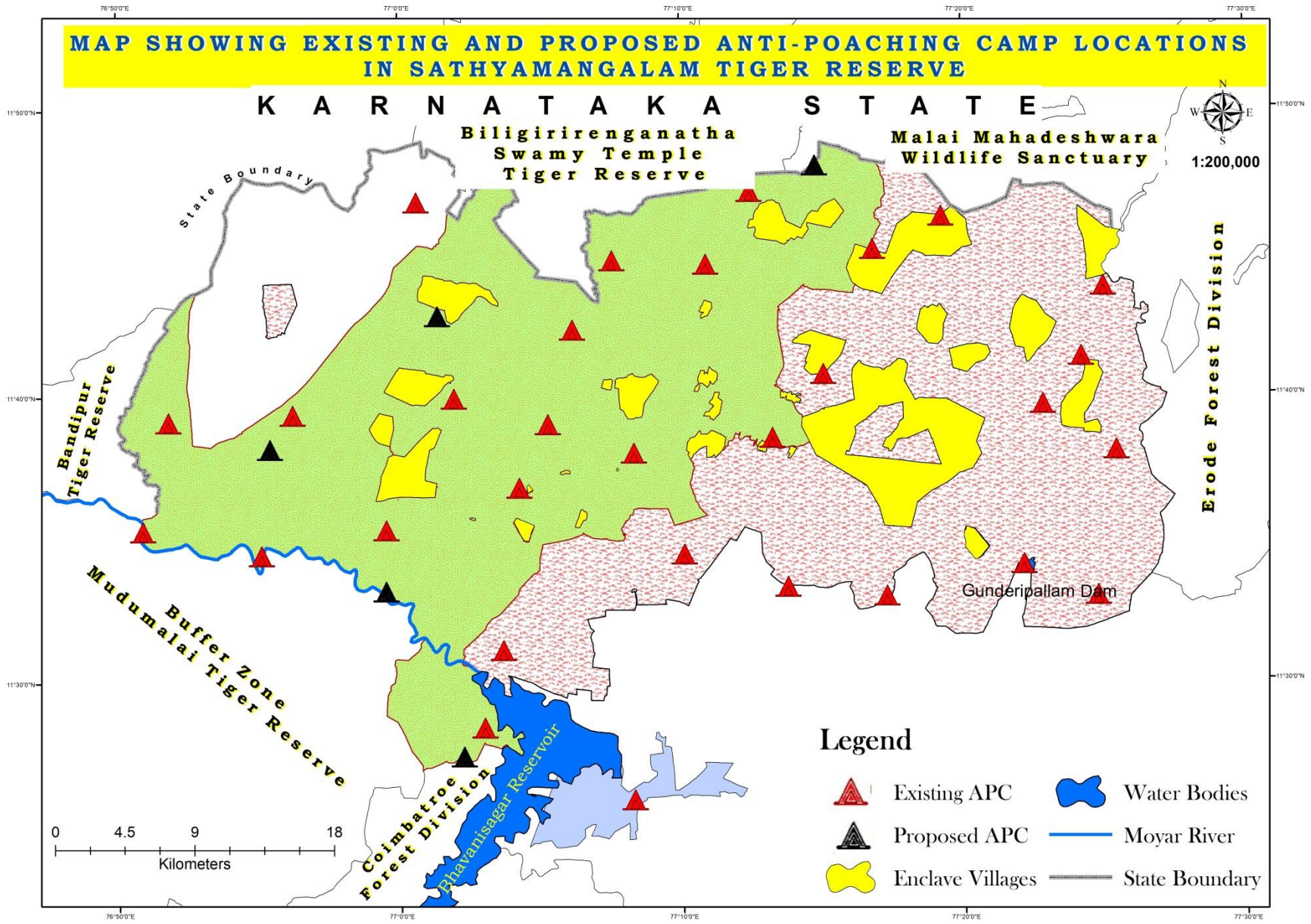
10) Establish better intelligence network at the villages in and around the Tiger Reserve to provide immediate information on the offenses and other activities happening in the Forests.

11) Use of Fire arms will be streamlined and a Standard Operating Procedure for maintaining Fire arms and ammunitions will be prepared.

12) A Standard Operating Procedure to address wildlife crimes efficiently, to investigate effectively and to follow up in court for successful outcome will be prepared and a capacity building training will be given to all Field staff.

Security Audit

The Field Director and the Deputy Director shall conduct “Security Audit” periodically to check compliance of instructions contained in this ‘Security Plan’ as well as the alertness, state of preparedness, availability of men and material resources check on the response time etc. The Field Director shall conduct security audit on a quarterly basis, though more frequent checks would be desirable. The Deputy Director in-charge shall conduct the security audit on a monthly basis, though more frequent checks on a fortnightly basis would be desirable for fool- proof protection system.


MAP SHOWING EXISTING AND PROPOSED ANTI-POACHING CAMP LOCATIONS IN SATHYAMANGALAM TIGER RESERVE
K A R N A T A K A S T A T E
Biligirirenganatha Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
State Boundary
Bandipur Tiger Reserve
Mudumalai Tiger Reserve
Buffer Zone
Erode Forest Division
Coimbatroe Forest Division
Bhavanisagar Reservoir
Gunderipallam Dam
1:200,000
0 4.5 9 18
Kilometers
Legend
Existing APC
Proposed APC
Enclave Villages
Water Bodies
Moyar River
State Boundary

The security audit should cover following aspects: -

1) Check Forest Range offices for maintenance of prescribed registers / manuals namely, patrolling plan, Criminal Profile Dossier, register showing details of briefing and debriefing of “sources”, Arms Register.

2) Conduct mock drills to check response time in the event of occurrence of wildlife crimes, forest fires, road kills, etc.,

3) Check the ‘daily patrolling log’ maintained in the anti-poaching camps.

4) Check functioning of wireless system and communication log at the Control Rooms and “link” stations.

5) Monitor availability of funds for disbursement of rewards.

6) Check display of information on Notice Boards in the Range offices and check-posts regarding telephone numbers for passing information.

7) Check the patrol log extracts / debriefing reports received by the headquarters i.e. office of the Deputy Director, Field Director and Control Room and write down instructions for follow-up.

2) Fire Management Strategy

It would address fire prevention and fire control strategies to manage fire issues in the area.

3) Proposal for Fire Prevention Strategy:

1) Conservation and Awareness about fire Incidence
2) Review the past fire data and develop action plan for sensitive areas
3) Ensure fire-fighting equipment is available in all Ranges
4) Regular meeting with field staff often to deal the fire season
5) Creation of fire line of 3m, 6m and 12 m as per sensitivity of the area, well in advance
6) Improve the communication facilities in all the ranges

7) Fire hazard management cell to be organized in Sathyamangalam with all infrastructure facilities to deal the situation

8) Fire prone areas to be identified for each compartment based on wind velocity, tree cover, soil moisture, ambient temperature, humidity and such areas to be targets of control burning activities. A data base to be formed to assess the fire sensitivity of areas with the help of outsourcing.

9) Establishment of temporary or periodic additional fire lines based on identified sensitive areas by engaging additional fire watchers and local labour force with ration and necessities.

10) Protection to fire entry points based on Past Scientific Data

11) Creation and Observation from Watch Towers

12) Conservation and Awareness Programme for villagers

13) Early Burning System on a Trail Basis

14) Periodic Fire Patrolling by Field Fire Team

15) Closing-off Tiger Reserve during the Dry Season as per intensity.

16) Increasing local man power support for fire-fighting mechanism during the Dry Season

17) Keeping dedicated Fire Fighting vehicles, Tools with Man Power to meet out the fire emergency calls from APC and watch towers.

18) *Lantana* and other weed dominated areas in Coupe Roads and vulnerable patches to be cleared off for at least 10 m on either side and in blocks to facilitate natural vegetation to re-cloth the ground cover. This would also act as an edge forests for prey species of carnivores

19) Block lines, beat boundaries, range boundaries and inter-state boundaries to be cleared off every year in approved width, as part of Fire Management Strategy.

20) Training to be properly organized for the ground staff, fire watchers, labour force on Fire Fighting Techniques.

21) Sign boards, awareness boards to be displayed in several places in high ways, fringe villages and sensitive areas as part of preventing fires from graziers, public and tourists.

22) Capacity Building Exercise to be planned for various stakeholders, especially tribal communities, villagers about impact of fire on wildlife habitats.

4) Proposal for Fire Control Strategy:

1) More number of Fire Watchers / local labour force to be deployed for vulnerable and sensitive Ranges in order to monitor the crucial habitats

2) Providing proper equipment to all the identified fire sensitive locations

3) Placement of vehicles in high fire prone areas with adequate man power.

4) Using existing fire lines and dry biomass patches, as counter fire to prevent spreading of fire

5) Beating with bushes in the periphery of the fire burning areas as a strategy by utilizing additional labour force

6) All the burnt fires have to be checked to completely put off the fire.

7) Monitor the mortality of animals in the fire burnt areas wherever possible by the fire watchers and staff.

8) All the burnt areas have to be checked at least three to four days as part of Fire Operation System.

9) All the approach roads have to be perfectly managed in order to approach fire prone areas as quickly as possible. Therefore, all the important game and forest roads to be cleared and maintained properly without any compromise in this regard. New paths to be created during heavy fire emergencies with the permission from Deputy Director and Field Director.

10) All the wireless station at the Anti-Poaching Camps shall be maintained more effectively for communications. If necessary temporary camps should be erected during the fire season in sensitive ranges with wireless communication system. The present wireless sets available in the Reserve may not be sufficient to prevent fire and for protection measures.

11) On a daily basis fire strategy mechanism to be evolved based on experiences learnt every day in terms of logistic and other facilities. Minutes to be prepared and send them to D.D office for assistance and support in controlling fire.

12) Funds for fire protection strategy to be obtained adequately from the Government with a separate proposal so that lack of funds should not be a limiting factor for fire management.

7.2.2.2. Theme Plan for Tiger Monitoring

As per the recent guidelines issued by the NTCA, tiger monitoring shall be an ongoing exercise, to be carried out annually in a tiger reserve. In this direction, a protocol named “Phase IV tiger monitoring “has been standardized and prescribed for implementation.

This exercise has been implemented in Sathyamangalam Tiger Reserve from 2014. All the six protocols prescribed under this program viz.,

1. Daily patrol log (recording)
2. 8-day transect study (for habitat and prey density)
3. Pug Impression Pads (Pressure Impression Pads)
4. Obtaining minimum number of tigers (camera trapping);
5. Obtaining tiger numbers using camera traps
6. DNA analysis; are to be carried out.

The NTCA has come out with detailed guidelines on each and every protocol and it is needless to repeat the same here. All protocols will be scrupulously followed.

The tiger monitoring phase IV exercise is being done through camera traps only. Presently in the reserve camera trap data are downloaded on a weekly basis for further record and analysis. This exercise covering all over the tiger reserve is done on an annual basis especially between the months of November and February. It is proposed to share camera trap images with neighbouring Tiger Reserves like BRT, Mudumalai and Bandipur to compare the captures and thereby monitoring movement of individual tigers for most effective monitoring. This would also reveal dynamic database of camera trap tiger captures using the NTCA nomenclature. As indicated by the NTCA, the scientific organization/individuals data sources on tigers (camera traps and photos) were also used as part of tiger monitoring plan.

The annual transect lines for 8 day protocol will be regularly maintained. Software, hardware and equipment necessary for conducting these monitoring exercises will be procured from time to time for the required strength in field and office. Adequate camera traps will be purchased so that phase IV can be under taken in house with cameras. Cameras will be replaced as and when they become unserviceable. Adequate provision will be made for meeting the maintenance cost of the cameras as the batteries needs to be replaced once in 15 days. Other phase IV exercise tools such as range finders, compass, etc. and adequate software facilities will be created in the DD office and FD office. The camera trapping grids and camera trap points needs to be determined and adjusted on annual basis as this is a new tiger reserve. (*Details regarding tiger monitoring exercises in STR has been dealt extensively in Chapter.9)*

7.2.2.3. Theme plan for Conservation of Elephant corridors

In Sathyamangalam Tiger Reserve, the All India Synchronized Elephant Census was conducted from 16th May 2017 to 19th May 2017. The Elephant population was estimated using multiple methods as prescribed by Project Elephant (MoEFCC). The current population of elephants in the Sathyamangalam Tiger Reserve is estimated to be 700 – 800 (772) Elephants. However, the Elephant population in Sathyamangalam Tiger Reserve is not isolated and is connected to other populations in the adjoining PAs and Reserve Forests of Tamil Nadu and Karnataka. There is also back and forth, seasonal movement of elephants into and out of the Tiger Reserve for the adjoining PAs and Reserve Forests.

Past land use changes within and around Sathyamangalam Tiger Reserve, neighboring PAs and Reserve Forests, natural features (like steep terrain) combine to create corridors (constrictions) for free movement of Elephants within the Tiger Reserve and also for movement between Sathyamangalam Tiger Reserve and the adjoining areas. These corridors are in many cases significantly narrow, often degraded and also have Human disturbances, thus posing additional challenges to free movement of Elephants through them. In addition, some have existing linear infrastructure, which hinders free movement of Elephants. These corridors that allow movement of Elephants between the Tiger Reserve and the adjoining areas are critical for maintaining the genetic diversity of the Elephant population and also to ensure non escalation of Human-Elephant conflict due to corridor issues. It is therefore very important that they are secured and their status is improved to facilitate free movement of Elephants through them.

Based on the report ‘Right of Passage’ by the Wildlife Trust of India (WTI) it is found that there are two corridors identified within Sathyamangalam Tiger Reserve. The maps (Figure 1,2,3 & 6) and the details provided in the tables are all from the WTI report ‘Right of Passage’. The corridors in Sathyamangalam Tiger Reserve are

(1) Chamrajnagar - Talamalai – Muddahalli corridor. The southern part of this corridor lies within the Sathyamangalam Tiger Reserve.

(2) Talamalai – Guthiyalathur corridor, which lies in Sathyamangalam Tiger Reserve.

In addition there are four other corridors which lies outside Sathyamangalam Tiger Reserve but are important as they support movement of Elephants into and out of the Tiger Reserve. These are

(1) Chamrajnagar - Talamalai corridor at Punjur, which is adjoining Chamrajnagar - Talamalai – Muddahalli corridor and complements the movement of elephants in the Chamrajnagar-Talamalai corridor. This corridor is within the Chamrajnagar Division of Karnataka State.

(2) Kanniyanpura – Moyar corridor, is an important corridor, which allows Elephants from Bandipur Tiger Reserve to move into Sathyamangalam Tiger Reserve. It lies entirely within the Bandipur Tiger Reserve in Karnataka State.

(3) Kallar Corridor (also known as Jaccanarie Slope to Hulikkal durgam corridor), which lies in the Coimbatore Forest Division of Tamil Nadu.

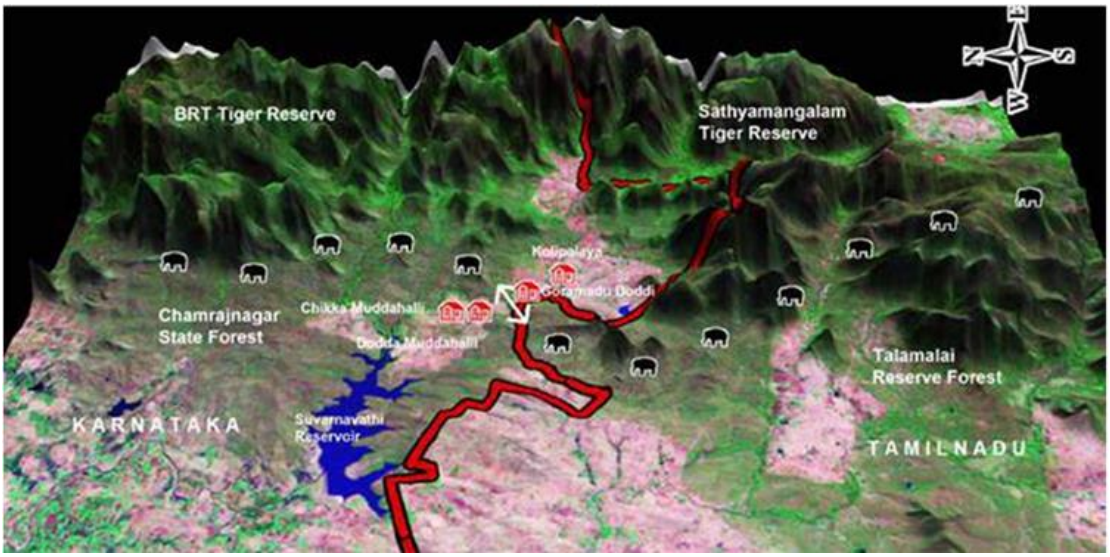
(4) Edayarhalli - Guttiyalattur corridor in Malai Madeshwara Wildlife Sanctuary in Karnataka State

1. Chamarajanagar – Talamalai at Muddahalli

This corridor (see Figure 1) connects the Punjur Range of Chamarajanagar Wildlife Division (BRT Tiger Reserve) with the Thalavadi Range of Sathyamangalam Tiger Reserve and is located at the inter-state boundary of Karnataka and Tamil Nadu. Elephants move between Sathyamangalam Tiger Reserve and BRT Tiger Reserve through this narrow forest patch and also use private lands between Goramadu Doddi and Dodda Muddahalli villages. This corridor is regularly used by Elephants, Tigers and other wild animals.

Alternate name	Thalavadi-Muddahalli
State	Karnataka and Tamil Nadu
Connectivity	BRT Tiger Reserve and
Length and Width	SathyamangalamTiger Reserve
Geographical coordinates	1.5 km and 0.5 km
Legal status	77° 3’ 50”- 77° 4’ 20” E
Major land use	Reserve forest
Major habitation/settlements	Forest and settlements
Forest type	Goramadu Doddi, Dodda Muddahalli
Frequency of usage by elephants	Regular

Figure 1. Chamarajanagar – Talamalai corridor at Muddahalli



This corridor requires joint management by Sathyamangalam Tiger Reserve and BRT Tiger Reserve (in Karnataka State) as it lies at the boundary of the two states (see Figure 2). However, the bulk of the corridor conservation and management action is required on the Karnataka as the corridor is constricted between two villages in Karnataka. Threats to the corridor and challenges for Elephants are

Narrowness due to villages on either side of the corridor: Ideally some agricultural land which borders the corridor (in both villages) should be secured to enhance the width of the corridor. This has to be done by Karnataka State as these villages are in Karnataka.

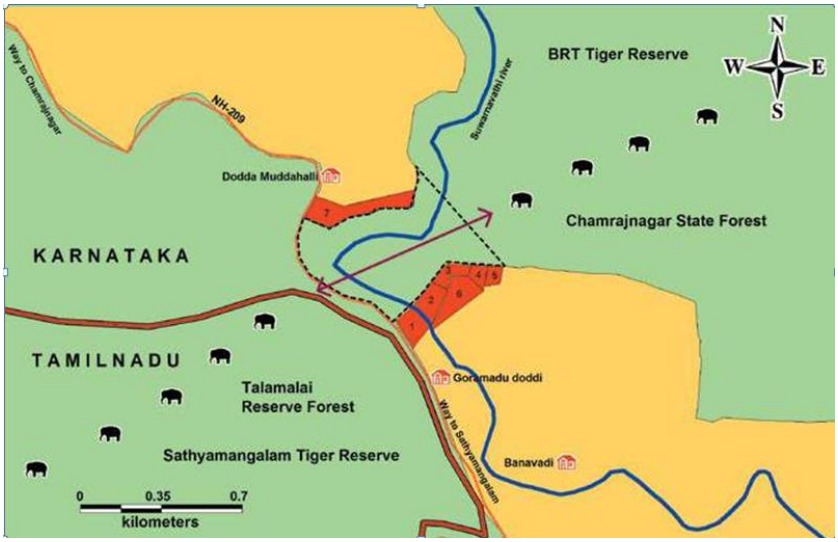
Linear infrastructure causing disturbance to the corridor: The National Highway 209 (Mysore – Sathyamangalam) runs across this corridor and traffic is increasing with time along this route. According to the WTI report ‘Right of Passage’, an estimated 3000

vehicle ply along this highway everyday and there is a 30% increase from the volume less than a decade ago. The road does have some signages indicating Elephant crossings but in the longer term some scheduled stoppage of traffic for a fixed period (ideally at night – for a few hours) would have to be contemplated to facilitate free movement of animals across the road. This too would have to be implemented by the Karnataka State Government as the section cutting across the corridor lies within their area.

Anthropogenic pressures on the habitat within the corridor: Given the narrowness of the corridor and the presence of villages on either side of it anthropogenic pressure is significantly high. The main corridor path would require management actions on the Karnataka side as the impacted area lies in Karnataka between the two villages. However the approach area from Tamil Nadu side is also impacted by anthropogenic pressure from these villages. Sathyamangalam Tiger Reserve will focus on reducing anthropogenic pressures like cattle grazing, fuel wood collection, and NTFP collection by these villages within its area but will coordinate action with BRT Tiger Reserve; so that action taken on the Tamil Nadu side does not result in increased pressure on the main corridor path between the two villages. It is proposed that a preliminary assessment will be done on the Sathyamangalam Tiger Reserve side to identify and quantify different anthropogenic impacts on the Tamil Nadu side, so that suitable budgeting can be done to address those problems and to provide a baseline; based on which it can be discussed with BRT Tiger Reserve for agreeing on a time bound plan to mitigate the problem from both sides,

Human-elephant conflict: Crop raiding by elephants and also electrocution of elephants have been reported in the villages on the Karnataka side. This is a problem that the Karnataka Forest Department has to address. But the issue will be discussed with them during the proposed joint meeting on the corridor.

Figure 2. Corridor map showing land to be acquired, road and elephant movement

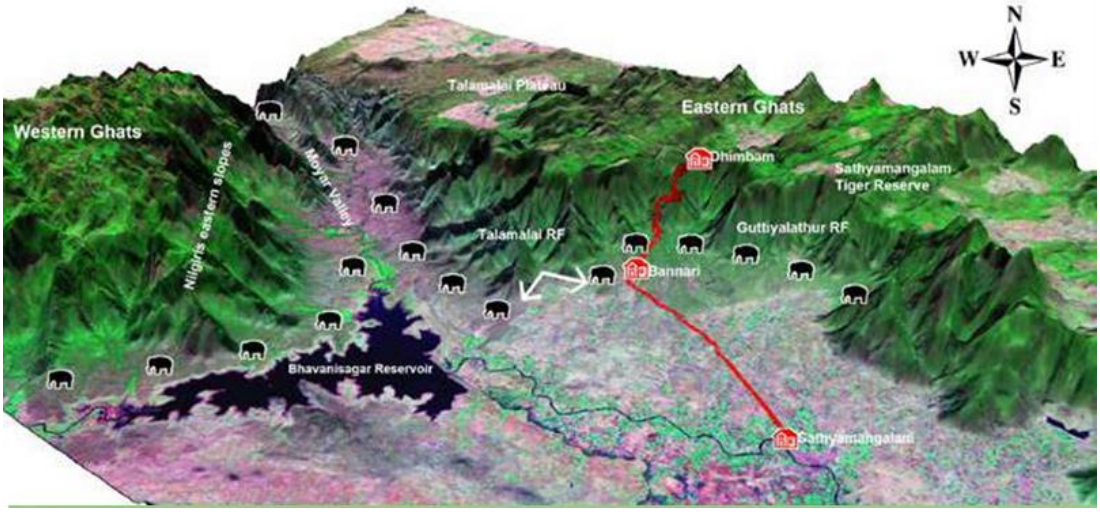


2. Talamalai – Guttiyalattur corridor

This corridor connects elephant habitats between Guttiyalattur Reserve Forest and Talamalai Reserve Forest of Sathyamangalam Tiger Reserve (see Figure 3). This corridor facilitates movement of elephants between the Moyar valley and the south-eastern parts of Tiger Reserve. It is also the base that allows elephants from the Tiger Reserve to move into Kallar corridor (southwest, in Coimbatore Forest Division) or to the west towards the Mudumalai Tiger Reserve buffer zone (Sigur Range) or to Erode Forest Division (east). Hence it plays a very important role in the seasonal movement of elephants from Sathyamangalam Tiger Reserve. It also plays a significant role in maintaining genetic connectivity between the three main elephant population areas of the areas to the north (Mudumalai TR, Bandipur TR, Wayanad WS, etc), to the southwest (Coimbatore Division, Attapadi RF, Silent Valley NP, etc) and to the north and east (Sathyamangalam TR, BRT TR, Erode Division, etc)

Alternate name	Sujalkuttai- Bannari
State	Tamil Nadu
Connectivity	Moyar Valley and Nilgiri Eastern Slope RF with Guttiyalattur RF and vice-versa
Length and Width	3 km and 0.3-0.55 km
Geographical coordinates	11° 30’ 31”- 11° 33’ 37” N, 77° 5’ 46”- 77° 8’ 26” E
Legal status	Reserve Forest
Major habitation/settlements	Forest, settlements and fallow lands Pudubirkadavu and Patramangalam
Forest type	Tropical thorn forest
Frequency of usage by elephants	Regular (mostly October to December)

Figure 3: Talamalai – Guttiyalattur corridor



The main challenge for elephants using this corridor is the narrowness created by the steep and rugged slopes raising up towards Talamalai Plateau (its southern slopes) and the agriculture/ settlements, which extend almost till the foothills (see Figure 6). The narrow usable passage is further compromised by anthropogenic pressures causing both degradation and disturbance to the corridor area. There is a large human population living in several villages and small towns bordering the corridor. Elephants moving in the east-west direction essentially have to move along these narrow foothill areas as they cannot traverse across the steep and rugged slopes.

Narrowness of the corridor: WTI has identified a few areas, where agricultural land needs to be secured for increasing the width of the corridor, primarily to provide better movement along the foothills.

Special Task Force (STF) of Police department firing range exist in this corridor. This is situated in the foothills and reduce the width of the corridor. It has to be relocated outside the Tiger Reserve, to enable free movement of elephants.

Anthropogenic pressures: Cattle grazing, fuel wood collection and NTFP collection are the primary pressures exerted by the local communities. These human activities result in adding more disturbances to wildlife using the corridor during the daytime. These pressures have not been quantified but a proposal is made to initiate an assessment of such human disturbances in full, so that the scale of the problem and to map dependencies on the forest can be ascertained and suitable remedial measures can then be identified to do strategic planning and budgeting.

Wood cutting for firewood is one of the serious threats to be addressed to prevent habitat degradation and disturbance in the corridor from local people. The assessment resulted that *Chloroxylon swetenia (locally known as Purasu maram)* is being lopped or cut mostly as preferred by local people for firewood use in this corridor. Providing LPG

connections to the people in the fringe villages is of immediate requirement to reduce firewood related forest dependence. Further, it was noticed that even in the areas where LPG have been facilitated local people are still indulging in collection of fuelwood for local chulas which they use for preparation of Ragi modhai (a traditional Ragi preparation which is made with bigger earthern vessels heated through local chulas using firewood), which needs special intervention to provide cookers for making Ragi modhai using LPG stoves.

Linear infrastructure: The National Highway 209 (Mysore – Sathyamangalam) cuts across this corridor on its western side. The high volume of traffic (3000 vehicle per day) is a major disturbance to the free movement of wildlife across the road. This traffic has also increased substantially (30%) in less than a decade. Closure of this road from 6 pm to 6 am would help in safe crossing of Elephants and other wild animals at night. A study would have to be undertaken to identify peak animal movement to enable night patrol facilities to ensure safe movement of wild animals across the road. There were also additional plans for laying a new railway line from Chamrajnagar to Sathyamangalam but this was abandoned due to opposition by the Forest Department and NGOs as it would have destroyed the fragile Moyar Valley and also fragmented the entire landscape as the railway line would decend down the steep slopes of the Talamalai Plateau thus making it impossible for many animals to cross it. Another plan was to construct a road from Bhavanisagar to Siriyiur and linking to the road to Gudalur through Mudumalai, but this too had been stopped by the Forest Department as it would severely damage the Moyar Valley with its high Tiger numbers. The proposed roads were not the only means of connectivity for the areas identified, as there are already two roads that serve the same purpose (the Mettupalayam-Ooty-Gudalur road and the Mettupalayam-Kothagiri-Ooty-Gudalur road). A watch will have to be kept to ensure that these projects are not revived.

Human-elephant conflict: At present human-elephant conflict is not severe. But there have been a few cases of electrocution of Elephants and deaths of people. A length of 10.2 kilometer boundary was assessed. The entire boundary has Elephant Proof Trench but there are 109 weak points observed. Most of which are used by Elephants to access the crop fields (Figure 7). To the south of *Semmalai karadu* along the forest boundary, elephants are regularly moving out to reach the stream nearby, which is located at the boundary of the forest. The stream needs to be included into the forest to avoid Elephants moving out of the forest for want of water.

At present compensation is being paid for crop depredations and loss of human lives. However, where illegal fencing of leased areas was there as ordered in the

Honorable High Court of Madras for the WP No. 9362 of 2018, the power fencing around the leased cultivation area has been removed. The forest areas which come under the inundation during the full tank level of the Bhavanisagar Dam were given on lease to the PWD department but the status of the area is maintained as forest only for all legal terms as per the lease agreement. It was also mentioned that no sub-leasing and no other activity other than water storage would be allowed in that leased area. In the recent decades it is learned that PWD has introduced a new system of sub-leasing to support the local population and it creates human-wildlife conflict issues intensively. It also leads to poisioning and ulcerization in wild animals in most of the agricultural fields in the backwater area use fertilizers and insecticides. It also creates a local pressure which is locally politicized to drain out the water storage in the Dam to increase the area for agriculture in the back water space of the dam. It should be strongly persuvaded with PWD department to stop sub-leasing the backwater area of the Dam once for all to put a full stop to all such problematic practices in the Forest continuum in Bhavanisagar Range, in the Core Area of the Tiger Reserve. A huge Ashram (Chandru Ashram) is emerging in the southern boundary of this corridor. The legality of the ownership of the land and surveying of the land to physically demarcate the legal boundary of the land concerned if it has proper documents. Otherwise, immediate action has to be taken to evict the unauthorized occupation of the land. It should also be ensured that the stream location which is frequented by the Elephant population is kept free of any illegal occupation by public. Further, the water holding area of Bhavanisagar Dam will be converted as wildlife sighting area in the lines of with Kabini Dam site in Nagarhole Tiger Reserve.

In Pasuvapalayam, the peripheral village of this corridor, numerous paper mills are found. The effluents from these paper mills are potentially contaminating the water flowing in the stream, thereby, affecting the health of the wild animals which are using the water source. Especially two paper mills (Samu paper mill and Shri Sakthi paper mill) are very close (500 m) to the forest boundary (Figure 4 & 5). The preliminary water quality study by WWF-India in this region has indicated clear surface and ground water contamination due to this pollution. If this pollution continues, it will affect the source of drinking water for wildlife severely and as well as the people around this region who use this water directly or indirectly. Therefore, more comprehensive water quality assessment and appropriate regulatory action will have to be undertaken taking the support of the Tamil Nadu Pollution Control Board (TNPCB).

Intensification of agriculture and industrialization can also lead to over exploitation of water, which may affect the water availability for the wildlife. The Stream which goes into the industrial and agriculture area and flows back into forest (Refer to the map) is the main source of water to the elephants in this corridor. This stream will have to be thoroughly surveyed and mapped to take appropriate protection measures. No new waterhole creation is required in this corridor.

Figure 4. Stream and the paper mills in the corridor

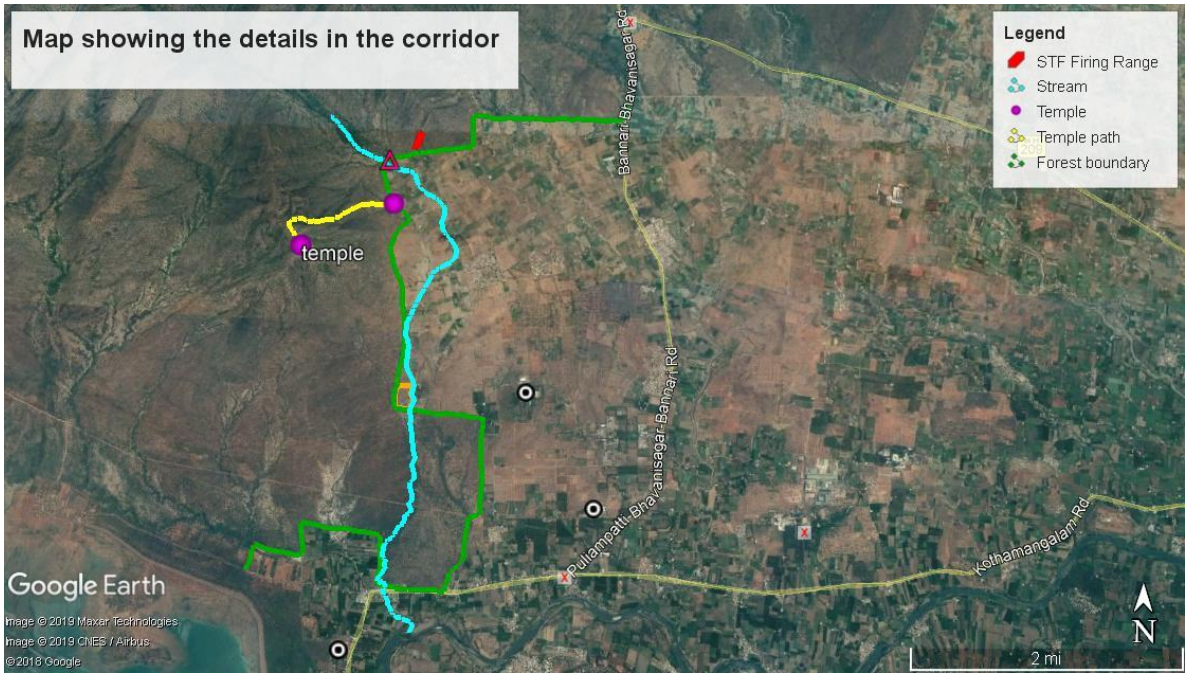


Figure 5. Paper mills locations

Figure 6. Map showing the corridor, lands to be purchased, road and elephant movement across the corridor.

