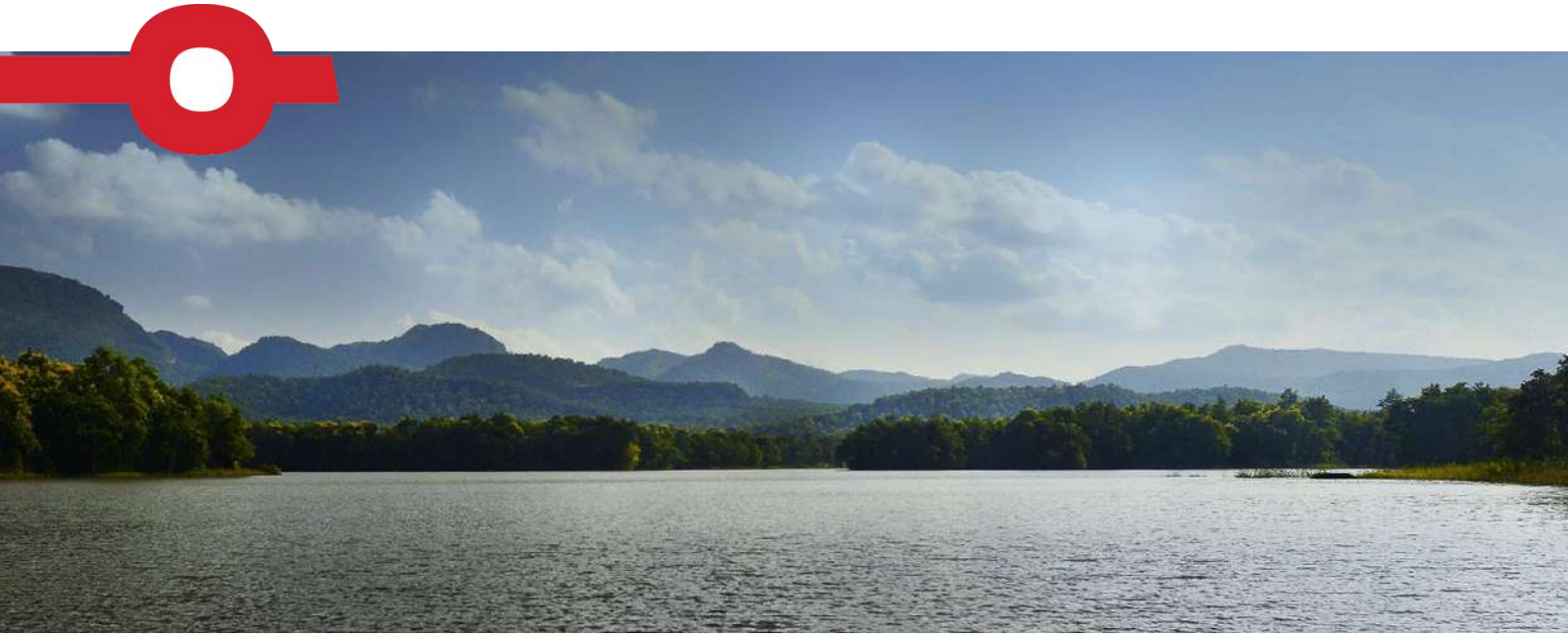
PREPARATION OF ZONAL MASTER PLANS FOR ECO SENSITIVE ZONES: SATPURA NATIONAL PARK AND PACHMARHI & BORI WILDLIFE SANCTUARY




PART-1 DESCRIPTION OF THE PROTECTED AREA AND ITS ECO-SENSITIVE ZONE- EXISTING SCENARIO



Madhya Pradesh Tourism Board, Bhopal

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IDENTIFICATION TABLE	
Client/Project owner	Madhya Pradesh Tourism Board, Bhopal
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Confidentiality	Confidential
Language	English
Number of pages	269

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1 INTRODUCTION OF THE PROTECTED AREA

'Ecologically Sensitive Areas' is a widely used term in efforts of conservation and is loosely defined in different contexts. An eco-sensitive area as 'ecologically and economically areas vulnerable to even mild disturbances and hence require conservation'. This inclusive definition implies three things- that eco-sensitive areas are biologically rich in the sense that they could hold high value to human beings, in maintaining the ecological stability of the area and in preserving the bio-diversity, unique in the sense that the species are endemic and will be impossible to replace if once lost, and vulnerable in the sense that they are threatened by habitat disintegration and destruction by both erratic human and non-human factors. With Massive urbanization and increase of development activities the vulnerability of Eco sensitive areas has increased.

Preparing an Eco sensitive plan provides conservation efforts to the ecologically sensitive areas and thus act as a transition zone from areas of high protection to areas involving lesser protection. Also it provides restoration of denuded areas, conservation of existing water bodies, management of catchment areas, soil and moisture conservation, needs of local community, etc, which needs attention. It demarcates all the existing and proposed urban settlements, village settlements, types and kinds of forest, agricultural areas, green areas, horticultural areas, lakes, etc. It emphasis on economic activities of the existing villages such as service industries, agro based industries, cottage industries, processing, agriculture, floriculture, horticulture areas and storage of agro based products, etc.

1.1 "PROJECT TIGER" – NEED

"Project Tiger", now ongoing as a Centrally Sponsored Scheme, was launched by the Government of India in 1973 in nine reserves of different States (Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Uttar Pradesh and West Bengal) over an area of approximately 14,000 sq. km. Since then, the project coverage has expanded considerably to 41 tiger reserves (TR), encompassing an area of around 63874.68 sq.km. in 17 tiger States with 35123.95 sq.km. of notified core/critical tiger habitats and 28750.73 sq.km. of buffer / peripheral areas in 17 tiger States. This amounts to 2% of the country's geographical area. The total core/critical tiger habitat of 41 tiger reserves amount to 5.2% of the country's forest cover. There are 668 protected areas in the country (September, 2012), out of which 41 have been designated as core/critical tiger habitats (6%). The in-principle approval has been accorded by the National Tiger Conservation Authority for creation of five new tiger reserves.

Figure 1-1 : Location of tiger reserves in India

1.1.1 National Tiger Conservation Authority

The National Tiger Conservation Authority under clause (c) of sub-section (I) of Section 38-0 of the Wild Life (Protection) Act, 1972 has the power to lay down normative standards for tourism activities and guidelines for project tiger for tiger conservation in the buffer and core areas of tiger reserves to ensure their due compliance. Approximately

71,027.1 km2 (27,423.7 sq mi) is being declared reserves are operated by state forestry departments "to ensure maintenance of viable populations of the conservation dependent Bengal tigers in India". The tigers are maintained for their scientific, economic, aesthetic, cultural and ecological values and to preserve for all time areas of biological importance as a national heritage for the benefit, education and enjoyment of the people. Satpura and Pench tiger reserve are the part of this program.

1.2 ECO-SENSITIVE ZONES OF MADHYA PRADESH

In Madhya Pradesh there are 26 eco sensitive zones as declared by Government of Madhya Pradesh Madhya Pradesh at present has twenty-five wildlife Sanctuaries and eight National Parks. The state Forest Department has identified and approved the eco-sensitive zones across Pench National Park, Kanha National Park, Panna National Park and Kuno Palpur sanctuary, Bandhavgarh National Park ,Satpura National park and others.

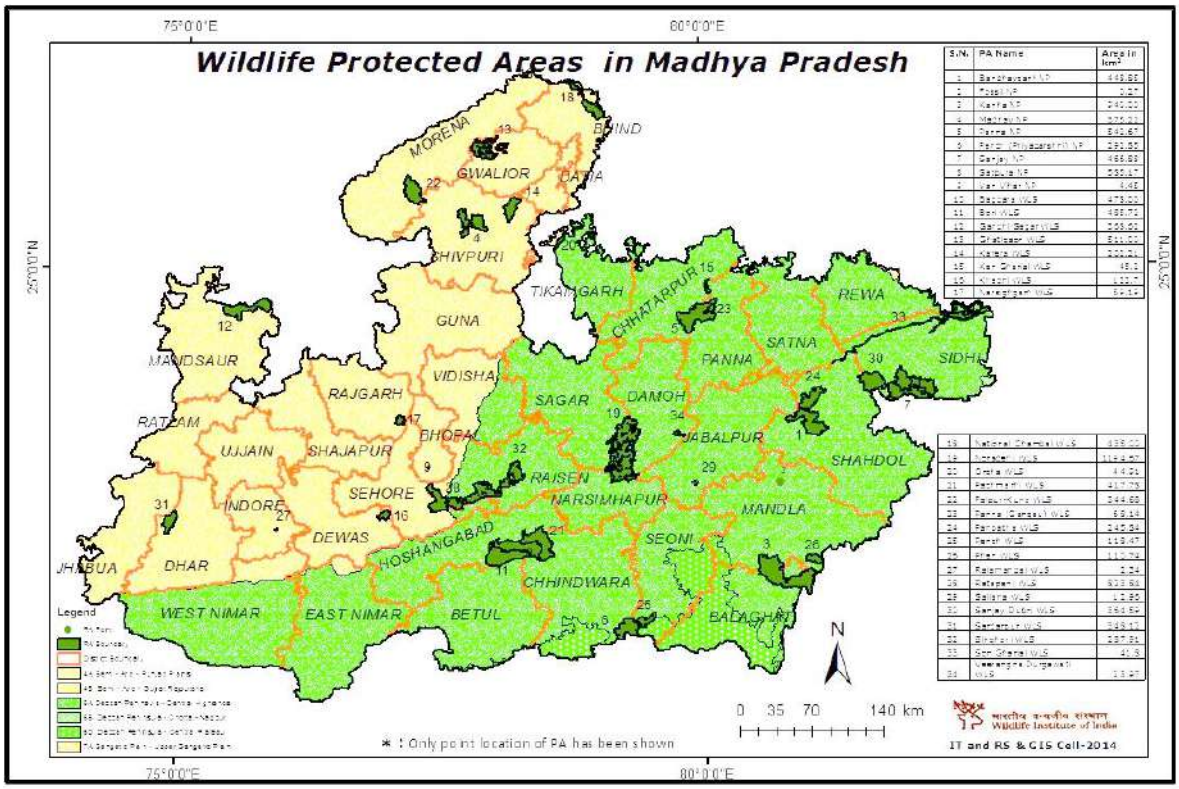


Figure 1-2 : Eco-sensitive zone and wildlife protected area

1.3 NEED OF THE STUDY

This project is initiated so that all the states could submit proposals for identification and delineation of ESZs in their respective areas. Once the proposals for Eco sensitive zones are finalised it can be conserved in an appropriate way. Also, it will be helpful in minimizing the impact of urbanization and other developmental activities on the ecologically vulnerable areas that are of prime importance. Eco sensitive zones acts as a shock absorber and thus is proved helpful to preserve the eco sensitive areas.

This project focuses on Preparation of zonal master plan for Pench cluster of Madhya Pradesh which includes Satpura National Park and Pachmarhi and Bori Wildlife Sanctuary and Pench National Park and Pench Mogali Sanctuary. This cluster is mostly a tiger reserve which is of immense importance, as these reserves are highly eco sensitive areas.

1.4 ZONAL MASTER PLAN FOR ECO SENSITIVE ZONES

In order to protect highly ecologically sensitive areas Zonal master plans are Prepared. The zonal master plans provides restoration of denuded areas, conservation of existing water bodies, management of catchment areas, soil and moisture conservation, needs of local community, etc., which needs attention. It also demarcates all the existing and proposed urban settlements, village settlements, types and kinds of forest, agricultural areas, green areas, horticultural areas, lakes, etc.

Also, existing land uses are not changed from green land cover, except limited conversion of agricultural lands to meet the residential needs of the existing local residents that are dependent on the Eco sensitive zone for their daily needs.

1.5 IDENTIFICATION OF CLUSTERS

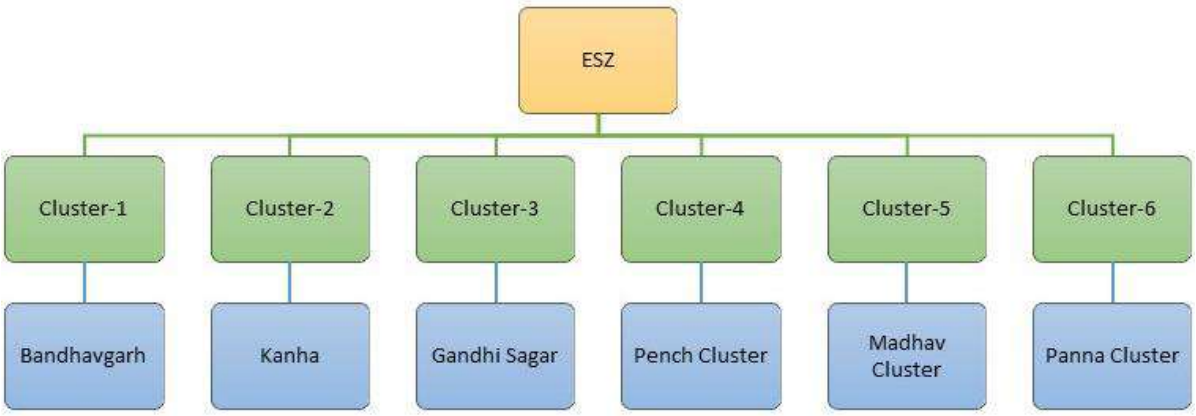


Figure 1-3 : Cluster for Eco-sensitive zone in Madhya Pradesh

In this project all the 26 identified ESZs are divided into 6 clusters for the purpose of Zonal Master Plan preparation. All the clusters are shown below

Table 1-1 : Clusters identified for ESZ Master Plans in MP

Name of the Cluster	ESZs within the cluster
Cluster 1 (Bandhavgarh Cluster)	Badhavgarh National Park and Panpatha Wildlife Sanctuary, Sanjay National Park and Sanjay Dubri Wildlife Sanctuary, Son Ghariyal Wildlife Sanctuary and Bagdara Wildlife Sanctuary
Cluster 2 (Kanha Cluster)	Kanha National Park, Jeevash National Park, Ghughwa and Phen Wildlife Sanctuary
Cluster 3 (Gandhi Sagar Cluster)	Dinosaur National Park, Gandhi Sagar Wildlife Sanctuary, Sailana Wildlife Sanctuary, Sardarpur Wildlife Sanctuary, Ralamandal Wildlife Sanctuary, Narsinghgarh Wildlife Sanctuary, Kheoni Wildlife Sanctuary and Ratapani National Park and Singhori Wildlife Sanctuary
Cluster 4 (Pench Cluster)	Satpura National Park and Pachmarhih and Bori Wildlife Sanctuary and Pench National Park and Pench Mogali Sanctuary
Cluster 5 (Madhav Cluster)	Madhav National Park, Orchha Wildlife Sanctuary, Kuno Palpur Wildlife Sanctuary, Ghatigaon- Hukna Wildlife Sanctuary and National Chambal Sanctuary
Cluster 6 (Panna Cluster)	Panna National Park and Gangau Wildlife Sanctuary, Noradehi Wildlife Sanctuary, Veerangana Durgavati Wildlife Sanctuary and Ken Ghariyal Wildlife Sanctuary

Table 1-2 : The status of approval of identified eco-sensitive zones

CLUSTER NO.	Sr No	Name of National Park/Wildlife Sanctuary	Date Of Constitution Of Monitoring Committee By State Government	Area of National Park/Wildlife Sanctuary (Sq. Km)	Area of Eco Sensitive Zone (Sq. Km)
CLUSTER 1	1	Badhavgarh National Park and Panpatha Wildlife Sanctuary	01.05.2017	1536.90	1030.30
	2	Sanjay National Park And Sanjay Dubri Wildlife Sanctuary	29.09.2017	1674.52	1053.00
	3	Son Ghariyal Wildlife Sanctuary	01.05.2017	478.00	424.00
	4	Bagdara Wildlife Sanctuary	06.11.2017	110.00	12.88
CLUSTER 2	1	Kanha National Park	Not yet notified	941.79	
	2	Jeevash National Park Ghughwa	15.09.2017	0.27	1.12
	3	Phen Wildlife Sanctuary	Not yet notified	110.74	
CLUSTER 3	1	Dinosaur National Park	29.09.2017	0.89	2.01
	2	Gandhi Sagar Wildlife Sanctuary	01.05.2017	368.92	310.50
	3	Sailana Wildlife Sanctuary	Draft Notification uploaded on MoEF	12.96	3.76
	4	Sardarpur Wildlife Sanctuary	Not yet notified	348.12	
	5	Ralamandal Wildlife Sanctuary	Not yet notified	2.34	
	6	Narsinghgarh Wildlife Sanctuary	Not yet notified	57.19	
	7	Kheoni Wildlife Sanctuary	Under Process	134.77	160.00
	8	Ratapani National Park And Singhori Wildlife Sanctuary	29.09.2017	1201.29	546.52
CLUSTER 4	1	Satpura National Park and Pachmarhi and Bori Wildlife Sanctuary	29.09.2017	1339.26	1051.70
	2	Pench National Park and Pench Mogali Sanctuary	06.11.2019	411.33	1180.63
CLUSTER 5	1	Madhav National Park	06.11.2017	354.61	277.20
	2	Orchha Wildlife Sanctuary	14.03.2018	45.36	24.84
	3	Kuno Palpur Wildlife Sanctuary	Draft Notification uploaded on MoEF	344.68	207.45
	4	Ghatigaon- Hukna Wildlife Sanctuary	01.05.2017	512.00	1100.46
	5	National Chambal Sanctuary	Not yet notified	435.00	

CLUSTER NO.	Sr No	Name of National Park/Wildlife Sanctuary	Date Of Constitution Of Monitoring Committee By State Government	Area of National Park/Wildlife Sanctuary (Sq. Km)	Area of Eco Sensitive Zone (Sq. Km)
CLUSTER 6	1	Panna National Park and Gangau Wildlife Sanctuary	Not yet notified	621.19	
	2	Noradehi Wildlife Sanctuary	Under Process	1197.04	291.10
	3	Veerangana Durgavati Wildlife Sanctuary	Draft Notification uploaded on MoEF	23.97	99.73
	4	Ken Ghariyal Wildlife Sanctuary	19.09.2017	45.20	9.34

	Receipt of Notification from MoEF for Constitution of Monitoring Committee
	Draft Notification uploaded on MoEF for Constitution of Monitoring Committee
	Notification yet to be uploaded on MoEF for Constitution of Monitoring Committee

1.6 SCOPE OF WORK

The preparation of Zonal Master plan is divided into two parts: -

PART-1: Preparation of Zonal Master plan that includes:

- Preparation of GIS based maps (scale 1:4000) and reports.
- GIS boundary of National Park/Wildlife Sanctuary/ESZ
- Obtaining Latest available satellite images of National Park/Wildlife Sanctuary/ESZ at 0.5m and 5.8mresolution
- Preparation of revenue boundaries within ESZs at 1:4000.
- Obtaining Digital Elevation Model at 10m resolution
- Preparation of GIS based thematic maps of Water bodies, Rivers, Lake, Watershed/Catchment area, Land under agriculture, horticulture, orchards, Urban and Rural Settlements.
- It would consider all the factors for improvement of infrastructure and would regulate all the other development activities so that it can be more efficient and eco-friendlier.
- Identification, restoration of denuded areas, conservation of existing water bodies, management of catchment areas, watershed management, groundwater management, soil and moisture conservation, needs of local community and such other aspects of the ecology and environment that need attention.
- demarcate all the existing worshipping places, village and urban settlements, types and kinds of forests, agricultural areas, fertile lands, green area, such as, parks and like places, horticultural areas, orchards, lakes and other water bodies, all sites of valuable natural heritage, man-made heritage sites, vehicular traffic,
- Expansion of existing village settlement on the basis of trends of growth of population in last 20 years.
- Identification and demarcation of steep hill slopes with a gradient of 20 degrees or more land areas with a high degree of erosion to prevent quarrying and development on such sites.
- To incorporate building regulations for construction, alteration and renovation of buildings. It will also include the provisions for rooftop rainwater harvesting, energy conservation and use of eco-friendly building materials.
- Proposals for protection of natural water courses or water bodies, waterfalls, water springs, watershed development for recharge of ground water.
- Identification, demarcation and protection of: -
  i. Natural drainage system.
  ii. Check dam sites and proposals for improvement of existing check dams
  iii. Existing encroachments within the Eco-sensitive Zone
  iv. site for disposal of solid waste
- Land use.- Forests, horticulture areas, agricultural areas, parks and open spaces earmarked for recreational purposes in the Eco-sensitive Zone shall not be used or converted into areas for commercial or industrial related development activities, Provided that the conversion of agricultural lands within the Eco-sensitive Zone may be permitted on the recommendation of the Monitoring Committee, and with the prior approval of the State Government, to meet the residential needs of local residents, and for the activities listed in the respective ESZ notification such as :-
  - Eco-friendly cottages for temporary occupation of tourists, such as tents, wooden houses, etc. for Eco-friendly tourism activities;
  - Widening and strengthening of existing roads and construction of new roads;
  - Small scale industries not causing pollution;
  - Rainwater harvesting; and
  - Cottage industries including village industries, convenience stores and local amenities:

PART-2: Preparation of Sub-Zonal Tourism Master Plan

Tourism Master Plan is prepared to govern all the tourist activities. The tourism master plan is a part of zonal master plan and is based on detailed carrying capacity of the Eco sensitive zone.

- The tourism plan includes all the important sites for tourism in Eco sensitive zone and new tourism activities, development for tourism or expansion of existing tourism activities shall be permitted only within the parameters of this Tourism Master Plan.
- In this plan analysis is done for the availability of existing infrastructure and tourist facilities and accordingly proposals will be given such as eco-tourism sites, camping sites, trails and facilities like convention centre, golf course, parking lots, sites for resorts & hotels, etc.
- Inflow of tourist each year from the past ten years, related issues and basic requirements will be worked out for the next 10 years.
- The plan emphasizes on accommodation facilities, camping sites, way side amenities, rural tourism, adventure tourism/water tourism related activities etc. and new tourism activities within the Eco sensitive Zone.
- Proposals for development of tourism and expansion of existing tourism activities is given as permitted by the concerned regulatory authorities based on the actual site-specific scrutiny and recommendation of the Monitoring Committee.

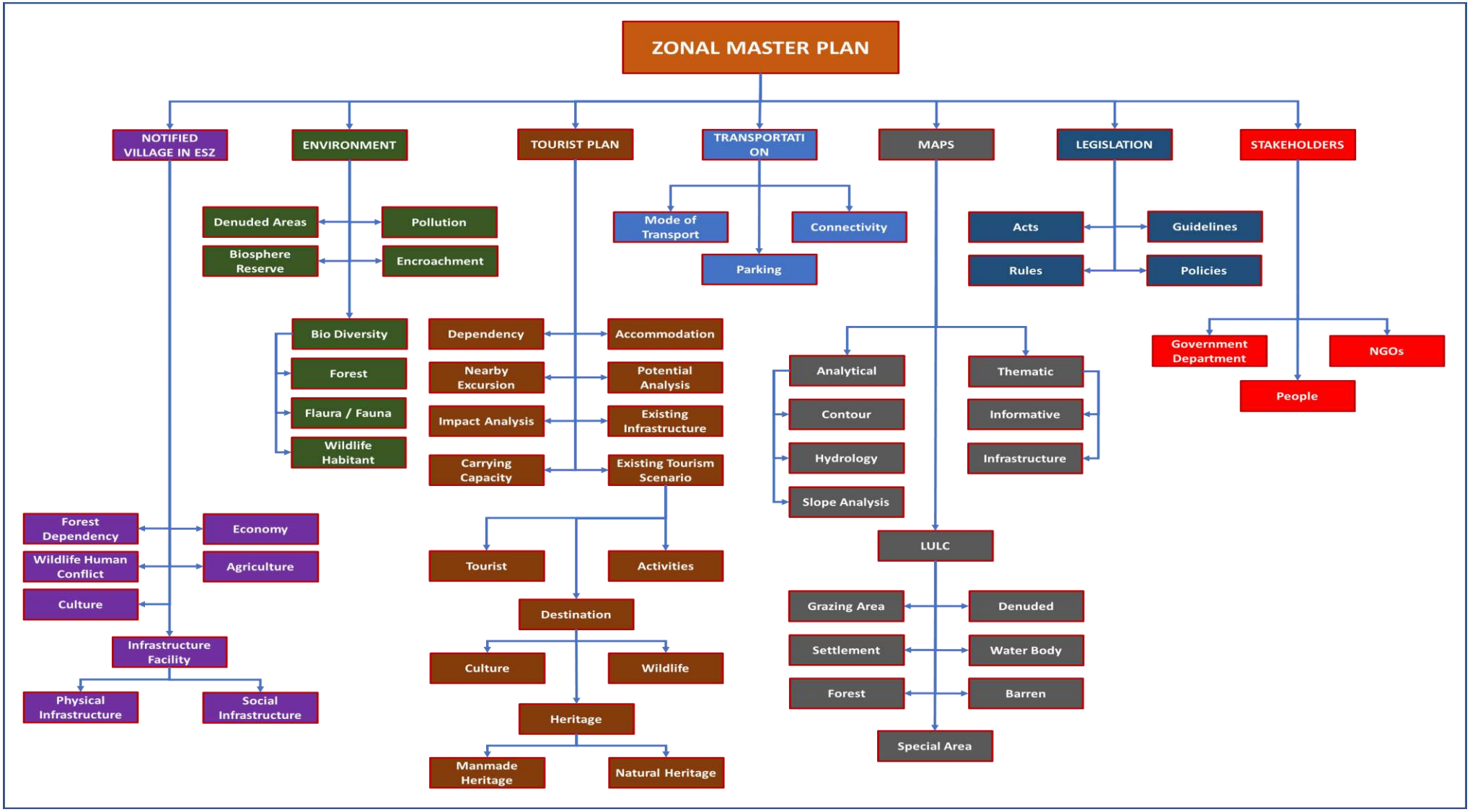


Figure 1-4 : Components of zonal master plan

1.7 NEED OF ZONAL MASTER PLAN FOR ECO-SENSITIVE ZONE

Zonal Master Plan for the eco-sensitive zone has to be prepared by the State Government within a period of two years from the date of last notification issued by the Ministry of Environment and Forests, Government of India. The zonal master plan should provide for restoration of denuded areas, conservation of existing water bodies, management of catchment areas, soil and moisture conservation, needs of local community, etc., which needs attention. It should also demarcate all the existing and proposed urban settlements, village settlements, types and kinds of forest, agricultural areas, green areas, horticultural areas, lakes, etc. No change of land use from green uses shall be permitted in the zonal master plan except limited conversion of agricultural lands to meet the residential needs of the existing local residents, improvement of roads and bridges, community buildings, without the prior approval of the state government. Pending preparation of the master plan and approval thereof by the Ministry of Environment and Forests, all new constructions can be allowed only after it is approved by the Monitoring Committee constituted by the Central Government.

1.8 NAME, LOCATION, CONSTITUTION AND EXTENT OF THE AREA PA

Madhya Pradesh Tourism Board have selected consultants preparing Zonal Plans for above mentioned eco-sensitive zones through fair bidding process. The respective Zonal Master Plan for the Eco-sensitive Zone shall be prepared by these selected consultant in such a manner as is specified in the Gazette notifications issued by Ministry of Environment and Forest for each of the identified Eco Sensitive Zones and also in consonance with the relevant Central and State laws and the guidelines issued by the Central Government, if any. Such Eco Sensitive Zones which are yet to be notified by Ministry of Environment and Forest shall be bound to follow all the provisions of the gazette notification whenever they get notified.

SAI Consulting Engineers Pvt Ltd (Systra Group) has been selected for preparing Zonal Plans for eco-sensitive zone identified in cluster 4 of Madhya Pradesh. Cluster 4 of the eco-sensitive zone consist of mentioned below National park and Sanctuary:

- Satpura National Park and Pachmarhi & Bori Wildlife Sanctuary
- Pench National Park and Pench Mogali Sanctuary

As discussed in table above, out of these eco-sensitive zones, Satpura National Park and Pachmarhi & Bori Wildlife Sanctuary is being notified on 29th September 2017. While, Draft Notification for Pench National Park and Pench Mogali Sanctuary is being submitted to the MoEF for sanction. Hence, work to prepare zonal plan for Satpura National Park and Pachmarhi & Bori Wildlife Sanctuary is being started on priority bases.

