Tiger Conservation Plan

Buffer Zone

(2019-20 to 2029-30)

Sathyamangalam Tiger Reserve

Erode, Tamil Nadu

Tiger Conservation Plan

Buffer 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 –Buffer Zone (Plan Period 2016 – 2017 to 2021 – 2022)

1.1.2. Location

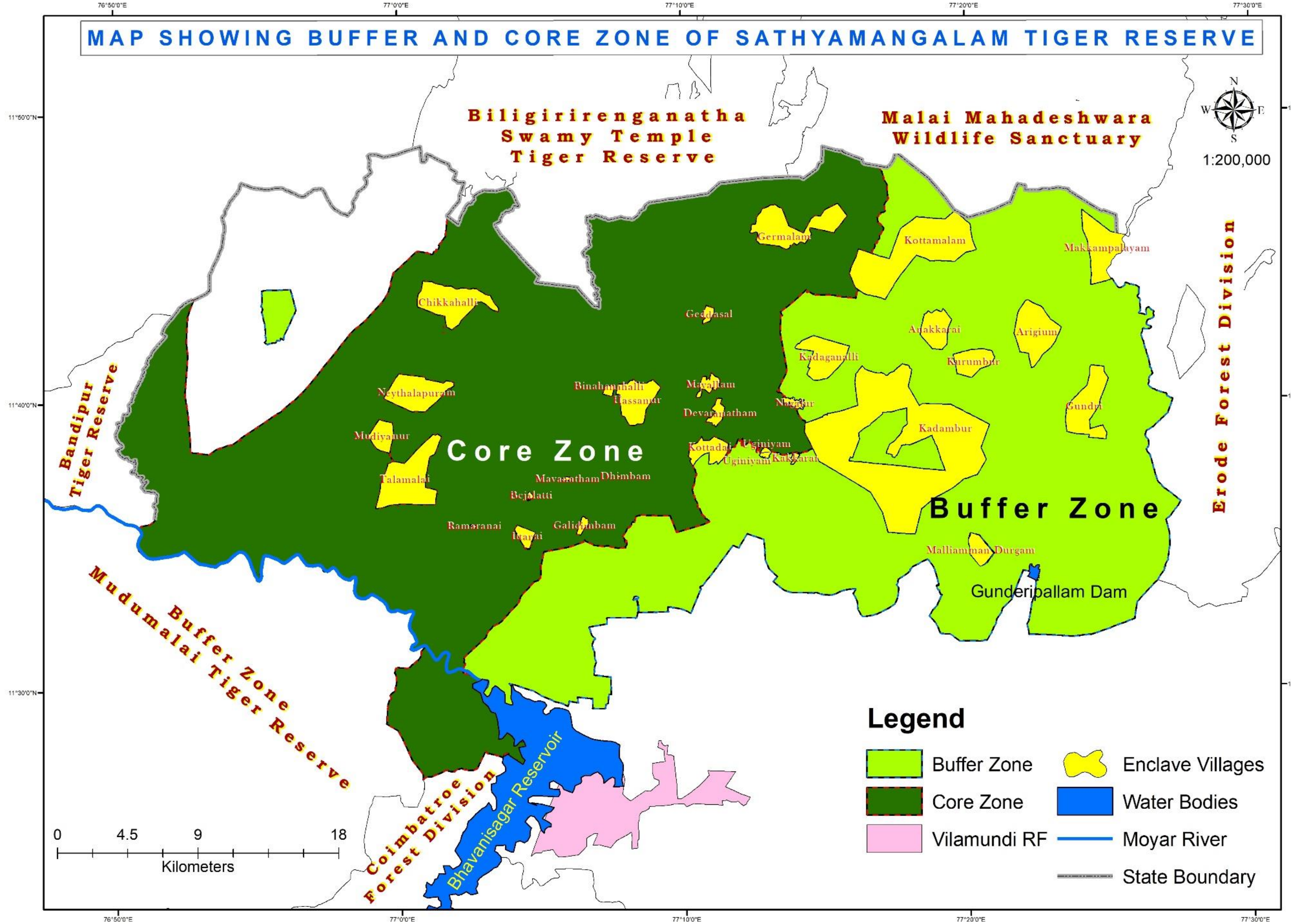
The buffer zone of Tiger Reserve falls between the latitudes 11º 28’ 48.82" and11º 48’ 43.06” and between longitudes 76º 55' 3.95” and 77º 27’ 36.25”. The buffer zone of Tiger Reserve is situated in Sathyamangalam &Talawady Taluk of Erode District.

In Sathyamangalam Forest Division the Buffer Zone covers the part of Moyar Valley adjacent to Bhavanisagar Dam’s water spread area in Bhavanisagar Range, plains of Bannari in Sathyamangalam Range, Ekathur, Kadambur-Gundriplateau of Sathyamangalam and T N Palayam Range. In Hasanur Forest Division it covers Kottamalam part of Germalam Range, Akkurjorai RF in Talawadi Rangeand Kakarai of Hasanur Range.

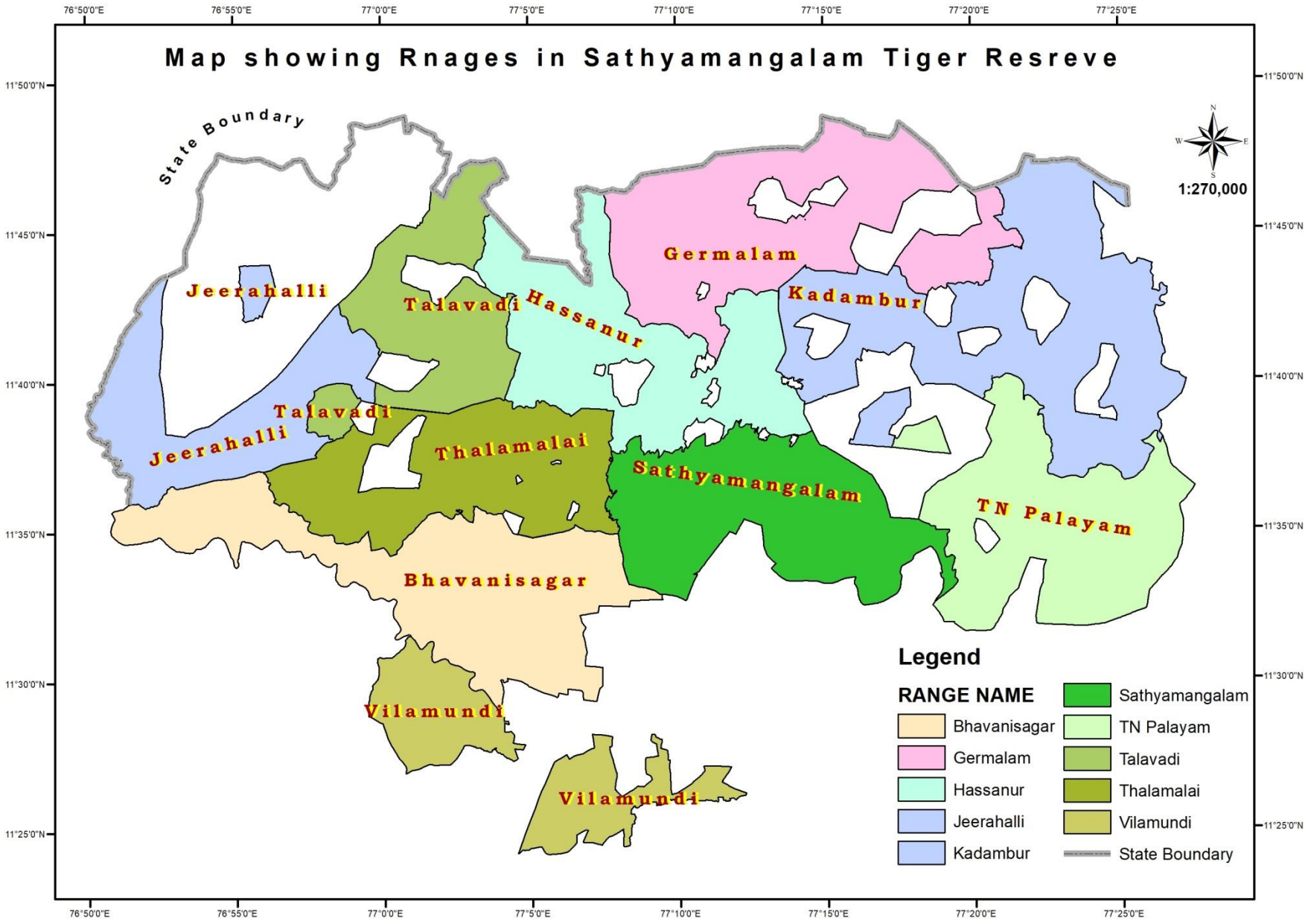
1.1.3. Constitution

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. 06.05.1980. (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 *vide* 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 in Govt. Order (Ms). No. 93 Environment & Forests Dept. dated 11.08.2011 under section 26A (1) (b) of Wildlife (Protection) Act 1972. (Appendix 4).



MAP SHOWING BUFFER AND CORE ZONE OF SATHYAMANGALAM TIGER RESERVE
Biligirirenganatha Swamy Temple Tiger Reserve
Malai Mahadeshwara Wildlife Sanctuary
1:200,000
Bandipur Tiger Reserve
Erode Forest Division
Buffer Zone Mudumalai Tiger Reserve
Coimbatroe Forest Division
Bhavanisagar Reservoir
Core Zone
Buffer Zone
Gunderipallam Dam
Germalam
Kottamalam
Makkampalayam
Chikkahalli
Geddasal
Arakkarai
Arigium
Kadaganalli
Kurumbur
Neythalapuram
Binahamhalli
Hassanur
Mavallam
Devaranatham
Nagalur
Gundri
Kadambur
Mudiyanur
Kottadai
Uginiyam
Kakkarai
Talamalai
Mavanatham
Dhimbam
Bejalatti
Ramaranai
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 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
11°50'0"N
11°45'0"N
11°40'0"N
11°35'0"N
11°30'0"N
11°25'0"N

The entire Sathyamangalam Sanctuary area was declared as a Tiger Reserve excludingtribal settlements within forest areas, i.e., 1,40,924 ha. *Vide*Govt. Order (Ms). No.41Environment & Forests Dept. dated 15.3.2013.(Appendix 2)

1.1.4. Extent

The area of the Buffer Zone of Sathyamangalam Tiger Reserve is 61,491.21 ha.

The details of Core and Buffer in the notification as mentioned in Table 1.1.

Table 1.1: Details Reserve Forests under Buffer Zones of SathyamangalamTiger Reserve

Buffer Area	Area (ha)
1. Guthiyalathur RF (Part)	53656.47
2. Guthiyalathur Ext. RF	162.31
3. Talamalai RF	3,410.06
4. Talamalai Extension RF	1,240.63
5. Akkurjorai RF	383.64
6. Akkurjorai Extension RF	155.80
7. Berabetta RF	1,468.52
8. Ullepalayam RF	1,059.58
	61,537.01
Exclude forest settlement area (2 settlements)	(-) 45.800
	61,491.21

The status of entire land comprising the Buffer area is Reserve Forests which was declared under Sec. 16 of Tamil Nadu Forest Act, 1882 as early as 1896 (Map 3). There are totally 9 Reserve Forests, details of which are furnished in the in (Appendix 5)**.** Buffer Zone is formed by eight Reserve Forests blocks namely, Guthiyalathur (Part), Talamalai (Part), Guthiyalathur Extension, Talamalai Extension, Barabetta, Hullepalayam, Akkurjorai and Akkurjorai Extension.

There are two tribal settlements name: Vilankombai and Kembanur which are located within the Buffer zone of the Tiger Reserve.The extent of this tribal settlement is 45.800 ha of forest land comprising these 2 settlements was excluded from notification of Tiger Reserve. There are 7 tribal villages and 34 villages/hamletswithin the buffer zone as enclosures.

The buffer zone of 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 Core Zone of STR. Coimbatore Forest Divisions are on the Southern side, separated by the perennial River Moyar which runs along the Moyar Valley. The details of boundary are given Table 1.2.

Table 1.2 : Details of buffer zone boundary length with adjacent forest Areas.

Sl. No.	Name of the Adjoining Area	Boundary Length (in km)	Boundary
	Buffer Zone		
1	MM Hills Wildlife Sanctuary (earlier Kollegal Forest Division)	24.30	North to Tiger Reserve (Buffer Zone)
2	Coimbatore Forest Division	06.30	South to Tiger Reserve (Buffer Zone)
3	Erode Forest Division	32.00	East to Tiger Reserve (Buffer Zone)
	Total	**159.40 Km**	

Total Boundary Length	–	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

1.2 Approach & Access

The Sathyamangalam Tiger Reserve constitutes both core and buffer zone under the administrative control of Field Director Sathyamangalam Tiger Reserve. The STR is about 260 km from Bengaluru City, about 68 km from Coimbatore City and about 95 km from Udhagamandalam (Ooty) by road. A part of the Tiger Reserve is 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. The nearest township in the state of Karnataka is Chamraj Nagar about 78 km from Sathyamangalam town& 40 km from Hasanur.

1.3 Statement of Significance

The significant value of the Buffer Zone is categorized into the following aspects:

1.3.1. Landscape Importance

Sathyamangalam Tiger Reserve is located in the strategic confluence region of the Western Ghats and Eastern Ghats. An area of 1, 40,924 ha is declared as Tiger Reserve from erstwhile Wildlife Sanctuary with an area of 1, 41,161 ha. of which 61,491.21 hahas been declared as Buffer Zone of Tiger Reserve which is interspersed within core areas except the Reserve Forest patch in T. N. Palayam Range which completely under Buffer zone. The landscape value for buffer zone is same as described in management plan for core zone vide para 1.3.1.

This Buffer area also holds a significant population of prey base. The Buffer Zone also similar to other areas ofTiger reserve but for human dominance with more enclosures.North eastern part of the buffer zone part is identified as a potential corridor for tigers to aid dispersal of tigers to Cauvery wildlife sanctuary.

1.3.2. Biological richness of STR

The Sathyamangalam Tiger Reserve (STR) is biologically rich 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. Owing to its large contiguous forests and connectivity with adjoining PAs, this Tiger Reserve has rich species diversity, especially endangered species such as Tiger, Leopard, Wild dogs, Hyena, and Sloth bear, Elephant, Gaur, Sambar, and Blackbuck. The diversity of habitats supports rich assemblage of rare plants, invertebrates, fishes, amphibians, and reptiles. This reserve also harbours several species of wild relatives of cultivated plants including, Wild ginger, Turmeric, *Solanum*, and Mango that act as a gene pool for the cultivated plants. The buffer zone is also equally endowed with wildlife though tigers are less in number due to high anthropogenic disturbance.The leopard population in buffer is considerably good.

Honey badger (*Mellivora capensis*) captured in camera traps in the Germalam area and this is the first record in the Sathyamangalam Tiger Reserve; Smooth coated otter (*Lutrogale perspicillata*) was captured in *Maruthamara pallam* nearby Makkampalayam. Though the Otter distribution was already recorded in the area but in the camera traps this was the first capture in 2015.

Rusty Spotted Cat (*Prionailurus rubiginosus*) listed as vulnerable in the IUCN list was also captured in camera trap exercises in buffer. The near threatened species in the IUCN list Striped Hyena (*Hyaena hyaena*) was captured in camera traps the vicinity of Gunderipallam. The Four horned antelope was captured in camera traps in the south of Makkamplayam.

Camera trap images of few faunal species in Sathyamangalam Tiger Reserve

Tiger

Leopard

Willd Dog

Honey Badger

Rusty spotted cat

Leopard cat

Camera trap images of few faunal species in Sathyamangalam Tiger Reserve

Jackal

Hyena

1.3.3. Interface & Social and cultural Value

This is a unique Tiger Reserve where people co-exist with Tigers. The culture of the people are intrinsically linked with the forest areas. Buffer zone has two tribal settlements inside Reserve Forest and 7tribal enclave villages in the Buffer Zone of Tiger Reserve comprising 580 families among them. Apart from these another 34 hamlets are situated as enclave villages in the Buffer Zone Tiger Reserve landscape. This makes Buffer Zone ofTiger Reserve as one of the porous and human dominant landscape. About 27 places of worship are located in the Buffer Area. Most of them have got right of way to these temples as admitted in the notification of Reserve Forests. The tribal communities of Solagas, Uralis and Irulas co-exist with the forests surrounding their habitations and follow nature friendly livelihoods and lifestyles in terms of their social customs and cultures. These tribals depend on the forest resources to meet their bonafide consumptive use.

1.3.4. Economic value

The economic value of Sathyamangalam Tiger Reserve is given in detail in the Core Zone plan in para No. 1.3and the same holds good here. The economic value stands to be enhanced through proposed eco-tourism activities in buffer zone. The buffer zone also has great potential in enhancing employment generation of the communities through ecotourism.

1.3.5. Eco-system services value

Ecosystem services of STR as whole entity has been described in detail in the management plan for core zone. The buffer zone has great significance in providing a watershed role with numerous streams originating in the forests and feeding the Bhavanisagar Dam, Perumpallam dam and Gunderipallam which are major sources of irrigation.

1.4 Geology, Rock and Soil

1.4.1. Terrain

The tract can be distinctly divided into the following units owing to the geomorphologicdiversity

a) The North Coimbatore plateau
b) The slopes and the foothills

1.4.1.1. North Coimbatore Plateau

The Southern extension of the Mysore plateau constituted this block and contains the most valuable forests of this division. Running East to West for about 70 km with varying width of 15 to 20 km. and elevations of 800 m to 900 m, this plateau is bordered by series of hills on the South and plains of Vilamundy Reserve Forests.

This belt of high hills falls off eastwards and North-eastwards to meet the Palar and Cauvery basins Westwards and South-westwards to meet Moyar basin. Also, the hills culminate in numerous towering peaks; the highest being Kambatrayan (1698 m), situated in buffer zone of Sathyamangalam Range and has significant eco-tourism potential. In the ridge of the hills, there are few gaps which provide passage from the plains to the plateau.

A series of double, treble hill ranges, running South to North, start at right angles to the southern belt of hills and intersect the table land at intervals into a number of extensive valleys. The Yekkathur, Kadambur-Gundry (average 1000 m) plateau is a similar extension of Kottadai plateau towards the east.

The Yekkathur-Gundriplatueu is a more or less even and large expanse of land encompassing Arigium, Gundri, Makkampalayam and numerous other enclosures. At its eastern extremity, Palar runs and the Bargur plateau meets the Gundri plateau at this point.

Rock

The rock types of the Buffer area mainly belong to the great gneissic series of pre-Cambrian age. The common metamorphic derivatives found in the reserve are metamorphosed sedimentary rocks such as quartzite, hornblende, amphibolite, pyroxenite and Pyroxene. The rocks acquire reddish tinge (east of the reserve). Metamorphic igneous rock types such as biotic gneiss charnockites and granite gneiss have widespread occurrence. The charnockitesare 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.

Soil

The common soil types of the sanctuary are red soils, laterite soils, black cotton soils, and alluvial soils.

1.5 Hydrology and Water Sources

The average annual rainfall over a ten-year period is 824 mm for the Reserve. However, variation could be noticed from place to place within the Tiger reserve. The reserve lies in the rain-shadow region, and the bulk of rain fall is derived (70%) from the North East Monsoon during October and November. The period from January to April is usually dry, though occasional showers may occur. From May onwards, intermittent rains occur till August.

Climate is varied in relation to topography. The slopes and plains are subjected to hot and dry. 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 moderate.

1.5.1. Water Sources:

The plateau, in general has northerly aspect and is drained mainly by Palar. Most of the streams from the eastern half of the plateau drain into Palar, while the streams from West and South-west join Moyar. The Palar flows northwards along the common boundary of Sathyamangalam division (T.N.Palayam Range) and Erode Division, (Bargur Range) and hence along the northern boundary of Burgur Range to join Cauvery. During hot weather, the bed of the river dries up leaving only a few stagnant pools of water in sheltered spots, creating water stress to grazing cattle and wildlife. Whereas, the Moyar is a perennial stream flowing into Bhavani, forming the Southern boundary of the Bhavanisagar Range. The perenniality of stream flow in Moyar is mainly due to streams from Nilgiris and the water is generally clear and cool. The central and north-west part of the plateau drains towards Mysore whereas the Southern outer slopes of the plateau are drained by numerous torrents, which flow during the rain and fall into Bhavani river.

Table 1.3: Time series data of rainfall by seasons (Last 10 years)

Sl. No.	Year	South West Monsoon		North East Monsoon		Winter Season		Hot Weather Season		Total		Deviation of Percentage
		Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual	
1.	1998-99	183.4	289.7	307.6	323.7	21.5	0.0	147.6	151.6	660.1	765.1	15.9
2.	1999-00	183.4	99.8	307.6	493.8	21.5	39.7	147.6	81.9	660.1	715.2	8.3
3.	2000-01	183.4	308.6	307.6	243.3	21.5	17.48	147.6	117.7	660.1	687.08	4.1
4.	2001-02	183.4	160.3	307.6	294.1	21.5	2.1	147.6	81.2	660.1	537.7	-18.5
5.	2002-03	183.4	113.9	307.6	317.4	21.5	2.1	147.6	134.8	660.1	568.2	-13.9
6.	2003-04	213.1	136.1	323.5	347.2	20.7	1.8	154.1	326.7	711.4	811.8	14.11
7.	2004-05	213.1	203.1	323.5	290	20.7	31.6	154.1	274.9	711.4	799.6	12.4
8.	2005-06	213.1	244.4	323.5	640.2	20.7	7.9	154.1	129.5	711.4	1022	43.7
9.	2006-07	213.1	174.5	323.5	386.2	20.7	0.6	154.1	66.4	711.4	627.7	-11.8
10.	2007-08	213.1	203.9	323.5	446.7	20.7	27.0	154.1	215.9	711.4	893.5	25.6
11.	2008-09	213.1	204.3	323.5	448.7	21.3	21.0	154.1	213.4	710.6	887.7	24.3
12.	2009-10	213.1	209.3	323.5	324.5	21.3	0.7	154.1	153.3	710.6	710.6	-0.3
13.	2010-11	250.6	305.3	331.8	495.4	16.1	9.9	142.4	59.6	740.9	1037.8	40.1
14.	2011-12	228.0	229.8	409.0	314.6	1.0	16.1	124.6	142.4	762.6	702.9	8.5
15.	2012-13	229.8	185.0	314.6	234.3	16.1	33.1	142.4	81.8	702.9	534.2	-24.0
16.	2013-14	229.8	233.1	314.6	210.0	16.1	0.0	142.4	80.8	702.9	523.9	-25.47
17.	2014-15	229.8	287.3	314.6	330.0	16.1	4.8	142.4	222.6	702.9	844.7	20.2

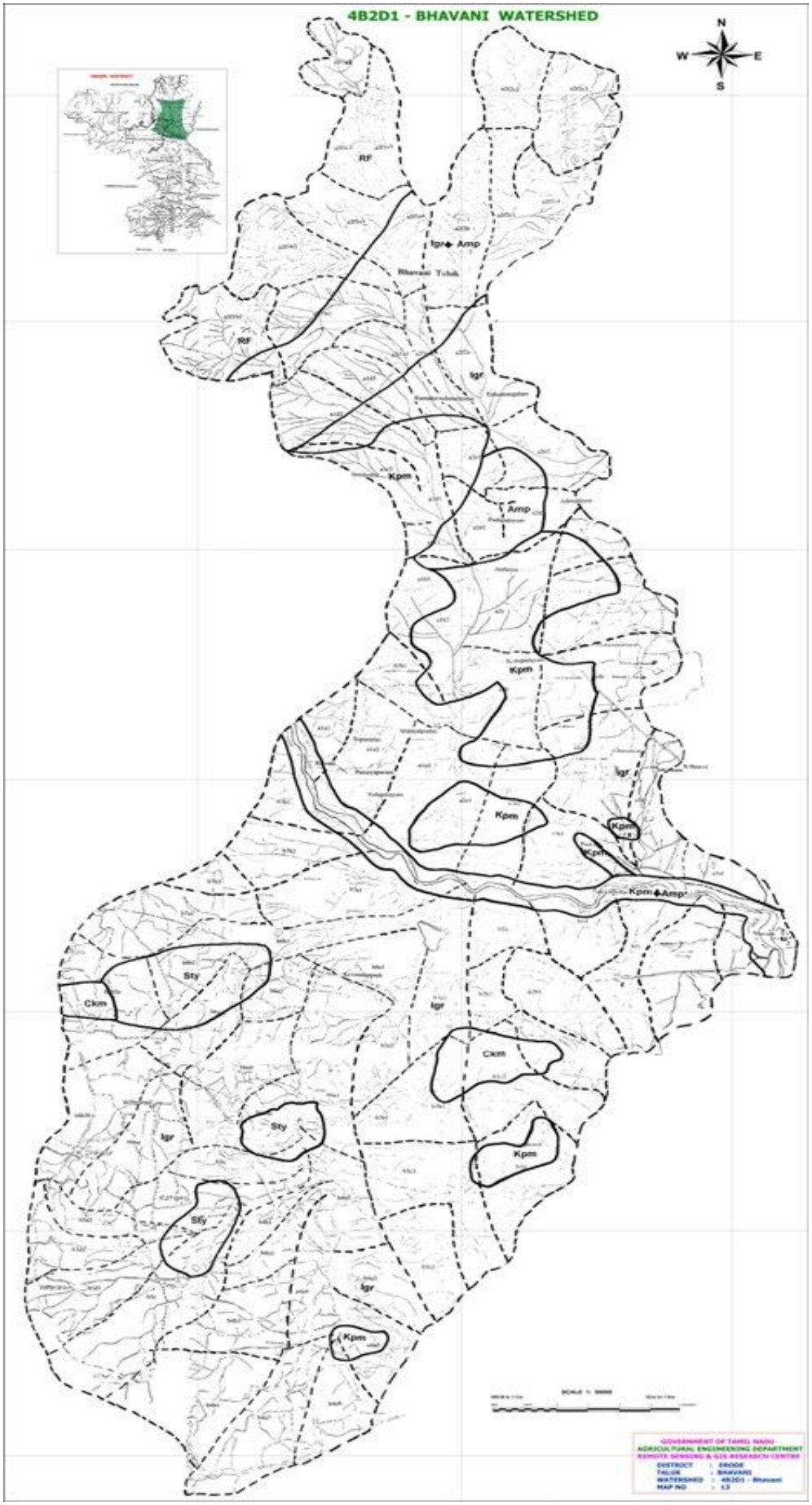
(Source: District Bulletin, 2015)

The Sathyamangalam and T.N.Palayam Range, are drained by numerous small streams joining into two big streams called Johimaduvu and Haleru-halla. The Johimaduvu is a tributary of Malleruhalla which in turn falls into Palar.

River Bhavani originates from Western catchments of Nilgiri Mountain, running through Kerala and again enters into Tamil Nadu. This river runs through Coimbatore Forest Division and enters into Bhavanisagar Range till it reaches Bhavanisagar Dam site. Most of small rivers streams and rivulets that originate and drain from the RF areas of Bhavanisagar, Sathyamangalam and T. N. Palayam join the River Bhavani throughout its length up to Bhavani - Kooduthurai. This is one of the major sources of drinking water to animals, especially Elephants and other wildlife.

Doddahalla, Kansaguripallam, Kukututahalla, Arekadavuhalla, Karamadaihalla, Devarhalla, Kalkombaihalla, Thanvaraipallam, Tattahalla, Jodumathihalla, Hileruhalla, Sagarhalla, Kallakovaihalla, Bellanathurhalla, Minmattuhalla, Kilathuhalla, Chenikadavanhalla, Mathimaraodai, Nellivarambuodai, Periyajorai, Chikkujorai are some of the minor streams.