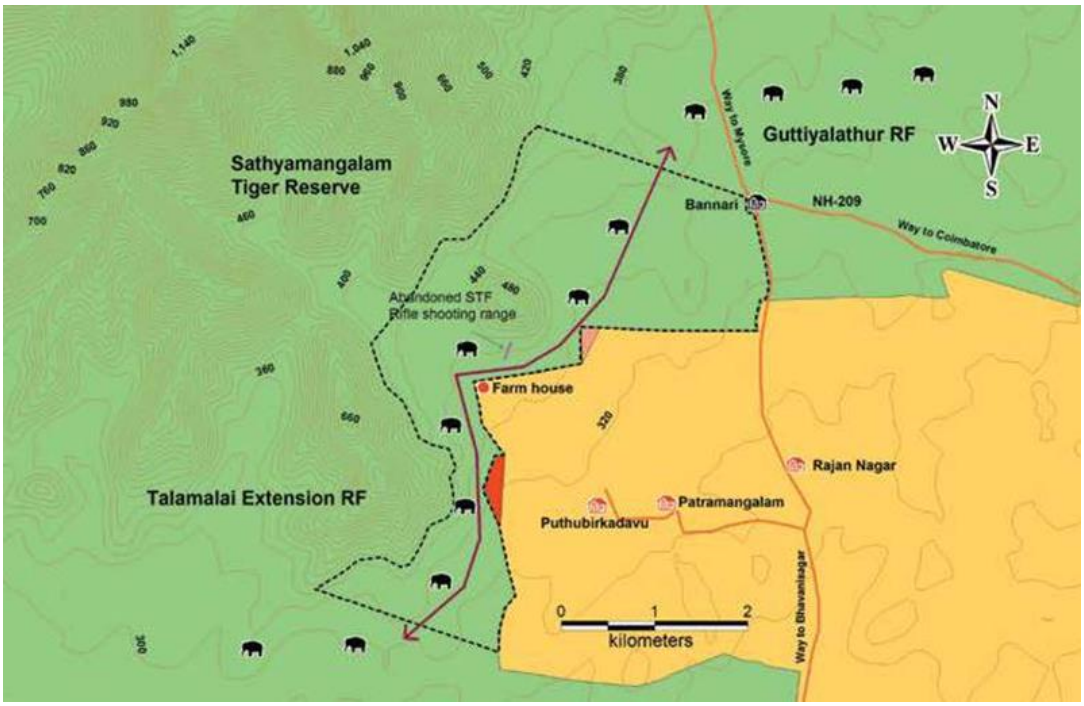
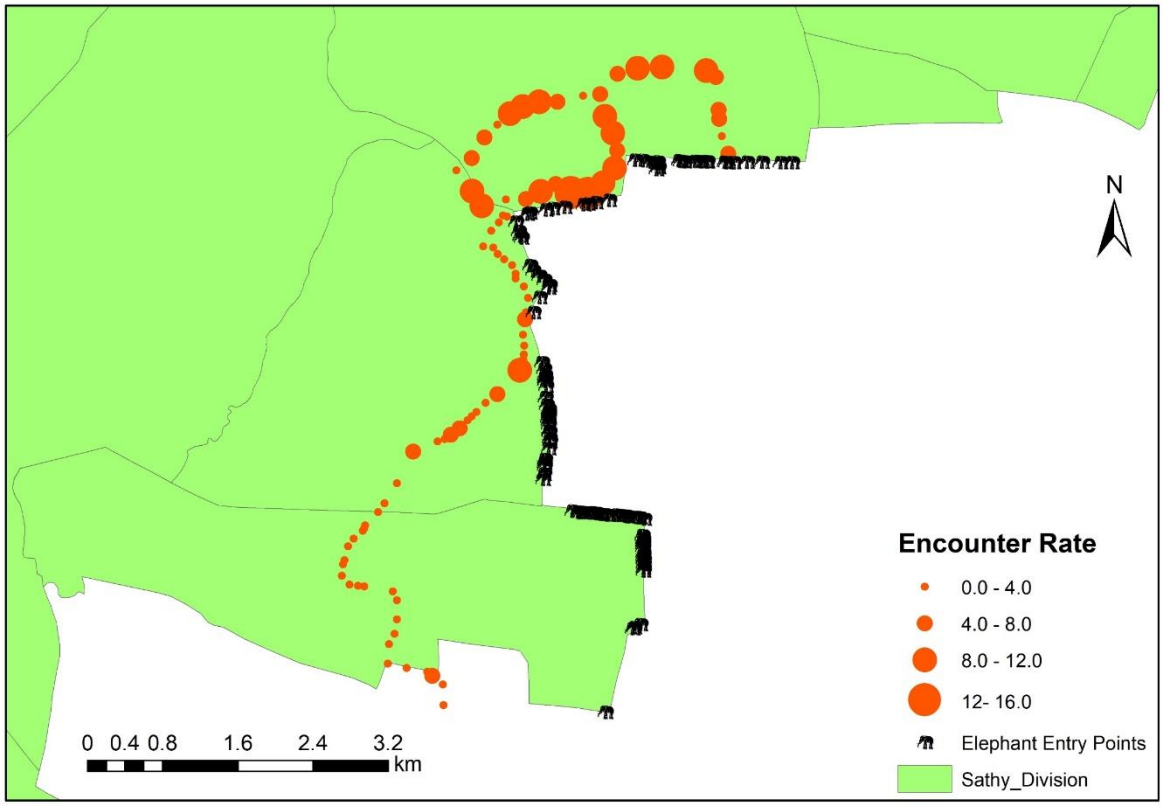


Figure 7. Elephant signs and elephant entry points in EPT in the corridor area



Two temples are located in this corridor. One is Vinayaga temple at the foothill and the Semmalai Murugan temple on top of the hill. Pilgirims mainly go to this temple during the Pongal festival. Solid waste management is needed by keeping dust bins at temple.

Major wildlife species distribution in this corridor:

Elephant, Indian Gaur, Sambar, Chital, Black buck, Tiger, Leopard, Striped hyena, Wild dog and Sloth bear.

Summary:

a. STF firing range needs to be relocated outside Tiger Reserve area
b. Need to acquire lands adjoining regular Elephant use area to increase the width of the corridor
c. LPG connections for fringe villages are to be provided
d. Alternate livelihood for reducing cattle grazing has to be facilitated
e. Need to check on paper mills contaminating the ground water and polluting the stream through consultative meetings and agreements
f. Closing the traffic in the NH (Bannari – Dhimbam) in peak hours of wildlife movement to facilitate easy crossing of wild animals
g. Protection has to be strengthened by regular and strategic patrolling in the corridor
h. Regulate and implement solid waste management for temples in this corridor
i. Strengthening the barrier at forest boundary to reduce human elephant conflict and prevent electrocution

There are four other corridors do not fall under the jurisdiction of Sathyamangalam Tiger Reserve but are also important as they are connective spaces facilitating coverage of complete range of the long ranging animals like elephants, which have large range and jurisdiction extending from Wayanad in the west to Bhavanisagar in the east and Coimbatore in the south to the Tiger Reserve. Some actions on the part of the Sathyamangalam Tiger Reserve will have to be taken in order to ensure that these corridors are also secured.

(1) **Kallar Corridor (also known as Jaccanarie Slope to Hulikkal durgam corridor),** which lies in the Coimbatore Forest Division of Tamil Nadu. This is one of the most important corridor in the Nilgiri Biosphere Reserve as it links the PAs on the eastern-northeastern side (Sathyamangalam TR, BRT TR, MM Hills WS, etc) and the

northwestern side (Mudumalai TR, Bandipur TR, Wayanad WS, etc) with the forests to the south and southeastern part of the Biosphere Reserve (Coimbatore Division, Silent Valley NP, etc). It lies entirely within the Coimbatore Forest Division and the Sathyamangalam TR will have to work with Coimbatore Forest Division to push for securing this corridor.

At present, banana cultivation in back water area of Bhavanisagar dam has been a notable threat to Elephant movement from this corridor and also the sole reason for conflict in the region and losses of both human and Elephants. Also accumulation of toxins (agricultural pesticides and fertilizers) in elephants and ulcerations in the gut region is another notable issue seen in the crop raiding herds. Hence, it is very much warranted to conduct meetings with Public Works Department to stop leasing of back water areas for cultivation and ban cultivation in backwater areas once for all. The back water areas of Bhavanisagar Dam is a important feeding ground for all type of herbivors, especially during lean summer seasons.

National Highway 67 passing through the corridor at Kallar. The mounted vehicular traffic (around 7000 vehicles per day) blocks the movements of elephants. With great difficulty elephants are crossing at first hair pin bend in NH at Kallar. Along the north and south of NH, the private lands (mainly Chemsford estate) are facilitating elephant movement. However, in recent days the land use has changed from fallow land to banana plantation bordered with electric fencing impedes the elephant movement further. The corridor is very narrow due to plantations and various other development activities. The recent road widenening activity has further narrowed down the corridor and making the movement of Elephants really challenging and risky.

There is a need to construct a flyover in crucial Kallar corridor to facilitate easy movement of elephants. Considering the gradient, the flyover has to be planned from Kallar bridge at NH 67 to second hairpin bend to a total length of 1.7 km. To build the flyover and to widen the corridor, lands have to be acquired. Further down in the south west of the corridor, the horticultural farm, which was formed in the forest land on lease. The farm has an electric fencing around, which is again a barrier for easy elephant movement which needs to be opened up to some distance through negotiations with Horticulture Department to facilitate ease of movement of elephants. All the suggested measures to be taken up urgently to minimize the human elephant conflict and to avoid problems anticipated through escalating cost of land value and construction.

(2) Chamrajnagar - Thalamalai corridor at Punjur, which is adjoining Chamrajnagar - Thalamalai – Muduhalli corridor and complements the movement of elephants in the Chamrajnagar-Thalamalai corridor. This corridor is within the Chamrajnagar Division of Karnataka State. Sathyamangalam TR will also highlight and discuss this corridor with Karnataka Forest Department when discussing the Chamrajnagar – Thalamalai corridor which is a common corridor to both the states.

(3) Kanniyanpura – Moyar corridor, is an important corridor which allows elephants from Bandipur Tiger Reserve to move into Sathyamangalam Tiger Reserve. It lies entirely within the Bandipur Tiger Reserve in Karnataka State and it has been significantly enlarged in the recent past by Bandipur Tiger Reserve. Additionally more land (Revenue Forests) to the north of this corridor have also been added to the Bandipur Tiger Reserve thus opening up an additional corridor to the north. Anthropogenic pressure remains high in the form of cattle grazing. But fuel wood collection has significantly reduced due to the supply of LPG gas to a majority of families living inside and outside the Bandipur Tiger Reserve.

(4) Edayarhalli-Guttiyalattur corridor in Malai Madeshwara Wildlife Sanctuary in Karnataka State. This corridor lies just outside the Tamil Nadu boundary and it will be discussed with the Karnataka Forest Department along with other corridors, which will affect both Sathyamangalam Tiger Reserve and the adjoining PAs in Karnataka.

Proposing a new corridor

MOYAR VALLEY - THENGUMARAHADA CORRIDOR

Location: Southern part lies with Thengumarahada Range, Mudumalai Tiger Reserve and northern part lies with Bhavanisagar Range, Sathyamangalam Tiger Reserve

Significance: Connecting Sigur plateau with Talamalai RF and Coimbatore Forest division

Issue: Narrowness at Thengumarahada village

Thengumarahada village:

Thengumarahada village was formed in 1952 by leasing Reserved Forest lands to 142 members as 3 acres each to promote food crop cultivation. One Co-operative society was

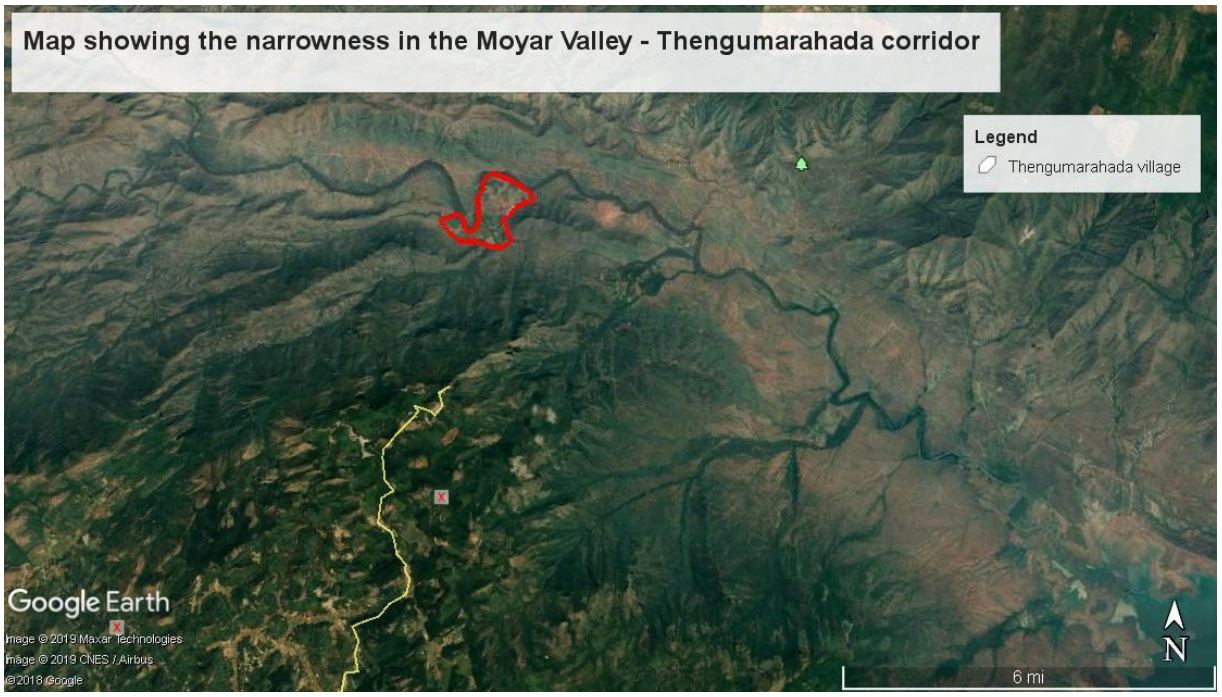
registered with 142 members. Original lessee are mostly moved out or given the lands on lease to others to cultivate. The physical demarcation of land for each member is not found in the field. There was no survey conducted recently to know the present area under use for cultivation. Food crop cultivation is no more practiced here and only cash crops like banana cultivation, turmeric cultivation and coconut cultivation are practiced now. The residential area is colonized in the middle of the valley but the cultivation area extended till the narrow bank of the River Moyar. The recent use of land confirms that there is a significant increase in the area of use for cultivation in the recent years which may potentially be encroachment. Even though the village is located on the other side of River Moyar and accessed through Karachikorai in Erode District, the revenue jurisdiction of the village is with the Nilgiris Distirct. It is also learnt that the lease period for the allotted land got expired long back and even after repeated communications the Revenue Department of the Nilgiris District is not able to trace the back records and share with Sathyamangalam Tiger Reserve. It should be immediately addressed to collect the legal documents related to the existence of the village and take legal action against the illegal owners of habitation and agricultural lands to get the area free of Human habitations and agriculture for free movement of Elephants and other Wild animals in the area. It is located at the crucial space interconnecting the Nilgiris Biodiversity with the Eastern Ghat Biodiversity and is also the important connecting corridor for most of the long ranging wild animals in the area. Efforts should also be taken to bring control of Thengumarahada, Kallampalayam and Hallimoyar villages and the North eastern slope beat / Range of Mudumalai Tiger Reserve in the Nilgiris District to Sathyamangalam Tiger Reserve in Erode District.

Major wildlife species distribution in the corridor:

Elephant, Indian Gaur, Sambar, Chital, Black buck, Tiger, Leopard, Striped hyena, Wild dog and Sloth bear.

Mitigation measures:

a. Width of corridor needs to be increased in the northern portion of the village by reducing the crop cultivation area after verifying the legal documents.
b. Removal of electric fences from all the crop fields.
c. Sujjalkuttai – Mangalapatti road should be kept as mud road worth of regular vehicle use and should not be metalled or tarred as this landscape is used by many of the wild animals in the Tiger Reserve on regular basis.
d. LPG connections should be provided to all inhabitants of all villages other than Thengumarahada to prevent firewood removal.
e. Alternative livelihoods should be provided to reduce scrub cattle.
f. Bus timings should be scheduled between 9 am to 3 pm to cross Karachikorai Check post from both sides to avoid disturbances to wild animals as well as to avoid risky encounter.



Additional prescriptions:

- Construction of 5 Elephant watch towers in Thalamalai – Guthiyalathur corridor and each 1 Elephant watch tower in other 6 Elephant corridors.

- Atleast one water trough or artificial water body for every 2 km will be created in the corridors.
- As ordered in the Honarable High Court of Madras for the WP No. 9362 of 2018, the power fencing around the leased cultivation area has been removed and in continuous to that necessary action will also been taken for permanentely stopping cultivation in the back water area and also one Elephant watch tower will be constructed near Boothikuppam area and one Elephant watch tower will be constructed near Sujjalkuttai for monitoring the Elephant movement and also to seal encroachments.

7.2.2.4. Theme plan for endangered species conservation

This plan period would address some of the important endangered species found in the area like Elephant, Gaur, Leopard, Hyena, Blackbuck, Four horned antelope, Crocodile, Orange finned Mahseer and Vulture.

Orange Mahseer fish conservation

The Orange Fin Mahseer is a critically endangered endemic species in a brink of extinction. It is also called Hump backed Mahseer and it can grow upto a size of 50 kg. It is a carnivorous fish that depend on many fishes at lower trophic level. The orange fin mahseer is now known to be extinct in Cauvery river belt. The mahseer is yet to be given a zoological name. Studies conducted by WASI (Wildlife Association of South India) has now recorded a small population in Vellimeenkadavu, Moyar River. Moyar River happens to be the last available habitat for orange fin mahseer. Studies have to be annually conducted regarding the population status, behaviour and threats need to be identified and dealt with. A wildlife biologist with knowledge and experience on fresh water fishes will be engaged on population monitoring on Orange Fin Mahseer and other fishes. A study will be carried out to identify the breeding sites of Orange Fin Mahseer, feed requirement of it, existing threats and possible methodologies to recover its population. Breeding and release of orange fin mahseer will be experimented. Advanced methods are available to capture and implant chips for radio detection. Two skilled local fishermen can be engaged as OFM (Orange Fin Mahseer) Watchers to monitor, patrol and record the existing population. The local communities needs to be sensitized through awareness programmes. Dynamiting and fishing of endangered fishes in Moyar river shall be totally stopped. Tribal communities maybe sensitized not to fish Orange Fin

Mahseer. A freshwater fish aquarium will be developed in Sujjalkuttai which will act as ex-situ conservation centre for fresh water fishes including Orange Fin Mahseer. Orange Fin Mahseer can be a unique theme of conservation significance of Sathyamangalam Tiger Reserve. Water quality has to be assessed during rainy season as well as dry season and importance of assessing status of water holes and Moyar river as well as water quality available in the water holes at the end of dry season is very important. Water quality will be assessed by looking at clarity of water, colour and odour. It will be a subjective assessment but it gives us a coarse indication of water quality. Similarly assessment of pH of water is very important.

Orange Finned Mahseer

Recovery Plan Vulture Conservation:

Vultures are nature's most successful scavengers, and they provide an array of ecological, economic, and cultural services (Moleon *et al*.2014). It is noteworthy to mention that the scavengers occupy an imperative and last level of the ecosystem without which the recycling or proper disposal, especially that of dead and decaying materials will be either stopped or delayed. There are nine species of vulture found in the Indian sub-continent. (Ali &Daniel 1995).Populations of White-rumped vulture, Long-billed vulture and Slender-billed Vultures have declined more than 97% in India, Pakistan and Nepal (Prakashet *et al*. 2003; Pain et al. 2004; Giri & Baral 2002, Baral 2002, Baral & Gautam

2002). The sharp decline of White-backed Vulture, Indian Vulture and Slender billed Vultures are classified by IUCN as Critically Endangered (Bird Life International, 2008).

The cause of this decline has been found due to the veterinary drug called Diclofenac (Oaks *et al*. 2004), which is widely used to treat diseased livestock in Asia. Vultures are exposed to diclofenac by feeding on livestock carcasses which contain residues of this drug. The post-mortem examinations of dead or dying birds from India and Nepal showed that the high incidence of diclofenac residues in visceral gout (Shultz *et al*., 2004). Other than the diclofenac effect, some of the factors are also reason for decline of vultures in India. They are kite flying is one of the major threat for all avian birds species particularly 47% of the death rate of vultures in Gujarat was due to kite flying (Roy and Shastry 2013). Malaria was also reported in declining of vulture population in Indian sub continent (Poharkaret *et al*. 2009). However, habitat destruction, road kills illegal poisoning, food shortage and other ecological factors are playing an important role for decline of vultures in Asian subcontinent and worldwide (Chhangani and Mohnot 2004, Chhangani 2005, 2007 & 2009, Margalida 2012, Margalida&Colomer 2012).

In southern India there are four species of vultures namely Egyptian Vulture (*Neophron percnopterus*), Red headed Vulture (*Sarcogyps calvus*), White-rumped Vulture (*Gyps bengalensis*) and Long-billed Vulture (*Gyps indicus*) are being sighted in the Moyar Valley of the Sathyamangalam Tiger Reserve (STR). Apart from these,

Cinereous vulture (Aegypiusmonachus) Himalayan Griffonhad been sighted sporadically in the valley. These vultures were primarily studied in Tamil Nadu by Davidar (2007), Davidar & Davidar (2002), Ramakrishnanet al. (2010, 2012 & 2014), Samson *et al*. (2014). Since 2000 to 2010 less attention was given on vultures in the Nilgiris Landscape. After a decade, Ramakrishnanet *al*. (2010) found that considerable numbers of vultures successfully thriving intheSegur plateau without diclofenac threat as they were depending on 90% of wild carcasses as major food resource.

With their scavenging adaptation vultures play a significant role in destroying the pathogens growing on animal carcasses. They also help in controlling the livestock diseases (Swan *et al*. 2006). This indirectly helps in preventing the contamination of the water bodies. Scarce studies are found regarding the ecological aspects of these birds (Navneethan *et al*. 2015). The sudden decline in the population of the vultures causes no cleaning mechanism in the forest and also human inhabited areas. In many parts of the

country, no vulture zones are facing the problems with the unattended carcasses like spreading of diseases from the decaying dead animal bodies, increase in the populations of the feral/street dogs and the chance of water body contamination. As there is no better alternative to the ecosystem service provided by the vultures and also to keep the nutrient cycle rolling it's now very important to conserve these large Aves.

A decade before the STR had some nesting colonies of White-rumped vultures in the Moyar Valley. Nowadays there is no single nest available in the STR. Therefore this proposal is submitted to bring back vulture nesting colonies in the STR, as well as to improve the habitat with respect to vulture conservation for their long run persistence in the STR.

Objectives

1) Mapping potential areas for nesting of vulture in the STR
2) To facilitate various ecological requirements to vultures for nesting
3) To estimate food availability to vultures
4) To create awareness on vulture conservation to various stake holders and
5) To establish a "Vulture Monitoring Research Centre"

Methodology

i) The identified roosting colonies will be monitored by erecting temporary watch tower in order to monitor breeding behaviour, parental care, incubation period and breeding success. These nesting sites would be protected by deploying anti-poaching watchers specifically for this purpose. Also watch towers would be erected at appropriate sites.

ii) Determine other threats to vulture populations besides Diclofenac - The other key threats will be monitored which affect the vulture population in this landscape.

iii) Assess the impact Diclofenac in livestock carcasses - The regular meat sample will be collected from dead livestock carcasses and the same will be analysed in collaboration of other institutions.

iv) Collection and analysis of blood samples from domestic herbivores and stray cattle - Random blood samples will be collected from livestock’s which are in the landscape in order to find percentage use of Diclofenac in veterinary practices.

Survey fringe villages to understand the use of Diclofenac and other similar NSAIDs - The pharmacy and medical shops which are available in the landscape and fringe areas will be periodically checked for availability of veterinary Diclofenac in the market

Mapping potential areas for nesting

In this landscape it was found that the *Terminalia arjuna* is highly preferred tree for nest construction by White rumped vultures. Therefore occurrence of T.arjuna trees GPS coordinates will be recorded and subsequently potential areas for nesting will be arrived.

Facilitate other ecological requirements

It has been well documented that food, water and protection are deciding factors for nest construction of White rumped vultures. Therefore adequate water facility will be provided where ever T.arjuna trees are available. Bamboo clumps are developed surrounding T.arjuna trees for protection and some of the earlier nest presence trees artificial nests also provided along with necessary ecological facilities in order to facilitate nest construction of White rumped vultures in the STR.

Food availability estimation

Line transect method will be used to estimate medium and large size herbivore populations in the STR in order to assess net food (biomass) availability. By continuous monitoring of each and every carcasses whether they have been killed by large carnivores or natural deaths using camera trap method one can estimate all scavenge individuals attendance according to their food requirement per capita including vultures with respect to their species of food requirement. Finally net food availability and utilized by vultures per annum will be estimated.

Awareness creation

During the occasion of Wildlife Week Celebration and World Vulture Awareness Day workshops, seminars, painting and drawing competitions for school and college

students will be organized to create awareness to young generations, local people, livestock holders and veterinary doctors.

Establishing a "Vulture Monitoring Research Centre"

In order to create strong scientific documentation, database and long term monitoring of vulture populations in various aspects a "Vulture Monitoring Research Centre" is imparted to establish at Bhavanisagar. Being a critically endangered species and as well as to secure our country's southern most wild and viable vulture population establishing a "Vulture Monitoring Research Centre" is highly warranted. A dedicated professional team is required to be on the task to carry out the monitoring task on day to day basis and compile data for further analysis. The centre should be equipped with basic minimum research facilities along with data analysis infrastructure. Hence it is proposed to have a separate facility to meet all the requirements to enable its functioning in an efficient manner.

The only remnant wild population of vultures can be saved only by carrying out such proposed studies as a long term programme through a dedicated professional team. This centre would be a model vulture centre to standardize SOPs for vulture conservation for the country.

Monitoring mortality rate of vultures

The roosting site will be monitored regularly for mortality of vulture and chick mortality. Dead birds will be examined to find the cause of death. Identification of tree species suitable for nesting and perching and study of surrounding habitat for their better survival and taking immediate step to replicate the same in disturbed areas. The past practice of engaging adequate vulture watchers to monitor vulture movement / sighting on daily basis, roosting areas, nesting areas, carcass feeding patterns and mortality needs to be restored. The forest Assistant Veterinary Surgeon at Forest Veterinary Unit will be given the responsibility of supervising, managing and monitoring all vulture conservation efforts.

Creation of Vulture parlours

Any accidental deaths of wildlife etc., if certified as healthy food by the veterinary care units may be fed to the vultures on experimental basis through specially designed vulture parlours.

Creation of Vulture Research centre

Creation of Vulture Research centre in the veterinary centre at Karachikorai for long time monitoring of vultures and possible egg removal for artificial incubation as the vultures are known to lay fresh eggs in case the existing eggs are removed. Vulture tagging may also need to be attempted for understanding behavioural ecology.

Awareness around vulture landscape

Awareness on public to usage of banned ketoprofen anti-inflammatory drugs to cattle, awareness to veterinary surgeons on usage of human anti-inflammatory drugs to cattle, ensuring co-operation of veterinary department, awareness and screening of animals that are used for sacrifice in temples, etc., are important activities to be carried out and monitored regularly.

Ban on anti-inflammatory drugs

After a ban on multi-vial drugs of Diclofenac by the Centre, State Government of Tamil Nadu in 2015 has withdrawn Ketoprofen, a non-steroid anti-inflammatory drug (NSAID) used extensively for veterinary purposes to save the vulture population in the three western districts.

Despite the first batch of the drug being supplied to all the districts beginning May 2015, the Directorate of Animal Husbandry has decided to discontinue the use of Ketoprofen in Erode, Coimbatore and The Nilgiris, where the vulture population was in danger.

The State government had included Ketoprofen based on an effort to identify an alternative to the banned drug Diclofenac. The Centre had banned Diclofenac multi-vial

doses after wildlife biologists proved that presence of the drug in the carcasses of the cattle caused the vulture population to dwindle drastically.

Vultures act as scavengers, preying on dead animals and Diclofenac in carcasses led to slow death of vultures. Wildlife activists said that Ketoprofen, which came as an alternative, caused the same effect on the vulture population. After reviewing the research work by wildlife scientists, the government decided to stop use of Ketoprofen immediately in the districts of Erode, Coimbatore and The Nilgiris where the activists see an opportunity of revival of the vulture population. Further use of Ketoprofen will be discontinued for veterinary purposes in the entire State. Meloxicam, an alternative drug, is currently included in the drug list and will be inducted in higher quantity to replace Ketoprofen completely in the State.

Chapter. 8. Research, Monitoring and Training

Research and Monitoring are basic tools for a better understanding of nature, its functions and to enable optimum or sustainable utilisation of its resources, as well as to evaluate the conservation status of endangered species and their habitat and extent of impact of conservation endeavours undertaken. Such understanding would help to reduce threats to tiger habitats.

8.1. Research Priorities

Wildlife management is a mix of field skills and a scientific practice through field research, studies, observations and experience. So far no major studies and research projects have been taken up in the buffer or core zone reserve by the Department. However, few external projects & research were and are being undertaken by researchers, students& institutions on various subjects like corridors, ecology of various species, floral studies, human dynamics, climatic impacts, etc.,

Research in the Sathyamangalam Tiger Reserve should focus on the critical information needs for effective science-based management of Tiger Reserves. The research should focus on study and documentation of important species in the landscape, RET species monitoring, conflict studies, human dynamics and impact, indigenous people, and all stake holders. The impact of human activities on wildlife habitats, or about the full range of benefits that flow from biodiversity-rich old growth, natural forests and ecosystems is a key area of research. Research should also foucs on techniques in restoration of degraded habitats.

Following are broad priority areas for research studies to be undertaken:

i. Prey and predator population monitoring

2) Monitoring of tiger and prey base (as per Phase IV monitoring)

3) Carrying capacity of carnivores (Tiger, Leopard, Wild dog, Hyena and other small animals).

4) Prey predator interaction –availability of prey base to the present population size of carnivores (as per phase IV monitoring).

5) Availability of fodder resources for required prey base

6) Radio collaring of tigers and leopards

7) Identification of individual tigers using DNA fingerprinting and evaluation of genetic fitness of the population.

8) Multidisciplinary research on tiger conservation program will be promoted with the assistance of various premier wildlife research institutions. This will require greater financial allocations for field research and monitoring through centrally sponsored schemes (Western Ghats and Eastern Ghats Development Programme, Biodiversity Conservation Projects, NBR, Project Elephant, NTCA, TBGP).

9) Develop and standardize procedures for health monitoring and disease surveillance of wildlife.

i. Habitat management

1) Conducting studies for collecting baseline information (both qualitative and quantitative inventories) to correct managerial decision.

2) Creating a data base (beat wise) on key animals and plants for scientific management of the tiger reserve

3) Direct/indirect and long term/short term changes in ecosystem resultant to the various management interventions made earlier.

4) Management Perspective for removal of alien species and strategies (control methods and clear cut strategies for future)

5) Ecology of *Lantana camara* and *Prosopis juliflora*

6) Habitat use pattern by larger mammals in the weed dominated areas

7) Elephant-vegetation interaction possible impacts and benefits

8) Water management

9) A long term study of species abundance and richness in various forest types.

ii. Climate change

1) Impacts of climate change on flora and fauna

2) Tolerance and response of plant communities towards climate change.

3) Habitat use and distribution pattern of larger mammals during drought conditions.

4) Seasonal migration of herbivores

iii. Fire Ecology

1) Impacts of fire on the eco-system, control and preventive strategies

2) A study on forest fire vulnerability, sensitive beats, wind effect etc.

iv. Study on Endangered species and Preparation of recovery plan for important endangered species list below

1) Vulture population

2) Ecology of Wild dogs

3) Striped Hyena

4) Four horned antelope

5) Smaller carnivores

6) Sloth Bears

7) Indian Gaur

8) Blackbuck

9) Distribution pattern of different species of squirrels

10) Avifauna, Pisces, and Reptiles

11) Crocodile

12) Rattles / Honey badger

13) Smooth coated Otters

14) Radio collaring study on Elephants

15) Inventory and study of status of RET species on periodical basis

16) Focus research to acquire a better countrywide understanding of diversity indices, populations of indicators and endangered species and their habitats.