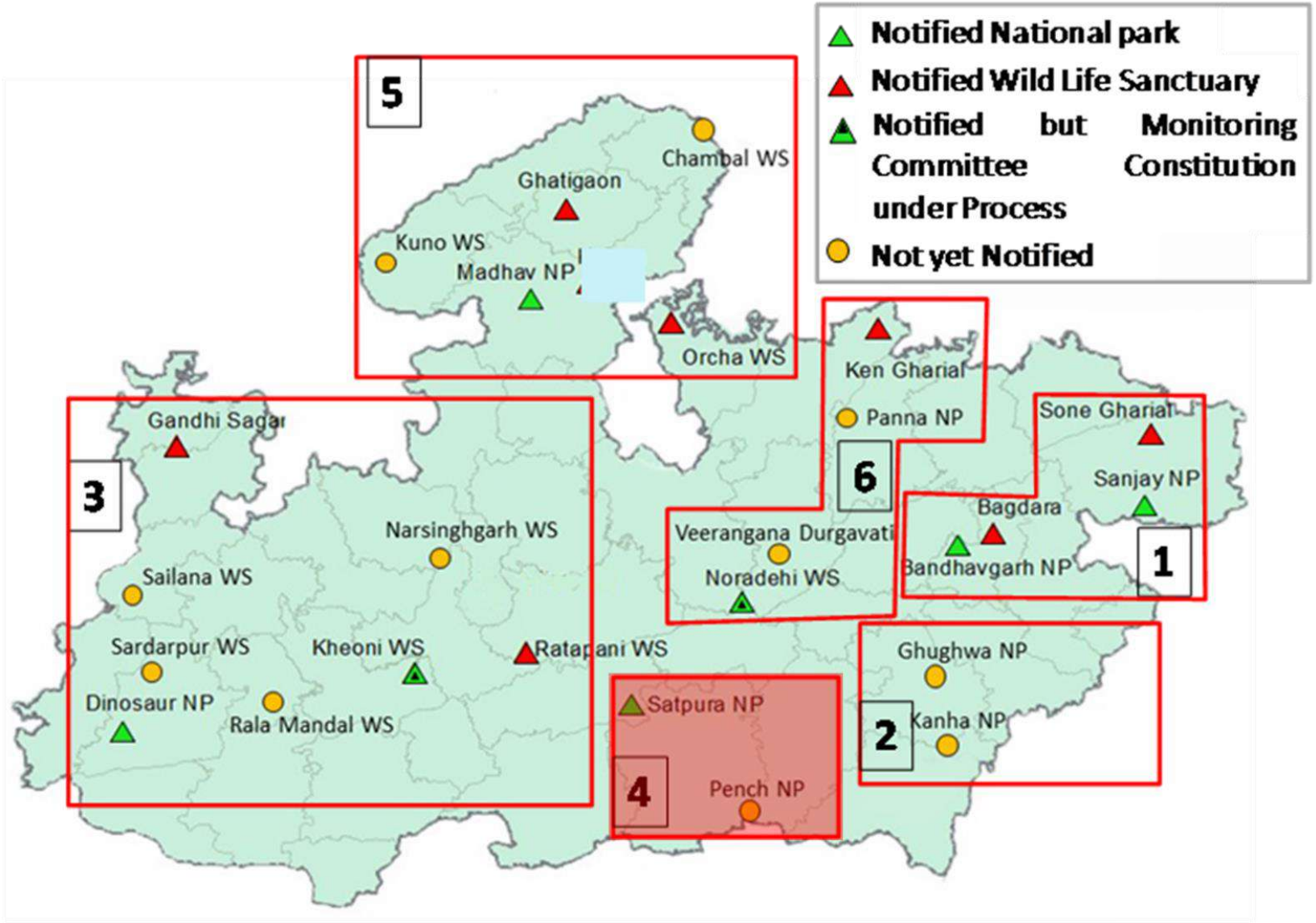


Figure 1-5 : Map showing Location of Satpura National Park and Pench National Park

1.8.1 Introduction of the Satpura Tiger Reserve

The Satpura Tiger Reserve is located in the Hoshangabad district of Madhya Pradesh. It is part of the largest Tiger Habitat in the world which includes Chhindwara, Hoshangabad, Betul, Harda, Khandwa and Melghat extending over 10,000 square kilometers. This landscape is most vital for survival of tiger and this area has historically been renowned for Tiger, Gaur and Sambhar. At least 14 endangered species of mammals, birds and reptiles inhabit these forests. The flying squirrel, Indian giant squirrel and Leaf nosed bats must be regarded among the most sensitive to habitat changes.

1.8.2 Legal formalities of Satpura Tiger Reserve as Eco-sensitive zone

A draft notification was published in the Gazette of India, Extraordinary, vide notification of the Government of the India in the Ministry of Environment, Forest and Climate Change vide number S.O. 655(E), dated the 4th March, 2016, inviting objections and suggestions from all persons likely to be affected thereby within the period of sixty days from date on which copies of the Gazette containing the said notification were made available to the public. Copies of the Gazette were made available to the public on the 4th March 2016 followed by objections and suggestions received from persons and stakeholders in response to the draft notification were duly considered by the central government. Same has been notified vide Extra ordinary gazette notification dated 9th August 2017.

In exercise of the powers conferred by sub section(1) and clauses (v) and (xiv) of subsection (2) and sub-section (3) of section 3 of the Environment (Protection) Act 1986 (29 of 1986) read with sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986, the Central Government notifies an area up to an extent of 100 m on the notified urban and 'Abadi' area side from the boundary of Core Critical Tiger Habitat of the Satpura Tiger Reserve, which includes Satpura National Park, Pachmarhi Wildlife Sanctuary and Bori Wildlife Sanctuary and up to 2 kilometres on other sides from the boundary of Core Critical Tiger Habitat of the Satpura Tiger Reserve, as the Satpura National Park, Pachmarhi Wildlife Sanctuary and Bori Wildlife Sanctuary in the State of Madhya Pradesh Eco-sensitive Zone (herein after referred to as the Eco-sensitive Zone).

1.8.3 Area

Jointly, Satpura National Park and Pachmarhi and Bori Wildlife sanctuary, popularly known as 'Satpura Tiger Reserve' (STR) is having a total area of 1432.22 sq. kms. Bifurcation of the area is given in table below:

Table 1-3 : Area details of the Satpura Tiger Reserve

Tiger Reserve	Sr. No.	Particular	Area (Sq.Kms.)
Satpura Tiger Reserve	1	Satpura National Park	528.73
	2	Pachmarhi Wildlife Sanctuary	417.78
	3	Bori Wildlife Sanctuary	485.71
	TOTAL		**1432.22**
	1	Core Critical Tiger Habitat	1339.26
	2	Buffer Area	794.04
	TOTAL		**2133.30**

1.8.4 Extent and boundaries of Eco-sensitive Zone

The extent of Eco-sensitive Zone is up to 100 m on the notified urban and 'Abadi' area side from the boundary of Core Critical Tiger Habitat of the Satpura Tiger Reserve in the State of Madhya Pradesh, which includes Satpura National Park, Pachmarhi Wildlife Sanctuary and Bori Wildlife Sanctuary and up to 2 kilometres on other sides from the boundary of Core Critical Tiger Habitat of the Satpura Tiger Reserve.

The Eco-sensitive Zone is spread over an area of 1079.43 square kilometres which includes 794.04 square kilometre buffer area of Satpura Tiger Reserve and forest areas of other adjoining divisions (Within two km. periphery) of 285.39 square kilometres.

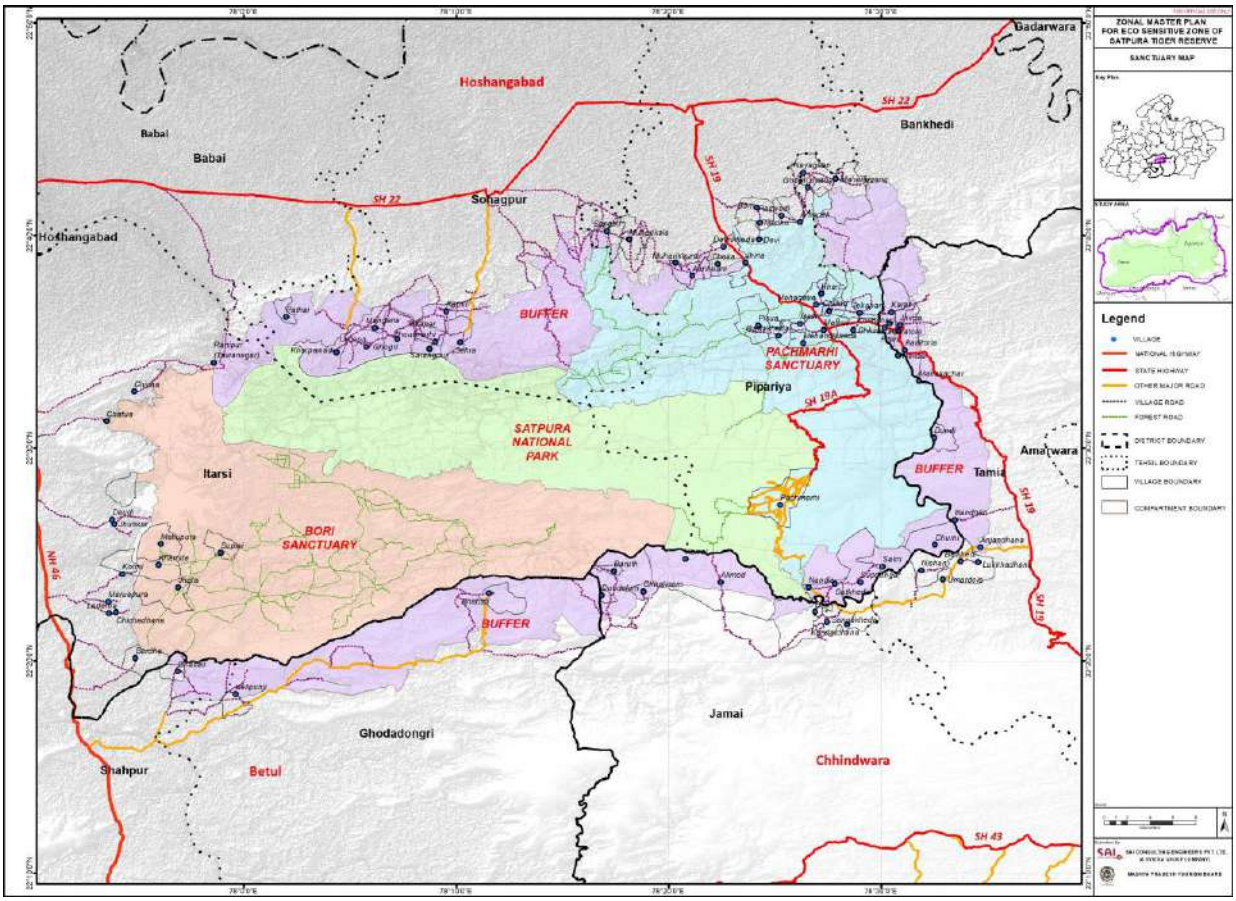


Figure 1-6 : Legal status of Satpura Tiger Reserve

The Eco-sensitive Zone includes 81 villages. The list of the villages falling within the Eco-sensitive Zone is given in ANNEXURE 1.1. While The map of the Eco-sensitive Zone is given in map below.

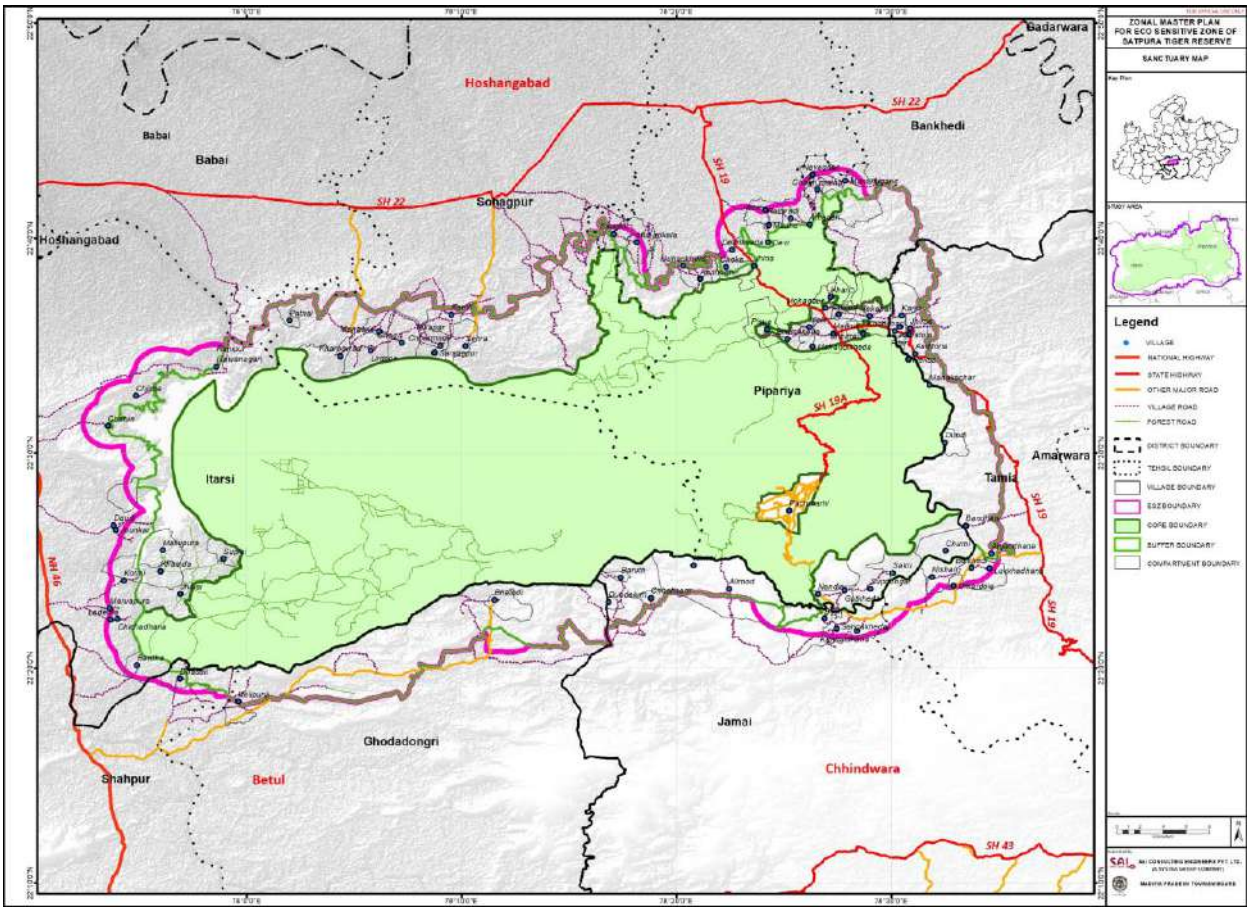


Figure 1-7 : Extent of Satpura Tiger Reserve

Table 1-4 : Extent / co-ordinates of the STR Core Zone and Eco-sensitive zone

Sr. No.	Direction	Latitude	Longitude
Coordinates of the Core Zone			
1	North	22º42'01.12''	78º27'35.84''
2	East	22º25'36.98''	78º33'57.22''
3	South	22º19'51.50''	78º01'59.74''
4	West	22º31'06.91''	77º53'45.03''
Coordinates of the Eco-Sensitive Zone			
1	North	22º43'13.89''	78º27'37.92''
2	East	22º25'20.98''	78º35'43.93''
3	South	22º18'12.13''	78º05'03.81''
4	West	22º31'11.29''	77º52'22.77''

1.9 APPROACH AND ACCESS

Satpura Eco-sensitive zone is fairly connected with different town cities of India. Distance and connectivity to Satpura eco-sensitive zone is discussed below:

1.9.1 Distance from major Urban Centres

Pachmarhi is the only urban centre situated within of Satpura Tiger Reserve. Thus, distance to Pachmarhi from the Urban Places is given in table below:

Table 1-5 : Approximate distance (KMs) of Major Urban centers to / from Pachmarhi

Sr. No.	Town / City	Approximate Distance (KMs) to / from Pachmarhi
1	Bhopal	195
2	Jabalpur	248

Sr. No.	Town / City	Approximate Distance (KMs) to / from Pachmarhi
3	Indore	339
4	Betul	180
5	Chhindwara	105
6	Nagpur	227

Road Connectivity

Satpura Tiger Reserve is spread over Hoshangabad, Betul and Chhindwara district, it is connected through roads only. The nearest town to Satpura tiger reserve is Pachmarhi and state capital Bhopal is at a distance of 170 km. Headquarter of Satpura Tiger Reserve is at Hoshangabad.

There are mainly three entrances for Satpura Tiger Reserve. Entire area is surrounded by the loop of State highways and one National highway.

- National highway 69, which is connecting Hoshangabad to Betul via Itarasi, is passing from the western side of the Satpura Tiger Reserve and connecting major cities of Madhya Pradesh i.e. Bhopal, Indore, Ujjain etc. State highway 22, which is connecting Hoshangabad to Pipariya, is in the north side of the Satpura Tiger Reserve.
- State highway 19 is passing through the eco-sensitive zone from eastern side and connecting Pipariya to Chhindwara via Matkuli.
- State Highway 19 B which is connecting Betul via Shahpur, Sarni, Damua, Parasia to Chhindwara, is in the Southern side of the area.

There are majorly five entry points of Satpura Tiger Reserve from above said National Highway and State Highways. First is close to Pachmarhi hill station. Second and popular one is from Madhai Entrance gate which is about 100 kms from Pachmarhi close to Sarangpur village. Madhai Entranct Gate is about 19kms inside from Pipariya-Hoshangabad road. Diversion for Madhai is close to Sohagpur town. Third entrance is for those who are staying in MP Tourism: Tawa Resort located on Tawa Dam. It is close from Hoshangabad town.

These entry points to the Satpura Tiger Reserve and the ESZ area are well-managed by forest department. Mentioned below is the existing set up followed by the forest depart as per the Tourist zones and carrying capacity of the region:

- **Entry gate of Madhai:** Only 24 vehicles are permitted to enter this core zone per day, including the morning and late-afternoon drives. Ecotourism activities except vehicle safari include elephant ride, boat ride, canoeing and trekking.
- **Entry gate of Churna:** In Churna zone, tourists can take their own pollution free, four-wheeled vehicle capable of going through the rough forest terrain.
- **Entry gate of Jamanidev and Parsapani:** These buffer zones (near Madhai) of the tiger reserve can be visited through safaris by private vehicles. 14 vehicles in the morning and 14 in the afternoon are permitted to enter these zones.
- **Entry gate of Pachmarhi:** This is a hill station containing waterfalls and some beautiful viewpoints, all of which can be reached by privately owned vehicles.

Rail Connectivity

Nearest railway stations for Satpura National Park are: Itarsi, Sohagpur, Pipariya & Hoshangabad.

1.9.2 Air Connectivity:

To reach Satpura National Park, nearest airport is at Bhopal city which is approximately 195 kms away.

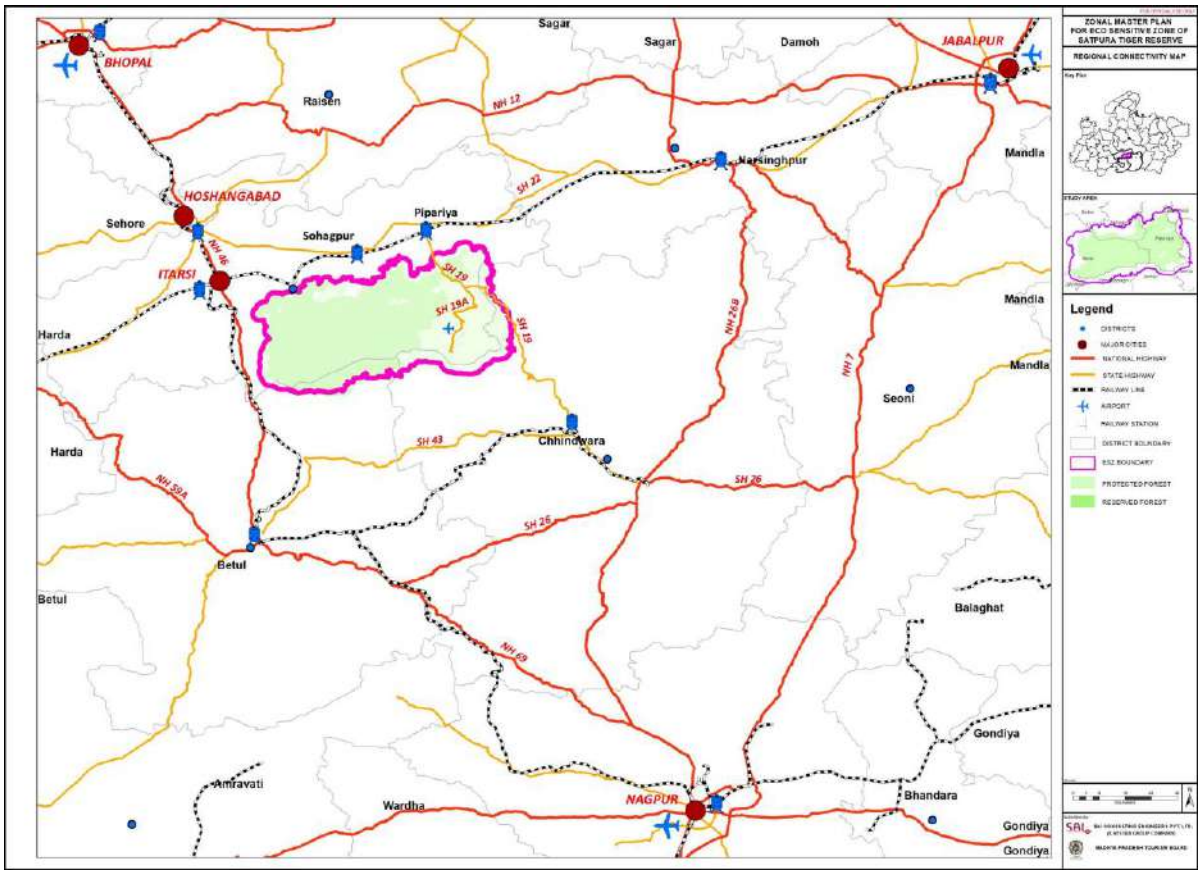


Figure 1-8 : Regional connectivity of Satpura Tiger reserve

1.10 DESCRIPTION OF THE ECOLOGICAL CHARACTERISTICS OF THE PA INCLUDING BIODIVERSITY

Satpura Tiger Reserve has a very rich diversity in flora and fauna. it is part of a one of the largest tiger habitats in the world as area is most vital for survival of tiger. The National Park is constituted forest areas of Chhindwara, Hoshangabad and Betul. This area has historically been renowned for Tiger, Gaur and Sambhar. Highest presence of Sambhar can be found here in central India region. 14 endangered species of mammals, birds and reptiles inhabit these forests. The flying squirrel, Indian giant squirrel and Leaf nosed bats must be regarded among the most sensitive to habitat changes. This protected area is also a habitant for avian fauna; more than 280 species of birds can be seen which include Malabar pied horn-bill, Malabar whistling thrush and the state bird paradise flycatcher and also visited by many migratory birds like Brahmni duck, Ibis, Cormorants and many more.

Satpura Tiger Reserve is one of the rich central Indian highlands eco-system. It has a unique area of high natural and diverse land resource values. The area consists of rare and endemic plants especially Bryophytes and Pteridophytes like Psilotum, Cythea, Osmunda, Lycopodium, Lygodium. The Pachmarhi plateau has Sal forests exist on Gondwana sandstone, whereas on lower plains teak forests grow on basaltic traps. Some of the endemic species are also found in the region. These species are from Himalaya and Nilgiri hills are found here. Based on its rich, unique, rare and endangered faunal & floral diversity, it has been declared as first Biosphere Reserve of M.P in the year 1999.

Apart from biodiversity, the area of Satpura Tiger reserve is also important for archaeology and study of human evolution history. There are more than 15 rock shelters with beautiful paintings which are approximately 1500 to 10,000 years old. Some of them are having very rare depictions.

The Satpura Tiger Reserve is vital from Economic, Biological, Ecological process and functional conceptual, physical attributes, Recreational, Scientific, Educational, Cultural, Religious as well as Historical point of view.


Hills of Satpura

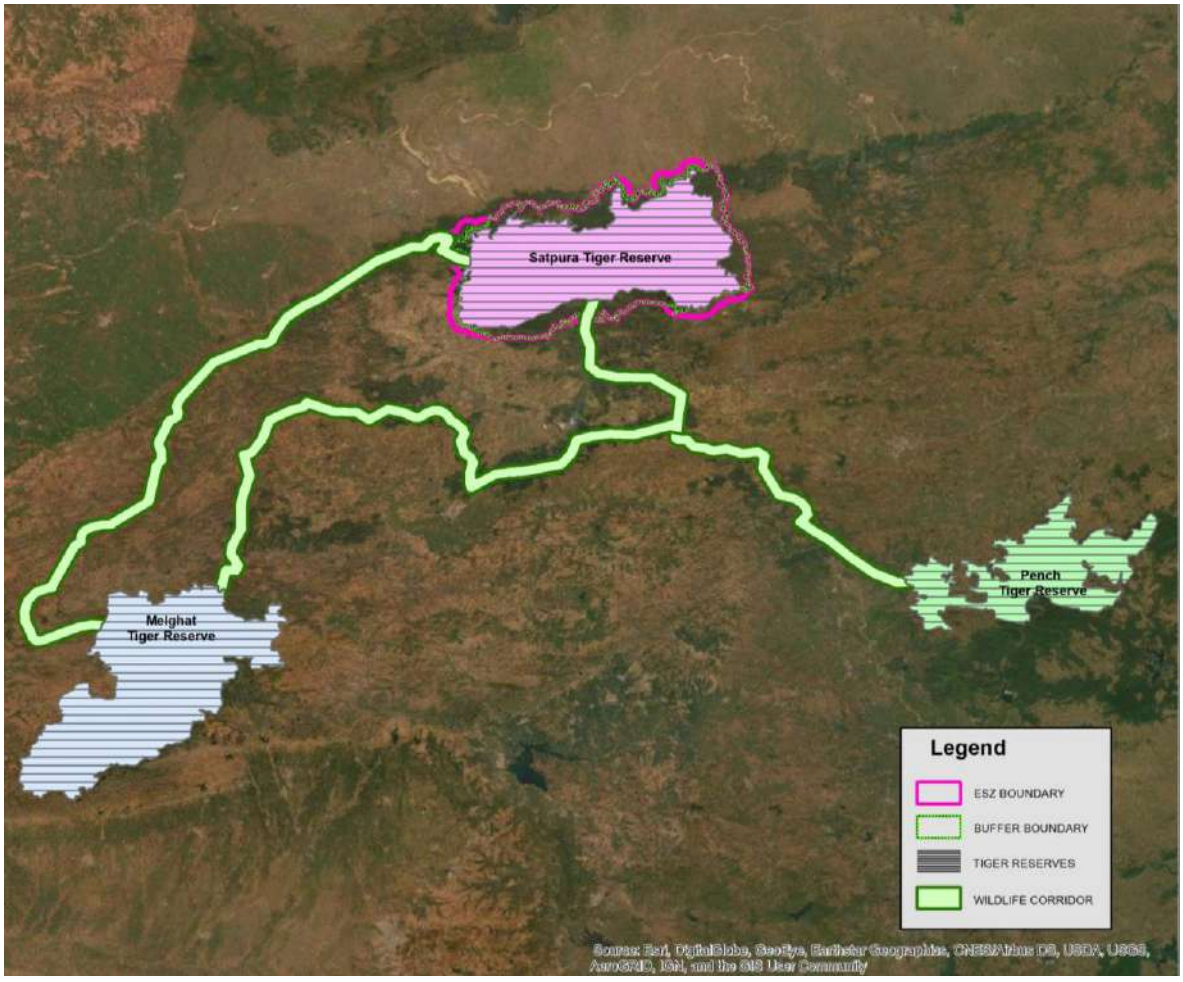

Caves of Satpura


Deep Gorges formation

Figure 1-9 : Landscape of STR

1.10.1 Forest connectivity

Satpura Tiger reserve also connected with Melghat and Pench forest through green corridors. Many forest areas are part of this corridor. Tiger is a landscape species and the extensive forests of this area play very vital role in movement and dispersal of tigers and other wild animals. The movement through this corridor is observed between forests of tiger reserve and other forests present in vicinity. Forests of eco-sensitive zone connect core area of the Tiger Reserve with forests situated outside the eco-sensitive zone. Thus, eco-sensitive zone forests and riparian strips act as green and blue corridors which facilitates spill over animal movement is possible safely and regularly. The green corridor is as per below map.



(Source : Tiger conservation Plan, Vol.-1 : core zone and Vol.-2: Buffer zone, Satpura Tiger reserve 2015-2024)

Figure 1-10 : Connectivity with Melghat and Pench forest

1.10.2 Panchmarhi Biosphere reserve

Biosphere is an international designation given by UNESCO for representative parts of natural and cultural landscapes extending over large area of terrestrial or costal marine ecosystem. These are designated to

deal with reconciling the conservation of biodiversity, economic and social development and maintenance of associated cultural values. A programme The Man & Biosphere (MAB) launched in 1970 by UNESCO with aim to emphasize the importance of the structure and functioning of ecological systems and their mode of reaction when exposed to human intervention including impact of man on the environment and vice-versa. Five priority areas were identified to enable Biosphere Reserves to implement results in UNCED in June, 1992.

- Conservation of biological diversity and ecological processes
- Development of sustainable use strategies
- Promotion of information dissemination and environmental education
- Establishment of training structure
- Contribution to the establishment and implementation of Global Environmental Monitoring System

A total of 631 BRs in 119 countries have been designated in the UNESCO's World Network of Biosphere Reserves (WNBR). In India, 18 Biosphere Reserves has been established and 9 reserves are included in WNBR. Among them 3 are from Madhya Pradesh which are Panchmarhi (1999), Achanakmar – Amarkantak (2005) and Panna (2011) notified by Ministry of Environment, Forest and Climatic Change, Government of India.

The area of Panchmarhi designated as biosphere reserve by Government of India in 1999 because of its unique Sal forests, diverse and rich flora and fauna, topography and geographic situation and inhabitation of tribal population. The area has also been identified on the World Network of Biosphere Reserves by UNESCO on 26th May, 2009. The area falls in Biogeographic zone and Biogeographic province. The Panchmarhi almost falls in centre. The total area covered by Panchmarhi biosphere is 4981.72 km^2. The core area of Panchmarhi Biosphere is 1555.23 km^2, which includes the Satpura National Park and area of reserve and protected forest. The buffer zone is extended in an area of 1785.58 km^2 and Transition zone comprise of area 1640.91 km^2.

Panchmarhi Biosphere Reserve is one of the highly biodiversity rich areas with floristic diversity and unique plant life forms. Panchmarhi Biosphere Reserve is known as "Genetic Express Highway" as it joins two biodiversity hotspots of Eastern Himalaya and Western Ghat. The most important timber species of the Biosphere Reserve are teak and sal. About 30 species of Thallophytes, 83 species of *Bryophyte*, 56 *Genera*, 71 species of *Pteridophytes*, 7 species of *Gymnosperms* belong to 633 genera are reported. There are rare and endemic species, which are observed and considered to be a 'gene bank' of rare species of this locality. Several rare angiosperm plants are also observed in this reserve. Species such as Whisk Fern, Sandbar willow, stalked adder's tongue fern and Tree fern are found here. A few clumps of rare and endemic species like *Bambusa Polymorpha* occur in the moist teak forest of Bori Reserve.