AsaganKuttai,Mallagoundankuttai, Doddamudugaraikuttai, KakkaraiKuttai, LakkadarKuttai, ChatrakaraiKuttai, AlamarathuKuttai, KumbeswaraKuttai, AmmalakaraiKuttai, JoganallaKuttai, ThavaraKaraiKuttai, PeriyaKuttai, SiddeswaranKuttai, KemparaiKuttai, PalakaraduKuttai, KathirikombaiKuttai, Lakkepallamkuttai, Kumarimaduvu are the percolation ponds located within the buffer zone and are a significant wildlife drinking water source.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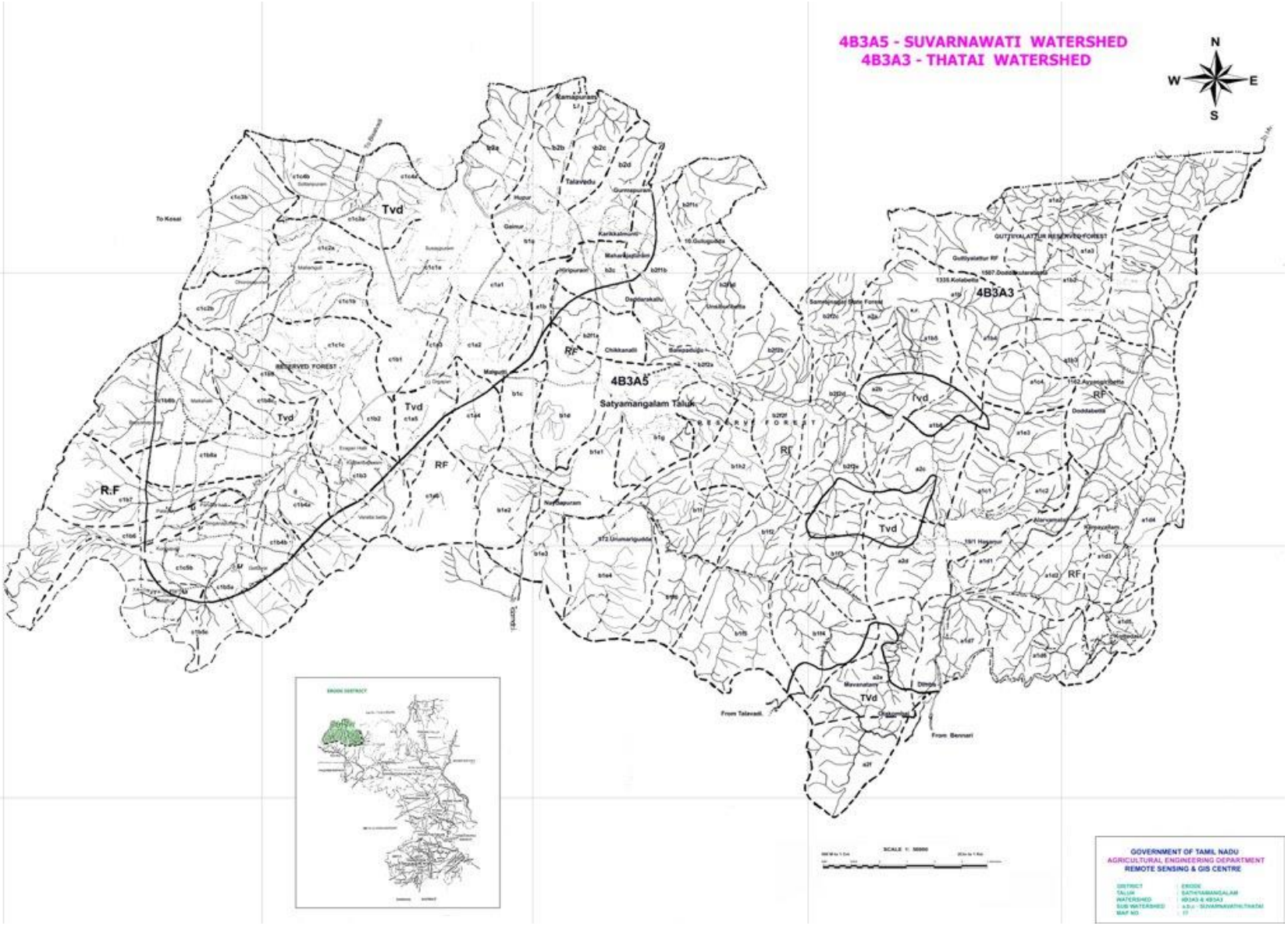
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4B3A3 - THATAI WATERSHED
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AGRICULTURAL ENGINEERING DEPARTMENT
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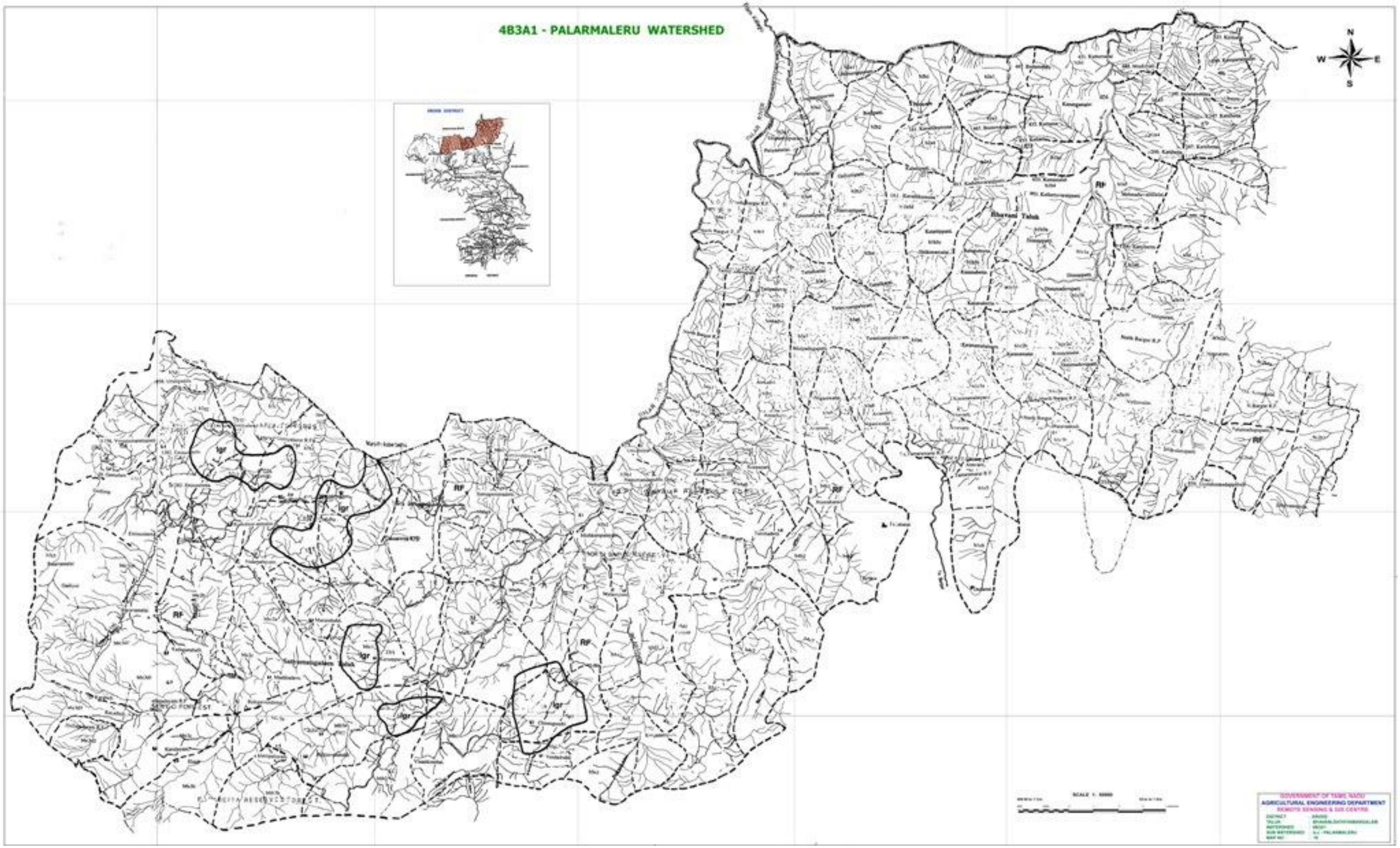
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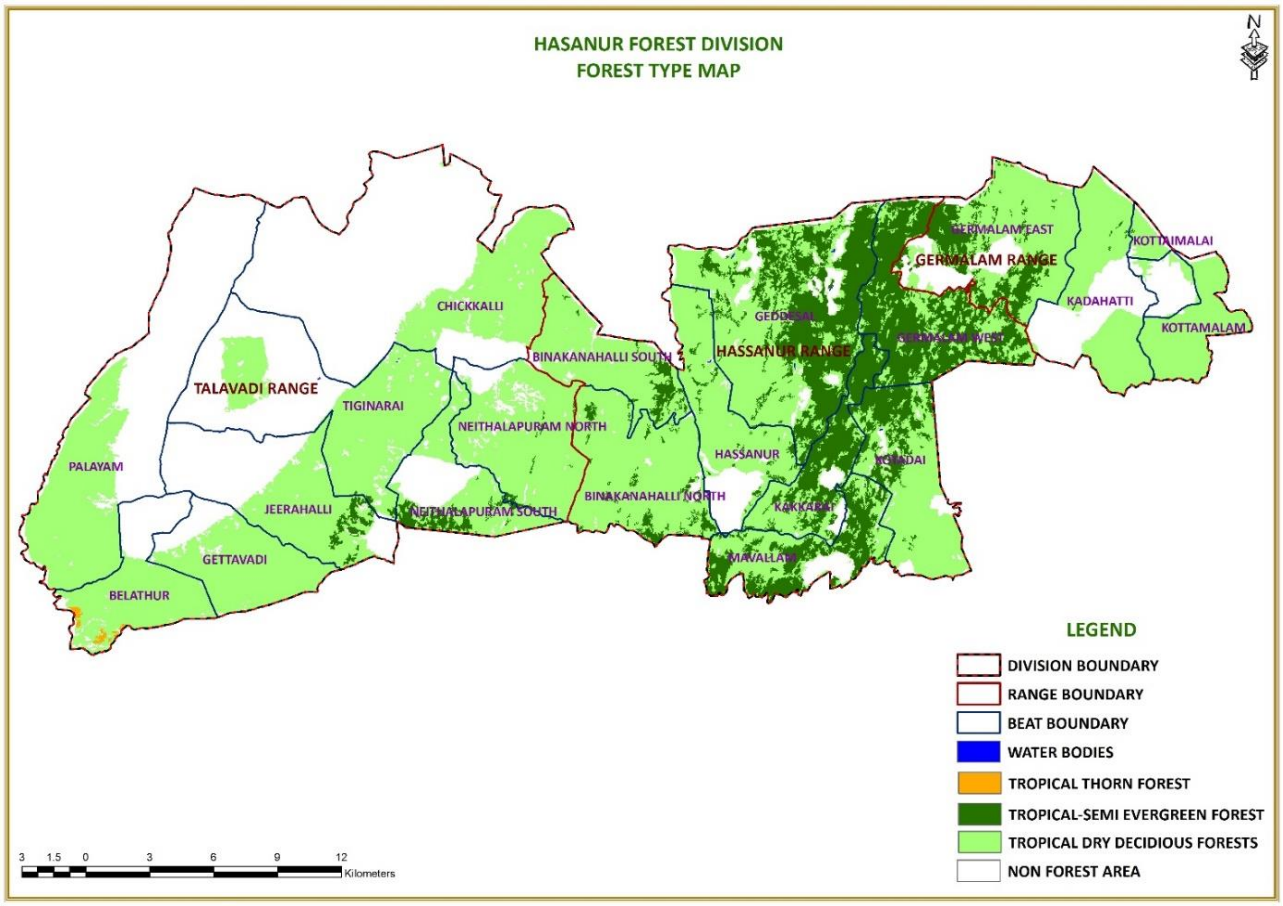
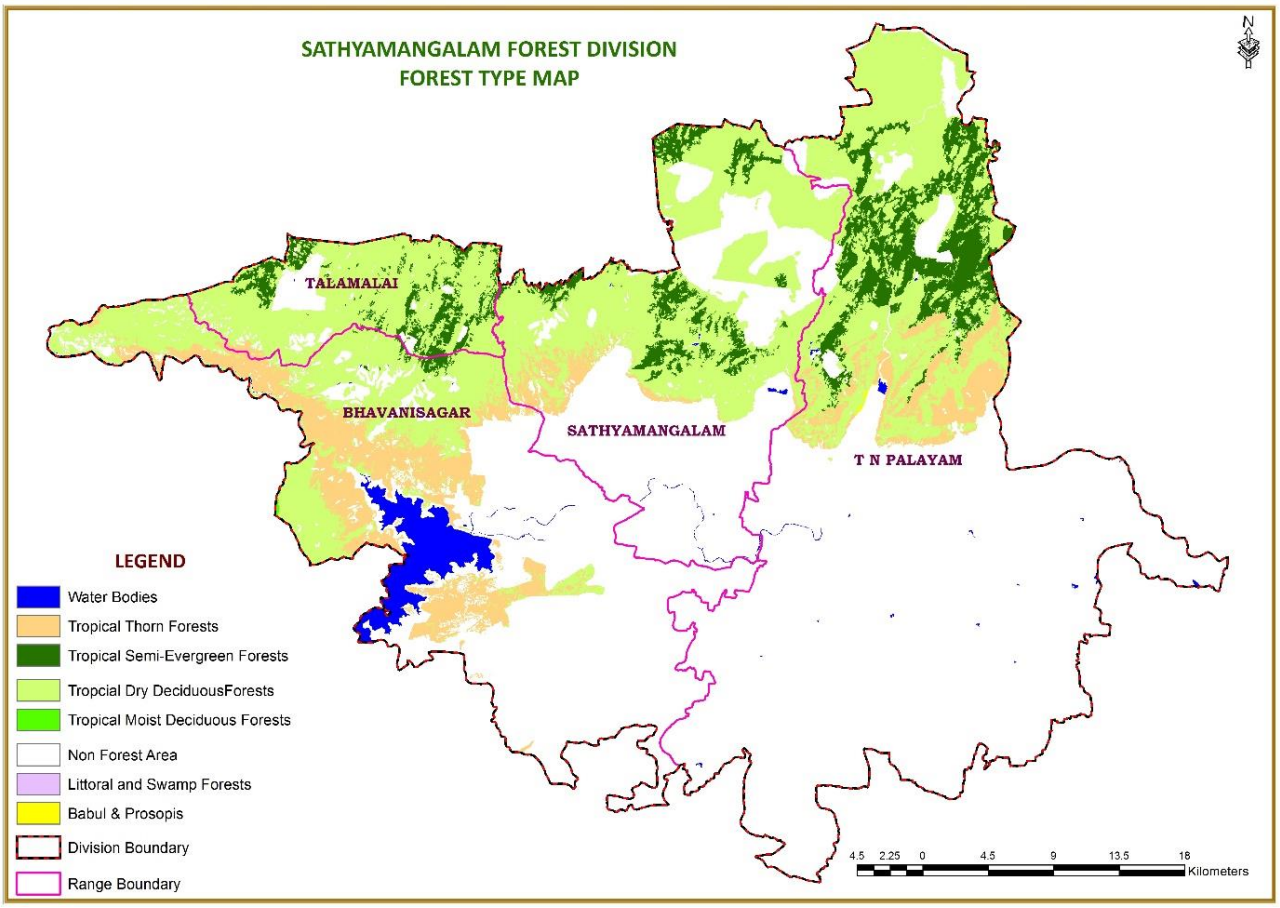
1.6 Vegetation Types

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 Buffer area are classified as per Champion & Seth 1968.

1. Southern Tropical Dry Thorn Forest (6 A /C1)
2. Southern Tropical Dry Mixed Deciduous Forest (5A/C3)





1.6.1. Southern Tropical Dry Thorn Forest

This forest type is prevalent in plains and the foot hills of all along the buffer zone.

Image 1.1: Dry Thorn forests in the Lower Plains

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 tree growth of the Top canopy and second storey are,

Top Canopy

Sl.No.	Name of Species	Family
1	*Acacia ferruginea*	Leguminoceae
2	*Acacia leucophloea*	Mimosoideae
3	*Albizia amara*	Leguminoceae
4	*Azadirachta indica*	Meliaceae
5	*Canthium dicocum*	Rubiaceae
6	*Chloroxylon swietenia*	Meliaceae
7	*Gyrocarpus jacquini*	Hernandiaceae
8	*Moringa cancanensis*	Moringaceae
9	*Protium caudatum*	Proteaceae
10	*Santalum album*	Santalaceae
11	*Tamarindus indica*	Leguminoceae

Second Storey

Sl.No.	Name of Species	Family
1.	*Acacia latronum*	Leguminoceae
2.	*Acacia sundra*	Mimosoideae
3.	*Balsamodendronberryi*	Bursaraceae
4.	*Bauhinia racemosa*	Caesalpanoideae
5.	*Dichrostachys cinerarea*	Mimosoideae
6.	*Erythroxylon monogynum*	Malpighiaceae
7.	*Wrightia tinctoria*	Apocynaceae

Shrubs

Sl.No.	Name of Species	Family
1	*Calotropis procera*	Asclepiadaceae
2	*Capparis sepiaria*	Capparidaceae
3	*Carissa carandas*	Apocynaceae
4	*Cassia auriculata*	Caesalpinoideae
5	*Grewia hirsuta*	Tiliaceae
6	*Jasminum rigidum*	Oleaceae
7	*Opuntia dillenii*	Cactaceae

8	*Randia dumetorum*	Rubiaceae
9	*Securinea leucopyrus*	
10	*Solanum rubescens*	Solanaceae
11	*Ziziphus spp.*	Rhamnaceae

Herbs

Sl.No.	Name of Species	Family
1.	*Indigofera tinctoria*	Leguminoceae
2.	*Leucas aspera*	Labiatae
3.	*Oscimum canum*	Labiatae
4.	*Tephrosia purpurea*	Leguminoceae

Climbers

Sl.No.	Name of Species	Family
1	*Abruspre catorius*	Leguminoceae
2	*Acacia intsia*	Leguminoceae
3	*Acacia pennata*	Leguminoceae
4	*Combretum ovalifolium*	Combretaceae
5	*Derris scandens*	Leguminoceae
6	*Maerua arenaria*	Capparidaceae
7	*Pterolobium indicum*	Caesalpinoideae
8	*Sarcostemna brevistigma*	Asclepiadaceae

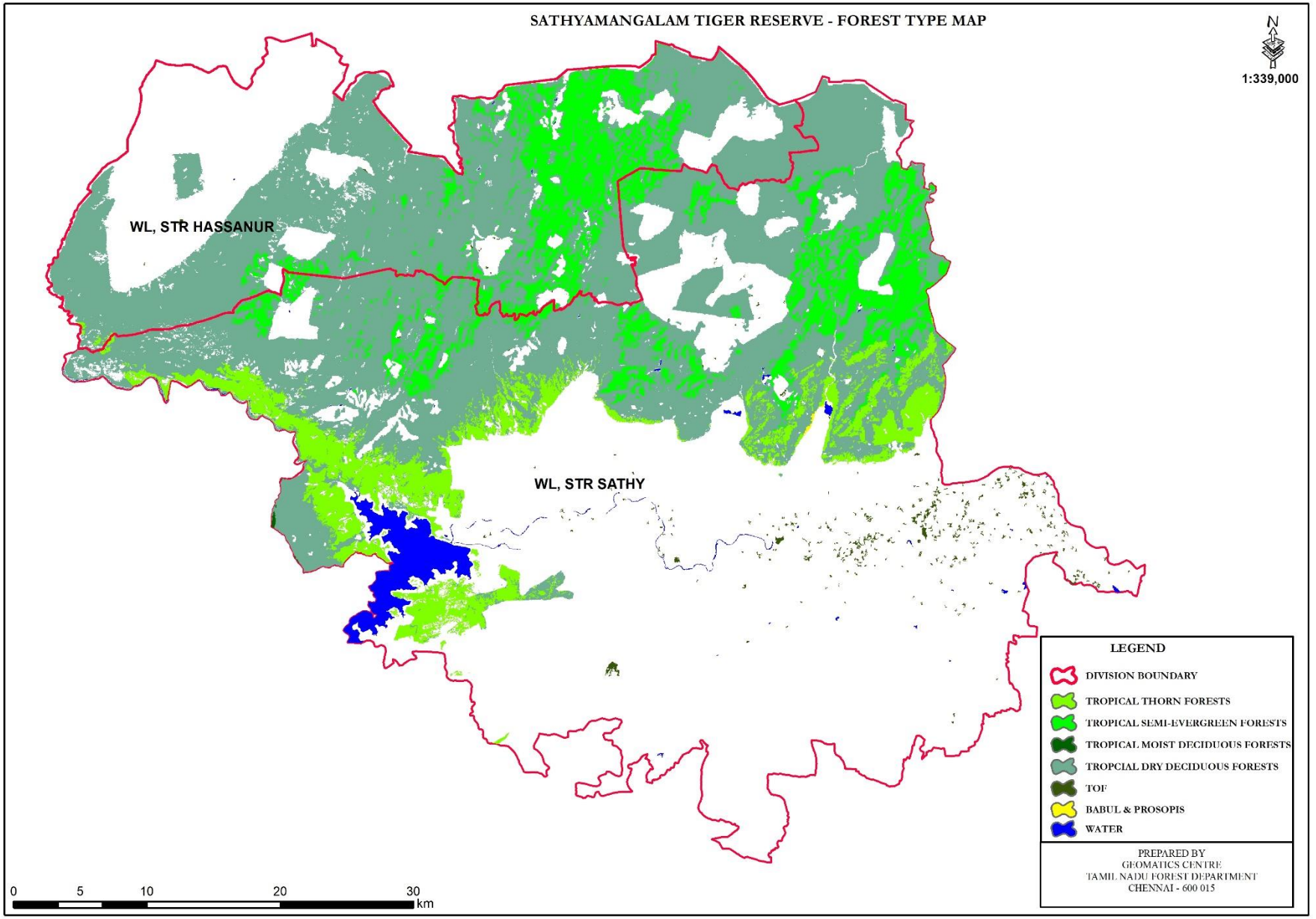
Occurrence of sandal trees is quite sparse. Even among the sandal tree population, it is seen that most of them are quite immature with hardly any heartwood. Presence of *Anogeissus latifolia* and *Soymidafe brifuga* in this forest type indicates merging of this type of forest with deciduous forest type.

Degradation stages

Ecological succession has either been arrested or reversed, near villages owing to indiscriminate felling, heavy grazing and fire. The following degraded stages are commonly seen.

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

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


SATHYAMANGALAM TIGER RESERVE - FOREST TYPE MAP
N
1:339,000
WL, STR HASSANUR
WL, STR SATHY
LEGEND
DIVISION BOUNDARY
TROPICAL THORN FORESTS
TROPICAL SEMI-EVERGREEN FORESTS
TROPICAL MOIST DECIDUOUS FORESTS
TROPCIAL DRY DECIDUOUS FORESTS
TOF
BABUL & PROSOPIS
WATER
PREPARED BY
GEOMATICS CENTRE
TAMIL NADU FOREST DEPARTMENT
CHENNAI - 600 015
0 5 10 20 30
km

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

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

This is the most common forest climax type met within the buffer zone of the tiger reserve. This type of forest occurs almost in the entire plateau, with slight variations in the component of species dueto edaphic and climatic factors. The terrain is flat and undulating and at elevation ranges between 700 – 1,200 m. The rainfall varies from 800 – 1,500 mm. The outer slopes and peripheral belt of the plateau are regularly ravaged by fires and show a different composition.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*.

The floristic of the dry mixed deciduous forests are

Top Canopy

Sl.No.	Name of Species	Family
1.	*Acacia leucophloea*	Mimosoideae
2.	*Anogeissus latifolia*	Combretaceae
3.	*Canthium dicoccum*	Rubiaceae
4.	*Cedrelami crocarpua*	Moliaceae
5.	*Chloroxylon swietenia*	Meliaceae
6.	*Dalbergia paniculata*	Leguminoceae
7.	*Feroni alimonia*	Rutaceae
8.	*Gmelina arborea*	Verbanaceae
9.	*Mallotus philippensis*	Euphorbiaceae
10.	*Miliusa tomentosa*	Annonaceae
11.	*Mimuso pselengi*	Sapotaceae
12.	*Mitragyna parvifolia*	Rubiaceae
13.	*Pterocarpus marsupium*	Leguminosaeae
14.	*Santalum album*	Santalaceae
15.	*Shorea talura*	Dipterocarpaceae
16.	*Tectona grandis*	Verbnaceae

Sl.No.	Name of Species	Family
17.	*Terminalia chebula*	Combretaceae
18.	*Ziziphus xylopyrus*	Rhamnaceae

Middle Storey

Sl.No.	Name of Species	Family
1	*Atalantia monophylla*	Rutaceae
2	*Bauhinia racemosa*	Leguminoseae
3	*Buchanania lanzan*	Anacardiaceae
4	*Butea monosperma*	*Leguminoseae*
5	*Careya arborea*	Melastyomaceae
6	*Cassia fistula*	Leguminoceae
7	*Cochlospermum gossypium*	Bixaceae
8	*Cordia dichotoma*	Boraginaceae
9	*Dendrocalamus strictus*	Gramineae
10	*Diospyros melanoxylon*	Ebenaceae
11	*Dolichandron efalcata*	*Bignoniaceae*
12	*Emblica officinalis*	Euphorbiaceae
13	*Erythroxylon monogynum*	*Linaceae*
14	*Eugenia dalbergioides*	Leguminoseae
15	*Gardenia gummifera*	*Rubiaceae*
16	*Grewia tiliaefolia*	Tiliaceae
17	*Ixora arborea*	Rutaceae
18	*Lawsonia aculeata*	*Lythraceae*
19	*Limonia acidissima*	Rutaceae
20	*Linociera ramiflora*	Rutaceae
21	*Pittosporum floribundum*	*Pittosporaceae*
22	*Premna tomentosa*	*Verbenaceae*
23	*Schleichera oleosa*	Sapindaceae
24	*Semecarpus anacardium*	Anacardiaceae
25	*Stereospermum chelonoides*	*Bignoniaceae*
26	*Vitexal tissima*	Verbenaceae
27	*Wrightia tinctoria*	Apocynaceae

Shrubs

Sl.No.	Name of Species	Family
1	*Acalypha fruticosa*	Euphorbiaceae
2	*Argyreia cuneata*	Convulvulaceae
3	*Capparis grandis*	Capparidaceae
4	*Capparis grandiflora*	Capparidaceae
5	*Carissa carandas*	Apocynaceae
6	*Cassia spp.*	Leguminoceae
7	*Cipadessa baccifera*	Meliaceae
8	*Desmodium motorium*	Leguminoceae
9	*Gardenia lucida*	Rubiaceae
10	*Grewia hirsuta*	Tilliaceae
11	*Gymnosporia montana*	Celastraceae
12	*Indigofera pulchella*	Leguminoceae
13	*Jatropha curcas*	Euphorbiaceae
14	*Melanthesa turbinata*	Euphorbiaceae
15	*Notonia grandiflora*	Compositeaea
16	*Osyris arborea*	Santalaceae
17	*Randia dumetorum*	Rubiaceae
18	*Santia venulosa*	Rhamnaceae(Rubiaceae)
19	*Solanum giganteum*	Solanaceae
20	*Todalia asiatica*	Rutaceae
21	*Webera corymbosa*	Rubiaceae

Herbs

Sl.No.	Name of Species	Family
1	*Croton bonplandianum*	Euphorbiaceae
2	*Leucas lantana*	Labitatae
3	*Plumbago zeylanica*	Plumbaginaceae
4	*Sida acuta*	Malvaceae
5	*Stachytarpheta indica*	Verbenaceae
6	*Tridax procumbens*	Compositae

Grasses

Sl.No.	Name of Species	Family

1	*Aristida spp*	Graminaceae
2	*Heteropogon contortus*	Graminaceae
3	*Cymbopogon flexuous*	Graminaceae
4	*Themeda quadrivalvis*	Graminaceae

Climbers

Sl.No.	Name of Species	Family
1	*Acacia pennata*	Leguminoceae
2	*Capparis zeylanica*	Capparidaceae
3	*Cocculus hirsutus*	Memispermanceae
4	*Derris scandens*	Leguminoceae
5	*Jasminum angustifolia*	Oleaceae
6	*Loranthus longiflorus*	Loranthaceae
7	*Passiflora foetida*	Passifloraceae
8	*Pterolobium indicum*	Leguminoceae
9	*Thumbergia fragrans*	Acanthacee
10	*Ventilago madaraspatana*	Rhamnaceae
11	*Viscum angulatum*	Loranthaceae

Degradation stages

Excessive grazing, frequent fires, illicit felling has caused degradation to the forest types. The following degradation stages can be distinguished in the main types of forests.

a) Dry deciduous scrubs (DS1)
b) Dry savannah forests (DS2)
c) Euphorbia scrub type (DS3)

1.6.2.1. 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.

1.6.2.2. 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*

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

The occurrence of this type is confined to hill tops in T. N. Palayam Range.

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. *Cyrotococum trigonum*, *Desmodium* species, *Centella* species and *Strobilanthes heyneanus* occur abundantly as ground vegetation and they together form a green carpet. *Eugenia* (*Syzigium*) is the characteristic genus with associates from Lauraceae and Melastomaceae.

Image1.2: Tropical Hill Forests

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

The floristics of the sub-tropical hill forest are:

I) *Syzigium cumini*(vf), Glochidion neilgherrense (f), Meliosma wightii(f), Elaeocarpus serratus (f), M. arnottiana (f), Mallotu salbus (c), M. simplicifolia (c), Machilus macarantha (c) , Symploco slaurina (c) , Mallotus philippinensis*

(c), Sterculia guttata (o) , Heptapleurum racemosum (o) , Salix ichnostachya (o).

II) *Ixorano toniana (vf), Cinnamomum wightii (vf), Vibernum acuminatum (vf), Macaranga peltata (f), Vernonia monosis (f), Sideroxylon tomentosum (c), Pittosporum floribundum (c), Meliosmami crocarpa (c), Litseadec canensis (c) Trema orientalis (c), Calycopteris floribunda (o).*

III) *Mahoniale schenaultii (a), Strobilanthes species (a), Eupatorium glandulosum (a), Maesaperr tottetiana (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) Cyrtococcumt rigonum.*

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

Epiphytes:

Oberoni abrauoniana , Dendrobium macrostachyum , Bulbophyllum species, Eria species , Aerides cylindricum , Diplocentrum recurvum , Saccalobium species , Hoya pauciflora.

1.6.4. Dry Tropical Riverine Forest (5 / ISI)

This forest type occurs in the buffer zone area comprising the Moyar river. 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.

Top Canopy

Sl.No.	Name of Species	Family
1	*Bassia latifolia*	Sapotaceae
2	*Bischofia javanica*	Euphorbiaceae
3	*Diospyrus montana*	Ebenaceae
4	*Filicium decipiens*	Sapindaceae
5	*Machilusma crantha*	Lauraceae
6	*Mangifera indica*	Anacardiaceae
7	*Manilkara roxburghiana*	Ebenaceae
8	*Mitragyna parvifolia*	Rubiaceae

Sl.No.	Name of Species	Family
9	*Pongamia pinnata*	Leguminoceae
10	Sizygium cuminii	Myrtaceae
11	*Tamarindus indica*	Leguminosae
12	*Terminalia arjuna*	Combretaceae
13	*Terminalia bellerica*	Combretaceae

Middle Storey

Sl.No.	Name of Species	Family
1	*Strychnos spp*	Leguminoceae
2	*Bambusa arundinaceae*	Graminae
3	*Elaeoden dronglaucum*	Celastraceae
4	*Mallotus philippinensis*	Euphorbiaceae
5	*Oleagla ndulifera*	Oleaceae
6	*Vitex peduncularis*	Verbenaceae

Shrubs

Sl.No.	Name of Species	Family
1	*Arundo donax*	Gramineae
2	*Carissa carandas*	Apocynaceae
3	*Celtiscinn amomea*	Ulmaceae
4	*Clerodendron spp*	Verbenanceae
5	*Ipomea spp*	Convolvulaceae
6	*Lantana camara*	Verbanaceae
7	*Toddalia asiatica*	Rutaceae
8	*Vitex negundo*	Verbenaceae
9	*Webra corymbosa*	Rubiaceae

Herbs

Sl.No.	Name of Species	Family
1	*Polygonum barbatum*	Polygonnaceae

Climbers

Sl.No.	Name of Species	Family
1	*Combretum ovalifolium*	Combretaceae
2	*Dioscorea bulbifera*	Dioscoraceae
3	*Hiptage bengalensis*	Malpighiaceae

Sl.No.	Name of Species	Family
4	*Jasminum angustifolium*	Oleaceae
5	*Jasminum sambae*	Oleaceae
6	*Ventilago madarsapatana*	Rhamnaceae

1.7 Wild Fauna and Habitats

Wild Fauna of the Buffer Zone of Sathyamangalam Tiger Reserve is same as described in the Core Zone. The Reserve is blessed with rich variety of wildlife. Sathyamangalam forests are known for Elephants. There are about 800 -1000 Elephants in the whole of Sathyamangalam forests. 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, Elephants, Gaur, Black Buck, Four Horned Antelope, Hyena, Sloth bear, Mugger Crocodile and White Backed Vulture.

Table 1.3: List of Major Fauna in the Sathyamangalam Tiger Reserve

Sl.No	Species	Habitats	Location in Buffer Zone	Conservation Status (IUCN)
1	Tiger	Mostly dense wooded deciduous forest tracts and valleys	Bannari beat, Kothamangalam beat, Makkampalayam beat, Vadavalli beat, Bungalow pudur beat, Kanakkampalayam beat, Vilankombai beat, Gundri beat.	Threatened - Endangered
2	Leopard	Open forested areas and scrub patches	In all beats of buffer zone	Threatened - Vulnerable
3	Wild dogs	Scrub to dry deciduous and grass lands	Bannari beat, Vadavalli beat, Kanakkampalayam beat, Bungalow pudur beat, Kothamangalam beat.	Threatened - Endangered
4	Striped Hyena	Open forests	Vilankombai beat, Kothamangalam beat, Bannari beat.	Near Threatened

Sl.No	Species	Habitats	Location in Buffer Zone	Conservation Status (IUCN)
5	Jackal	Open forests and scrub habitats	Not available	Least Concerned
6	Sloth Bear	Dry deciduous to moist deciduous including open jungle	Widely distributed.	Threatened - Vulnerable
7	Elephants	Dry deciduous to ever green forests	Widely distributed.	Threatened - Endangered
8	Gaur	Mostly grass land dominated deciduous forests	Bannari beat, Kothamangalam beat, Makkampalayam beat, Vadavalli beat, Bungalowpudur beat, Kanakkampalayam beat, Vilankombai beat, Gundri beat.	Threatened - Vulnerable
9	Sambar	Wooded forests of mixed vegetation	Bannari beat, Kothamangalambeat, Vadavalli beat, Gundri beat.	Threatened - Vulnerable
10	Chital	Open forests and grass lands including deciduous tracts	Widely distributed	Least Concerned
12	Blackbuck	Open scrub forest	Kothamangalam beat	Near Threatened
13	Four-horned Antelope	Open scrub forest and deciduous forests	Kothamangalam beat.	Threatened - Vulnerable

1.8 Major Conspicuous Changes in the Habitat since Inception

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.