17) Ecological requirement of rare, endangered, threatened and endemic flora & fauna species.

v. Community interface Studies:

1) Implementation of (community) participatory project to address landscape conservation programme, especially reduction of human induced pressure such as fuel wood collection, grazing and NTFP collection
2) Assessment on the socio economic status of forest villages to develop comprehensive eco-development programme and to provide alternative employment generation activities in order to minimize threats on wildlife habitats
3) Documentation of ethnic knowledge for the benefit of forest conservation
4) Impact of collection of NTFP and forest dependency of tribal on the ecosystem.
5) Study of ecological relationships of wildlife and habitats and PA-People relationships.
6) Impact of various development activities in the enclave and peripheral villages on the integrity of tiger reserve

The main projects in Buffer Zone in current circumstances should focus on;

a. Livelihood of Tribals and other local community dwellers / eco-development.
b. Afforestation of degraded forest patch including soil moisture conservation works.
c. Survey and assessment of invasive alien species removal
d. Monitoring of Tiger, co-predator and prey species and its management., etc.,

Implementation

Field Director, Sathyamangalam Tiger Reserve along with Deputy Directors and Forest Range Officers will implement /accommodate any outcome of research projects projects in the landscape in their APOs. The field director can initiate MOUs with local scientific insittions, NGOs, researchers on subjects of imminent management interest and also sufficient Biologists and Project Assistants will be engaged through plan schemes and Tiger Conservation Foundation for implementing this activity.

8.2. Research Projects

There are several research organizations that are working in the tiger reserve. Indian Institute of Science has been monitoring the human animal conflict. IISC has also

studying the ecology of larger mammals in this region since early 1980. Researchers from SACON have studied plant – bird interaction with special reference to seed dispersal by birds. SACON has also studied the diversity of fish in the River Moyar. Scientists from WWF India Program-AREAS have studied the socio economic aspects of people and implemented various conservation programmes with the focal theme of landscape initiatives. Scientists from BNHS have studied the status of feral buffaloes and other herbivores including the status of large carnivores. Recently a study on the ecology of black buck was carried out by the Indian Institute of Science.

8.3. Monitoring Frame Work

As per National Wildlife Action Plan-2002, monitoring and research are tools for a better understanding of nature, its functions and to enable optimum or sustainable utilisation of its resources, as well as to evaluate the conservation status of species and habitats and the extent of impact of conservation endeavours undertaken. Such understanding will also help reduce man-animal conflicts. There is a marked deficiency in baseline biological data and on information we need to manage and monitor Protected Areas.

Little is known about the impact of human activities on wildlife habitats, or about the full range of benefits that flow from biodiversity-rich old growth, natural forests and ecosystems. Not much is known about techniques, which could *inter alia* help restore, at a very minimal cost, degraded habitats. Research for making use of ethnic knowledge in wildlife conservation and management as well as in applied research to obtain IPR's (Intellectual Property Rights) capable of benefiting the local communities and country should receive special attention.

The NWAP suggests the following actions required for this purpose.

1) Multidisciplinary research on tiger conservation program will be promoted with the assistance of various premier wildlife research institutions. This will require greater financial allocations for field research and monitoring through centrally sponsored schemes (Western Ghats and Eastern Ghats Development Programme, Biodiversity Conservation Projects, NBR, Project Elephant, NTCA, TPGP).

2) Focus research to acquire a better countrywide understanding of diversity indices, populations of indicators and endangered species and their habitats.

3) Review current management practices and translate research findings into management applications with an effective monitoring and evaluation systems.

4) Monitor and document the impact of human activities on natural habitats, including the spread of disease and impact of fires

5) Document and assess damage done by large projects and intrusions, such as dams, roads, high tensile power lines and use of pesticides and chemicals in natural water.

6) Review present research approval procedures to ensure research in biological conservation.

7) Identification of wildlife corridors between important PAs harbouring endangered and long ranging charismatic species such as tigers and elephants.

8) Study ethnic knowledge and apply it to wildlife management and work with communities to obtain IPRs to benefit both the communities and the nation.

9) Prepare research priorities for PA which would be consolidated into a State Wildlife Research Plan (5-year period).

8.4. Training Needs Assessment

The challenging wildlife conservation scenario today requires committed wildlife managers and front-line staff who possess scientific competence. They also need sharp detection and enforcement capabilities against organised criminal elements nursed by big-money illegal trade. Frontline staff equally must have a set of field skills at the grassroots level. The current capacity building and personnel planning and management measures need to be greatly strengthened to meet these challenges. Training programmes aimed at upgrading the skill levels of the staff to match these challenges have to be part of routine rather than exception.

All new entrants to this Reserve shall be sensitized in wildlife management through a capsule training course which will be arranged by Sathyamangalam Tiger Conservation Foundation. Specialized training will be imparted on use of equipment for monitoring of tiger and prey species. Staff will be taken on exposure trips to other PAs within and outside the state. Staff members will be given training in wildlife health monitoring. Staff and all JFMCs will be provided training on eco-development and alternative employment generation activities along with marketing links and sustenance.

Ministerial staff will be exposed and sensitized on various management aspects through workshops and excursions. All such trainings should be periodical and regular. The antipoaching watchers will also be provided training in once in year tp increase their capacity building.

For training the staff the existing institations such as SACON, IFGTB FCRI, mettupalyam and tamilnadu forest academy will roped in

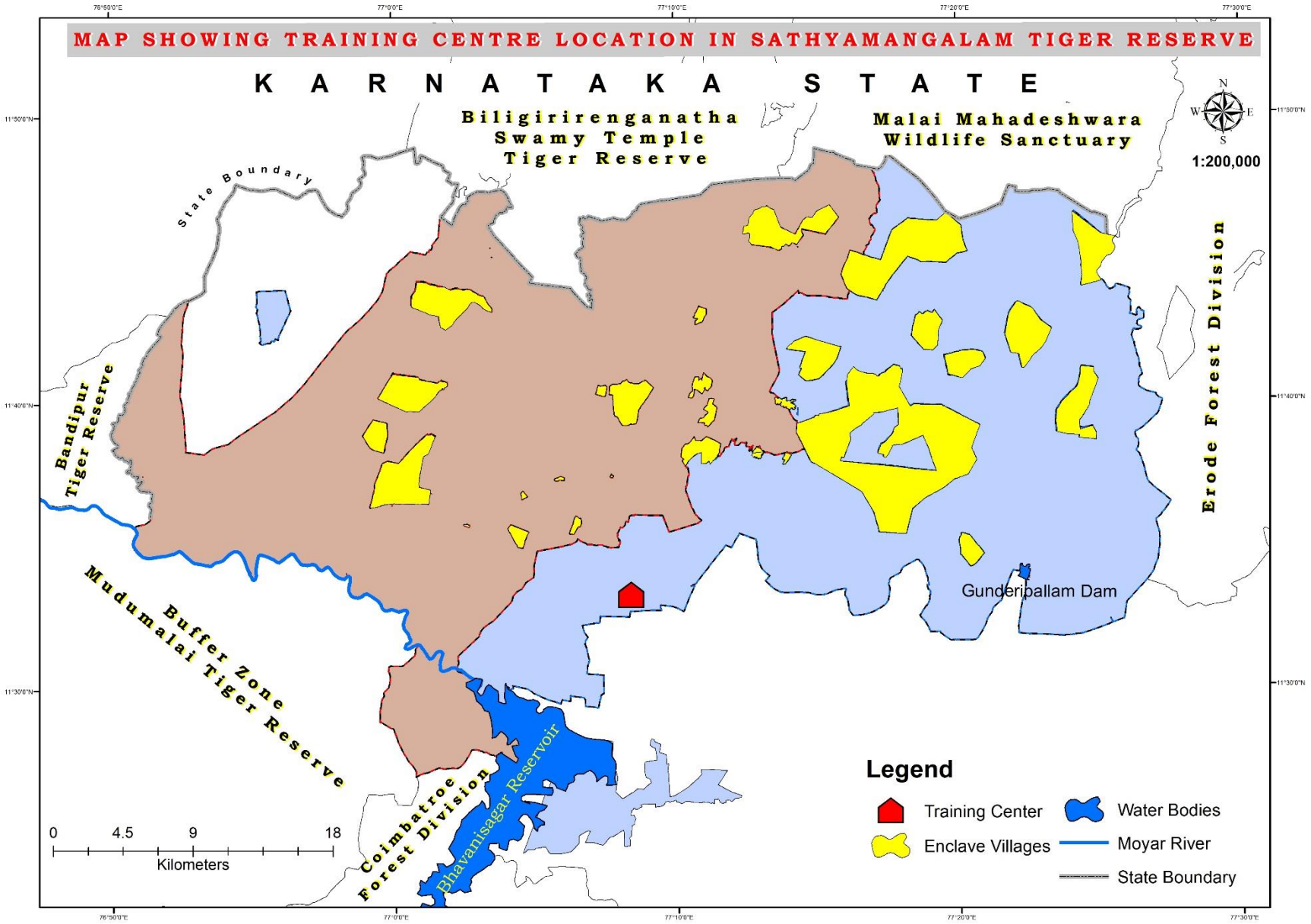
Creation of training infrastructure:

a. In addition to in house training through other agencies, visiting resource persons, will also be roped in for training purposes
b. A learning centre will be created at Hassanur and Bannari in order to gain and upgrade knowledge on the biological specimens, floral collections, equipment etc., Biological specimens of wild animals, herbarium specimens collected for learning will be kept in the centre.
c. Reference books, pictorial guides on various subjects in different languages will be collected for reference to staff, students and visitors in the centre.
d. In all officers working in the tiger reserve will be well equip with advanced versions of computer its accessories and essential software.

Proposed Training Requirements:

- ✓ NTCA 8 days protocol, Tiger Monitoring, Smart Patrolling, PIPs, Camera trap survey, etc.
- ✓ Training on wildlife ecology, signs & survey and handling Human-wildlife conflicts, NTCA protocol and SOPs, identification of conflict kills, monitoring techniques.
- ✓ Understanding of principles and procedures of intelligence gathering, modus operandi of poachers, equipment used and procedures and networking with other enforcement agencies.
- ✓ Training of procedure, sections and rules of various acts applicable to the landscape.
- ✓ Training on identification of Wildlife parts and products, arms and ammunitions, its usage and procedures, wireless equipment, survey equipment etc.,.
- ✓ Training on fire management & disaster management

- ✓ Knowledge of first-aid, improvised stretches, etc.
- ✓ Knowledge of forest survey and mapping; alignment of boundary of Forest Stations, and its checking with maps. Existing rules and regulations governingboundary cairns. Survey of boundary Act and Rules.
- ✓ Plant morphology and taxonomy.
- ✓ Wildlife Photography
- ✓ Training on dealing with conflict scenario and eco-development aspects.


MAP SHOWING TRAINING CENTRE LOCATION IN SATHYAMANGALAM TIGER RESERVE
K A R N A T A K A S T A T E
Biligirirenganatha Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
State Boundary
Bandipur Tiger Reserve
Erode Forest Division
Gunderipallam Dam
Buffer Zone Mudumalai Tiger Reserve
Coimbatroe Forest Division
Bhavanisagar Reservoir
1:200,000
0 4.5 9 18
Kilometers
Legend
Training Center
Enclave Villages
Water Bodies
Moyar River
State Boundary

8.5. HRD Plan

There are three fundamental component areas of human resource development (HRD): individual development (personal), career development (professional), and organizational development. The importance of each component will vary from organization to organization according to the complexity of the operation, the criticality of human resources to organizational efficiency, and the organization's commitment to improved human resources. But all three have one focus individual performance improvement. Since individual performance improvement is the heart of an HRD program, HRD can be described as the "area of congruence" among the three components. *(Source: Jerry Gillet and Seteven Eggland, Principles of Human Resource Development, Perseus Books Group.)*

The Human Resource Development (HRD) plan aims to improve the morale of the staff and encourage them by providing various facilities, awards and rewards for their special performances in different fields.

8.5.1. Individual Development

Individual development refers to the development of new knowledge, skills, and/or improved behaviors that result in performance enhancement and improvement related to one's current job (training). Learning may involve formal programs, but is most often accomplished through informal, on-the-job training activities. *(Source: Jerry Gillet and Seteven Eggland, Principles of Human Resource Development, Perseus Books Group.)*

Skill development on various components is required for the forest field staff in order to improve their standards for managing the tiger reserve in a scientific manner. The skill development could promote the field staff in upgrading their knowledge which could be highly important as part of management practices of the tiger reserve.

8.5.1.1. Provision of quality medical facilities.

Most of our staff is working in inaccessible and remote areas. First Aid Equipment should be provided in every anti-poaching camp, rest house, tourist lodge and dormitories. Staff should be sent for first aid course conducted by resource personnel so that they are available at our disposal to administer first aid at the time of emergency. The antidote

(anti-venom) for snake bite must be procured and always kept in readiness at all the Range Offices. This is very important and urgent. Additionally, regular health / medical camps are being conducted through various Non-Governmental Organizations.

8.5.1.2. Provision of other facilities

In house facilities such as dormitories, training halls, hands on labs, in house library, in house web access unit, physical fitness facilities like in house gym, play equipment, indoor & outdoor courts will be created for enhancing the efficiency and provide capacity building skills.

The existing staff mess (canteen) in Hassanur has to be upgraded with subsidy and adequate dining and other facilities. Staff canteens can be developed in other ranges headquarters too.

Anti-poaching watchers are temporary daily wage staff engaged for strengthening protection. At present there are 150 anti-poaching watchers functioning under 25 anti-poaching camps. These anti-poaching watchers are not eligible for any establishment benefits and allowances like field staff / uniform staff. In order to address their crucial and family emergency needs, a thrift society in the name of Sathyamangalam Tiger Reserve anti-poaching watchers welfare & thrift society is registered in July 2015, which has got basic funding from external agencies to be given as loan on repayment basis without interest. This funding should be increased to address the needs of anti-poaching watchers so that the loan amount can be increased from the current Rs. 5,000/-. This thrift society is a matter of great support and motivation to the daily wage staff of the reserve.

8.5.2. Special Allowance: (Project Allowance)

At present the staffs are paid Project Allowance as per guidelines of National Tiger Conservation Authority.

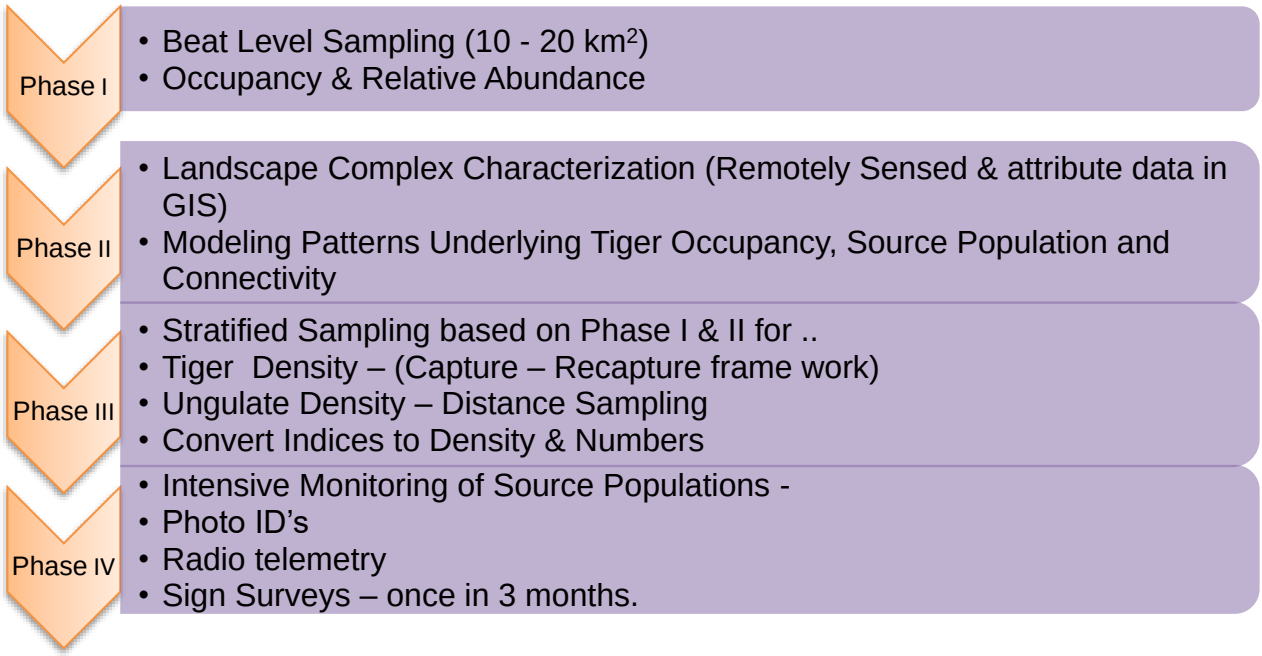
Chapter. 9. Tiger Population and Habitat Assessment

This chapter proposes strategies for regular documentation and monitoring of tigers, co-predators, prey and their habitat in line with the guidelines prescribed by NTCA .This exercise is to strengthen the intense monitoring of tiger and the habitat at field level and to generate information on regular basis for evaluating tiger occupancy and conservation effectiveness. Results will be used by the management for reframing protection strategies, undertake remedial actions any if needed. Based on data collected through the above exercises, a database on distribution of tigers, co-predators and prey base, potential habitats and threats to the population and habitats will be created. Reports on the monitoring programme will be submitted to FD and CWLW for onward submission to NTCA.

9.1. Daily Monitoring and Forecasting

Daily patrolling using GPS equipment / patrol data register format is one of the methods of monitoring the presence of Tigers. This is being done at the level of beats/anti-poaching camps, so that movement of Tigers in the respective areas is recorded. Daily smart patrol data will be collected through M-Stripe application developed by NTCA. Detailed analysis of the raw data collected would be subjected to analysis by the M Stripes software, developed by Wildlife Institute of India with site specific modifications to suite STR field conditions in future. This is being dealt with in detail in the section 9.2 of this plan.

9.2. Tiger Population Estimation and Monitoring Frame Work (Phase I, II,III & IV)



Phase I

Phase–I comprises of rapid and cost effective assessment of tiger habitats. Phase I Protocols were developed by NTCA and WII and are implemented by the tiger reserves.

The tiger estimation is based on the study of sampling units (i. e. beats) systematically distributed throughout the Tiger landscape. Outcome of this technique is in the form of Spatial occupancy (presence/ absence) and relative abundance of animals. Sampling unit, i.e. 'Beat' will be explored for carnivore sign survey, ungulate abundance, human disturbance and the vegetation (Habitat features)

Spatial mapping and monitoring of Tigers, prey and habitats would be done as per the NTCA protocol. All forest beats would be sampled for the above indices. Data generated will be analysed through GIS tools to give spatial locations for generating distribution maps and coverage of target species, especially Tigers.

Based on the recent studies more transact to be laid and uncovered areas will be revisited to identify more transact lines so as to have comprehensive coverage of the entire Tiger Reserve for Tiger and Prey base monitoring.

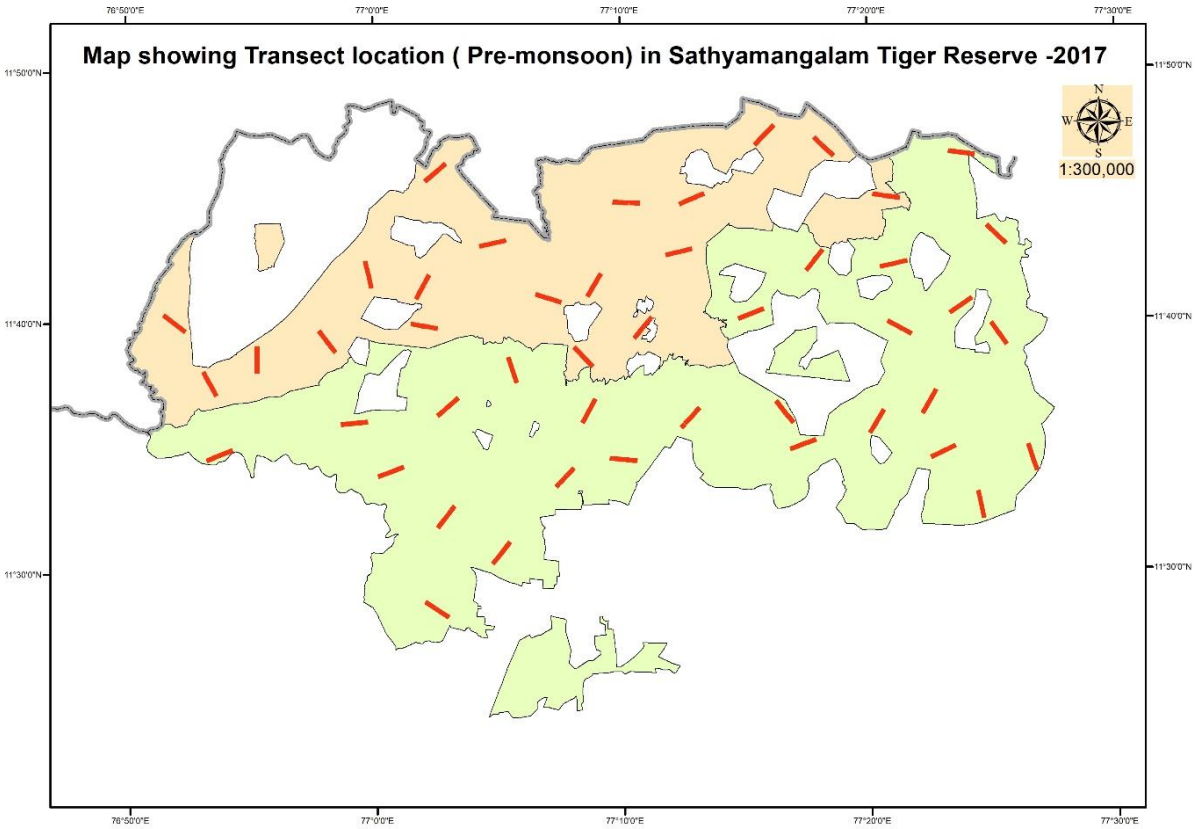


Table 9.1: Shows that the transects coordinates along with ranges and beats in SMTR.

S.No	Name of the Ranges	Name of the Beats	Start points coordinate		End point coordinate	
1	Bhavanisagar	Thengumarahada	11.58060	76.90320	11.58708	76.88623
2	Bhavanisagar	Gajalaty	11.55689	76.98476	11.57416	76.98982
3	Bhavanisagar	Kothamangalam	11.49395	77.08970	11.51150	77.08603
4	Bhavanisagar	Bannari	11.54128	77.12856	11.55932	77.12840
5	Bhavanisagar	Patramangalam	11.47049	77.05093	11.45380	77.05240
6	Bhavanisagar	Pudhbeerkadzvu	11.54630	77.05368	11.53740	77.04056
7	Germalam	Kottamalam	11.74123	77.31563	11.72766	77.32355
8	Germalam	Kadatti	11.76235	77.28275	11.78010	77.28364
9	Germalam	Germalam West	11.71477	77.18859	11.71519	77.20650
10	Hassanur	Germalam East	11.76706	77.23548	11.78500	77.23593
11	Hassanur	Kottadai	11.64937	77.13210	11.64937	77.13212
12	Hassanur	Hassanur	11.74472	77.11191	11.74386	77.13033
13	Hassanur	Binahalli North	11.72207	77.11376	11.70496	77.10812
14	Hassanur	Mavalam	11.68632	77.18301	11.67471	77.17020
15	Hassanur	Kakkarai	11.63850	77.21876	11.65564	77.22430
16	Hassanur	Binahalli West	11.66518	77.12296	11.64865	77.11713
17	Sathyamangalam	Kadampur West	11.63454	77.31600	11.63494	77.29972
18	Sathyamangalam	Vadavalli	11.55424	77.15022	11.57126	77.15343
19	Sathyamangalam	Dhimpam	11.60036	77.14207	11.61612	77.14207
20	Sathyamangalam	Ekkathur	11.65057	77.27523	11.64530	77.29194
21	Sathyamangalam	KNPalayam	11.56408	77.29404	11.58186	77.29049
22	Sathyamangalam	Chikkarasampalayam	11.57855	77.18816	11.59418	77.18944
23	Sathyamangalam	Anaikarai	11.68817	77.31104	11.68908	77.29284
24	Sathyamangalam	Kondappa Naiken Palayam	11.55711	77.26077	11.56865	77.24830
25	Thalamalai	Bejalaty	11.61993	77.03320	11.60966	77.02978

S.No	Name of the Ranges	Name of the Beats	Start points coordinate		End point coordinate	
26	Thalamalai	Onnathittu	11.62661	77.09366	11.64322	77.10052
27	Thalamalai	Thalamalai	11.60933	76.98585	11.62025	76.97154
28	Thalavadi	Neithalapuram North	11.67983	77.02541	11.69669	77.01914
29	Thalavadi	Chikkali	11.73903	77.01722	11.74441	76.99942
30	Thalavadi	Belathur	11.63510	76.87781	11.62174	76.86583
31	Thalavadi	Palayam	11.66779	76.87481	11.67074	76.85662
32	Thalavadi	Getavadi	11.64318	76.90269	11.62695	76.90205
33	Thalavadi	Neithalapuram South	11.65688	76.99596	11.65275	77.01361
34	Thalavadi	Thiganarai	11.70469	77.01661	11.70117	76.99895
35	Thalavadi	Jirahalli	11.66202	76.93089	11.65630	76.94811
36	TNPalayam	Banglow Pudhur	11.55250	77.41881	11.54916	77.40046
37	TNPalayam	Koothampalayam	11.74147	77.39892	11.72815	77.38651
38	TNPalayam	Arigium	11.71885	77.38826	11.72330	77.37231
39	TNPalayam	Kovilur	11.66026	77.38550	11.67797	77.38870
40	TNPalayam	Makkampalayam	11.73245	77.41917	11.72410	77.40404
41	TNPalayam	Kadampur East	11.66436	77.34496	11.66377	77.36178
42	TNPalayam	Vilamkombai	11.57175	77.36719	11.58747	77.36975
43	TNPalayam	Kongarpalayam	11.59259	77.37283	11.57660	77.38176
44	TNPalayam	Kanakkampalayam	11.56331	77.44926	11.55441	77.42870

Phase II

The Phase II is done by NTCA and WII .Assimilation of spatial attributed data of phase I would be plotted by the WII in geographical information system (GIS) to develop a presence/absence map for tigers, at the beat or range level across the tiger reserve. The presence/absence map is then to be used to develop a resource selection probability index using attribute data on transportation network (i.e., linear features such as roads and train tracks), forest cover, normalized difference vegetation index (NDVI), vegetation type, terrain model, hydrology, and night light satellite (to represent human disturbance). The

output of phase-II will be a map with relative rankings of high, medium, and low probability of tiger occupancy index throughout the reserve.

Phase III

This phase will again be done by NTCA and WII.Estimation of Tiger and Ungulate Abundance will be done using Intensive Sampling. The habitat preference Map for tiger developed in phase II will be used to draw a sample of location for intensive Density Estimation of Tiger and Ungulates Density.

Phase IV

Phase IV is a specialized exercise for source population i.e. 'Tiger Reserves' which is expected to be carried out by the Tiger reserve managers twice every year. As per the NTCA guidelines, the minimum standards for the Phase IV protocols are:

(1) Camera trap density one pair per 4-5 sq.km.

(2) Minimum trap nights of a 1000 per 100 sq.km. (i.e. 25 pairs of cameras in 100 sq.km. for 40 days)

(3) Minimum area coverage of 400 sq.km.

(4) Closure period of 40 to 60 days

(5) Minimum of 20 spatial replicates of line transects each of a minimum of 2 km length (for the entire reserve)

(6) Entire reserve needs to be sampled. Each sampling occasion should cover minimum area of 400 sq.km (100 pairs of cameras) and in case of larger reserves, the area should be covered by dividing the area into 400 sq.km blocks and camera trapping should be done successively, within the closure period of 60 days.

As per the direction and guidelines of NTCA, 6 protocols prescribed under countrywide Phase IV Tiger Monitoring, all the protocols shall be followed in STR. Accordingly this work had commenced with the training of field staff from the month January 2014. Following are the 6 protocols:

1) Maintaining daily patrolling log
2) Carrying out the eight-day protocol twice a year
3) Recording from PIP
4) Obtaining minimum tiger number using Camera traps
5) Obtaining tiger number using camera traps

6) Obtaining minimum number through DNA analysis from scats

9.2.1.1. Daily Patrolling log

Maintaining daily patrolling log in patrolling camp

The NTCA has given detailed guidelines on this exercise which will be scrupulously followed. While on regular or targeted patrolling duties the personnel shall record the following information:

1) Each patrolling team shall be equipped with a GPS unit and a digital camera besides the regular equipment (e.g. wireless, torch, etc) and patrol data sheet.
2) The date, time and GPS coordinates of the beginning of the patrol recorded.
3) Preferably the GPS unit shall be switched on throughout the patrol in a track log mode. However, due to constraints of technical knowhow or other issues if this is not possible then a GPS coordinate recorded and written down in the record form every 30 min or at major deviations from a straight line path.
4) The total number of persons on the patrol are recorded along with number of armed personnel and type of arms. The mode of patrol is also recorded, e.g. on foot, bicycle, motorcycle, 4WD, elephant, boat, etc.
5) All records and observations of patrol and record of all illegal activities is entered in the data sheet along with time, date and coordinate stamp. A photograph is also taken of the site with the time - date stamp if possible.
6) A record of signs and sightings or highly endangered species while on Patrol is also maintained by entering the GPS coordinate, date and time of the sighting /sign as well as recording a digital picture of the same if possible.
7) After the end of the Patrol, the GPS track log is either downloaded onto a computer (in MSTrIPES program on installation if this is applicable at the site) or the datasheet with the recorded information deposited at the Range Head Quarters. Data formats for recording Patrol data are provided in Annexure-I of the guidelines issued by the NTCA. (A Protocol on Phase IV monitoring)

Adequate GPS, digital camera, torches, range finders, compass, copies of maps, mobile handset for MStripes installation with data charges, additional software purchase if any, arms and ammunitions and other necessary equipment will be purchased. Adequate patrolling forms and registers will be printed.

Care has to be taken in maintaining as much silence as possible during the walks and noting down the associated information for habitat and weather. The records of these walks, if maintained properly and compared over a period of time, these data could provide reliable information towards understanding and deriving an overall idea about the habitats. Reporting and Database Maintenance are the two most important components of the management program.

Data collected during these daily patrolling has to be compiled by the respective Range Office. Periodically, the data sheets from each range office is stored in the Tiger Monitoring Cell for further analysis. For the same reporting and database maintenance, provisions for stationary in all Ranges, Deputy Director's office, Field Director's office, Monitoring Cell &Provision for maintenance of software, computers &peripherals is highly essential with regular budget allocation. Monitoring gadgets, monitoring data sheets, log books and other requirements is to be procured and provided regularly.

For the functioning of monitoring units and control units at Range level, Division level, Field Director's level, equipment, communication facilities, data charges, broadband charges, etc., is to be provided. Telephone / mobile allowance should be provided to all officers, contract staff at Control &Monitoring units, all frontline staff. Data charges and communication charges for handsets used in M-Stripes monitoring at anti-poaching watcher level should be included for effective data transfer and analysis.

9.2.1.2. 8 day protocol twice a year

For estimating prey base density, line transect direct count method should be followed during pre-monsoon and post monsoon. The line transects method developed by Burnham *et al,* 1980 and Buckland *et al* 2001 has many advantages in terms of its ability to deal with practical field problems such as non-detection of some animals in the sampled area because of dense cover, varying detection conditions between sampling efforts and non-random animal distribution Burnham, 1980.

For estimating prey base density, the entire area of STR will be covered including buffer zone taking beat as sampling unit. In each beat two transects will be laid with length of 2 km and spaced at least 1.5 km apart. Totally 48 transects will be laid, covering all vegetation types and altitudinal gradient. Additional transect lines would be laid in future for newly created beats in all Ranges. These transects will be walked six temporal replicates (three each in the morning and evening) resulting in a sampling effort of 576 km of distance walked. In the transect line for each sighting the details such as animals species, group size, sighting angle and distance between the observer and location of first sight of animal was measured. The sighting angle was measured using advanced compass or liquid filled prismatic compass with accuracy of ±1 degrees. Angular distance will be measured (in meters) using optical laser range finder. This 8 day protocol will be made twice in a year and the data will be recorded in the format prescribed by the NTCA.

Recording data from pressure impression pads

As a part of intensive monitoring of source population of tigers, data of pressure impression pads would be recorded in each beat of the reserve in future.

1) A minimum of 2 PIPs will be permanently monitored in each beat previously during first protocol. The dimension of the PIP will be as prescribed by the NTCA guidelines in appropriate places. GPS coordinates of all PIPs will be recorded.
2) PIPs will be prepared with fine dust of about 0.5 cm depth and the area cleared for debris, leaf litter and gravel. The data of PIPs will be collected once in a week.
3) Tracks of all carnivore and mega herbivore will be recorded periodically in the prescribed format.