About 50 species of mammals, 254 species of birds and 30 species of reptiles are reported in region of biosphere. The steep vertical carps are home to numerous raptors like honey buzzard, serpent eagle and black eagle. Common birds found in the reserve are gray jungle fowl, Malabar pied hornbill, Malabar whistling thrush and paradise flycatcher. The reptilian population include geckos, skinks, etc. Several species like rhesus monkey, Indian giant squirrel and flying squirrels, skimmer are endemic to the area.

There are a large number of cave shelters of great archaeological interest, with rock paintings of several thousand years old. The paintings are of different styles and periods gives a closer look to civilizations of past.

The hills around Pachmarhi are sacred because of Mahadeo or Lord Shiva temples. There are two important Hindu festivals observed in this locality: Nagpanchami in Shravan (July-August) and Maha-Shivaratri in March. More than 12,000 pilgrims come to attend these festivals.

The major threats to the reserve are collection of rare, endemic and medicinal plants by various groups, proliferation of lantana and poaching.

1.11 STATEMENT OF SIGNIFICANCE / IMPORTANCE OF THE PA

Landscape of Satpura Tiger Reserve is most vital for survival of tiger and this area has historically been renowned for Tiger, Gaur and Sambhar. At least 14 endangered species of mammals, birds and reptiles

inhabit these forests. The flying squirrel, Indian giant squirrel and Leaf nosed bats must be regarded among the most sensitive to habitat changes.

This protected area is a paradise for people interested in avian fauna. More than 300 species of birds can be seen which include Malabar pied horn-bill, Grey Jungle fall Malabar whistling thrush and the state bird of Madhya Pradesh paradise flycatcher. The Area also visited by many migratory birds like Skimmer, Brahmi duck, Barheaded Gees, Pintail etc.

Satpura Tiger Reserve is prime example of central Indian highlands ecosystem. It is a unique area of high natural and diverse land resource values and endowed with rich biodiversity. It has a large number of rare and endemic plants especially bryophytes and pteridophytes like Psilotum, Cythea, Osmunda, Lycopodium, Lygodium etc. On Pachmarhi plateau sal forests exist on Gondwana sandstone whereas on lower plains teak forests grow on basaltic traps.

Phytogeographically the Tiger Reserve is unique; some species, which are not common elsewhere in Madhya Pradesh are found in this area. These are Malastoma malabaricum, Moraya paniculata, Holmskildia senguines, Blumea lancelaria, Sophora interrupta etc. There are 26 species of Himalaya and 42 species of Nilgiri hills are found here.

The area is very important from the archaeological and human evolution point of view as there are more than 50 rock shelters with paintings which are 1,500 to 10,000 years old.

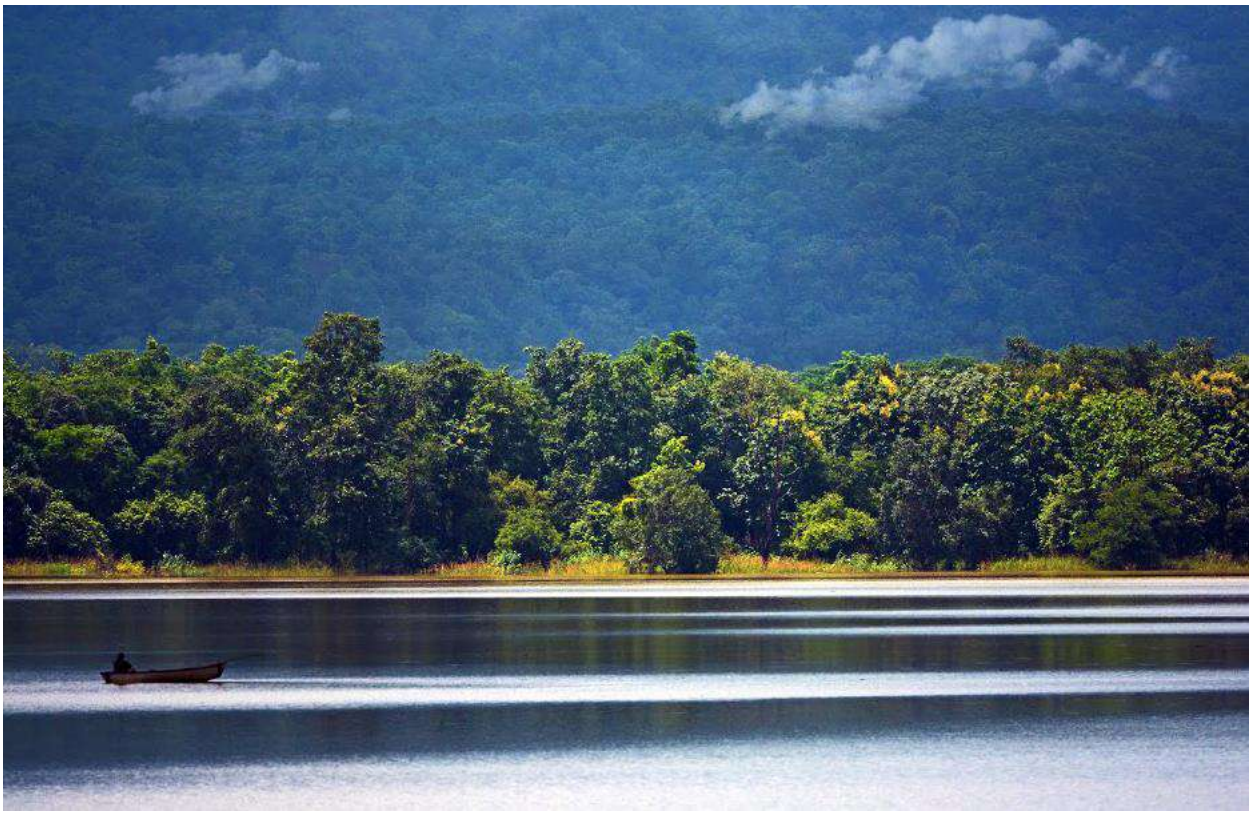


Figure 1-11 : View of Tawa Reservoir

1.12 THREAT TO THE PA DUE TO ANTHROPOGENIC ACTIVITIES IN THE PERIPHERY

The core area and buffer have villages inside of the buffer zone of tiger reserve. The major livelihood source apart from agriculture is livestock rearing for the villagers. This leads to immense grazing pressure on the pastures in buffer zone of STR. The biotic pressure created on forest due to presence of villages and activities of villagers in buffer zone. In these areas due to heavy pressure of grazing around villages, forest habitat is degrading, and area is infested with weeds. The other issue from increment in cattle numbers, a competition for fodder and water between cattle and wild animals starts in ESZ area. Presence of the carnivores also found in the grazing land area because of the of cattle.

To control grazing 'Charai Yojana' is prepared every year. Cattle are converted into 'cattle grazing units' as per Madhya Pradesh Charai Niyam, 1986. Open areas for grazing is earmarked around villages based

on rotation. The area is further divided into restricted area in which problem of crossing over to closed area and as permitted area which is accessible all the times. Maximum poaching incident location are observed in the grazing land as the access to both human and cattle is provided into the forest.

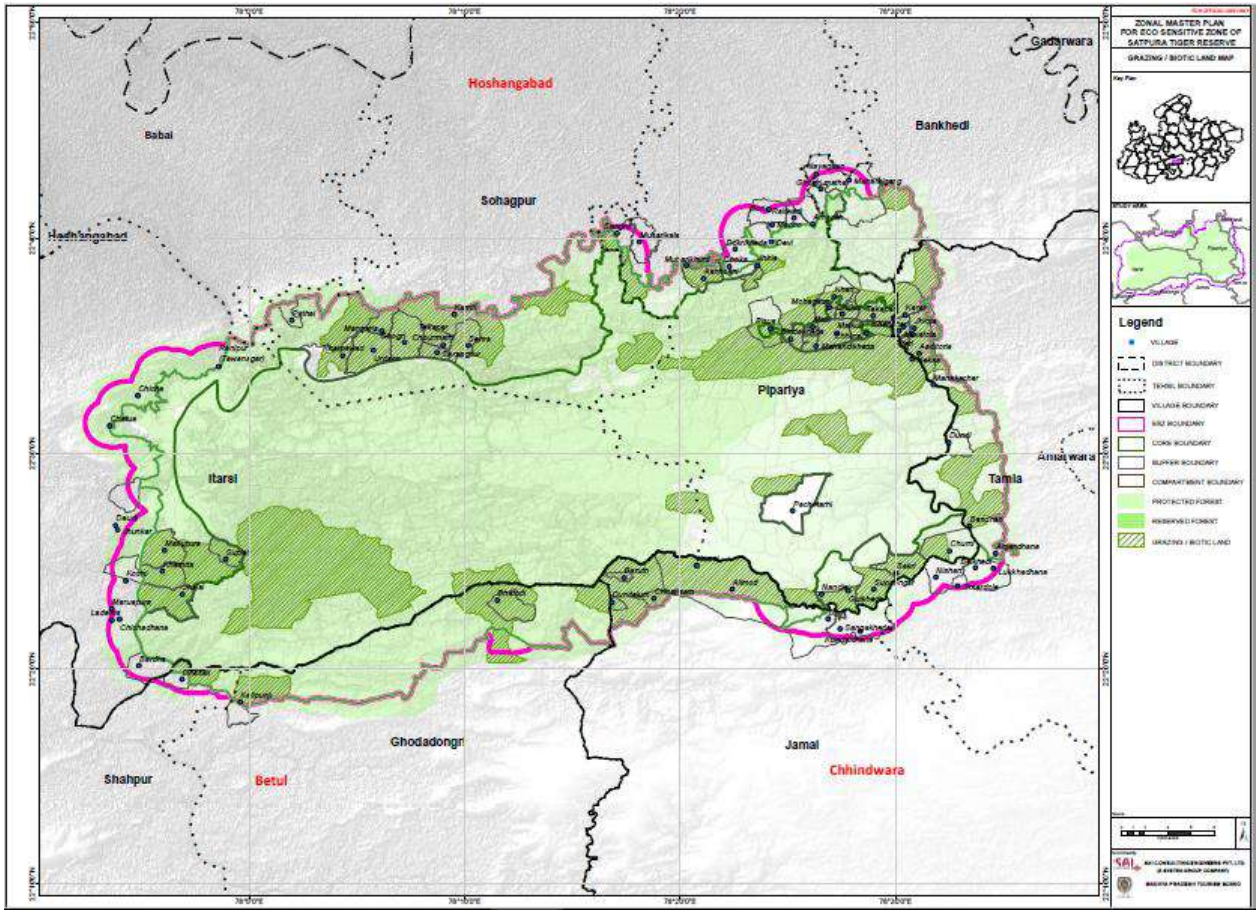


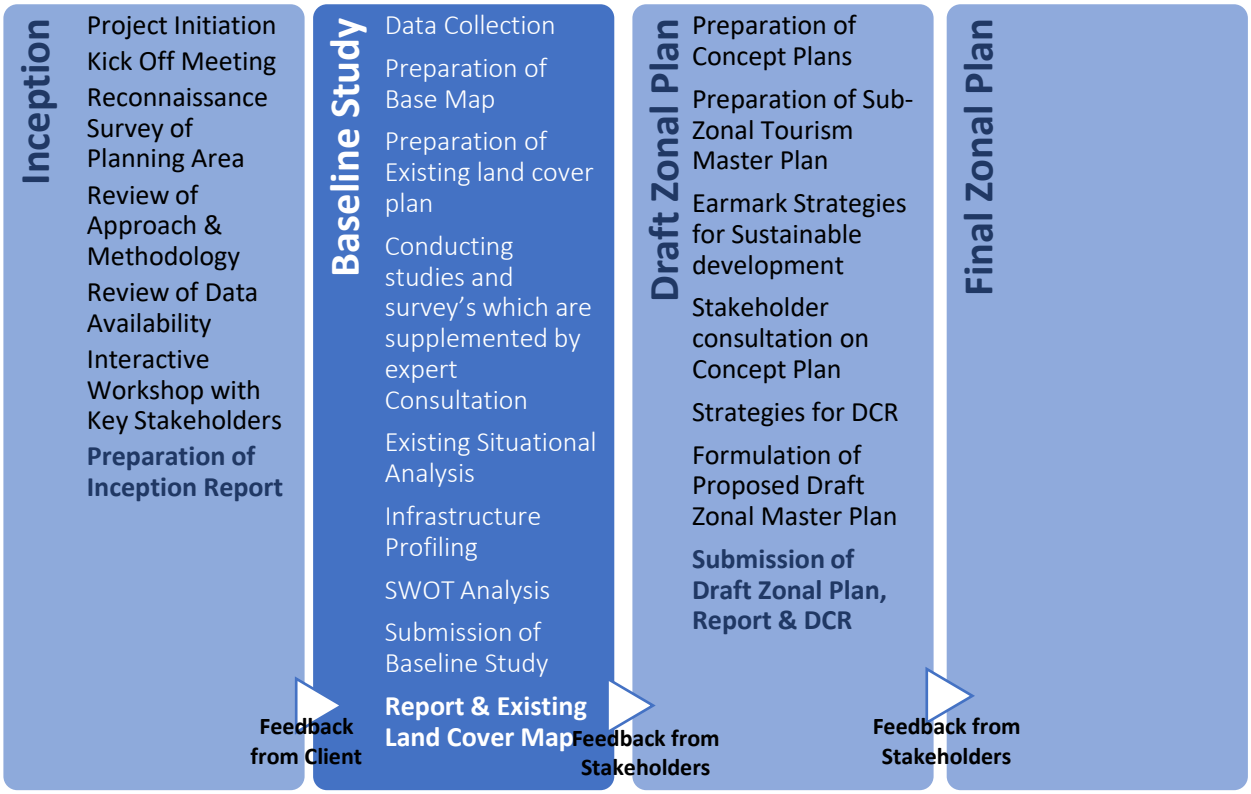
Figure 1-12 : Biotic/ Grazing land pressure in the STR

1.13 REQUIREMENT OF DELINEATING ECO-SENSITIVE ZONE

Zonal Master Plan for the eco-sensitive zone has to be prepared by the State Government within a period of two years from the date of last notification issued by the Ministry of Environment and Forests, Government of India. The zonal master plan should provide for restoration of denuded areas, conservation of existing water bodies, management of catchment areas, soil and moisture conservation, needs of local community, etc., which needs attention. It should also demarcate all the existing and proposed urban settlements, village settlements, types and kinds of forest, agricultural areas, green areas, horticultural areas, lakes, etc. No change of land use from green uses shall be permitted in the zonal master plan except limited conversion of agricultural lands to meet the residential needs of the existing local residents, improvement of roads and bridges, community buildings, without the prior approval of the state government. Pending preparation of the master plan and approval thereof by the Ministry of Environment and Forests, all new constructions can be allowed only after it is approved by the Monitoring Committee constituted by the Central Government.

1.14 METHODOLOGY

Overall methodology and description of tasks to prepare the Zonal Master Plan is shown in figure below:



1.15 DATA COLLECTION PROCESS

Collecting data allows to store and analyze important information about your existing and potential area of development. Data collection is one of the major parts of any plan. There are two types of data: Primary data and Secondary data

Primary data: Are those which are collected a fresh and for the first time and thus happen to be original in character and known as primary data.

Secondary data: Are those which have been collected by someone else and which have already been passed through the statistical process are known as secondary data.

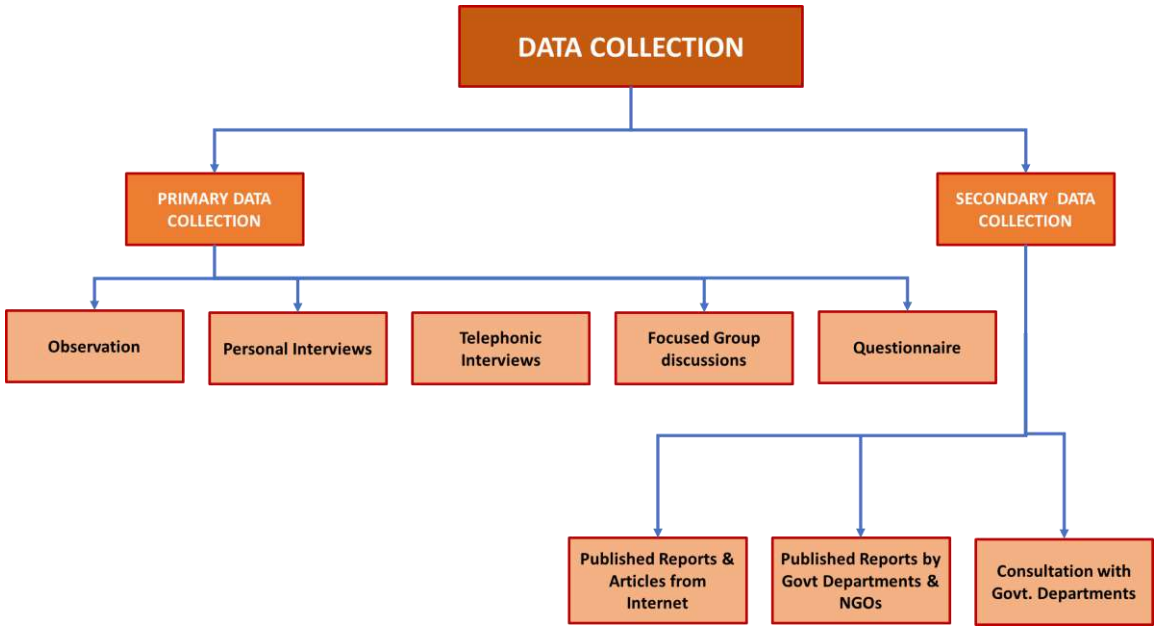


Figure 1-13 : Data Collection

1.16 PRIMARY DATA COLLECTION

As a part of the stage baseline assessment - data collection for cluster 4 - ESZ, included the primary data collection which were supplemented with expert and stakeholder consultation of officials, villagers. The semi-structured interview comprised of a questioneer form which has been attached in annexure 1.2.

Stakeholder Consultation:

People who will get affected by this project are the stakeholders such as investors, villagers, concerned government departents etc. Stakeholder consultation is one of the major part of planning process. Ultimately planning is to be done for the development of people who are living there or interested in that area, so it is necessary to involve them to know their expectetions, needs and perception for a perticular plan.

As a part of stakeholder consultation, the following villages have been coverd during primary survey and site visit for this project:

Table 1-6 : Date of Visit Villages Visited During Primary Survey

Sr. No	Villages	Visiting Date
1	Tekapar	01/07/2016
2	Ghoghari	01/07/2016
3	Urdon	01/07/2016
4	Ranipur	30/06/2019
5	Naya Chicha	30/06/2019
6	Chatua	30/06/2019
7	Jhunkar	30/06/2019
8	Tawanagar	30/06/2019
9	Daudi	30/06/2019
10	Magariya	02/07/2019
11	Dokrikhera	04/07/2019
12	Tekapar	25/07/2019
13	Jhirpa	25/07/2019
14	Jhunkar, Daudi	25/07/2019
15	Bardha	25/07/2019
16	Silwani	25/07/2019
17	Pipariya Kalan	25/07/2019

Sr. No	Villages	Visiting Date
18	Kelipunji	26/07/2019
19	Dhasai	26/07/2019
20	Bori	27/07/2019
21	Jhiriya	27/07/2019
22	Devi	27/07/2019
23	Madho	27/07/2019
24	Raitwadi	27/07/2019
25	Amadeh	27/07/2019
26	Matkuli	28/07/2019
27	Ghoghri Mattha	28/07/2019
28	Mohgaon	28/07/2019
29	Khari	28/07/2019
30	Chhirai	28/07/2019
31	Jhirpa	28/07/2019
32	Khanchari	28/07/2019
33	Fiferi	28/07/2019
34	Muharikala	29/07/2019

Sr. No	Villages	Visiting Date
35	Delakheri	29/07/2019
36	Kapurnala	29/07/2019
37	Nishan	29/07/2019
38	Nayagaon	29/07/2019
39	Sangi	29/07/2019
40	Kamti	29/07/2019
41	Sarangpur	29/07/2019
42	Sehra	30/07/2019
43	Tekahar Chourmahi	30/07/2019
44	Sehra	30/07/2019
45	Bijakheri	30/07/2019

Sr. No	Villages	Visiting Date
46	Gram Panchayat, Jamundonga	03/08/2019
47	Anjandhana	03/08/2019
48	Almod	03/08/2019
49	Sangakheda	03/08/2019
50	Bandhan	04/08/2019
51	Belkhedi	04/08/2019
52	Bijori	04/08/2019
53	Umardole	04/08/2019
54	Karer	05/08/2019
55	Pachmarhi	05/08/2019

Figure 1-14 : Village Survey Form

Questionnaire has been filled for most of the villages. Also, primary data has been collected accordingly from villagers. Also, personal interviews of villagers and focused group discussions helped to understand characteristics of the villages and lifestyle of the villagers as well as economy of the villages. Focused group discussions have been fruitful to understand the issues of the villagers in detail and potential area of

development in the village. It also helps to understand villager's perception regarding environmental awareness, conservation of natural resources & eco sensitive zone.

As a part of data collcetion, following governemnt departments have been consulted during site visit. Inwarded letters for data collection is attached in annaxure 2.2.

Table 1-7 : Date of visit of Department for Data Collection

Sr. No	Department	Visiting Date
1	MPPCB, Bhopal	24/06/2019
2	MP State Biodiversity Board, Bhopal	24/06/2019
3	Mineral Resource Dept, Bhopal	25/06/2019
4	MP Ecotourism Development Board, Bhopal	26/06/2019
5	Ground Water Survey, WRD, Bhopal	26/06/2019
6	Town & Country Planning, Bhopal	26/06/2019
7	Fisheries Dept, Bhopal	26/06/2019
8	State Minor Forest Produce, Bhopal	27/06/2019
9	Archaelogical Museum+ASI, Bhopal	27/06/2019
10	Agriculture Department	29/06/2019
11	Animal Husbandry, Hoshangabad	29/06/2019
12	District Planning, Hoshangabad	29/06/2019
13	NRLM	29/06/2019
14	DRDA, Hoshanagabad	29/06/2019
15	District Trade & Industries Centre, Hoshangabad	29/06/2019
16	Panchayat & Rural Development Dept, Sohagpur	02/07/2019
17	Revenue Dept, Sohagpur	02/07/2019
18	Revenue Dept, Itarsi	03/07/2019
19	Revenue Dept, Pipariya	04/07/2019
20	EPCO	22/07/2019
21	Rural Agriculture Extension Officer, Kesla	25/07/2019
22	Reliance Foundation, Pipariya/Kesla	25/07/2019
23	NRLM, Kesla	25/07/2019
24	NRLM, Pipariya	29/07/2019
25	Janpad Panchayat, Sohagpur	31/07/2019
26	Janpad Panchayat, Tamia	01/08/2019
27	SRLM, TAMIA	01/08/2019
28	MPSRLM, Jamai	02/08/2019
29	AAO, Junnardeo	02/08/2019
30	SADA, Pachmarhi	06/08/2019

Sr. No	Department	Visiting Date
31	NRLM, Hoshangabad	08/08/2019
32	Cantonnement Office, Pachmarhi	17/09/2019
33	Jilla Panchayat, Hoshangabad	19/09/2019
34	Horticulture Department, Hoshangabad	27/09/2019
35	Narmada Control Authority, Hoshangabad	27/09/2019
36	PHE Department, Hoshangabad	16/10/2019
37	Satpura Tiger Reserve, Hoshangabad	29/06/2019

1.17 SECONDARY DATA-SET:

As a part of the stage baseline assessment - data collection for cluster 4 - ESZ, following departments were visited, requested to provide data across various aspects and on the lines the team was provided with the data set of varying quality which has been described in below section.

Table 1-8 : Avability of Data acquired from various governemnt departments:

Data	Department	Status	Discussion during Workshop to collect data
Satellite Imagery (Orthorectified / registered)	MPNIC / MAPIT / MPDST	Data Collected	State IT
State Boundary		Data Collected	State IT
District Boundary		Data Collected	State IT
Village boundary		Data Collected, Village boundaries of 13 villages are not available	
Cadastral Boundary (ESZ villages)		Not available for33 villages	
Government Land		Not available for33 villages	
Boundary of notified forest / wildlife sanctuary, national park, tiger reserve		Data Collected	
Water Bodies		Data Collected	
Watershed		Data Collected	
Catchments / Basin		Data Collected	
Natural Drainage		Data Collected	
Ground water levels	MP Water Resource Department/ PHED / CGWB	Can be contours or points with levels data	
Topography	MAPIT	Data Collected	
Contours	MAPIT	Data Collected	

Data	Department	Status	Discussion during Workshop to collect data
Streams and Drains	MP Water Resource Department/ Survey/ MAPIT	Data Collected	
Wildlife Habitat areas	MP Forest Dept., STR	Data Collected	
Forest	MP Forest Dept., STR	Data Collected	
Forest Preservation Plot	MP Forest Dept., STR	Data Collected	
Land Use and Land cover	MAPIT / Bhuvan	Data Collected	
Soil Profile	MAPIT / Bhuvan/ National Bureau of Soil and Land Use Survey/ Agri Dept	Not Available	
Soil erosion	Bhuvan/ National Bureau of Soil and Land Use Survey/ Agri Dept	Not Available	Not available with MAPIT
Agriculture	MAPIT / Bhuvan/ MP Agriculture Dept.	Data Collected	MAPIT- Area under cultivation
Climate Zone	Available Online		
Fire (5-10 years, Fire sensitive spots)	MP Forest Dept./ MODIS Open Data	Data Collected	MODIS
Agro-Climatic Regions	National Bureau of Soil and Land Use Survey	Not Available	
Geology	MAPIT / MPPCB	Data Collected	
Geomorphology	MAPIT / Bhuvan	Data Collected	
Land/ water pollution points	Survey		
Noise pollution	MPPCB/ Survey	Not available	
Natural Heritage Sites	MoEF / ASI/ Tourist information center / Tour Operators/ Survey/ MAPIT	Data Collected	
Road	MPNIC / MAPIT	Data Collected	
Railway Track	MPNIC / MAPIT	Data Collected	
Bus Stop	Survey	Data Collected	
Railway Station	MPNIC / Survey	Data Collected	
Heritage Sites/ Structures/ Areas/ Precints	Survey / Bhuvan / ASI / State Arch	Data Collected	
Tourist Footfall	Survey / MPTB	Data Collected	
Forest Interpretation Centres	Survey / MPTB	It is to be collected locally + MPTB	
Tourists Entry Points	Survey / MPTB	Data Collected	
Other tourism infrastructure	Survey / MPTB	Data Collected	
Settlements	MPNIC / MAPIT / MPDST	Data Collected	
Tribes Settlement	MP Tribal Affairs Department	Data Collected	
Parks & Open space	Survey	Local	

Data	Department	Status	Discussion during Workshop to collect data
Religious activities	Survey	Data Collected	
Industries	MPIDC/ MAPIT	Data Collected	
Mining	MPNIC / MAPIT / MPSMCL	Data Collected	
Sewage discharge point, Network and treatment	Survey	Local	
Solid waste collection, landfill site	Survey	Data Collected	
Public toilets	Survey	Data Collected	
Encroachment in Eco-Sensitive Zones	Survey	Data Collected	
Check dams	MP Water Resource Dept. / MAPIT	Data Collected	
Regional Infrastructure	MPPTCL,	Local	
Public Facilities (Health, Education, Police station, Fire Station)	Survey	Data Collected	
Markets, MELA, FAIRS	Survey	Data Collected	
Tourist Spots	Survey / MPTB	Data Collected	
Entertainment Activities	Survey	Data Collected	
Canal	Water Resource Dept./ MAPIT	Data Collected	
ESR/ GSR	Water Resource Dept./ PHE	Data Collected	
Street Vendors	Survey	Data Collected	
Hotels / Resort	Survey / MPTB / Hotel and Restaurant Association (Western India)	Data collected from MPTB & MPSTDC, insufficient data from local hotel association	
Restaurant	Survey	Local	
Air Quality	MPPCB	Partially Available	
Water Quality			
Noise Pollution			
Denuded Areas	Forest, STR	Data Collected	
Location of Mining, Saw mills and Brick kilns	Mining and geology department	Data Collected	
Location & No. of Poaching Incidents of particular animals	MP Forest Dept.	Data Collected	
Location and No. of Blind wells	Water resource dept./ PHE		
Location of Naka/Chowki, watch towers	MP Forest Dept.	Data Collected	
Previous Master Plan/ Structure Plan	TCPO	Data Collected	

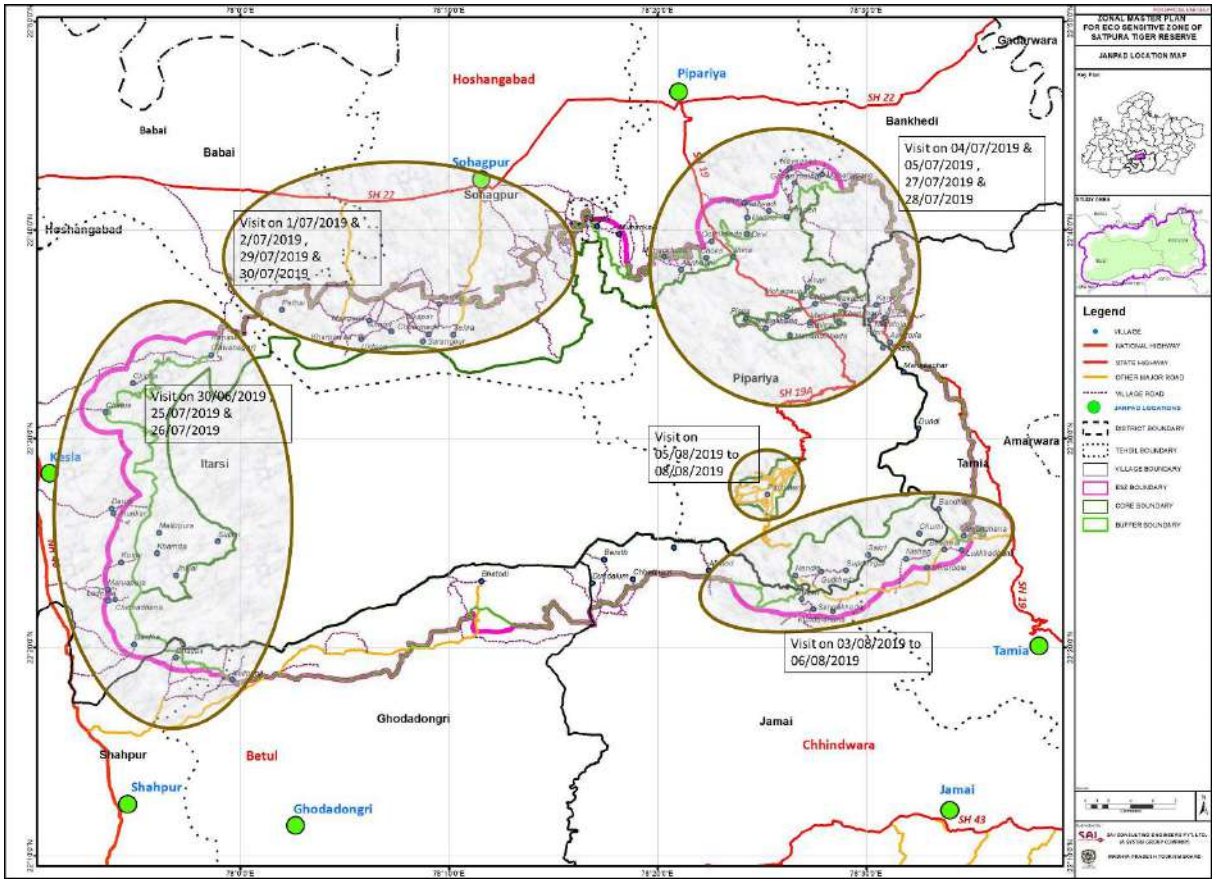


Figure 1-15 : Stakeholder Consultation in ESZ Villages

2 EXTENT AND BOUNDARY DESCRIPTION OF ESZ

The Satpura Tiger Reserve is a part of the largest Tiger Habitat in the world which includes Chhindwara, Hoshangabad, Betul, Harda, Khandwa and Melghat district extending over 10,000 square kilometre. Satpura Tiger Reserve is located at 22°30'11.78"N & 78°26'9.06"E in the Satpura hill ranges south of river Narmada. The landscape of Satpura tiger reserve is extremely vital for tiger conservation.