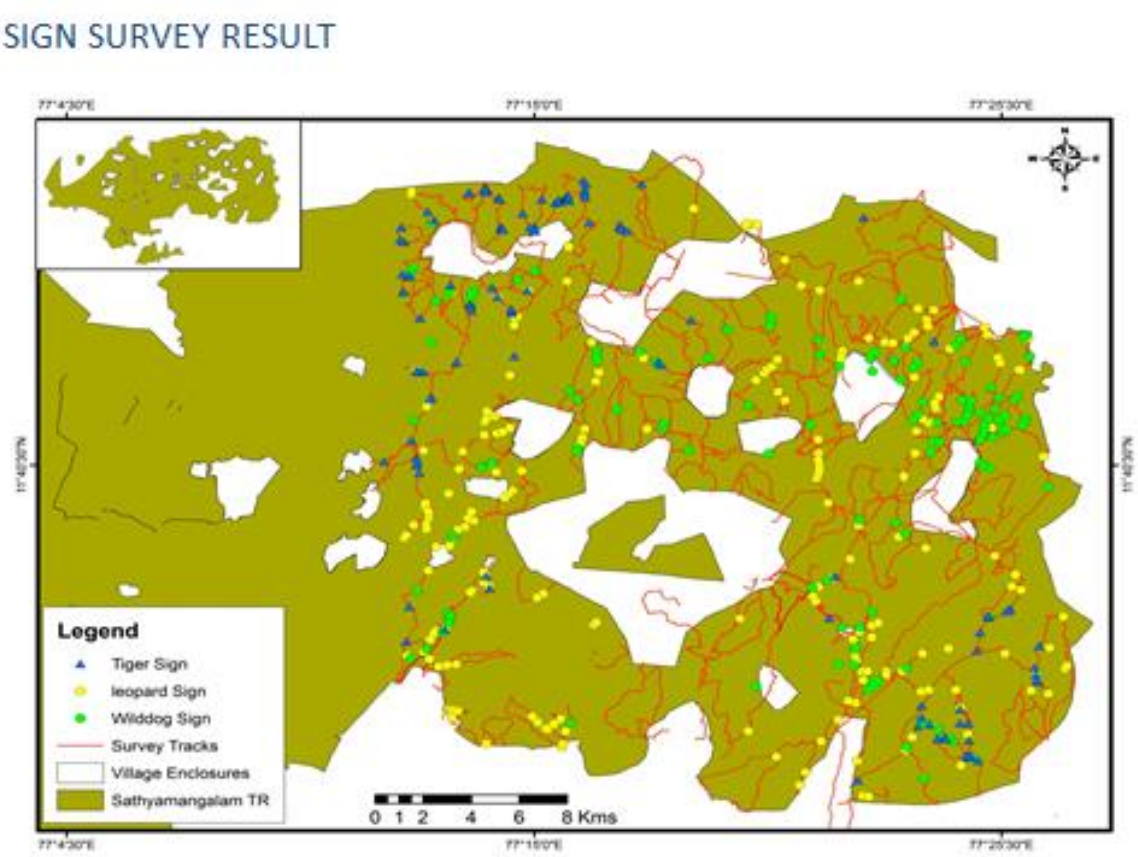
A detailed discussion on this factor has been made in para no. 2.5 of Core zone plan and the same is applicable for buffer zone also.

Chapter. 2. Status of Tiger and Co-Predators

2.1 Distribution

The Buffer Zone of Sathyamangalam Tiger Reserve is 61,491.21 ha and its varying landscape and vegetation is a good habitat for Tigers and its prey base. Variety of vegetation types, natural corridors, perennial water sources, niche habitats (dens and caves) and rivers. However, being a human dominant landscape, the population of Tiger is very low in buffer zone compared to core zone its habitat suitability. At present only 5-10 tigers are reported in the buffer zone of the park .The Bhavanisagar dam back water areas of the Buffer part of the Bhavanisagar Range and Kattubannari, Karikalmokkai buffer part of the Sathyamangalam Range are having huge potential in holding Tiger populations.

Map showing the Sign Survey tacks and large carnivore presence in Buffer Zone



The buffer zone holds a very healthy Leopard population and about 45 leopards have been recorded here as per 2015 census.

The distribution of wild dogs is almost similar to Leopard and sightings are common in Moyar Valley and Bannari Plains and Ekkathur, Kadambur-Gundry Plateau.

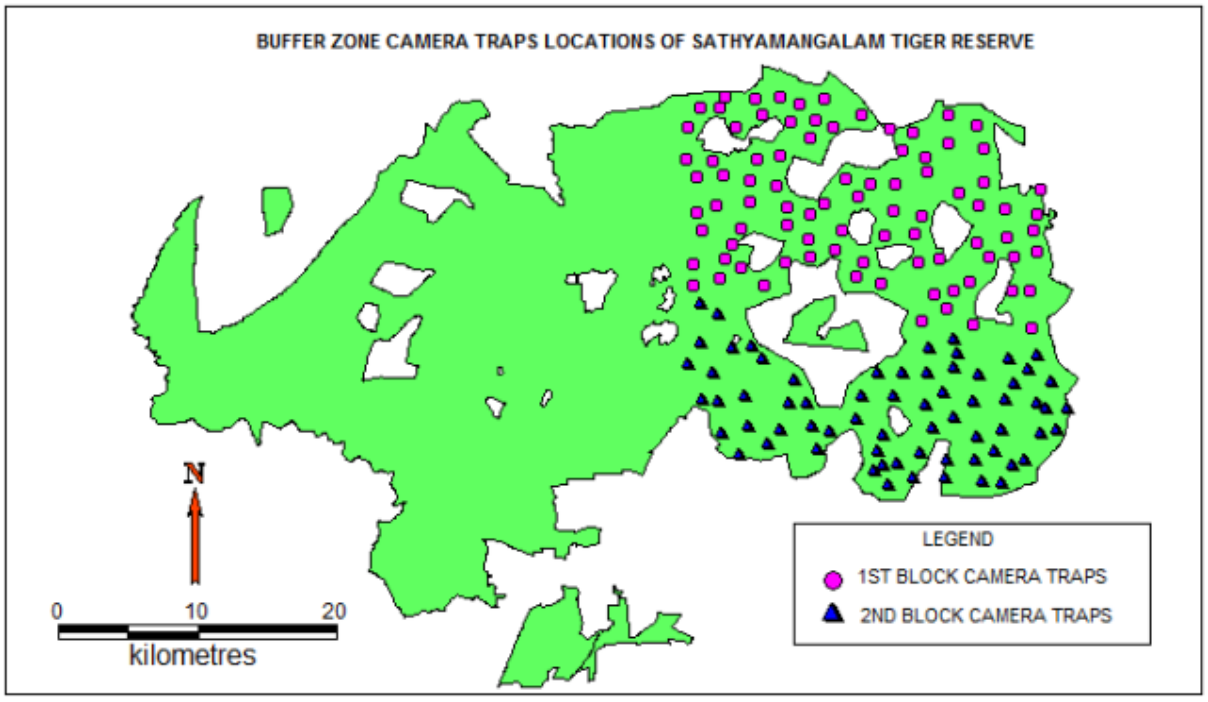
2.2 Abundance Status

Tiger Occupancy

In 2015, camera trap study was conducted in the Buffer Zone of the Tiger Reserve by STR and WWF. About 596 km^2 of Buffer Zone, leaving Kothamangalam beat of Moyar Valley and Bannari plains and Akkurjorai RF, were studied by WWF – India for Tiger occupancy by camera trap method.

In October 2015, 153 pairs of camera traps were placed in 149 grids in buffer. Based on the availability of camera traps and betterment of monitoring camera traps; the study area was divided into two blocks. Each blocks had respectively 86 and 67 pairs of camera traps respectively placed during the five-month study periods from June to October 2015.

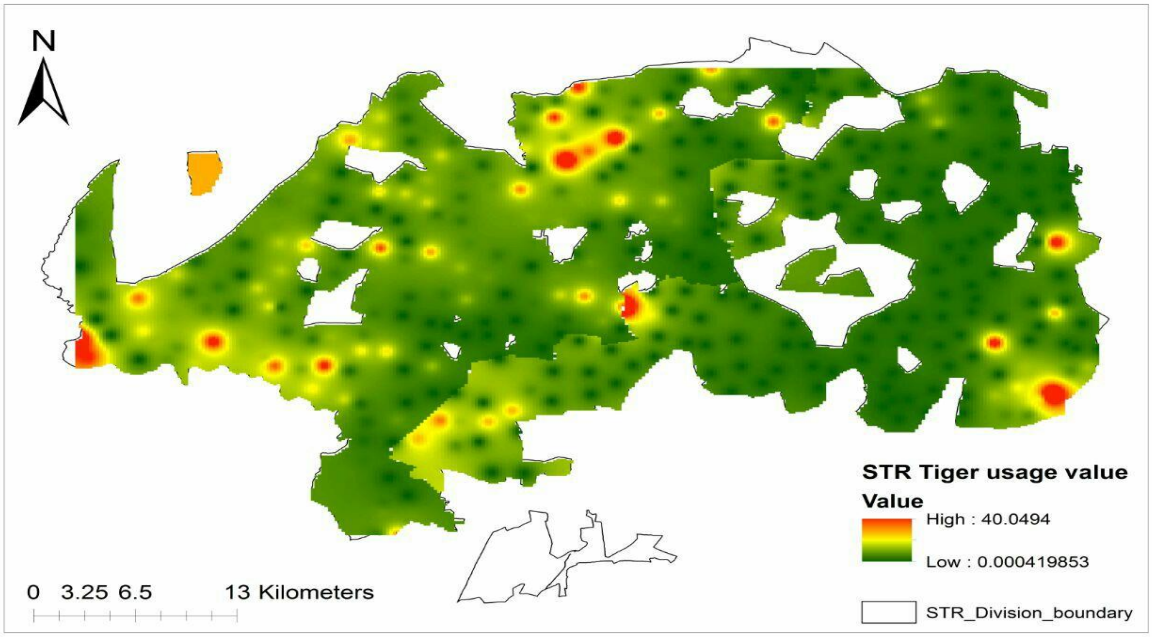
Map shows the camera trap locations in the Buffer Zone in 2015



10 adult Tigers along with 1 cub and 45 individually identified leopards along with 3 cubshave been captured in the buffer area as per 2015 camera trapping exercises.

As such the density of tigers in buffer is 1.6/100sqkm and leopards are 7.3 /100 sq.km.

Map showing tiger occupancy in Sathyamangalam Tiger Reserve



Leopards are a widely distributed predator in the Sathyamangalam Tiger Reserve. Often sightings are recorded in closer proximity to human settlements, possibly for preying on domesticated animals. Based on the Camera Trap studies conducted in the Yekkathur - Kadambur - Gundri Plateau, 45 leopards along with three cubs were individually identified in that area, and is an indication of the good prey base in buffer zone. Leopards are obviously able to inhabit the highly human dominated buffer zone

The Hyena population is very low in buffer and it is almost locally extinct however a camera trap image of hyena was captured in Gunderipallam.

There is insufficient field data on the occupancy patterns of wild dogs in buffer zone.

2.3 Prey-Predator Relationships

In the year 2014, prey base estimation was done for the entire Tiger Reserve, (including Buffer Zone) and the details are shown in Table 2.1.

*Table 2.1: Prey base Density of Sathyamangalam Tiger Reserve (Phase IV Monitoring – 2014)**

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

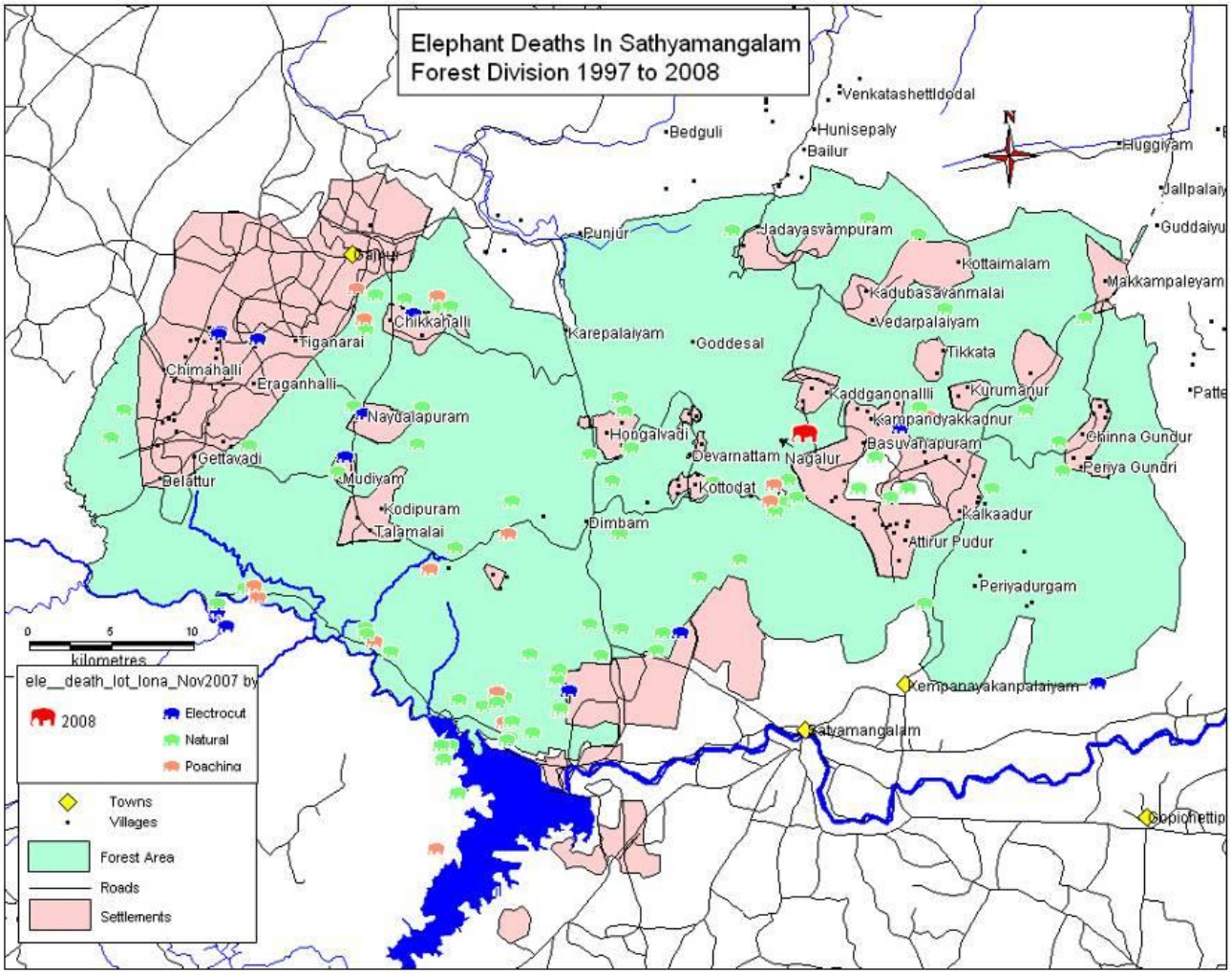
* Prey in buffer zone: This shows the mean values computed for core and buffer

2.4 Assessment of Threats

The threat assessment of Sathyamangalam reveals the following main threats that are being perceived by the management.

2.4.1. Poaching

Poaching of prey species is considered as aserious threat in buffer zone.Snaring,chemical extermination and hunting with weapons and dogs have been frequently reported in buffer zone areas. Sometimes Leopards get caught into snares kept for Deer and gets killed in the process. Retaliatory poisoning of Leopards havealso been recorded in the past. Fringe villages of Bhavanisagar Range are notoriously known to engage in killing deers for meat. Sambar deer have also been hunted for meat in the past in buffer zone. Elephant poaching is a serious threat in interstate patches and also around Bhavanisagar Range. Small wildlife trade of pangolin shells,monitor lizard, Mongoose, Hare is also a serious threat. Peacocks are also reported to be hunted for medicinal values. The details of offence in buffer zone is in Appendix 5.



2.4.2. Anthropogenic Pressure

Habitat degradation due to anthropogenic pressure remains a major threat in the upper plateau, especially Ekkathur, Kadambur-GundriPlateau, Kadahatti – Kottamalam, Kakkarai etc., in buffer zone of the Tiger Reserve. This primarily originates from cattle grazing in Ekkathur, Kadambur-GundriPlateau. The Bargur cattle which is an endemic cattle variety is reared by local communities and the cattle depends upon the Forest areas for **grazing**. **Fuel wood** collection exerts major pressure on buffer zone forests. Fire wood collection is a serious threat in buffer zone. The villagers of tribal villages viz Kembanur, Vilankombai, Indira nagar, Erumaikuttai, Bhagavathinagar, Sundakaradu and revenue villages of Pungar, Karchikorai, K. N. Palayam, and Puliankombai engaging firewood collection from the reserved forests of buffer zone for their domestic requirements.

The forests of the Buffer zone of reserve are subjected to intensive grazingin this human dominated landscape. Excessive grazing has brought about hardening of the top soil, thus creating conditions in-hospitable for plant growth, scarcity of natural regeneration and destruction of tender seedlings especially sandal and bamboos. 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 and at the same time it does not allow good regeneration of grasses and other plants which would help better water harvesting. Soil compaction also reduces regeneration. In water deficient areas these problems become very significant.Goat browsing is rampant in most parts of the Buffer Zone of the Reserve. Goat browsing causes severe degradation of forests. In buffer zone all forest blocks near to villages are vulnerable to grazing by goats. **NTFP** collection also exerts severe pressure on the habitat health of Tiger Reserve. Sundakaai, Naval, Date leaves, Guava, Kelakkai, Kattumurangai, Kolinji, Kiluvai, Sembuluchan fruit are collected by tribals for their bonafide use.

2.4.3. Forest Fire

In buffer zone of the Sathyamangalam Tiger Reserve, fire is very common during the dry season.Generally, these fires are set by the local communities to get better fresh grass growth for their livestock and few fires due to carelessness of individuals. Annual fires cause extensive damage to wild animals causing injury, death and dispersal besides restricting fodder availability to wild herbivores during the critical dry season. Details of fire occurrences in buffer zone is in Appendix 6.

2.4.4. Linear intrusions

The Sathyamangalam – Mysore NH 209 runs through the buffer zone has a severe impact on free movement of animals. Road kills have often been reported. Likewise frequent movement of vehicles within the Sujjalkuttal – Thengumarahada road in the buffer zone part has a deterrent effect on ecological sanctity of the Tiger Reserve.

2.4.5. Invasive Plants

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, Euphatorium odoratum and Opuntia, in the dry deciduous area and also to a lesser extent in the thorn forest.

Prosopis is changing the vegetation structure of this area and that too is a very important component of conservation of the landscape. In Kothamangalam, Sathyamangalam – Bannari belt, Gunderipallam, Bunglowpudur, Ekathur and other places, the presence and spread of *Prosopis juliflora* is particularly worrying as it is converting large areas of open thorn forest into dense *Prosopis* .This change is likely to have an adverse impact on wild herbivores all over the buffer zone and Black-buck in Bhavanisagar Range in particular.

Lantana in particular has taken over large areas of the landscape in akkurjorai, Kadahatti, Kotamalam, T. N. Palayam, and other areas of buffer which has impact on the conversion of grasslands / scrub jungle into *Lantana* thickets and loss of pristine native wildlife habitats.

Eupatorium too competes with grass and reduces grass cover in many areas of buffer zone. In addition, there are other weeds like *Ageratum conizoides, Parthenium hysterophorus* inspread over the landscape of buffer zone.

Invasion of *Opunti astricta in* Gundri – Makkampalayam area is another major threat to herbivorous habitat. It has overgrown hundreds of hectares of scrub forests in Gundri – Makkampalayam Plateau. Some patches are densely covered that they are completely inaccessible for herbivores. As such the proliferation of weeds is affecting the very biodiversity values that are important in this area.

2.4.6. Communicable diseases

Diseases of domestic animals pose a serious threat to both large carnivores and their prey species. Cattle borne diseases like Foot and Mouth Diseases, anthrax, black quarter and haemorrhagic septicaemia will bring major epidemic in wild ungulates. There is potential danger of Diseases like Canine distemper, Rabies, Parvo viral enteritis and Lepto spirosis spreading from stray dog and may affect carnivores.

2.4.7. Human wildlife conflict

In the recent times, cattle lifting by Leopards have been significantly reported in Bannari plains, Akkurjorai, and Kadambur-Gundri and in fringe areas of Vilankombai, Kongarpalayam beat areas of the Tiger Reserve. Retaliatory killing of

large carnivores which come into conflict with local people is of concern, though not reported to have occurred hitherto. Human elephant conflict is a major threat. Though Vilamundy RF is not part of Tiger Reserve the Elephants of Buffer zone travels through Vilamundy RF and engaging crop depredation. Such conflicts are likely to increase in future with the population likely to build upwith enhanced protection.There is likelihood of drop in the stakeholder tolerance level of the communities endangering the wildlife sustenance.

2.4.8. Impact of Religious Tourism

Annually large number of devotees throng the shrines during the temple festival period. Such mass religious tourism is reported in the temples by namely Malliamman durgam, Navakinarumathayyan kovil, Ekkaraiperumal kovil, Karikalmathayyan kovil, Adimathayyan kovil, Sakkarimathayyan kovil, Guthiyalathurmathayyan kovil, Venkapathi kovil, Peekripalayam Perumal kovil, Kambathrayangiri, Semmalaiandavar kovil. high volume of pilgrims movement causes stress in the ecological character of the eco-systems affecting wildlife behaviour and habitat usage. Littering is also a huge detrimental activity.

2.4.9. Encroachment and agriculture in the banks of Bhavani River

The low-lying areas of Bhavanisagar water spread areas belonging to reserved forest areas are being seasonally occupied by the people for cultivation of banana and other commercial crops illegally. Such agriculture cultivation denies the availability of vital grazing land during summer to the wildlife. The access to water bodies is also blocked due to agriculture and fencing. Retaliatory poisoning, electrocution have been reported in these areas.Farming activities in the reserved forests of Bhavanisagar Dam water spread area and along the Bhavani river is a long term management issue. The illegal cultivation in the water spread area of the Bhavanisagar Dam exerts severe stress on the habitat usage by Wildlife. Illegal fencing is a serious threat causing danger to wildlife. Intentional and unintentional poisoning due to pesticides applied to the crops is also reported in this area.

Chapter. 3. History of Past Management and Present Practices

3.1 Conservation & Forest Management History

The Sathyamangalam Tiger Reserve entirely falls within the erstwhile Sathyamangalam Forest Division. Both the core zone and buffer zone of STR are hence actually were part of the unified Sathyamangalam Forest Division. Hence the conservation and forest management history of the buffer zone is same as described in core zone in Chapters 4.1 of the core zone management plan. These areas were dealt with under protection working circle, NTFP working circle and tribal working circle of different plans. After the formation of Tiger Reserve various activities such as establishment of 10 number of anti-poaching camps, development of water resources, removal of invasive alien species, fire line developments, strengthening of infrastructure have been undertaken at a lower scale in last 4 years. As such the investment for conservation in buffer zone is low, it is suggested that for the buffer zone of the tiger reserve which is a wildlife sanctuary separate funds may be accessed from Government of India.

3.2 Protection of Tiger, its Prey and Habitat

Before the declaration of Tiger Reserve there has been sporadic attempts on habitat management mainly through Tamil Nadu Afforestation Project 7,500 ha of forest areas were treated under Tamil Nadu Afforestation Project where in focus was afforestation, soil moisture conservation and community fencing. Certain works were carried under Centrally Sponsored Schemes like Project Elephant and Nilgiris biosphere reserve at a very low scale. After the declaration of Sathyamangalam forest division as a wildlife Sanctuary in 2011, focus was shifted to strengthening anti-poaching measures and under taking habitat development measures. There are 9 camps established in buffer zone areas. The existing threats to Tiger and its habitat has already detailed in chapter 2 of buffer zone plan. The poaching of wildlife continuous to be a serious threat endangering the very ecological integrity of buffer zone.

3.3 Other Land Use – Villages, Agriculture, Developmental Programs, Tourism etc.

Land use

Land use of Sathyamangalam Tiger Reserve as a composite unit including core zone and buffer zone has been dealt with in detail in Chapter 5.1 of Core Zone. As such in buffer zone the dominate land use is forest only. There are 41 hamlets and two forest settlements in the Buffer Zone. Out of 41 hamlets, 34 are Non-tribal villages and 7 are tribal villages.

Table 3.1: Table showing Area and Population in Revenue hamlets intervening in Buffer Area

Sl. No.	Name of the hamlets	Area (ha.)	No. of families	Population
1	Kottamalam	75.00	150	460
2	Sujjalkkarai	50.00	30	97
3	Kadupasavanmaalam	30.00	25	62
4	Kadatti	65.00	30	105
5	Vedarpalayam	25.00	23	76
6	Makkampalayam	8.25	168	784
7	Arasamarathoddi	20.00	35	104
8	Arigium	88.33	80	445
9	Kurumbur	52.50	70	390
10	Mosalmaduvu	72.00	46	180
11	Chinnasalatti	81.93	125	504
12	Kalkadambur	57.36	156	468
13	Periyadurgam	78.64	185	555
14	Vazhamarathur	12.00	12	56
15	Kovilur	48.00	204	460
16	Gujjampalayam	48.00	42	154
17	Mahalithoddi (Tribal)	215.83	224	909
18	Venthadoddi	32.00	35	130
19	PeriyaGundri	144.00	150	825
20	Anilnatham	54.00	56	294
21	Kadaganalli	82.30	161	676

22	Chikkur	18.20	26	102
23	ChikkaHullepalayam	46.00	89	372
24	Modikkadavu	22.70	29	98
25	Giddampalayam	24.30	34	132
26	Basuvanapuram	141.70	320	1387
27	Elanji	450.00	120	380
28	Karalayam	183.00	151	672
29	Kanakundur	182.00	87	412
30	Akkisivandoddi	31.60	28	267
31	Iruttipalayam	101.00	92	532
32	Germalam	34.50	56	248
33	Anakkarai	105.00	126	635
34	Marandoddi	12.20	22	87
	Total	**2,692.34**	**3,187**	**13,058**

Table 3.2: Table showing area and population of tribal hamlets (Revenue Villages) in Buffer Area

Sl. No.	Name of the tribal hamlets	Area (ha)	No. of families	Population	Tribal Community
1	KombaiDoddi	1,274.09	68	250	Solagas
2	Bathripadugai	1,276.50	82	253	Solagas
3	Osapalayam	1,468.52	120	470	Solagas
4	Kilathur	3,222.73	52	204	Solagas
5	Hosur	22.25	45	125	Solagas
6	Vaithiyanathapuram	32.45	29	101	Solagas
7	Ramabayalur	3,763.25	80	630	Solagas
	Indiranagar				Urali
	Sundakaradu				Urali
	Bagavathinagar				Urali
	Mahalithotti				Urali
	Anilnatham				Urali
	Total	**11,059.79**	**476**	**2033**	

Table 3.3: Table showing area and population tribal hamlets (Forest Settlements) in Buffer Area

Sl. No.	Name of the settlements	Area (ha)	No. of families	Population	Tribal Community
1	Vilankombai	20.80	26	70	Urali

2	Kembanur	25.00	77	246	Urali
	Total	**45.80**	**103**	**316**	

The tribal communities co-exist with the forests surrounding their habitations in an integrated manner in terms of their social customs and cultures. Their basic livelihood mostly tribals depend on forest resources. The resource dependency on buffer zone forest is high.Tribal depend on the forest for their sustenance. They collect honey and tubers, rhizomes, date leaves, amla, soap nut, catch fish and at times scavenge meat from predator kills. Communities collect fuel wood from the forest for their use. The people outside the Reserve boundary exert considerable influence on the natural resources of the Tiger Reserve in the fringes of buffer. The villages living close to forests require fodder for stall feeding and thatch grass for roofing the houses. The villagers pack the thatching grass like a felt to a thickness of 10 to 15 cm above a bamboo mesh.

The use of green manure is comparatively low. There is demand for silt from tanks in the Reserve.

Agriculture in Buffer Zone

Minor millets like Ragi (*Eleusine coracana*),Tenai (*Setriait alica*) are grown in hills of buffer zone. Tapiocais also grown mainly by the tribes in T. N. Palayam Range area of Buffer zone. In the T. N. Palayam hills few coconut orchards have come up in lands sold by natives to outsiders. Open wells and bore wells are used as source of water in many villages. People have to depend on rains for cultivation in hill areas of Kadambur. Bore wells are dug even for 800 ft. The main season is North East Monsoon period which is from October to December.

In Bhavanisagar and Sathyamangalam Range part of the Buffer zone maize, beans, sugarcane, Cholam, Kambu, Paddy, Ragi, Bengal gram, Red Gram, Horse gram, Green gram, Turmeric and banana are cultivated through canal irrigation.

Table 3.4: Details of block wise agriculture land use in Buffer Zone in 2016-17

Block	Area under Rain fed crop	Area under irrigated crop	Total
T. N. Palayam Block	2505.290	9812.320	**12317.61**
Sathyamangalam Block	2.930	24453.260	**24456.19**

3.3.1. Tourism

In the enclosure villages and fringes, there are innumerable farm houses, home stays, few resorts which are operating since many years even before declaration of Tiger Reserve. Gunderipallam and Bhavanisagar dam sites attract large number of visitors. Safaris has been started in the buffer zone of the Tiger Reserve and are under process of adjustments and adaptations to suit consumer use. At present the existing tourism packages in buffer zone has already been mentioned in the Eco-tourism plan. Religious tourism is a major tourism activity in the buffer zone and the same has been detailed under Para No. 2.4 of buffer zone plan.

3.4 Research, Monitoring and Wildlife health

The buffer areas are equally rich biodiversity and form part of Nilgiris Biosphere Reserve and Nilgiri – Eastern Ghats Elephant reserve. There is very rich floral diversity in diversified landscape and equally rich wild animals dynamics.

There has been no studies carried out to document and monitor the biodiversity of buffer zone. Buffer zone is also a very important habitat for Elephants and other wild animals. But, few research studies have been under taken in wildlife health monitoring. 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), Delhi have conducted few studies on wildlife ecology and monitoring but not on wildlife health.

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

1. Endangered Species Conservation Program and monitoring
2. Assessment of Tiger Population using Camera Traps and Scat analysis
3. Imparting training on capacity and skill development for the front line field staff
4. Conservation and Awareness Program for various stakeholders

Wildlife health monitoring

An exclusive wildlife veterinary care unit has been set up in 2015-16 in Karachikorai, Bhavanisagar Range of Sathyamangalam Tiger Reserve with following staff. This caters to the need of Wildlife Health monitoring in STR. The veterinary unit care has facilities such as veterinary ambulance, veterinary surgical room, etc.,

The wildlife diseases that are prevalent and the present control measures adopted are given in the following tables.