9.2.1.3. Obtaining Minimum Numbers (Tiger Population Estimation)

Intensive carnivore sign survey mps have ben developed in STR. The locations of camera traps that need to placed have been already standardised. The details are listed below.

Following are the instructions given by the NTCA on this exercise for Obtaining the minimum number of tigers in the tiger reserve

(i) Three pairs of camera traps to be deployed per beat and should be left open within a closed period of 40-60 days depending on the reserve.

(ii) The period of leaving the camera traps open (closure period) is important owing to the fundamental assumption of “population closure” (no deaths / births / immigrations / emigrations in the population). Leaving the cameras open for longer duration will lead to over estimation of tiger numbers.

(iii) The photographs obtained from camera trapping should be submitted to NTCA for analysis for fixing individual IDs of tigers.

(iv) A digital camera trap tiger photo database should be prepared for the reserve with location ID, Date and Time Stamps as per format to be provided by NTCA.

(v) The minimum number of tigers should be ascertained based on individual camera photo traps of tigers obtained within the closure period specified to be 45-60 days.

(vi) Details of new captures / missing tigers should be recorded.

(vii) The format for recording the camera trap capture data as provided by NTCA will be used.

Phase IV camera trapping exercises will be undertaken annually in 2 sq. km grids, each block will be consists of 400 sq. km so that the core will be covered by 2 blocks. In 2017-18 Adequate camera traps will be purchased in phased manner as at present there are only 180 functional camera traps against requirement of 720 Camera traps for 360 grids. Other equipments like range finders, compass, GPS, altimeters, binoculars, etc., have to be purchased as per the number of transects in beat. There shall prior training for conducting of bi-annual 8 day protocol exercise.

a. Obtaining tiger numbers using camera trap (Density estimation)

The NTCA has given detailed guidelines on obtaining tiger population size for the reserve using spatially-explicit capture recapture framework in technical document No. 01/2011, which is reproduced below for adherence.

(A) Obtaining tiger population size.

(i) The camera traps deployed as per the survey design in Appendix-1 of the guidelines. Should be left open for a period of 40-60 days (depending on the areas). Where possible the entire Tiger Reserve must be surveyed. If the survey area is very large, tiger population size can be obtained by sampling a minimum block of 400 square kilometres at a time, but following all other minimum standards in section 3. If deployment

of camera traps in an entire reserve or parts of it is not feasible for any reason, faecal DNA samples may be collected over the entire Tiger Reserve for Capture-Recapture analysis. The tiger population size may then be estimated over the entire Tiger Reserve using Mark-recapture methodology.

(ii) The analysis of the data needs to be done in collaboration with a technical expert / scientist conversant with spatially explicit capture-recapture process / analysis.

(iii)The period of leaving the camera traps open (closure period) is important owing to the fundamental assumption of “population closure” (no deaths / births / immigrations / emigrations in the population). Leaving the cameras open for longer duration may lead to over estimation.

(iv) The format for summary record of camera captures and the basics of mark recapture process using camera traps are provided at Annexures-V & VI of the guidelines.

(v) The analysis of capture data between years (using open population models) should also be done in collaboration with technical experts / scientists/ WII.

b. Obtaining minimum number through DNA analysis from scats

The NTCA has given guidelines vide Technical Document 01/2011 for using scats for DNA analysis to obtain the minimum tiger numbers in reserves where camera trapping is not possible. This is not applicable to STR, however DNA analysis is a good tool to understand the genetic lineage of the source population of Tigers. The guidelines given by the NTCA is reproduced below which may be used by suitable modifications for conducting genetic studies.

9.3. Habitat Assessment and Monitoring Frame Work

NTCA has given a detailed guidelines in its field guide – Monitoring Tigers, Co-predators, Prey and their habitats (2009) on Habitat assessment using line transect sampling which is reproduced below for strict adherence.

To quantify the habitat parameters and determine levels of human disturbance, 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 human disturbance (and also for ungulate pellets - section 4). Sampling for vegetation and human disturbance (and ungulate pellets) will be done only once on a transect .If there are less than 5 species then only record these.

A beat will be the sampling unit, and sampling will be done along the established line transect. The beginning and end point coordinates of the line transect need to be recorded using a GPS unit. If possible GPS coordinates for each plot should be recorded. The same principal of laying line transects as explained in the section on ungulate encounter rates is applicable .For each transect, the broad vegetation type and associated terrain type eg. Mixed teak forest on hilly terrain, Sal forest on flat land, etc. should be recorded (based on Champion & Seth, 1968 classification). There would be 1-3 vegetation types occurring locally and these need to be communicated to the forest staff a prior.

Vegetation and human disturbance would need to be sampled every 400m along the transect. The vegetation and human disturbance would need to be quantified visually at the following categories for each plot:

1) Within a distance of approximately 15 m of the observer the five most dominant trees (over-story, all vegetation > 6ft in height, including bamboo) need to be listed in the order of dominance (abundance)

2) The observer needs to list the 5 most dominant shrub species (middle-story, vegetation >40cm &< 6ft) in order of dominance (abundance) within 15m of the location. The observer needs to categorize shrub density (under-story vegetation) as absent (0%), very low (25%), low (50%), medium (75%), and dense (100%) on a five point scale (0 to 4). (a) In 15 m. radius circular plot

3) If exotic invasive weeds are present, their abundance needs to be scored on 0 to 4 scale (0 being absent and 4 high abundance) and the three most common weeds seen in15mradius need to be listed in order of abundance.

4) The observer needs to visually quantify the canopy cover at the location. The observer should 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 by sampling 5 points along a diagonal of the 15m plot.

5) Within the same 15m radius the observer needs to record number of trees with signs of lopping, woodcutting, presence/absence of human/livestock foot trail and if there are evidences of grass/bamboo cutting.

6) If any livestock or humans are visible from the plot then record their presence as Yes in data sheet.

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

(b) In1m radius circular plot

This plot should be laid 5m away from the center of the 15m circular plot. The observer needs to use a 2mlong 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 (green and dry), weeds, and bare ground,

b) list the 3 most dominant grass species and herb species in order of dominance

In the data collected in the formats will be analyzed in the office of the Deputy Director and Field Director and the parameters will be correlated and analyzed scientifically to extract information for management actions. Regular collection of the data of the habitat will also be used to generate seasonal fodder availability index.

9.4. Spatial Database Development

Loss of habitat is the most important cause of species extinction in recent times. Habitat loss often results not only in an overall decrease in the amount of habitat, but also in discontinuities in the distribution of the remaining habitat. The result is the fragmentation of the original habitat which now exists in disjoined patches. When a species lives in several patches, much depends on exactly where those patches are, i.e., on their spatial arrangement. This determines the distances between the patches, which is important for

dispersal rates. It also determines how similar (or, correlated) the environmental conditions in the neighbouring patches are. Both of these spatial factors (dispersal and correlation) are very important in determining the risk of extinction or decline of a species (RAMAS GIS).

GIS technology is an effective tool for managing, analysing, and mapping wildlife data such as population size and distribution, habitat use and preference, changes in habitats, and regional biodiversity. The ability to overlay such data makes GIS instrumental in delineating relationships between wildlife and outside forces, enabling the visualization of both where conservation practices need to be implemented and what current protection plans are effective). Once an area is found to be suffering from human disruption, weather, forest fires, or other interferences, it can be targeted as an area for conservation practices to be implemented.

When deforestation, extinction, and fragmentation harm this biodiversity, the strength of the environment diminishes. GIS technology enables monitoring of wildlife and their habitats so that threats to biodiversity can be tracked and policies can be implemented to protect threatened areas.

Population viability analysis (PVA) is a process of identifying the threats faced by a species and evaluating the likelihood that it will persist for a given time into the future. Population viability analysis is often oriented towards the conservation and management of rare and threatened species, with the goal of applying the principles of population ecology to improve their chances of survival. Threatened species management has two broad objectives. The short term objective is to minimize the risk of extinction. The longer term objective is to promote conditions in which species retain their potential for evolutionary change without intensive management.

Identifying the variables, spatial and non-spatial, those influence the existence of a species in a given area, analysing the variables in the GIS environment using Multi Variable Criteria analysis, evaluating the likelihoods using GIS modelling will assist PA mangers take decisions for the persistence of species for a given environment and time.

Primary data collected from the field on tigers will be used for analysing spatial distribution of tigers. This will be correlated with details on co-predators, prey base, habitat quality and human indices. This will be further correlated with the information generated on

vegetation cover, terrain model, drainage, transportation network, weather data, livestock abundance, human density, socio-economic parameters etc., for modelling habitat condition, tiger occupancy and potential areas of tiger for conservation. Infrastructure needed for generating such information including procurement of GIS software, digital data will be developed in STCF with funding support from NTCA. Database on territory of individual tigers and their identity will be kept strictly confidential.

Periodical satellite images will be purchased for undertaking vegetation change surveys and ecological monitoring.

9.5. Analysis and Reporting Frame Work

Analysis of the data collected by the forest department will be done by the Biologist at Sathyamangalam Tiger Conservation Foundation or Tiger Monitoring Cell. The recommendations of the research institutions/domain experts will be considered for decision making. Fully equipped tiger monitoring cell with biologists, technical staff and all necessary infrastructure is to be established for field data analysis and day-to-day monitoring of Tigers, co-predators and prey. Output of the entire monitoring programme will be used to make necessary modifications in the management prescriptions within the plan period. Information will also be published in peer reviewed journals and presented in seminars/symposia.

Reporting system for monitoring programme is given in Table 9.2.

Table 9.2: Reporting System of Monitoring Programme

Sl. No.	Report	Submitted by FRO to Tiger Monitoring Cell	Tiger Monitoring cell to Field Director
1	Daily Patrol Details	Every Month before 10th	Quarterly
2	Weekly Monitoring of PIP (Dec – Apr)	to be done in all beats from current year	---
3	Eight Day Protocol (Pre-Monsoon and Post Monsoon)	Jul - Aug Jan – Feb (after the exercise)	1 month after completion of the exercise
4	Annual Camera Trap Monitoring	February of every year (Camera trap exercise is carried out from Oct – Feb)	April of every year
5	Annual Report	---	10th April of every year

Chapter. 10. Protection and Intelligence Gathering

The core zone of Sathyamangalam Tiger Reserve spreads over 793. 49 sq. km. comprising various forest types and with undulating terrain and middle elevation Talamalai plateau. As such, its protection and augmentation of regeneration will be vital for conserving tigers in long term. The task of protecting a vast tiger habitat is difficult and challenging and will need dedicated and well planned action backed by timely intelligence inputs, prompt follow up as well measures on preventive actions.

10.1. Tiger Cell

A Tiger Cell is to be constituted with Field Director, Sathyamangalam Tiger Reserve, as its Chairman, with the Deputy Directors of the Tiger Reserve, District Forest Officer Erode, District Forest Officer Nilgiris North, Deputy Director Mudumalai, District Forest Officer Coimbatore, Assistant Conservator of Forests Erode District & Coimbatore District. The cell would monitor all the events having a bearing on tiger conservation, including intelligence, intelligence gathering and prosecution of wildlife offences, cases of predation, mortality at the Landscape Level. The cell would also liaise with other Law Enforcement Agencies like STF, Police, Narcotics to focus on protection. It will ensure effective implementation of protection strategies of the Sathyamangalam Tiger Reserve and also forests divisions in adjacent landscape and to liaise with the governmental and non-governmental agencies. The tiger cell will have a full time staff comprising one retired Forest Range Officer who has a good track record on forest and wildlife protection while in service. The tiger cell office will operate from office of the Field Director or any other strategic location within the Reserve. Tiger Cell will meet at least once in six months. The Tiger Cell will assist in Population assessment of tigers, Law enforcement, Wildlife forensics, Infrastructural development for protection, Smart patrolling, etc.

10.2. Strike Force

There is no requirement at present to have a separate strike force and it is sufficient strengthen the existing forest protection squads attached to the Hasanur and Sathyamangalam Divisions. At present the existing sanctioned staff strength in Sathyamangalam Tiger Reserve is attending the routine protection duty of the reserve. In case of any eventuality the reserve management has to mobilize the staff from different beats, which not only proves difficult at times but also the staff from different territorial

divisions tend to have different loyalties. So, Forest Protection Squads located in Sathyamangalam and Hasanur have to be well equipped with vehicular mobility to specifically look after the interface, which are more vulnerable. The Forest Protection Squads are now headed by Forest Range Officer and following staff strength is proposed for strengthening the unit. (Table 10.1)

Table10.1: Proposed Strength for Forest Protection Squad

Sl. No.	Post	Sanctioned	Proposed
FPS, Sathyamangalam	Forest Range Officer	1	1
	Forester	1	2
	Forest Guard	5	5
	Driver	1	1
FPS, Hasanur	Forest Range Officer	1	1
	Forester	-	2
	Forest Guard	-	5
	Driver	-	1

The Forest Protection Squad shall be entrusted with the following responsibilities.

1) Building up an effective intelligence network to monitor, prevent and pre-empt illegal activities in the Tiger Reserve.
2) Intensive night patrolling throughout the Tiger Reserve, and the villages surrounding it. Also periodical checking of interstate boundaries.
3) Raid and seizure of illegal wildlife products.
4) Weekly monitoring of market and general surveillance on the unauthorized movements, as also on the transitory nomads/Narikuravars, gypsies, and foreigners.
5) Keeping a watch over the offence profiles in the neighbouring areas of BRT Tiger Reserves, Cauvery Wildlife Sanctuary and Erode & Nilgiri North Forest Divisions.

10.3. Strategy for Protection and Communication

The strategy for protection and communication has been dealt in the theme plan for protection under chapter No. 7 also.

The Forest Protection in Sathyamangalam Tiger Reserve has to be accorded the highest priority and all other activities can best be considered only as complementary as protection goals. With inherent socio-economic problems and compulsions, and the ever mounting pressures on natural resources, illegal wildlife trade, Forest Protection assumes even greater importance.

For controlling poaching and such other illegal activities, timely planning, which involves identification of vulnerable areas, periods and then effective control are essential. Vulnerable periods is the specific time of the year when probability of hunting increases due to festivals, easy accessibility in the forests etc. During festival times, protection strategies will be strengthened and on decided routes, seasonal floating and anti-poaching camps will be organized. Equipment's, ration, camping materials, etc necessary for conducting such floating camps will be procured.

The patrolling and floating camps to vulnerable areas and deep interior areas are proposed to be undertaken by engaging local villagers and youth lead by Forest Guards or Foresters. The Deputy Directors will decide about the deployment strength, time and location. The forest staff will be regularly trained on protection skills and prosecution of offenses.

Advanced tools such as drones, thermal cameras will be utilized for enhancing the protection. Monsoon patrols and LWE patrols will be under taken by the Deputy Directors as per specific needs. Creation of cell phone network with CUG may be undertaken. Forest Range offices not having landlines at present, the same will be provided with data network. Adequate vehicles such as patrol jeeps, force mobilization vehicles will be purchased for protection. Provision will be made for providing fuel allowance for forest staff using personal bikes for mobility, provision for meeting the additional fuel requirement and additional funds for maintenance of functional vehicles used for patrolling & protection drives will be provided.

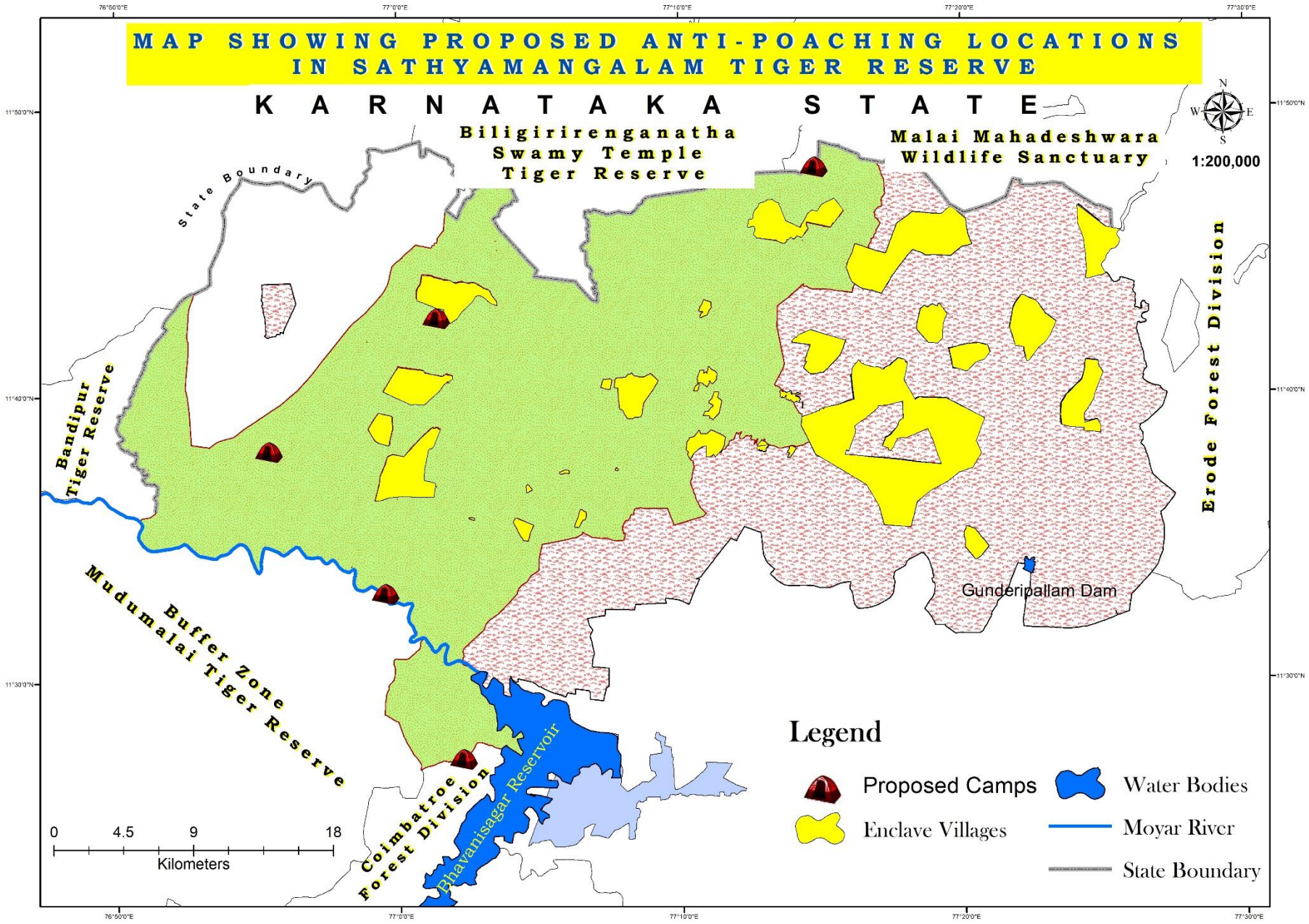
In core zone, at present only 15 anti-poaching camps are operating another 5 new anti-poaching camps will be created in the core for enhancing the protection. Range offices will be equipped with cells to detain offenders, adequate GPS, binoculars and Cameras will be purchased for use of staff. Every Divisions / Ranges will have a common dormitory accommodation for forest staff to cater during special drives. At present, Bhavanisagar Range has only one jeep with the Range officer, as Mangalapatti is almost

30 km additional vehicle will be purchased for Bhavanisagar Range for use at Thengumarahada. Special patrolling vehicles, highway patrol vehicles will be purchased at Division level and will be equipped for such activities. Adequate camping and other equipment will be purchased.

Also, a wildlife forensic lab will be established in the veterinary centre, For anti-poaching watchers, field gear consisting of uniform, shoes, bags, beddings, water bottles, carriers, torches, etc have to be provided every year as there are subjected to wear and tear because of their field duty routine. Maintenance of existing amenities like torches, search lights, wireless equipment's, solar lights, batteries etc., to be maintained and repaired regularly.

10.3.1. Forest Consolidation and Maintenance of Boundary

Reserve has a long interstate boundary with Karnataka having 56 km in Talavadi, Hassanur and Germalam Ranges. This boundary has to be maintained by clearing a width of 12 meters periodically (annually or once in two years). Range and Section boundaries wherever boundaries are not conspicuous will be cleared to a width of 6 m annually as a fire line considering site conditions. Boundary demarcation in tribal settlements has been carried out by erecting pillars in past years. These shall be maintained and reconstructed wherever necessary by conducting necessary survey. Boundary shall also be demarcated by constructing cairns wherever it is not consolidated. Boundary should be demarcated by a special team formed to do survey works. The Field Measurement Books and Villages sketches shall be obtained from Survey department and hast be verified on ground with the help separate survey team using modern surveying tools like Total Station and DGPS. Since it is a human dominated landscape it is also targeted to construct and maintain 1000 cairns /pillars and 50 km of trenches along the tribal settlements and enclave villages during the plan period.


MAP SHOWING PROPOSED ANTI-POACHING LOCATIONS IN SATHYAMANGALAM TIGER RESERVE
KARNATAKA STATE
Biligirirenganatha Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
State Boundary
Bandipur Tiger Reserve
Erode Forest Division
Gunderipallam Dam
Buffer Zone Mudumalai Tiger Reserve
Coimbatroe Forest Division
Bhavanisagar Reservoir
1:200,000
0 4.5 9 18
Kilometers
Legend
Proposed Camps
Enclave Villages
Water Bodies
Moyar River
State Boundary

10.3.2. Interstate Coordination

STR is having 56 km boundary with Bandipur, BRT Tiger Reserves and MM Hills Wildlife Sanctuary in Tamil Nadu State. There are few villages located in between Karnataka and Tamil Nadu along this interstate boundary. Habitual Offenders and suspected poachers in these hamlets are to be monitored by both the managements as they are imminent threat in protection. Apart from the routine patrolling schedules and protection activities, a better interstate coordination between STR and adjacent Forest Divisions of Karnataka is to be ensured. Regular inter-state meetings with BRT, Cauvery WLS and Police Department will take place for inter-state information sharing on offenders. The camp sheds given in Table may be used as joint camping sites for Tamil Nadu and Karnataka Forest staff.

Table 10.3: Camp sheds for Joint Camping Sites

Sl. No.	AP Camps	Range
1	Kumtapuram	Talavadi
2	Thattavadi	Hassanur
3	Kongalli Temple	Talavadi
4	Odaikaan Betta	Germalam
5	Kottamalam	Germalam
6	Karuppan anai	Germalam

The already existing standard operational procedure for interstate coordination meeting of the NTCA and other protocols for Interstate meeting will be strictly followed.

Presence of a large number of cattle in and around Tiger Reserve not only competes with the herbivores for the grazing resources, degrades the habitat by compacting and reducing regeneration but also poses a real time threat of spread of various diseases that become difficult to tackle for the wildlife. For improving the habitat and managing it for wildlife interest, grazing of domestic livestock is to be controlled. Most of these cattle are unproductive and mainly reared for cow dung. Following prescriptions are made:

1) Encourage to reduce the number of cattle by promoting high yielding breeds

2) Promote stall feeding

3) Ensure timely vaccination and deworming

4) Explore possibilities of phasing out cattle grazing in core through Eco Development Committees and line department activities.

5) Collaborate with Animal Husbandry and Tribal Welfare and other line departments.

Sathyamangalam belt was infamous for poaching and community hunting activities since long time which reached its peak during the Veerappan's period. During the period people owned country guns and indulged them in poaching of wild animals. With death of Veerappan many efforts have been made from Forest Department and Police Department to make people surrender the illegal country guns. Many such country guns have been seized during offence detection also. Periodical efforts to surrender country guns through JFMCs will help reduce and regulate use of illegal weapons in the area.

Licensed fire arms details should also be in the purview of Tiger Reserve Management. Following actions are proposed for registration of fire arms in the surrounding areas of Reserve. Deputy Directors shall take following initiatives.

1) Identify villages within 10 km distance from the boundary of the Reserve and take action for registration of licensed fire arms with concerned authorities and maintain database of registered fire arms.

2) Liaise with District Collector and Police Department.

The e-Surveillance i.e., monitoring vulnerable areas remotely through modern cameras and drones is an essential technology required for vast and inaccessible areas. Thermal cameras can also be used in suspected locations to identify poachers in illegal entry. These cameras use thermal imaging which allows users to detect people, objects and incidents in complete darkness and difficult conditions such as smoke, haze, dust and light fog. Thermal cameras are immune to problems with light conditions and normal shadows, they can achieve higher accuracy than conventional cameras. It is proposed to procure and install these cameras in the plan period.

In vulnerable places CCTV surveillance installation will be installed (Sujjilkuttai Bannari Talamalai, Kulithuripatti, Dhimbam check post will be provided with CCTV on

priority followed by other locations by Germalam, Hasanur, Karapallam, Maharajapuram etc.,). CCTV cameras, drones and computerized scanners should be installed at check posts and vulnerable locations and regularly movements of suspicious people and vehicles to be monitored at Crime Control Unit at Deputy Director & Field Director level. Elevated vehicle scanners can be installed on trial basis at inter-state boundary points like Karapallam (Hasanur), Germalam for checking transit of wildlife articles and trophies as a preventive measure against wildlife trade.

Communication Network:

Wireless repeater stations in the Reserve are installed at strategic locations like Kodanad View Point, Othimalai etc., permanent wireless base stations are at all Range Offices and Check posts. The field staff up to the level of Forest Guards have been provided with walkie-talkies with necessary accessories. Remaining permanent camping stations have wireless handsets. All vehicles are equipped with mobile sets. In order to provide seamless wireless network coverage in STR, a separate pair of frequency which is obtained from Government of India and Wireless Planning & Coordination Agency (WPCA), will be requested to exempt Forest Department from payment of licence fee and Royalty Charges every year, for use of wireless services.

It is also proposed to have base sets in all anti-poaching camps and walkie talkies to all anti-poaching camp watchers. It is also proposed to convert the existing analog based wireless facilities into digital based wireless network in a phased manner for easy integration of all base and mobile sets. Digital walkie talkies are also used for communicating data in addition to voice, and useful for getting track locations on real-time basis.

For maintenance of wireless sets, continuous power supply throughout the year shall be ensured. Solar or innovative simple mechanisms shall be provided for the same. Base stations and wireless handsets will be coded for identification.

Mobile SIM cards and handsets have to be provided to all Forest Range Officers on priority basis followed by mobile phone allowance to all staff including controlling unit staff and Tiger Conservation Foundation. All Range Office will be provided with broadband connectivity for easy communication.

It is proposed to strengthen the staff upto anti-poaching watchers level in communication field by providing latest equipment like PDA (Personal digital assistance) and GPS equipment with internet connectivity. In future, canopy and intra net facility will be developed to exchange the data whatever collected in the field including fire occurrences from the field level to all level officers. Periodical training will be given to the field staff to update their knowledge.

Maintenance of Roads

Good roads also act as better means of communication which in turn is best utilized for efficient protection. Apart from well bitumen roads, engineering roads in reserved forests area, Sathyamangalam Tiger Reserve is having a good network of kuccha roads (forest roads, coupe roads, NTFP roads, patrolling paths, approach roads) which are mostly of fair weather kind though some of the roads are BT laid prior to the Forest (Conservation) Act 1980.

The roads are being maintained based on the NTCA guidelines and also as per the directions of Apex Court. The present condition of most of roads is very bad, which needs to be maintained properly every year, especially fair weather roads. Periodical maintenance of roads not only ensure its stability but also helps in protection. While carrying out maintenance and repairs works to roads it may be kept in mind that the funds may be sought from various state / central scheme on priority of damage and purpose of utility such as protection / eco-tourism / for administration and for the use of staff.

Strengthening of Anti-Poaching Camps

One of the unique protection mechanisms in the Sathyamangalam Tiger Reserve has been the anti-poaching operations by involving local youth, mostly tribal youth, in the protection operations. The continued presence of anti-poaching Watchers in the camps has acted as a biggest deterrence against any illegal activity in the reserve area. Anti-poaching camps are manned by Anti-poaching Watchers on rotation basis, for 6 days a week along with uniformed Beat subordinates staff. Every day the anti-poaching Watchers will patrol by covering an area of about 10 km, and they will record any illicit activity, presence of wildlife, mortality, fire etc., in registers maintained for each camp.

Anti-poaching watchers (APW) are employed predominantly from the local tribes and other fringe villages. They are engaged in the existing 15 Anti-poaching camps in

Core Zone. Further, additional 25 nos. of Anti-poaching camps shall be established in the vulnerable and Inter-State border areas wherever necessary.

In the case of any emergency situations funds will be sourced from the Tiger Conservation Foundation and existing JFMCs and this fund can be replenished on receipt of plan scheme funds. This single factor will lead to continuity in anti-poaching operations throughout the year without seriously compromising on protection.

In addition, the following may also be considered for the welfare of Anti-Poaching Watchers:

1) To meet out medical care and emergency financial needs through thrift society and Foundation.
2) To provide good logistic facilities at the camp like water, lighting, staying facilities with bedding, cooking necessities. Etc.,
3) Improvement works to create permanent water facilities will be undertaken. In case water availability is not there in the camp and natural resources of water are not available in the vicinity, supply of water has to be done with a tanker fitted vehicle manned by a driver.
4) To provide ration, LPG and other basic staying facilities regularly to the camp.
5) Maintenance of approach roads, infrastructure of the camp building regularly with safety measures like EPT, Solar fencing, providing and maintaining wireless facilities, registers, etc.,
6) Priority for considering qualified anti-poaching watchers while recruiting Reserve Watchers/Guards.

Highway Patrolling

The passage of busy highways – Mysore Grand Trunk road (NH 209) and Dimbam – Kollegal road through the Reserve increases the risk of wildlife being injured or killed by vehicles. Despite clear and abundant signage and speed-breakers along these roads, vehicular speeds are yet to be controlled. Furthermore, the stopping and parking of vehicles along these roads, together with the feeding of wildlife by people not only disturbs wildlife but also increases the potential for human-wildlife conflict. Hence to control the above problem following strategies are followed and proposed additionally.

1) One vehicle is presently utilized with existing staff to patrol the highway and another 2 vehicles manned with staff are highly essential to prevent conflict along these linear intrusions.

2) More number of speed breakers at vulnerable locations than existing few rambler strips are necessary on these highways & forest roads for controlled driving and prevention of road kills and other conflicts.

3) There are sign boards and wildlife signages along NH and forest roads and they have been effective in bringing awareness among commuters. More number of sign boards and wild animals' signages are required to be erected to create awareness about parking, picnicking, littering, teasing of animals, safety, animal crossing etc., at many important and strategic locations along these roads.

4) A separate database will be created for road-related wildlife mortality.

5) Awareness initiatives at all entry points, and tourist facilities including literature distribution to all commuters by utilizing students, NGOs and existing staff.

Strengthening of Check Posts

Presently the check post is manned by Forest Guards and the strength is inadequate because of vacanices. This will be strengthened by deploying sufficient number of staff. More number of check posts are to be formed in strategic locations at the entry of Tiger Reserve boundaries on roads. (For eg., Talamalai, Kollegal Road Junction near Arepalayam, Thalavady road entry at Kumbaragundi etc.,). The check posts are to be fully equipped with communication networks, logistics and CCTV surveillance cameras and elevated scanners in future.

Monsoon patrolling

During monsoon periods particularly on the Inter-State borders (northern part of and eastern part) of Sathyamangalam Tiger Reserve, daily vehicle and foot patrolling will be arranged and monitored closely by engaging additional volunteers, along with existing APWs for strengthening protection, as there may be disturbance in regular communication network.

Enforcement

The staff of the wildlife area need to be ever vigilant to enforce various Acts like Tamil Nadu Forest Act 1882, Wildlife (Protection) Act, 1972 and the Forest (Conservation) Act, 1980, considering the ever-increasing biotic pressures on wildlife protected areas. It is very important that the Field staff of protected area is well-acquainted with and updated on the various provisions of the Act. It is also important to maintain a very close working relationship with the police and judiciary to put across the department's point of view more effectively. Legal support to prosecute offenders, hiring of vehicles for nabbing offenders, rewards to informers, staff showing special interest in detection of offences are few supporting measures which will aid in better enforcement. Secret service funds provision should be made for the same.

Various ranks of field staff of forest department have been specifically empowered to take cognizance of offences relating to forest and wildlife. They must keep various documents and formats handy along with the checklist required for booking offences. The investigation and subsequent trial of the offences need much more care with periodical reviews and interactive meetings with judiciary, so that what is done in detection of offences, is not undone by poor investigation and weak prosecution.

10.3.3. Security Plan

As a precursor to establishment of an efficient protection mechanism, 'Security Plan' has been developed compiled based on unique prevailing conditions in STR, for strict compliance during the plan period, the security plan has been dealt in detail in Chapter No. 7.2.2.1. Theme Plan for Protection.

10.4. Fire Protection

Fire is a vital and natural part of the functioning of numerous forest ecosystems. Humans have used fire for thousands of years as a land management tool. Fire is one of the natural forces that have influenced plant communities over time and as a natural process it serves an important function in maintaining the health of certain ecosystems. Fire changes the proportion, arrangement, and characteristic of habitats across the landscape. Immediately after a fire, there can be temporary loss of food and shelter. Fires can cause the displacement of territorial birds and mammals, which may upset the local balance and ultimately result in the loss of wildlife (Barkley Y, 2010).

Fire serves as an important function in maintaining the health of certain ecosystems, but as a result of changes in climate and in human use (and misuse) of fire, it is now a threat to many forests and their biodiversity (Nasi R et al, CIFOR).