However, the habitat was fragmented at the time of declaration of the tiger reserve due to the presence of 63 villages and Pachmarhi town inside the core zone. But 38 villages have been voluntarily relocated from Satpura Tiger Reserve which has led to creation of an inviolate space of more than 200 km² that is ideal for large carnivores like tigers and leopards.(STR,2019) The area of relocated villages have been converted into grasslands that harbour prey populations for tigers. As a result, the tiger numbers have improved in the reserve and Satpura Tiger Reserve management has also been able to successfully reintroduce three tigers from Panna and Bandhavgarh.

Also, Satpura Tiger Reserve has potential corridor connectivity with Pench Tiger Reserve in Madhya Pradesh and Melghat Tiger Reserve in Maharashtra. These adjoining area include parts of Betul and Chhindwara forest circles in Satpura-Pench Corridor and parts of Hoshangabad, Harda, Betul and Amravati forest circles in Satpura-Melghat corridor.

2.1 RATIONALE AND SIGNIFICANCE OF ESZ

The Satpura Tiger Reserve is a part of Satpura range, which is widely known for its uniqueness as an ecologically sensitive area. The range of Satpura hills is a part of the Deccan plateau and runs from east to west between the Narmada and the Tapti River. Satpura is a Sanskrit word, that means seven mountains (Sapta=seven;Pura=mountain). The Satpura Mountain Belt forms a distinct morphotectonic unit in the central part of India. The Satpura range means seven folds that forms the watershed between the Narmada and Tapti rivers.

The Satpura range was heavily forested after declaration of core critical habitat and Buffer Zone. Special attention has been given for habitat improvement and regular watch and ward ensured. These measures have been consequently resulted in the richness of faunal population. These forest enclaves provide habitat to several endangered species, including the Tiger. Madhai, Churna and Pachmarhi plateau areas of this landscape preserved marvelously for protection of flora and fauna.

2.1.1 Formation of Satpura Range

It was ingeminated by British Officer, Captain J. Forsyth in 1862, while undertaking search operation of Tantya tope, the famous freedom fighter to counter Indian freedom fight movement. He accidentally reached the highlands of Central India, a part of central prominence. He perused it to be an important strategic location to establish the military base to exercise control over the region. From that incidence, British India Government appreciated its importance and undertook permanent establishments over the region. The important chronological events in history of Satpura region are listed below:

Table 2-1 : Timeline of Satpura Tiger Reserve Forest

YEAR	DESCRIPTION
1862	Capt. James Forsyth reached Highlands of Pachmarhi
1864	Colonel Pearson implemented fire protection measures
1916	D. O. Witt prepared checklist of Plants, Trees & Shrubs
1975	Creation of Bori Sanctuary
1981	Notification of Satpura National Park
1999	Declaration of Pachmarhi Biosphere Reserve
2000	Satpura Tiger Reserve notified
2007	Notification of Critical Tiger habitat
2010	Buffer Zone notified

The altitude ranges from 300 to 1,352 metres (980 to 4,436 ft). The terrain of the national park is extremely rugged and consists of fascinating deep valleys, sandstone peaks, narrow gorges, rivulets, waterfalls, thick dense green forest of Sal and other medicinal herbs. The slopes and plains are occupied with teak, bamboo and miscellaneous species. It also has large tracts of best quality Teak forests in the Bori Wild Life Sanctuary.

Central India region has 02 important mountain ranges i.e. Vindhyachal range and Satpura mountain range. Both the mountain ranges are the important forest area of Central India region offering shelter to large variety of mammals, birds and reptiles. Since past, these mountain ranges have untouched forest area where human society avoided to destroy or establish their accommodation. Still some tribal peoples have their presence who cut themselves from main stream of human society.

The area of Satpura range forest is considered as the view point of archeology of human evolution as here we can find large number sites having rock-shelters and rock painting ranging from 1500 to 10000 years old. In these pictures we can find the images of Tigers, Deers, Lions, Elephants, Porcupines etc. It means in ancient time, Elephants and Lions were present in these forest areas. World famous Bhimbetka Rock Shelters, having status of UNESCO World Heritage Site, are also very close from Satpura national park.

2.1.2 The Tribe: Cultural Significance

Gonds: Historically the Gond tribe belonged to the Satpura, the Gondwana, or the *"land of the Gonds",* was a part of the Satpura Tiger Reserve. In the 1500's, several Gond dynasties were firmly incorporated by the Gond rajas, or kings. They ruled like Hindu princes until Muslim armies conquered them in 1592. In the 1700's, the Gond lost all power to the Maratha kings who forced their culture to make them retreat to the hills.

The majority speaks various and, in part, mutually unintelligible dialects of the Gondi, an unwritten language of the Dravidian family. Some Gonds have lost their own language and speak Hindi, Marathi adjoining part of Betul district depending on the linguistic dominance in their respective areas. A significant percentage of the Gonds are Hindus, worshipping hundreds of gods and goddesses. Gonds grew the two millets known as Kodo or Kutki. Rice is their ceremonial feast, which they prefer eating during the time of festivals. Most of the Gonds are meat consumers.

***Korku*:** It is another ethnic group of the same stock, living around the Satpura Tiger Reserve is the Korku originally the belonging to Thakur Bhabut Singh, Jagirdar of Harrakot in Mahadeo hills from whom the large portion confiscated by British govt. in 1859. They are forest dwellers and skilled woodsmen. The Korku are known as the most primitive and interesting forest tribal of the region.

2.2 GEOGRAPHICAL LOCATION, WIDTH OF THE ECO-SENSITIVE ZONE AND AREA

The Wildlife Protection Act, 1972 was amended in 2006, and a separate Chapter (IVB) has been added on the National Tiger Conservation Authority. This Chapter (IVB) has enabling provisions (Section 38V) for preparing a **'Tiger Conservation Plan'** for the proper management of a tiger reserve

A Tiger Conservation Plan ensures agricultural, livelihood, developmental and other interests of the people living in tiger bearing forests or a tiger reserve. For the first time, the 'core' and 'buffer' areas of a tiger reserve have also been defined, the former being the critical, inviolate area, and the latter the peripheral area to foster coexistence with local people for safeguarding the integrity of the core. This Tiger Conservation Plan attempts to propose various management interventions and prescriptions keeping in mind the above legal provisions.

The Satpura Tiger Reserve is delineated into three distinct zones that are core, Buffer and Adjoining areas.

Core or Critical Tiger habitat: It is an unaltered zone that strictly protect the Tiger habitat from all illegal activities and human interferences and improves the habitat quality for ensuring viable and breeding population of tiger, co-predators and prey populations including rare and endemic species of flora and fauna. The core zone comprises of Reserve forests of Satpura National park and Bori and Pachmarhi Sanctuaries. The total area of core is 1339.26 km². The core area comprises of three protected areas namely **Satpura National Park, Bori Sanctuary** and **Pachmarhi Sanctuary**. All three Protected Areas are in unified command of the Satpura Tiger Reserve

Buffer Zone: It is a peripheral area of the core. This zone permits the core to foster coexistence of local people for safeguarding the integrity of the core and for providing adequate dispersal habitats for spill over population of wild animals including tigers .All the incompatible activities in this zone is mainstreamed with wildlife concerns while ensuring due recognitions and rights (livelihood, social, cultural, developmental) of the local community.

An area of 794.04 km² has been notified as the buffer zone of Satpura Tiger Reserve. The Buffer Zone falls into the three districts namely Hoshangabad, Betul, and Chhindwara of Madhya Pradesh.

Adjoining areas: These are the forests adjacent to core and buffer zone of Satpura Tiger Reserve (within two km. periphery) with traditional forestry practices and other land uses. The area of this zone is 285.39 km² and it aims at maintaining connectivity to meta-populations and tiger habitats outside the tiger reserve for ensuring gene flow as an ecological requirement for the long term survival of tiger by streamlining with concern for wildlife, the existing incompatible management practices so as to upgrade and maintain the ecological status of connectivity.

Table 2-2 : classification of area in Satpura Tiger Reserve

Sr No	Name of PA	Type of Forest	Area (Ha)
1	Satpura National Park	RF	41,465.252
		PF	11,407.788
		Revenue	0.00
Sub-Total			**52,873.040**
2	Bori Sanctuary	RF	48,571.367
		PF	0.00
Sub-Total			**48,571.367**
3	Pachmarhi Sanctuary	RF	16,086.716
		PF	25,691.770
		Revenue	7385.126
Sub-Total			**49,163.612**
Grand Total			**1,50,608.019**

2.3 ADMINISTRATIVE AND POLITICAL UNIT (PANCHAYAT, BLOCK, TEHSHIL, DISTRICT)

There are 81 villages are notified in Satpura Tiger Reserve Eco-Sensitive Zone. Region is divided in three divisions of Hoshangabad, Chhindwara and Betul. The existing administrative structure governed as 58 villages under Hoshangabad division, 20 village under Jabalpur division and 03 villages under Betul division. The existing administrative structure is as below:

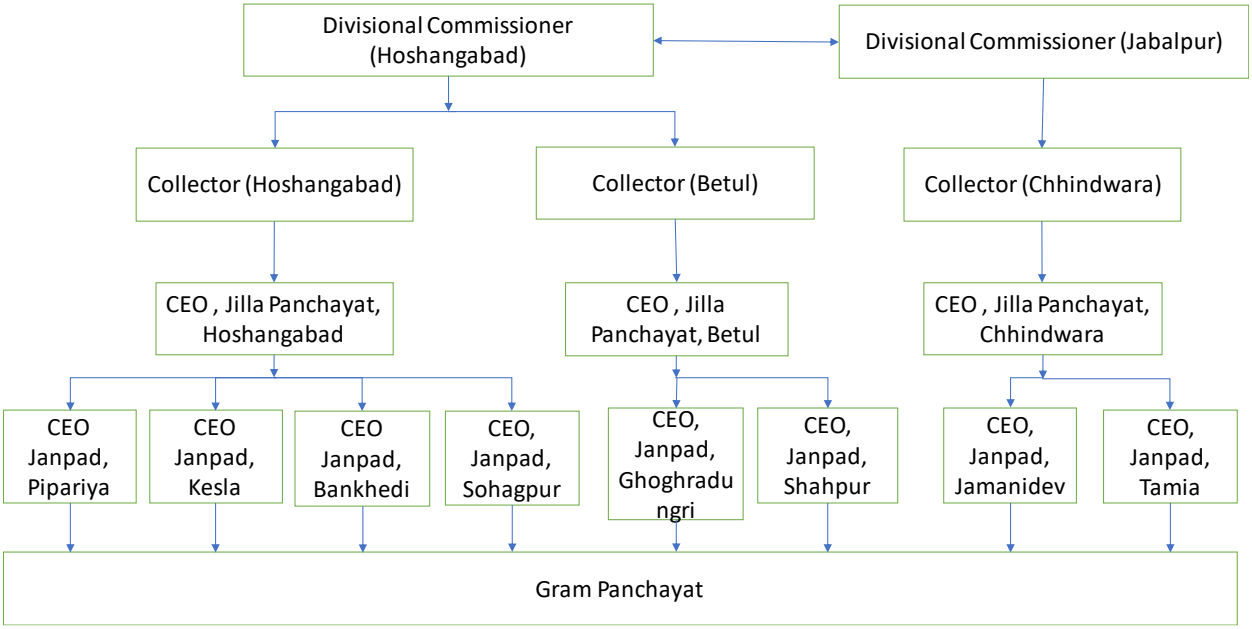


Figure 2-1 : Administrative Structure of STR

Satpura Tiger Reserve is divided in between Core and buffer zones including the Satpura National Park, Pachmarhi Sanctuary, Bori Sanctuary. The Buffer Area is formed by the Reserve and Protected Forest of Bankhedi, Pipariya, Bagra and Sukhtawa Ranges of the Hoshangabad Division; the area around Rampur, Bhatodi and Nishan villages of Rampur-Bhatodi Project from the Van Vikas Nigam of Betul District and; adjoining forest area of Sangakheda, Delakhari and Jhirpa Ranges of Chhindwara (W) Division. Parts the the Satpura National Parks and Bori and Pachmarhi Sanctuaries are also included in the buffer zone.

The forest is divided among divisions like Hoshngabad Division, Chindwara Division, etc. Divisions further divides into forest ranges. Satpura Tiger reserve has six forest ranges in the core area and 4 in buffer area. Details of Ranges, Sub Ranges and Beats is given below:

Table 2-3 : Range, Sub-range and Beats in the core and buffer area

Core Area			
Sr No.	**Range Name**	**No. of Sub range**	**No. of beats**
1	Kamti	4	18
2	Bori	6	21
3	Churna	5	28
4	East Panchmarhi	5	20
5	West Panchmarhi	6	17
6	Matkuli	5	22

Buffer Area			
Sr No.	**Range Name**	**No. of Sub range**	**No. of beats**
1	Bagra Buffer	5	24
2	Tawa Buffer	3	15
3	Pipariya Buffer	2	10
4	Denwa Buffer	4	11

(Source: Officials of Satpura Tiger reserve)

Whole area of Satpura Tiger Reserve with the Eco-tourism range and Forest Guard Training School, Pachmarhi are also under unified command of Field Director Satpura Tiger Reserve, Hoshangabad. There are 5 ACFs to that are immediate in-charge of the field staff. The organisation chart is given below:

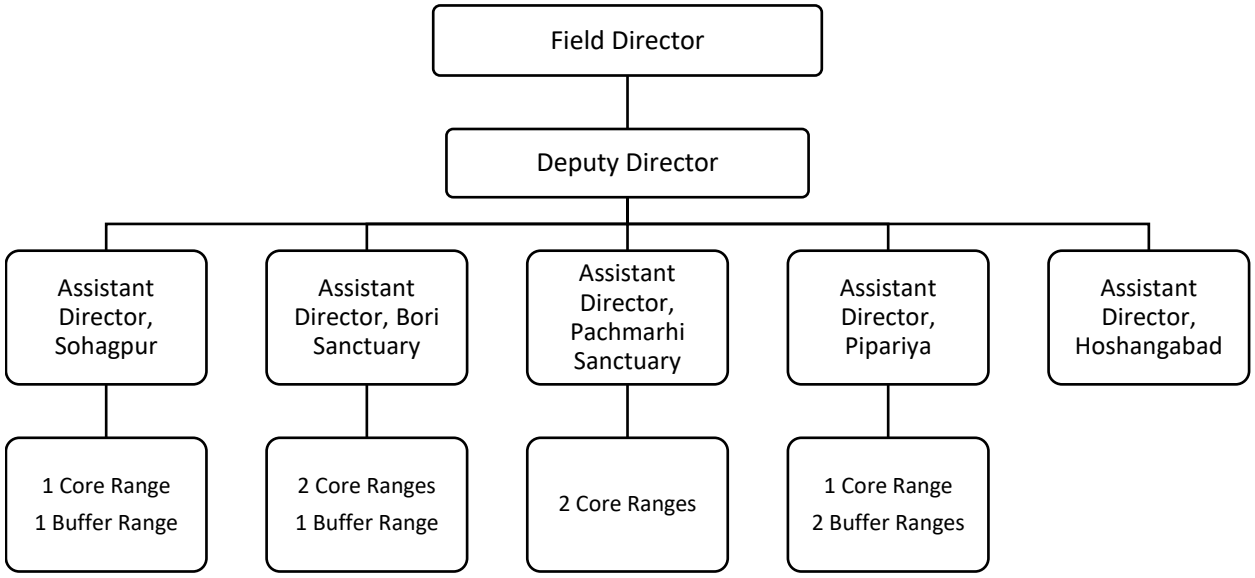


Figure 2-2 : Administrative structure for STR

2.4 PHYSIOGRAPHIC AND NATURAL CONDITIONS (TOPOGRAPHY, GEO-CLIMATIC FEATURES)

Satpura Tiger Reserve is part of the Deccan bio-geographic zone of India **(Rodgers and Panwar, 1987).** The area is hilly and rugged over a major part within the folded ranges of Satpura hills. The area includes the three highest peaks of Central India i.e. Dhoopgarh (1352 m), Mahadeo (1330 m) and Chauragarh (1308 m).

2.4.1 Geology

The Satpura Tiger reserve area slopes toward the Narmada River in the northern west direction. This slope is generally step at the foothills of Satpura but moderate to gentle towards Narmada River. Soils of the area are characterized by black grey, red and yellow colors, often mixed with red and black alluvium and ferruginous red ravel or lateritic soils. These soils are commonly known as black soils.

The soil varies with the underlying rock and local topography. It is sufficiently deep along the river banks, fairly deep and well drained on the initial gentle slopes or the talus but shallow on higher and steeper slopes. On the ridges themselves rocks are commonly exposed. The flat hill tops such as those occur in the Bori reserve, however, often bear sufficiently deep soil.

The area is part of deccan bio-geographical zone of India. It consist hilly and rugged area within the ranges of Satpura hills. The geological formation can be classified into Recent, Deccan Trap series, Gondwanas and Metamorphic rocks.

The metamorphic rocks contains Calcareous crystalline, Phyllites and Schists and Limestone which are found in east of hills of Pipariya. The Gondwana system consists of Bijoris, buff clays, Sandstones , Tichris , Kanker and limestones. These formation can be found in Bori sanctuary area, Mahadevas, Jabalpur and Pachmarhi. The deccan traps are of volcanic origin, formed by the solidification of molten lava erupted successively through the fissures of the earth's crust at different periods. The deccan traps can be found in area of of hills between Matkuli and Jhiria & between Dhain and Churna of the large intrusion of trap found in Bori Sanctuary, east of Sonbhadra. The Deccan Trap appears as numerous and irregularly scattered intrusions of sills and dykes inside the Gondwanas of all stages.

The geology is also helpful for forest as there are three main types of rocks, namely, the trap, the conglomerate and the sandstone. The soils derived from the trap support only the teak type of forests. The soil derived from the conglomerate support a mixed type of forests with varying proportion of teak and the soil derived from sandstone also supports mixed type of forests with no or very little teak.

The SONATA lineament zone embodies the two quaternary basin of tectonic origin on Satpura crustal block. The Narmada Quaternary basin in the north and Tapti-Purna basin in the south are two Graben which formed prominent loci of sedimentation in lineament zone.

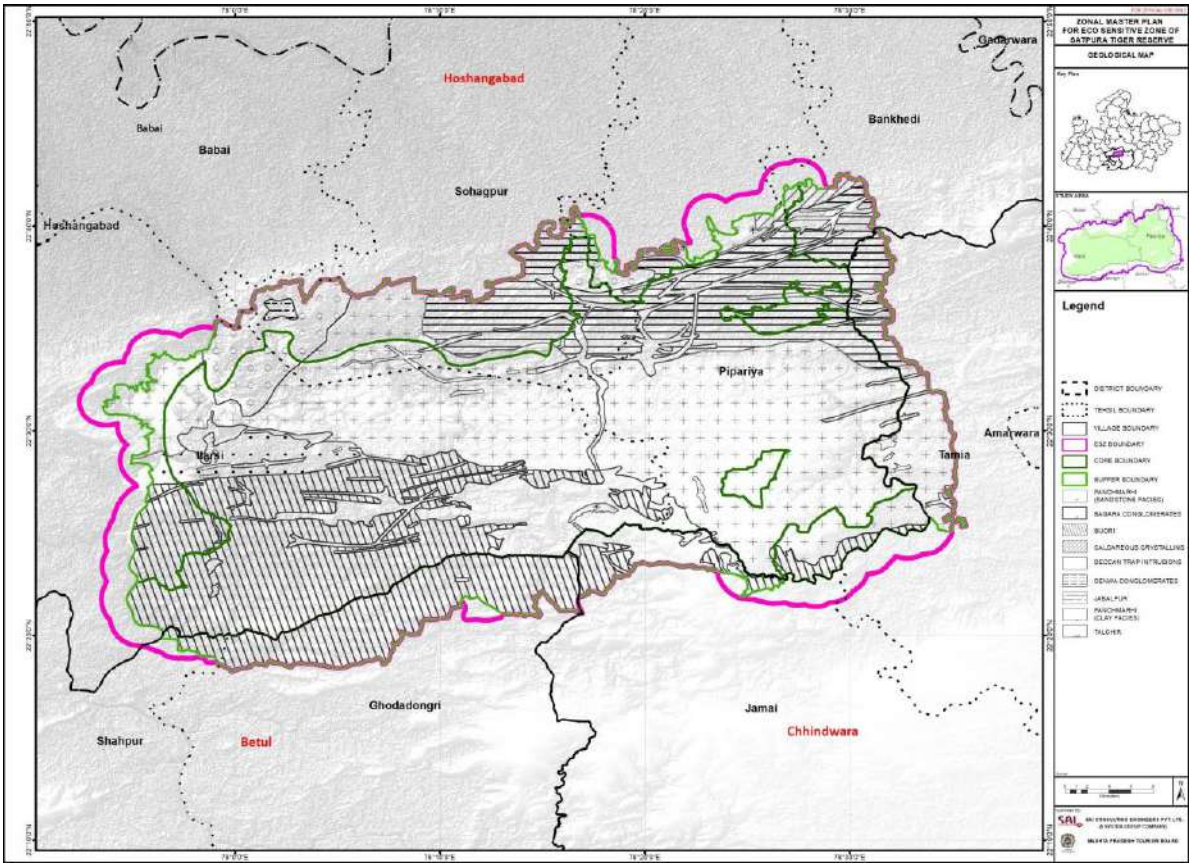


Figure 2-3 : Geological map of Satpura Tiger reserve

2.4.2 Climate

Climate has been identified as a key driver for tourism and an important destination attribute. It is either the main tourism resource, for example in the case of beach destinations, or it acts as a facilitator that makes tourism activities possible and enjoyable, such as in the case of Tarifa in Spain, which capitalized on its frequent and intense wind, unfavorable for beach tourism, but became mecca for wind surfing.

Satpura being situated in Central India is subjected to extreme and tropical weather. The Pachmarhi plateau has got its own micro climate. There are three distinct seasons viz:

Winter: November to February (with the night temperature dropping to - 2°C sometimes during December and January).

Summer: Late February to mid-June (the hottest period extends from May up to the first or even second week of June, with the day temperature sometimes soaring to 45°C).

Table 2-4 : National Parks of Madhya Pradesh

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum (°C)	1	8	22	30	34	35	32	30	28	32	22	18
Maximum(°C)	16	22	33	40	42	44	40	33	33	38	32	25

Monsoon: July to late September (August is the wettest month, and the average annual rainfall is around 1300 mm.). Rainfall in Pachmarhi is much higher than rest of the district, average rainfall being 1700mm. The heavy precipitation gives the places seasonal waterfalls and lush plant growth.

Hoshangabad district

The normal average rainfall of Hoshangabad district is 1225.9 mm. It receives maximum rainfall during southwest monsoon period with a share of 92.8% of the annual rainfall and only 7.2 % of the annual rainfall in the October to May period. The maximum rainfall received is 2122 mm in Pachmarhi region and minimum is 1302.3 mm in Hoshangabad Region. Rainfall forms the sole source of natural recharge to ground water regime and the rain water is available mainly during the southwest monsoon period only. During the southwest monsoon season the relative humidity generally exceeds 91% (August month). In rest of the year is drier. The driest part of the year is the summer season, when relative humidity is less than 33%. April is the driest month of the year.

Rain gauge stations in Hoshangabad districts are Pachmarhi and Sohagpur. The yearly average rainfall in Pachmarhi is as shown in below chart.

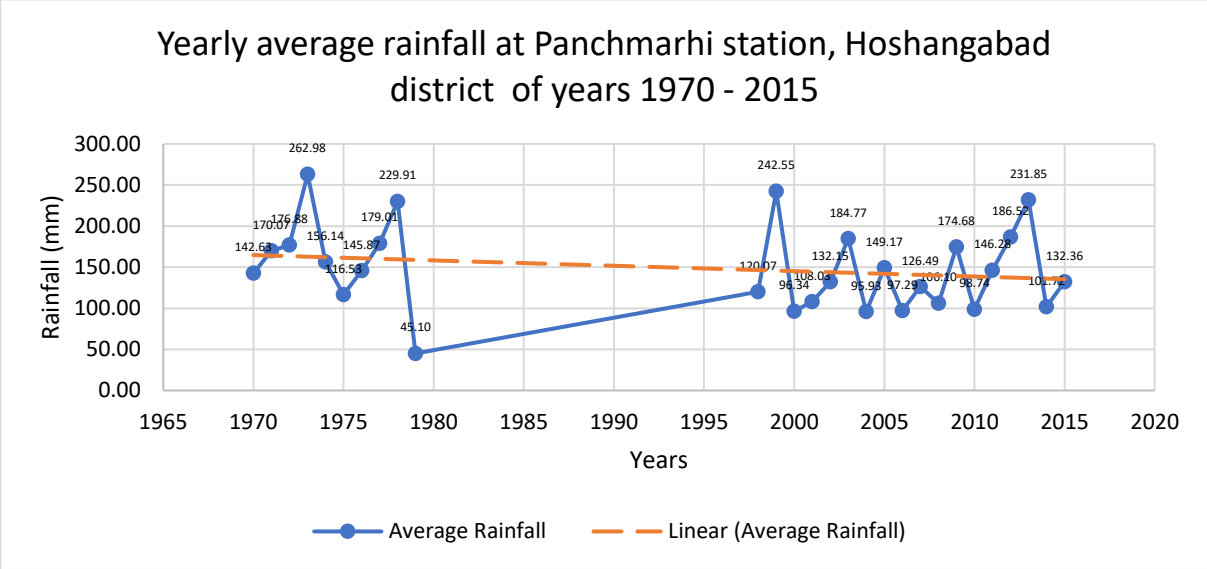


Figure 2-4 : Average Rainfall at Pachmarhi station

(Source: Madhya Pradesh Water Resource Department)

*** The rainfall data from years 1980 to 1997 is not available.*

Maximum rainfall is in the year of 1963 with average of 263 mm and in recent year of 2013 is 231.85 mm. The monthly average of years 1970 – 2015 from below chart represents the frequency of rain during the months.

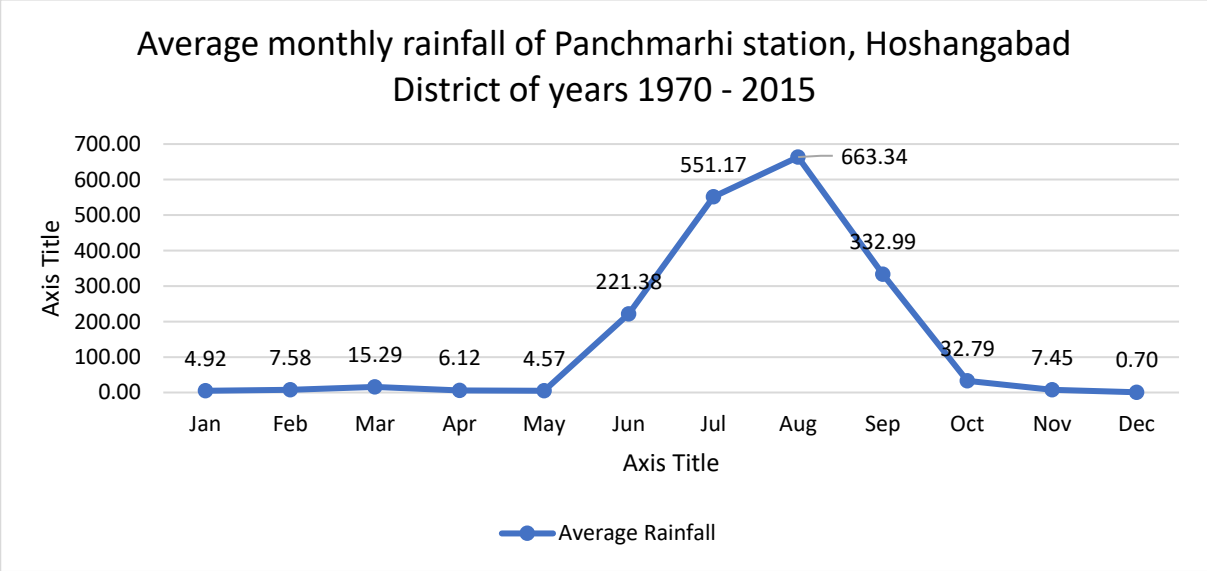


Figure 2-5 : Average monthly rainfall at Pachmarhi Station

(Source: Madhya Pradesh Water Resource Department)

*** The rainfall data from years 1980 to 1997 is not available.*

The maximum rain is in duration of Jun to October months of the years. Maximum rain noted from the chart is in July and August months. The monsoon season in the district is from month of June to September.