Table 3.5: Diseases of domestic animals transmissible to wild animals
Spread of Infection - Carnivores

Disease name	Wildlife species which are affected	Source of infection	Control measure
Rabies **Feline Distemper** **Parvo virus** **Toxoplasmosis** **Leptospirosis**	Carnivores	Direct contact, tissues from infected animals, or exposure to contaminated soil, food or water	Routine vaccination (Once in year) proramme for street dogs against Rabies Distemper Parvoviurs

Table 3.6: Internal parasites (Endoparasites) of free-Ranging Animals:

Disease Name	Wildlife species which are affected	Source of infection	Control Measure
Nematodes – **Round worms**	All young animals and animal with weakened immune systems.	Indirect and direct	Periodic check-up of Dung samples and deworming for cattle, sheep and dogs in forest settlement areas.
Cestodes – **Tapeworms**		Indirect	
Trematodes **– Flukes**		Indirect	
Acanthocephalans – **Thorny-headed worm**		Indirect	
Protozoans – **Coccidians**		Direct and indirect	

Wildlife mortality due to diseases

No deaths due to any wildlife disease recorded in the case of **Tigers** and **Leopards** in the past in STR. However, canine distemper viral disease was 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 is undertaken in the Tiger Reserve as a proactive measure to prevent occurrence of the disease in this landscape.

Elephants are known to be affected due to various causative factors such as Prosopis toxicity, anthrax disease which is endemic in Bhavanisagar, Hasanur and Talavady Ranges, Foot and Mouth Disease, Organo-phosphorous 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 periods of water scarcity, many elephant deaths have been noted with gastro intestine infections in Bhavanisagar & Talawady tracts. Contamination through water points shared with domestic cattle is a serious threat.

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 is very essential to prevent such diseases. The present schedule of Foot and Mouth Disease vaccination twice in a year is to be continued.

Sathyamangalam Tiger Reserve has four species of **Vultures**. Awareness programmes have been conducted with the help of NGO Arulagam to avoid usage of Diclofenac sodium and Ketoprofen in treating diseased cattle.

The Government has banned the use of Ketoprofen immediately in the districts of Erode, Coimbatore and The Nilgiris to protect the Vulture population. Meloxicam, an alternative drug, is prescribed by the State Government as a alternative to ketoprofen.

3.5 Nature Education and Interpretation

Nature Education and Interpretation is an important Conservation tool as a provision forensuring an opportunity to spread the message of conservation to the public besides providing recreation experience to the tourists. At present nature education, interpretation centres and eco-tourism facilities are very minimum in the buffer area of Tiger Reserve for the nature lovers, students and general public except for accommodation facilities at Kadambur, Ekkathur, Sathyamangalam and Makkampalayam with bare minimum facilities and there are no such facilities in ranges of Hassanur Division.

The following are the existing list of eco-tourism activities

1) Organized trekking in Forest Trails
2) Short Nature Walks, Nature camps for students & other stake holders
3) Bird Watching in nature trails and riverside.
4) Wildlife safari in old coupe roads and forest roads.
5) Regulated religious tourism

3.6 Administration and Organization

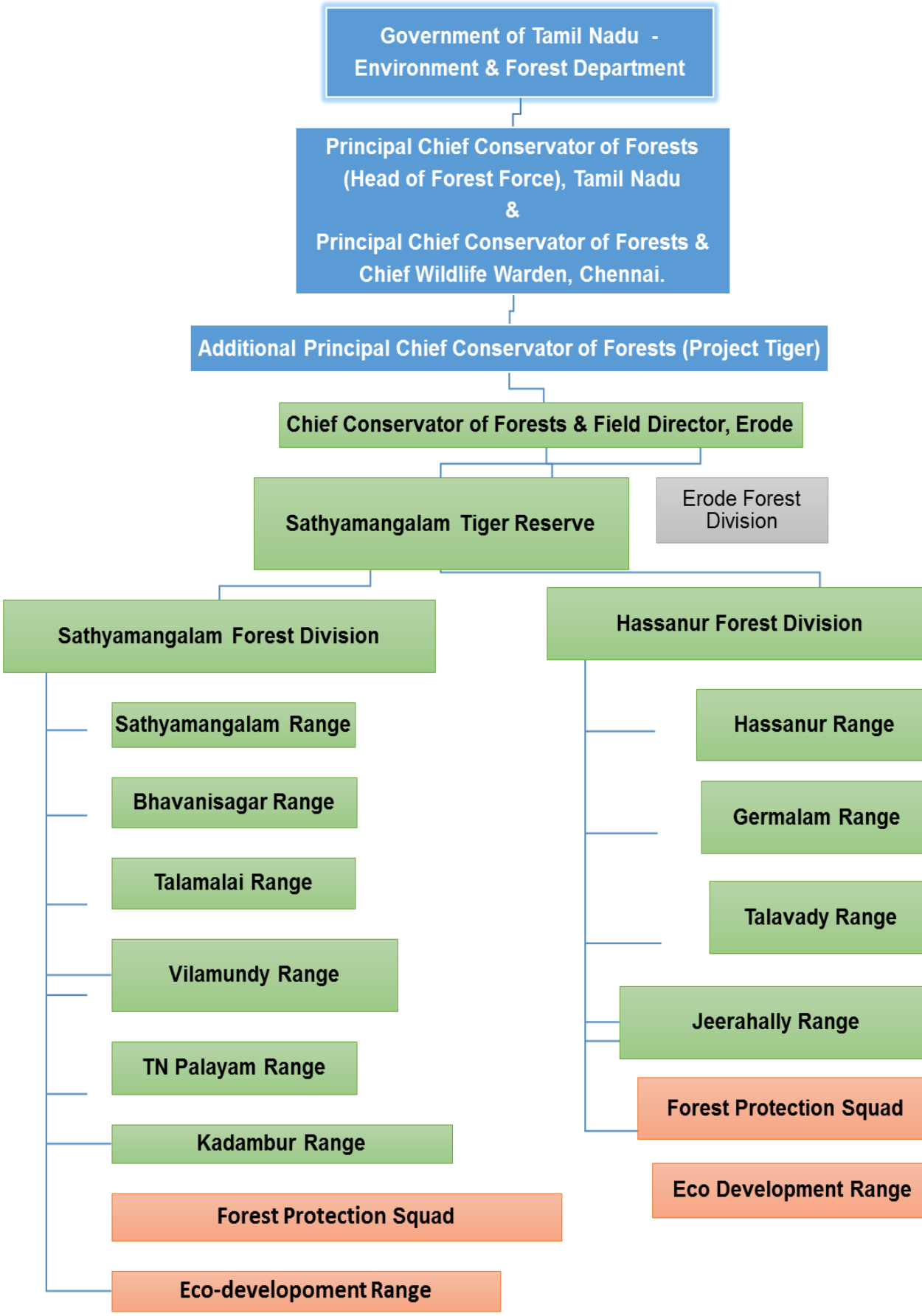
Buffer Zone of Sathyamangalam Tiger Reserve is part of erstwhile Sathyamangalam Wildlife Sanctuary and very much inside the boundary of Tiger Reserve. Out of 7 Territorial Ranges, 5 Range comprises of both Core & Buffer Zone, T. N. Palayam is completely buffer and Talamalai Range does not have Buffer Zone. Buffer Zone is under the administrative control of the Field Director in the rank of Chief Conservator of Forests and is assisted by the Deputy Directors in the rank of District Forest Officers at Sathyamangalam and Hassanur and 6 Territorial Range officers. The Erode Forest Division and Bamboo Supplies Division. Gobichettipalayam is also under the Administrative control of the Field Director.

The flow chart of the present Administrative structure is furnished below.

Table 3.7: Details Reserve Forests under Buffer Zone of Sathyamangalam Tiger Reserve

Buffer Area	Area (ha)
1. Guthiyalathur RF (Part)	53656.47
2. Guthiyalathur Ext. RF	162.31
3. Talamalai RF	3,410.06
4. Talamalai Extension RF	1,240.63
5. Akkurjorai RF	383.64
6. Akkurjorai Extension RF	155.80
7. Barabetta RF	1,468.52
8. Ullepalayam RF	1,059.58
	61,537.01
Exclude forest settlement area (2 settlements)	(-) 45.800
	61,491.21

Area of the Buffer Zone of Sathyamangalam Tiger Reserve is 61,491.21 ha.


Government of Tamil Nadu - Environment & Forest Department
Principal Chief Conservator of Forests (Head of Forest Force), Tamil Nadu & Principal Chief Conservator of Forests & Chief Wildlife Warden, Chennai.
Additional Principal Chief Conservator of Forests (Project Tiger)
Chief Conservator of Forests & Field Director, Erode
Sathyamangalam Tiger Reserve
Erode Forest Division
Sathyamangalam Forest Division
Hassanur Forest Division
Sathyamangalam Range
Bhavanisagar Range
Talamalai Range
Vilamundy Range
TN Palayam Range
Kadambur Range
Forest Protection Squad
Eco-developoment Range
Hassanur Range
Germalam Range
Talavady Range
Jeerahally Range
Forest Protection Squad
Eco Development Range

Chapter. 4. Production Sectors in the Landscape

The buffer zone area comprises of forests in Bhavanisagar, Sathyamangalam and T.N. Palayam Ranges play a vital role in sustaining a wide range of biodiversity. The entire area of Buffer Zone is already notified as Wildlife Sanctuary considering its wildlife wealth. In the peripheral villages, many developmental sectors are playing their role in sustaining the existing eco-system in the possible way. However, this requires vibrant relationships among stakeholders, a shared vision and a focused approach for enhancing bio-diversity conservation outcomes. The local support in protecting the wildlife is appreciable. The status of various sectors is furnished as below.

4.1. Forestry

As the buffer zone area is also part of the wildlife sanctuary no forestry operations are carried out in the buffer area. In the state of Tamil Nadu green felling has been totally stopped since last two decades.

4.2. Agriculture

Agriculture practices in abetting villages of the buffer zone vary from place to place. Irrigation is a serious limitations in the upper hills, whereas around Bhavanisagar reservoir well / canal irrigation is practiced. In Upper hills drip irrigation is practiced by enterprising farmers. Most of the crops in upper hills are rain fed. Land holdings are small to marginal. In tribal settlements main crop is Maize and Ragi in upper plateau. In the Western part of the Tiger Reserve in Bhavanisagar Range and Talawady Ranges, the villagers grow mainly Banana, Sugarcane, Maize, Ragi and Vegetables, etc. Some of these crops entice the wildlife and leads to man-wildlife conflict.Apart from threat due to cropping pattern, in the process of protecting the crop there are instances of electrocution of wildlife, particularly Elephants in the agriculture area. Agriculture in water spread area of Bhavanisagar Dam and banks of Bhavaniriver is also an activity that takes place causing damages to the freeranging wildlife as mentioned in Chapter 2.

4.3. Integrated Development (Eco-development, Development through District Administration)

Eco- development

At present Eco -Development programes has been started under few forest department schemes and covers only few villages. Eco development committees under TBGP scheme are functioning in 12 revenue hamlets of Sathyamangalam, T.N. Palayam and Germalam Ranges. These Eco Development Committees were

formed under Tamil Nadu Biodiversity Conservation and Greening Project (TBGP) in the year 2012 – 2013. The activities of the EDCs at present not covered by any statuary guidelines and institutional structure of the committees as per ground conditions. For conducting the day to day business the guidelines available under Tamil Nadu JFM guidelines 1997 / NAEB guidelines will be followed subject to legal provisions of the Sanctuary and Tiger Reserve. The details of EDC villages & its committees in buffer zone is given in Appendix 7.

VFCs under TAP / NAP

Village Forest Committees were formed under Joint Forest Management Programme through the Tamil Nadu Afforestation Project funded by JBIC. There are 43 VFCs in buffer zone (20 in Phase-I and 23 in Phase-II of TAP). Appreciable socio-economic development programmes (community development activities) undertaken by Forest Department in these villages such as roads, drinking water facilities, community halls, drying yards, skill development programmes, social function amenities, equipment to schools, micro credits for income generation activities, petty shops, community toilets, electricity facilities, drainage, ration shops, etc.,

At present all these VFCs has to be converted into EDCs as these committees are working very closely with the Forest Department for protection of Forest resources. The Village Forest Development funds available in the VFCs shall be permitted to operate in the ambit of the EDCs. There are few VFCs managed by the Bamboo Division at Gobichettipalayam and after conversion as EDCs these committees continued to be managed by the respective divisions of the Tiger Reserve.

There are 25 JFMC villages under NAP which are not very active, the same may be re-designated immediately as EDCs.

Tribal VFCs

Tribal Village Forest Committees were formed in tribal villages for the sustainable utilization of NTFPs in continuation to the Government order 79 in 2003 wherein the NTFP rights over 20 NTFP items were awarded to tribals of Tamil Nadu through formation of Tribal Village Forest Committees. Accordingly separate NTFP harvesting committees named as Tribal VFCs were formed in Tribal hamlets, both in core & buffer zones. The tribals were harvesting NTFPs and selling through Sathyamangalam Hill Tribes Society and later to LAMPs society prior to this LAMPs

society is dissolved.There are 28 Tribal VFCs working in this reserve-Buffer zone. These Tribal VFCs were formed with the model of the TAP JFMCs and the revenue generated after making good collection costs was credited into the VFC account which is being used for socio-economic development including provision of revolving funds.

4.3.1. Development through District Administration

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.

DRDA and District AdiDravidar & Tribal Welfare Department had been supporting major initiatives in the management of landscape like fund support in fulfilling basic amenities to the tribal hamlets. Animal Husbandry department had been actively helping reserve management in disease prevention by way of vaccinating surrounding domestic animals. Also, the Animal husbandry department has been supporting the ban on diclofenac sodium and Ketofenac. Electricity board has been of great use to the management especially in maintenance of transmission lines to avoid accidental electrocution of wild animals.

In Tamil Nadu by a state government order the Forest Department has ensured institution of District Level grievance disposal mechanism for tribals and villagers living in the fringe of forests. District level JFMC coordination meeting is being conducted once in three months, by District Collector along with the District Forest Officer as member secretary along with all line department officers and representatives from JFMCs. The Presidents/member of EDCs, VFCs attend this meeting. The District level officials from various line Department attend these meeting and grievance of villagers are heard on priority basis and instructions are given to line department officers to include the works on priority basis in their Annual Plan of Operations which is reviewed in every meeting for status of implementation. This gives the best result by way of getting good will from the villagers in PA management. Also, a state level committee chaired by the Chief Secretary of Tamil Nadu monitors and reviews functioning of the District Level grievance redressal mechanism.

4.4. Tourism

At present tourism activities in the Buffer Zone are negligible. The existing tourism activities has been dealt in para No. 3.3.1.of this plan.

4.5. Fisheries

Fisheries is a major production sector in the Buffer areas abutting Bhavanisagar Dam. Fisheries Department is managing inland fishing activities in the Bhavanisagar and Gunderipallam Reservoirs. In Bhavanisagar Dam fishing activities is taking place within the water spread area which is a reserved forests and sanctuary. The said activity has to be regulated under the Wildlife Protection Act and Forest Conservation Act. More than 80 coracles move in the dam area in an unregulated manner. The movement of people and timing of fishing activities has to be regulated with the consolation of Fisheries Department. This will help in trespassing of poachers in the identity of fishermen. Dynamiting fishes needs to be banned to protect the native fishes. Fishing in Moyar river is by the tribals communities and people of Thengumarahada is a serious issue that needs to slowly discouraged and totally banned to protect the native fish species including orange finned Mahseer from being over exploited.

4.6. Tea and Coffee Estates

The buffer zone has no tea/ coffee estates.

4.7. Road/Rail Transport

There is no rail track in this area. There are main roads leading to the State of Karnataka, which passes both through core and buffer zone area. Apart from this, many roads leading to the various villages do exist in the buffer zone. At present, some of the roads are conspicuously having a negative impact due to heavy traffic which not only hinders the free movement of wild animals but also leads to road kills. The road network in certain parts of buffer zone is a serious threat and has been dealt in the para No. 2.4. The National Highways and State Highways departments are in the process of systematically developing the roads plying through the buffer zone area. As such there is no separate projects are proposed.

D.G. Pudur – Kadambur – Kadahanalli State highways (50 km), Kadahanalli to Badripadugai (3 km – Sathy Range), Kadambur – Arigiam (15 km in patches – TN palayam), Makkampalayam to Kombaithotti (5 km – TN Palayam), Mahalithotti to Anilnatham (5 km TN palayam) are some of the interior roads in the Buffer Zone that affects the wildlife habitat of buffer zone.

4.8. Industry

The area does not have any major industries but there are many number of small scale industries in the periphery of the reserved boundary which does not affect forests & wildlife.

4.9. Mining

In buffer zone there are many smaller quarries (for minor minerals / construction materials). These quarries are located on Southern boundary of T. N. Palayam Range, Kottamalam of Germalam Range and Eastern boundary of Bhavanisagar Ranges. As such these small mining leases are yet to be studied individually in details. These quarries will be regulated as per existing Rules and guidelines by examining from the view point of ecological sensitivity with each and every case.

4.10. Thermal Power Plants

There are no Thermal Power Plants in the Buffer zone area.

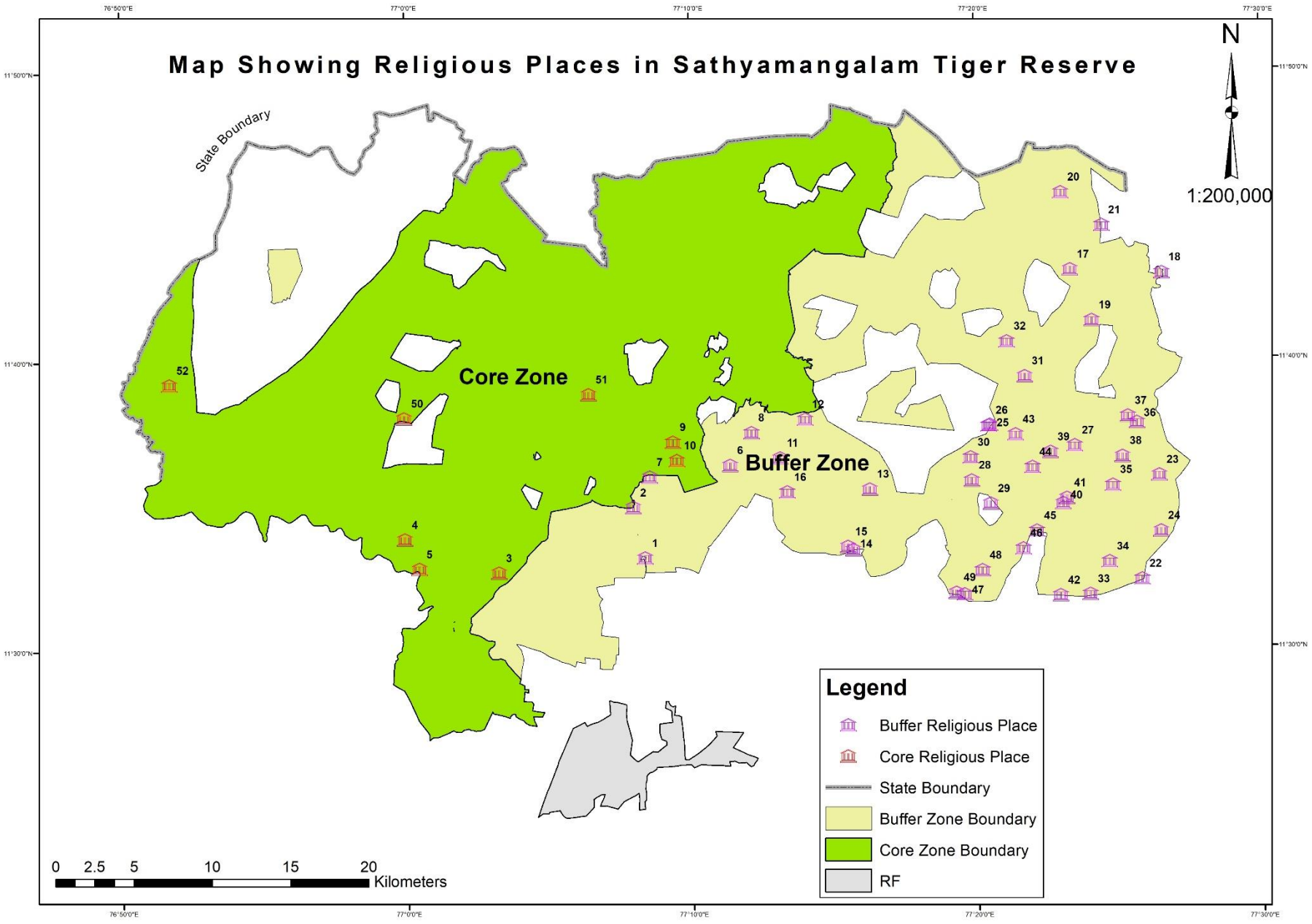
4.11. Irrigation Projects

The irrigation projects is a major boon for the conservation of wildlife in STR as they ensure all round the year water availability for wildlife. The Bhavanisagar Dam was the first major irrigation project in the state of Tamil Nadu which falls in the periphery of Bhavanisagar Range, buffer zone. Water from the dam feeds all the surrounding agricultural land through Kalingarayan canal and Lower Bhavani Project canal system in the District.

Gunderipallam and Perumpallam Dams in T. N. Palayam and Sathyamangalam Range also are mini irrigation project dams in the buffer zone of the reserve for the irrigation needs in the surrounding areas. There is proposal by Public Works Department to establish a Vedaparai irrigation project (mini dam) at Kanakkampalayam beat-T.N. palayam

4.12. Temple Tourism

About 30 places of worship are in the Buffer Area**.** Most of them have got right of way to these temples as admitted in the notification of RFs and most of them are family deities of tribals. Malliammandurgam temple attracts huge pilgrims strength in the buffer.Religious tourism is seasonal as in the case of Navakinarumathayan kovil on full moon days, Venkapathimariamman kovil on full moon days and new moon days, Kambathrayangirion Puratasi months.


Map Showing Religious Places in Sathyamangalam Tiger Reserve
N
1:200,000
State Boundary
Core Zone
Buffer Zone
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
0 2.5 5 10 15 20
Kilometers
Legend
Buffer Religious Place
Core Religious Place
State Boundary
Buffer Zone Boundary
Core Zone Boundary
RF

The K. N. PalayamPeriyasamy kovil and Ekkaraiperumal temple attract religious tourists during specific seasons.

There are many religious sites located within the Tiger Reserve limits attracting large number of pilgrims. The entry and exit of vehicles, and number of visitors must be regulated strictly and entry fees should be prescribed. The pilgrims are advised not to disturb the forest environment and wild animals. Throwing of waste and plastics by them inside the forests to be banned. 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 same can be extended to other temples also. The support of NGOs, student volunteers and other enforcing agencies will play a major role in controlling these activities.

Appropriate arrangements must be made for public conveniences and accommodation to reduce man-animal conflict in these areas. Awareness boards with information on dos and don'ts must be erected at all these places. In all the approach roads to these sites, barricades must be erected to restrict the entry of vehicles.

Table4.1.--: Temples situated within the Buffer Zone of Sathyamangalam Tiger Reserve

Sl. No.	Name of Temple	Range	Remarks
	Talamalai R.F.		
1.	BannariMariammankovil	Bhavanisagar	Mentioned in the R.F. notification
2.	VinayagarKovil	Bhavanisagar	--
3.	Semmalaiandavarkovil	Bhavanisagar	--
	Guthiyalathur R.F.		
3.	NilgiriRangaKovil	Sathyamangalam	Mentioned in the R.F. notification
4.	BegepatimariKovil	Sathyamangalam	--
5.	Venkapatimariyammankovil	Sathyamangalam	Mentioned in the R.F. notification
6.	ManirasiKovil	Sathyamangalam	Mentioned in the R.F. notification as Mani temple
7.	Jadayaswamykovil	T.N.Palayam	Mentioned in the R.F. notification
8.	Kakkaraimariyammankovil	Sathyamangalam	Mentioned in the R.F. notification
9.	Ambadikovil	Sathyamangalam	Mentioned in the R.F. notification
10.	Perumalkovil	Sathyamangalam	Mentioned in the R.F. notification
11.	Muniyappankovil	Sathyamangalam	Mentioned in the R.F. notification
12.	Periyaswamykovil	T.N.Palayam	--
13.	Malliyattankovil	T.N.Palayam	--
14.	KilakkamalaiswamyKovil	T.N.Palayam	--
15.	Malliyammankovil	T.N.Palayam	Mentioned in the R.F. notification
16.	Tambatirayankovil	Sathyamangalam	Mentioned in the R.F. notification
17.	Mariyammankovil	Sathyamangalam	Mentioned in the R.F. notification
18.	Manjulrayankovil	T.N.Palayam	--
19.	Madeswarankovil	T.N.Palayam	Mentioned in the R.F. notification

Sl. No.	Name of Temple	Range	Remarks
20.	Viramathikovil	T.N.Palayam	--
21.	Belarimariyammankovil	T.N.Palayam	Mentioned in the R.F. notification
22.	Eggaramuniyappankovil	T.N.Palayam	Mentioned in the R.F. notification
23.	Rangasamykovil	Sathyamangalam	--
24.	Malichakankovil	Sathyamangalam	--
25.	Kumbeswaran Temple	Talawady	--

4.13. Communication Projects

There are no major communication projects within the Buffer Zone area. If new projects are proposed, consideration will be done based on existing rules and guidelines.

Chapter. 5. Land Use Patterns & Conservation – Management Issues

5.1 Land use classification

The lands under the buffer zone are part of the Sathyamangalam Wildlife sanctuary which fully lies within the territorial limits of the Erode District, hence the land use classification of this landscape has already been covered under Chapter No. 5 of Core Zone, which is reproduced below as the same is applicable to the entire Erode District.

The Buffer area of the Sathyamangalam Tiger Reserve is 614.912 km^2. The area was declared as Reserve Forests under Sec 16 of Tamil Nadu Forest Act, 1882 as early as 1896. There are about 9 tribal enclave hamlets inside the Buffer Zone of Reserve about 579 families have been living. These hamlets cover an area of 11,059.79 ha of patta lands and 45.80 haof forest lands under their possession. Agriculture is the major land use in these villages/hamlets. In addition to this, 34 enclave villages are located within the Buffer zone as separate revenue enclaves. The details are given in Table 5.3, Table 5.4 and Table 5.5.

Sl. No.	Details	No.	Area (in ha)	Families	Population
1	Revenue Villages (Non-tribal)	34	2692	3187	13058
2	Tribal hamlets (Revenue Villages)	7	11060	476	2033
3	Tribal hamlets (Reserve Forests)	2	46	103	316

About 800 ha are under water spread area of Bhavanisagar Dam in the reserved forest area. As such Reserved Forests solely constitute the whole buffer area, except 45.80 ha in the enclave hamlets, Forests is the major land use of the buffer area. The land cover, from east to west, varies from dry thorn forests to dry deciduous, moist deciduous and a patch of semi evergreen forests on the North-Eastern part of the Buffer Zone in different density class.

Table 5.2: Details of block wise agriculture land use in Buffer Zone in 2016-17

Block	Area under Rain fed crop	Area under irrigated crop	Total
T. N. Palayam Block	2505.290	9812.320	**12317.61**
Sathyamangalam Block	2.930	24453.260	**24456.19**

5.1.1. Forest Lease:

The following area is leased out to user agencies for providing essential services within the Buffer Zone of Tiger Reserve.

I.	*1.*	*Project Name*	*:*	*Gundri BSNL Tower*
	2.	User agency	:	BSNL, Tamil Nadu Circle
	3.	Location	:	Gundri
	4.	Forest area diverted	:	
	5.	Order No.	:	1) Govt. of India approval order No.F(C) A/11/3/4/TM/2427 dt.13.11.1992. 2) Govt. of Tamil Nadu Order No. 24 Environment & Forest Department dt.25.01.1993.
	6.	Lease period originally sanctioned	:	01.04.1983 to 31.03.1993.
	7.	Lease amount Assessment and Collected	:	Rs. 25/-
	8.	Amount spent for Compensative Afforestation	:	Nil

5.2 Socio Economic Profile of the Villages:

There are about 41 hamlets / villages/settlements situated as separate enclaves within the Buffer Zone of the TigerReserve. Soligas, Irulas and Ooralis are tribal living within the Reserve among other communities.Out of these 41 hamlets, 34 are Non-tribal hamlets and 7 are tribal villages.

Table 5.3: Human population and cattle population in the Revenue hamlets intervening in the Buffer Area

Sl. No.	Name of the hamlets	Area (ha.)	No. of families	Population	Cattle	Buffalo	Sheep	Goat
1	Kottamalam	75.00	150	460	70	0	25	35
2	Sujjalkkarai	50.00	30	97	55	0	12	47
3	K. B. Malam	30.00	25	62	25	0	0	27
4	Kadatti	65.00	30	105	62	0	0	22

5	Vedarpalayam	25.00	23	76	15	0	12	18
6	Makkampalayam	8.25	168	784	157	10	20	60
7	Arasamarathoddi	20.00	35	104	32	8	0	40
8	Arigium	88.33	80	445	185	5	30	50
9	Kurumbur	52.50	70	390	155	5	15	50
10	Mosalmaduvu	72.00	46	180	45	0	10	46
11	Chinnasalatti	81.93	125	504	89	0	115	154
12	Kalkadambur	57.36	156	468	78	62	84	168
13	Periyadurgam	78.64	185	555	153	102	118	138
14	Vazhamarathur	12.00	12	56	47	7	12	0
15	Kovilur	48.00	204	460	60	14	14	23
16	Gunjampalayam	48.00	42	154	94	13	36	17
17	Mahalithoddi	215.83	224	909	318	53	204	116
18	Venthadoddi	32.00	35	130	58	9	10	42
19	Periyagundri	144.00	150	825	260	10	25	150
20	Anilnatham	54.00	56	294	74	11	24	27
21	Kadaganalli	82.30	161	676	526	65	42	563
22	Chikkur	18.20	26	102	142	26	56	376
23	ChikkaHullepalayam	46.00	89	372	147	5	0	50
24	Modikkadavu	22.70	29	98	62	23	34	217
25	Giddampalayam	24.30	34	132	178	18	26	149
26	Basuvanapuram	141.70	320	1387	102	61	32	80
27	Elanji	450.00	120	380	118	20	10	75
28	Karalayam	183.00	151	672	276	136	31	201
29	Kanakundur	182.00	87	412	432	35	49	278
30	Akkisivandoddi	31.60	28	267	82	11	23	92
31	Iruttipalayam	101.00	92	532	53	47	62	255
32	Germalam	34.50	56	248	162	24	49	161
33	Anakkarai	105.00	126	635	352	44	36	150
34	Marandoddi	12.20	22	87	18	12	37	98
	Total	**2692.34**	**3187**	**13058**	**4682**	**836**	**1253**	**3975**

Table 5.4: Table showing area and population of tribal hamlets (Revenue Villages) in Buffer Area

Sl. No.	Name of the settlements	Area(ha)	No. of families	Population	Tribal Community
1	KombaiDoddi	1,274.09	68	250	Soligas
2	Bathripadugai	1,276.50	82	253	Soligas
3	Osapalayam	1,468.52	120	470	Soligas

4	Kilathur	3,222.73	52	204	Soligas
5	Osur	22.25	45	125	Soligas
6	Vaithiyanathapuram	32.45	29	101	Soligas
7	Ramabayalur	3,763.25	80	630	Soligas
	Total	**11,059.79**	**476**	**2033**	

Table 5.5: Table showing area and population tribal hamlets (Forest Settlements) in Buffer Area

Sl. No.	Name of the settlements	Area (ha)	No. of families	Population	Tribal Community
1	Vilankombai	20.80	26	70	Soligas
2	Kembanur	25.00	77	246	Soligas
	Total	**45.80**	**103**	**316**	

5.2.1. Socio Economic Status:

The villages and communities that live around the buffer zone come under the jurisdiction of three blocks of rural development village, Sathyamangalam block Bhavanisagar block and TN Palayam block.