One of the most important ecological effects of burning is the increased probability of further burning in subsequent years, as dead trees topple to the ground, opening of the forest to drying by sunlight, and building up the fuel load (dry biomass) with an increase in fire-prone species, such as prophylactic grasses. The consequence of repeated burns is detrimental because it is a key factor in the impoverishment of biodiversity in rain forest ecosystems. Fire can be followed by insect colonization and infestation in forest which disturb the ecological balance.

In forests where fire is not a natural disturbance, it can have devastating impacts on forest vertebrates and invertebrates - not only killing them directly, but also leading to longer-term indirect effects such as stress and loss of habitat, territories, shelter and food. The loss of key organisms in forest ecosystems, such as invertebrates, pollinators and decomposers, can significantly slow the recovery rate of the forest (Boer, 1989).

The biggest effect fire has on wildlife is the change in their habitats. Wildlife habitats, forests, are not static; they evolve and respond to disturbances as do other natural systems. Fire changes the proportion, arrangement, and characteristic of habitats across the landscape. Vegetation, population of invertebrates, birds, flying insects get mostly affected due to fire because eggs, young-ones, food supplies and shelter are destroyed. Herbivores in the forests get affected by fire due to loss of fodder and shelter.

Forest fires are common in Sathyamangalam Tiger Reserve landscape during peak dry season. These wild fires are mostly intentional and sometimes accidental. Fire is set by the villagers to get fresh fodder for their cattle, tubers for consumption and poachers - to get better visibility of trophies. Another reason for intentional fire in higher elevations is for easy growth of Phoenix grass every year and easy to move around in burnt areas for collection. Wild fire causes severe damage to both wild flora and fauna. If there is a strict control over fire for a period of five years, the dry biomass gets accumulated and in the subsequent years if there is an outbreak of fire, all the saplings, young, dead, dying trees get charred and also the other smaller faunal species get killed.

The Deciduous Forests of Sathyamangalam are highly prone to fire. The fires season begins from late January to July usually. A study was conducted during 2012 with the following objectives.

1) To determine the current fire-return interval in the Sathyamangalam landscape.
2) Determine the relative importance of topography, biomass, and climate in explaining fire occurrence in the landscape through the use of MaxEnt modelling approaches.
3) Delineate areas susceptible to fire in the landscape.

The study found that, Mean (fire-rotation interval) FRI ranges from 2 years to 16 years. The mean area burnt was 16 ± 18 km2. The least area burnt was in 2011 < 1 km2 and the maximum area burnt was in 1999 was. 74 km2. The study also found that there is considerable variability in the size of fires in the landscape, most (> 90%) of fires in any given year are < 100 ha in size. Bioclimatic variables contributed relatively higher than other variables in modelling fire occurrences. Variables of importance include annual mean temperature, annual mean rainfall, seasonal effects, including the wettest, driest, warmest, and coldest quarters of the year. The Topographic variables were the next most important group of variables, followed by the anthropogenic layer, and remote sensing layers. Several of these variables consistently contribute to >80% of model performance during the 16 year period of analysis. An integrated approach to forest fire management will be required to mitigate fire occurrences in the Sathyamangalam landscape. Effective management of fires in the landscape should include several measures, an integrated approach wherein important climatic parameters such as diurnal temperature changes during the fire season; low rainfall both during and before the fire season, could provide valuable indicators of fire danger in the landscape. Since the anthropogenic factor (proximity to roads) is also an important contributor to the fire susceptibility in the landscape, measures to inform people of the need to prevent these fires would be very important.

10.4.1. Fire Risk Zones:

A study was conducted for mapping of Risk Zones in Sathyamangalam Tiger Reserve. This study was conducted by analysing Satellite images. Forest fire risk zonation mapping for the entire forest area is prerequisite for preparing forest fire management plan for each range.

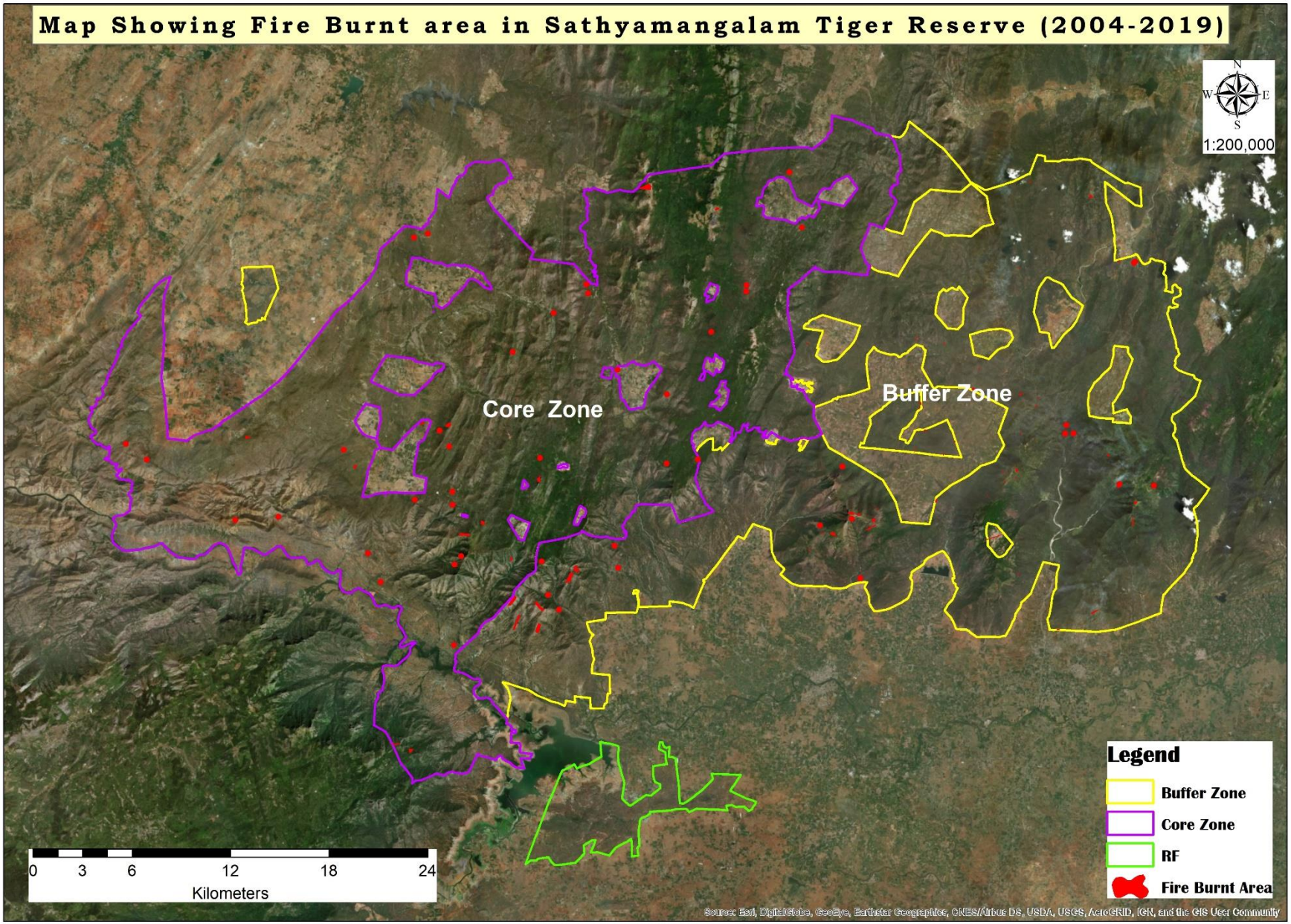
We have identified forest areas in the Sathyamangalam landscape susceptible to fire (low, moderate, high), by taking into account, various factor that are influencing fire viz, the fuel (forest type and NDVI), the topography (elevation, slope, and aspect), the anthropogenic factor (proximity to road network), the environmental factors (bioclimatic layers.) for the entire forest area of the Reserve. These maps are useful in delineating most to least vulnerable areas to fire and helpful for creating fire lines and combating the fire hazards. Thus a complex mix of climatic, topographic, forest fuel and anthropogenic factors are contributing to the occurrence of forest fires in the Sathyamangalam landscape.

However, it must be mentioned that the climatic variables in several years of analysis, contribute substantially to the occurrence of fire in the landscape. Effective management of fires in the landscape should include several measures, an integrated approach wherein important climatic parameters such as diurnal temperature changes during the fire season; low rainfall both during and before the fire season, could provide valuable indicators of fire danger in the landscape. Since the anthropogenic factor (proximity to roads) is also an important contributor to the fire susceptibility in the landscape, measures to inform people of the need to prevent these fires, would be very important. In Sathyamangalam Tiger Reserve Landscape, between 2001 and 2011 MODIS has detected 248 hotspots in 118 fire days. The details are in Table34.

As per the recent study conducted by Geomatics Cell of Tamil Nadu Forest Department, (K. Rammohan, ACF) for spatial and temporal analysis of fire in Sathyamangalam based on MODIS hotspot data, it is found that

1. About 64% of MODIS hotspots were sensed with 1000 m distance of road buffers
2. Maximum fire is experienced in the months of February and March, the peak fire season.
3. The fire sensitive period is from *3rd week of February to 1st week of August.*
4. The annual fire interval ranges from 4 months to 12 months with mean fire interval for the period 2001 to 2011 being 3.59 months.

Fire Control strategy and Fire prevention strategy is dealt in Chapter No. 7.2.2.2. Theme plan for Fire Control Management.


Map Showing Fire Burnt area in Sathyamangalam Tiger Reserve (2004-2019)
N
W
E
S
1:200,000
Core Zone
Buffer Zone
Legend
Buffer Zone
Core Zone
RF
Fire Burnt Area
0 3 6 12 18 24
Kilometers
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

10.4.2. Fire Protection Measures:

The firefighting measures involves three stages, namely

1) Pre-fire season preparedness
2) Firefighting operation (during fire season)
3) Post fire operation

10.4.3. Pre fire Preparedness

Before the start of fire season every year (pre fire season) all preparatory works towards fire protection measures should be ensured. The following guidelines has to be enforced.

1) Identification of team for firefighting.

2) The firefighting equipment's are checked before the season and are kept at fire vulnerable places. Further, if any additional equipment is needed the same may be procured and kept ready.

3) As per the existing network of fire line, estimates are prepared and are sanctioned before the fire season so that the work can be carried out before the end of January. Control burning is done to prevent spread of fire from one area to other during fire outbreak.

4) Strategy for engaging fire watchers from fringe villages of vulnerable areas and requirement of watchers as per the utility / vulnerability for fire / fire entry point of the reserve of the are to be finalized and accordingly estimates are to be prepared and got sanctioned well in advance.

5) Massive awareness has to be created well in advance among the public, local people of core area and adjoining areas so as to ensure their co-operation for the control of fire with the reserve management. In this connection the awareness can be created through media, publicity through notice, through eco-awareness/ Interpretation centres, meetings in VFCs, EDCs, and through tom - tom in the adjoining area of Reserve.

6) All the staff including uniformed staff, fire watchers and anti-poaching watchers is to be trained before the fire season. Specialized persons / experts can be engaged for the purpose of giving training.

7) The firefighting teams, fire watchers and anti-poaching watchers including uniform staff are put in for mock drill for controlling fire.

8) Removal of invasive exotic weeds, tall dry grasses clearing has to be taken up at fire entry point as well as in vulnerable areas.

9) A meeting has to be conducted along with field staff of adjoining division and state to ensure better coordination in protection during fire in interdivision and interstate boundary vulnerable areas.

10.4.4. Prescribed Burning (Controlled Burning & Strip Burning)

It is an operation that involves 3 m to 6 m width firing of vegetation / bushes as a fire precautionary measure where the areas which supports heavy fuel load and are prone to fire are burnt as a control operation intentionally before it becomes dry. This will ensure safety of large area and to avert chances of major fire. Early burning of the grass patches and areas with heavy dead and dried tree patch is an important consideration.

10.4.5. Firefighting Operation - Annual Fire Protection Works

The Management has to grapple with the fire prevention and control, much before the onset of fire season during the months of January to April and sometimes May depending upon early showers, involving the local people. Therefore, it necessitates carrying out the following fire protection activities.

1) Engaging fire protection watchers

2) Fire line / fire breaks formation works

- Interstate boundary 12 m width
- Along road sides and beat boundary - to a width of 6 m on either side.
- Internal block lines to a width 10 m
- Patrolling and movement paths to a width of 6 m
- Old existing well maintained fire lines to a width of 3 m.

10.4.6. Employing Fire Watchers

Fire watchers are usually kept on daily wage basis during the fire season (December to June or till the conventional rain starts) by the department from amongst the local population especially tribes from vulnerable fringe villages. About 10 fire watchers minimum per range are to be engaged every year to keep a watch over various vulnerable beats in a larger landscape. They are engaged for patrolling, detection and extinguishing small fires at the earlier stage or controlling large fires at the earliest. The patrolling is taken by the squad on the instruction of Forest Range Officer in most vulnerable areas. Anti-poaching watchers also patrol adjoining area around their camps / beat for any inducing substances, dry elephant dung kindled with fire during fire season. Moderate and least vulnerable areas are kept under surveillance by the regular staff. Map showing the details of vulnerable fire areas is enclosed in map 7.

10.4.7. Fire Tracing Works

Sathyamangalam Tiger Reserve has a good network of fire-lines. Depending upon the availability of funds, the fire-lines are formed in these well-defined areas. In the event of scarce resources, the fire tracing works are prioritized to cover the vulnerable locations. This work must be completed much before the fire season. In Eucalyptus plantations with oil based leaf dominate areas, deciduous patches with leaf fall and heavy weed growth areas, the leaves and dry weed need to be swept and burnt in open areas.

10.4.8. Watch Towers

These watch towers play a crucial role in detecting fire and communicating the information to Forest Fire control station / Range office. Early detection of forest fire is one of the important factors for control. Very often due to the remoteness of the tract, forest fires, may remain undetected for a day or two and by the time fire may spread to an uncontrollable extent. Thus adequate measures have to be taken for the early detection of outbreak of the forest fires and fire watch towers serve this purpose, wherein few fire watchers are placed on rotation basis with binoculars and with other gadgets for earlier detention. Hence necessary budget provision may be included for construction, regular maintenance and improvement of such watch towers. Temporary watch towers and camps may also be erected at vulnerable locations to prevent fire. These towers during fire

season are manned 24 hours on rotation. The anti-poaching camps and check posts, in addition to their regular work, function as satellite fire centres.

10.4.9. Other Measures

1) A special squad will perambulate vulnerable fire entry point and all fire prone areas, such as border area, settlement adjoining forest area etc., Placement of vehicles in high fire prone areas with adequate man power is essential.

2) During the fire season, especially from the late January to the end of July every year, when all the staff is engaged in fire-fighting operations, the Reserve should be closed for the visitors preferably.

3) Training for the field staff in fire management.

4) During the fire season, meetings / awareness camps with the help of experts are held in the adjoining villages and the staff should maintain constant touch to keep the intentional fires under control.

5) The fire line formation and employing of fire watchers constitute important eco-development activities on the lines of periodic employment generation. It may be appropriate to execute these works through the eco-development committees, JFMCs which will foster shared responsibility and source of involvement and commitment.

6) Signage hoardings, distribution of pamphlets, awareness through media, students and JFMCs are part of fire prevention activities.

7) All the approach roads have to be perfectly managed in order to approach fire prone areas as quickly as possible. Therefore, all the important game and forest roads to be cleared and maintained properly without any compromise in this regard.

8) All the wireless station at the Anti-Poaching Camps shall be maintained more effectively for communications. If necessary temporary Anti-Poaching Camp should be erected during the fire season in sensitive ranges with wireless communication system. The present wireless sets available in the Reserve may not be sufficient to prevent fire and for protection measures.

9) New fire watch towers needs to be created at suitable locations to detect fire at early stages for less damage and preventive measures.

10) Closure of Tiger Reserve for Visitors: During the fire season, when all the staff is engaged in fire-fighting operations, the Reserve may be closed for the visitors with the direction from the Field Director.

10.4.10. Post Fire Assessment

Damage assessment, mitigation planning for future and awareness in fire areas is the post fire operation. The success and failures of pre fire preparedness, fire control operations will be analysed at the end of each fire season. Any innovative method used during the fire season will be documented as per procedure for future guidance in the management of the reserve.

Fire burnt area will be inspected for damage assessment and continuously monitored and surveyed to assess the rejuvenation of the locality and reporting. Necessary and suitable silvicultural interventions, if necessary, will be implemented for the improvement of the habitat.

The post impact of fire incidences in deciduous forests has not been investigated seriously so far as part of management and such studies are warranted for proper conservation planning with regard to impact of fire on animal and plant ecology.

Monitor the mortality of animals in the fire burnt areas wherever possible by the fire watchers. All the burnt areas have to be checked at least three to four days as part of fire operation system.

10.4.11. Future strategies for Fire Monitoring

1) A fire vulnerability map prepared for the whole Sathyamangalam Tiger Reserve prepared at Range level and beat level on yearly basis will help for taking necessary measures to prevent the fire.

2) Funds for fire protection strategy to be obtained adequately from the Government with a separate proposal so that lack of funds should not be a limiting factor for fire management.

3) Real time monitoring (daily fire alert) using MODIS rapid fire system data’s.

4) Providing PDA (Personal digital Assistance) to the field staff will be more helpful to give daily instant fire alert to officials and to take necessary fire control measures, detection of forest offences etc.,

5) Fire hazard management cell to be organized in Sathyamangalam with all infrastructure facilities to deal the situation

6) Fire prone areas to be identified for each compartment based on wind velocity, tree cover, soil moisture, ambient temperature, humidity. A data base to be formed to assess the fire sensitivity of areas.

7) Use the Satellite Data Base on Fire Ecology from researchers to Plan Proper Strategy for controlling Fire Incidences in the Reserve.

8) Block Lines which are demarcating beat Boundaries to be cleared off every year as part of Fire Management Strategy.

10.5. Intelligence Gathering and Coordination

Fore warned is fore armed. All enforcement work demands that precise advance information is available before any action is initiated. Wildlife authorities need a well-organized intelligence network for prevention of offences, tracking of previous offenders, creating of database and timely detention of offenders.

Intelligence is evaluated information useful for decision making. Thus the base for generation of intelligence is credible information. This information has to be collected, collated, analysed and evaluated before it becomes intelligence. An intelligence network should deal with all these stages of processing information. Information could be gathered from open published material and through confidential channels employing agents or sources. Information flow should be established from the field, from the people and from open sources. Over and above these, confidential sources and agents are to be raised, trained and placed in position to enable us to get information which, will be known only to a few.

In Sathyamangalam Tiger Reserve, a separate Wildlife Intelligence Crime Control Unit (WICCU) is formed for gathering intelligence information. This will be a separate entity

under the control of Field Director and collect information on illegal activities independently and report to the concerned authority.

The use of informants is a key component of any intelligence system. If used well, informants can determine the final result of an investigation. Developing an informant, using his information and keeping the informant over a number of years is a vital skill. Setting up a system of information gathering analysis and evaluation is the most important facet in anti-poaching or anti-smuggling. Necessary funds for informers, intelligence gathering and secret service expenditure shall be sanctioned.

This chapter on intelligence gathering and co-ordination has been discussed in detail under Chapter No. 7.2.2.1. Theme Plan for Protection.

Chapter. 11. Eco Tourism and Interpretation

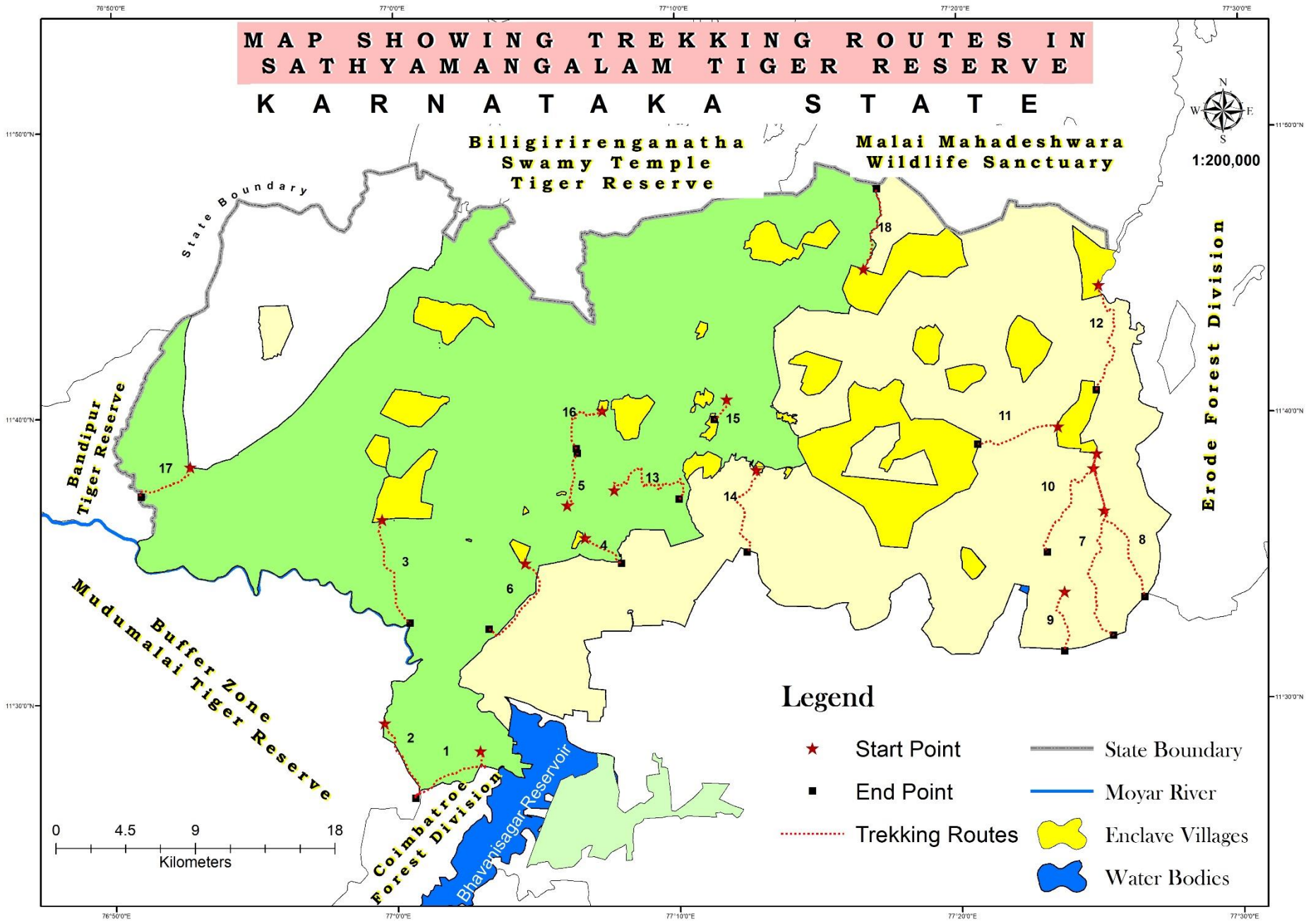
According to the World Tourism Organization (WTO), Eco-tourism is defined as “tourism that involves travelling to relatively undisturbed natural areas with the specified object of studying, admiring and enjoying the scenery and its wild plants and animals, as well as any cultural aspects found in these areas”.

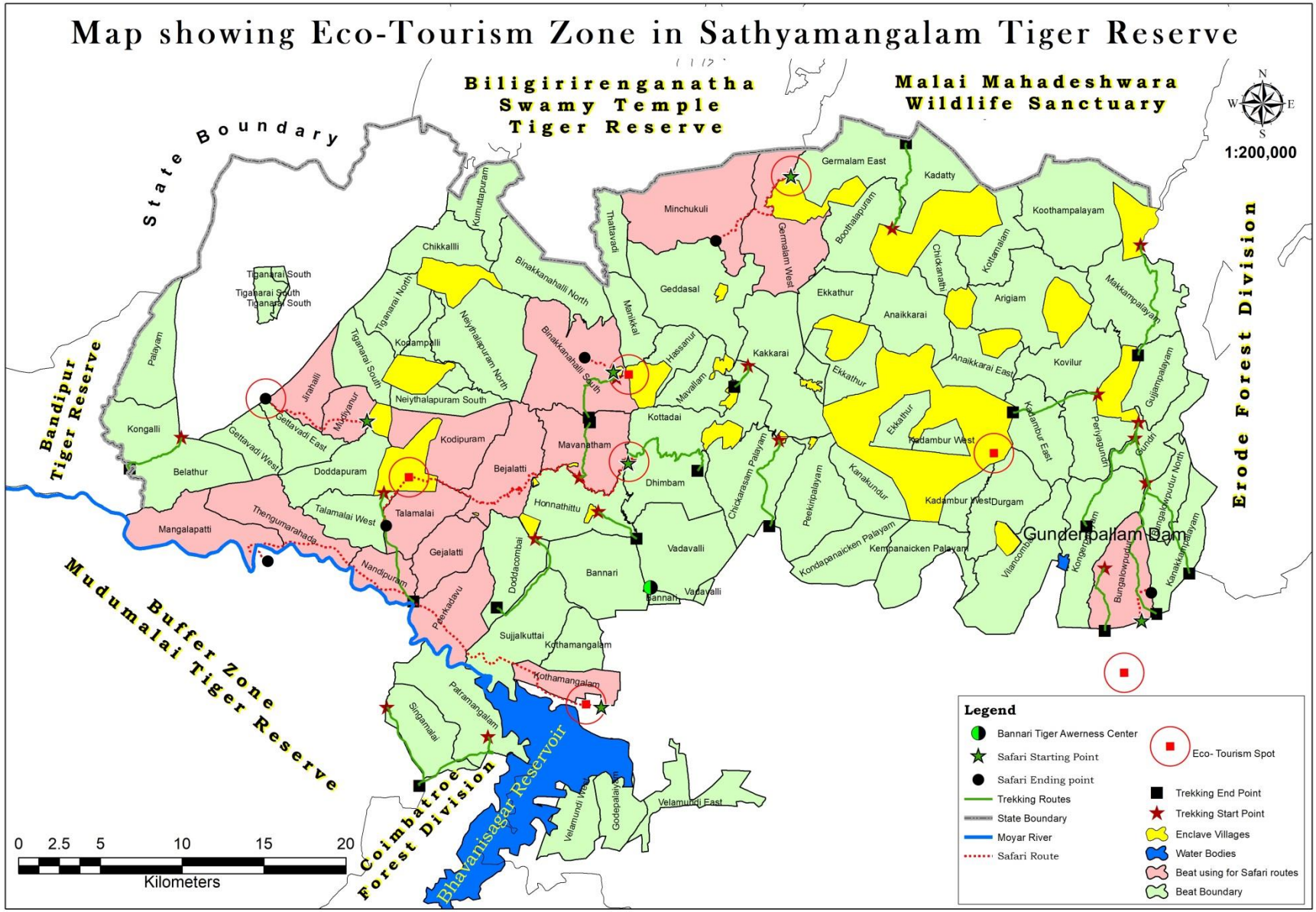
Ecotourism is defined as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education". Education is meant to be inclusive of both staff and guests *(Source: The International Eco-Tourism Society).*

Principles of Ecotourism

Eco-tourism is about uniting conservation, communities, and sustainable travel. This means that those who implement, participate in and market ecotourism activities should adopt the following ecotourism principles:

- Minimize physical, social, behavioural, and psychological impacts.
- Build environmental and cultural awareness and respect.
- Provide positive experiences for both visitors and hosts.
- Provide direct financial benefits for conservation.
- Generate financial benefits for both local people and private industry.
- Deliver memorable interpretative experiences to visitors that help raise sensitivity to host countries' political, environmental, and social climates.
- Design, construct and operate low-impact facilities.
- Recognize the rights and spiritual beliefs of the Indigenous People in your community and work in partnership with them to create empowerment.


MAP SHOWING TREKKING ROUTES IN SATHYAMANGALAM TIGER RESERVE
KARNATAKA STATE
Biligirirenganatha Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
State Boundary
Bandipur Tiger Reserve
Erode Forest Division
Buffer Zone Mudumalai Tiger Reserve
Coimbatroe Forest Division
Bhavanisagar Reservoir
1:200,000
N
S
E
W
0 4.5 9 18
Kilometers
Legend
Start Point
End Point
Trekking Routes
State Boundary
Moyar River
Enclave Villages
Water Bodies


Map showing Eco-Tourism Zone in Sathyamangalam Tiger Reserve
Biligirirenganatha Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
State Boundary
Bandipur Tiger Reserve
Buffer Zone Mudumalai Tiger Reserve
Coimbatroe Forest Division
Erode Forest Division
Bhavanisagar Reservoir
Gundenpalam Dam
N
W
E
S
1:200,000
Germalam East
Kadatty
Minchukuli
Germalam West
Boothalapuram
Koothampalayam
Chikkallli
Kumuttapuram
Thattavadi
Geddasal
Ekkathur
Kottamalam
Chikkanathi
Arigiam
Makkampalayam
Tiganarai South
Tiganarai North
Binakkanahalli North
Manikkal
Anaikkarai
Palayam
Kodampalli
Neiythalapuram North
Binakkanahalli South
Hassanur
Kakkarai
Anaikkarai East
Kovilur
Gujjampalayam
Jirehalli
Mugiyanur
Neiythalapuram South
Mavalam
Ekkathur
Kongalli
Gettavadi West
Gettavadi East
Kodipuram
Kottadai
Kadambur West
Kadambur East
Periyagundri
Gundri
Belathur
Doddapuram
Bejalatti
Mavanatham
Dhimbam
Chickarasam Palayam
Peekiripalayam
Kanakundur
Thengumarahada
Talamalai West
Talamalai
Honnathittu
Kadambur West Durgam
Mangalapatti
Gejalatti
Vadavalli
Kondapanaicken Palayam
Kempanaicken Palayam
Vilamcombai
Kongerpalayam
Bungalowpudur
Bungalowpudur North
Kanakkampalayam
Nandipuram
Doddacombai
Bannari
Vadavalli
Perkadavu
Sujjalkuttai
Kothamangalam
Kothamangalam
Patramangalam
Singanallai
Velamundi West
Godepalayam
Velamundi East
0 2.5 5 10 15 20
Kilometers
Legend
Bannari Tiger Awerness Center
Safari Starting Point
Safari Ending point
Trekking Routes
State Boundary
Moyar River
Safari Route
Eco- Tourism Spot
Trekking End Point
Trekking Start Point
Enclave Villages
Water Bodies
Beat using for Safari routes
Beat Boundary

Significance of the landscape

Existence of abundant wildlife is an indication of ecological health of an area. Such ecological richness in Sathyamangalam Tiger Reserve is brought about by the harmonious coexistence with culturally rich ethnic tribal communities of Soligas, Ooralis, Irulars and non-tribal communities inhabiting the landscape. The recognition and understanding of value based inter relationship between flora and fauna on human culture is of utmost importance for existence and well-being of all the three.

If left unregulated or unplanned, increasing tourism trends in wildlife areas bring about varieties of pressure threatening the very bio-diversity of protected areas. Regulated low impact ecotourism has the potential to be a vital conservation tool as it helps to win public support for wildlife conservation. Ecotourism inculcates among the visitors, an empathy for nature conservation. The role of ecotourism, Interpretation and Nature Education has been emphasized in National Wildlife Action Plan (2002 – 2016).

The Ecotourism Plan of Sathyamangalam Tiger Reserve is based on the Comprehensive Guidelines for Tiger Conservation and Tourism issued by National Tiger Conservation Authority (NTCA) and State Eco-tourism guidelines. The ecotourism, interpretation and nature education plan for Sathyamangalam Tiger Reserve emphasizes participatory, community oriented, low cost, low impact, educational, eco-friendly, ecologically sustainable, culturally compatible, socially acceptable programmes which will accomplish the paramount objective of tiger conservation in the landscape.

The Ecotourism Plan for Sathyamangalam Tiger Reserve primarily aimed at:

1. Developing Community based Ecotourism Programmes by utilizing existing forest roads, wildlife and landscape view points, trekking route, camp sites and nature trails for enhancing the socio-economic status of local communities by providing alternate employment opportunities through Eco-Development Committees. Eco-tourism is acknowledged as a viable tool for poverty alleviation as it is a force multiplier in creating employment.

2. Regulate and reduce gradually mass religious tourism activities and other tourism related illegal activities inside forest areas by streamlining the recreational areas and minimize the negative impact.

3. Provide an opportunity to common man to enjoy the landscape value, ecological value, biodiversity value, cultural value and recreational value of natural resources which is otherwise strictly regulated by law.

4. Develop mechanisms to generate revenues from ecotourism to assist the conservation funding in priority sectors to meet the conservation objectives of the Tiger Reserve and to incentivize the local communities.

5. To develop mechanisms for promoting conservation awareness and nature education among the communities of Erode District in order to secure co-operation and support for the cause of Tiger Conservation in the landscape.

11.1. Organization Set up and Management

As per the NTCA guidelines, the Eco-tourism activities will be designed and operated by the Tiger Conservation Foundation Trust with the active participation of local communities.