The normal annual maximum and minimum temperature of hoshangabad district is 32.8°C and 19.8°C respectively. The maximum normal temperature experienced is 42.1 °C in May and minimum temperature experienced is 11.7 °C in January.

The wind velocity is higher during the pre-monsoon period as compared to post monsoon period. The maximum wind velocity 7.7 km/hr observed during the month of June and is minimum 2.9 km/hr during the month of December. The average normal annual wind velocity of Hoshangabad district is 5.0 km/hr.

Chhindwara district

The normal annual rainfall of Chhindwara district is 1139.3 mm. The district receives maximum rainfall during south-west monsoon period i.e. June to September. About 85.7 % of the annual rainfall falls during monsoon season. Only 14.3 % of the annual rainfall takes place between Octobers to May period. Thus, surplus water for ground water recharge is available only during the southwest monsoon period.

The normal maximum temperature noticed during the month of May is 39.40 C and minimum during the month of December 9.80 C The normal annual mean minimum and maximum temperatures has been worked out as 18.20 C and 30.60 C respectively . During the south-west monsoon season, the relative humidity generally exceeds 87% (August month) and the rest of the year is drier. The driest part of the year is the summer season, when relative humidity is less than 33%. May is the driest month of the year.

The wind velocity is higher during the pre-monsoon period as compared to post- monsoon period. The maximum wind velocity, 9.5 km/hr observed during the month of June and minimum, 3.3 km/hr during the month of November. The average annual wind velocity in is 5.4 km

Betul district

The climate of Betul is characterized by a hot summer and general dryness except rainfall during the south-west monsoon season. May is the hottest month of the year with average temperature of 39.3°C. The minimum during the December is 10.3°C. The normal annual mean maximum and minimum temperature is 30.7°C and 17.9°C respectively.

The south-west monsoon starts from middle of June and lasts till end of September. October and middle of November constitute the post monsoon or retreating monsoon season. The normal annual rainfall of Betul district is 1129.6 mm. About 86.6% of annual rainfall is received during monsoon season. Only 13.4% of annual rainfall takes place between October to May. The humidity comes down lowest in April. It varies between 31% to 91% at different time in different seasons.

The wind velocity is high during the monsoon period as compared to pre and post monsoon. The wind velocity is higher in June around 8.5Km/hr and lowest is 3.8 km/hr in November.

The region has fairly good weather, making it one of the ideal places for tourist attraction all year round which shows that local communities, to some extent, can rely on tourism related employment opportunities for livelihood generation all throughout the year although the best time to visit the reserve is 15 October to 30 June. The monsoon season is the only time when people going on vacation are less likely to come here, since the rain is usually pouring most of the time, and the sky is cloudy almost constantly.

2.4.3 Hydrology

Madhya Pradesh state is rich in water resource. Rivers like Narmada, Chambal, Betwa, Ken, Wain ganga and many more flowing through the state. Even though, the area being rich in natural sources of water, there are few pockets, where water is scarce during hot season making some of region dependent on ground water.

Surface water

Madhya Pradesh state is divided among 10 water basins like Narmada, Chambal, Sindh, Mahi, Betwa, Tapti, Wai Ganga, Ken, Tons and Son. The reservoirs like Indrasagar dam, Bansagar dam, Tawa reservoir dam, Tegra dam and many more reservoirs helps to strengthen the surface water storage. The natural

and man-made lakes like Bhoj Tal, Chhatarpur lake, etc. are also helpful surface water sources in state. The river basin is as shown in map.

Entire area of Satpura Tiger reserve is part of Narmada Basin. Some of the rivers/rivulets like Nagdwari, Tawa, Denwa etc. are perennial. But Majority of rivers flow till February and although a number of them cease to flow in the hot weather but their beds invariably contain scattered pools of permanent water. In additional to above rivers there are numerous rivulets and streams draining through the areas notably the Nagdwari, Suaria, Lagda, Jamuna, Bainganga, Bhainsa nala, Parantha, Juli, Gajar kuan etc.

Apart from Rivers/Rivulets/Nalahs there are a few springs, where water oozes out throughout the year. This water invariably forms a small pool of water, which again is another very important source of water for wild animals, cattle and human beings. Most of these sources are considered sacred by local population and normally named after the tree from where water seeps out e.g. Sajapani, Aampani etc. Apart from above, the large reservoir created by Tawa dam is an important source of water.

The Satpura Tiger Reserve receives fair amount of rainfall, owing to its natural water sources which are adequate in majority of pockets. An interesting feature of the water courses of the tract is the large number of small but perennial streams, known as Jhots which flow down the steep slopes on either side of Mahadeo ridge. Higher up in the hills, these Jhots flow throughout the year, but down below they disappear beneath the talus only to reappear further ahead on relatively flat country in the form of pools. These pools form the most important sources of water for wild animals.

The Tawa reservoir covers more than 220 km2 area within Protected Area stretching over Tawa, Denwa, Sonbhadra, Malini, Koti etc. rivers creates a big wetland. This wetland has developed into an essential year round as well as seasonal habitat for the wintering and resident waterfowl.

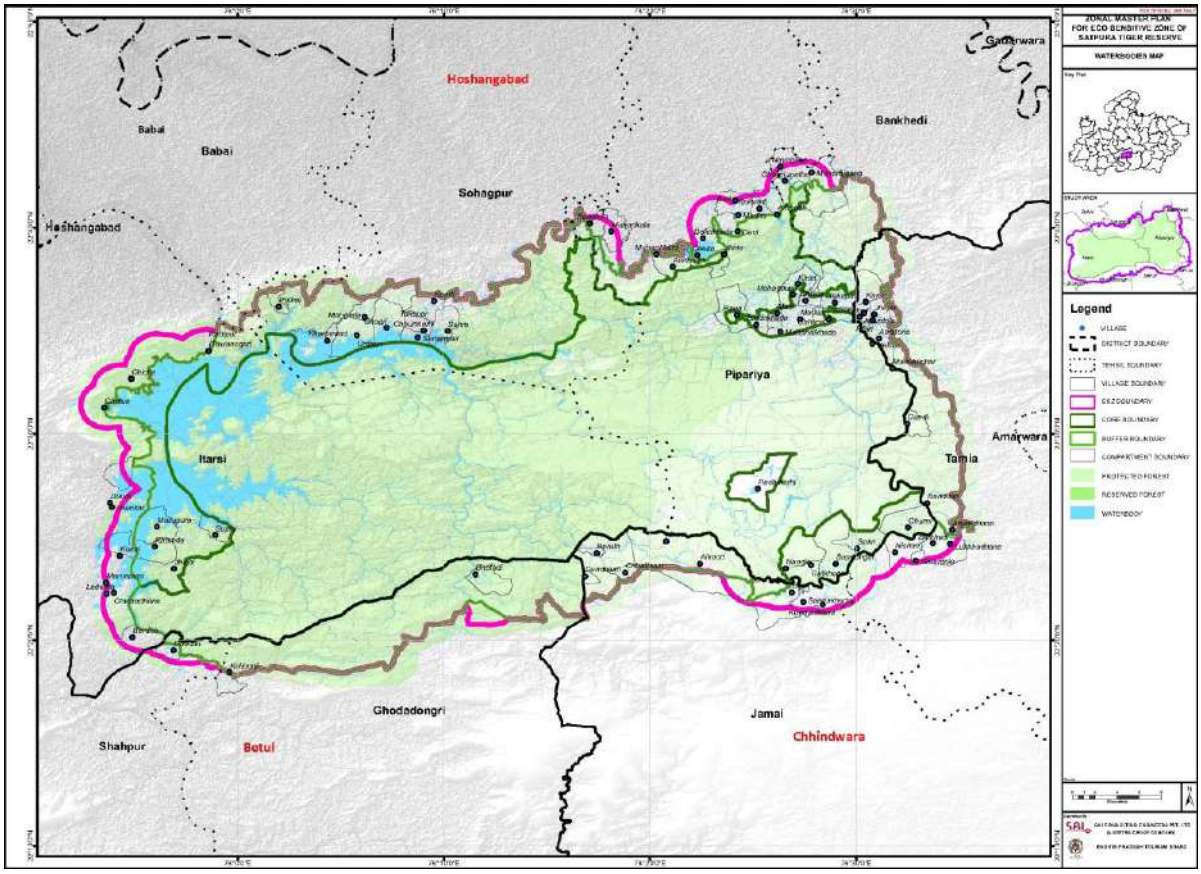


Figure 2-6 : Waterbodies in Satpura Tiger reserve

Ground water

ESZ is characterized by alluvial formations, Reccent and Upper Gondwana formations. Only 4 OW monitoring points are present in the north eastern part of the zone. Out of 4 at two points data is recorded from 2016 while in other 2, data is recorded from 1990. The average ground water level depth from these point is 12.3 m. A study carried the correlation of the GW recharge over the period of time and the average

ground water level. It was found that over the period of time GW table depleted, supported with a lag in recharge amount in the last 7 years. The GW level ranges from 2.9 m - 15.8 m. The GW table average depth from 4 points is 12.3 m. ***(source: data collected from GW survey division of Water resource Department, Madhya Pradesh).***

However, from the primary survey it was found that the predominant source of water is borewell and depth of the borewell varies from 100 feet 700 ft in the region. Dynamic ground water resources of the district have been estimated for base year -2008/09 on block-wise basis. All blocks of the district are categorized as **safe blocks**, Bankhedi block is with highest stage of ground water development of 61%. The net ground water availability in the district 2,01,888 ham and ground water draft for all uses is 35,617ham, making stage of ground water development 18% (14% in 2003/04) as a whole for district. The transmissivity of Gondwana aquifer in general varies from 249 to 449 m^2/day. Quality of ground water is fresh to saline with EC ranging from 440 to 2710 mmhos/cm at 25°C, nitrate from 1.3 to 122mg/l and fluoride from 0.11 to 1mg/l.

Irrigation

Tawa dam is a major irrigation system in the district. About 60% of the total area of Hoshangabad district is irrigated by Tawa canal system. The Tawa dam is constructed about 823 m. downstream of the confluence of Tawa and Denwa rivers at east longitude 77º 58'30" and north latitude 22º 33' 40". It has a Catchment area of 5982.90 Sq. Km. with 20055 ha area under submergence. The left Bank Canal starts from Ranipur and runs parallel to Narmada river course along the limits of the foot hill pediments of Satpura. This canal takes off directly from the reservoir with a head discharge of 103.06 cumecs. The first 6.44 km length is lined with thick concrete. The Handia branch canal with a head discharge of 29.9 cumecs takes off from the main canal at 92 km point. The right bank canal is taken through a tunnel from Kamthi and runs parallel more or less to the course of Narmada river. The distributary system has been planned along the drainage divide. Due to topographic difference between the right and left bank canal has been taken through 6 km long tunnel. Bagra branch canal and Piparia branch canals take off on either side of the pickup weir. The Bagra canal is 60 km long. The total length of distributaries and minors on the right bank is 450 km.

Many minor irrigation Schemes are also operating in the district, amongst which Dokrikhera Tank Project in Bankheri block is prominent. Dokrikhera Tank Project has a gross command area 9104 ha and culturable command area 7625 ha. The area irrigated by canals, tube wells, dug wells and tanks are tabulated below in Table.

Table 2-5 : Irrigation by Different Sources

S.No.	Source	Hoshangabad District Total	
		Number	Area (In sq.km.)
1.	Canals	6	1474
2.	Tubewells	4,853	523
3.	Dugwells	23,495	535
4.	Tanks	9	11
5.	Other Sources	-	163
6.	Net Area Irrigated	-	2703

Foremost, weather allows for an activity to be undertaken, or likewise may act as an inhibitor to participation. For example, wind speeds over 15 km/h were found to be detrimental to fishing or water skiing, whereas motor boating could be undertaken up to wind speeds of 50 km/h. Weather will also influence how enjoyable an experience is and therefore tourists satisfaction is likely to be at least partly weather dependent.

2.5 LAND USE/ LAND COVER TYPES AND EXTENT

Satpura Tiger Reserve has developed natural settlements in accordance with its unique and diverse landscap. Major area is covered with forest in core zone and some devotional / religious places are present in core.In buffer zone and Eco-Sensitive Zone, following landuses can be classified:

1. Built-up : Existing rural settlements with inclusion of villages and Tolas

2. Agriculture: Agricultural fields, plantation, fallow lands and many more
3. Forest : Reserve and Protected forests
4. Waterbodies: Rivers, Drains, Canals, Ponds, Lake, Reservoirs
5. Wastelands

The above mentioned categories of landuse/landcover has been analysed from the satellite imageries and discussed in detail in section 4.1 of chapter 4.

2.6 GEOLOGICAL FORMATIONS AND RELATION WITH FORESTS

Satpura Tiger Reserve is part of the Deccan bio-geographic zone of India. The area is hilly and rugged over a major part within the folded ranges of Satpura hills. The altitude varies from 300 m to 1352 m above MSL. These variations are clearly seen in the contour map below. The area has three highest peaks of Central India i.e. Dhoopgarh (1352 m), Mahadeo (1330 m) and Chauragarh (1308 m). The Western portion of PA is characterized by steep ridges, narrow valleys and deep gorges, having perennial streams and rolling flat country.

2.6.1 Type of geological formation

The area consists of types of geological formations like Recent, Gondwanas, Decan trap and metamorphic. All types are described in Table-. The Gondwanas covers the major area of Satpura National Park.

Table 2-6 : Type of geological formations in STR region

Sr No	Type	Classification	Location
1	Recent	Alluvium, Laterite, Soil cap	Near to Pachmarhi plateau
2	Deccan trap series	Sills, dykes, intertrappean beds	Prominently on southern and southwestern side and in north-eastern part of reserve
3	Gondwanas	Upper Gondwana: Mahadevas: Bagra, Denwa and Pachmarhi	• Panchmarhi: all the areas of reserve • Denwa: vallies of Denwa river • Bagra: North-Western parts of the reserve near Jaharghat area.
		Lower Gondwana: Bijoris and Talchirs	Bori Sanctuary, Hathnikhapa, Anhoni village
4	Metamorphic	Calcareous crystalline, Phyllites and Schists and Limestone.	Hills east of Pipariya - Pachmarhi road (Baridevi, Tekapar etc)

(Data Source: Tiger conservation Plan, Vol.-1: core zone and Vol.-2: Buffer zone, Satpura Tiger reserve 2015-2024)

Quartz *Basalt* *Sandstones* *Conglomerate*

Figure 2-7 : Types of geological rocks found in STR

2.6.2 Soil type

The soil varies with the underlying rock and local topography. It is sufficiently deep along the riverbanks, fairly deep and well drained on the initial gentle slopes or the talus but shallow on higher and steeper slopes. On the ridges themselves rocks are commonly exposed. The flat hill tops such as those occur in the Bori reserve, however, often bear sufficiently deep soil.

Mainly there are two kind of soil is observed in the area.

1. Deccan Trap
   The region has horizontality of the strata and extreme hardness, the Deccan Trap rocks weather only slowly and often exfoliate into concentric shells. When such disintegration is subterranean, the Trap boulders become friable *in situ* forming a red *murram* and loosely packed gritty soil capable of supporting only poor tree growth. Decomposition of the Trap rock produces the good brown loam which has valuable contribution in growth of teak. At the junction of the Trap rock with the sandstone, such as that which occurs on the outer periphery of the trap intrusions, the trap loam gets modified by admixture with the sandy soil and then becomes fertile for tree growth.

2. The Gondwanas
   Soils derived from the Gondwanas vary greatly but are very often sandy. The Pachmarhi sandstones yield very thin sandy soil capable of supporting only a stunted forest growth. The Denwas produce stiff coloured clays strewn with *kanker* nodules. Some of them, particularly the pink, purple and black friable shales, are peculiarly infertile and almost refractory to any tree growth. Bagra conglomerate produces soils which are shallow but quite good for forest growth. Bijori soils vary greatly ranging from pure sand to stiff coloured clays similar to the Denwa clays. The metamorphic rocks in this division yield shallow black soils incapable of holding sufficient moisture and therefore can grow only small-sized trees.

2.6.3 Relation with forest

Geology plays an important partin the distribution of the growing stock in the forests. The character of the forest is influenced by the type of underlying rock. Geo-botany of the area is very interesting. Teak forests are mostly found in soils derived, entirely or in part, from the trap rocks. There is also possibility at a lesser extent, to be found on the conglomerates, limestone, calcareous crystalline rocks, quartzite, phyllites, schists and granitic gneisses.

There are three main types of rocks, namely, the trap, the conglomerate and the sandstone. The soils derived from the first support only the teak type of forests, those derived from the second support a mixed type of forests with varying proportion of teak and the third also supports mixed type of forests with no or very little teak.

Table 2-7 : soil type and geological features

Sr. No.	Soil type/geological feature	Plant species like the formation	Forest type appear	Remark
1	Soil derived entirely or in part from the trap rocks	Teak (*Tectona grandis*)	Teak forest	Much liked by the species
2	Conglomerates, limestone, calcareous crystalline rocks, quartzite, phyllites, schists and granitic geneisses	Teak (*Tectona grandis*)	Teak forest	Relatively liked up to lesser extent
3	Gondwana Sandstones of all stages	Sal (*Shorea robusta*) in many pockets	Sal (*Shorea robusta*)	Teak absent or only present in very low numbers. The most of area is occupied by Sal (*Shorea robusta*)
4	Soil derived from conglomerate rocks	Teak and many other species	Mixed forests	-

2.7 State of Forests, Wetlands And Grasslands

Combination of various climate and edaphic factor at different attitudinal level gives rise to typical rich and luxuriant tropical flora in this protected area. Many rare and endemic plants are found in this part of the country. In all following different plant communities are identified in the protected area. The moist miscellaneous forests occur on higher altitude is characterized by *Mangifera indica, Syzygium cuminii,*

Terminalia chebula, Ficus benghalensis, F. religiosa, F. virens and other species of *Ficus Genus*. Mixed forest with *Terminalia tomentosa* and *Annogeissus latifolia* occurs on gentler slopes along foothills Low quality mixed forest occur where underlying rock is sandstone and carries high percentage of *Chloroxylon swietenia*, *Lagerstroemia parviflora*, and *Lannea grandis*. Good quality teak forest having a high percentage of teak with dense under story of Bamboo, occurs where soil is derived from trap. Low quality teak forest grows on similar soils on much drier sites and are characterized by the undergrowth of *Lantana camara* and *Hyptis suveolens*. Teak community with tall and well-formed stems occurs on alluvium soil along riverbanks.

Dry peninsular Sal community, which spreads over an area about 140 sq.km. on Pachmarhi plateau, this is the western limit of distribution of species and appears to be the highest limit of dry Sal and gives appearance of an island of Sal surrounded by Teak and miscellaneous species. Satpura Tiger Reserve is rich in *Bryophytes* and *Pteridophytes*. There are various types of ferns and fern allies. Recent studies have recorded 138 species of *Pteridophytes* in Pachmarhi hills. *Pteridophytes* such as *Psilotum, Lycopodium, Osmunda, Cyathea, Botrychium, Ophioglossum, Asplenium, Isoetes, Acrostichum* are endangered and are on the verge of extinction. Among Broyphytes there are 83 species of 16 families.

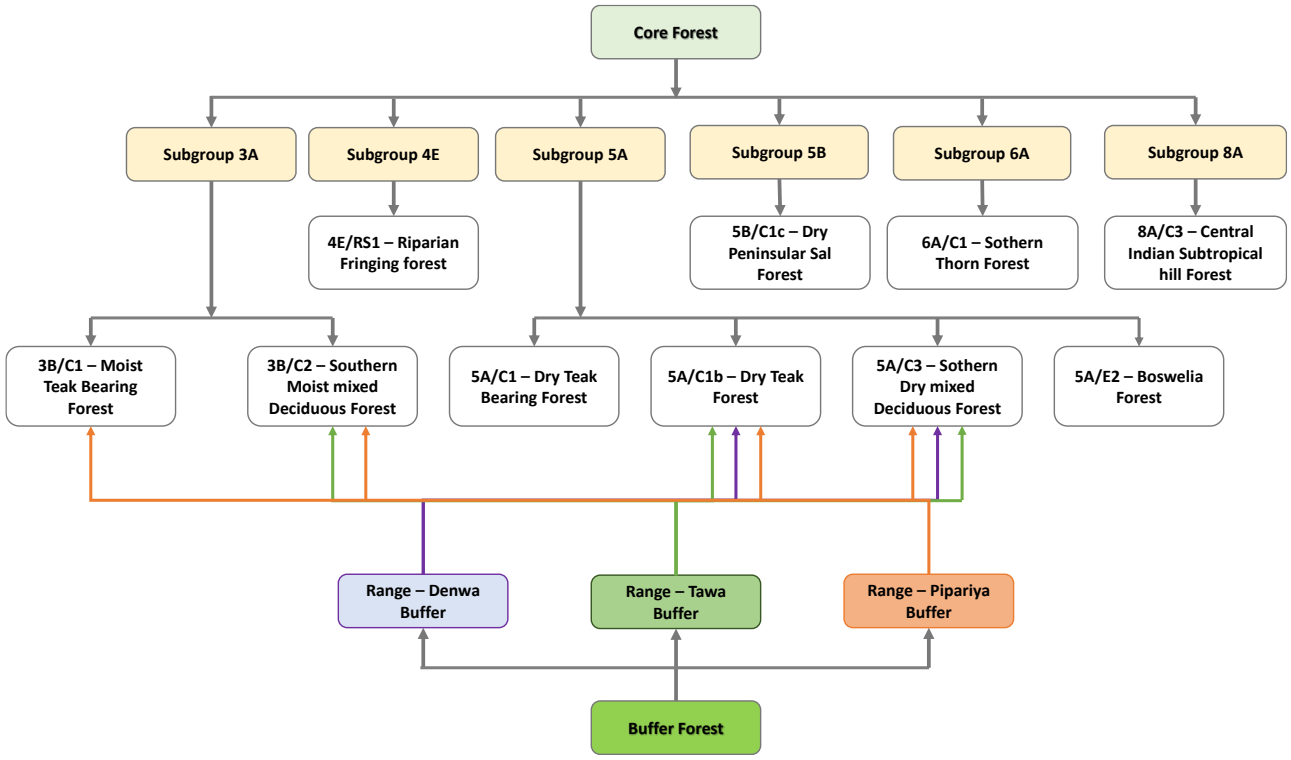
Species of orchids that have restricted distribution include *Eulophia, Aerides, Dendrobium, Anervilia, Platanathera*. Two endangered insectivorous species- *Drosera* and *Utricularia* have small population as well as restricted distribution. A species of bamboo i.e. *Bamboosa polymorpha* is represented by only a few clumps found in Bori Sanctuary.

2.7.1 Classification of forest

As per Champion & Seth (1968), the forests of Satpura Tiger Reserve have been classified into the following types:

1. Subgroup 3A - Southern Moist Deciduous Forests
2. Subgroup 4E - Tropical Riparian Fringing Forests
3. Subgroup 5A - Southern Tropical Dry Deciduous Forests
4. Subgroup 5B - Northern Tropical Dry Deciduous Forests
5. Subgroup 6A - Southern Tropical Thorn Forests
6. Subgroup 8A - Southern Tropical broadleaved Hill Forests

In the Buffer area, forest of subgroup 3A, 5A and 5B have the presence. The detailed classification is as per the figure -5.



(Data Source: Tiger conservation Plan, Vol.-1: core zone and Vol.-2: Buffer zone, Satpura Tiger reserve 2015-2024)

Figure 2-8 : Classification of Forest in Core and Buffer

2.7.2 Vegetation

Satpura tiger landscape supports luxuriant plant growth. The area is endowed with rich and dense tropical flora owing to combination of various biophysical factors and different altitude levels. The variety in vegetation includes some of the rare and endangered species too. Area is considered amongst one of the richest plant diversity and gene pool area in the Central India. The forests represent remarkable vegetation diversity and area is true juncture of representative forest types prevailing in Madhya Pradesh by forming an eco-tone of two most important forest forming species of Central India i.e. Teak *(Tectona grandis*) and Sal *(Shorea robusta*). The dividing line which segregates the isolated patches of Pachmarhi's stunted growth of Sal on plateau from Bori teak of Bori valley.

Satpura Tiger reserve supports divers flora. All major taxonomic groups of the plants can be seen in this landscape. Floral diversity of the area is shown in table.

Table 2-8 : Floral diversity

Sr. No.	Major	Family	Genera	Species
1	*Thallophytes*	-	-	30
2	*Bryophytes*	17	34	83
3	*Angiosperms*	127	633	1190
4	*Unidentified Angiosperms*			50
5	*Pteridophytes*	18	46	138
6	*Gymnosperms*	03	-	07
Total				**1498**

The Satpura Tiger Reserve is rich in the floal diversities. There are variety of species which need the special conservation efforts. The major species are *Bryophyta, Pteribophyta, Gymnosperm* and *Angiosperm*.

Table 2-9 : Flora diversity in STR

S.No.	Major taxa	Important species
1	*Bryophyta*	*Astrella spp., Plageocasma spp. etc.*

2	*Pteribophyta*	*Psilotum triquetra, P. nudum, Isoetes panchanaii, Selaginella exigua, Ophioglossum nudicaule, Cyathea gigantean, C. spinulosa, Lycopodium cerenum, Lygodium flexuosum, Asplenium inaewuilaterale, A. unilateral, etc.*
3	*Angiosperm*	*Tectona grandis, Anogeissus latifolia, Pterocarpus marsupium, Adina cordifolia, Lagerstroemia parviflora, Dendrocalamus strictus, Bambusa polymorpha, Shorea robusta, Terminalia tomentosa, T. arjuna, Bombax malabaricum, Madhuca indica, Gmelina arborea, Ougeinia oojenensis, Buchanania lanzan, Phoenix aucaulis, Bauhinia vahlii, Schleichera oleosa, Miliusa tomentosa, Careya arborea, Chloroxylon swietenia, Hardwickia binata, Vanda coerulea, Eulophia spp., Aerides spp., Dendrobium spp., Nervilia spp., Platanthera spp. etc.*

2.7.3 Rare and endangered plants

Satpura tiger reserve is home of many rare and endangered species. Presence of deep gorges on the Pachmarhi area has resulted in to the creation of several waterfalls, marshy places, perennial streams, springs and hills of various elevations. A little or no sunrays penetration at some of gorges because of its depth and narrow banks. Such conditions are very suitable to shed demander and drought sensitive species of algae, bryophytes, ferns, orchids and many tiny herbs of immense ecological and economic values. Thus these area is conserving special gene pool of floral wealth.


Cythea


Psilotum


Polysticum ambile

Figure 2-9 : Rare and Endangered flora of STR

Apart from having 138 species of fern and fern allies, several rare Angiosperms are also observed in the area. Some of the important species of ferns are *Psilotum triquerta, Isoetes panchanaii, Selaginella exigua, Ophioglossum nudicaule*, tree ferns i.e. *Cyathea gigantean* and *C. spinulosa* etc. The existence of several species like *Psilotum nudum, Lycopodium cerenum, Polybotrya appendiculata, Lygodium flexuosum, Cyathea spinulosa, Polysticum ambile* and several medicinal plants are in danger due to constant visit of students and collectors. This supports large number of rare and endemic plant species specially Bryophytes and *Pteridophytes* like *Psilotum, Cythea, Osmuda, Lycopodium, Lygodum* etc.