The details of Human development index,Gender inequality index,child development index and multiple dimensional poverty index of various blocks of Erode District is given below.

Table 5.6Consolidation 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

Villages in Bhavanisagarblock (13th rank) and Sathyamangalam (14th rank) are high in MPI as they are affected by poverty .TN Palayam block is ranked 4 in MPI due to intensive irrigated agriculture in plains.

28.5% of households in Bhavanisagarblock ,30,98% in Sathyamangalam block and40.2% in TN Palayam block fall under BPL categories.There are about 50000 labourers in the three blocks that cover the villages abutting the buffer zone.The scheduled tribe population in these three blocks is almost 14000 in number.

The public distribution system and primary health care system in Tamil Nadu in general and the 3 blocks in particular is strong and catering to the livelihood security needs. 70% of households in TN Palayam, 80% in Sathyamangalam and 40% in Bhavanisagar blocks have sanitation facilities in their homes. The literacy percentage is around 60 % against the district average of 63%.

Table 5.7: Demographic Profiles

Sl. No	Block wise	Total Population		Scheduled Castes		Scheduled Tribes	
		2001	2011	2001	2011	2001	2011
1	Ammapet	1,23,340	1,29,140	22,476	24,780	3,361	1,610
2	Anthiyur	1,24,963	1,38,394	18,338	22,155	1,858	3,753
3	Bhavani	1,75,405	1,91,983	22,127	26,027	473	210
4	Bhavanisagar	95,183	1,03,990	19,512	23,479	149	159
5	Chennimalai	97,687	1,05,470	14,175	16,422	9	25
6	Erode	4,56,348	59,605	50,952	10,612	424	25
7	Gobichettipalayam	1,87,920	1,97,895	28,757	31,765	262	59
8	Kodumudi	1,05,099	1,10,341	17,105	19,557	31	30
9	Modakurichi	1,45,082	1,53,914	26,361	30,330	269	133
10	Nambiyur	88,981	93,917	16,821	18,801	16	9
11	Perundurai	1,39,852	1,60,636	21,095	26,502	16	123

Sl. No	Block wise	Total Population		Scheduled Castes		Scheduled Tribes	
		2001	2011	2001	2011	2001	2011
12	Sathyamangalam	1,39,248	1,60,092	23,720	28,086	5,320	7,757
13	Thalavadi	53,174	63,359	10,312	12,444	3,347	5,900
14	Thukkanaickenpalayam	84,300	84,539	15,050	16,647	1,277	1,463
15	Erode M Corp.	--	4,98,469	--	61,876	NA	624
	Total	20,16,582	22,51,744	3,06,801	3,69,483	16,812	21,880

Source: District Census Handbook Erode 2001 & NIC Data 2011

Table 5.8: 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**

Table 5.9: 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 5.10: Percentage of Households with access to Toilet Facilities (2013-14)

Sl. No.	Block wise	Total No. of HH's	No. of HH's with Toilet facilities	% of HH's provided toilets facilities
1	Ammapettai	33820	11727	34.67
2	Anthiyur	28987	22170	76.48
3	Bhavani	42290	19161	45.31
4	Bhavanisagar	34455	13897	40.33
5	Chennimalai	30940	29638	95.79
6	Erode	18072	11036	61.07
7	Gobichettipalayam	55623	16192	29.11
8	Kodumudi	36948	23502	63.61
9	Modakurichi	54928	20323	37.00
10	Nambiyur	31130	17442	56.03
11	Perundurai	55817	24883	44.58
12	Sathyamangalam	80929	65735	81.23
13	Thalavadi	14521	2467	16.99

Sl. No.	Block wise	Total No. of HH's	No. of HH's with Toilet facilities	% of HH's provided toilets facilities
14	Thukkanaickenpalayam	26656	18499	69.32
15	Erode Municipal Corporation	139155	99252	71.32

Source: GOI / www.mdws.gov.in/NBA

Table 5.11 Literacy Rate

Sl. No.	Block	Literacy rate					
		2001			2011		
		Male	Female	Total	Male	Female	Total
1	Ammapettai	59.20	38.58	49.26	65.94	48.62	57.47
2	Anthiyur	58.29	39.18	49.01	64.08	48.64	56.47
3	Bhavani	66.64	49.00	57.97	73.05	57.81	65.53
4	Bhavanisagar	64.92	46.75	56.05	69.91	55.57	62.78
5	Chennimalai	71.06	48.98	60.25	75.88	57.34	66.83
6	Erode	77.43	64.38	71.03	75.99	62.81	69.42
7	Gobichettipalayam	68.12	51.21	59.70	74.55	60.47	67.44
8	Kodumudi	72.97	52.18	62.62	77.32	59.80	68.48
9	Modakurichi	67.53	48.42	58.11	74.57	58.96	66.74
10	Nambiyur	61.33	40.68	51.08	68.67	50.62	59.61
11	Perundurai	67.30	49.82	58.64	74.89	60.35	67.61
12	Sathyamangalam	59.26	43.13	51.32	65.99	51.97	59.03
13	Thalavadi	51.14	33.73	42.45	62.29	47.54	54.88
14	Thukkanaickenpalayam	61.47	43.36	52.52	67.33	53.00	60.11
15	Erode Municipal Corporation	-	-	-	81.15	71.66	76.42
	Total	64.76	46.39	55.72	71.44	56.34	63.92

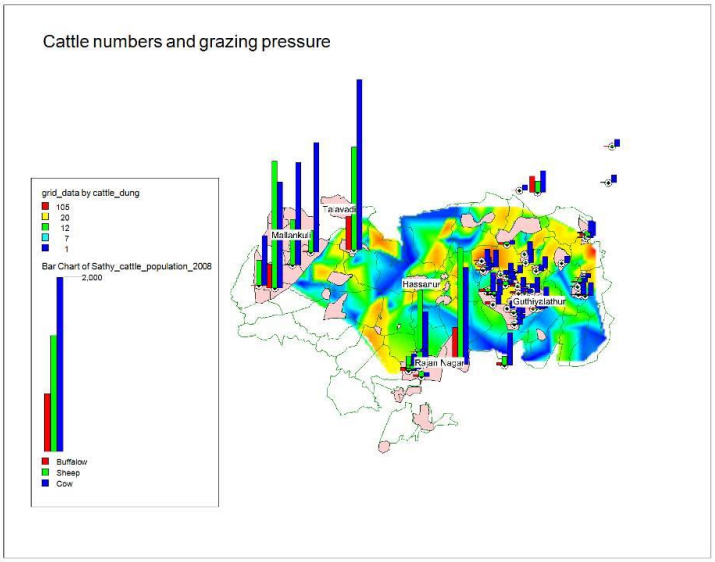
In general people of the zone seek employment in textile factories in Tiruppur, bore rigs in north India, bamboo cutting in Kerala, Mostly SSLC & HSC, very few for Colleges.

5.3 Resource Dependency of the Villagers

Tribals living within buffer depend on the forest for their sustenance. They have been collecting honey and tubers, Seemar grass, Amla, Soap Nut, catch fish and at times scavenge meat from predator kills.They also collect fuel wood from the forest for their domestic use.

The people outside the Reserve boundary exert considerably influence on the natural resources of the Tiger Reserve in fringes of buffer. The low-lying areas of Bhavanisagar water Spread areas are being seasonally occupied by the people for cultivation of banana, sugarcane and other commercial crops illegally. As a result, the pressure of this population has directly fallen on the peripheries of the sanctuary affecting fodder (grassland) for wildlife. Grazing is a serious issue in the bufferzone areas as the communities graze goats, Burgur breed cattle in the forests. More than 5000 cattle are estimated to be engaged in grazing in the forest areas of buffer

Under TBGP, community development activities more than 500 LPG connections have been provided to EDC members and this has successfully weaned them away from fuel wood dependency from forests



5.4 Human Wildlife Conflict

In the areas of Bhavanisagar, Kottamangalam, Rajannagar, Karachikorai, Pungar, Peerkadavu, Pattaramangalam, Puthukuyanur, Kurumbur, Chinnasalahatti, Erumaikuttai - Anna nagar, Sellipalayam, Vadavalli, Rambayalur, Peekripalayam, Kondappanayakkanpalayam, K. N. palaym, Athiyur, Kanakuthur, Kadahanalli, Karalayam, Ulleypalayam, Hosapalayam, Anaikarai, Kittampalayam, Ekkathur,

Irruttipalayam, Kalkadambur human elephant conflicts are frequent. Various types of crops including banana and sugarcane are raided by elephants. Deer straying is reported in these areas. Wildboar conflict is also a serious issue. Cattle lifting by leopards are reported around Akkurjorai areas, The STR has developed a network of elephant proof trenches in buffer zone and utilise anti-poaching watchers to double up as anti-depredation team. The STR also compensates for any loss /injury/death on account of human wildlife conflict.Solar fencing was installed in 130 km length in vulnerable locations and Elephant Proof Trenches have been formed in strategic boundary locations to prevent crop raiding Elephants. Compensation claims are processed quickly and the affected farmers are given due compensation in time. Human causalities are kept to the minimum through various campaigns and awareness drives. The details of Elephant Proof Trenches formed in this Reserve are given in Appendix 8.Followinghuman wildlife conflict cases have been recorded during the past years. (Table 5.12: Status of human animal conflict between 2000 and 2016)

Table 5.12: Status of human animal conflict between 2000 and 2016

Year	No of deaths	No of injuries	Cattle killed	Crop damage
2000 – 2001	2	4	2	10
2001 – 2002	5	2	1	58
2002 – 2003	7	5	2	6
2003 – 2004	7	5	1	7
2004 – 2005	3	5	--	41
2005 – 2006	4	2	1	10
2006 – 2007	8	2	--	10
2006 - 2007	12	02	--	35
2007 - 2008	5	--	--	09
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

Year	No of deaths	No of injuries	Cattle killed	Crop damage
2014 – 2015	10	10	3	130
2015 - 2016	7	8	9	75

Table 5.13: 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)
1997 – 1998	2	2	0	5	1,10,000.00
1998 – 1999	3	2	0	25	2,13,000.00
1999 – 2000	4	2	0	9	2,12,500.00
2000 – 2001	2	4	2	10	1,54,500.00
2001 – 2002	5	2	1	58	1,00,000.00
2002 – 2003	7	5	2	6	5,42,950.00
2004 – 2005	0	2	1	12	9,7500
2005 – 2006	1	0	0	3	1,20,000
2006 – 2007	5	4	2	11	9,31,850
2007 – 2008	6	1	0	9	2,43,000
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
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

Table 5.14 : Nature of Conflict and compensation paid 1996 - 2007

Conflict Status	Bhavanisagar Range	Talavadi Range	Sathy Range	Hassanur Range	T N Palayam	Total Cases
Human Death	6	10	9	3	2	30
Human Injury	7	0	5	3	3	18

Conflict Status	Bhavanisagar Range	Talavadi Range	Sathy Range	Hassanur Range	T N Palayam	Total Cases
Livestock death	6	3	0	2	0	11
Crop damage	18	10	3	1	3	35
Total Compensation Paid (Rs)	72,7300	93,0500	70,5500	22,2500	25,8500	28,44300

Other than Elephants, Wild Boar and Pea fowls are the high menace causing wildlife in the peripheral and enclave villages of Buffer Zone. Wild Boar destroys almost all crops including tubers and pea fowls, cause depredation with their mass numbers at seed sowing level even before the crop is germinated.

Human wildlife conflict also caused loss/injury to wildlife .The Elephant death for the past ten years showed that electrocution is one ofthe reason for unnatural deaths. Electrocution of animals by passing 220V current along the farm boundary is a crude way to prevent crop raiding herds, it was also evident that some farmers follow such illegal practices mainly to keep away the wild boar, but Elephants accidentally fell as victims. But some cases are specifically targeted against crop raiding Elephants .some farmers are also known to have engaged in deliberate organo-phosphorus poisoning of marauding elephants. Urea poisoning of stray Deers and guars have also been reported in the past.

Large scale awareness through stake holders, frequent meetings with farmers' associations and compensation in time is a must for public co-ordination for mitigation.

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.

DRDA and Tribal Welfare had been supporting major initiatives in the management of landscape like fund support in fulfilling basic amenities to the tribal hamlets. Animal Husbandry department had been actively helping reserve

management in disease prevention by way of vaccinating surrounding domestic animals. Also the Animal husbandry department has been supporting the ban on diclofenac. Electricity board has been of great use to the management especially in maintenance of transmission lines to avoid accidental electrocution of wild animals.

In every quarter, District Level Coordination meeting is conducted by District Collector as part of support to Joint Forest Management. The Presidents of EDCs, tribal VFCs and TAP VFCs attend this meeting for their grievances if any to be placed in front of District Administration. The District level officials from various line Department attend these meeting and grievance redressal of villagers are done on priority basis. This gives the best result for getting good will from the villagers for Protected Area management.

Part B: The Proposed Management

Vision, Goals, Objectives and Problems

6.1 Vision

Vision is to identify, declare and manage and with active participation of the communities to preserve the integrity of the core area and to provide viable dispersal cover for Tiger conservation and to sustain ecological health, integrity, productivity of the entire landscape through adoption of inclusive management practices, co-existence agendas and mainstreaming of wildlife concerns in all development sectors of this buffer zone".

6.2 Management Goals

1. Long term conservation of Tiger, its co-predators and prey through specific management interventions and facilitating sustainable use 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 through people participatory and inter-departmental initiatives.

GENERAL PRINCIPLES OF BUFFER ZONE MANAGEMENT

1. Co-occurrence agenda (Wildlife and People).
2. A 'no-go area' for industrial development (but retrofitting safeguards required if such infrastructure already exists).
3. The wildlife status of buffer should not be elevated to that of the core and managerial interventions should be restricted to allow tiger / wildlife gene permeability and low density occupancy while facilitating the meta-population dynamics of tiger in productive patches.
4. Factoring in the landscape context and reducing resource dependency of local people on forests through sectoral integration resulting in ecologically sustainable livelihood option.
5. Using the impact of natural / managerial interventions in the core area as a guide for dealing with forestry practices and wildlife management in the buffer.

6. Identifying zones of influence vis-à-vis the various land uses operating in the area.

7. Overarching focus on habitat restoration/productivity, reduction of forest resource dependency, providing ecologically sustainable livelihood options to local people, permitting ecologically sustainable land uses, avoiding intensive forms of land uses like mining or heavily used infrastructure and actively addressing human-wildlife interface. In case such land uses are present or permitted appropriate mitigation measures need to be enforced so as not to compromise on the conservation objectives of the buffer.

8. Convergence of ongoing district level schemes is important to provide ecologically sustainable livelihood options for local people. This would reduce their dependency on forest resources while eliciting the much needed public support. A sizeable portion of tourism gate receipts should be recycled and earmarked to eco-development committees for village specific interventions as per the participatory micro plan, with reciprocal commitments to protect wildlife and their habitat on quid-pro-quo basis.

6.3 Management Objectives

1. 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 regularize eco-tourism and religious tourism and facilitate involvement of local population in landscape conservation through people participation and inter-departmental coordination.
4. To encourage tribal consultation, to reduce dependence on the natural resources of the area to ensure sustainable use of available resources 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 evolve conservation methodologies for better management of the Reserve.
6. To address human-wildlife conflict issues through public consultation and awareness by combining awareness and people participatory mitigation measures.

SCOPE OF MANAGERIAL INTERVENTIONS

(i) Providing ecologically sustainable livelihood options to local people in collaboration with various sectors/organizations.

(ii) Incentivizing local people for protecting forests and wildlife (PES, Ecotourism).

(iii) Ensuring retrofitting measures in sectors of development with reciprocal commitments.

(iv) Ensuring active management in areas where tiger / Co predators / wild ungulates co-occur with people to minimize human-wildlife interface conflicts.

(v) Ensuring monitoring of tiger / wildlife on a periodic basis in standardized manner, amenable to scientific inference.

(vi) Ensuring surveillance and protection of tiger and wildlife.

(vii) Building up the capacity of field staff and local people as a part of an adaptive management to ensure effective implementation.

(viii) In case the buffer comprises of protected area then managerial interventions should be inconformity with the provisions of the Wildlife (Protection) Act, 1972.

6.4 Problems in Achieving Objectives

Objectives	Problems & Issues	Broad Strategies
1. To undertake population monitoring of Tigers, its co-predators and prey in the Reserve on regular basis adopting approved protocols and methods.	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
2. To undertake proactive, preventive, site specific and dedicated action against major habitat degradation from anthropological pressures.	1. Resource dependency of local people 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) Enhancing capacity of staff and local people Effective and enhanced interstate coordination and dialogue d) Phased removal of exotic & invasive speciesand science based restoration. e) Awareness generation& involving local communities in fire prevention & control f) Improving infrastructure and facilities, in terms of quality and quantity g) Enhancing the skill & capacity of frontline staff

Objectives	Problems & Issues	Broad Strategies
3. To regularize eco-tourism and religious tourism and facilitate involvement of local population in landscape conservation through people participation and inter-departmental coordination	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 guidelines prescribed by the NTCA.
4. To encourage tribal consultation, to reduce dependence on the natural resources of the area to ensure sustainable use of available resources and facilitate tribal development in the forest fringes	1. Capacity of local people insufficient 2. Support to conservation is lacking 3. Lack of viable alternate livelihood options 4. Lack of awareness	a) Capacity of local communities improved through skill development. Youth is provided various types of vocational trainings b) Focused conservation awareness and education activities are undertaken with active participation of NGOs & other stakeholders. c) Viable alternate livelihood options are identified and provided

Objectives	Problems & Issues	Broad Strategies
5. To undertake required Research and Monitoring activities to enhance knowledge base about the biodiversity richness of the Reserve and to evolve conservation methodologies for better 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 awareness and people participatory 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.
Opportunities	**Threats**
- Starting afresh, building strong foundations towards protected area management associated eco-development - Opportunity of investment on key strategic	- Retrofitting existing activities in conservation framework - Invasive Alien species and loss of fodder to wild animals

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 showpiece - 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	- Mostly man-made fire due to their belief and myth - Presence of more number of enclave villages - 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 Buffer Areas and Other Zones within Buffer Area.

The entire Sathyamangalam Forest Division, except Vilamundy RF, spreading over an area of 1,411.609 km^2 was notified as Sathyamangalam Wildlife Sanctuary in two separate notifications. Southern portion of Forest areas was notified in the year 2008 *vide* 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 in Govt. Order (Ms). No. 93 Environment &Forests Dept. dated 11.08.2011 under section 26A (1) (b) of Wildlife (Protection) Act 1972.

While notifying as tiger reserve 7 tribal settlements have been excluded from the notification. STR comprises a Core Area of 793.49 Sq. Km and Buffer Area of 614.912 Sq. Km. Details of Notification and Zonation Maps are given in the Appendix 2. The Details of Reserve Forests under Core and Buffer Zones are given in Table 1.1.

The buffer zone entirely comprises of the reserve forests of Sathyamangalam and the entire buffer zone including the tribal settlements located within the reserve forests are part of the Sathyamangalam wildlife sanctuary. In effect the entire buffer zone of STR is a legally notified protected area.

Buffer zone will be managed with the Co-occurrence agenda (Wildlife and People). The buffer zone will be a 'no-go area' for industrial development . Managerial interventions will be restricted to allow tiger / wildlife gene permeability and low density occupancy while facilitating the meta-population of dynamics of tiger in productive patches. The resource dependency of local people on forests will be reduced through sectorial integration resulting in ecologically sustainable livelihood options.

The management interventions of buffer zone will be undertaken by using the impact of natural / managerial interventions in the core area as a guide for dealing with forestry practices and wildlife management in the buffer area.

Convergence of ongoing district level schemes is important to provide ecologically sustainable livelihood options for local people. This would reduce their dependency on forest resources while eliciting the much needed public support.

A sizeable portion of tourism gate receipts should be recycled and earmarked to Eco-development committees for village specific interventions as per the participatory micro plan, with reciprocal commitments to protect wildlife and their habitat on quid-pro-quo basis.

Intensive form of land uses like commercial mining, setting up of industries causing pollution and establishment of major hydroelectric projects, and discharge of effluence / solid wastes in natural water bodies etc. needs to be avoided in such areas.

7.2 Zone and Theme Approaches to Management Strategies

The NTCA in its guidelines has listed out the broad scope of managerial interventions in buffer areas.

(i) Providing ecologically sustainable livelihood options to local people in collaboration with various sectors/organizations.

(ii) Incentivizing local people for protecting forests and wildlife (PES, Ecotourism).

(iii) Ensuring retrofitting measures in sectors of development with reciprocal commitments.

(iv) Ensuring active management in areas where tiger / Co predators / wild ungulates co-occur with people to minimize human-wildlife interface conflicts.

(v) Ensuring monitoring of tiger / wildlife on a periodic basis in standardized manner, amenable to scientific inference.

(vi) Ensuring surveillance and protection of tiger and wildlife.

(vii) Building up the capacity of field staff and local people as a part of an adaptive management to ensure effective implementation.

(viii) In case the buffer comprises of protected area then managerial interventions should be in conformity with the provisions of the Wildlife(Protection) Act, 1972.

The NTCA has also given broad Guidelines for wildlife management in buffer zone. Buffer / corridor areas require a ‘coarse filter’ approach for maintaining avariety of

plant / animal species
• Day to day monitoring
• Habitat amelioration (compensatory nature)
• Fostering indigenous fodder / fruit species
• Maintaining existing water points
• No drastic habitat interventions
• Cropping pattern / harvesting to factor in cover values
• Inherent / induced diversity indices need to be computed for maintaining theedges (without enhancing them)
• Human-wildlife interface issues to be addressed
• Treatment for riparian zones / unique features
• Retention of dead trees, snags
• Restoration / protection of existing corridors

7.2.1. Zone Plans

Following the guidelines of NTCA and as per the need assessment following zone plans are proposed for the buffer zone of STR.

1. Zone Plan for Habitat Management
2. Zone Plan for Eco-development
3. Zone Plan for Eco-tourism zone & interpretation zone
4. Zone Plan for Administrative zone

7.2.1.1. Zone Plan for Habitat Management

This zone includes all the reserve forest part of the Tiger Reserve in buffer zone and includes Vilamundy RF of Sathyamangalam Division.

The following activities are prescribed to be carried out in this zone in tune with the guidance of NTCA outlined in the preceding paras.

1. Invasive species removal,
2. Water management,
3. Soil conservation,
4. Fire management.
5. Artificial regeneration.

Invasive alien species removal,

Prosopis Lantana and *Opuntia dillenii* are major invasive species. The impact of this invasive species, the methodology of eradication, maintenance of removal plots has already been dealt in detail in Chapter No. 7 of Core zone plan and the same applies to the invasive alien species removal in buffer zone.

It is proposed that annually around 200 ha of Lantana and 200 ha of Prosopis will be removed and annual maintenance will be carried for three years.

Water Management

As described in the core zone under Chapter No. 7, the habitat from the consumptive utility point of the wildlife is severally constrained by lack of water for physiological needs. The habitat of STR in both core and buffer zones , experiences severe water stress from the months of February to September and wildlife adapts to such drought like situations by moving to zones around water availability in streams and ponds. In acute drought years when these sources dry the wildlife undergo severe behavioral and physiological stress. Elephants particularly get into conflict situation with humans as they move to farmlands in search of water. It is imperative to create adequate new drinking water sources and maintain and improve the existing sources for wildlife in buffer zone.

Following interventions will be undertaken to provide water security to wildlife: -

1) Deepening and de-silting of existing perennial and seasonal water holes, and construction and maintenance and improvement of water holding structures like percolation ponds, check dams and permanent water troughs for prolonged/continued availability of water during pinch period.

2) Small temporary ponds/troughs will be created wherever required for the use of wild animals and these temporary troughs/ponds will be filled with water supplied through vehicles.

3) Suitable sites will be selected in very dry and interior areas where wildlife presence is pronounced and activities such as digging of bore wells and providing of solar powered/diesel operated pumps to fill up water holes.

4) The rainfall window in this landscape particularly in upper plateau is limited to less than 10 rainy days in North East monsoon. Large Check Dams of minimum of 15 m to 20 m length and 5 m to 10 m height in selected jungle streams will greatly enhance climate change resilience in addition to availability of water for prolonged

duration. Creation of large / mega percolation ponds and check dams for impounding water will be built based on water shed maps.

5) 2 vehicles fitted with water tanker and pump sets will be purchased per Division and will be utilized for supply of water to water holes during summer. During pinch period additional vehicles on lease /hire with tankers will be engaged to supply water to water holes in periods of acute water stress due to failure of monsoons/shortfall in monsoons.

6) During pinch period, additional temporary water troughs will be created for providing water to wild animals in strategic locations, identified as per movement of wild animals.

7) Water troughs and water bodies in the fringe of forests outside forest areas will be improved maintained.

Soil & moisture conservation

As described in the Core zone under Chapter No. 7, the buffer zone areas of the reserve forests have also been traditionally impacted by degradation forces such as grazing, illicit felling, fire etc., historicalforest management such as clear felling for fire wood and planting of hardy monoculture .Hence it is proposed to apply same soil and moisture conservation treatment to buffer zone which is also wildlife sanctuary area.

Gully Control - Gully plugging structures such as check-dams, check-walls, rough stone packing will be constructed at suitable places. Wherever feasible vegetative measures such as planting of grass slips /agaves etccan be taken up across the Gullies.

Check dams will be constructed in smaller streams to arrest soil erosion and enable water storage during pinch period. Contour trenching and staggered trenching would be a very useful activity in this degraded landscape of buffer zone to accelerate -growth of natural regeneration and in-situ soil and moisture conservation. Trenches of the size 5 m X 1 m X 30 cm will be created in buffer zones at the rate 20 trenches per ha for 100 ha per year.

Fire management

Like core zone forests of buffer zone is also prone to fire every year. The details of impact of fire, fire management and control measures have been dealt in detail in Chapter 13.4 of buffer zone.

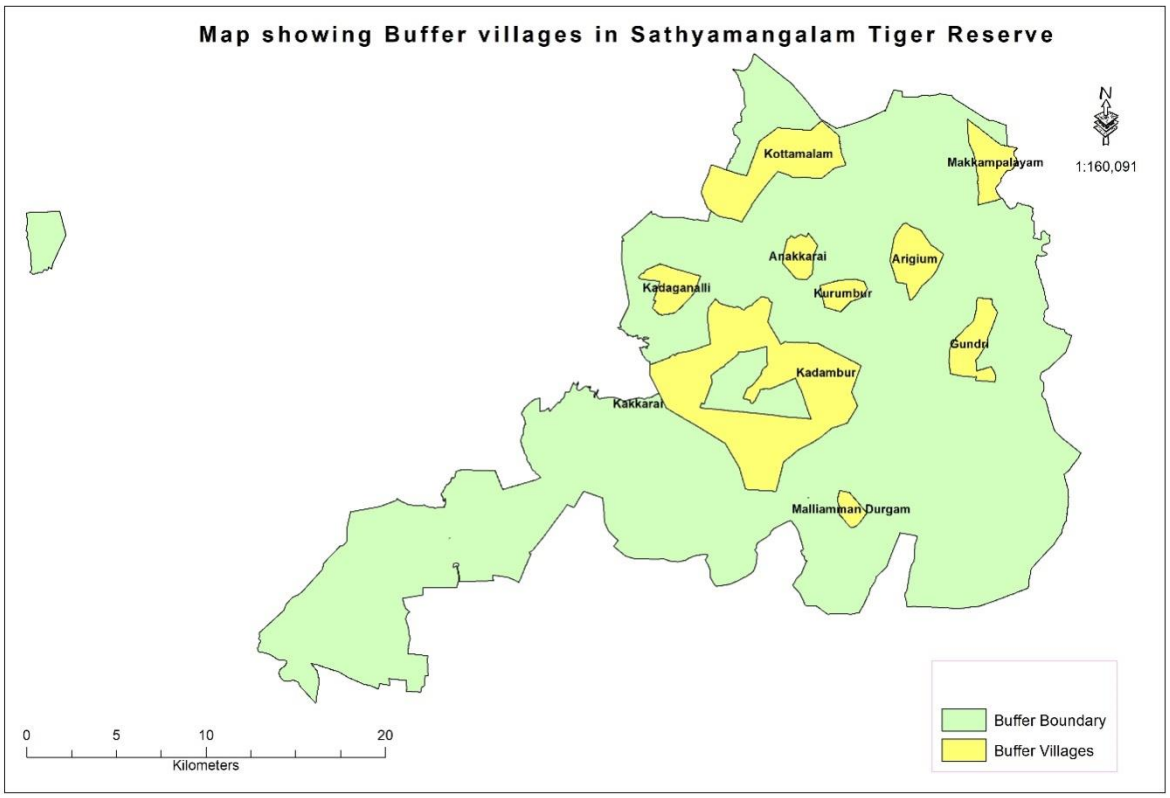
Artificial regeneration

In the degraded forests, especially on the fringes of villages, gap planting with native vegetation will be taken up to restore native vegetation. fodder plantsthat yield fodder, fruits for wildlife will be will be grown with intensive cultivation techniques that include planting of tall seedlings, fencing of individual plants ,summer watering etc. in high priority areas of wildlife. In the other potentially productive areas, and fringes, suitable package of practices will be followed to assist the natural regeneration to improve the health and vitality of the forests. Native fodder species and native species like sandal will be regenerated.Grass landswill also be restored. If needed irrigated plantations of selected species may be taken up on trial basis. The funds from NAEB and other sources can be explored for this purpose.

7.2.1.2. Zone Plan for Eco-development

This Zone comprises of all tribal settlements, enclave villages and fringe villages falling under 2 km boundary of the buffer zone of Tiger reserve.people and their livelihoods rely on the health and productivity of our landscapes, and their actions as stewards of the land play a critical role in maintaining this health and productivity.

There are 2 tribal forest settlements as enclaves in the buffer zone namely Vilankombai & Kembanurand there are 7 number of revenue tribal settlements as enclaves in buffer zone as per revenue records. Apart from that 34 bigger settlements with heterogeneous communities are found as enclaves within the buffer zone of the Tiger reserve. The activities that are to be implemented under this zone plan have been prescribed in Chapter 8 of Buffer Zone plan in detail.