Organization set-up

As it is new tiger reserve, no new organizational set-up in Tiger Reserve management is prescribed and the existing administrative units at range level will administer the eco-tourism operations. It will be useful to employ a dedicated reserve tourism manager who will work under the Field Director to guide and develop scientifically and technically enriched eco-tourism programmes. Good MBA graduates or specialist in hospitality management or masters in Tourism may be employed. A separate cell will be created in the office of the Field Director with necessary software support and call room. This cell will maintain the web hosting, annual maintenance fees of such web pages, online booking portals will be met from funds of Tiger Conservation Foundation Trust or Project Tiger.

Range level Vannapoorni committees have already been formed and registered in each range to promote eco-tourism in a viable community based eco-tourism model. Each range has a vannapoorni committee. The general body of the committee consists of 5 members from every village of the range and the president of the already existing village forest committees. The executive body of the Vannapoorni committee consists of Presidents of all the existing VFCs, EDCs. The committees will generally follow the

structure and operational rules laid out by NAEB. The financial expenditure will be authorized by the Deputy Director. Each and every activity and financial expenditure borne for functioning of eco-tourism is reimbursed through a monthly fund forecast to the Vannapoorni committees approved by Deputy Director. The Deputy Director will ensure the proper utilization of revenue receipts of the Vannapoorni committees after meeting the operational expenditures with due approval from Field Director. The committees will invest in eco-tourism from a commonly pooled financial fund that will be maintained by the concerned Range officer as Member Secretary. The committees will take active part in organizing eco-tourism activities in this Tiger Reserve. The benefits obtained from the eco-tourism activities through the Vannapoorni committees will be solely utilized for socio-economic development of communities.

Local Advisory Committee

In view of the notification issued by National Tiger Conservation Authority on 15.10.2012 regarding the guidelines for eco-tourism in and around tiger reserves, the existing practices and proposed strategy are to be placed before the Local Advisory Committee of Sathyamangalam Tiger Reserve. Accordingly, a Local Advisory Committee (LAC) has been proposed and it is under the consideration of State Government. Once the Eco tourism development is initiated, public response / opinion is gathered during initial three months, and placed before the Local Advisory Committee for discussion with all stake holder representatives

At present there are very few private homes / tourist resorts available in Hassanur and they will be integrated into the eco-tourism strategy as per guidelines of NTCA. Public – Private partnership will be implemented wherever feasible.

Management of Eco-tourism

i. Eco-tourism communities

Eco-development committees / VFCs / Tiger Conservation Foundation will complement the role of Eco-tourism committees wherever eco-tourism facilities are operated. Their role of the committee is to recommend, approve, and co-ordinate all activities of eco-tourism functioning. Eco-tourism Committees will engage, drivers, eco-guides, eco-sanitary watchers, receptionists, tour operators etc., in each of the eco-tourism activity for creating awareness about the wildlife, landscape, core area and to

provide hospitality services to tourists. This will ensure employment opportunity to tribal families / local communities. Additional services will be linked to eco-tourism for the benefit of local people.

Tariffs for individual activity and payment to EDC members involved in Eco-tourism approved and proposed by Committee will be decided and fixed by the Executive Committee of Sathyamangalam Tiger Conservation Foundation Tamil Nadu Trust represented by Field Director, Deputy Directors, Forest Range Officers and JFMC Presidents.

The fund flow mechanism will be as follows.

All eco-tourism revenue receipts will be credited into a separate account operated by the Field Director, Sathyamangalam Tiger Reserve for this purpose. Online booking of Eco-tourism facilities will also be linked to this account. At the end of every calendar month within the first 5 days the Field Director will segregate the revenue receipts into

1. Park entry fees to be credited into Tiger Conservation Foundation account.

2. Guest house occupancy fees to be credited into Tiger Conservation Foundation account.

3. Eco-tourism fees to be redistributed to the individual range accounts for further payment to stake holders.

Any changes in revenue and expenditure schedule can be introduced based on request by the Committees to the Field Director and Deputy Directors.

Strategies of eco-tourism management in STR

1. The Sathyamangalam Tiger Reserve eco-tourism plan will involve local communities for revenue and employment generation through eco-tourism and to establish and maintain necessary infrastructure for the operation and regulation of wildlife based ecotourism activities within the permissible carrying capacity besides making it a nature education tool for sowing the seeds of conservation, appreciating the landscape value, awareness creation, nature & wildlife education.

2. Identification of tourism zones and organize the wildlife based ecotourism activity on low impact basis.

3. Regulation of visitors / tourists as per the carrying capacity of the tourism zone.

4. Establishment of interpretation centers, Museums, Nature Trails, Eco-shops, EDC Canteens, Amphi theatres etc., for wildlife conservation, education and awareness.

5. Conducting regular nature education camps and wildlife awareness programme for the school children, college student and their teachers.

6. Involving local communities in Eco-tourism, Eco-guides, trekkers, drivers, cooks, rest house keepers, interpretation center staff, managing staff for eco-shops etc.,

7. Providing for capacity building to train local people in managing Eco-tourism activities to meet the needs of visitors / tourists in the lines of hospitability, guides for different activities, catering, and reception.

8. Providing for capacity building of forest staff by training them various management aspects of eco-tourism.

Proposed activities of eco-tourism

Different proposed activities of Eco-tourism are as follows:

1. Day time safaris,
2. Organized Treks, nature trails & nature camps
3. Landscape stay programmes.

1. Daytime safaris aim to create conservation awareness and inculcate a love and compassion towards wildlife also in addition to creating landscape richness pride to the communities of Erode. It will also create employment opportunities of local communities & tribals. As the wildlife sighting probability is very low in this large landscape at present, the safaris will be primarily oriented towards, displaying landscape richness. Accordingly, the existing roads, patrol paths, coupe roads, NTFP roads will be maintained regularly and utilized.Tengumarahada road will be maintained and the height will be increased by filled up red soil with adequate drainage so that it is free from erosion. In selected areas causeways and Irish bridge will be laid to prevent soil and water erosion.

The investment for running safari programmes has to be supported by Vannapoorni Committees, NTCA and State Tourism Department during the initial stages. As it is a new Tiger Reserve, safari facilities such as vehicles, road maintenance, boards,

pick-up points, reception centres, sanitary facilities, trekking sheds, dormitories, etc have to be created. As a general rule with exceptions permitted by Field Director all permanent infra-structure will be created in buffer zone or patta lands under the control of forest department outside Tiger Reserve apart from improving the existing infrastructure inside the reserve.

2. Treks & nature trails: Existing trekking routes and nature trails will be maintained regularly for seasonal permitted treks and trails. Pick-up points for trek routes will be demarcated, existing view points en-route trekking will be improved, temporary trekking sheds will be formed at the periphery of trek routes. Nature trails will be improved with conservation education boards of flora and fauna, temporary sit-outs for students and public, watch towers, etc.,

Nature Trails would be in smaller patches of forest areas with guided walk-through the experience the jungle, its composition and significance along with its wilderness. There are existing 2 – 5 km trails for the purpose of creating awareness about that particular landscape and wildlife. Certain trails which are currently used for students camps like Dhimbam, Soppanabetta, Jadaisamy Kovil route, Jeerahally, Ethukatti, Sulthan road, Tengumarahada, Bargur Mariamman Temple location (Hasanur), Ecological farm, Chikhalli and Kongahalli would be developed with educative boards, identification of flora and fauna, details of landscape richness, etc. Following the Periyar Tiger Reserve model this tiger reserve management may also developed nature trails / treks in protected areas.

List of existing Trekking Routes permitted for public in Sathyamangalam Tiger Reserve

Sl No	Trekking Route	Trek category (Easy / Moderate / Tough)
1	Uppupallam to Bangalapadugai	Tough
2	Kallampalayam to Bangalapadugai	Tough
3	Thalamalai to Gejalatti	Moderate
4	Vinayakar Koil to Galidimbam	Tough
5	Vandipatti pallam to Alamalai Kovil	Easy
6	Ittari to Dhoddakombai kovil	Tough
7	Punjaithoraiampalayam muniyappan kovil – Gundri	Tough
8	Bagavathinagar – Kannimaroothu – Anilnathan	Tough
9	Punjaithoraiampalayam – Navakinaru – Manikarai – Erumaikuttai	Easy
10	Kembanur colony to Koomathayyan kovil – anilnatham	Tough
11	Moolakadambur to Karadisuttanannai – Gundri road	Tough
12	Magallithotti – Koviloor – Makkampalayam	Easy

Sl No	Trekking Route	Trek category (Easy / Moderate / Tough)
13	Dhimbam – Maadankuttai to Kokkuvarai	Easy
14	Uginium to Vengapathi	Tough
15	Devarnatham to Beddumandai	Moderate
16	Hasanur – Alamalai kovil	Moderate
17	Belathur to Areakal mandappan kovil	Moderate
18	Neergundipudur – karayankovil – Neergundipudur	Moderate

3. Landscape staying programmes will be developed to showcase the landscape richness and landscape over night stay. As it is a new Tiger Reserve, stay facilities such as rest houses, trekking shed, dormitories, canteens, interpretation centres, reception centres, museum, etc. has to be created afresh. All permanent infra-structures will be created in periphery areas of core & buffer zones of Tiger Reserve, patta lands under the control of Forest Department, Revenue department lands, Tribal lands outside Tiger Reserve. Existing accommodation facilities, trekking sheds, unoccupied dilapidated staff quarters will also be utilized for landscape staying programmes. Old dilapidated stay facilities in Germalam Range near Geddesal will be developed as heritage staying site. Locations to be utilized for landscape programmes including existing infrastructure in Sathyamangalam, Bannari, Bhavanisagar, Kulithuripatti, Mangalapatti, Kallampalayam, Talamalai, Dhimbam, Ittarai, Ramarpatham, Doddapuram, Hassanur, Gettavady, Jeerahally, Chikhalli, Ethugatti, Geddesal, Kottadai, Belathur, Karapallam and Germalam will be maintained regularly.

Infrastructure strategy and plan for STR

List of activities planned, infrastructures to be created, assets to be established is listed below:

S. No.	Eco-Tourism activity	Facilities
1.	Safari	Vehicle along with recurring requirement Reception centers Pick-up points Watch towers EDC Refreshment centers Maintenance of all coupe roads, patrol paths, NTFP roads, engineering roads Rest rooms
2.	Treks & natural trails	Trekking sheds Inspection sheds Macchan Pergola

			Interpretation centers & Museums
	3.	Landscape stay (Existing & New infrastructure outside Tiger Reserve)	Rest houses Dormitories Temporary Tents Tree houses EDC – Cafeterias Community Food points Eco-shops Rest rooms
	4.	Conservation awareness	Interpretation centers Museums Library Amphi theatres Watch Towers Eco-shops Reception centers Eco-canteen facilities, Rest rooms

Regulation of tourism activities

For an effective management of eco-tourism activities inside the tiger reserve certain regulations have to be enforced and strictly followed which will be based on eco-tourism guidelines.

Regulation of safari Vehicles:

No private vehicle will be allowed inside the Tiger Reserve area for safari purposes and wildlife safari will be managed only through department eco-tourism safari vehicles owned or leased by the Tiger Conservation Foundation Trust or Vannapoorni Committees.

Safari vehicles will be periodically tested for air pollution and will be maintained in good condition to avoid noise pollution in the Reserve area. Roads are to be maintained well too to minimize dust and noise pollution.

Other regulation on eco-tourism activity:

1. The park will be open from 7 am – 7 pm. However, visiting hours / safari timings should be restricted between 7.00 am. To 10.30 am in the morning and 3.00 pm to 6.30 pm in the evening. During other timings, no visitors should be allowed to enter the tiger reserve for safari purpose.

2. EDC canteen, community food point, Café, Refreshment points should be run only by the Department / Eco-Development Committees / Committees and not by any private authority. Food will be basically from local patterns to provide cultural touch to the visitors / tourists.
3. No liquor should be allowed to be served in the rooms and canteen or mess.
4. Dress code will be enforced for trekkers and identity cards and other important details of the trekkers will be scanned and the details will be maintained at the data bank of reception.
5. Children below 10 years & elderly people should be restricted for long treks.
6. First aid kit should be mandatory with each trekking team and trekking guides should be trained in first aid.
7. Fire arms & fireworks will not be allowed to be carried by visitors.
8. Littering will not be allowed by visitors, trekkers and it is liable to be fined.
9. Visitors are not allowed to move out of vehicle during the safari.
10. Shouting, teasing, chasing and feeding wild animals during safari and trekking is prohibited and liable to be fined as per Executive Committee of Foundation based on Tamil Nadu Forest Act and Wildlife Protection Act of 1972.
11. Any other conditions imposed from time to time based on necessity shall be strictly followed by the visitors.

Regulation of Religious tourism

In Sathyamangalam Tiger Reserve there are about 295 religious sites / temples inside the reserved forests (appendix – 5) out of these Karuvanrayan Kovil, Gejalatthy Darga, Doddakombai Temple and Kongahalli Kovil are the main places of worship located inside the core area of the Tiger Reserve which attracts thousands of devotees during festivals and specific days of the month. Other than these there are smaller temples in every range jurisdiction like Vengampathy Kovil, Kambathraayangiri temple, Bisil mariyamman kovil, Alamalai kovil etc., which are basically worship places for local communities. The impact zone for bigger temples is around 50 ha each and for smaller temples is around 1 ha each. At present regulations for pilgrims for visiting the pilgrimage sites are in place, so that any pilgrim interested to visit the temple should submit an

application form atleast 15 days in advance prescribed by the Tiger Reserve management by agreeing all the conditions laid. (Conditions & application form is in annexure – 16)

Further, as the religious locations found in Sathyamangalam Tiger Reserve are to be studied in detail and also required to prepare a compendium of comprehensive list of religious sites of Sathyamangalam Tiger Reserve to estimate their impact towards the Tiger Reserve, a detailed research study may also be initiated within this plan period.

Forest fire, littering, noise pollution and vehicular transport at odd hours are the serious threat to the wildlife. Efforts were taken in the year 2014, to restrict the visiting days and time, number of vehicles, in major pilgrim Places. The support of NGOs and other enforcing agencies shall be secured in effectively controlling these activities.

The following regulations will be enforced in religious tourism locations.

Visiting hours would be restricted between 8.00 a.m. and 6.00 p.m. for in the places of worship based on subject to local community custom. During special events such as once in a month ritual day and annual festival days, additional time would be allowed by the Deputy Directors by written orders.

No littering would be allowed. Special team consisting of Eco-watchers, rotational field staff, Highway patrol would be monitoring this.

Use of loud speakers would be prohibited.

Deputy Director shall regulate pilgrimage through engagement of the EDCs and TAP Committees / JFMCs. These committees shall be requested and empowered to take up the responsibility of keeping the premises clean, plastic free, etc.

The Temple authorities of Karuvannarayar Temple and Mallikaarajuna Temple in Kongalli shall be motivated, educated and engaged to take the responsibility of cleaning up the area immediately after the annual festival. In case of Karuvannarayar Temple the practice of goat sacrifice needs to be systematically discouraged.

Adequate and effective signage and display boards on the cultural and religious relation of Tiger in Indian folklore shall be established at all strategic locations.

Awareness boards with information on do's and don'ts shall be erected at all these places. In all the approach roads to these sites, barricades will be erected to regulate and restrict the entry of vehicles.

Eco-sanitary watchers should be engaged on daily wage basis at all these major temples in coordination with temple authorities / HR & CE and from Project Funds.

The religious tourism will be permitted to operate under the guidelines of the NTCA.

Entry fees for vehicles and individual will be fixed by the Field Director to regulate the entry. Conservation / Eco fees for functioning and maintenance of the area through committees will also be collected separately and remitted to Foundation and committees respectively.

Closure of the Park:

During forest fire, conflict emergencies and other crucial situations eco-tourism activities including safari might be closed as per the orders of the Field Director and previous bookings and charges collected, if any would be refunded. As per the NTCA guidelines the park will also be closed for eco-tourism during strategically determined durations.

11.2. Determination of Carrying Capacity

Carrying Capacity depends very much on the impact of wildlife and its habitat, which can be tolerated, which in turn depends on the relative importance of the Recreational Objective. The question still arises as to how best to determine the levels at which the control of visitors is necessary. Several ideas exist for protected areas, including those of defining carrying capacity, and of acceptable limits of change and use. Hence, the idea of tourist carrying capacity assumes that there is a level of development, and a maximum number of visitors, that a protected area can tolerate without adverse effects on the Tiger Reserve.

The Government of India, NTCA guidelines issued on 15.10.2012 has been adopted while assessing the Physical Carrying Capacity, Real Carrying Capacity and Effective Permissible Carrying Capacity.

The existing eco-tourism facility in the core zone is limited to its carrying capacity as calculated below:

11.2.1. Physical Carrying Capacity:

This is the "maximum number of visitors that can physically fit into a defined space, over a particular time".

PCC = A x V/a x RF

A = Available area for public use (Tourism zone)

V/a = One visitor/m^2

RF = Rotation factor (visits per day)

A = linear road length in tourism zone

Opening period - 12 hours (7 am to 7 pm)

Average time of one visit - 2.4 hours

Rotation factor (RF) = opening period/ average time of one visit

= 12/2.4 = 5

Physical Carrying capacity (PCC) = 120 X (2/1) X 5

= 1200 visits / day

11.2.2. Real Carrying capacity (RCC):

RCC is the maximum permissible number of visits to a site, once the “reductive factors” (corrective) derived from the particular characteristics of the site have been applied to the PCC. These “reductive factors” (corrective) are based on biophysical, environmental, ecological, social and management variables.

The variables which are considered for calculating real carrying capacity are;

1. Road erosion
2. Disturbance to wildlife / breeding period during monsoon
3. Maintenance of roads / park

For calculating real carrying capacity with road erosion as variable, the existing safari roads are identified with 3 different parameters like nil erosion – 0 weighting factor, low erosion – 1 weighting factor, high erosion – 2 weighting factor which is listed as below.

Sl. No.	Name of Road	Total length (in km)	Erosion weighting factor
1	Chikkally to Malguttipuram	5	1
2	Mudiyanur to Jerrahally	12	0

3	Yettigatti to watch tower	4	0
4	Hasanur to Huligere patti	5	1
5	Hasanur to Manikal	6	1
6	Hasanur to Kuliyada	6	0
7	Germalam to Manjugumba to Badripadugai	8	0
8	Gerkuttai to Kurupatti pallam to Kanakerai	7	1
9	Shooting Lodge to Alagere kuttai	10	0
10	Karachikorai to Thengumarahada	18	2
11	Dhimbam to Tippusultan road	26	0
12	Talamalai road to Deisendra kuttai to Makalikuttai	5	1
13	Ramarpatham temple to Padahallikuttai	4	0
14	Talamalai road to Arasamarathupatti	4	1
	Total	**120**	

No Erosion sink - 70 km

Low Erosion sink - 32 km

High erosion sink - 18 km

RCC = PCC- Cf_1-Cf_2---------- Cf_{n3}

Corrective factors are “site specific” and are expressed in percentage as below;

Cf = M_1/M_t x100

a) Road Erosion:

Total road length - 120km (M_t)

Low Erosion Sinks - 32km (weighting factor: 1)

High erosion risk - 18 km (weighting factor: 2)

M_1 = (32X1) + (18 X 2) = 68km

M_t = 120km

Cf_c = (68 / 120) X 100 = 56.66 or 57%

b) Disturbance to Wildlife (Breeding season):

Corrective Factor (Cf) = Limiting months / year x 100
12 months / year

Corrective factor for Spotted Deer = Cf w_1= (2 / 12) X 100 = 16.66 (or) 17%

Corrective factor for Elephant = Cf w_2= (2 / 12) X 100= 16.66 (or) 17%

Corrective factor for Gaur = Cf $w_{3=}$ (2 / 12) X 100= 16.66 (or) 17%

Corrective factor for Tiger =Cf w_4= (2 / 12) X 100= 16.66 (or) 17%

Overall = Cfw=Cf_1+ Cf_2+ Cf_3 + cf_4 = 68%

c) Temporary closing of roads:

Cf_t = limiting weeks/ year X 100 / Total weeks / year

= 4 weeks during December & January

= (4 / 52) X 100 = 7.69 (or) 8%

Computation of RCC:

$$RCC = PCC - Cf1 - \text{Cf2} - - - - - - - - - - - - \text{Cfn3}$$

Where Cf is a corrective factor expressed as a percentage. Thus, the formula for calculating RCC is:

$$RCC = 1200 * \frac{100-57}{100} * \frac{100-68}{100} * \frac{100-8}{100}$$

$$RCC = PCC * \frac{100-Cf1}{100} * \frac{100-Cf2}{100} * \frac{100-Cf3}{100}$$

$$RCC = 1200 * 0.43 * 0.32 * 0.92$$

RCC = 151.91 (or) 152 visits / day

11.2.3. Effective Permissible Carrying capacity (ECC):

ECC is the maximum number of visitors that a site can sustain, given the management capacity (MC) available.ECC is obtained by multiplying the real carrying capacity (RCC) with the management capacity (MC). MC is defined as the sum of conditions that PA administration requires if it is to carry out its functions at the optimum level. Limitations in management like lack of staff and infrastructure limit the RCC.

Management capacity:

As far as Sathyamangalam Tiger Reserve is concerned, the managing capacity of staff to manage tourism is just adequate because there is one Eco-development Range officer and Saffari guides and drivers will be engaged from local EDCs, involvement of permanent field staff is very low to nil since the beginning to plan period.Other than staff, the limitation would be emergency conflict situations or unpredictable field emergencies

due to anthropogenic pressue, problems in transit vehicles etc., However, since, Sathyamangalam Tiger Reserve is new Tiger Reserve and there are fund constrains for purchase of tourism vehicles, about 35 to 40 vehicles will be procured or engaged on hired to manage Eco-tourism safaris in Core Zone during the initial years. Considering these facts managing capacity will be around 50%.

EPCC = 152 x 0.50 = **76 vehicles /day**

Thus, the Effective Permissible Carrying Capacity on any single day is only 76 vehicles, which should be allowed entry as below:

(Forenoon) = 35 about vehicles (inclusive of all entry points)

(Afternoon) = 41 vehicles (inclusive of all entry points)

During peak season, the staff strength shall be increased (only 10%) by deploying “special duty” personnel; this would enhance the ECC to 91 vehicles per day. Further, increase in the number of vehicles would lead to deleterious effects on the habitat.

11.2.4. Carrying capacity of visitors to the Reserve

Effective permissible carrying capacity of vehicle/day is **76**

Average sitting capacity per vehicle is **06**

Therefore; 06 X 76 vehicles = **456 visitors/day**

During vacations: 06 X 91 vehicles = **546 visitors/day**

11.3. Implementation of Eco Tourism Guidelines

As mandated by the NTCA and the normative guidelines issued by the authority and notified on 15-10-2012, the guidelines would be strictly implemented in the Reserve in all aspects. A separate tourism plan covering both core and buffer eco-tourism is annexed to this Tiger Conservation Plan. The eco-tourism will be restricted within 20% of the core zone. Local Advisory Committee will be involved in the guiding the development of eco-tourism.

11.4. Park Interpretation Programme

Keeping in view the objectives of eco-tourism, the education and interpretation activities of tiger reserve rich biodiversity resources will be a part of overall Eco-Tourism

development efforts. A new Wildlife outdoor Interpretation centre will be established at Hassanur and museum and indoor interpretation centre will also be developed in Hasanur in existing eco-tourism site developed in 2011. Smaller theme based outdoor interpretation cum awareness centres will be created near religious tourism sites like Karuvanrayar Kovil, Gejalatty Dharga, Masiamman Kovil, Kongahalli Kovil etc., and near administrative campuses of Range officers and rest houses like Gedessal – Mavellam belt, Jeerahally, Talamalai. Patches of exotic Eucalyptus plantations in Gedessal – Mavellam will be selectively cleared to develop theme based interpretation cum awareness centres. Existing interpretation cum awareness centre in Hasanur will be upgraded. This interpretation Centre will have a display of various wildlife models, conservation themes, biodiversity indicative landscaping, medicinal plant garden, children's park, awareness boards, educative boards, Butterfly Park will also be established in the existing interpretation centre at Hassanur and eco-shops. Also, new publicity materials and brochures would be designed for distribution among the visitors.

Realizing that the Reserves have no future, unless people who live around such areas cooperate with the management and actively participate in the Programmes so as to ensure the conservation strategy through social fencing is made a reality.

All new eco-tourism facilities and interpretation centres will be established preferably at Bannari and Karachikorai of Sathyamangalam Division. This will be developed in the longer run as a world class museum to showcase the rich biodiversity of the STR and for supporting awareness and education for visitors. Rural school children living in the villages and towns around and reserve will be taken round the tourism zone. Nature orientation camps to both rural and urban students are conducted in collaboration with voluntary organizations. They should be taught of our rich heritage of fauna and flora and their role in the maintenance of ecosystem and how this is necessary for the very survival of man. Nature education workshops will be conducted to the school, college teachers in collaboration with education department.

Chapter. 12. Miscellaneous Issues

12.1. House Keeping of Departmental Elephants

No captive elephants are maintained in Sathyamangalam Tiger Reserve. In future, if there is risk of menace causing or continuous crop raiding elephants, temporary elephant camp on the lines of Sadivayil camp in Coimbatore may be established for health care and monitoring of captured elephants until release in Vilamundy or any other suitable location.

12.2. Wildlife Health Monitoring

Wildlife, domestic animals and humans share a large and increasing number of infectious diseases. These interfaces are such that a century-old concept of “the one medicine” is receiving greater attention because of the need to address these diseases across the species if their economic, social, and other impacts are to be effectively minimized. The wildlife component of this triad has received inadequate focus in the past to effectively protect human health as evidenced by such contemporary diseases as SARS, Lyme disease, Kyasnur forest disease, Avian flu, West Nile fever, and host of other emerging diseases. Hence, wildlife health monitoring is necessary.

12.2.1. Past records of wildlife diseases in Sathyamangalam Tiger Reserve

12.2.1.1. Tiger:

No deaths due to any wildlife disease recorded in the case of Tiger in past. However, canine distemper viral disease is reported in few parts of the Country in the year 2013-14. Stray dogs are major carrier for this viral disease. Prophylactic immunization of dogs in tribal hamlets and peripheral villages shall be done as a proactive measure to prevent occurrence of the disease in this landscape.

12.2.1.2. Leopard

As in the case of Tiger no deaths have been recorded due to viral diseases in the past. Prophylactic immunization of dogs in tribal hamlets and peripheral villages is needed as a proactive measure to prevent occurrence of the disease in this landscape.

12.2.1.3. Elephant

Elephants are known to die due to prosopis toxicity, anthrax which is endemic (Bhavanisagar, Hasanur and Talavady), organophosphorous poisoning due to ingestion of agricultural crops. In few cases ingestion of plastic materials have also been recorded from the dung samples but no deaths have been recorded so far.

During pinch period, due to scarcity of water and contamination, many elephant deaths have been noted with gastro intestine infections in Bhavanisagar & Talavady tracts usually.

12.2.1.4. Gaur

Many incidents of death of Gaur is noted in this landscape and reasons have been cataract during old age, injuries / fracture etc., Periodical Foot and Mouth Disease Vaccination of cattle in the fringe villages and monitoring of straying gaur is very essential to prevent such deaths. The present schedule of Foot and Mouth Disease vaccination twice in a year is to be continued.

12.2.1.5. Vulture

Sathyamangalam Tiger Reserve has four species of vultures noted during the survey for the past decade. As in other places, Sathyamangalam landscape had also noted deaths of vultures due to feeding on carcass having Diclofenac content. Diclofenac was banned subsequently and later ketoprofen came as an alternative. Ketoprofen, which came as an alternative, caused the same effect on the vulture population.

After reviewing the research work by wildlife scientists, the Government has decided to stop use of Ketoprofen immediately in the districts of Erode, Coimbatore and The Nilgiris where the activists see an opportunity of revival of the vulture population. Further use of Ketoprofen will be discontinued for veterinary purposes in the entire State. Meloxicam, an alternative drug, is currently included in the drug list and will be inducted in higher quantity to replace Ketoprofen completely in the State sources say.

Monitoring of the same has to be done by the tiger reserve by following up with department of animal husbandry and local veterinarians.

12.2.1.6. Other animals

Any suspicious death noted in any other wild animals due to disease will be monitored and measures will be taken to prevent the same.

12.2.2. Objectives of wildlife health monitoring

1) To document regular disease events taking place in wildlife as well as in the livestock and human interface and to create a disease data base.

2) To understand disease ecology, find out causative factors which causing disease to take better preemptive action.

3) Disease surveillance of wildlife population are more likely to detect the presence of infectious and zootomic diseases and swift adopt counter measures.

4) Development of on-site wildlife veterinary services, including veterinary support for animal handling activities, diseases surveillance, and disease outbreak investigation, including field evaluation, necropsy, and specimen sampling.

5) Facilitation of wildlife health professional capacity development, as well research by veterinary students and veterinary universities

6) Development of an outreach program, including educational material for field courses on wildlife health to educate veterinarian in adjoining and in the fringe areas of the reserves, field staff and field biologist.

12.2.3. Wildlife Health Management

“Wildlife disease has been defined as any condition which jeopardizes the survival of an animal in a particular environment. This is a broad definition but one most useful in considering diseases of wildlife (Richard.1971)”.

Diseases caused by pathogens are inherent events of the natural system, like predation by predators and herbivore by herbivores. Like increasing incident forest fires, the role of parasites and pathogens need particular attention in the present day environment of habitat encroachment, disturbance and fragmentation.

Disease of wildlife occurs in many different forms in a wide range of animal species and populations. Diseases, when expressed in free-ranging animals, can have significant effect on wildlife ecologies.

In the wild the cause of mortality could be due to intrinsic and extrinsic factors and generally they are: starvation, diseases, parasite, predation, pollution, poisoning, accidents, poaching etc., Treatment of individual is not possible in diseases of wildlife. Preventive medicine is a far more effective means of dealing with diseases in free living animals.

Sathyamangalam is an important connective PA in the Nilgiri – Eastern Ghats landscape and has a high density and diversity of wildlife species and is therefore disease management is an important issue to consider. If there is any outbreak, a large number of animal species will be wiped out. Hence, outbreak of major diseases would be monitored for control. Recently, the Government have sanctioned formation of new mobile veterinary unit with following staff strength;

1. Forest Veterinary Officer
2. Livestock inspector

In the present scenario where a Wildlife Manager has to dealwith Human-Wildlife Conflict, diseased, sick and injured animals, monkey menace, Stray wild animals, Post-mortem, domestic livestock and stray dogs etc. The Services of Forest Veterinary Officer are highly essential. Presently the service of Forest Veterinary Officer, Coimbatore is utilized for all the above said purposes. It is noticed that there are many difficulties in tackling the issues for want of expert services. Therefore, it is proposed to a create a post of Forest Veterinary Officer. The Field Director will move the proposal for creation of post of Forest Veterinary Officer exclusively for Sathyamangalam Tiger Reserve. The Veterinary expert will be provided the services of one Forester and Driver by redeployment. The Forest Veterinary Officer will,

1) Conduct routine and systematic post mortems and epidemiological investigations through non-invasive samples and proper laboratory investigations for disease surveillance.

2) Collect samples for pathological and forensic studies in the case of poaching, poisoning or electrocution of animals for meeting vetero-legal requirements.

3) Co-ordinate with local veterinarians of Animal Husbandry Department for conducting periodic immunization of livestock in fringe areas to prevent disease spread to wildlife.

4) Co-ordinate with local veterinarians for providing de-worming medicines, vitamins and mineral supplements to cattle grazing in fringe areas and for collecting livestock disease data.

5) Conduct ring vaccination, if there is an outbreak of disease.

6) Provide de-worming medicines, vitamins and mineral supplements to wild animals on a need basis, as per epidemiological investigations, with follow up examination of faecal samples.

7) Monitor problematic animals for taking appropriate management actions.

8) Monitor the health of wildlife and cattle sharing waterholes by observation and sample collection.

9) Prepare periodical report regarding wildlife health monitoring activities and submit to Deputy Director & Field Director.

10) Provide training to staff of STR in various aspects of health monitoring and management, chemical restraint, autopsy, collection and preservation of samples.

11) Provide technical support to management in proper preservation and maintenance of specimens if required,

12) Sending samples to laboratories at Centres of Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) and Animal Husbandry Department for analysis.

13) Train staff/watchers for effectively monitoring / implementing wildlife health monitoring protocol.

14) Monitor water quality in water bodies of Reserve in relation to wildlife health.

15) Develop a field guide on wildlife diseases for wildlife managers and biologists and field staff.

16) Coordinate with other agencies for control of stray dogs in and around Sathyamangalam Tiger Reserve.

17) Coordinate with local self-government, line departments, NGOs and stakeholders for creating awareness on wildlife health related issues, zoonotic diseases etc.

12.2.4. Management:

Wildlife health management programme in protected areas are grouped under five categories

1) Preventive Measures (to avert outbreaks): - Based on the earlier diseases epidemic and endemics in wild animal as well in domestic

animals at the wild life, human and livestock interface suitable and timely preventive measures can be taken.

2) Health Monitoring Operation (a routine features): - Detection monitoring - This is designed to detect changes and make preliminary assessments of significant findings based on the systematic data collection. Baseline data presented (such as starvation, malnutrition, limping, etc..,) presented in this report was collected at the Detection Monitoring level.

Report of illnesses of deaths involving many animals from a free-living population may represent the initial alert to the likely presence of new disease agent.