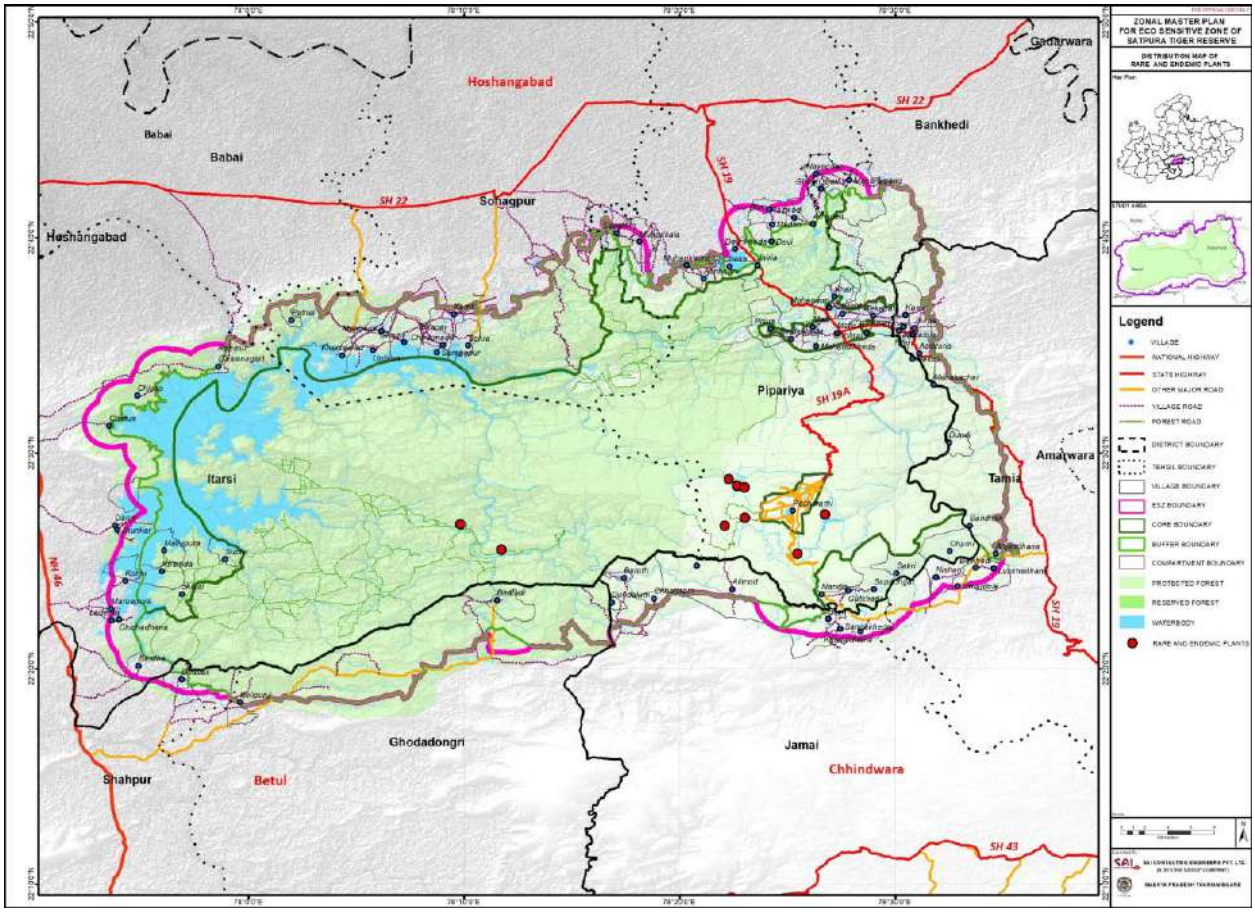


Figure 2-10 : Location of Rare and endangered plants

2.7.4 Grass lands

Most of grasses are strong light demander and can be seen where openness is available in the forested area. Best growth of the grasses can be observed along the roads and paths and forest blanks. *Sehima nervosum, Dicanthium annulatum, Apluda mutica, Dactyloctenium aegyptium* and *Cynodon dectylon* are important grasses of the area because of food habits of the herbivorous animals. *Dendrocalamus strictus* and *Bambusa arundinacea* are important bamboos of the area. *Bambusa polymorpha*, an eastern element is also present in scattered patches in this area. Leaves of bamboos are used as food by the herbivorous animals. Development of grasses can be observed in the fringe area because of availability of the openness and which also attract the grazing animals in the area.

Total 36 villages have been relocated out of 64 from the core zone to make the critical habitat disturbance free. The vacant land of 23 villages has been converted into grassland which covers area of 537ha as per core forest management plan.

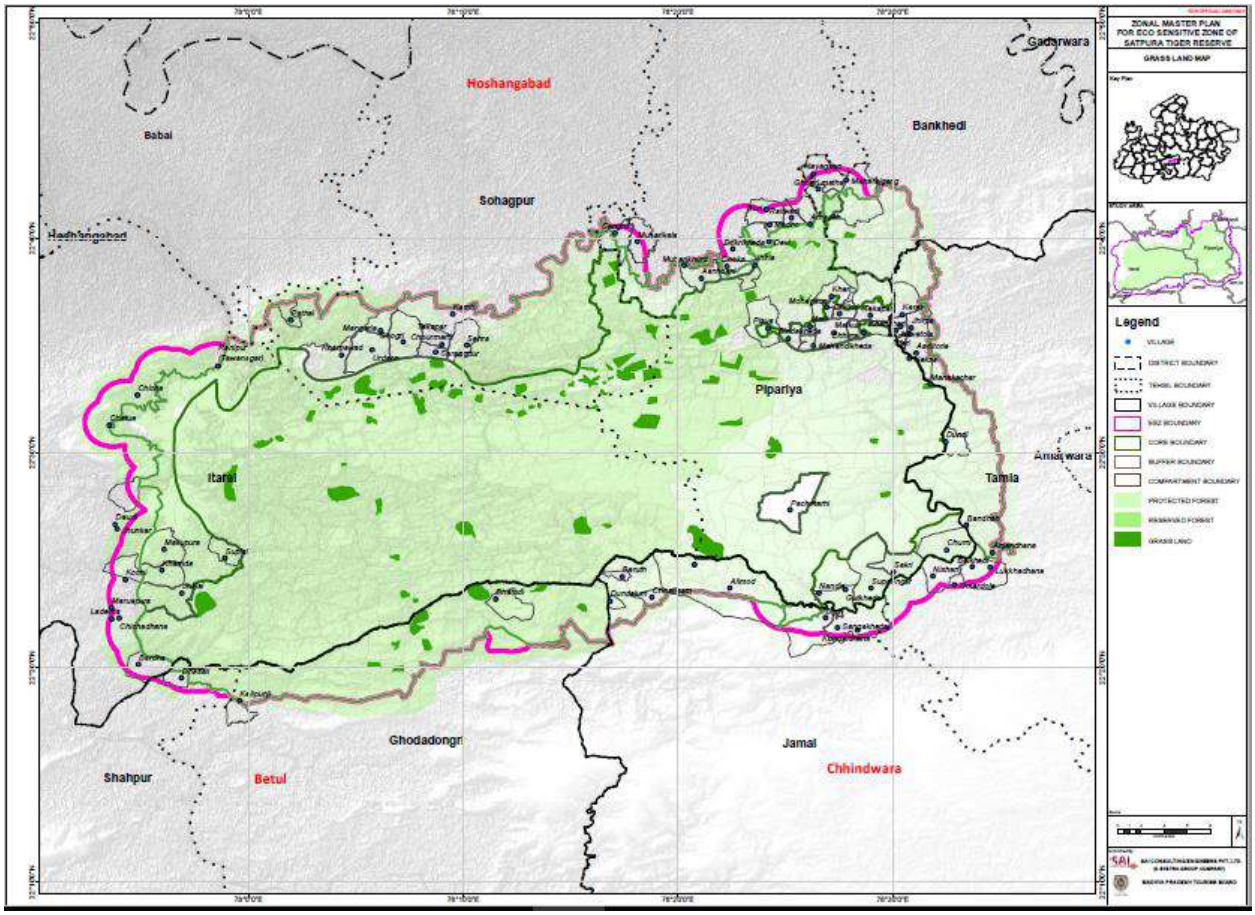


Figure 2-11 : Grassland in the STR

2.7.5 Wetlands

This whole area is part of Narmada Basin including the other rivers Nagdwari, Tawa, Denwa and many more small streams. Majority of the rivers flow till about February. Although a number of them cease to flow in the hot weather but their beds invariably contain scattered pools of permanent water. There are large number of small but perennial streams, known as Jots which flows down the steep slopes of the hills. On high elevation of the hills, Jots flow for whole the year. With decrease in elevation Jots disappear beneath the talus and only to reappear on relatively flat land in the forms of pools. These pools form the most important sources of water for wild animals.

Apart from above the large reservoir created by Tawa dam is an important source of water. Dokrikheda Dam is also one of the valuable sources of water in the region. There are 198 small and medium lakes which are developed by the forest department for ground water recharge and rainwater storage capacity. Average storage capacity for each lake is 5000 m^3 to 7000 m^3.

2.7.6 Reserve Plots

There are three sample plots and three preservation plots. Sample plots were formed in 1936 for teak, with the common object of determining volume per acre and the rate of growth of these species.

Three preservation plots were set up during the year 1928. The one protected with having area of 37 Ha. within the Compartment 52 in the Bori Wildlife Sanctuary is a representative old growth patch of forest and one of the BSAs in the landscape. The structure and composition of this plot and even form and architecture of trees at places is remarkably different than the surrounding forests. The habitat patterns used by some species of smaller mammals, birds, reptiles and amphibians. Presence of epiphytic flora could be significant. As per forest management plan, there are 9 preservation plots are there in Satpura Tiger Reserve.

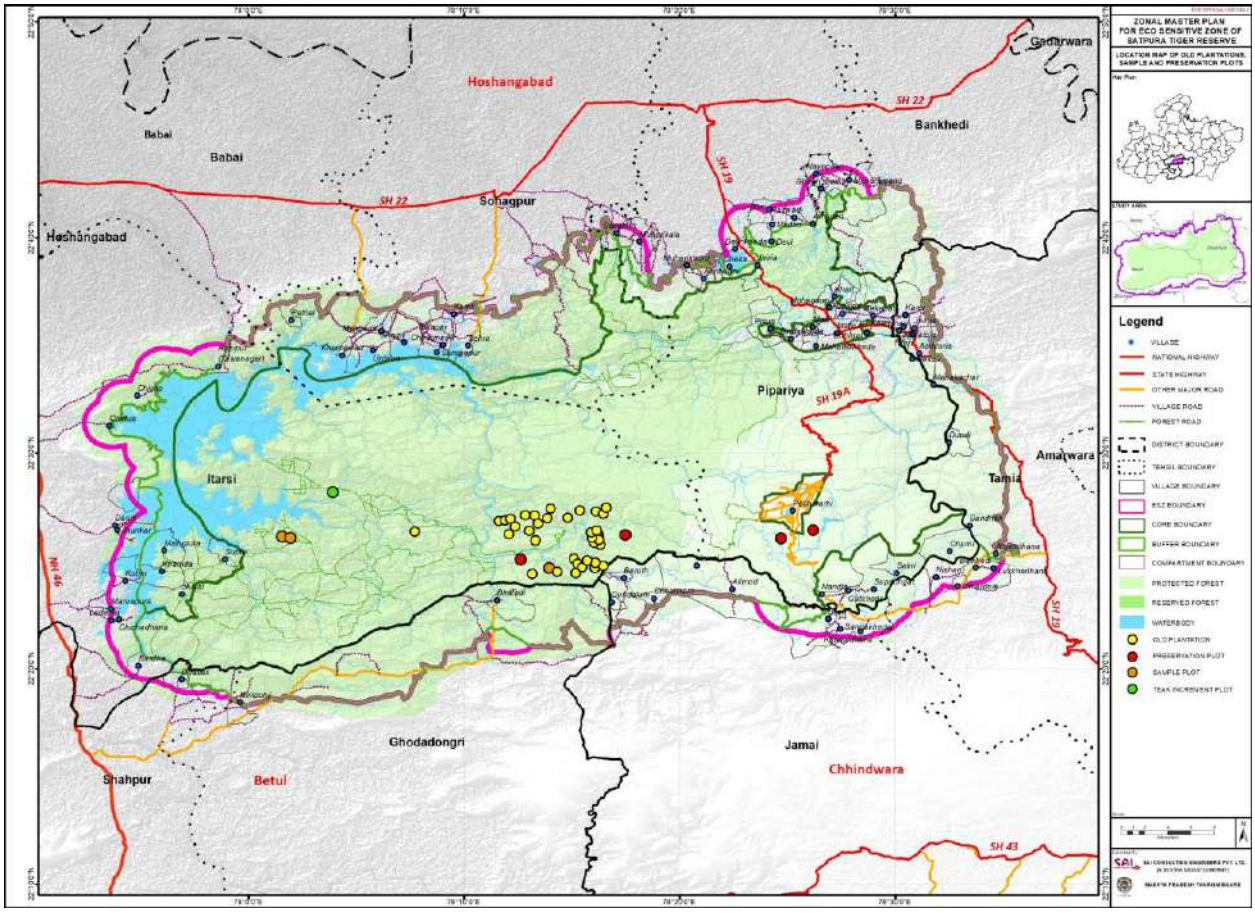


Figure 2-12 : Wetlands and Reserve Plot location in the STR

2.8 WILD ANIMALS AND HABITATS

Since the tract consists of Varying altitudes, topography climate and forests, it also contains almost all the wildlife species found in the Central India. There are 52 species of mammals, 300 species of birds and 31 species of reptiles are found here. Nature has endowed this area with luxuriant flora and rich fauna. Tiger, Panther, Gaur, Sambar, Cheetal, barking deer, Chausingha, Chinkara, Bluebull, Wild pig, Sloth bear, Hyena are seen easily. The small carnivore includes Jungle cat, Palm civet and small Indian civet. There are two important arboreal mammals, the Indian Giant squirrel and the large brown flying squirrel. Three striped palm squirrels is also present in the area besides five striped palm squirrel. First three squirrels represent south Indian elements. As many as four species of squirrels, one nocturnal and three diurnals are confined to this area. The only record of Leaf nosed bat (*Rhinopuslucdus*) in central India is around the Pachmarhi plateau. Local hills are full of crevices and dens which provides congenial habitat to many cavernicoles like bats. Important reptiles are freshwater crocodile, the monitor lizard and Indian soft-shell turtle.

Panthers and bears are common in the area. Sambar was the commonest deer. At present a project for re-introduction or Barasingha is in progress at Bori. The Indian Bison is found on high hill and slopes. The bird life varied specially in the area adjoining cultivation Peafowl, Grey jungle fowl, Green pigeon, Peacock were common in the forests, while Grey partridges, several types of quails, Snipes and other water birds are found in the open area and water bodies. The several sandstone cliffs around Pachmarhi plateau provides diverse habitat. The edges along the cliffs are significant resting and roasting sites of long billed vulture (*Gyps indicus*) and white Rumped vulture (*Gyps bengalensis*). Likewise, such large cracks have colonies of bats. Prominent among them Fruit bat, Flying fox and short nose Fruit bat.

The riparian areas constitute the most important habitat for the Indian giant squirrel. The large crowned tall trees with continuous canopy are ideal for supporting their population, providing nesting sites and access to Fruit trees. The species occurs in valley portion of Tiger Reserve and performs a significant function of dispersal of wild fruits and seeds. Fish of various types also found in large number in the

streams and rivers. In the deeper holes even up to some elevation crocodiles were reported to have been seen in Sonbhadra River.

Table 2-10 : Important Fauna in STR

Sr. No.	Major taxa	Important species
1	Mammals	Tiger, leopard, sloth bear, wild pig, barking deer, mouse deer, spotted deer, sambhar, Indian giant squirrel, large brown flying squirrel, horseshoe bat (*Rhinolopus luctus*) etc.
2	Birds	Long-billed vulture, white-rumped vulture, cliff, swallows, alaxandrine parakeet, woodpeckers, grey jungle fowl, spotted spur fowl etc.
3	Reptile	Indian python, Indian cobra, rat snake, common tree snake, green keel back, crocodiles etc.

2.8.1 Varied class of animal forms

Satpura Tiger Reserve is habitat for the wide spectrum of wild animals from fish to mammals, all taxa are well represented in the area. Apart from chordates, a variety of non-chordates like earthworms, leeches, insects, spiders, scorpions, millipedes, snails etc. are present in the area. Satpura Tiger Reserve is equally gifted in faunal diversity along with floral diversity. There are two important arboreal mammals, the Indian Giant Squirrel and the Large Brown Flying Squirrel. The only record of the Horseshoe Bat, *Rhinolopus luctus* in central India is around the Pachmarhi plateau. The pangolin is patchily distributed. The population of the Smooth Coated Otter is small and disjunctive.

2.8.2 Carnivores

Among the principal species of carnivores are tiger, leopard, wild dog, hyena, jackal, smooth coated otter, pangolin, sloth bear, honey badger, etc. Small carnivores include the jungle cat, the palm civet and the small Indian civet.


Tiger


Leopard


Sloth Bear

Figure 2-13 : Carnivores presence in STR

2.8.3 Herbivores

The herbivores include the Gaur, Sambar, Spotted Deer, Nilgai, Barking Deer, four horned Antelope, Wild Pig, Mouse Deer, Giant Squirrel, large Brown Flying Squirrel, Five Striped Palm Squirrel etc.


Gaur


Sambar


Spotted deer


Nilgay

Figure 2-14 : Herbivores presence in STR

2.8.4 Rare, endangered and endemic animals

Tiger, leopard, honey badger mouse deer, pangolin, smooth coated otter, four horned antelope and many more are important rare and endangered of the area. Long-billed vulture and white-rumped vulture are also visible in the region as Long-billed vulture prefers cliff areas to roost and nest in the area.

2.8.5 Animal occupancy (Density)

Different micro habitats there in Satpura tiger reserve. Nilgai and spotted deer prefer grasslands of foothill areas. Sambhar, barking deer, mouse deer etc. prefer woodland areas of hilly tract. Tiger and leopard

roam in hilly forested areas as well as grassland zones also. Deer and antelope graze in grasslands and meadows. Giant squirrel prefers denser pockets reach in fruit bearing species. Flying squirrel prefers old woodlots, especially Mahuwa groves. Crocodiles, chelonians, fishes, water snakes etc. aquatic animals are seen in water bodies. Long-billed vultures are much seen in gorges and prefers cliffs for nesting and roosting. Because of having the large and hilly landscape area, the density is less in the area.

2.8.6 Animal corridors and hotspot

Satpura tiger landscape is an extensively forested zone. Various forest blocks are well connected and in most of areas there no problem of connectivity. Since area is extensive, hence landscape species like tigers roam freely in the area.

Since area is rich in biodiversity, hence it is a well-known hotspot in local landscape. Hot spots are small areas markedly rich in plant and animal diversity, and often unique with respect to plant and animal species association like the deep and dark narrow gorges over limited area below the Pachmarhi plateau. These are small sites and very vulnerable to change.

It is unique area of high natural and diverse land resource values with rich biodiversity. It has large number of rare and endemic plants especially *bryophytes* and *pteridophytes* like *Psilotum, Cythea, Osmuda, Lycopodium, Lygodium* etc. On Pachmarhi plateau, Sal forests occur on Gondwana sandstone whereas on lower plains, teak forests grow on basaltic traps. Some of the species are not common elsewhere in Madhya Pradesh. These are *Malastoma malabthricum, Muraya paniculata, Holmskildia senguines, Blumea lancelaria, Sophora interrupta* etc. There are 26 species of Himalaya and 42 species of Nilgiri hills found here. Total 7 types of forest are found in this region. This region is also known as mega biodiversity region or biological hotspot.

2.8.7 Diseases and Vaccination

The cattle of the Buffer Zone intermingle with the wild population, and there is always a chance of the transmission of infectious diseases from cattle to wild population and vice-versa. A sudden breakout of any epidemic may play havoc with the lives of thousands of ungulates. The Wildlife (Protection) Act, 1972 (as amended up to 2006) also makes a provision to regular immunization programmes for the villages within the periphery of the 5 km of the buffer.

2.8.8 Human – wildlife conflict

Human-wildlife conflict is very common in the buffer area in the form of human injuries, deaths, cattle lifting and crop raiding. Besides, bites by monkeys, bears and snakes are also very common. Carnivores like tigers and panthers also sometimes harm the animals or humans. However, there is mechanism in place through which compensations are promptly paid by concerned divisions.

2.9 STATE OF WILDLIFE CONSERVATION AND PAST EFFORTS

Satpura Tiger reserve is the largest protected area of Madhya Pradesh located in the Satpura hill ranges south of river Narmada. The area forms a part of the largest contiguous forest and tiger habitat in India. It is bestowed with many unique features from ecological, archaeological, historical, anthropological as well as forestry point of view apart from wildlife conservation.

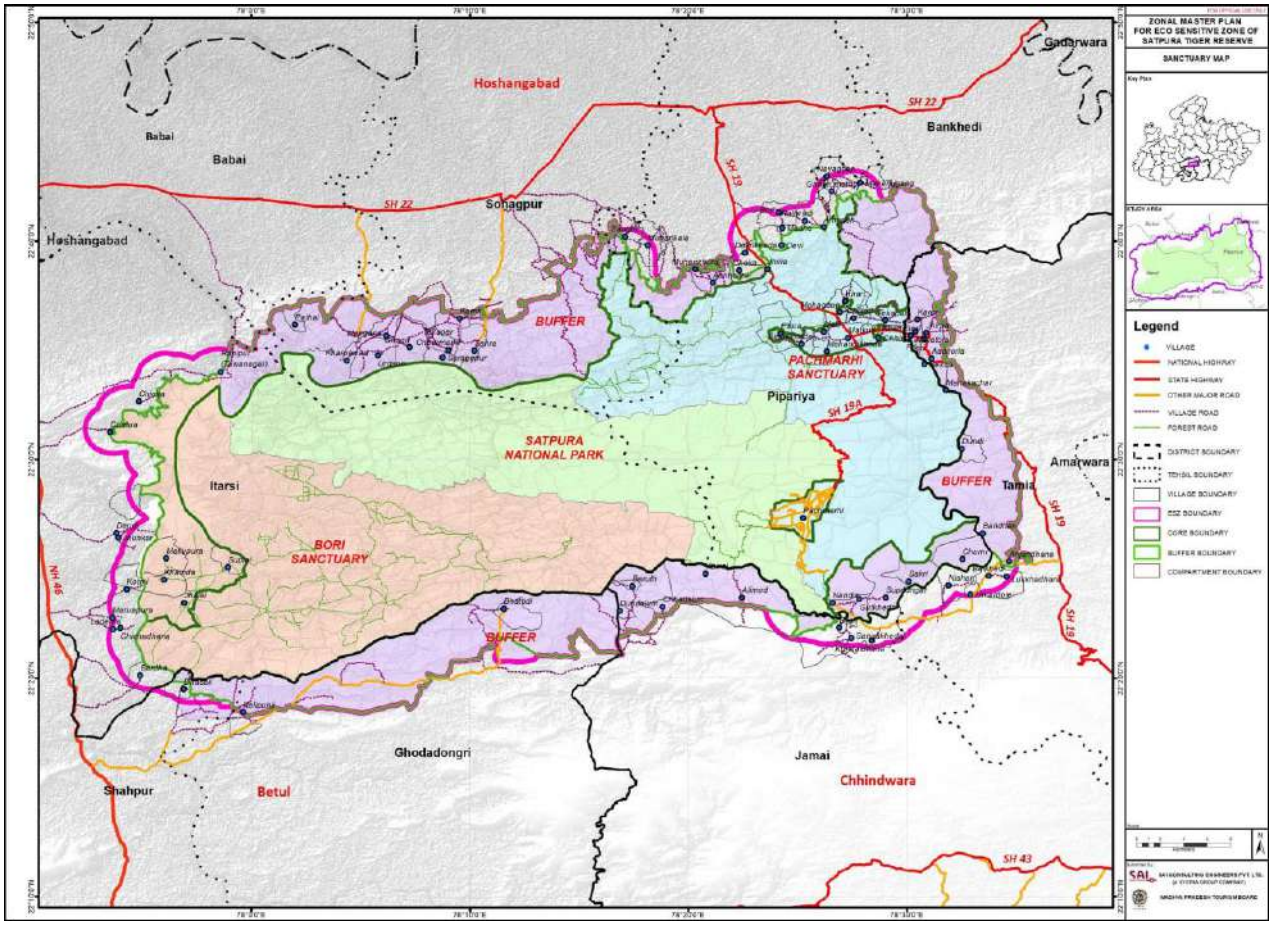


Figure 2-15 : Location of the Satpura Tiger Reserve

The area was declared Tiger Reserve vide Govt. of India notification No.F-No.1-4/2000 P.T. dated.10-02-2000 extending over a forest area of 1427.87 sq. km. Earlier the landscape was demarcated into three different protected areas of Bori and Pachmarhi Wildlife Sanctuaries and Satpura National Park which were accorded different levels of protection under the Wildlife (Protection) Act, 1972. Other than these three Protected Areas, the region also includes the Pachmarhi Biosphere Reserve. In 2000, the area of these three PAs was together declared as a Tiger reserve. The buffer zone was included in the reserve area in 2011. The reserve area includes the core zone spread over 1339.26 km^2 and the buffer zone of 794.04 km^2 (of which the buffer area inside PAs is 170.75 km^2).

The notifications of declaration of sanctuary and National park is as below table.

Table 2-11 : Notification of declaration of Protected Areas

Sr. No.	Protected Areas	Notifications
1	Bori Sanctuary	15-22-76-10 (8) dated 1-6-1977
2	Pachmarhi Sanctuary	15-22-76-10 (8) dated 1-6-1977
3	Satpura National Park	15/12/80-10/2 dated 13-10-1981
4	Pachmarhi Biosphere Reserve	22016/94-BR dated 3-3-1999
5	Tiger Reserve	1-4/2000-PT dated 10-2-2000
6	Core Zone/ Critical Tiger Habitat	F-15-31-2007-X-2 dated 24-12-2007
7	Buffer Zone	F-15-20-2010-X-2 dated 03-01-2011

The area under present day Satpura Tiger Reserve has witnessed many events. The Forest of this reserve has two different type of Past history as National park and sanctuary. The Reserve Forests included in this Tiger Reserve were declared reserved under section 34 of Indian Forest Act VII, of 1878 by Central province Gazette Notification No. 886 dated 20th February, 1879. However, Bori Reserve East of Sonbhadra has the distinction of being the first reserve forest in India, notified as reserve forest under Forest Act of 1865. The Protected Forest blocks of this reserve were declared Protected Forest under the

provision of section 29 of Indian Forest Act, 1927. All the Protected Forest has been notified under section 4 of Indian Forest Act, 1927 for constituting them as reserved forests.

In the year 1977, Bori Sanctuary was divided into two sanctuaries i.e. Bori and Pachmarhi adding some more area to Bori sanctuary of 1975. After this notification area details were as under:

Table 2-12 : Area Bifurcation of Satpura Tiger Reserve as per notifications

Name of PA	Type of forest	Old sanctuary		Newly added area (ha)	Total area (ha)
		Name & year	Area (ha)		
Bori sanctuary	RF	Bori sanctuary 1975	79781.041	-	79781.041
	PF	Bori sanctuary 1975	866.031	-	866.031
	Revenue	-	-	-	-
Total			**80647.072**	**-**	**80647.072**
Pachmarhi sanctuary	RF	Bori sanctuary 1975	13736.458	9310.068	23046.526
	PF	Bori sanctuary 1975	31951.912	2698.443	34650.355
	Revenue	-	-	7731.244	7731.244
Total			**45688.37**	**19739.755**	**65428.125**

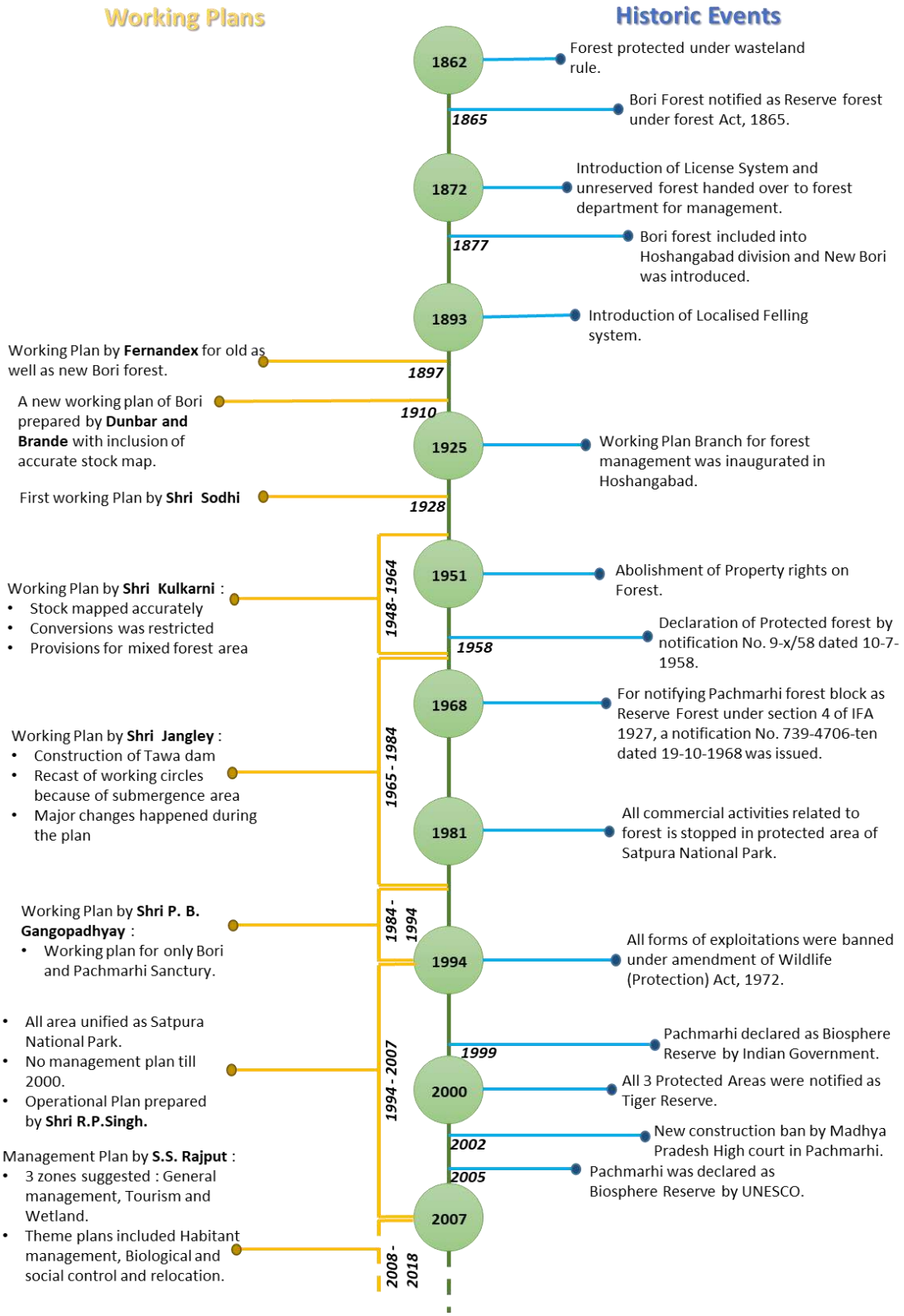
The change in area of the Satpura National park with inclusion of Bori and Pachmarhi Sanctury is as below table:

Table 2-13 : Satpura National Park area

Name of PA	Type of forest	Previous area	Added area from		Area deducted from		Newly added area	Present area (After creation of SNP)
			Name of PA & year		Name of PA & year			
Satpura National Park	RF	-	Bori sanctuary 1977	30112.194	-	-	3296.038	41465.252
			Pachmarhi sanctuary 1977	8057.02	-	-		
	PF	-	Bori sanctuary 1977	76.486	-	-	1582.689	11407.788
			Pachmarhi sanctuary 1977	9748.13	-	-		
	Revenue		Bori sanctuary 1977	-	-	-	-	-
			Pachmarhi sanctuary 1977	346.118	-	-		
Total								**52873.040**
Bori sanctuary	RF	79781.041	-	-	SNP 1981	30112.194		

Name of PA	Type of forest	Previous area	Added area from		Area deducted from		Newly added area	Present area (After creation of SNP)
			Name of PA & year		Name of PA & year			
					Pachmarhi in 1981 for management	1097.480	Nil	48571.367
	PF	866.031	-	-	SNP 1981	76.486		
					Pachmarhi in 1981 for management	789.545	Nil	-
Total								**48571.367**
Pachmarhi sanctuary	RF	23046.526	Bori sanctuary 1977 for management	1097.480	SNP 1981	8057.02	Nil	16086.716
	PF	34650.355	Bori sanctuary 1977 for management	789.545	SNP 1981	9748.13	Nil	25691.770
	Revenue	7731.244	-	-	Under the limits of SNP 1981	346.118	-	7385.126
Total								**49163.612**

The forest area have both Reserve as well as protected Forests and these areas were managed accordingly. The reserve forest has been under control of government for period more than 125 years and has undergone systematic management since then, whereas protected forest is under systematic management only since 1963.