7.2.1.3. Zone Plan for Eco-tourism zone & interpretation zone

Ecotourism in buffer zone has great role in supporting the socioeconomic development of communities and incentivizing them, detailed prescriptions and the scope objective, significance and relevance of ecotourism activity has been already dealt with in the ecotourism plan in the TCP for core zone. The buffer zone of Sathyamangalam Tiger Reserve in Sathyamangalam Division has great potential for being utilized for creating eco-tourism facilities especially in areas immediately adjoining core zone where the sighting of wildlife can be a good attraction. The prospective areas suitable for eco-tourism in buffer zone includes Akkurjorai RF of Talawady, Kadahatti – Kotamalam of Germalam, Kadambur, Makkampalayam–Gundri of TN Palayam, Vadavalli – Chikkarasampalayam of Sathyamangalam &Kottamangalam of Bhavanisagar,Karachikorai, sujalkottai,bannari temple zone, Varakatukombai & Gundri – Gunderipallam zone, Kambatturayan mettu. Carefully designed eco-tourism facilities and packages needs to be developed in these areas.

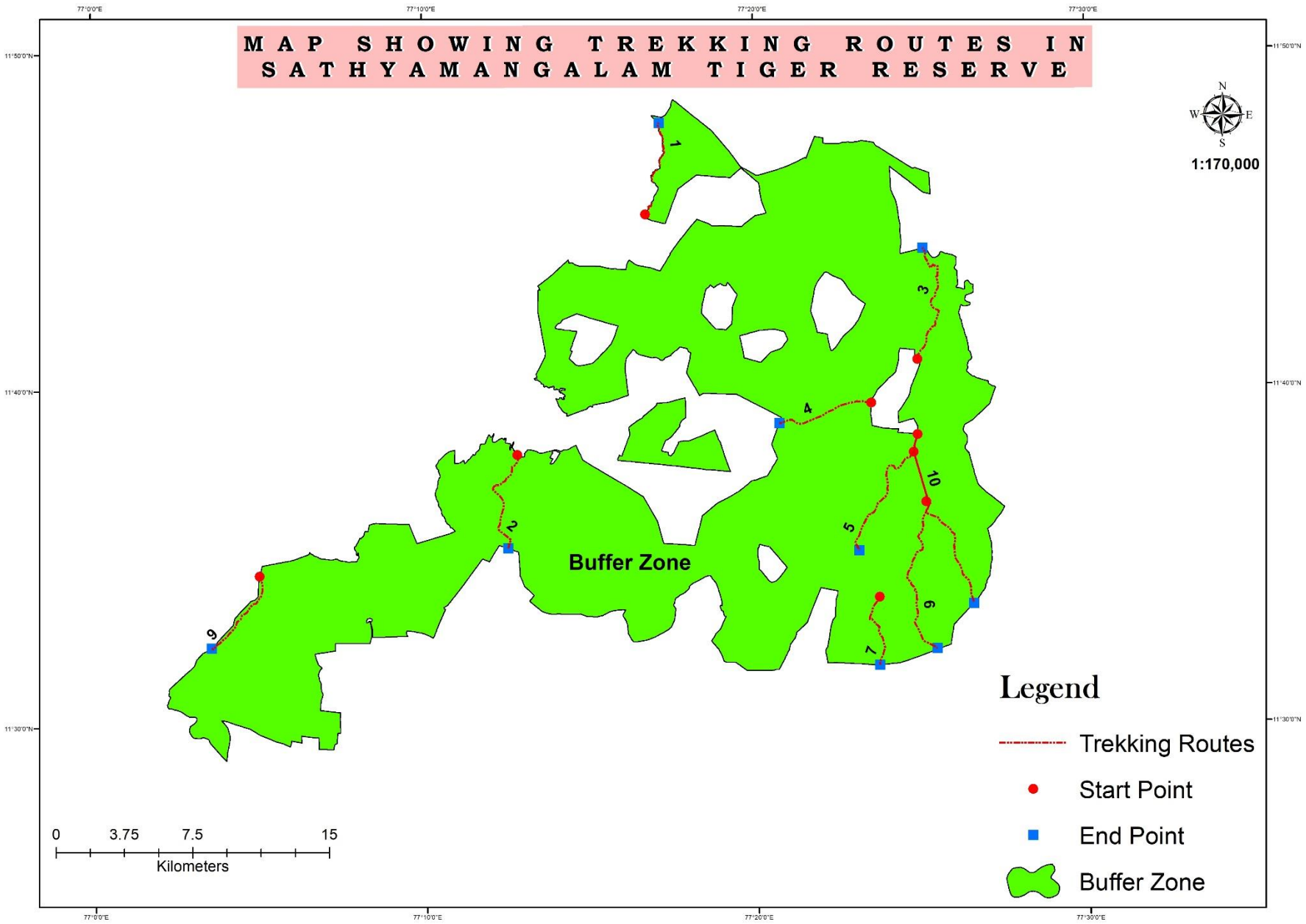
To strengthening the existing tourist infrastructure, safari trips will be conducted in new buffer routes. There is a very good scope of developing boat based tourism in Bhavanisagar dam the same will be actively pursued and implemented. In the buffer zone on the banks of the Bhavanaisgar dam dormitories

and eco huts will be created. New eco-tourism proposals have to be developed in a phased manner in this biodiversity rich, culturally rich landscape. Existing natural trails, trekking routes and jeep safari roads that are available will be improved in harmony with Tiger conservation requirements and interpretation centers have to be established at suitable locations. Existing rest houses in Kadambur, Basavanapuram, Makkampalayam, Sathyamangalam in buffer will be improved and will be part of eco-tourism infrastructure.New stay accommodation will be built in buffer zone in places such as Karachikorai, Sujalkottai, Akurjorai, Karachikorai, Bannari temple zone. The eco-tourism plan appended to this TCP and Chapter 14 of buffer zone plan deals with various gamut of prescriptions in the eco-tourism zone.

A separate eco-tourism complex will be created at Sujalkottai where outdoor interpretation park, indoor interpretation centers, ex-situ grass conservation center, along with dormitories, eco-huts, training centers, reception centers, fresh water fish aquarium, vulture conservation awareness centers, etc will be created. An outdoor interpretation park will be created in the area opposite Bannari temple. As detailed in eco-tourism plan of core zone in Chapter 11, the eco-tourism facility will be managed by the park management and foundation trust by involving range level Vannapoorni committees and EDCs. The mechanism of community based tourism with the Vannapoorni committees as nodal units have been clearly laid out in the eco-tourism plan detailed in core zone. The same mechanisms will be applicable for developing and maintain ecotourism projects.

Needless to say the ecotourism activities will be as per NTCA guidelines. The carrying capacity of buffer zone is worked out and the eco-tourism will remain within the said threshold levels.

The infrastructure, mode of operation of eco-tourism, carrying capacity and other functioning is dealt in detail in Chapter 14.

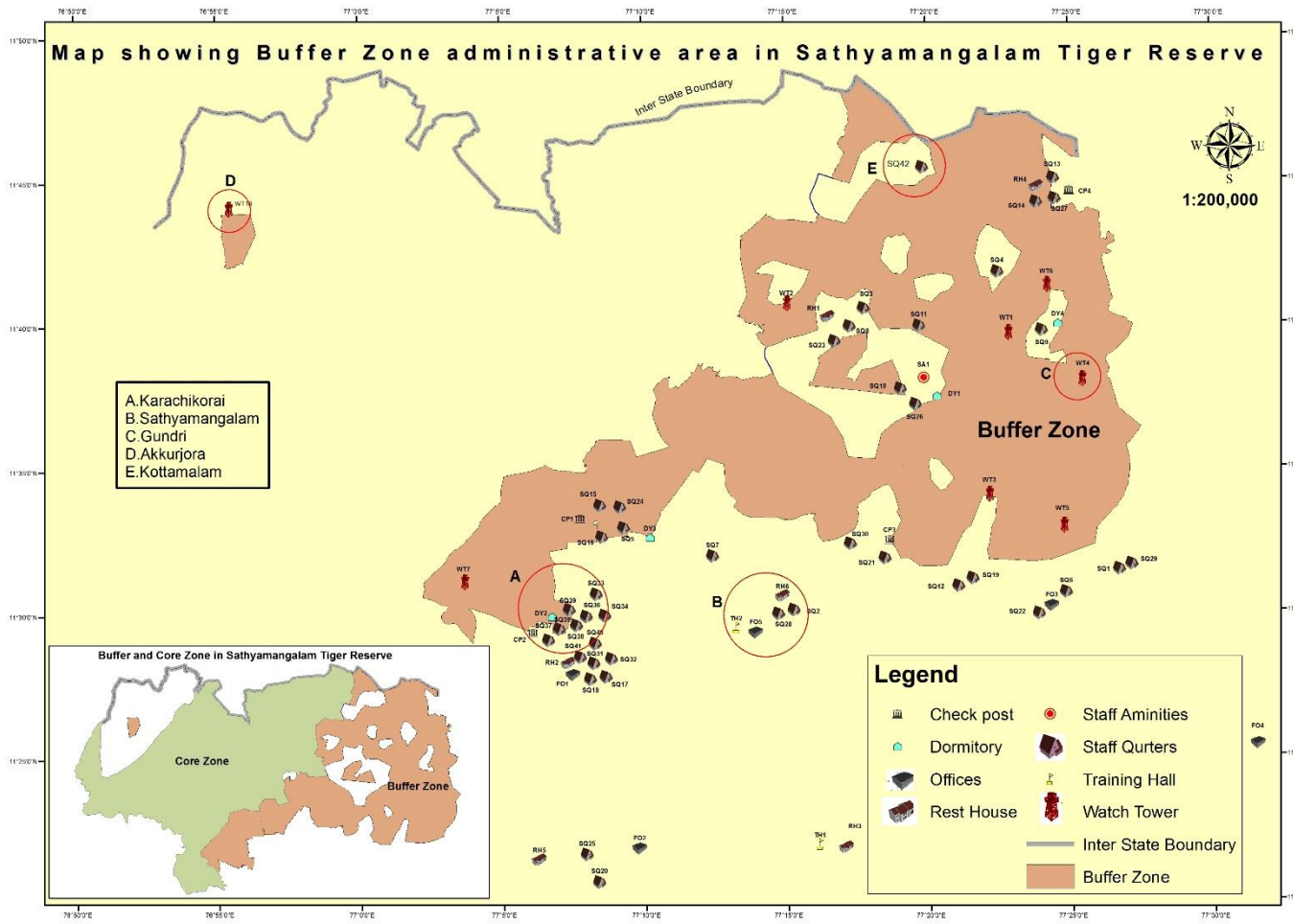

MAP SHOWING TREKKING ROUTES IN SATHYAMANGALAM TIGER RESERVE
77°0'0"E
77°10'0"E
77°20'0"E
77°30'0"E
11°50'0"N
11°40'0"N
11°30'0"N
N
W
E
S
1:170,000
Buffer Zone
1
2
3
4
5
6
7
9
10
0
3.75
7.5
15
Kilometers
Legend
Trekking Routes
Start Point
End Point
Buffer Zone

7.2.1.4. Zone Plan for Administrative zone

Administrative zone in buffer zone consists of office complex, rest houses, watch towers, staff quarters, forest check posts, ecological farm, etc., which is demarcated in the map given below.

All the existing infrastructures which are not in good condition have to be repaired and maintained. Further, more staff quarters as per the sanctioned strength, watch towers, rest houses, dormitories, office buildings, jeep sheds, meeting halls, training centers, staff recreation centers, canteens, eco-shops, approach roads, interpretation centers, etc., will be constructed in the administrative zone.

The veterinary clinic at karachikorai will further be developed for expanding its capacity and utility. A wildlife museum can be developed near the veterinary unit. Staff quarters will be developed for officers and staff for veterinary unit .At a later date field director's residence and office will be developed at Sathyamangalam either at Karachikorai or in any other suitable place. It is proposed to create new territorial range at Kadambur and necessary infrastructure will be created in Kadambur hills for the same. Inspection sheds needs to constructed at Uginium village, at TN Palayam range office complex and at Sujalkuttai. New guest house in Sathyamangalam sandalwood depot will be developed and old guest house will be maintained for facilitating inspection. The field directors office and guest house complex at Erode will also be maintained, Training and meeting halls will be constructed wherever required. New staff quarters check post buildings anti-poaching camps etc will be developed wherever suitable as per the needs that may arise in future for the purpose of strengthening protection and management



7.2.2. Theme Plans

The following are the theme plans:

1. Theme plan for human wildlife conflicts
2. Theme plan for protection
3. Theme plan for wildlife monitoring
4. Theme Plan on fire management

Theme Plan for Human-wildlife conflicts

This theme plan covers the Human wildlife conflicts of core zone also. This covers the entire buffer zone. The Human elephant conflicts, wild boar crop raiding, Deer crop raiding, cattle lifting by Leopards are significant issues that needs to be addressed for successfully securing community co-operation. The existing status and interlinked issues regarding human wildlife conflicts in Sathyamangalam Landscape has been detailed in Chapter No. 5.4of buffer zone plan and the same hold goods here.

In particular the villages around Kothamangalam, Kadambur, Ekkathur, Gundri, Vadavalli, Chikkarasampalayam, Kadahatti, Kotamalam, fringes of Akurjorai

R.F are prone to Human-wildlife conflict, the highest conflicts reported from Puliampatti of Vilamundy RF in Bhavanisagar range.

Interventions and activities will target four key dimensions of the negative wildlife interactions.

1. Biological dimensions covering activities dealing with set of interventions based on the natural behavioral ecology of Meta population. Conducting population studies. Conducting home range studies through radio collaring / DNA sampling, Population studies through camera trapping. Photo profiling of individual problem animals/ groups through camera trapping at exit points. 24x7x12 monitoring of identified migratory routes through camera trapping. Daily conflict mapping of elephant movement with sex, age, group composition and type of feeding. Engagement of nodal NGOs for assisting data compilation and analysis at division and reserve level.

Deliverables:

2. Habitat dimensions covering activities dealing with forest habitats and their capacity to nurture wildlife Meta population. List of activities include Restoration of native habitat (grasslands on special focus) through removal of invasive alien species and assisting natural regeneration. Creation of walkway mosaics in invasive alien species thickets of large patches. Point / Patch planting of selected pre grown tree species of 3.0 mts height in fenced / EPT covered patches thru mechanized planting with irrigation in strategically distributed patches. Assisting natural regeneration of fodder species in identified foraging habitats with catch water pits. . Contour trenching with seed sowing in known elephant habitats for augmenting natural regeneration thru in-situ moisture conservation. Creation of strategically placed Check dams and Percolation ponds to enhance ground water percolation to assist natural regeneration and to ensure extended water availability.

Research on mechanical, chemical and biological methods of destruction of invasive species. Setting up of Ex-situ Fodder and Grass conservation centre at STR.

1. Creation of summer water troughs for supply of water through vehicles. Packing contour lines in hillocks.

2. Creation of artificial water sources through bore-wells and troughs. Development of Hybrid vehicle (407 type) that will serve the dual purpose of watering the troughs and mobilization of anti-depredation team and tools.

3. Study of effect of linear intrusions over wildlife migration / movement. Development of cost effective design for Under Passes and Over Passes

4. Study of bottlenecks and disconnections due to urbanization/ private fencing, private barricades in all divisions.

5. Human dimensions covering activities dealing with the perspectives over HWNI and capacity of communities to cope up directly and indirectly coming into negative interactions. List of activities include Forming district level / hamlet level farmer / stake holder groups/societies and training & equipping them with handling interactions in identified conflict critical zones. Awareness programmers, posters, community booklets / manuals, warning boards, village level meetings, line dept. meetings thru NGOs, institutions.. Development of centralized message receipt and dissemination system. Exchanging information on movement of problem animals through Range level/district level social media groups. Establishment of Early Warning System in areas outside RF/PA. Providing solar / regular streetlights in hamlets.. Design, Development and supply of low cost energizer proto type for private fencing systems. Creation of vistas in forest roads, paths, common properties like roads, pathways. Creation of farmer sub groups and providing anti-depredation equipment. Line departments and land use planning. Training and appointing part time volunteers and linking them with hamlet committees. Identification and marking of old elephant movement areas outside RF. Development of mechanisms to Alert community through Public Address System.. Development of Electronic Surveillance System - Automated Movement Sensor and Alert System for forewarning/. Development Thermal Surveillance System on selected areas as Pilot Mode. Establishment of Control Room at District Forest Office and Range Offices with helpline facilities.

6. Management dimension covering activities dealing with the enhancement of organizational capacity and development of organizational frame work and tools to plan, execute and monitor efficient mitigation measures.

1. Providing anti-depredation vehicles for each Range. (One Pick-up jeep, One 407 model tempo for carrying tools, such as cages, ADT etc.,)
2. Providing one Force mobilization vehicle at division level (25 Seater)
3. Providing anti-depredation tools, (infra red cameras, night vision binoculars, lights).

4. Purchase of conflict mitigation tools and gears for carnivore related emergencies.

5. Acquisition of rescue tools and equipment.

6. Purchase and engagement of drones with thermal Cameras.

7. Watch towers at vantage points equipped with thermal cameras.

8. Dormitories / Rest rooms for anti-depredation squads at section level in all Ranges.

9.Developing new barriers wherever required and maintenance of existing physical barriers created under various schemes

10. Consolidation of dugout soil in EPTs with grasses, agaves or other suitable species.

11. Establishment of hanging fences at pilot level

12. Securing livelihood of tribal communities through barriers around tribal settlement

13. Study of existing barriers and their efficacy and development of divisional barrier plan.

14. Conducting study of the magnitude of HWNI of various species

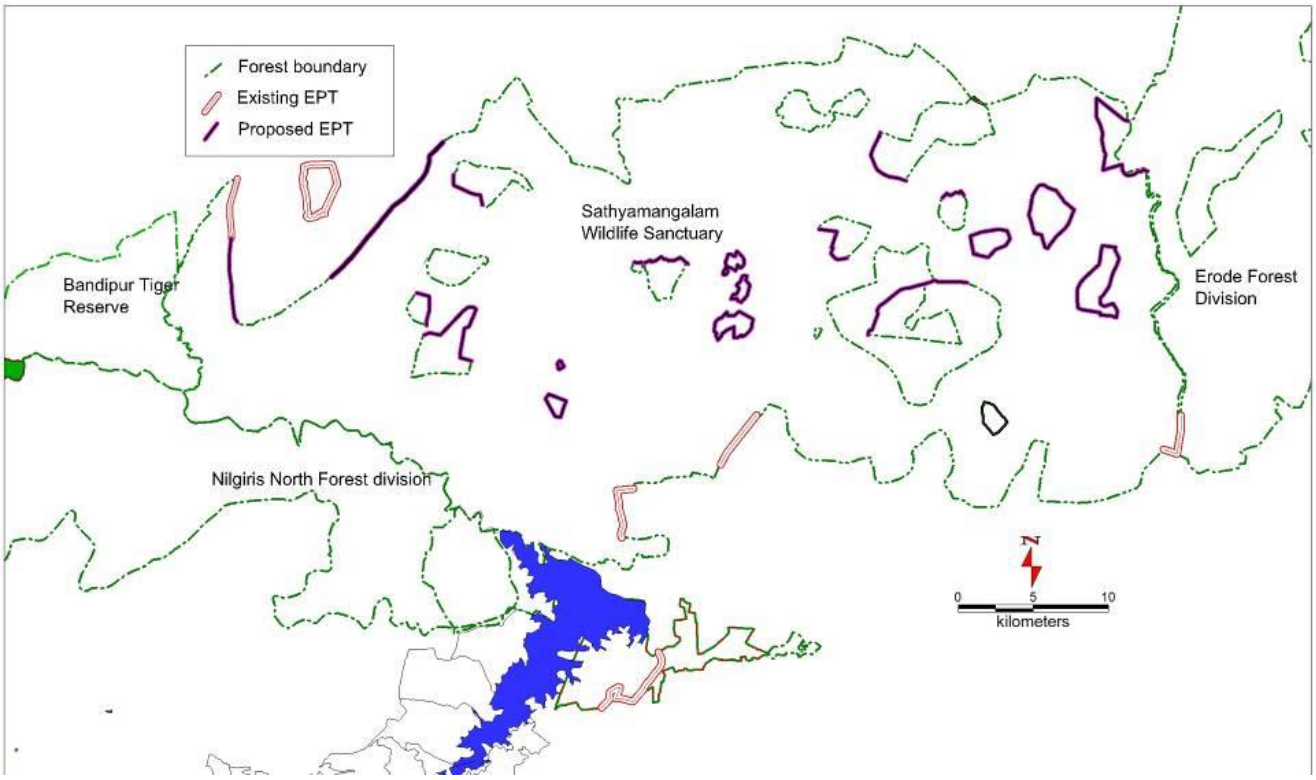
15. Development of Division level conflict management plans through outsourcingConducting training programme, exposure visits to officers, staff, APWs, RRT Units andanti-depredation squad

Following activities are identified as thrust activities for Human wildlife conflict;

1. Engagement of anti-depredation watchers & formation of local anti-depredation team with equipment and vehicles in Kadahattikottamalam, Akkurjorai, Kadambur, Bhavanisagar, Kottamangalam, Basavanapuram, Vadavalli, Kongarpalayam,
2. Creation of new Elephant proof trenches and maintenance of old elephant proof trenches
3. Creation of early warning systems and developing community information networks with range as units using social media.
4. Creating awareness and securing co-operation of communities in conflict mitigation.
5. Developing stray Leopard monitoring tool kits including camera traps and other equipment, capture, rescue and translocation infrastructure.
6. Anti-depredation activities require dedicated tool kits including crackers, torch lights, binoculars, drones, thermal sensors, infra-red

sensors, public address system including creation of helpline with a dedicated landline at every range offices.

7. Adequate anti-depredation vehicles will be purchased and deployed. day to day operational costs of the anti-depredation squad has to ensure for successful deployment of ADS.
8. The priority areas where EPT has to be undertaken has been depicted in the following map.



Theme Plan for Protection

This theme plan covers entire buffer area of 793.493 km^2. Protectionis the topmost priority of management of STR. 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 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 remaining 10 are in buffer zone, 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. At present the number of anti-poaching camps in buffer is insufficient to protect wildlife in particular Elephants and a precursor to establishment of an efficient protection mechanism in Sathyamangalam Tiger Reserve a 'Security Plan' has already been compiled based on unique prevailing conditions in STR, for strict compliance during the plan period, the same security plan is adopted to the buffer zone also as the buffer zone lies in the same landscape of erstwhile Sathyamangalam Division and the threats are also of the same nature.

The major threat that core and buffer of STR perceives is from poaching. Therefore, the first effort in this security plan would be to secure the Core from potential poachers. Poaching includes retaliate poisoning of larger carnivores for cattle lifting, snaring for venison in fringe areas, hunting, etc., Prey poaching of spotted Deer and other animals that stray out of forests in the Core is a big menace in STR. Towards this end, anti-poaching operations are being given supremacy, which is being described in detail in the following paragraphs.

There is a serious threat from illegal grazing, firewood removal and NTFP removal in buffer zone. This threat is common in all ranges particularly in periphery of villages and these happen continuously although on a smaller scale since the reserve is a human dominated landscape.

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) Smart patrolling software like the one developed by the Wildlife Institute of India for respective Tiger Reserves, namely M-STrIPES shall be used for integrating data with other protection parameters for effective monitoring and to reduce human bias.

2) There are presently 10 anti-poaching camps in the buffer zone functioning from existing camp buildings and watch towers. However, due to recent developments, there is further scope for establishing additional camps. The existing camps in buffer zone is given below. These additional camps will be stationed

around the Inter-State Borders and any other vulnerable location assessed from time to time.

3) Efforts will be taken to formalize the present liaison with other enforcement agencies namely Police, Special Task Force (STF), Q Branch, Prohibition Enforcement Wing, etc.

4) There will be a codified manual for day-to-day operations of every anti-poaching camp which shall be prepared by the concerned Forest Range Officer and the same shall be displayed both in the camps and the Forest Range Offices. Following points shall be covered in this manual, which shall be called Range Patrol Manual.

i) Each patrol team, on rotation shall comprise of at least one uniform staff authorized to use fire arms as per Tamil Nadu Forest Code Section 114.

ii) That there shall be a minimum of 4-5 anti-poaching watchers in a patrol team with frontline staff on rotation.

iii) Each patrol team shall carry essential equipment including wireless handheld-set, GPS, fire arms, pocket note book, bill hooks, ropes, etc.,

iv) At the end of the patrol, on a given day, it is the duty of the uniformed staff of the camp to debrief the camp activity for the day. He shall report along with track log and the extract of entries in the Patrol Register / Chowki Register (as prescribed in Phase-IV protocol) to the headquarters. Debriefing details shall be passed on through Radio (wireless) or in person to the respective Range headquarters. These details are to be regularly submitted to tiger monitoring cell and the reports shall also be placed before the Deputy Director on a weekly basis for their perusal and instructions and periodically to the Field Director.

v) As per the patrol plan to be developed by the concerned Forest Range Officer, main activities should include visit to important waterholes in their jurisdiction, look out for signs of human presence (cigarette / beedi butts, left over materials of cooking, unusual and sharp cuts of broken branches etc.,). This intensity especially, during the nights should be undertaken on an increased frequency during full moon nights. They shall also look out for signs of traps, snares etc., in the surroundings of waterholes which are in proximity to human habitations.

vi) The Forest Range Officers shall conduct frequent mock drills of detection of wildlife crimes, investigation, response time in reaching this spots, recording of evidence etc., to keep these subordinates in high alert.

vii) The anti-poaching camps shall be equipped with solar powered lighting, chargers for wireless sets and mobiles, required furniture, provide cooking utensils and ration for cooking, provide LPG, storage facilities and all other basic amenities. Each camp shall also have storage facilities to keep the fire arms securely.

viii) Each anti-poaching camp will have a minimum of 5-6 anti-poaching watchers, who would be on rotation. On rotation, anti-poaching watchers attached to a camp shall also be given duty like, manning control rooms, gather intelligence, highway patrol, attending to wireless and any other emergency work in the range.

ix) Other field officials like the concerned Forester, the Forest Range Officer shall ensure that they stay in the camps as frequently as possible but not less than at least thrice a week.

x) Senior officials namely the Field Director and the Deputy Director shall visit the camps as frequently as possible to motivate and guide the staff manning the camps.

xi) There shall be a “Joint Patrolling” 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.

7.2.2.1.1.1. Planning and Execution of Protection work at Range level:

Forest Range Officers will be holding the key to succeed in planning and executing effective protection. Towards this, there are certain cardinal principles in planning protection strategy. Following generic prescriptions will guide the development of an effective and workable protection strategy:

1) Identify all vulnerable points especially, high risk areas with respect to various protection issues and mark them on the range map which should be displayed in the Range office.

2) Identify and delineate areas prone to frequent man-wildlife conflict.

3) Identify and delineate water-sources/waterholes on the periphery of the Tiger Reserve.

4) Identify and delineate all human habitations as high risk areas.

5) List out details of old offenders pertaining to last 10 years.

6) Identify and delineate road net-work for transport of men and material in case of emergencies. The details shall include the type of road, distance from point to point, time taken for travel from one point to another etc.,

7) Location of parking area of emergency vehicles and time taken to travel to high risk areas.

8) Identify high density spots of tiger / co-predators / prey and mark them on map.

9) Mark spots of wildlife poaching during the last 5 years on the map.

10) To develop "Patrolling Plan" for his/her range which shall include identification of all paths around of each anti-poaching camps, assign nos. to each of the paths, paths to cover all waterholes, vulnerable areas, ensuring foot-fall over the entire range area, follow-up on debriefing, designating patrol team leader, rotate the anti-poaching watchers of different camps on a periodic basis to ensure camaraderie, recording observations during the patrol like sighting of tigers and other animals along with GPS data etc.,

11) As per the security map anti-poaching patrols should also perambulate fringe areas of timber-bearing forests opening towards adjoining Nilgiri North forest division, Cauvery WLS, M.M.Hills sanctuary, Bandipur and BRT Tiger Reserve. There shall be joint patrolling with the sub-ordinates from this forest division along such vulnerable spots on a fortnightly basis. There shall be an exchange of dossiers of past offenders.

12) To check incidences of firewood removal and illicit grazing, there should be joint programs with other Government agencies/Departments, NGOs, to identify and implement schemes that can substitute use of wood (for cooking) and encourage stall-feeding of cattle. However, patrolling along vulnerable beats should be continued by the beat staff.

13) In order to detect wildlife trade, elevated scanners with computer peripherals will be established at main highway entry points and in other locations CCTV based scanning system will be established.

14) ***Criminal profile dossier***: Maintain dossier of past criminals and those who operate across the States. Since the Sathyamangalam Tiger Reserve has common boundary with adjoining States of Karnataka, details of such offenders shall be shared with the adjoining States. This dossier shall be maintained in the form of register, so that there is a continuity of information flow as also serves as a

means of easy retrieval. The dossier shall contain other important details of past offenders including their photographs, whether they are main poachers or accomplices, their addresses, property owned by them, history of convictions, among others. Also details such as physical appearance of the offenders, their marks of identification, details of family, their employment, etc. are to be incorporated. The Forest Range Officer concerned shall also ensure that there is a surveillance of movements of these past offenders to keep a tab.

15) The Deputy Directors should obtain details of licensed weapon holders residing in the vicinity of the range as also gather intelligence regarding illicit weapons. In case of the latter, the Superintendent of Police, Erode and the District Collector/District Revenue Officer, Erode. Regarding details of license to weapons, the Forest Range Officer must request for details from Form-3 and Form-5 Maintained under Arms Act. This shall be done by all Forest Range Officers for their jurisdiction.

7.2.2.1.1.2. Communication System-Wireless:

Wireless system should be put into use for efficient protection system. Since, wireless communication is only method by which instant connectivity is ensured in remote areas this should be made systematic in day-to-day usage.

All range activities must be reported to Deputy Director Office daily in the morning and Deputy Director Office will prepare a Daily Situation Report in the form prepared for this which is given in the annexure

There shall be daily communication from the patrolling parties / anti-poaching camp to the control rooms and “link” stations. The person in-charge of communication / debriefing shall report the camp activities, events, observations etc. after return from patrol duty. They shall also mention about sightings of tigers, co-predators and major ungulates on a daily basis along with their locations, apart from recording in the daily chowki register. The sighting of Tigers, Leopards, Elephants and other endangered animals will be codified and used during the communications over wireless or mobile in order to avoid even a chance hearing by the poachers. These codes will be kept confidential and changed at regular interval by the Field Director.

Besides, each patrol team shall contact the proposed control room on an hourly basis to report their current locations and significant events, if any. Even if there are no events they shall mention “nothing to report” (NTR).

The Field Director and the Deputy Director shall conduct “Security Audit” for buffer zone also.

Theme plan for Fire Control Management

This theme plan is prescribed for fire control management and is dealt in detail in chapter No. 10.4.

Proposed Fire Management Strategy

7.2.2.1.1.3. Early Burning System Approach

Early cool burning / control burning of grasslands and areas with heavy dry biomass like road sides, beat boundaries, patrol paths boundaries, interstate boundary lines, weed removal areas and other vulnerable locations is an important consideration as part of wildlife management techniques. The areas to be control burnt must be inspected and approved by the Deputy Director and the controlled burning must be completed by early January.

7.2.2.1.1.4. Fire lines

Existing fire lines need to be maintained on annual basis during the month of December – January so that they act as fire breaks in the event of any fire hazard. New fire lines may be created ideally at 6 m width or 3 m width wherever necessary based on fire vulnerability and mapping.