3) Disease control operations (during an outbreak)
4) Disease impact assessment (at the end of an outbreak)
5) Evaluation of management strategies

Medical treatment of individual sick animals is of limited biological value, and unlike in captivity, the approach should be a population medicine.

12.2.4.1. Disease Preventive Measure Programme.

1) Periodical vaccination of village cattle against contagious diseases and de-worming
2) Elimination of dog in protected areas
3) Periodical vaccination and de-worming of stray dogs in fringe areas
4) Continuous monitoring of infectious disease by sending sample from each possible wildlife death
5) Wherever possible where wild animals and cattle sharing same drinking water facilities, it is better to identify villages where there is no provision for drinking water facility for cattle and provide for cattle ponds, cattle water troughs, by the park management to prevent cross contamination and infection.
6) The Forest Veterinary Officer and Mobile Veterinary Unit prepare for an annual action plan for prophylactic immunization in consultation with State Animal Husbandry Department.

12.2.4.2. Disease surveillance.

Forest veterinarian is regularly keeps in touch with adjoining veterinary doctors and gets to know information about report of any contagious disease and outbreak in fringe areas live stocks.

Enquiry with patrolling forest staffs and personal periodical visit by the veterinarian is also done to screen the animals against any symptoms related to infectious disease.

12.2.4.3. Disease Diagnosis and Health Monitoring

Post mortem conducted on wild animals in every death and biological sample has been collected and processed in the laboratory as a part health monitoring programme, to assess' diseases of anthropogenic origin and disease of Natural origin to take suitable management.

Endotheliotrophic Elephant Herpes virus in elephant calf, canine distemper in free ranging panther and rabies and Kyasnur forest diseases in Nilgiri langur is reported first time in the country.

12.2.4.3.1. Safe disposable of carcass

After the postmortem care is given to dispose the carcass if the animal affected with infectious diseases to avoid further spread and outbreak.

12.2.4.3.2. Quarantine and surveillance of cattle through the forest check post.

Cattle through the sanctuaries in the highway through the forest check post not allowed by foot. Only cattle with valid vaccination certificate from the registered veterinarian are allowed through forest check post by the truck.

12.2.4.3.3. Facilities for rescuing injured, sick, abandoned wildlife

Temporary veterinary health care and monitoring unit with minimum laboratory facilities can be developed at existing Forest Veterinary Unit in Bhavanisagar or any suitable locations.

12.2.4.4. Remedial Action

At present, one of the main wildlife health management preventive actions is vaccination to stop the spread and outbreak of diseases. But in order to conduct this in an effective manner there are no proper facilities and infrastructure such as funds allocated specifically for the purpose, staff and vehicle facility to carry out vaccination programs regularly in the entire landscape. Other requirements are a basic disease diagnostic laboratory set-up to collect samples, analyze or dispatch to a referral laboratory and upgrade the facilities after initial establishment. The other wildlife health monitoring procedures like body condition evaluation, assessment of parasitic infestations, population estimation, habitat evaluation, anthropogenic pressure, mortality and morbidity survey during disease out-break, post-disease outbreak monitoring require special technical staff such as field biologists, field assistants, and equipment and instruments to collect the necessary information including a computer for data storage and analysis. The staff of the Forest Department needs to be continuously trained to monitor the health of wildlife and report out-breaks of any diseases and the general health of the wildlife. A wildlife rescue ambulance is required in order to reach all regions within a short notice to rescue trapped or injured animals.

12.2.4.5. Training

Periodical training to the field staff on Wildlife disease and monitoring should be given as a capacity building exercise. Likewise, periodical training to the Forest Field staff for collection of details on mortality should be given regularly to maintain proper records by the wildlife health monitoring and Forest Veterinary Officer.

12.2.5. NTCA Guidelines for Tiger Mortality

As per the guidelines issued by the NTCA vide reference No. 1-9/93-PT (NTCA)/, dated 15-07-2010, revised set of formats are given for recording post-mortem findings/sample collection. The details are given in Appendix

Some of the protocols suggested by NTCA are as follows;

1) To ensure that all tiger carcasses are preserved in a deep freeze till an independent team analyses the cause of death.

2) Every death of tiger should be thoroughly examined by the independent team including the representatives from NTCA, a Veterinary Officer from the Tiger Reserve or from the district, a Non-Governmental expert nominated by the Chief Wildlife Warden.

3) The concerned officials to immediately report incidents of tiger mortality by telephone/fax, followed by a detailed post-mortem report in the prescribed format along with the report of the independent team to the NTCA.

12.3. Mortality Documentation and Survey

On finding any wildlife casualties/carcasses, the field staff will immediately report to Forest Range Officer & Forest Veterinary Officer for further course of action. The FVO will conduct systematic post-mortem and submit preliminary necropsy reports to the Deputy Directors within a week, and the final report after obtaining results of laboratory investigations, if any. Staff will prepare a report to Forest Range Officer.

Mortality Register: - A register will be maintained in the Office of Deputy Director on the casualties/mortality of animals with information such as:

1) Species
2) GPS Coordinates
3) Date and time of detection
4) Age and sex
5) Date of necropsy
6) Condition of the carcass
7) General findings
8) Important gross lesions
9) Laboratory investigations
10) Field observation
11) Cause of mortality

Based on the above information, the Deputy Directors will prepare annual mortality report and submit to Field Director by 30th April for further action.

Mortality survey is an important tool for monitoring a population in the Protected Areas as important as population estimator. Abnormal mortality has to be recognized and

handled with due importance. Mortality rates than the normal can lead to serious conservation problems because it reduces the population to abnormally low levels or even wipe out a population. This is of greater importance if the animal under conservation.

Systematic mortality survey and data collection over the period must be analyzed and the end result can be used to strengthen wildlife management in a scientific way. This has to be handled most professionally by a wildlife manger. The standard recommendation for mortality is the old dictum of ‘remove the cause’ is not always possible in wildlife management because asserting the cause and its removal is not easy in wildlife. Poor health can lead to excessive predation. But other man-made etiological factors like cattle grazing, highways cutting across the Reserve, poaching or hunting, electrocution, poisoning, dynamite blast hidden in the agricultural fields, and manmade structures such as wells, pollution from industrial units and quarries, contaminants, drug residue like diclofenac, etc., should be handled in a professional manner.

Chapter. 13. Organization, Administration and Budget

13.1. Tiger Steering Committee

As per Government Order No 10 Environment & Forests (FR – V) Department dated 15.02.2008, State level Tiger Steering Committee has been constituted under the Chairmanship of Hon'ble Chief Minister of Tamil Nadu with Minister in charge of Forests as Vice Chairperson among other members including Secretaries to Government (Environment & Forests and Adi Dravidar and Tribal Welfare Department). (Tamil Nadu Government Gazette Extra-ordinary No. 46, dated 15.2.2008) The Chief Wildlife Warden will be the Member – Secretary of the Committee. Details of the Members is given below. Now a revised Committee has to be constituted and order is awaited from the Government. The role of the committee is already been described in the Wildlife (Protection) Act 1972.

13.2. Tiger Conservation Foundation (STCF)

The Wildlife (Protection) Amendment Act, 2006 (Section 38 X provides for establishment of a Tiger Conservation Foundation in each reserve, to facilitate and support management, apart from taking initiatives for involving people in conservation. The Foundation is a new institutional frame work which can complement the tiger reserve management and liaison with various eco-development committees and their confederations apart from production sectors in the landscape. The Foundation should be registered under the relevant rules of the state as a Trust, and as prescribed in the guidelines, will have a State Level Governing Body, apart from a field level executive committee under the Chairmanship of the Field Director with representatives of the eco-development committees as nominated by the Governing Body. The Foundation would act as a "non-profit centre" and as a "development agency" by increasing local participation. It can secure the tiger reserve from financial constraints by providing funding support through various sources; recycling of gate receipts, service charges, donations, and the like. The Foundation may under take various activities related to mainstreaming of conservation: eco-development, staff welfare, and visitor regulation, field research, facilitating eco-development committees for market access, conducting capacity building programs, ecotourism and Joint Forest Management.

The Government of India, Ministry of Environment and Forests have communicated the National Tiger Conservation Authority the (Tiger Conservation Foundation) Guidelines, 2007 issued for the purpose of Regulation of Tiger Conservation Foundation as per section 38-X of the Wildlife (Protection) Amendment Act, 1972 Clause 3 of National Tiger Conservation Guidelines,2007 and states that.,

1) The State Government shall establish a Tiger Conservation Foundation in each Tiger Reserve for facilitating and supporting its management for conservation of tiger and biodiversity apart from taking eco-tourism and eco-development initiatives by involving people in each process.

2) The Foundation shall be a trust, registered under the relevant rules of the Government.

3) The Head Office of the Foundation shall be at an administratively convenient location in proximity to the Tiger Reserve.

4) The area of operation of the Foundation shall be the Tiger Reserve and its adjoining landscape, forming the impact zone with possible corridor value for dispersal of wild animals from the Tiger Reserve.

Sathyamangalam Tiger Conservation Foundation, Tamil Nadu Trust has been established and registered as a trust as per the Tamil Nadu Societies Registration Act, 1975 (Act 27 of 1975) on 14-07-2015 vide No. 158 of 2015 of Registrar, Erode. (Deed of trust is enclosed in Appendix - 13).

1) The Governing Body of the Sathyamangalam Tiger Conservation Foundation, has been constituted as per Government Order (Ms) No. 182 Environment and Forests (FR-V) Department, dated 11-11-2013.

2) The Executive Committee of the Sathyamangalam Tiger Conservation Foundation, has been constituted as per Government Order (Ms) No. 126 Environment and Forests (FR-V) Department, dated 07-11-2014.

3) A separate Operation Manual is prepared for smooth functioning of Foundation and got approved by Governing Body in its second meeting.

Infrastructure such as office building, research & training centres, tiger monitoring cell, MIS and GIS labs, vehicles, field equipment etc., shall be developed during the plan period based on the necessity and budget allocation. The Annual Report will be placed before the Governing Body of the foundation and suitable decision taken to strengthen the foundation.

It is recommended that the STCF will also finance conservational activities for significant matters in adjacent landscape of Coimbatore & Erode Forest Divisions.

13.3. Coordination with Line Agencies/Departments

Anthropogenic pressure such as livestock grazing, collection of wood for commercial purposes and other development activities have severely degraded this Tiger Reserve in this landscape. Considering the vast stretch of areas and number of enclaves within the Tiger Reserve, the role of line agencies/other departments are important to function as a “connective bridge” between the forest authorities and local people for an “eco-friendly tiger landscape” approach by sharing of benefits between the people and eco system. This could evolve a new strategy of landscape governance with new mechanism which could be more sustainable in conservation of tiger habitats. As part of this exercise, various modules of conservation and awareness programme would be targeted for these agencies in order to understand the value of the tiger conservation programme in STR. The proposed plan for addressing the management of tiger reserve through mutual discussions among various partners of Government Department, and other stakeholders would throw out effective management strategies, in a transparent manner, for conservation of tiger habitats on a long-term basis.

Modules of awareness programs proposed: -

1) Importance of Tiger Conservation Programme
2) Tigers and its Eco-system relationship
3) Status of Tiger Population
4) Minimizing Strategies for Human animal conflict
5) Impact of Development Activities on Tiger Habitats
6) Strengthening of Legal Mechanism for Protection of Tiger Population
7) Impact of Conservation Problems, especially Human-Induced Pressure
8) Preventive disease management to protect the prey and predator population.

13.3.1. State Forest Department

The management of tiger reserves and corridors through land acquisition procedure with the funding support from the Tamil Nadu State Forest Department, NTCA, Project Elephant, Government of India, National and International Donors will be guided by the State Forest Department.

Mitigating measures for HAC will be viewed by utilizing various methods including modern techniques. Policy amendment, if needed, to protect the tiger habitats of sensitiveness will be viewed seriously using the existing conservation policy and laws.

Preparation of strategies for action plan for corridor sites preventing encroachment closer to forests, weed removal, elimination of unproductive livestock, fire control, protection of critical habitats, management of water sources, and formation of corridors will be addressed with various stakeholders.

13.3.2. District Administration, Revenue Department and HACA

Government have created a body for development of hill areas namely, “Tamil Nadu Hill Area Conservation Authority (HACA)” under the provisions of Sec 10 of the “Tamil Nadu Town & Country Planting Act, 1971” to develop the hills into an ecologically acceptable and environmentally desirable area of Indian Land Mass.

Necessary clearances would be strictly monitored in the HACA notified areas for the designated activities requiring prior approval. Also, proposed Eco-sensitive zone would take care of preventing detrimental activities in the fringes

For issue of pattas to locals, regularization encroachments, if any, issuing license for resorts, the STR may be consulted for objections if any. Revenue department may be requested to cooperate with Forest Department in land acquisition in case of migratory path or elephants.

13.3.3. Eco Sensitive Zone

A separate proposal for declaration of Eco-Sensitive Zone around Tiger Reserve is under consideration of the Government. This will be notified under Rule 5 (3) of the Environment (Protection) Rules, 1986. A separate Zonal Master Plan shall be prepared with due involvement of all concerned Departments for integrating ecological and

environmental considerations into it. The Zonal Master Plan shall provide for restoration of denuded areas, management of catchment areas, watershed management, groundwater management, soil and moisture conservation, provision for fuel wood, needs of local community and such other aspects of the ecology and environment that need attention.

13.3.4. Local body, Village Panchayats and DRDA

The development programme of the DRDA of the District Administration for villagers of forest fringes and tribal villages within the forest areas would be tuned for maintaining an ecologically sensitive tiger reserve with little or nil conservation problems. Eco development programme, funded by the DRDA have to be reviewed by the forest authorities in consultation with the experts before its implementation in forest areas.

13.3.5. District Policy makers and Legislative members of the State

Annual fund allotment for addressing poverty elimination program for local communities in forest settlement areas could be viewed more towards a balanced eco-friendly sustainable scheme for the benefits of locals in total harmony with Tiger reserve. This need a rigorous policy and norms, that is possible, if the themes of Tiger conservation program could convince and develop confidence among the Policy makers. Possibility for a mutual activity based solution, aimed for each reserve, with the support of the policy makers and legislative members of the state. This is possible through an exercise of acceptability by government departments, keeping their policy reservations towards development activities for locals in village community levels.

13.3.6. Agriculture Department

Less attractive crops to elephants with incentives from government agencies are suggested to the farmers belonging to tribal/local communities and forest settlement villages with modern agricultural practices.

13.3.7. Animal Husbandry Department

The administrative norms of the department with existing policies for promoting sustainable program for the local communities, those depend on Tiger reserve for their daily livelihood, to minimize the human induced pressures, rearing scrub cattle for manure besides creating an awareness for the locals. Policy, plan and specific annual budget allotment for Tiger reserve abutting and enclave villages to replace the scrub cattle with

high breed and high milk yielding animals, stall feeding, Milk cooperative societies to market the products, fodder cultivation in agriculture fields would be promoted by providing some incentives to local villagers. Periodical vaccination on priority basis for the domestic stock would be initiated for the benefits of preventing epidemic diseases to wild animals. These aspects will be attempted on a high priority to come out with an action plan for a coordinated effort between the animal husbandry and other related stakeholders. Periodic training for awareness creation may be organized for the local communities with the help of Animal Husbandry to prevent cattle borne diseases.

13.3.8. Tribal development & Social Welfare Department

The welfare of the tribal communities could be reachable and achievable only if the schemes for them must be in close harmony with the system in which they are living closely. The understanding of tribal communities connects with nature web for the benefits of all species has be ensured while modern technology reaches them in course of time. Tribal development and social welfare activities for the tribes and locals in around the Tiger reserve and migratory paths of elephant shall be in consultation with forest department.

Eco development activities, in the proposed new settlements formed, for locals and tribes who are willing to move away from Tiger reserve and migratory path of elephants and formation of SHGs for tribal women on priority basis.

13.3.9. Public Works Department

The development activities, especially formation of new roads and encroachment of PWD land by the locals in the vicinity of Tiger and wildlife habitats, migratory paths would be seriously discussed besides amendment of policies for preventing such activities with the support from the state government. Wherever, Tiger bearing jungle is available in PWD land, efforts would be made to manage them in a proper way.

13.3.10. Highways and Transport department

A protocol for safety to the animals will be designed during their migration while passing through these traffic lines. Furthermore, the future road proposals in forest tracts and its impact to Tigers and Elephants' home will be discussed for developing a suitable alternative, keeping animal's ecological requirements.

The roads also are the cause of several road kills of wild animals and many animals have died in the past. The problem can be addressed by limiting speed and regulating traffic at night on certain roads. Any further expansion of the road network or a major increase in traffic can be detrimental to the conservation of Tiger Reserve owing to predictable increase in movement of vehicles. The entry and exit of vehicles will be noted for all reference and regulations.

In the recent period due to continuous persuasion with the District Administration regarding the requirement for regulating road traffic in Bannari – Dhimbam – Hassanur (Karapallam) NH 209, District Gazette notification has been published on 23 November 2018 and 07 January 2019 to have conditions for vehicle movement as well as for collecting entry fee for the vehicles using Tiger Reserve area. All the critically located check posts in the Tiger Reserve are now having CCTV camera facility as well as IVS (Intelligence Video Surveillance) systems for intensive 24X7 monitoring of entry and exit of vehicles and outsiders. It would be very much relevant to upgrade and strengthen the monitoring technology along all the linear developments inside the Tiger Reserve to have better control over vehicle movement as well as outsiders.

13.3.11. Customs & Department of Revenue Intelligence, Wildlife Crime Control Bureau, Chennai

The status of tiger population and its threats to the survival in the long run to be shared with various enforcing departments like Customs, Revenue Intelligence, Wildlife preservation Regional Offices to prevent illegal transit of tiger products from the country. Various international laws, conventions, may be highlighted to these agencies for strict enforcement. Sharing information on illegal trade of animal products, all the identified transit routes will be solicited.

13.3.12. Veterinary & Animal Sciences University, Research Institutions

The extension department of Universities and Wildlife Research Institutes may be requested and involved in research programmes on wildlife habitat, wildlife health & welfare, monitoring spread of diseases & remedial measures, conservation etc.

13.3.13. Rural Land Development Banks /Financial Institutions

The administrative and operational role of Land development banks like NABARD and other institutions may be fine-tuned towards the benefit of local communities in securing their financial benefits and that would help them to deviate from the dependence on Tiger reserve.

13.3.14. Education Department

School children may be given exposure towards conservation awareness, especially themes on ecology and management of tigers. National Green Corps (NGC) and Eco Clubs may be utilized for awareness creation among school children. By involving local NGOs, conservation awareness programs shall be arranged in all schools abutting Tiger Reserve on various topics.

Periodic meetings shall be conducted with various stakeholders, agencies and departments for better coordination among them in implementing various Government projects/programmes towards conservation of the Tiger Reserve and habitat.

13.4. Staff Deployment

STR is under the administrative control of Field Director, Erode. For administrative convenience, the Reserve is divided into two Divisions, *viz.*, Sathyamangalam (881.32 km^2) and Hassanur (573.99 km^2) under the control of Deputy Directors. The headquarters of Sathyamangalam Division is at Sathyamangalam and that of Hassanur is at Hassanur.

Eco development, conservation awareness and nature education in STR need special attention for better future management. For this, a separate Eco Development Officer in the rank of Assistant Conservator of Forests is proposed for the Tiger Reserve.

Similarly, veterinary care, health monitoring of wildlife, rescue operations are specialised job and to be carried out under the supervision of qualified veterinary doctor. A Forest Veterinary Officer post is proposed to be created exclusively for this Tiger Reserve.

13.4.1.1. Provision of quality residential facilities.

Officers & Staff Housing Facilities in this project is not that good as most of the frontline staff either not having the residential accommodation in their working place or with some temporary houses. Further, most of the old time houses built decades back are in the dilapidated condition and demands major repairs. Even though some periodical maintenance and repairs are being carried out periodically, some of the buildings including non-residential and residential buildings lack some basic facilities to ensure hygienic living conditions due to remoteness of the buildings, where the facilities could not be ensured. Therefore, it is proposed to provide the required accommodation to all designated officers, ministerial staff & field staff near the existing staff colonies in the form of individual quarters, combined quarters, dormitories, family hostels, etc., where, the available facilities can be extended and also to provide good social life and ensure good education facilities.

Further the annual maintenance and special repairs shall be carried out for all the residential buildings under any available projects, schemes and non-plan budget. These facilities would also help in the encouraging the staff to work in the reserve.

Staff quarters would be constructed in the villages/ towns nearest to their headquarters, where good education and medical facilities are available. This will be of immense help to their families. For field staff a dormitory type accommodation shall be constructed in their headquarters/ forest areas where field staff can stay and perambulate the areas.

Action has to be taken during this plan to establish water supply to all staff colonies and quarters with separate connection and suitable motors depending on the requirement. This will facilitate the staff to stay in their headquarters with their family. Periodical maintenance is also necessary for the same. The existing facilities are not adequate and it is necessary to provide basic facilities without any compromise.

13.5. Fund Raising Strategies

Sathyamangalam Tiger Conservation Foundation's role in larger way is to support and finance conservation activities other than project funding and for other priority conservation activities as approved in Governing Body year to year. Sufficient funds has to be generated by Sathyamangalam Tiger Conservation Foundation for all such priority conservation activities. But, currently funds availability is very low since Sathyamangalam

Tiger Reserve is newly declared and does not have finance from any revenue generating activity as of now. Sathyamangalam Tiger Reserve seed money of Rs. 2.50 crores was sought from State Government as a fixed deposit, the annual interest of which was planned to be utilized for carrying out conservation activities. The approval for this grant is also pending from the State Government. In addition to this special operational fund of Rs. 3.25 crores was also sought from the State Government to create initial infrastructure facilities for protection and administration of the reserve. As such the impact of the Tiger Conservation Foundation on conservation activities is continued to be minimal.

The income generated from levying tourist entry fees, rest house accommodation, eco-development surcharge on visitors to Sathyamangalam Tiger Reserve, compounding fees and other charges for the services generated in the Tiger reserve shall be pooled in to the operational fund of Sathyamangalam Tiger Reserve foundation.

13.5.1. Community based Eco Tourism

A separate Eco-tourism and infrastructure development proposal is prepared and sent to Government for approval for implementation of various eco-tourism activities by involving local Committees i.e., community based ecotourism programmes. The Eco-tourism will be implemented as per the approved guidelines of Government and as per NTCA guidelines. It is proposed that these committees shall remit a part of the income from the activities to the Foundation. These funds are utilized mainly for payment of wages to the watchers and ecotourism guides of the Reserve, maintenance of infrastructure and other welfare activities. The details of proposed eco-tourism activities are described in Chapter XI.

13.5.2. Grants, Loans and Donations

Apart from this it would be the endeavour of the reserve management to seek funds from like-minded organizations having commitment for conservation of wildlife and nature and those corporate sectors with available funds under Corporate Social Responsibility (CSR) programme. Efforts will be made to explore possibilities to identify and appoint as agencies/experts to the Foundation so as to facilitate leverage of funds from other sources like from Small Grant Funds, donations for outside and inside donors etc. The donations received by the Foundation are exempted from the Income Tax as per

section 80 G of Income Tax Act. Similarly, efforts will be to avail donations from foreign nations and organizations under Foreign Exchange Regulation Act (FCRA).

Following are the broad spectrum of sources for fund generation

1) Government of India / Government of Tamil Nadu
2) Loans and Grant's given by Govt. of India, Banks
3) Donations from Pvt. Sector Companies, Pvt. Trust, Pvt. Individual
4) Joint venture with NGO'S and Pvt. Research Organizations.
5) Interest accrued on investment and fixed assets of Sathyamangalam Tiger Reserve.
6) Corporate Social Responsibility

Contribution from other sources, such as fund raising for the Sathyamangalam Tiger Reserve at National as well as Inter National levels, Grants, Donations all assistance from any Individuals, Organizations including Foreign Governments and other external agencies as permitted by law of this land and Government orders.

13.5.3. Ecosystem Services

Tiger Reserve Management will explore the possibilities of charging for ecosystem services on Resorts, home stays and tour operators in and around the Tiger Reserve.

13.5.4. Tourism Department

Tourism Department will be appraised for providing financial support for various ecotourism programmes of STR. Appropriate ecotourism projects will be designed in future for support. Ecotourism programmes in STR indirectly provide livelihood security to the local communities. However all eco-tourism activities will be carried out in accordance with NTCA guidelines.

13.5.5. Funds from line departments

The Tribal Welfare Department will be approached for providing funds for welfare activities of tribal communities. This can be made available through STR Foundation as an additional support for development of tribal communities. Similarly, the funds available with the local bodies for programmes under NREGA and other development programmes can be channelled to the fringe area people through STCF ensuring alternate employment and thereby reducing pressures on core. In addition, the Foundation will also explore the

possibilities of availing funds from line departments functioning in the adjoining landscape, to implement various programmes

13.6. Schedule of Operation

To achieve the management objectives, the proposed activities mentioned in the previous chapters (including filling of vacant posts) shall be implemented on priority basis during the plan period. Annual physical targets would be achieved as per corresponding financial allocations in the budget.

13.7. Activity Budget

Annual budget for each of the proposed activities would be derived from the prescriptions given under respective zone and theme plans as contained in the preceding chapters. The activities flowing from these prescriptions of the TCP have been provided. The budget provisions will be made by following the approved FSR, PWD-SSR and District Collector's approved wage rates and approved rates of the Government as applicable from time to time for the area where the activity is being taken up. The TCP will remain the "Source Document" to prepare the Annual Work Plan for the Core/Buffer/Corridor for various activities as per the prescription provided in the TCP. The budgets needed for implementing activities for the Annual Work Plan will be finalized by the Chief Wildlife warden of the State in consultation with NTCA. The activity budget is given below.

Activities to be implemented in Tiger Reserve
Sathyamangalam Tiger Reserve

Core Zone - Recurring

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
I	**Protection : Anti - Poaching Measures**												
1	Engaging Anti-poaching watchers for existing and proposed Anti-poaching camps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Providing Ration Allowance to APWs in Anti-poaching camps of Sathyamangalam Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Providing LPG refills to Anti-poaching camps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Maintenance of Anti-poaching camps by providing (camouflage dress and gears) Kit, ruck sack, torch lights, chargers, shoes, etc.,							✓	✓	✓			
5	Skill development trainings to APWs & subordinates on smart patrolling, intelligence gathering etc.,								✓	✓	✓		
6	Providing water facilities, improvement, special repair works, electrification to Forest Staff Quarters								✓	✓	✓	✓	
7	Logistics to prosecute offenders	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	Secret Service Fund and rewards for all category of staff and incentives for gathering intelligence about wildlife offences	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	Providing water facilities, improvement and special repair works to Anti-poaching camps / watch towers in vulnerable localities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
10	Establishing and maintenance of floating camps, deployment of local villagers as camp labour for special patrolling during raids against cultivation of ganja (Cannabis), interstate boundaries, monsoon patrol and special tasks in vulnerable places	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11	Purchase of vehicle for establishing a Highway Patrol squad along, NH and other district roads passing through the Tiger Reserve, including cost of fuel, maintenance and driver wages				✓	✓	✓	✓	✓	✓			
12	Addition Fuel charges for field director, DDs and Protection Range vehicles @ 25 litres per month for intense patrol and strengthening of protection	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
13	Engaging tiger & elephant trackers @ Rs. 6,750 per watcher per month (6 months) for Talamalai, Germalam & Hassanur Ranges in absence of anti-depredation squad	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
14	Maintenance of patrolling / old coupe roads for strengthening of protection						✓	✓	✓	✓	✓		
15	Maintenance of existing check posts	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16	Expenditure for anyother protection related requirements and issues	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
17	Engaging vulture watchers in Bhavanisagar Range of Sathyamangalam	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
II	**Strengthening of Communication facilities in the Tiger Reserve**												

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
18	Engaging qualified wireless technician for manning wireless network facilities in tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
19	Procurement & maintenance of wireless equipment, batteries, consumables, including payment of license fee	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20	Purchase of communication gadgets for smart patrolling by frontline staff				✓	✓	✓	✓	✓	✓	✓		
21	Engaging computer operators in all ranges for monitoring and documenting smart patrolling activities and technical works in the Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	Mobile phone and land line bill payments of Additional Principal Chief Conservator of Forests (Project tiger)/Field Director / Deputy Director / Rangers/ Foresters and Crisis Management cell and land line phone charge for Crime Control Board at Camp Office.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IV	**Eco – Development**												
23	Bi-annual immunization of cattle in enclave villages in the core area of the Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24	Engaging Data Entry Operators / Qualified Computer personnel for MIS and GIS applications (each one for DD Office & FD Office)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	Funding support to Eco-development committees for various community development and alternate income generation activities including training	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	Provision for Landline phone / Broadband / Data charges for Range Offices, DD Office & FD office	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
27	Maintenance of Software, Computer & accessories	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
28	Purchase of journals, books, publications, newsletter for Sathyamangalam Tiger Reserve offices and for utility of field staff	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
III	**Strengthening of Infrastructure within Tiger Reserves**												
29	Upgradation and maintenance of residential buildings in Bhavanisagar, Hassanur, Talamalai, Talavadi and Germalam Ranges					✓	✓	✓	✓	✓	✓	✓	
30	Maintenance and special reparies to existing residential buildings of DDs & office buildings of DDs & FROs					✓	✓	✓	✓	✓	✓	✓	
31	Administrative expenses like stationary, printing of maps etc., for functioning of office of Field Director, Foundation, Deputy Director and Forest Range Officers including stationary expenses (10 offices)				✓	✓	✓	✓	✓	✓	✓	✓	
IV	**Fire Control Measures**												
32	Maintenance of Old Coupe Roads/ Patrol routes, for fire protection measures in vulnerable areas					✓	✓	✓	✓	✓	✓		
33	Annual maintenance of fire lines including the block lines						✓	✓	✓	✓			
34	Engaging fire protection watchers & labourers for fire detection & extinguishing							✓	✓	✓	✓	✓	
35	Addition Fuel, maintenance of vehicles and boats used for anti-poaching activities, fire protection, Interstate meetings etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
36	Maintenance of publicity & awareness boards and distribution of pamphlets	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
V	**Habitat Improvement and Water Development**												
37	Construction of Percolation Ponds / Large Water holes in core Areas				✓	✓	✓	✓	✓	✓			
38	Construction of Check Dams in core areas				✓	✓	✓	✓	✓	✓	✓		
39	Water management for wildlife by de-silting and maintenance of existing water hole / check dams				✓	✓	✓	✓	✓	✓	✓	✓	
40	Repairing & improvement to Existing Old Check Dams & Percolation Ponds				✓	✓	✓	✓	✓	✓	✓	✓	
41	Water for wild animals externally during pinch period - 3 months	✓	✓	✓						✓	✓	✓	
42	Maintenance and repairs to existing water troughs and solar powered borewell units	✓	✓	✓									
43	Opening up habitat by removal of exotic weeds like Lantana, Prosopis, etc., for improving regeneration of native species, fodder and grass growth	✓	✓	✓							✓	✓	✓
44	Soil working, catch water pits & micro-nutrient supply for improving soil quality in plain forests (Dry deciduous & thorn Forests)					✓	✓	✓	✓	✓	✓		

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
45	Engaging Eco Sanitary Watchers - 20 Nos.in all Ranges. Supply of Eco friendly materials such as cloth bags, paper cups and covers in lieu of hazardous plastic bags and cups, providing dust bins at important places to maintain hygiene near places of worship, forest fringe villages, roads passing through forests, etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
46	Reclamation of swamps by removing tree growth/weeds etc	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VI	**Eco-Tourism**												
47	Up-gradation and maintenance of Rest Houses	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
48	Maintenance of out door intrepretation centre in Karachikorai, Bannari & Hassanur	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
49	Maintenance & fuel cost to vehicles for conducting Eco-tourism during first 2 years support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
50	Awarness & publicity materials	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
51	Maintenance of view points & watch towers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
52	First 2 years supporting wages to Eco-guides and drivers for functioning of Eco-tourism	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VII	**Eco - Development**												
53	Bi-annual immunisation of cattle in enclave villages in the core area of the Tiger Reserve in 4 ranges for 2 camps consisting of 40 to 50 villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
54	Eco-development awareness activities in EDC fringe villages for exposure to alternate income generation activities and Tiger conservation				✓	✓	✓	✓	✓	✓	✓		
55	Funding support to Eco-development committees for various community development and alternate income generation activities.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
56	Stage wise support to tribal VFC members as allowance to wean away from NTFP dependency on trial basis during 3 months of year	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
57	Providing LPG to tribal settlement and fringe village people for high fuel dependency villages in fringe villages.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
58	Providing of solar lamps, solar lanterns, solar lights, solar powered street lights in selected model villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VIII	**Addressing Man-Animal Conflict**												
59	Functioning of anti-depredation squads in high conflict zones of Talawady & Bhavanisagar including wages, fuel for vehicle, crackers, torch lights, etc., for 6 months	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
60	Support to anti-depredation local staff anti-depredation squad in low conflict areas of Hasanur, Talamalai, Germalam & other areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
61	Fuel for Vehicle used for Anti Depredation Squad Vehicles @ 150 lit./ Month and maintenance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
62	Establishment of Rescued animals temporary observation centre at Hassanur and purchase of tranquilizing			✓	✓	✓	✓	✓	✓				