(Source: Tiger conservation Plan, Vol.-1: core zone, Satpura Tiger reserve 2015-2024)

Figure 2-16 : Timeline for historic events and working plans of STR

The forest was managed by different working plans after establishment of working plan branch on year 1925. The first plan was made by Shri Sodhi with focus on stock and growth of timber production. After that plan was revised by Shri McDonald in 1938. McDonald improved the prescriptions especially for obtaining successful reproduction in the light of the experience gained. Accurate stock mapping and conversion of land was restricted during the working plan of Shri Kulkarni. The construction of Tawa

reservoir began in year 1956 causing the recast of circles in the Satpura National park during Jangley's Plan. The working plan for P.B. Gangopadhyay in year of 1994-1995 made improvements like introduction and provision of core and buffer area, biodiversity conservation and provision for tourism. The plan was only for Panchmarhi and Bori. During years of 1994 to 2000, Panchmarhi and Bori placed unified under command of Satpura National Park. The first working plan prepared by Shri R.P.Singh in haste. The plan was in work till 2008-2008. After that current working plan was developed.

2.10 STATE OF ENVIRONMENT

This section of the report is confined to the Dataset handed over by MPPCB. The pollution caused by the tourist activities has been mentioned in the Tourism chapter-5.

2.10.1 DATA SET

A data set was requested of the monitoring points by MPPCB on 25.06.2019. It involved aspects such as Air quality, Water Quality, Noise Quality, Sanctioned list of mining, effluent and discharge point in the ESZ area.

Table 2-14 : Data Set

Sr. No.	Domain	DATA set	Details
MPPCB	Sanitation & SWM	Sewage discharge point, Catchment area of each of STP, PS/APS and degree of treatment, list of monitoring station, frequency of data recorded, summary of reports	Location, Area name, Status, STP Capacity
		Solid waste collection, landfill site	Location, Area name, Status
	Point pollutants	Land/ water pollution points	Category across various points, location and location of monitoring points
	Noise and air Pollution	Noise pollution	Category, Reports, location of monitoring points and location of monitoring points
		Air Quality	Category, Reports, location of monitoring points and location of monitoring points
	Mining Points	Mining	The places which are granted the permission and applied for conducting mining activity
	Water Quality	Water Quality and Ground water level	Reports on Water and Ground water, Identification of sites where water quality exceeded standards

As a response to the data request Partial set-data was handed on 7.10.2019 whose status across various categories is described below.

1. Water Quality: Water Quality data across the 7 monitoring points which includes the GW quality data of the Municipal Solid waste site was handed over.
2. Air Quality: While the air quality dataset consisted of only one monitoring point Panchmukhi which possess the data -set of only one year.

The dataset for the domain of mining, Noise Quality, MSW dumping site data have not yet been handed over and thus are not incorporated in the analysis.

Note: The Dataset collected of Water Quality of monitoring points of MPPCB has been displayed in the annexure in 2.1.

The analysis included 3 aspects the spatial analysis, the quality aspects and the frequency of recording data.

2.10.2 Quality Analysis

The quality aspects incorporate the analysis of water and air quality from the monitoring points of MPPCB.

Water Quality:

The IS; 2296-1982 describes about the *TOLERANCE LIMIT OF THE INLAND SURFACE WATER SUBJECT TO POLLUTION the* CLASSIFICATION OF WATERS and its uses are described as follows

Generally, the inland surface water sources are put to multiple uses, However, depending on the best use, inland surface waters subject to pollution shall be classified as given below. In the case of multiple uses, the quality criteria of the water shall be governed by the requirement for the best use.

Class A - Drinking Water Source without Conventional Treatment but after Disinfection. The quality of inland surface water under this category shall be such that it will be fit for human consumption without any treatment, except disinfection by approved methods. This classification is intended primarily for waters having water shed which are uninhabited and otherwise protected, which requires approved disinfection with additional treatment when necessary to remove naturally present impurities. This water is considered safe for drinking, culinary and food processing purposes.

Class B - Outdoor Bathing

This water is useful for bathing. The waters under proper sanitary supervision by the controlling authorities will meet accepted standards of water quality for outdoor bathing places and considered safe and satisfactory for bathing purposes.

Class C - Drinking Water Source with Conventional Treatment Followed by Disinfection This is a source of water supply for drinking, culinary and food processing purposes after it is subjected to approved treatment such as coagulation, sedimentation, filtration and disinfection, with additional treatment, if necessary, to remove naturally present impurities.

Class D - Fish Culture and Wild Life Propagation. The water is fit for fish and wild life propagation.

Class E - Irrigation, Industrial Cooling or Controlled Waste Disposal. This water is suitable for agriculture, industrial cooling or process water supply, fish survival etc. The waters without treatment, except for natural impurities which may be present therein, will be suitable for agricultural uses and will permit fish survival. The waters are also usable after special treatment by the users as may be needed under each particular circumstance for agricultural uses and will permit fish survival. The waters are also usable after special treatment by the users as may be needed under each particular circumstance for industrial purposes, including cooling and process water. Based on the five categories most of samples lies in either Class A or Class B, as per IS-2296, an exercise of analysis among the available sample was conducted whose summary is described below.

Table 2-15 : Quality Analysis for Environment

Name of Place	Total Sample	Samples Ranged in the class		Note	Remark
		A	B or above		
Denwa River	6	5	1	T. Coli Detected beyond Tolerance Limit in one Sample	Possibility for existence of harmful micro-organism cannot be ignored
Pachmarhi lake	6	1	5	BOD Detected beyond Tolerance Limit in one Sample	Probability of discharge due to human activities is inferenced
Tawa Dam	10	7	3	T. Coli and BOD Detected beyond Tolerance Limit in 3 and 1 Sample respectively	Possibility for existence of harmful micro-organism and discharge by human activities cannot be ignored
Cantonnent Area Pachmarhi	2	0	E	D. solids and BOD Detected beyond	Probability of discharge due to human activities is inferenced

Name of Place	Total Sample	Samples Ranged in the class		Note	Remark
				Tolerance Limit both the Sample	
MSW Ground Water-level	3	NA	NA	BOD and T coli was detected magnitude 102 (mg/l) and 110 (50 mpl/100). BOD about 50 times and T coli about 2 times higher in respect to Class A.	Sincere Attention must be delivered to these aspects as a step to conserve ecosystem.
Jatashankar	1	0	E	BOD Detected beyond Tolerance Limit in a Sample	Probability of discharge due to human activities is inferenced
Banganga Nalla	2	0	E	BOD Detected beyond Tolerance Limit in a Sample	Probability of discharge due to human activities is inferenced which was supplemented with the

It is noted that ESZ possess places where human activities are causing imbalance to the ecosystem.

2.10.3 Spatial Aspects

The monitoring points were mapped to comprehend the coverage of the area. It was observed that predominant points are located in proximity of Pachmarhi. Thus, it is pointed that overall area is not covered which is analogous to quote- if you can't measure, you can't improve. It is strongly recommended to monitor the pollution level or air, water & Noise quality periodically.

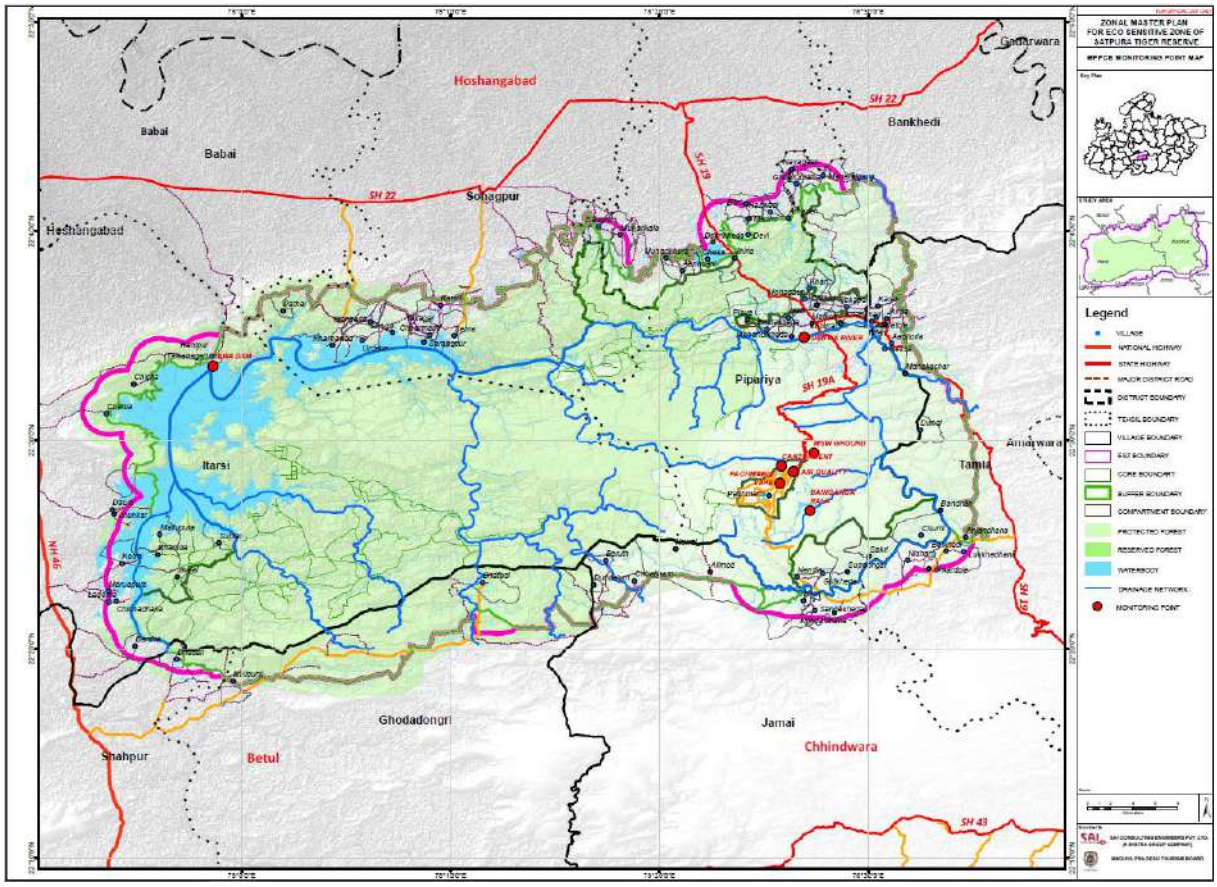


Figure 2-17 : Monitoring Points of MPPCB

2.10.4 Frequency Analysis

Table 2-16 : Frequency Analysis

Name of Place	Total Sample	Frequency (times sample taken in Annum)			
		I	2	3	4 or more
Denwa River	6	3	2	0	1
Pachmarhi lake	6	4	2	0	0
Tawa Dam	10	2	1	6	1 (7 times)
Cantonnent Area Pachmarhi	2	0	2	0	0
MSW Ground Water-level	3	3	0	0	0
Jatashankar	1	1	0	0	0
Banganga Nalla	2	NA	NA	NA	NA

It must be noted that dataset handed over for all the 7 monitoring points commences from 2013 to 2018 which points that all this points mush have 7 data (i.e., 1 data-set in an annum) in the record. But, 4 among the 7 points doesn't possess it. Additionally, the frequency analysis for recording of data in a year was conducted whose summary has been shown above, pointing towards inconsistency with dataset.

2.10.5 Air Quality

In aspect of air quality dataset of only a location Pachmarhi is handed over with just one sample. The sample measured three aspects which are as follows.

- Respirable Suspended particular matter
- SO_2
- NO_X

Table 2-17 : Standards for the permissible limit as per National Ambient Air Quality Standard.

Pollutants	Time-weighted average	Concentration of ambient air (in µg/m^3)		
		Industrial area	Residential rural	Sensitive area
SO_2	Annual average	80	60	15
	24 h	120	80	30
NO_2	Annual average	80	60	15
	24 h	120	80	30
SPM	Annual average	360	140	70
	24 h	500	200	100
RSPM	Annual average	120	60	50
	24 h	150	100	75

(Source: National Ambient Air Quality Standard.)

3 DETAILS OF VILLAGES / SETTLEMENTS IN AND AROUND THE ESZ

There are 81 villages that comes within Eco sensitive Zone of Satpura Tiger Reserve as per notification S.O.2538 (E). These villages are located in the buffer zone and comes under district Betul, Chhindwara and Hoshangabad of Madhya Pradesh. The Satpura Tiger Reserve achieved land mark success in relocation and settlement of 38 villages from the core area, resulting in the creation of a contiguous habitat for wildlife. Relocation released about 8450.823 ha ideal habitat for wildlife. It also resulted in better living conditions for villagers and enabled access to the facilities such as electricity, drinking water, schools, market place and health centers.

3.1 NUMBER OF SETTLEMENTS, VILLAGES AND TOWN

Many human settlements are there in the eco-sensitive zone with connectivity network of roads and rail. Besides many roads, Khandwa-Hoshangabad railway line is present towards northern side of Satpura Tiger Reserve and Hoshangabad – Betul railway line is situated towards western outskirts.

Presently, there are 05 revenue villages inside the core zone of Satpura tiger reserve. As many as 50 villages and one town are situated in buffer area. Details of these villages are as following:

Table 3-1 : List of villages in core and buffer area

Sr. No.	Range	Zone	Core area		Buffer area		
			Forest village	Revenue village	Forest village	Revenue village	Town
1	Pachmarhi (West)	Core	-	4	-	-	-
2	Pachmarhi (East)	Core	-	9	-	-	-
3	Matkuli	Core	3	1	-	-	-
4	Churna	Core	7	-	-	-	-
	Total	Core	10	14			
5	Bagra	Buffer	-	-	2	8	-
6	Tawa	Buffer	-	-	2	3	-
7	Pipariya	Buffer	-	-	-	2	-
8	Denwa	Buffer	-	-	-	12	-
9	Buffer inside PA	Buffer	-	-	5	16	1
	Total	Buffer	-	-	9	41	1

(Source : Satpura Tiger Reserve Eco-sensitive Zone notification, Officials of Satpura Tiger Reserve)

The list of notified villages with latitude and longitude under ESZ is shown in annexure 1.1.

From primary survey it has come to know that location of 8 notified villages differs from actual ground location of the same. The list of villages is shown in table below:

Table 3-2 : The list of villages having change in location

Villages	Divergence from notified Village location	Location as per Notification		Actual Location Of villages	
		Longitude	Latitude	Longitude	Latitude
Fiferi	**9.32 km**	78.5364389	22.5103278	78.5136452	22.5918133
Daudi	**8.65 km**	77.8912333	22.5220111	77.8967077	22.4439833
Bandhan	**7.47 km**	78.5465028	22.5105444	78.5578427	22.4438372
Chatua	**5.9 km**	77.9059306	22.4693722	77.8921842	22.5211607
Jhunkar	**1.49 km**	77.9067222	22.4295861	77.8982920	22.4405274
Khari	**1.03 km**	78.4498139	22.6120250	78.4530988	22.6208432
Mohagaun	**0.53 km**	78.4488972	22.6075361	78.4491157	22.6123827
Bijori	**0.21 km**	78.4486000	22.3736194	78.4481072	22.3717724

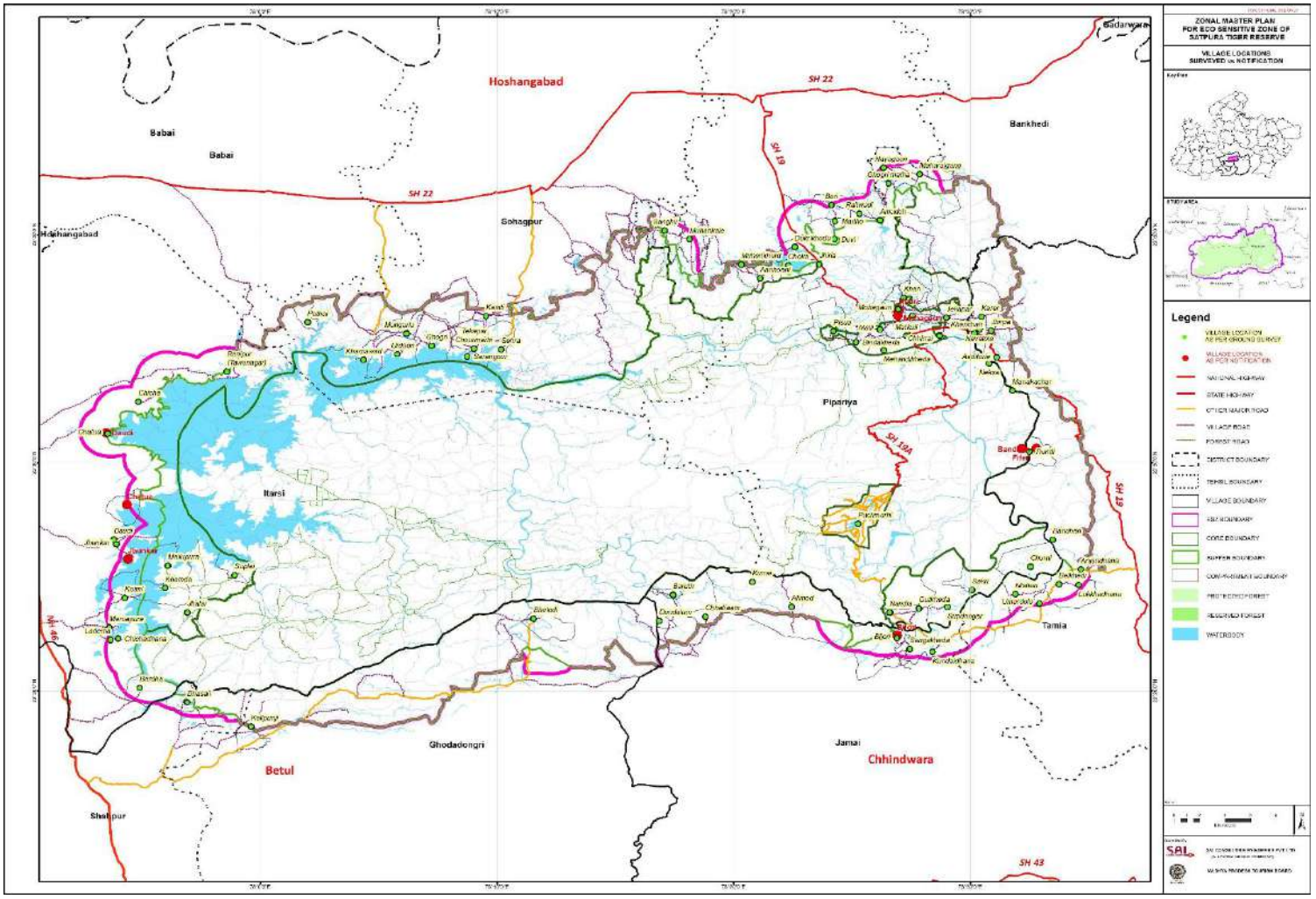


Figure 3-1 : Location of Villages as per notification and primary survey

Figure 3-1 shows village locations as per notification and as per primary survey. As it was seen in table 14, location of 8 villages differs from it's actual location in notification.

Out of 81 villages, GIS boundaries are available for 67 villages that is shown in figure 3-1. [1]

[1] GIS boundaries not available for 13 villages: Ranipur (Tawanagar), Chicha, Daudi, Chatua, Jhunkar, Maruapura, Chichadhana, Ladema, Umardole, Anjandhana, Bandhan, Neksa, Manakachar

3.2 POPULATION SIZE AND COMPOSITION

The dynamic of human populations can be studied with the help of the basic components of demographic structure that helps to understand the trends of demographic process. All the villages notified under ESZ are adjacent to the forest area.

3.2.1 Population

There are 81 villages in the eco sensitive area out of which Pachmarhi and Ranipur (Tawanagar) are urban area having total population 12062 and 4561 respectively according to Census 2011, which lies in buffer area of Satpura Tiger Reserve. All other notified villages are having population less than 1000 except Matkuli, Bijori, Bardha, Jhirpa, Jhunkar, Nayagaon and Sangakheda. Male – Female ratio varies between 45% to 55% in all the villages.[2]

The Census data for following villages are not available.

Sr No.	Notified Villages
1	Aaditoria
2	Aanjandhana
3	Bandhan
4	Dundalum
5	Gutkheda
6	Fiferi
7	Kundaidhana
8	Kurrai
9	Ladema
10	Lukkhadhana
11	Manakachar
12	Maruapura
13	Navatola
14	Neksa
15	Sehra
16	Umardole

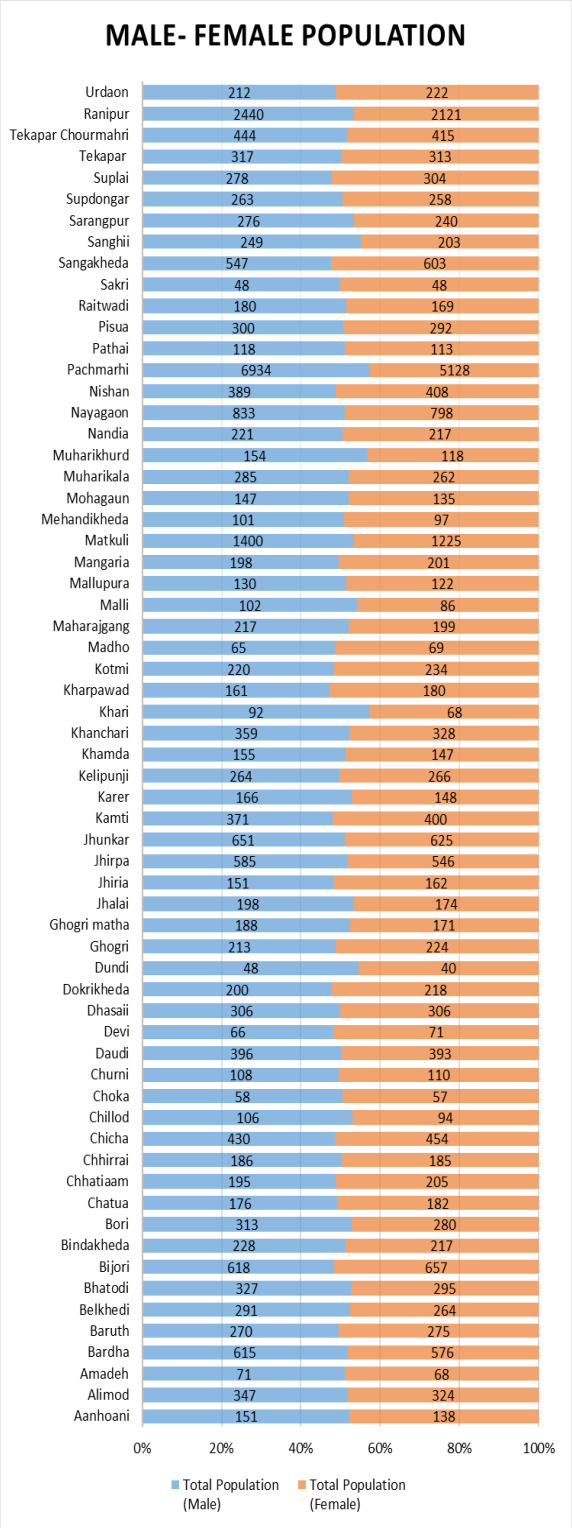


Figure 3-2 : Village wise Male-Female Population

[2] Census data is not available for 16 villages: Aaditoria, Aanjandhana, Bandhan, dundalum, Fiferi, gutkheda, Kundaidhana, Kurrai, Ladema, Lukkhadhana, Manakachar, Maruapura, Navatola, Neksa, Sehra, Umardole

3.2.2 Child population ratio

Child population ratio is the ratio of total number of Children in the villages to the total population.

Average child population ratio of all the villages of ESZ is 17.2%. Average rural child population ratio in Madhya Pradesh is 15.48% according to Census 2011. Also, in surrounding districts of ESZ, i.e. Hoshangabad, Betul and Chhindwara has the child population ratio of 13.9%, 13.8% and 13.5%. In the graph below it can be seen that most of the villages having child population ratio below average of rural child population ratio of Madhya Pradesh State. Also, it can be seen that Mehandikheda, Nandia, Ghogri, Malli, Sangakheda, Supdongar, Aanhoni, Devi, Amadeh, Bijori, Madho and Raiwadi villages have child population ratio more than 20%.

Pachmarhi being an urban has 12062 population out which child population is only 11.13% of total population and the lowest child population is around 10.94 % in Ranipur (Tavanagar) among all the villages.