Fire watch systems

Adequate fire watchers will be employed in strategic locations from the period December to May to detect any occurrence of fire early and extinguish forest fires before they assume serious proportion. Fire watchers will also patrol fire vulnerability areas and perambulate and patrol those areas as a preventive measure. Fire watch towers will be created in strategic locations as deemed fit. Existing fire watch towers will be maintained.

7.2.2.1.1.5. Publicity and Awareness

During the fire seasons, regular meetings must be held in the neighbouring villages and the staff must maintain constant touch and information network to keep the intentional fires under control. A notification may be published in the District gazette requesting communities to assist the Forest Department in early detection and control of fire. Street plays and rallies may be conducted to sanitize the communities on fire prevention. Posters and wall signages may be employed.

7.2.2.1.1.6. Fire Control Operations

The foremost work is to detect the movement of the wind, so as to determine the fire front. The fire beating is done by making clearance of the fuel load and beating edge of the fire. The clearance is also done on the counter at the safe distance and counter-fire is burnt. The idea is to remove the fuel load from the direction of fire advance so that it dies out. Thus strip cutting, beating the fire edge manually and counter firing are the important fire control operations. The use of modern fire control tools such as blowers, etc., will increase the efficiency of fire protection.

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.

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.

The prescriptions provided in Chapter No. 10.4 have to be considered as part of Theme plan for Forest Fire prevention and management.

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 of core zone and the same will be applicable to buffer zone also).*

Chapter. 8. Eco-development and Livelihoods

8.1 Policy and Institutional Framework

Tamil Nadu Forest Department has been working very closely with the communities living in the fringes of the forests and also tribal communities living within the forest. From 1997 onwards, the Sathyamangalam Forest Division has been engaged in developing formal dialogue with the communities through Joint Forest management approach. The JFM guidelines of Tamil Nadu were issued during 1997. The vehicle for institutionalizing for participatory management at village level was designated as village forest committee (VFC). These VFCs discharge their duties towards participatory conservation through 2 tier institutional arrangement viz., 1. General Body & 2. Executive Committee. The Executive Committee is chosen by the General Body and the Member Secretary for this is the Forest Range Officer. The VFC functioning was modelled based on the various statuary codes of Tamil Nadu Government and each VFCs were also given a seed capital which was deposited in a Bank account called Village Forest Development Fund. The VFCs were monitored and controlled by the District Forest Officer. Later on after advent of National Afforestation Project from 2000 onwards, VFCs were formed to undertake reforestation. Some VFCs were also modeled as per guidelines of the NAEB and reported to District Level Forest Development agency.

From 2012, Eco Development committees were formed under the project support of JICA .the Eco-development committees were modelled on the designs of VFCs under Tamil Nadu Afforestation Project (TAP) but with the forester as member secretary. Focused eco-development activities have been attempted sporadically only due to lack of funding from any agency.

As the Sathyamangalam Tiger Reserve's buffer zone supports a large human population, eco-development activities need to be financed for ensuring a harmonized co-existence of wildlife and human beings. It is a challenge to park management to seek the attention of possible donors to embark on these quintessential activities. The existing community institutions formed by forest department are detailed as below;

8.1.1. Existing institutions

8.1.1.1. EDCs under TBGP

List of villages to be included) Committees are function in 12 revenue hamlets of Sathyamangalam, T.N. Palayam and Germalam Ranges. These Eco Development Committees were formed under Tamil Nadu Biodiversity Conservation and Greening Project (TBGP) in the year 2012 – 2013. The business conduct of the EDCs at present are not covered by any statuary guidelines and the District Forest Officer may choose the framework and institutional structure of the committees as per ground conditions. For conducting the business the guidelines available under Tamil Nadu JFM guidelines 1997 and guidelines of NAEB will be followed subject to legal provisions of the Sanctuary and Tiger Reserve.

8.1.1.2. VFCs under TAP / NAP

Village Forest Committees were formed under Joint Forest Management Programme through the Tamil Nadu Afforestation Project funded by JBIC. VFCs are the vehicles of the participatory management. Each VFC has a general body comprising all the village families and an executive committee with 15 or more EC members, the president of the VFC is elected by the EC .Sizeable funds have been parked in a village forest development fund VFDF which is used for advancing microcredit for microenterprises. The forest range officer functions as member secretary. There are 43 VFC (20 in Phase-I and 23 in Phase-II of TAP). Appreciable socio-economic development programmes (community development activities)were undertaken by Forest Department in these villages such as roads, drinking water facilities, community halls, drying yards, skill development programmes, social function amenities, equipment to schools, micro credits for income generation activities, petty shops, community toilets, electricity facilities, drainage, ration shops, etc.,

At present all these VFCs have to be converted into EDCs as these committees are working very closely with the Forest Department for protection of Forest resources. The Village Forest Development funds available in the VFCs shall be permitted to operate under the ambit of the EDCs. The roles and responsibilities of the EDCs willbe spelt out separately.There are 25 JFMC villages under NAP of NAEB which are not very active, the same will be converted into as EDCs with a change in roles and responsibilities.

8.1.1.3. Tribal VFCs

Tribal Village Forest Committees were formed in tribal villages for the sustainable utilization of NTFPs in continuation to the Government order 79 in 2003 (Copy of GO enclosed in appendix…) wherein the NTFP rights over 20 NTFP items were awarded to Tribals of Tamil Nadu. Accordingly separate NTFP harvesting committees named as Tribal VFCs were formed in Tribal hamlets, both in core &buffer zones. The tribal's were harvesting NTFPs and selling through Sathyamangalam Hill Tribes Society and later to LAMPs society prior to this. The Tribal VFCs working in this reserve-Buffer zone were formed with the model of the TAP JFMCs and a portion of the sale amount was credited into the VFC account The said funds are used for socio-economic development including provision of revolving funds. These committees may be merged with their parent EDCs to avoid duplication of institutions.

Proposed intuitional framework:

The Eco-development committees will be broadly formed following the structure, roles and responsibilities as suggested in the NAEB guidelines. The EDCs will be registered with the deputy directors. The EDCs will have a general body and executive body .The tenure terms and conditions of functioning will be modelled on NAEB and JFMC guidelines. The EDCs executive committee will meet once a month and the general body once in 6 months. The financial conduct of the dc will be as the guideline issued under JFM by the state.The accounts of the VFCs will be audited by an auditor employed for the purpose. Monthly report on the functioning of EDCs will be provided to the field director for monitoring purpose. The deputy directors will scrutinise the records of EDCs once in year and produce a consolidated report to the field director in a concise format. The field director will be the final authority for issuing any operational guidelines regarding the functioning of the EDCs. A federation of EDCs will be created at the tiger reserve level with appropriate structure as deemed fit by the field director.This federation can interact with the officers at the Field Director level and other District Officers on regular basis.

8.2 Livelihood Support Initiatives through village micro-plans

As proposed already existing committees formed under different projects / schemes will be converted into eco-development committees. In addition to that in the eco-development committees will be formed in phased manner forsecuring participatory conservation. Each eco-development committees will have a dedicated

micro-plan for 5 years detailing the list of activities year wise to be undertaken by concerted efforts of part management and district administration. Suitable NGOs need to empanelled and financially supported for facilitation of the constitution of committees and to support hand holding and escorting of the communities. The stages of the micro-plan will be as follows.

1. Participatory rural appraisal assisted by NGO
2. Preparation of the Micro-plan by Range Officer indicating the activities proposed for socioeconomic development of the communities.
3. Vetting of the Micro-plan by village forest committees
4. Approval of the Micro-plan by the Deputy Directors concerned

. The ways and means to finance the activities identified in the micro-plan also needs to be incorporated in the micro-plan. Funds can be sourced out through NTCA, District Administration, Other state plans such as SADP, CAMPA, Sathyamangalam Tiger Foundation etc.,

The EDCs will function as a strong micro financing institution to provide microcredit to individual families for livelihood options. The loans such provided will be as per the guidelines of TAP and TBGP where certain stipulations and ceiling have been laid down. Alternate income generation (AIG) activities namely, securing livelihood, imparting vocational training, support education, etc., would be undertaken in these villages.

In addition to employing the native workforce in conservation activities of the Tiger Reserve, a bouquet of cross linked activities with tiger reserve management needs to be undertaken to assist the communities in socio economic development. Micro enterprise training programmes and skill development training programmes need to undertake to expand the capacity of the communities. Marketing facilities of products must be made available through existing established institutions and new facilities like eco-shops etc may be created to market the items produced by rural enterprises. Horticulture can also be taken up as a major programme in the tribal areas and high yielding hybrid varieties can be supplied to them at subsidized price or free of cost through Horticulture Department.

The EDCs will also foster Community development works (CDW) include ensuring basic minimum needs of the individual families such as housing, education, nutrition, electricity, sanitation, etc. It is imperative to improve the financial stability to ensure sustainability of the existing village level interface institutions by revisiting

existing micro-plans. While TAP and NAP helped in institutionalizing participatory forest management at village level, their continuity is threatened at several places in view of the limited availability of funds. In order to consolidate the social capital harnessed through these institutions, it is essential to support them through continued provisions of funding for their community development and income generation activities

8.3 Integration of Rural Development Programmes

In Tamil Nadu the Forest Department has ensured District Level integration mechanism for tribals and villagers living in the fringe forests. Such a mechanism is successfully implemented in Erode District too. District level JFMC coordination meeting is being conducted once in three months, by District Collector along with the District Forest Officer as member secretary along with all line department officers and representatives from JFMCs. The Presidents/member of EDCs, VFCs attend this meeting. The District level officials from various line Department attend these meeting and grievance of villagers are heard on priority basis and instructions are given to line department officers to include the works on priority basis in their Annual Plan of Operations which is reviewed in every meeting for status of implementation. This gives the best result by way of getting good will from the villagers in PA management. Also, a state level committee chaired by the Chief Secretary of Tamil Nadu monitors and reviews functioning of the District Level grievance redressal mechanism. The rural development programs needs to dovetailed with the plan of activities identified in the micro-plans of EDCs..

It is very important to rope in all the line departments to assist the eco-development activities in the reserve area, for this purpose regular sensitization and awareness and exposure visit programmes needs to be undertaken for district level officials and first & second level officers.

8.4 Monitoring and Evaluation

The Monitoring and Evaluation mechanism will be as detailed in the JFM guidelines of Tamil Nadu 1997. District Forest Officers will be visiting the VFCs, EDCs as per his / her convenience to assess the performance, to undertake annual scrutiny of the committees. He / She will also be monitoring the various works undertaken by the EDCs as to the quality and statuary conformities. Any disputes that arise in the EDC, the Deputy Director will be the appellate authority. The Deputy Director will have all authority to dissolve any committee, reconstitute any committee, expel any member, may regulate and issue order regarding utilization and transfer of resources including financial resources.

Annual audit of accounts will be conducted by the external agency and the results submitted to the Deputy Director for scrutiny and necessary follow up action.

Chapter. 9. Implementation Strategy

9.1 State Level Monitoring Committee

To facilitate coordination and mainstreaming of eco-development and wildlife concerns at the field as well as State level, the State level monitoring committees and District Level coordination committees are suggested by NTCA.

9.1.1. Duties and Responsibilities:

The committee will facilitate coordination and mainstream wildlife concerns at landscape level. The Committee will meet at least once in a year. The committee will be formed by the Government as per the guidelines of NTCA.

9.2 Tiger Conservation Foundation and District Level Coordination Committee

The details regarding the Tiger Conservation Foundation has been dealt under Chapter 13.2 of Core Zone Plan.

A separate District level co-ordination committee is not required as the Government has already constituted a District Level JFM committee. The same committee will carry out landscape level coordination once in 3 months.

9.3 Formation of Eco-development committees (EDCs), Confederation of EDCs and other supporting institutions like Self Help Group (SHGs) and Nature Clubs

The same has been already dealt in Chapter 8.1 under Policy and institutional framework.

9.4 Livelihood support Initiatives through village Micro plans

The same has been already dealt in Chapter 8.2 under same head.

9.5 Integration of Rural Development Programmes

The same has been already dealt in Chapter 8.3 under same head.

9.6 Monitoring and Evaluation

The same has been already dealt in Chapter 8.5 under same head.

Chapter. 10. Mainstreaming strategy with various Production Sectors

10.1 Forestry

As the buffer zone is also a part of protected area coupe operations are not permitted legally. However forestry operations such as artificial regeneration through gap planting /assisted natural regeneration in degraded forest patches with fodder fruit and other local species may be taken up in priority areas.

There is huge scope of taking up agro forestry and farm forestry plantations in private farm lands. The existing Tree Cultivation in Private Land scheme under Tamil Nadu Biodiversity Conservation and Greening Project may be made use of to take up plantations in farm lands. As most of the farm lands are rain fed thus rendering it economic productive for 4 to 5 months only, the tree crops that grow all through the year will enhance the economic returns to the farmers. Tree crops in farm lands are a better insurance against climate variability and safe land use against wildlife conflicts. Hence, it is recommended that trees outside forest may be taken up in a large scale through designing a special project under relevant schemes. Similarly inside forest, since the area receives scanty rainfall we may take up broadcasting/dibbling of seeds of indigenous species for increasing forage species for the wildlife. Thrust would be on species like *Zyziphus mauritiana*, *Z. xylopyrus*, *Z. jujuba*.

10.2 Agriculture

The buffer zone villagers as also in the fringe villages are raising agriculture crop for the livelihood. Silvi-pastoral mixed cropping and other combined agricultural practices can be encouraged through line departments.

Unscrupulous application of pesticides and insecticides that cause mortality in the Carnivores and Herbivores needs to be discouraged. There is a great scope for promoting organic farming in this landscape, particularly in the upper plateau. Unscientific choice of crops and improper methods of cultivation in sloppy lands are leading to the degradation of farm lands in hill areas leading to the overall ecological instability through a accelerated erosion. Under SADP, the tribal lands can be taken

up and leveling and bundling may be undertaken to secure the productivity of farm lands.

The farmers in the buffer zone of Sathyamangalam Tiger Reserve, are cultivating plantain crop which exacerbates human elephant conflict. There are few deaths of Elephants recorded in the past due to consumption of crops applied with pesticides. It is imperative to encourage farmers to go for alternate crops and use bio-pesticides. Within the buffer zone of Tiger Reserve experimental farm crops with native herbicides, pesticides can be tried as a demonstration plot to farmers also different plantain varieties can be planted in selected demonstration plots in reserved forests of Elephant conflict area to study the possibility of isolating varieties that do not attract Elephants. The fencing used by the farmers has to be regularly screened to prevent electrocution of wildlife. In the long run solar energizers can be manufactured by the Tiger Reserve and sold at subsidized rate. Low cost alarms can also be manufactured by the Tiger Reserve as a cottage industry and supply to other divisions of state as experimental basis.

Many tribal communities in Tamil Nadu engage in Tapioca cultivation, as root tubers are removed in hilly terrains that soil gets eroded. Many studies concluded that continuous Tapioca cultivation without crop rotation with legumes will result in nutrient exaction thus improvising the soil quality leading to decline in yields on a temporal scale. Training and exposure on scientific farming techniques needs to be imparted. Tapioca value addition through establishment of Tapioca processing units may be promoted through EDC federation through the assistance from District Administration and TAHDCO.

10.3 Integrated Development (Eco-development, Development through District Administration)

As explained in detail under Chapter 8. The micro-plans will be developed for buffer zone villages and activities identified will be under taken through sourcing of funds from various Government and non-government agencies including DRDA, the District Collector will be actively involved in this process. The district level committee headed by the district collector will monitor the same

10.4 Tourism

The tourism in Bhavanisagar dam is leading to a lot of littering and disturbance and the line department needs to be sensitized. The owners of the resorts / farm houses in the buffer zone of the reserve are important stake holders

and they may be regulated through the eco-tourism guidelines of the State Government.

10.5 Fisheries

The fishing in reserve forests part of the Bhavanisagar dam and Moyar River needs to be regulated to protect native fishes. In the long run areas which are regularly accessed by the wild animals for water from Bhavanisagar dam needs to be prohibited from any fishing activity. Dynamiting should be totally avoided. There are few cases of elephant deaths are recorded due to impaction by injection of fishing nets. The fisherman needs to be sensitized on the same. The PWD and fisheries department may be sensitized on the need for freshwater fish conservation.

10.6 Tea and Coffee Estates

Very few estates occur in the buffer zone areas and the cultivation needs to be eco-friendly. Labor staying in these estates needs to be sensitized on precautions to be taken to prevent herbivore and carnivore attacks. Adequate lighting should be maintained in the labour colony of this estate to prevent conflicts.

10.7 Road and Rail Transport

There is no rail transport network in the buffer. The existing road network has to be maintained. At present the movement of two wheelers has been stopped from 6 pm to 6 am in the Ghat stretch. By the request of the Tiger Reserve management and District Collector's proceedings, heavy loaded lorries (14 to 16 wheelers such as Taurus vehicles) transit have been stopped from 10.00 pm to 6.00 am to aid wildlife conservation and for free movement of wild animals across these linear intrusions.

From 2013, speed breakers with metal barricades have been placed in strategic locations based on animal crossing. During 2015-16 on request of park management rumble strips have been laid by National Highways, which is insufficient and the design adopted at present does not deter the vehicle drivers to reduce the speed. Instead of this rambler strips mild speed breakers have to be installed like in the stretch between Dimbam to Punjanur for efficient functioning of speed breakers. Further, adequate awareness boards and signages needs to be installed at suitable locations to prevent road kill and public awareness.

All the public transport vehicles especially private owned will be levied conservation fee for passing through linear intrusions inside the Tiger Reserve limits.

10.8 Industry

The industry will be governed by the guidelines issued under the eco-sensitive zone, on case to case basis of ecological sensitivity. The functioning of these various types of industries will be governed by pollution control board, HACA, national wildlife board guidelines and other regulatory / statuary provisions.

10.9 Mining

In buffer zone there are many smaller quarries (for minor minerals / construction materials). These quarries are located on Southern boundary of T. N. Palayam Range, Kottamalam of Germalam Range and Eastern boundary of Bhavanisagar Ranges. These quarries will be regulated as per existing Rules and guidelines by examining from the view point of ecological sensitivity with each and every case.

10.10 Thermal Power Plants

There are no Thermal Power Plants in the buffer zone area.

10.11 Irrigation Projects

The Bhavanisagar Dam was the first major irrigation project in the state of Tamil Nadu which falls in the periphery of Bhavanisagar Range, buffer zone. Water from the dam feeds all the surrounding agricultural land through left bank and right bank canal system in the District. Cultivation during summer in dam back waters should be totally stopped as it is a very good foraging ground for herbivores especially Elephants. This will also reduce the human elephant conflict in this region form the current high level.

Gunderipallam and Perumpallam Dams in T. N. Palayam and Sathyamangalam Range also are mini irrigation project dams in the buffer zone of the reserve for the irrigation needs in the surrounding areas. Minimum storage levels need to be ensured as these are the major drinking water sources for the wildlife in particular ungulates and elephants during summer seasons.

10.12 Temple Tourism

About 30 places of worship are in the Buffer Area**.** Most of them have got right of way to these temples as admitted in the notification of RFs and majority of

them are small temples worship by local tribals and other fringe villagers. These smaller temples are not a threat to the wildlife conservation.

Temples within the boundary of the reserve in buffer zone like Bannariamman Temple, Malliammandurgam, etc., are attracting large number of pilgrims, especially during festivals and annual fest.

The guidelines issued by the NTCA on regulation of temple tourism have been incorporated in the ecotourism plan annexed to this plan. The guidelines should be scrupulously followed by the temple authorities' .The entry and exit of vehicles, and number of visitors should be regulated during festival season. The pilgrims need to be advised not to disturb the forest environment and throw waste and plastics inside the forests. Forest fire, littering, noise pollution and vehicular transport at odd hours are to be prevented. The Temple authorities must take the responsibility of cleaning up the area immediately after the annual festival. Appropriate arrangements must be made for public conveniences and accommodation to reduce man-animal conflict in these areas. The temple authorities need to be sensitized by regular awareness programmes.

Efforts were taken in the year 2014, to restrict the visiting days and time, number of vehicles, in major pilgrim places and it is being followed. The support of NGOs, student volunteers and other enforcing agencies need to be utilized in removing the litter though sanitation drives.

Adequate eco-sanitation watchers need to be engaged to remove plastic litter in sensitive locations.

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

10.13 Communication Projects

No major communication projects are found in the buffer zone of the Tiger Reserve. Any further projects will be regulated bases on the existing guidelines and rules.

Chapter. 11. Research, Monitoring and Training

11.1 Research Priorities, Main Projects & Implementation

This has already been dealt in chapter 8 of core zone plan and the same is extended here for adoption.

Implementation

Field Director, Sathyamangalam Tiger Reserve along with Deputy Directors and Forest Range Officers will implement /accommodate any outcome of research projects in the landscape in their APOs. Few good NGOs like WWF and OSAI and various premier wildlife research institutions such as SACON,FCRI need to be roped in for coordinating with the Department for monitoring, survey and training process. The field director can initiate MOUs with local scientific institutions, NGOs, researchers on subjects of imminent management interest.

11.2 Monitoring Frame Work

This has already been dealt in chapter 8 of core zone plan and the same is extended here for adoption.

11.3 Training Needs Assessment

This has already been dealt in chapter 8 of core zone plan and the same is extended here for adoption. .

11.4 HRD Plan

This has already been dealt in chapter 8 of core zone plan and the same is extended here for adoption.

11.5 Wildlife Health Monitoring

Wildlife, domestic animals and humans share a large and increasing number of infectious diseases. There is a need to address these diseases across the species if their economic, social, and other impacts are to be effectively minimized. Hence, wildlife health monitoring is necessary.

11.5.1. Wildlife Health monitoring

“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 connecting 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

11.5.2. 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.

A wildlife veterinary unit is already operating in STR with a forest veterinary assistant surgeon drawn on deputation from animal husbandry department. necessary infrastructural support and capacity building support has to advanced for effective functioning of this veterinary unit.

The duties of the wildlife veterinary assistant surgeon will be to

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 checking water samples in and around forests / PAs and for providing de-worming medicines, vitamins and mineral supplements to cattle grazing in fringe areas and for collecting livestock disease data and follow-up the same periodically.

5) Conduct ring vaccination, if there is an outbreak of disease.

6) Monitor problematic animals for taking appropriate management actions.

7) Prepare periodical report regarding wildlife health monitoring activities and submit to Deputy Director & Field Director.

8) Provide training to staff of STR in various aspects of health monitoring and management, chemical restraint, autopsy basics, collection and preservation of samples.

9) Provide technical support to management in proper preservation and maintenance of specimens if required.

10) Sending samples to laboratories at Centres of Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Animal Husbandry Department, Forensic lab and other recognized & authorized institutions for analysis.

11) Develop a field guide on wildlife diseases for wildlife managers and biologists and field staff.

12) Coordinate with other agencies for control of stray dogs in and around STR.

13) Coordinate with local self-government, line departments, NGOs and stakeholders for creating awareness on wildlife health related issues, zoonotic diseases etc.

14) Assist all rescue, translocation and capture operations

11.5.3. Wildlife health 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 like biannual vaccination, checking of waterholes, monitoring of animal behavior, providing salt licks and anti-helminthes medicines.

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..,) will be collected at the Detection Monitoring level by the field staff.

3) 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.

4) Disease control operations (during an outbreak)

5) Disease impact assessment (at the end of an outbreak)

6) Evaluation of management strategies

11.5.3.1. Disease Preventive Measure Programme.

1) Periodical vaccination of village cattle against contagious diseases and de-worming
2) Controlling the population of stray dogs by implementing ABC programme around protected areas
3) Periodical vaccination of stray dogs in fringe areas
4) Continuous monitoring of infectious disease by sending sample from each possible wildlife death
5) Provide separate drinking water facilities to cattle and other domestic animals / stray animals in fringes to prevent contamination of water and spread of contagious diseases to wild animals.
6) The Forest Veterinary Officer and Mobile Veterinary Unit prepare for a annual action plan for prophylactic immunization in consultation with State Animal Husbandry Department.

11.5.3.2. Disease surveillance.

Forest veterinarian should regularly keep in touch with veterinary deprtmentand 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.

11.5.3.3. Disease Diagnosis and Health Monitoring

Post mortem conducted on wild animals in every death and biological sample will be 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.

a) Safe disposable of carcass

After the postmortem care is given to dispose the carcass if the animal is diagnosed as affected with infectious diseases to avoid further spread and outbreak. The expenditure towards post mortem needs to be met from relevant allocation.

b) 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.

c) 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.

11.6 Mortality Documentation and Survey

11.6.1. 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.

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 .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. Poor health can lead to excessive predation. But other man-made actors 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 monitored, regulated, prevented as the case may be.

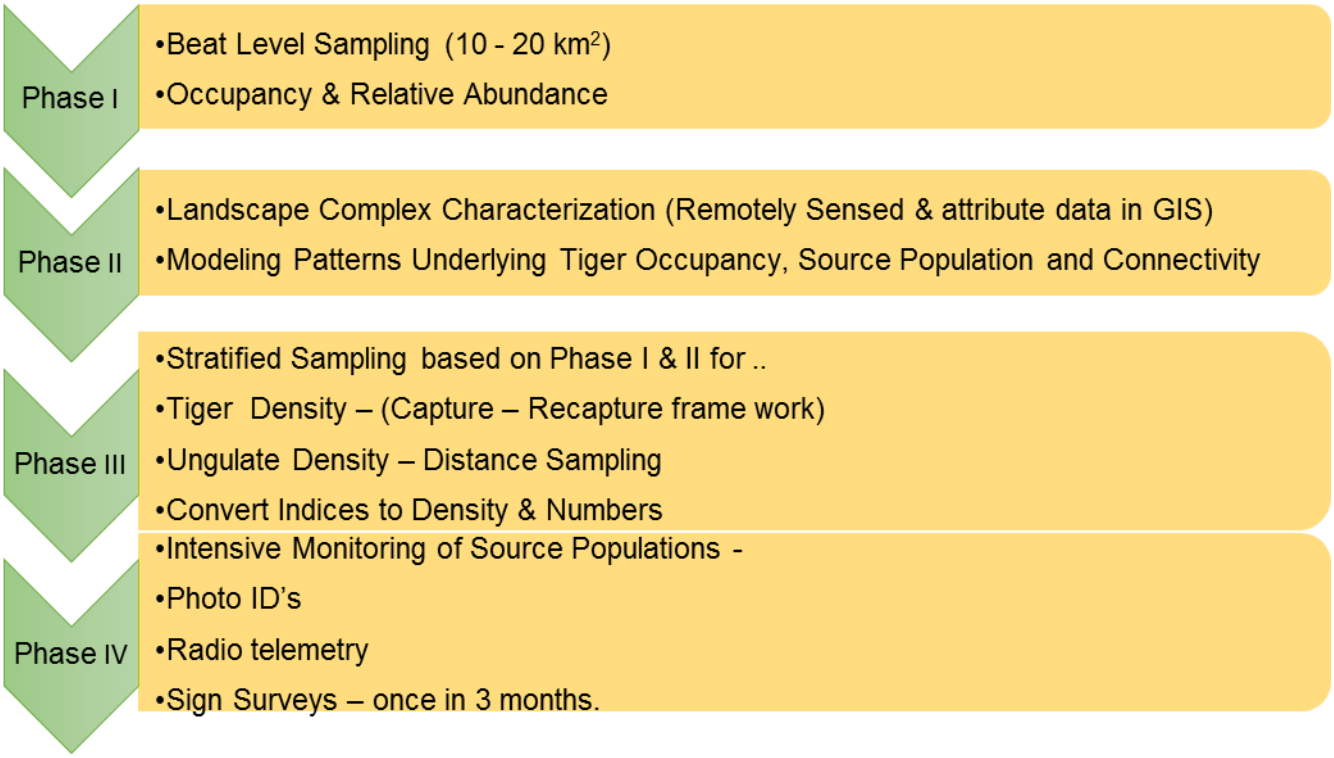
Chapter 12. Tiger Population and Habitat Assessment

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.

12.1. 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.

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



12.2.1. 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.

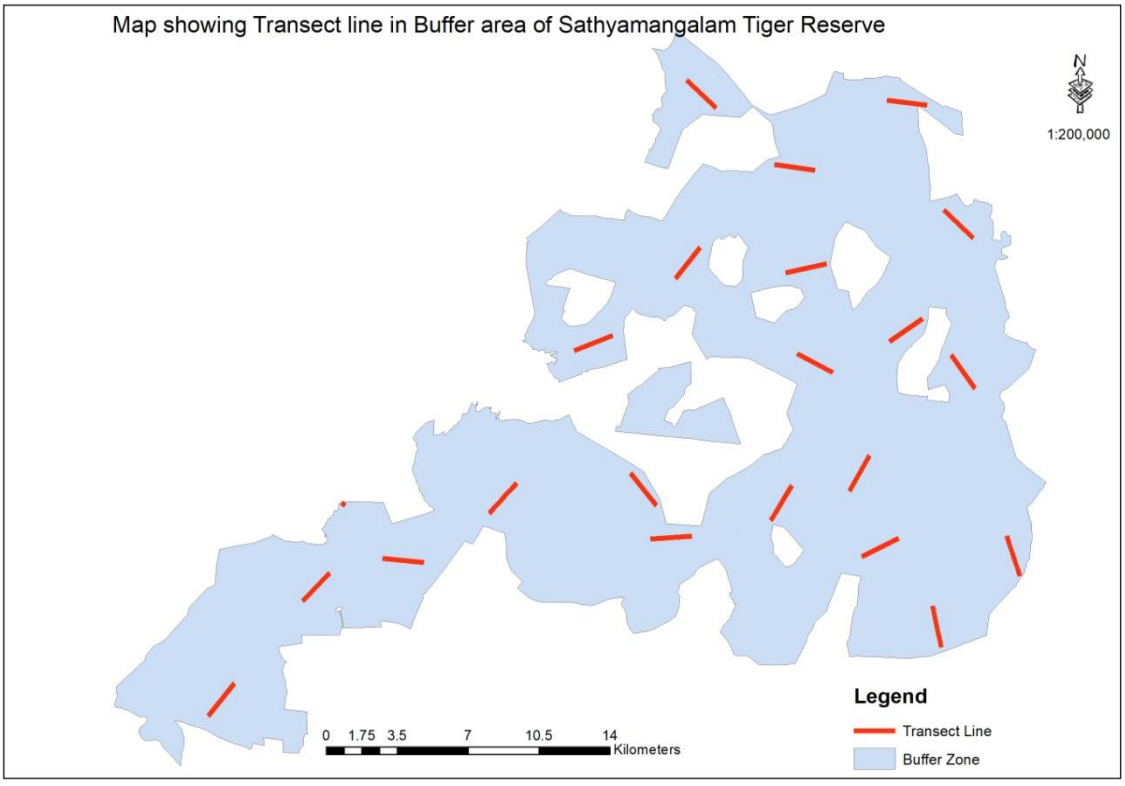


Table 12.1: Shows the transect GPS coordinates along with ranges and beats in SMTR.