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
	equipment and medicines												
63	Purchase of Rescue Equipment for rescue and relocation of wildlife from conflict area in both divisions (Squeeze cage)			✓	✓	✓	✓	✓	✓	✓	✓		
64	Purchase of I.R Camera's, thermal cameras, camera traps, night-—vision binoculars, body gears and other equipment for monitoring of conflict causing wildlife					✓	✓	✓	✓	✓	✓		
65	Conducting awareness meetings and camps in schools and forest fringe villages regarding man animal conflict to elicit public co-operation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
66	Post mortem expenditure with wages and transportation charges for safe disposal of carcass in case of deaths outside RF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
67	Compensation for Human-wildlife conflict damages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
68	Engaging Eco tone watchers for monitoring and documenting all cattle kills, conflict data, tribal dependent data and other matters in fringe villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
69	Expenditure for emergency rescue operations in forest lands and fringe villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IX	**Human Resource Development**												
70	Conducting medical camps, employment camps, in fringe villages					✓	✓	✓	✓	✓	✓	✓	

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
71	Capacity building through trainings to the field staff on aspects of man-animal conflict mitigation, animal ecology, intelligence gathering, personality development, jurisprudence, forensics, etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
72	Additional allowance for APWs engaged in protected area for protection duty	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
X	**Research and Monitoring**												
73	Conducting Workshop / training for research needs of Tiger Reserve					✓	✓	✓	✓	✓	✓		
74	Study & monitoring of unique habitats & unique species once in two years					✓	✓	✓	✓	✓	✓	✓	✓
	Phase IV Monitoring of Tigers					✓	✓	✓	✓	✓	✓	✓	✓
75	Purchase of Camera Traps					✓	✓	✓	✓	✓	✓	✓	✓
76	Purchase of Laser Range Finder					✓	✓	✓	✓	✓	✓	✓	✓
77	Purchase of Compass					✓	✓	✓	✓	✓	✓	✓	✓
78	Clearing the transect line (2 Km. Per block)					✓	✓	✓	✓	✓	✓	✓	✓
79	Engaging Biologist for monitoring of Phase IV of Tiger Monitoring @ 24,000/month in Hasanur & Sathyamangalam Divisions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
80	Annual maintenance expenditure for Tiger Monitoring Cell at Sathyamangalam	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
XI	**Establishing of Crime Control Unit**												

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
81	Engaging 3 mazdoors to man control room	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
82	Establishment and maintenance of “Wildlife Intelligence and Crime Control Unit (WICCU)”	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
83	Fuel, Oil, Lubricant, and maintenance etc. for WICCU Vehicle 250 lit fuel / month	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
XII	**Publicity**												
84	Purchase of Books and Journal of Wildlife and printing of pamphlets, newsletters, books of Sathyamangalam Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
85	Providing publicity boards in important location of Tiger Reserve.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Core Zone – Non-recurring													
I	**Protection : Anti-Poaching measure**												
1	Construction of Anti-poaching camps buildings for functional camps and additional camps including solar facilities, kitchen and water facilities					✓	✓	✓	✓	✓	✓	✓	
2	Construction of check post building for functional, temporary check post locations with solar facilities					✓	✓	✓	✓	✓	✓	✓	
3	Formation of boundary pillers around tribal settlements to prevent encroachment in Core Zone					✓	✓	✓	✓	✓	✓	✓	
4	Installation & maintenance of CCTV cameras with computers & accessories for monitoring in check posts of vulnerable areas				✓	✓	✓	✓	✓				

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
5	Construction of new range offices					✓	✓	✓	✓	✓	✓	✓	✓
6	Creation of wireless watch tower					✓	✓	✓	✓	✓	✓	✓	✓
7	Procurement of motor bikes for patrolling duties					✓	✓	✓	✓	✓	✓	✓	✓
II	**Strengthening of infra-structure within Tiger Reserve (including new Tiger Reserve)**												
8	Construction of meeting halls cum training halls in Sathyamangalam & Hassanur along with training necessity equipments					✓	✓	✓	✓	✓	✓	✓	✓
9	Construction of FRO Quarters for Germalam Range and Talamalai Forest Range and for Squad & Eco-development ranges					✓	✓	✓	✓	✓	✓	✓	✓
10	Construction of Forest Guard cum Forest watcher combined quarters					✓	✓	✓	✓	✓	✓	✓	✓
11	Formation of dormitory for field staff with residential quarters					✓	✓	✓	✓	✓	✓	✓	✓
12	Purchase of Laptop, fax machine, scanner, software, internet connection, computer peripherals etc.,					✓	✓	✓	✓	✓	✓	✓	✓
III	**Habitat Improvement and Water Development**												
13	Construction of mega size percolation ponds in larger watershed spread areas					✓	✓	✓	✓	✓	✓	✓	
14	Formation of watch towers & temporary camps in vulnerable areas for strengthening protection					✓	✓	✓	✓	✓	✓	✓	

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
IV	**Eco - Tourism**												
15	Formation of Eco shop at Bhavanisagar, Talawady, Areypalayam, Bungalowpudur, Hassanur				✓	✓	✓	✓	✓	✓	✓		
16	Formation of guest houses and inspection bungalows				✓	✓	✓	✓	✓	✓	✓	✓	
17	Formation of trekking sheds				✓	✓	✓	✓	✓	✓	✓	✓	
18	Procurement of jeeps & 20 seater vehicles					✓	✓	✓	✓	✓	✓	✓	
19	Formation of reception centres cum pickup points for functioning of eco-tourism including equipment					✓	✓	✓	✓	✓	✓	✓	✓
V	**Addressing Man-Animal Conflict**												
20	Procurement of anti-depredation vehicles for attending to conflict emergencies immediately					✓	✓	✓	✓	✓	✓	✓	
21	Purchase of Radio collar in emergent situations like capture and release of aberrant tigers, leopards	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	Purchase of post mortem kits and make-shift tents to perform post mortem of dead wild animals	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	Purchase of basic mobile phones to frontline staff with six months telephone allowance for attending conflict emergencies and monitoring movement of conflict causing wild animals including control unit staff at head quarters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VI	**Human Resource Development**												
24	Conducting Study Tour Officers & Staff to other Tiger Reserve								✓	✓	✓		

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
25	Project Allowance as per the Guidelines of CSS-PT all employees of staff permitted by GOI.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	Conducting training to the staff and stake holders in capacity building and other associated field issues							✓	✓	✓	✓		
VII	**Research and Monitoring**												
27	Establishment of Tiger Monitoring Cell - Procurement of Computer peripherals, software, printers, stationaries and vehicles for data analysis of field studies and monotoring of movement of Tiger and other species along with M-STrIPES data analysis					✓	✓	✓	✓	✓	✓	✓	
28	Research towards recovery of endangered species in Sathyamangalam Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
29	Conduct detailed study on Temples in Sathyamangalam Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VIII	**Conservation of Elephant Corridors**												
30	Construction of Elephant watch towers in Elephant corridors				✓	✓	✓	✓	✓	✓	✓	✓	
31	Creation of water bodies in Elephant corridors				✓	✓	✓	✓	✓	✓	✓	✓	
32	Conducting regular meetings with stake holders for eviction of encroachment in corridor location – Bhavanisagar Dam area	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
33	Establishment of Elephant depredation squad with necessary vehicles and manpower.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
34	Conducting periodical study on movements and behavior of Elephants	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Activity Budget for Tiger Conservation Plan
Sathyamangalam Tiger Reserve

Core Zone - Recurring

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
I	**Protection : Anti - Poaching Measures**										
1	Engaging Anti-poaching watchers for existing and proposed Anti-poaching camps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Providing Ration Allowance to APWs in Anti-poaching camps of Sathyamangalam Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Providing LPG refills to Anti-poaching camps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Maintenance of Anti-poaching camps by providing (camouflage dress and gears) Kit, ruck sack, torch lights, chargers, shoes, etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Skill development trainings to APWs & subordinates on smart patrolling, intelligence gathering etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	Providing water facilities, improvement, special repair works, electrification to Forest Staff Quarters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	Logistics to prosecute offenders	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	Secret Service Fund and rewards for all category of staff and incentives for gathering intelligence about wildlife offences	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	Providing water facilities, improvement and special repair works to Anti-poaching camps / watch towers in vulnerable localities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
10	Establishing and maintenance of floating camps, deployment of local villagers as camp labour for special patrolling during raids against cultivation of ganja (Cannabis), interstate boundaries, monsoon patrol and special tasks in vulnerable places	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11	Purchase of vehicle for establishing a Highway Patrol squad along, NH and other district roads passing through the Tiger Reserve, including cost of fuel, maintenance and driver wages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12	Addition Fuel charges for field director, DDs and Protection Range vehicles @ 25 litres per month for intense patrol and strengthening of protection	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
13	Engaging tiger & elephant trackers @ Rs. 6,750 per watcher per month (6 months) for Talamalai, Germalam & Hassanur Ranges in absence of anti-depredation squad	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
14	Maintenance of patrolling / old coupe roads for strengthening of protection	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	Maintenance of existing check posts	✓	-	-	✓	-	✓	-	-	✓	-
16	Expenditure for anyother protection related requirements and issues	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
17	Engaging vulture watchers in Bhavanisagar Range of Sathyamangalam	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
II	**Strengthening of Communication facilities in the Tiger Reserve**										
18	Engaging qualified wireless technician for manning wireless network facilities in tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
19	Procurement & maintenance of wireless equipment, batteries, consumables, including payment of license fee	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20	Purchase of communication gadgets for smart patrolling by frontline staff	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
21	Engaging computer operators in all ranges for monitoring and documenting smart patrolling activities and technical works in the Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	Mobile phone and land line bill payments of Additional Principal Chief Conservator of Forests (Project tiger)/Field Director / Deputy Director / Rangers/ Foresters and Crisis Management cell and land line phone charge for Crime Control Board at Camp Office.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IV	**Eco - Development**										
23	Bi-annual immunization of cattle in enclave villages in the core area of the Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24	Engaging Data Entry Operators / Qualified Computer personnel for MIS and GIS applications (each one for DD Office & FD Office)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	Funding support to Eco-development committees for various community development and alternate income generation activities including training	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	Provision for Landline phone / Broadband / Data charges for Range Offices, DD Office & FD office	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
27	Maintenance of Software, Computer & accessories	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
28	Purchase of journals, books, publications, newsletter for Sathyamangalam Tiger Reserve offices and for utility of field staff	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
III	**Strengthening of Infrastructure within Tiger Reserves**										
29	Upgradation and maintenance of residential buildings in Bhavanisagar, Hassanur, Talamalai, Talavadi and Germalam Ranges	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
30	Maintenance and special reparies to existing residential buildings of DDs & office buildings of DDs & FROs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
31	Administrative expenses like stationary, printing of maps etc., for functioning of office of Field Director, Foundation, Deputy Director and Forest Range Officers including stationary expenses (10 offices)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IV	**Fire Control Measures**										
32	Maintenance of Old Coupe Roads/ Patrol routes, for fire protection measures in vulnerable areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
33	Annual maintenance of fire lines including the block lines	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
34	Engaging fire protection watchers & labourers for fire detection & extinguishing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
35	Addition Fuel, maintenance of vehicles and boats used for anti-poaching activities, fire protection, Interstate meetings etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
36	Maintenance of publicity & awareness boards and distribution of pamphlets	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
V	**Habitat Improvement and Water Development**										
37	Construction of Percolation Ponds / Large Water holes in core Areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
38	Construction of Check Dams in core areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
39	Water management for wildlife by de-silting and maintenance of existing water hole / check dams	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
40	Repairing & improvement to Existing Old Check Dams & Percolation Ponds	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
41	Water for wild animals externally during pinch period - 3 months	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
42	Maintenance and repairs to existing water troughs and solar powered borewell units	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
43	Opening up habitat by removal of exotic weeds like Lantana, Prosopis, etc., for improving regeneration of native species, fodder and grass growth	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
44	Soil working, catch water pits & micro-nutrient supply for improving soil quality in plain forests (Dry deciduous & thorn Forests)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
45	Engaging Eco Sanitary Watchers - 20 Nos.in all Ranges. Supply of Eco friendly materials such as cloth bags, paper cups and covers in lieu of hazardous plastic bags and cups, providing dust bins at important places to maintain hygiene near places of worship, forest fringe villages, roads passing through forests, etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
46	Reclamation of swamps by removing tree growth/weeds etc	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
VI	**Eco-Tourism**										
47	Up-gradation and maintenance of Rest Houses	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
48	Maintenance of out door intrepretation centre in Karachikorai, Bannari & Hassanur	-	✓	✓	✓	✓	-	✓	✓	✓	✓
49	Maintenance & fuel cost to vehicles for conducting Eco-tourism during first 2 years support	✓	✓	-	-	-	-	-	-	-	-
50	Awarness & publicity materials	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
51	Maintenance of view points & watch towers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
52	First 2 years supporting wages to Eco-guides and drivers for functioning of Eco-tourism	✓	✓	-	-	-	✓	✓	-	-	-
VII	**Eco - Development**										
53	Bi-annual immunisation of cattle in enclave villages in the core area of the Tiger Reserve in 4 ranges for 2 camps consisting of 40 to 50 villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
54	Eco-development awareness activities in EDC fringe villages for exposure to alternate income generation activities and Tiger conservation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
55	Funding support to Eco-development committees for various community development and alternate income generation activities.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
56	Stage wise support to tribal VFC members as allowance to wean away from NTFP dependency on trial basis during 3 months of year	✓	✓	-	-	-	✓	✓	-	-	-

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
57	Providing LPG to tribal settlement and fringe village people for high fuel dependency villages in fringe villages.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
58	Providing of solar lamps, solar lanterns, solar lights, solar powered street lights in selected model villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VIII	**Addressing Man-Animal Conflict**										
59	Functioning of anti-depredation squads in high conflict zones of Talawady & Bhavanisagar including wages, fuel for vehicle, crackers, torch lights, etc., for 6 months	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
60	Support to anti-depredation local staff anti-depredation squad in low conflict areas of Hasanur, Talamalai, Germalam & other areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
61	Fuel for Vehicle used for Anti Depredation Squad Vehicles @ 150 lit./ Month and maintenance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
62	Establishment of Rescued animals temporary observation centre at Hassanur and purchase of tranquilizing equipment and medicines	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
63	Purchase of Rescue Equipment for rescue and relocation of wildlife from conflict area in both divisions (Squeeze cage)	✓	-	-	-	-	✓	-	-	-	-
64	Purchase of I.R Camera's, thermal cameras, camera traps, night–vision binoculars, body gears and other equipment for monitoring of conflict causing wildlife	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
65	Conducting awareness meetings and camps in schools and forest fringe villages regarding man animal conflict to elicit public co-operation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
66	Post mortem expenditure with wages and transportation charges for safe disposal of carcass in case of deaths outside RF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
67	Compensation for Human-wildlife conflict damages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
68	Engaging Eco tone watchers for monitoring and documenting all cattle kills, conflict data, tribal dependent data and other matters in fringe villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
69	Expenditure for emergency rescue operations in forest lands and fringe villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IX	**Human Resource Development**										
70	Conducting medical camps, employment camps, in fringe villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
71	Capacity building through trainings to the field staff on aspects of man-animal conflict mitigation, animal ecology, intelligence gathering, personality development, jurisprudence, forensics, etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
72	Additional allowance for APWs engaged in protected area for protection duty	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
X	**Research and Monitoring**										
73	Conducting Workshop / training for research needs of Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
74	Study & monitoring of unique habitats & unique species once in two years	✓	-	✓	-	✓	✓	-	✓	-	✓
	Phase IV Monitoring of Tigers										

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
75	Purchase of Camera Traps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
76	Purchase of Laser Range Finder	✓	✓	✓	-	-	✓	✓	✓	-	-
77	Purchase of Compass	✓	✓	✓	-	-	✓	✓	✓	-	-
78	Clearing the transect line (2 Km. Per block)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
79	Engaging Biologist for monitoring of Phase IV of Tiger Monitoring @ 24,000/month in Hasanur & Sathyamangalam Divisions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
80	Annual maintenance expenditure for Tiger Monitoring Cell at Sathyamangalam	-	✓	✓	✓	✓	-	✓	✓	✓	✓
XI	**Establishing of Crime Control Unit**										
81	Engaging 3 mazdoors to man control room	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
82	Establishment and maintenance of “Wildlife Intelligence and Crime Control Unit (WICCU)”	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
83	Fuel, Oil, Lubricant, and maintenance etc. for WICCU Vehicle 250 lit fuel / month	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
XII	**Publicity**										
84	Purchase of Books and Journal of Wildlife and printing of pamphlets, newsletters, books of Sathyamangalam Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
85	Providing publicity boards in important location of Tiger Reserve.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
Core Zone; Non Recurring											
I	**Protection : Anti-Poaching measure**										
1	Construction of Anti-poaching camps buildings for functional camps and additional camps including solar facilities, kitchen and water facilities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Construction of check post building for functional, temporary check post locations with solar facilities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Formation of boundary pillers around tribal settlements to prevent encroachment in Core Zone	-	✓	✓	✓	✓	-	✓	✓	✓	✓
4	Installation & maintenance of CCTV cameras with computers & accessories for monitoring in check posts of vulnerable areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Construction of new range offices	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	Creation of wireless watch tower	✓	-	-	-	-	✓	-	-	-	-
7	Procurement of motor bikes for patrolling duties	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
II	**Strengthening of infra-structure within Tiger Reserve (including new Tiger Reserve)**										
8	Construction of meeting halls cum training halls in Sathyamangalam & Hassanur along with training necessity equipments	✓	-	✓	-	-	✓	-	✓	-	-
9	Construction of FRO Quarters for Germalam Range and Talamalai Forest Range and for Squad & Eco-development ranges	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10	Construction of Forest Guard cum Forest watcher combined quarters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
11	Formation of dormitory for field staff with residential quarters	✓	-	-	-	-	✓	-	-	-	-
12	Purchase of Laptop, fax machine, scanner, software, internet connection, computer peripherals etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
III	**Habitat Improvement and Water Development**										
13	Construction of mega size percolation ponds in larger watershed spread areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
14	Formation of watch towers & temporary camps in vulnerable areas for strengthening protection	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IV	**Eco - Tourism**										
15	Formation of Eco shop at Bhavanisagar, Talawady, Areypalayam, Bungalowpudur, Hassanur	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16	Formation of guest houses and inspection bungalows	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
17	Formation of trekking sheds	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
18	Procurement of jeeps & 20 seater vehicles	✓	✓	✓	✓	-	✓	✓	✓	✓	-
19	Formation of reception centres cum pickup points for functioning of eco-tourism including equipment	✓	✓	-	-	-	✓	✓	-	-	-
V	**Addressing Man-Animal Conflict**										
20	Procurement of anti-depredation vehicles for attending to conflict emergencies immediately	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
21	Purchase of Radio collar in emergent situations like capture and release of aberrant tigers, leopards	✓	-	✓	✓	✓	✓	-	✓	✓	✓
22	Purchase of post mortem kits and make-shift tents to perform post mortem of dead wild animals	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	Purchase of basic mobile phones to frontline staff with six months telephone allowance for attending conflict emergencies and monitoring movement of conflict causing wild animals including control unit staff at head quarters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VI	**Human Resource Development**										
24	Conducting Study Tour Officers & Staff to other Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	Project Allowance as per the Guidelines of CSS-PT all employees of staff permitted by GOI.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	Conducting training to the staff and stake holders in capacity building and other associated field issues										
VII	**Research and Monitoring**										
27	Establishment of Tiger Monitoring Cell - Procurement of Computer peripherals, software, printers, stationaries and vehicles for data analysis of field studies and monotoring of movement of Tiger and other species along with M-STrIPES data analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
28	Research towards recovery of endangered species in Sathyamangalam Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
29	Conduct detailed study on Temples in Sathyamangalam Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No.	Item of work	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
VIII	**Conservation of Elephant Corridors**										
30	Construction of Elephant watch towers in Elephant corridors	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
31	Creation of water bodies in Elephant corridors	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
32	Conducting regular meetings with stake holders for eviction of encroachment in corridor location – Bhavanisagar Dam area	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
33	Establishment of Elephant depredation squad with necessary vehicles and manpower.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
34	Conducting periodical study on movements and behavior of Elephants	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Chapter. 14. Monitoring and Evaluation

Effective monitoring and evaluation is an utmost important factor to improve the management outcomes and to identify areas where extra efforts are needed. The National Tiger Conservation Authority has issued some guidelines for monitoring and evaluation of the functioning of the Tiger Reserves in India.

14.1. Criteria

The criteria used for the assessment will be based on the World Commission on Protected Areas (WCPA), Management Effectiveness Assessment Framework (MEAF) and will be adapted to this Tiger Reserve. Hence, the monitoring and evaluation on the outcome of the various activities will be carried out in the reserve based on the following 32 important indicators of performance

14.1.1. Context

1) To ensure the values of the Tiger Reserve are well documented, assessed and monitored.
2) To ensure threats to Tiger Reserve values are well documented and assessed
3) To ensure the 'Core Area' of Tiger Reserve free from human and biotic interference

14.1.2. Planning

1) To ensure, Tiger Conservation Plan is prepared.
2) To ensure, Tiger Reserve safeguards the threatened biodiversity values.
3) To ensure, stakeholders are given an opportunity to participate in planning process.
4) To ensure, habitat management programmes are systematically planned, relevant and monitored.
5) To ensure, Tiger Reserve has an effective protection strategy.
6) To ensure, Tiger Reserve is effective in the mitigation of human-animal conflicts.
7) To ensure, Tiger Reserve is integrated into a wider ecological network/ landscape following the principles of the ecosystem approach.

14.1.3. Inputs

1) To ensure personnel adequate, well organized and deployed with access to adequate resources in the Tiger Reserve.
2) To ensure resources (vehicle, equipment, building etc.) are adequate, well organized and managed with desired access.
3) To ensure financial resources other than those of the State are linked to priority actions and are funds adequate, released timely and utilized.
4) To ensure financial resources from the State are linked to priority action and funds adequate, timely released and utilized for the management of Tiger Reserve.
5) To assess the level of resources provided by NGOs.

14.1.4. Process

1) To ensure Tiger Reserve have manpower resources trained in wildlife conservation for effective management.
2) To ensure Tiger Reserve staff management performance is linked to achievement of management objectives.
3) To ensure effective public participation in Tiger Reserve management and to show in making a difference.
4) To ensure a responsive system for handling complaints and comments about Tiger Reserve management.
5) To ensure Tiger Reserve management addresses the livelihood issues of resource dependent communities, especially of women.
6) To ensure the Tiger Reserve is planned and implemented the voluntary 'Village Relocation' from the core, buffer and Tiger bearing areas by considering the future prospects of the Tiger Reserve and conservation of the landscape as a whole.

14.1.5. Output

1) To ensure whether adequate information on Tiger Reserve management is available to public?
2) To ensure visitor services and facilities are appropriate and adequate.
3) To ensure research/ monitoring related trends are systematically evaluated routinely, reported and used to improve the management.

4) To ensure a systematic maintenance schedule and funds is in place for management of infrastructure/assets.

14.1.6. Outcomes

1) To ensure populations of threatened species especially Tiger populations are increasing, stable or declining?
2) To assess threats to the Tiger Reserve are being reduced/ minimized / increased.
3) To ensure the expectations of visitors are generally met or exceeded.
4) To ensure local communities are supportive of Tiger Reserve management.
5) To ensure Assessment Criteria for addressing issues are related to Climate Change & Carbon sequestration in the Tiger Reserves (TRs)
6) To ensure additional Criteria on Climate Change
7) To ensure Tiger Reserve is being consciously managed to adapt to climate change, prevent carbon loss and encourage further carbon capture.

Some of parameters and criteria for evaluation of management interventions of core zone at division level and their success indicators are given in Table 14.1.

Table 14.1: Parameters and criteria for Monitoring and Evaluation

Sl. No.	Parameter	Evaluation Criteria	Success indicators
1	Effective Protection	1. Daily patrolling schedule 2. Interstate joint patrolling 3. Highway patrolling 4. Floating camps conducted for anti-poaching 5. Infrastructure developed for camp sheds 6. Vehicles 7. Communication equipment 8. Fire arms 9. Surprise checks 10. Inter-state Co-ordination meetings	1. Reduction in poaching incidences 2. Reduced cases of illegal entry / other offences 3. No. of meetings / interactions with adjacent State / Forest Divisions 4. Days/staff spent on patrolling 5. Reports generated 6. Reduction in poaching
2	Habitat management interventions	1. Biotic interference 2. Regeneration status of indigenous plant species in	1. Reduction in quantity of firewood and number of people involved in firewood

Sl. No.	Parameter	Evaluation Criteria	Success indicators
		areas where invasive species are removed 3. Invasion of woody species in grass lands and other unique habitats 4. Weeds 5. Restoration of Eucalypts plantations 6. Waterholes	collection. 2. Reduction in number of cattle in enclave / tribal hamlets 3. Reduction in NTFP collection (annual quantification) 4. Reduction in incidents/extent of fire 5. Status of permanent sample plots / transect lines 6. Reduction in invasion of weeds in natural habitats. (Number, density, spatial distribution) 7. Extent of exotic weeds 8. Increased regeneration of natural species 9. Increased habitat utilization by wildlife 10. Availability of water during pinch summer
3	Animal Population	1. Tiger and co-predator population and density 2. Prey population	1. Increased number of tigers/ co-predators/cubs 2. Increased frequency of indirect evidences 3. Increased prey density
4	Human-Animal Conflicts	1. No. of conflict incidences 2. Effectives of mitigation measures	Reduced incidences of i. Cattle lifting ii. Crop damage iii. Property loss iv. Human death v. Human injury
5	Human Resource Development	1. Staff amenities 2. Infra-structure development for staff housing, camps etc., for staff 3. No. of staff trained	1. Increased staff satisfaction 2. Efficiency of staff increased. 3. Positive attitude in managing situations (through periodical survey)
6	Financial Support	1. Utilization of funds received	1. Percentage of funds utilized
7	Stakeholder	1. Adverse comments on the	1. Reduced negative

Sl. No.	Parameter	Evaluation Criteria	Success indicators
	satisfaction	management / staff	comments / complaints received 2. Media reports (Annual report) 3. Appreciations and suggestions received from public and other stakeholders
8	Livelihood issues	1. Measures taken to address livelihood issues	1. Amount spent for income – generation activities and community development works in Eco development and JFMCs 2. No. of man days generated 3. Alternate income generated
9	Research and monitoring	1. No. of studies	1. No. of reports/publications 2. ARS conducted
10	Publicity and creation of awareness	1. Increased public support 2. Increased public involvement	1. No. of nature camps 2. No. of awareness campaigns 3. No. of meetings conducted in JFMCs and EDCs 4. No of publications and information available in public domain
11	Wildlife Health Management	1. Immunization of fringe area cattle 2. Monitoring wildlife health 3. Reduction of free ranging dogs in tribal settlements	1. Reduced wildlife mortality 2. due to diseases 3. Increased natality 4. Decrease in number of stray dogs
12	Effect of Linear Intrusions on Wildlife	1. Measures to reduce Road Kill 2. Measures to reduce death due to electrocution	1. Reduction in number of Road Kill Incidences. 2. Reduction in number electrocution death
12	Adapt to climate change,	1. Improvement of forest canopy / cover 2. No. and extent of wild fire 3. Incidences of tree felling 4. Increased biomass	1. Reduction in forest loss 2. Reduction in fire 3. Reduction of tree felling 4. Biomass removed
13	Measures to reduce carbon loss		
14	Measures to		

Sl. No.	Parameter	Evaluation Criteria	Success indicators
	Increase carbon capture		

14.2. Process

Sathyamangalam Tiger Conservation Foundation will develop a format for objective evaluation of management interventions based on the above parameters and criteria. The parameters requiring professional inputs such as habitat management interventions, assessment of changes in animal populations, research and monitoring will be evaluated by Field Biologist working in STCF. The parameters for wildlife health monitoring will be reviewed by Forest Veterinary Officer. Reports of all these evaluations will be submitted to DDs and FD. Other parameters will be evaluated by DDs and reported to Field Director. In order to create database and monitor and evaluate effectiveness of the following, a web based MIS will be developed for data base management and for reviewing purpose.

1) Protection
2) Fire Management
3) Habitat Management
4) Tiger and prey base monitoring
5) Eco-development/Livelihood support
6) Research, Monitoring & Training
7) Wildlife Heath Monitoring
8) Visitor Management
9) Inventory Management
10) Awareness Campaigns

14.2.1. Internal Monitoring

All the conservation activities proposed in the Conservation Plan will be implemented based on the site specific importance with scientific observations for long term conservation of wildlife and its habitats. The entire activities are being monitored by the Field Director with the assistance of the Deputy Directors on a regular interval vis-a-vis the course of action on spatial and temporal grounds. The success of the conservation depends upon creation of active and vibrant commitment that can be

ensured by proper monitoring. It may be appropriate a set of monitoring parameters that can be used for the purpose of reporting on periodical basis. At the same time evaluation of the programme will give chance for correction at different stages as also the real impact of the activities to achieve the desired objectives. The evaluation can better be done with the help of an internal or external system. A monitoring proforma would be developed for evaluation.

Table 14.2: Schedule of Evaluation

Sl. No.	Parameter	Criteria	Schedule
1	Effective Protection	1. Daily patrolling schedule 2. Interstate joint patrolling 3. Highway patrolling 4. Floating camps conducted for anti-poaching 5. Infrastructure developed for camp sheds 6. Vehicles 7. Communication equipment 8. Fire arms 9. Surprise checks 10. Inter-state Co-ordination meetings	Annual
2	Habitat management interventions	1. Biotic interference	Annual
		2. Regeneration status of indigenous plant	Once in three years
		3. species in areas where invasive species are removed	Once in three years
		4. Invasion of woody species in grass lands and other unique habitats	Annual
		5. Weeds	Annual
		6. Restoration of Eucalypts plantations	once in three years
		7. Waterholes	Annual
3	Animal population	1. Tiger and co-predator population and density 2. Prey population	Once in four years
4	Human-Animal conflicts	1. No. of conflict incidences 2. Effectives of mitigation measures	Annual

Sl. No.	Parameter	Criteria	Schedule
5	Human Resource Development	1. Staff amenities 2. Infra-structure development for staff housing, camps etc., for staff 3. No. of staff trained	Annual
6	Financial Support	1. Utilization of funds received	Annual
7	Stakeholder satisfaction	1. Adverse comments on the management/ staff	Annual
8	Livelihood issues	1. Measures taken to address livelihood issues	Annual
9	Research and monitoring	1. No. of studies	Annual
10	Publicity and creation of awareness	1. Increased public support 2. Increased public involvement	Annual
11	Wildlife Health Management	1. Immunization of fringe area cattle 2. Monitoring wildlife health	Annual
12	Adapt to climate change,	1. Improvement of forest canopy / cover 2. No. and extent of wild fire 3. Incidences of tree felling 4. Increased biomass	Once in five years (Plan Period)
13	Measures to reduce carbon loss		
14	Measures to Increase carbon capture		
15	Internal MEE	As per the guidance of NTCA by the approved committee.	Annual

14.2.2. Use of the Results

(a) The agency responsible for the Tiger Reserves and especially the site managers must use the assessment results to improve the condition of the reserves. If the results are not used, the managers will not see change emerging from them and it could become just more work for the managers. Follow-up on the results must be provided.

(b) The most immediate use for the assessment results is adaptive management. Adaptive management is a basic foundation of management effectiveness. The reserves must learn, correct and enhance the management of their values based on the results provided by the assessments. The implementation of

adaptive management is a means to shape the Tiger Reserves as learning organizations.

(c) Another use of the assessment results is by incorporating them into the regular agency reporting requirements that include reporting to the agency hierarchy, to donors and stakeholders. The results can be used to report to local communities and indigenous groups as well. This effort will promote the accountability of the Tiger Reserves and will help constituency building.

14.2.3. External monitoring

Apart from internal monitoring of all activities in the reserve is ensured by the Field Director with the assistance of the Deputy Directors and the concerned Forest Range Officers, the Principal Chief Conservator of Forests and Chief Wildlife Warden and The Principal Chief Conservator of Forests (Head of Forest Force) will be monitoring ongoing activities periodically. Additional Principal Chief Conservator of Forests (Project Tiger) would supervise, control and provide guidance on various facets of management as well as to review performance and effectiveness of management based on various existing procedures. Evaluation by external MEE team once in 4 years including the officials from the Regional Office of NTCA in Bengaluru will also be monitoring the activities and management action of STR regularly as per their mandate.

14.2.4. State level / Central level monitoring

The evaluation for efficient management of the Tiger reserve would be ensured by the Central / State Committee formed by the National Tiger Conservation Authority / Government of India / State Government from time to time.

14.2.5. The Way Forward

In case the assessment of management effectiveness of the tiger reserves continues into the future (annual iterations, for example), which we strongly recommend, it is advisable to design a means to store, process and make the information from present and future assessments readily available. It is recommended that the tiger reserve managers and the agency authorities define an annual programme to complete future management effectiveness assessments. If possible, the process is internalized

and becomes a part of entire gamut of Tiger Reserve management protocols and practices.

Where the performance is good, the reserve managements should ensure that they maintain the status or further improve to achieve the desired mark. Where the assessments need more information, the next assessments should refocus on designing clear criteria that can widely be used by all reserves. If the assessment reports can be reviewed now, it will be even better. This will give the correct picture of the reserve to enable the policy makers and managing authorities take appropriate policy decisions in their future management.