S.No.	Name of the Ranges	Name of the Beats	Start points coordinate		End point coordinate	
1	Bhavanisagar	Kothamangalam	11.49395	77.08970	11.51150	77.08603
2	Bhavanisagar	Bannari	11.54128	77.12856	11.55932	77.12840
3	Germalam	Kottamalam	11.74123	77.31563	11.72766	77.32355
4	Germalam	Kadatti	11.76235	77.28275	11.78010	77.28364
5	Sathyamangalam	Kadampur West	11.63454	77.31600	11.63494	77.29972
6	Sathyamangalam	Vadavalli	11.55424	77.15022	11.57126	77.15343
7	Sathyamangalam	Ekkathur	11.65057	77.27523	11.64530	77.29194
8	Sathyamangalam	KNPalayam	11.56408	77.29404	11.58186	77.29049
9	Sathyamangalam	Chikkarasampalayam	11.57855	77.18816	11.59418	77.18944
10	Sathyamangalam	Anaikarai	11.68817	77.31104	11.68908	77.29284
11	Sathyamangalam	KondappaNaikenPalayam	11.55711	77.26077	11.56865	77.24830
12	Thalavadi	Thiganarai	11.70469	77.01661	11.70117	76.99895
13	Thalavadi		11.66202	76.93089	11.65630	76.94811
14	TNPalayam	BanglowPudhur	11.55250	77.41881	11.54916	77.40046
15	TNPalayam	Koothampalayam	11.74147	77.39892	11.72815	77.38651
16	TNPalayam	Arigium	11.71885	77.38826	11.72330	77.37231
17	TNPalayam	Kovilur	11.66026	77.38550	11.67797	77.38870
18	TNPalayam	Makkampalayam	11.73245	77.41917	11.72410	77.40404
19	TNPalayam	Kadampur East	11.66436	77.34496	11.66377	77.36178
20	TNPalayam	Vilamkombai	11.57175	77.36719	11.58747	77.36975
21	TNPalayam	Kongarpalayam	11.59259	77.37283	11.57660	77.38176
22	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 byNTCA and WII.Estimation of Tiger and Ungulate Abundance will be done using Intensive Sampling. The habitat preference Map for tigerdeveloped 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

12.2.1.1. 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. Rs.500/- to Rs. 1,000/- per month as 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.

12.2.1.2. 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 transectswill 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.

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 equipment 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.

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.

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.

12.3. 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.

12.4. 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.

12.5. 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 12.2.

Table 12.2: 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. 13. Protection and Intelligence Gathering

13.1 Deployment of native work force

The buffer zone has sizable wildlife population. It shares boundary with highly populated areas that occur on the fringes of forest areas and Karnataka state boundary. As such the buffer zone remains degraded due to anthropogenic activity. Protection becomes a key factor in restoring the buffer landscape to its native level of ecosystem productivity. Sathyamangalam Tiger Reserve has the highest number of wildlife cases registered in the state .The buffer zone is more vulnerable due to common proximity with territorial divisions and interstate boundaries. Poaching of Spotted deer, Sambhar, Guar for meat has been rampant in the past and has been brought control after establishment of Tiger Reserve. Elephant poaching has been a very serious threat in this areas .The offenders from villages abutting STR in Karnataka in the past have engaged in Elephant poaching, Gaur and spotted deer poaching for meat.

At present 10 anti-poaching camps are located in selected vulnerable positions of buffer zone and native youth has been employed as anti-poaching watchers for setting up systematic patrol. Patrolling with Mstripes software will greatly improve the efficacy of the existing patrol system which is at present monitored with patrol logs. These anti-poaching camps have to be sustained by provision of wages to the anti-poaching watchers, ration, gear and other infrastructure to the anti-poaching camps. Further, the number of anti-poaching camps has to be scaled up in future to plug gaps.

It is reemphasized that the protection in buffer zone is paramount to secure the successful Tiger conservation since buffer in Sathyamangalam Tiger Reserve is within the boundary and part of wildlife sanctuary. The buffer of Sathyamangalam is remaining at suboptimal level of resource health due to high degree of anthropogenic exploitation past.

For according effective protection, the anti-poaching system needs to be kept in prime efficiency. Sustenance of anti-poaching network is a force multiplier of conservation efficiency. Hence, regular and enhanced funding from NTCA has to be ensured to maintain these anti-poaching camps. It has also to be recorded here that consequent to the formation of Tiger Reserve about 150 native youth have already

employed as fire watchers & anti-poaching watchers in STR and there is a new sense of ownership evident in the communities as their wards become guardians of their natural resource. Unemployment is a serious cause for poverty and resource dependency 150 families now have bread earners supported by NTCA and identify themselves with tiger conservation.

Further sizeable Native workforce is also deployed in conducting monsoon patrols, fire extinguishing drives and as watchers. These activities have multiple benefits and needs to continued and up scaled.

The native workforce also needs to deployed in reserve development works such as fire lines, weed extermination works and wherever possible funds under MNREGA be sourced to provide employment.

The list of anti-poaching camps in buffer zone is tabled as follows.

Table: 13.1. List of Anti-poaching camps in Buffer Zone

Name of the Division	Name of the Range	Location
Sathyamangalam	Sathyamangalam	Sathara kombai
	T.N.Palayam	Gundri
		Kavundachi kuttai
		Anilnatham
		Anjaneyarkovil
	Kadambur	Ulepalayam
		Makkampalayam
Hasanur	Jeerahally	Akkurjorai
	Germalam	Kadahatti
		Kottamalam

13.2 Patrolling strategy including joint patrolling

This paramount activity is already dealt in the theme plan for protection of buffer zone in para no. 7.2.2.The strategy will be based on the guidelines of NTCA on smart patrolling strategy of Phase 4 monitoring will be adopted. MSTriPes will be implemented as and when the infrastructure for the same is made available. The anti-poaching camps are strategically located as nodes spread over the buffer zone area and nodes have specific areas allocated for patrol. These specific areas

intersect each other and the patrol takes place regularly in the areas surrounding the nodes by each anti-poaching team. Each anti-poaching team has 6 watchers. Watchers take turn in staying in the camps.

The strategic approach for protection includes

a. Daily Patrolling and Surveillance
b. Joint Patrolling
c. High Way Patrolling
d. Anti-Poaching Camps
e. Communication Net work
f. Strengthening of Check Posts
g. Interstate and Intra State Co-ordination(joint patrols)

For strengthening of protection anti-poaching watchers needs to be given regular wages in time, field gear, uniforms, torches, ration, LPG for anti-poaching camps and refilling of undertaking regular maintenance of anti-poaching camps, equipping the camp with solar power, water facilities, kitchen facilities, EPT barriers around camps, approach paths, equipment for monitoring like GPS, mobiles with data charges, patrol registers, wireless equipment etc. Water needs to be ferried in vehicles to the anti-poaching camps in a regular periodicity and facilities such as camper vans fitted with water tanks need to be created at range level. Besides stationary, computer & peripherals, , software, vehicle drivers, qualified data entry operators and other administrative expenditure is also required to at all Ranges in for monitoring MStripes based patrolling.

Strengthening of protection also needs to be secured through enhancement of infrastructure facilities. Facilities such as providing facilities like vehicles, additional fuel & maintenance charges, bikes for frontline staffs, jackets, rain coats, torches, telephone allowance, data charges, etc., to the frontline staff as prescribed in detail in chapter 10 of core zone plan.

13.3 Maintenance of Village level crime dossiers

As such no organized poaching originates from the villages of buffer zone at present .however elephant and other wildlife poaching from offenders of villages in Karnataka abutting buffer zone has been a threat in the past. Poaching for meat is a issue, small time wildlife trophy trade is also prevalent. A village level crime dossier will be created by recording all known past offences and the details of offenders will be collected and recorded. There will be a separate dossier for habitual offenders

with the help of past records and past history of the offenders. Crime record must have certain details about the criminal such as offenders past record, occupation; present residence, past employment, a recent photograph etc. Additional records from Police department if any can be added to these dossiers. Movements of such habitual offenders should be monitored and this will help the staff to have a close watch of their activities.

1) One copy of the dossier can be with the Deputy Director and one with Field Director.

2) Crime dossier record of interstate accused can be maintained by the Deputy Director of the Tiger Reserve with the help of the Range Officer. From neighboring State similar information can be obtained and dossiers of accused can be exchanged. This will help both the State to have a watch on the criminals. The photographs of the usual offenders can be given to patrolling staff. This will help in checking the movement of usual offenders from one place to another.

3) Informants in the Tiger landscape in different villages will be patronized to control poaching by receiving timely intelligence.

13.4 Fire Protection

Buffer zone of Sathyamangalam is alsopart of the wildlife sanctuary within the Tiger Reserve boundary and the issue, impact, remedial measures and preventive measures remain the same as in forest areas of core zone. Buffer zone has got more enclaves and hence the incidences of fire and its impact is naturally more in this zone because of anthropogenic pressure.

Fire risk zone, Fire protection measures, fire preparedness, prescribed preventive measures, fire fighting operations, employing of local villagers as fire watchers, fire tracing, post fire assessment, formation of watch towers and future strategies for fire control along with Theme plan for Fire monitoring & management has been dealt in detail in Chapter 10.4 of core zone plan.

13.5 Intelligence Gathering and Coordination

Fore warned is fore armed. All enforcement work demands that precise advance information is available for crime prevention, detection and investigation.. Wildlife authorities need a well-organized intelligence network. Intelligence is evaluated information useful for decision making. 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. 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.

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.

The Assistant conservator of forests, forest protection squad and the wildlife intelligence crime control unit WICCU has a very significant role in this aspect.

The field director needs to be authorized under information technology act to obtain CDRs and other mobile usage details from telephone service providers to track suspected offenders. The security plan has been proposed in chapter 7.2.2. Theme Plan for Protection.

Efforts would be taken to ‘cultivate’ potential informants, especially in the nearby Bhavanisagar Reservoir, Anthiyur – Burgur belt and Karnataka boundary village clusters and other vulnerable locations. Main thrust would be to tag movements of past poachers, snaring, hunting activities, movement pattern of illegal elements. Adequate incentive has to be provided the intelligence needs to be follow-up on intelligence to prevent any incidents within the 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 Direct and collect information on illegal activities independently.

If the field staff are motivated and enthused to pay special attention to the prevention of crime against wildlife we would reap enormous benefits. They will be trained by organizing with the assistance of Wildlife Crime Control Bureau and State Police Intelligence. There is a need to develop capacity building in this regard amongst the field staff.

Rewards to the staff and public will strengthen the protection. A credible reward system is the sheet anchor for generation of information. There is need to establish and operate a cash reward system for providing information. Rewards

should be just appropriate and made on the spot. As is being done in the Customs Department payment of rewards should vary according to the value of the item covered by the information. Payment should be de-linked from the disposal of cases in the courts. Rewards should be paid to all giving the information including forest and wildlife officials. Cash rewards should be payable for

- ✓ Information leading to the seizure of wildlife products and arrest of the offenders.
- ✓ Information pertaining to the organization modus operandi and other details of gangs indulging in wildlife trade.
- ✓ Information leading to successful prosecution of cases in courts.

All field officers should be provided with a permanent advance for payment of cash rewards. They should be encouraged to make spot payments according to a predetermined scale. The amounts spent are to be recouped promptly. At the time of inspection, senior officers will look into this aspect of work to evaluate the performance of field staff.

Chapter. 14. Eco Tourism, Interpretation and Nature Education

14.1 Tiger Conservation Foundation and Management of Community Based Ecotourism Programmes

The Tiger Conservation Foundation has been established in Sathyamangalam Tiger Reserve as per section 38-X of the Wildlife (Protection) Act 1972 as amended in Act No. 39 of 2006. Tiger Conservation Foundation for Tiger reserves have been established to facilitate and support their management for conservation of Tiger and bio-diversity and, to take initiatives in eco-development by involvement of people in such development process. Ecotourism in tiger reserves are the exclusive mandate of the tiger conservation foundation trust. As per the deed of trust & NTCA guidelines all eco-tourism activities within the Tiger reserve will be managed by the foundation.

Eco-tourism is a responsive form of tourism wherein the tourists enjoy the landscape and wildlife values of natural resource with least impact on the ecosystem dynamics of such natural resource. The tourists are expected to appreciate the diversity and the dynamics of natural systems and become aware of the ecological significance of such systems. Awareness perse is expected to lead to a change in perception over natural ecosystems and consequential positive actions in the different ways of consumptions of natural resources. Sathyamangalam Tiger Reserve being a new wildlife sanctuary the good will, co-operation and support of local communities is a must. Such positive resource –community interaction can be brought about when Sathyamangalam Tiger Reserve acts a green space, where the communities of the District can visit, experience and enjoy the bounty of nature and connect themselves with the objectives of the conservation. Ecotourism is seen as a market based conservation mechanism wherein green money is generated through carefully designed tourism packages and this green money is re-ploughed for conservation. Jobs generated by ecotourism are termed as green jobs .Ecotourism also has great potential in supporting the local economy in a myriad ways, direct and indirect employment are created through ecotourism which has been identified worldwide as a force multiplier to generate employment in rural economies. As already explained in chapter 7.2.1.3 all ecotourism programmes will be designed and

run by Tiger Conservation Foundation with a very clear and defined role for Vannapoorni / EDC's ecotourism management committee. The local advisory council will take active role in shaping up the future ecotourism programmes.

It is proposed to run eco-tourism in buffer zone in same manner, pattern and design as in the case of core zone by involving local communities in forest fringes though vannapoorni committees. The role, structure, functioning, fund management of the vannapoorni committees and VFCs/EDCS have been spelt out in detail in Chapter XI of Core Zone Plan of TCP. All stakeholders including the Vannapoorni / EDC's, legally established resorts, private vehicle operators will be actively involved in this effort to make the effort a success. There will be capacity building programs specially designed and delivered to these key stakeholders. The Vannapoorni / EDC's would support the cause by supplying the local guides and monitoring the safari rides, trekking etc. There will be a reciprocal commitment from the Vannapoorni / EDC's by way of a mutually agreed MoU with the Deputy Director in this regard. For the services rendered by the EDC's there would be remuneration provided by the Foundation.

Safari, Trekking along safe routes, boating will be allowed in this zone under the supervision of vannapoorni committees. This activity would go a long way in creating awareness about the forests and wildlife among the visitors. In addition to these natural trails, interpretation centres, museums, nature education programmes, etc., will also be created for the visitors in this zone. Necessary eco-huts, guest houses, eco-tourism establishments, infrastructure, tourist facilities like canteen and rest rooms will be created. New guest houses will be built at Karachikorai, buffer zone boundaries of Moyar River, buffer zone boundaries of Bhavanisagar Dam and elsewhere on the basis of requirement. All old buildings will be maintained. Eco-shops, toilets, resting sheds, eco-friendly canteens, viewing points etc will be created in in appropriate places in buffer zone as deemed required. There is a very good scope of developing water based tourism in the Bhavanisagar dam coupled with wildlife sighting. For this necessary approach paths and boat points will be created in buffer zone. Eco-huts will be created on the fringes of Bhavanisagar dam in the buffer zone area for creating tourist facilities. All allied facilities for supporting ecotourism will be created in an eco-friendly way.

The different type of packages, modality, and infrastructure required, the role of community, Vannapoorni / EDC's etc has already mentioned in chapter 11 of core

zone plan and the same will be followed as uniform approach. The eco-tourism plan of Sathyamangalam Tiger Reserve also covers in details regarding eco-tourism in Buffer Zone.

14.2 Ecotourism Guidelines and Constitution of Park Welfare funds

The ecotourism guidelines have been framed by the NTCA and the state level eco-tourism for Tiger Reserves and protected areas are awaited. The ecotourism activities will be carried out in conformity of the above guidelines, This has already been dealt in chapter 11 of core zone plan and also in the separate plan for ecotourism annexed with this plan.

Ecotourism in buffer zone will be modeled as per the strategy spelt out in the separate eco-tourism plan

14.3 Interpretation Programme

Unlike established Tiger Reserves the interpretation programme is very weak in Sathyamangalam Tiger Reserve, keeping in mind the future growth of this reserve as an visitation site carefully designed interpretation programmes should be put in place. During this plan period it is proposed that a dedicated interpretation part area will be developed in Karachikorai. Such an interpretation park complex will have the following interpretation units;

a. Training hall
b. Indoor interpretation centre
c. Outdoor interpretation park
d. Vulture museum
e. Fresh water fish aquarium

It will also have other infrastructure such as reception centre, eco-huts, watch towers, ex-situ plant conservation centre etc., Likewise a small interpretation centre with butterfly park ,tiger trail,ecoshop will be developed opposite Bannari temple to cater to the interest shown by the visitors over wildlife conservation. A Tiger interpretation centre will be exclusively developed in Akkurjjorai with state of the art state of interpretation techniques.

Orange fin Mahseer is in the verge of extinction in its original habitat, the Cauvery River, following unregulated fishing and introduction of blue fin Mahseer. The large orange fin Mahseer (tor species – not classified) is a iconic spot fish endemic to Cauvery River basin which includes the Cauvery, the Kabini, the Moyar

and the Bhavani rivers. The Moyar River flows through core zone of Sathyamangalam Tiger Reserve and large number of Orange fin Mahseer are reported from the river. Since this species is on the verge of extinction, it is necessary to create a fresh water aquarium in Sujjalkuttai of Sathyamangalam Tiger Reserve for creating awareness, for displaying and for research purposes..In future, it is also planned to develop an artificial breeding centre for Orange fin Mahseer and to release the young ones back to Moyar river in order to save them from being extinct from the river.

Similarly, Wildlife Grasses research and interpretation centre will also be established at Sujjalkuttai in Bhavanisagar Range.

A tribal living museum will also be created to highlight the nature friendly life style and livelihoods of tribals highlighting the intrinsic cultural bond of coexistence between tribal communities and wild resources.

14.4 Nature Education

In the long run dedicated 40 /30/15 seater buses/vehicles will be purchased and on a regular basis students from Government Schools and Government Colleges will be taken to this interpretation centre to inculcate ecological responsibility. Carefully designed one day interpretation & nature education programme on cost basis will be undertaken in suitable places for possible consumers such as schools, colleges, companies etc., and in suitable places large size exhibits of Tigers, Vultures, Mahseer, etc., can be placed.

Safaris will be organised in suitable routes as part of the nature education programme to cater to the need of the visitors /tourists. Trekking will also be permitted as per requirement and demand.

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
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

Chapter. 15. Organization, Administration and Budget

15.1 Buffer areas coordination committee and its linkages with Tiger Steering Committee and Tiger Conservation Foundation

The buffer zone management may be organized in coordination with the following committees.

A State Level Steering Committee for Tiger conservation for ensuring coordination, monitoring , protection and conservation of Tiger, co-predators and prey animals within the Tiger Range under sub sections (1) and (2) of section 38-U of the Wildlife (Protection) Act 1972 (Central Act, 53 of 1972) has to be constituted.

As per section 38-X of the Wildlife (Protection) Act 1972 as amended in Act No. 39 of 2006 a Tiger Conservation Foundation for Sathyamangalam Tiger Reserve was established on 15.07.2015. The Foundation will coordinate with the other departments for buffer zone activities, especially Eco-development activities.

The issues pertaining to management of buffer zone can be dealt with these statutory bodies. As the Buffer zone also is under the administrative control of the Field director there is no need for separate coordination committee at tiger reserve level.

15.2 Coordination with eco-development committees, confederation and other line agencies / departments / production sectors.

The Tiger Foundation Trust will take leadership in developing coordination with eco-development committees, confederation and other line agencies / departments / production sectors. The deputy directors being the district forest officers will take leadership in the aspect. The implementation of the micro plan will be monitored by the Deputy Directors and Field Directors and an adequate interface meeting to receive feedback is to be ensured. Confederation of EDMC may be formed as already suggested in eco-development chapter 8 of buffer zone.

15.3 Staff deployment

As for staff deployment is concerned, it has been dealt in detail in discussion regarding staff deployment of core zone plan in Chapter 13.4, besides organization setup. T. N. Palayam, part of Sathyamangalam Range, Bhavanisagar, Talawady, Germalam ranges form part of establishment of buffer zone.

There is a necessity to form new range offices by reorganising the existing forest ranges. New range with headquarters at Kadambur is the need of the hour. As such the entire area of 1.40,000 ha of Tiger reserve is managed by 7 Range Officers which is inadequate. Appropriate reorganisation of the ranges, formation of new sections is the need of the hour. The facilities such as vehicles, buildings, residential quarters for new ranges and new sections need to be created.

15.4 Fund raising strategies

Adequate funds are available with the Eco-development committees in the form of village forest development funds provided under the Tamilnadu Afforestation project phase 1 and phase 2. Funds need to be sourced out from ongoing projects of the state forest department. Dovetailing of ongoing schemes of the district administration is also a must. The foundation can also share part of its revenue. The prosopis weed removed from the core and buffer will be disposed off and revenue accrued will be use of financing Eco-development. Projects can be submitted to NAEB for funding under NAP in buffer. The proceeds of the ecotourism activities can also be source of funds. Innovative market based conservation mechanisms can be explored. The foundation can develop marketing of commodities such as organic millets, milk products, handmade products etc produced by the communities and plough back part of the proceeds for Eco-development.

15.5 Schedule of operations

The following schedule of operations is prescribed for successful implementation of the Management of buffer zone of this Tiger Reserve apart from the present operation as is followed by the concerned territorial forest divisions.

Sl. No	Activity	Schedule
1.	Eco-tourism	Throughout the year except during fire, monsoon and other emergencies.
2.	Anti-poaching operation and protecting	Throughout the year
3.	Maintenance works of roads	October – March
6.	Maintenance of water	Before monsoon

	holes	
7.	Phase-IV monitoring	Pre monsoon and post monsoon May to June and December to January
8	Removal of Invasive plants	Throughout the year
9	Fire management a)Clearing fire lines	December to January
	b)Control burning of fire lines	December to January
	c)Cool burning of Block lines/ State Boundary	December to February
	d)Engaging Fire watchers	December to June
10	Functioning of Anti-depredation squad	October to April

15.6 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.

Activities to be implemented in Tiger Reserve

Buffer 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 Anti-poaching camps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Providing Ration Allowance to APWs in Anti-poaching camps of Sathyamangalam Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Providing LPG refills to Antipoaching camps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Maintenance of Anti-poaching camps by providing (camouflage dress and gears) Kit, ruck sack, torch lights, chargers, shoes, etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Providing water facilities, improvement and special repair works to Anti-poaching camps / watch towers in vulnerable localities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
7	Maintenance of existing check posts	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	Additional allowance for APWs engaged in protected area for protection duty (within sanctuary)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	Engaging tiger & elephant trackers in absence of anti-depredation squad	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
II	**Fire Control Measures**												
9	Maintenance of Old Coupe Roads/ Patrol routes, for fire protection measures in vulnerable areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Annual maintenance of fire lines including the block lines								✓	✓	✓	✓	
	Engaging fire protection watchers & labourers for fire detection & extinguishing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
II	**Strengthening of Infrastructure within Tiger Reserve**												
9	Improvement of Staff Quarters in TN Palayam, Germalam, Bhavanisagar and Sathyamanglam Range					✓	✓	✓	✓	✓	✓	✓	
10	Maintenance and Improvement of Non-Residential Buildings such as Range Offices, Training halls, etc.,					✓	✓	✓	✓	✓	✓	✓	

Sl. No	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
III	**Habitat Improvement and Water Development**												
11	Construction of Percolation Ponds / Large Water holes in Buffer Areas					✓	✓	✓	✓	✓	✓	✓	
12	Construction of Check Dams in Buffer areas					✓	✓	✓	✓	✓	✓	✓	
13	Water management for wildlife by de-silting and maintenance of existing water hole / check dams	✓	✓	✓	✓	✓	✓						
14	Repairing & improvement to Existing Old Check Dams & Percolation Ponds	✓	✓	✓	✓	✓	✓	✓					
15	Water for wild animals externally during pinch period	✓	✓	✓	✓						✓	✓	✓
16	Maintenance and repairs to existing water troughs and solar powered borewell units	✓	✓	✓	✓						✓	✓	✓
17	Opening up habitat by removal of exotic weeds like Lantana, Prosopis, etc., for improving regeneration of native species, fodder and grass growth	✓	✓	✓	✓						✓	✓	✓
18	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
19	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.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IV	**Eco Tourism**												
20	Up gradation of Forest Rest Houses in Sathyamanglam & T.N.Palayam Ranges					✓	✓	✓	✓	✓	✓	✓	
21	Maintenance & fuel cost to vehicles for conducting Eco-tourism during first 2 years support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	Awarness & publicity materials	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	Maintenance of view points & watch towers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24	First 2 years supporting wages to Eco-guides and drivers for functioning of Eco-tourism	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
V	**Eco - Development**												
25	Bi-annual immunisation of cattle in enclave villages in the core area of the Tiger Reserve in 3 ranges for 2 camps consisting of 30 to 40 villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sl. No	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
26	Eco-development awareness activities in EDC fringe villages for exposure to alternate income generation activities and Tiger conservation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
27	Funding support to Eco-development committees for various community development and alternate income generation activities in 3 ranges including training	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
28	Stage wise support to tribal VFC members as allowance to wean away from NTFP dependency on trial basis during 3 months of year	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
29	Providing LPG to tribal settlement and fringe village people for high fuel dependency villages in fringe villages.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
30	Providing of solar lamps, solar lanterns, solar lights, solar powered street lights in selected model villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
31	Conducting medical camps, employment camps, in fringe villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
32	Eco-development Fund for various community development and alternate income generation activities for core zone Eco Development Committee	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VI	**Addressing Man-Animal Conflict**												

Sl. No	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
33	Purchase of rescue equipment					✓	✓	✓	✓	✓	✓		
34	Post mortem expenditure with wages and transportation charges for safe disposal of carcass in case of deaths outside RF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
35	Anti-Depredation Squad and monitoring team during emergency conflict and straying incidences into human habitation in fringe areas of all Range	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VII	**Publicity**												
36	Preparation of publicity and awareness boards, printing of broachers, stickers, booklets, etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
37	Providing Paper bags to Public/ devotees with printed slogan about avoiding Plastics etc., in festival seasons	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Buffer 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					✓	✓	✓	✓	✓	✓	✓	

Sl. No	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
	facilities												
3	Formation of boundary pillers around tribal settlements to prevent encroachment in Core Zone					✓	✓	✓	✓	✓	✓	✓	
4	Installation and maintenance of CCTV cameras with computers & accessories for monitoring in check posts of vulnerable areas					✓	✓	✓	✓	✓	✓	✓	
5	Construction of new range offices					✓	✓	✓	✓	✓	✓	✓	
6	Procurement of motor bikes for patrolling duties					✓	✓	✓	✓	✓	✓	✓	
II	**Strengthening of infrastructure within Tiger Reserve (including new Tiger Reserve)**												
7	Construction of Field Director's Office					✓	✓	✓	✓	✓	✓	✓	
8	Construction of Field Director's Residence & Camp Office					✓	✓	✓	✓	✓	✓	✓	
III	**Addressing Man-Animal Conflict**												
1	Conducting of man-animal conflict awareness camps in fringe villages			✓	✓	✓	✓	✓	✓	✓	✓	✓	

Sl. No	Item of work	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
2	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					✓	✓	✓	✓	✓	✓		

Activity Budget:

Buffer 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 Anti-poaching camps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Providing Ration Allowance to APWs in Anti-poaching camps of Sathyamangalam Tiger Reserve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Providing LPG refills to Antipoaching camps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Maintenance of Anti-poaching camps by providing (camouflage dress and gears) Kit, ruck sack, torch lights, chargers, shoes, etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	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
6	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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	Maintenance of existing check posts	✓	-	-	-	-	✓	-	-	-	-
8	Additional allowance for APWs engaged in protected area for protection duty (within sanctuary)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	Engaging tiger & elephant trackers in absence of anti-depredation squad	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
II	**Fire Control Measures**										
9	Maintenance of Old Coupe Roads/ Patrol routes, for fire protection measures in vulnerable areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Annual maintenance of fire lines including the block lines	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Engaging fire protection watchers & labourers for fire detection & extinguishing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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
II	**Strengthening of Infrastructure within Tiger Reserve**										
9	Improvement of Staff Quarters in TN Palayam, Germalam, Bhavanisagar and Sathyamanglam Range	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10	Maintenance and Improvement of Non-Residential Buildings such as Range Offices, Training halls, etc.,	✓	-	-	✓	-	✓	-	-	✓	-
III	**Habitat Improvement and Water Development**										
38	Construction of Percolation Ponds / Large Water holes in Buffer Areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
39	Construction of Check Dams in Buffer areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
40	Water management for wildlife by de-silting and maintenance of existing water hole / check dams	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
41	Repairing & improvement to Existing Old Check Dams & Percolation Ponds	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
42	Water for wild animals externally during pinch period	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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
43	Maintenance and repairs to existing water troughs and solar powered borewell units	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
44	Opening up habitat by removal of exotic weeds like Lantana, Prosopis, etc., for improving regeneration of native species, fodder and grass growth	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
45	Soil working, catch water pits & micro-nutrient supply for improving soil quality in plain forests (Dry deciduous & thorn Forests)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
46	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.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
III	**Eco Tourism**										
11	Up gradation of Forest Rest Houses in Sathyamanglam & T.N.Palayam Ranges	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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
12	Maintenance & fuel cost to vehicles for conducting Eco-tourism during first 2 years support	✓	✓	-	-	-	✓	✓	-	-	-
13	Awarness & publicity materials	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
14	Maintenance of view points & watch towers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	First 2 years supporting wages to Eco-guides and drivers for functioning of Eco-tourism	✓	✓	-	-	-	✓	✓	-	-	-
IV	**Eco - Development**										
16	Bi-annual immunisation of cattle in enclave villages in the core area of the Tiger Reserve in 3 ranges for 2 camps consisting of 30 to 40 villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
17	Eco-development awareness activities in EDC fringe villages for exposure to alternate income generation activities and Tiger conservation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
18	Funding support to Eco-development committees for various community development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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
	and alternate income generation activities in 3 ranges including training										
19	Stage wise support to tribal VFC members as allowance to wean away from NTFP dependency on trial basis during 3 months of year	✓	✓	-	-	-	✓	✓	-	-	-
20	Providing LPG to tribal settlement and fringe village people for high fuel dependency villages in fringe villages.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
21	Providing of solar lamps, solar lanterns, solar lights, solar powered street lights in selected model villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	Conducting medical camps, employment camps, in fringe villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	Eco-development Fund for various community development and alternate income generation activities for core zone Eco Development Committee	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
V	**Addressing Man-Animal Conflict**										

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
24	Purchase of rescue equipment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	Post mortem expenditure with wages and transportation charges for safe disposal of carcass in case of deaths outside RF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	Anti-Depredation Squad and monitoring team during emergency conflict and straying incidences into human habitation in fringe areas of all Range	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VI	**Publicity**										
27	Preparation of publicity and awareness boards, printing of broachers, stickers, booklets, etc.,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
28	Providing Paper bags to Public/ devotees with printed slogan about avoiding Plastics etc., in festival seasons	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Buffer 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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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
	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 and maintenance of CCTV cameras with computers & accessories for monitoring in check posts of vulnerable areas	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Construction of new range offices	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	Procurement of motor bikes for patrolling duties	✓	✓	✓	-	-	✓	✓	✓	-	-
II	**Strengthening of infrastructure within Tiger Reserve (including new Tiger Reserve)**										
7	Construction of Field Director's Office	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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
8	Construction of Field Director's Residence & Camp Office	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
III	**Addressing Man-Animal Conflict**										
1	Conducting of man-animal conflict awareness camps in fringe villages	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