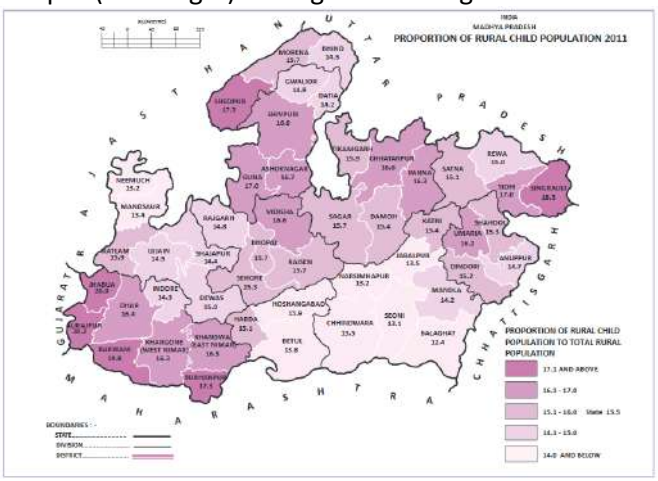


Figure 3-3 : Child Population Ratio

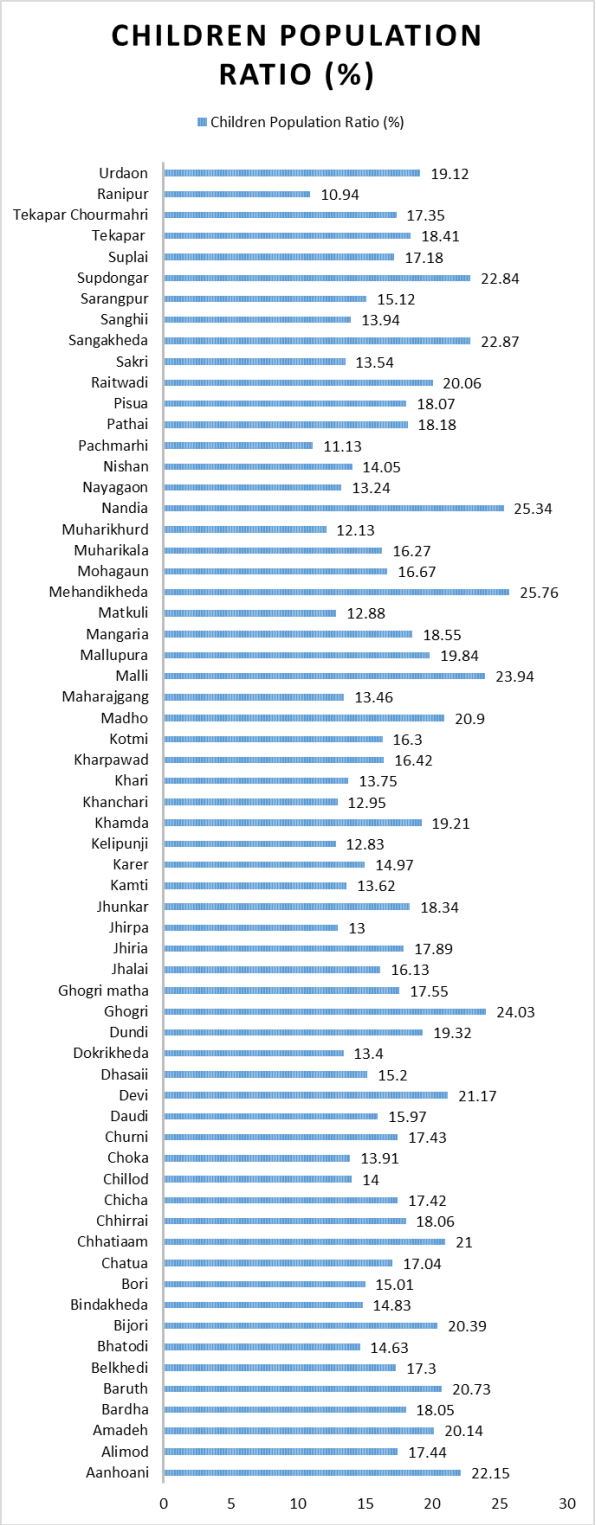


Figure 3-4 : Children Population Ration

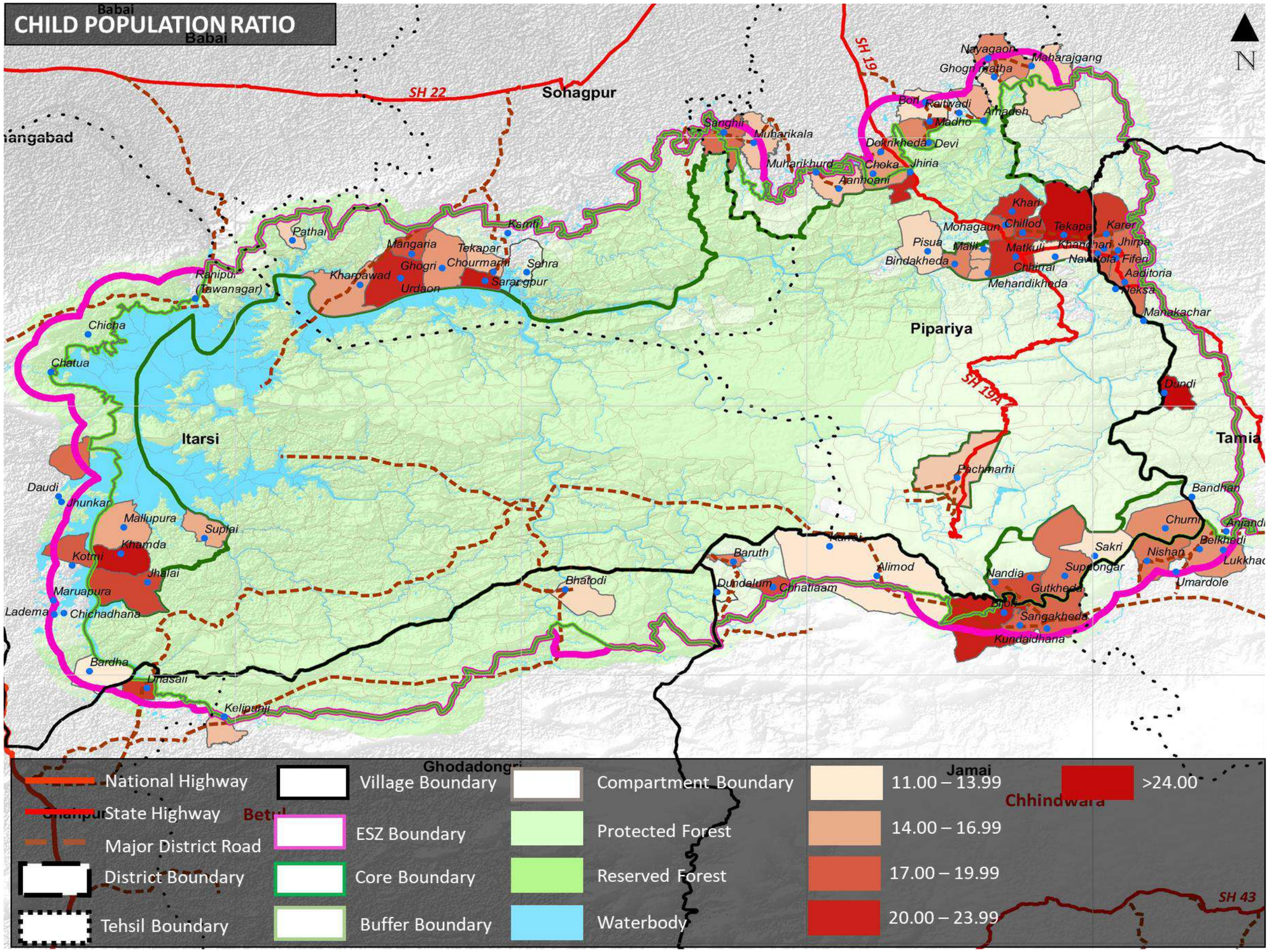


Figure 3-5 : Child Population Ratio

3.2.3 Sex ratio

Sex ratio is defined as Number of females per 1,000 males in a population. It enables to know the ratio of females in comparison to number of males of an area.

Villages sex ratio indicates that there is less disparity in terms of total male and female population. Out of all the villages 16 villages have sex ratio more than 1000. And average sex ratio in ESZ villages is 961. Whereas in rural area of Madhya Pradesh has average sex ratio of 931. Khari, Muharikhurd and Pachmarhi has sex ratio less than 800.

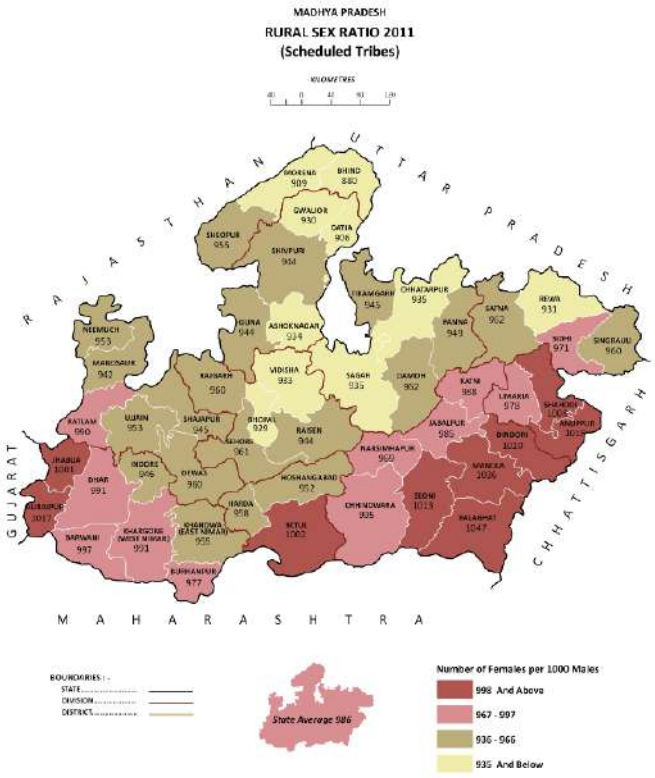


Figure 3-6 : Rural Sex Ratio 2011

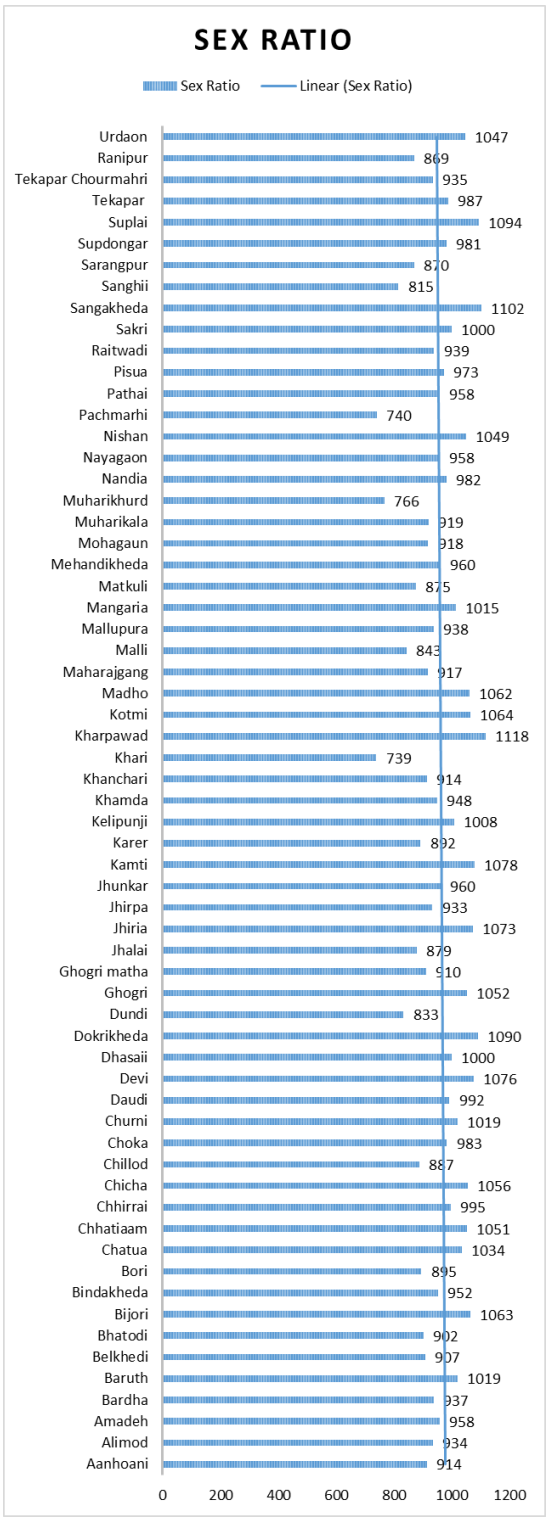


Figure 3-7 : Sex Ratio

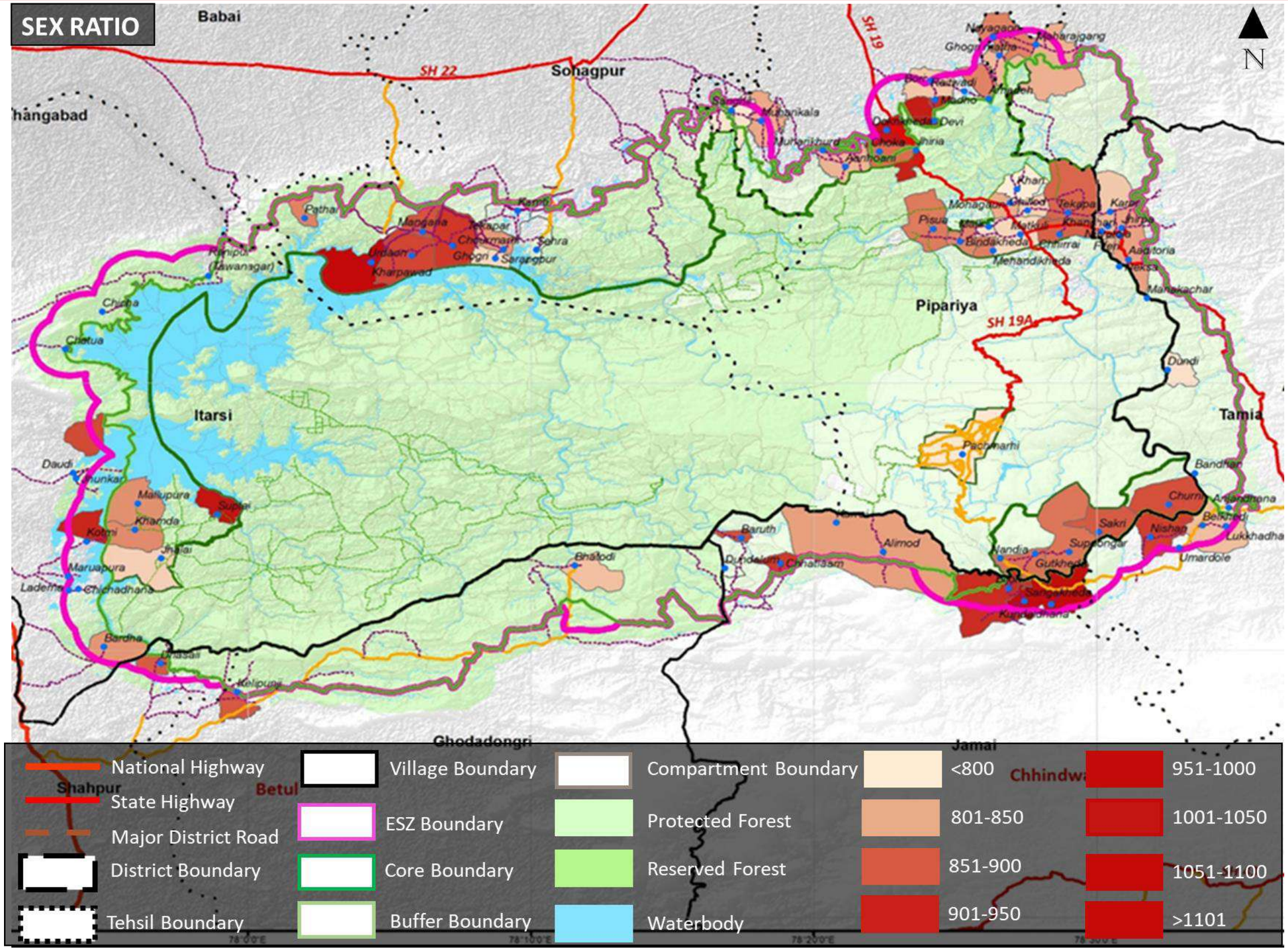


Figure 3-8 : Sex Ratio

3.2.4 Child Sex Ratio

The child sex ratio (0-6) in the country in villages and UAs / Towns is low when compared to the sex ratio of the total population reflecting prevalence of bias against the girl child in certain parts of the country both in villages and towns.

Like the sex composition of the total population, the sex composition by age groups is vital for studying the demographic trends of young population, its future patterns and particularly, the status of the girl child.

Average Child Sex ratio of ESZ villages is 1018.

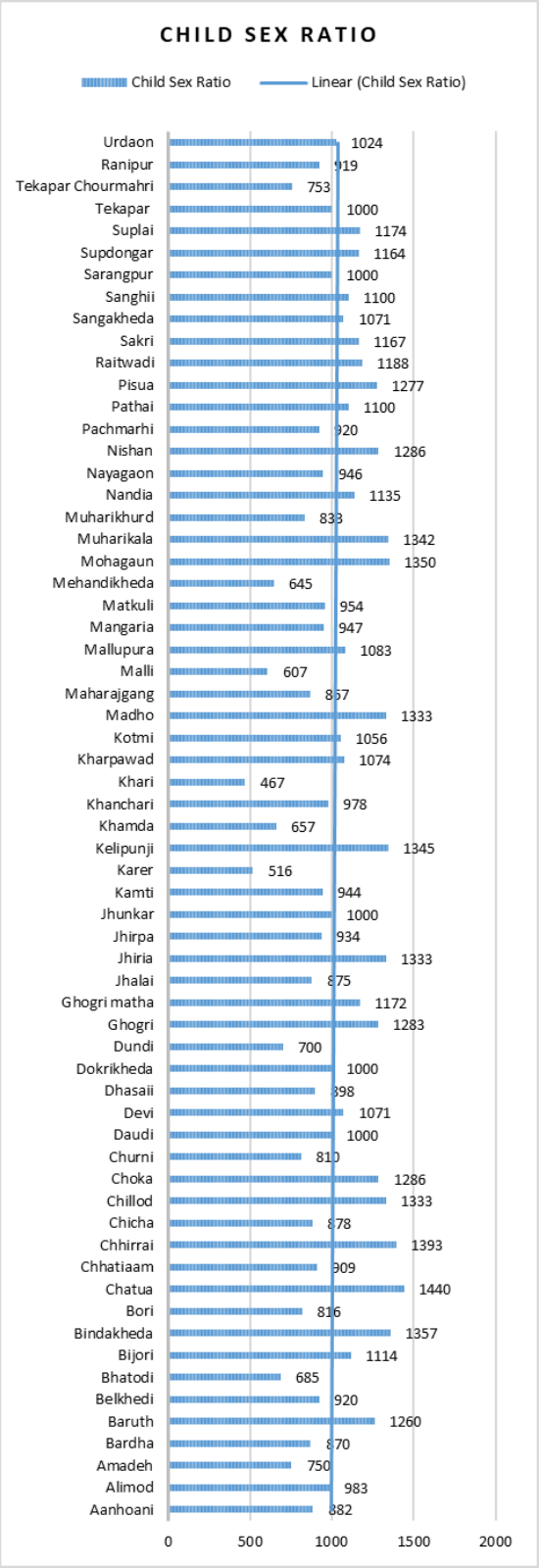


Figure 3-9 : Child Sex Ratio

3.2.5 Literacy rate

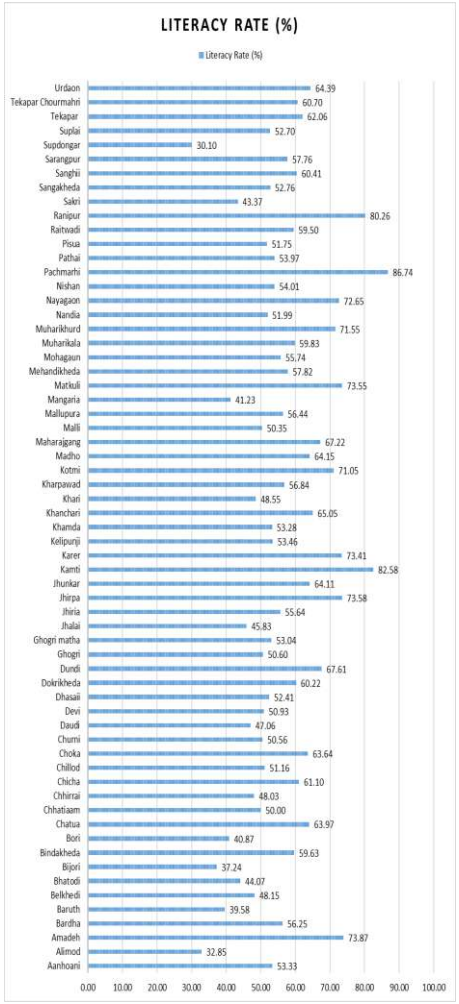


Figure 3-10 : Literacy Rate

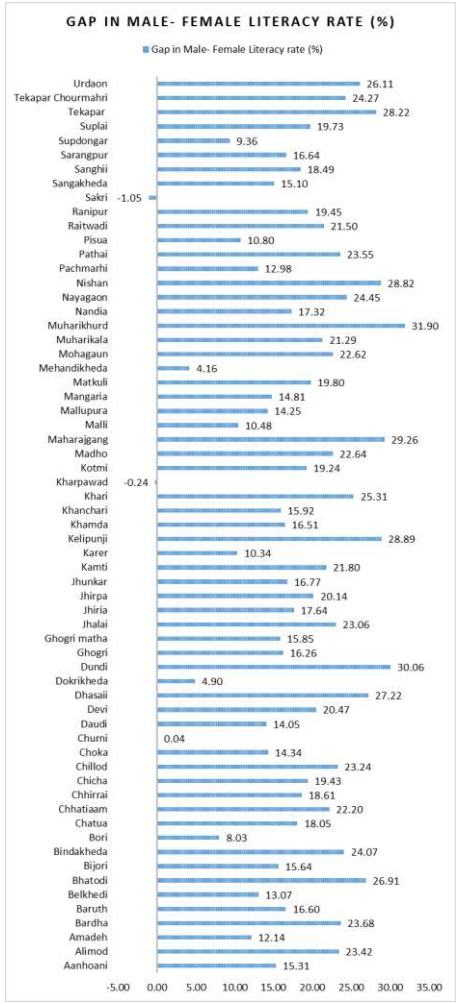


Figure 3-11 : Gap in Male-Female Literacy Rate

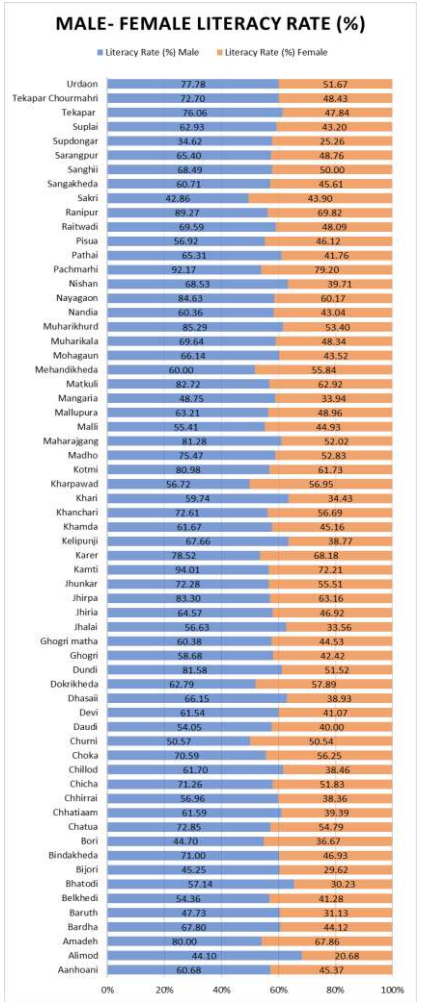


Figure 3-12 : Male-Female Literacy Rate

Literacy rate of the population is defined as the percentage of literates in the age group seven years and above. For different age-groups the percentage of literates in that age-group gives the literacy rate.

Average literacy rate of Rural Madhya Pradesh is 65.3%. While average literacy rate of villages of ESZ is 57.02%, which is lower than state's rural average.

There are only 13 villages having literacy rate more than average literacy rate of rural Madhya Pradesh. Pachmarhi, Ranipur (Tawanagar) and Kamti are the only villages having literacy rate more than 80% and female literacy rate more than 65%. Average female literacy rate of Madhya Pradesh Rural is 53.2%. There are only 17 villages having more female literacy than state average.

Also, it can be observed from the graph that there is a huge gap in male- female literacy rate. Average gap of male- female literacy rate of Madhya Pradesh Rural is 23.4% as per Census 2011 & average gap of the same for villages of ESZ is 26.15% which is higher than state rural average. There are 15 villages having higher percentage rate of gap than state rural average. So, more efforts should be made to minimise the gap in male- female literacy rate.

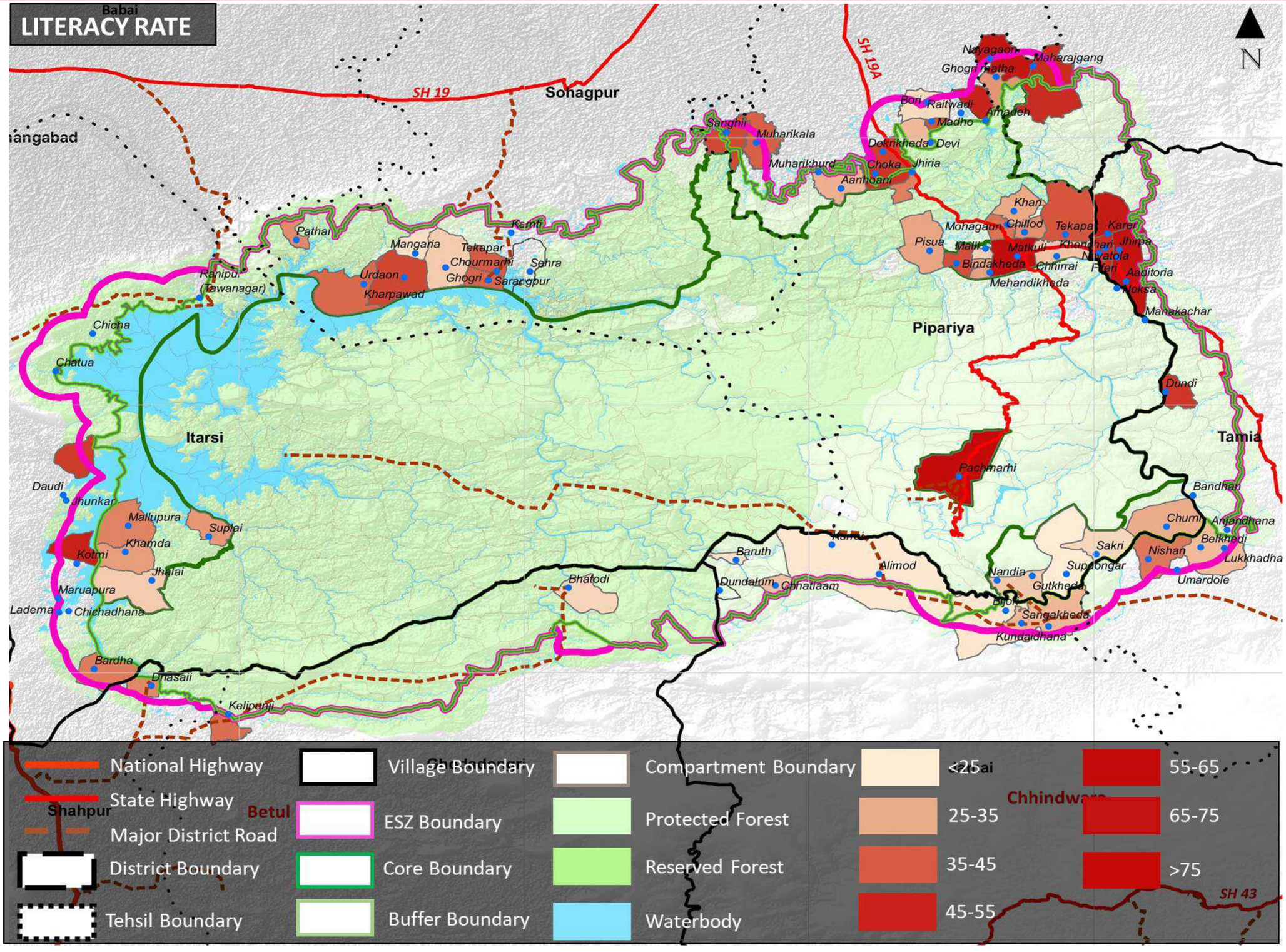


Figure 3-13 : Literacy Rate

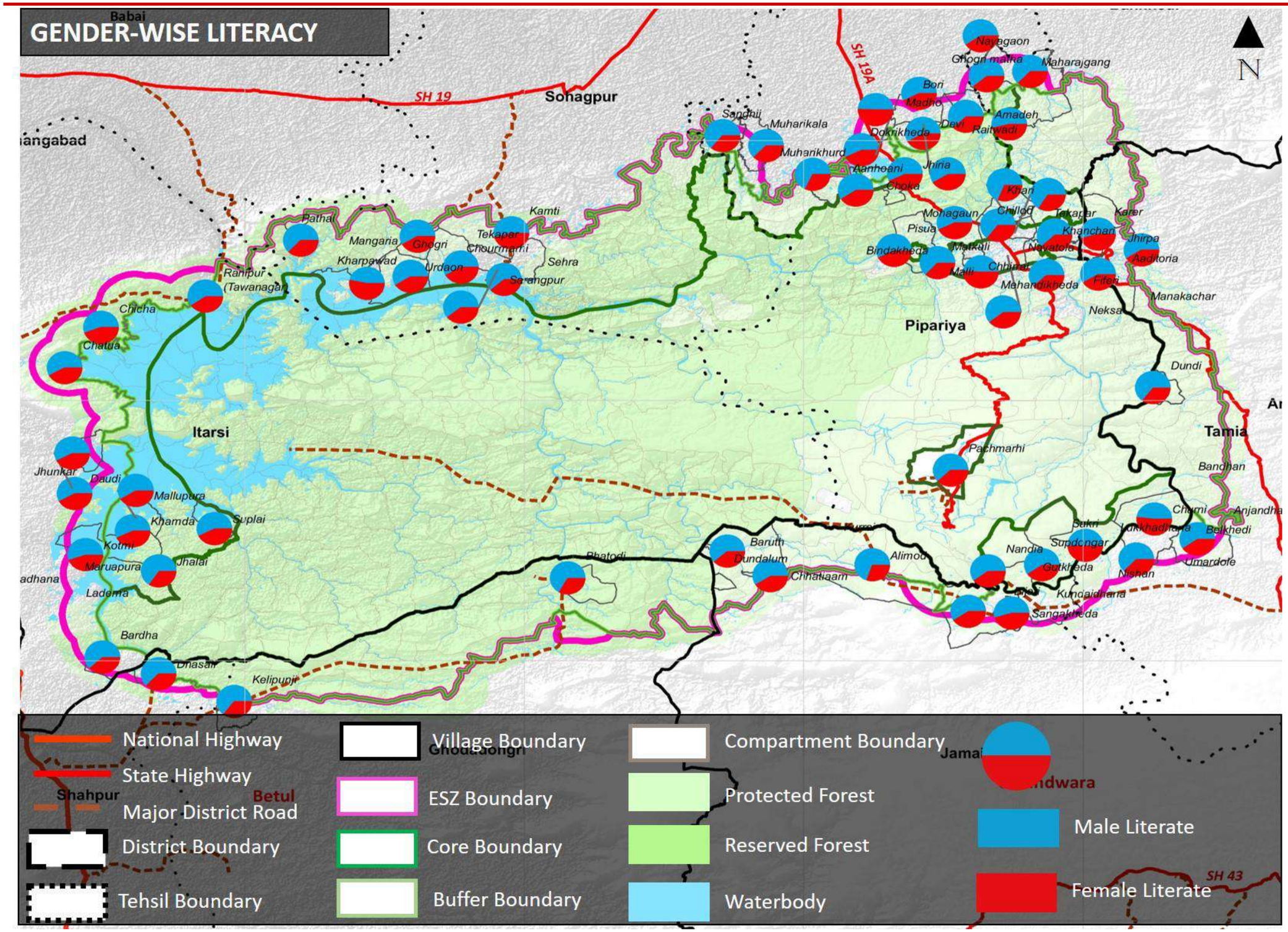


Figure 3-14 : Gender-wise Literacy

3.3 POPULATION DENSITY AND DISTRIBUTION

Population density is a measurement of the number of people in an area. It is an average number. Population density is calculated by dividing the number of people by the area. Population density is usually shown as the number of people per Hacter. Detailed calculation of population density for notified villages is briefly explained in annexure 3.1

The highest density in STR is of Pachmarhi town 12.05 per ha because of being only urban area and major tourist attraction in ESZ region. The other villages have on an average density of range 0.5 to 1.5 per ha. Apart from that, Matkuli village has population of 4.29 because of its location, development of commercial activities in surrounding areas and tourism based service industries. Population Density is in higher numbers in surrounding villages of Nayegaon village in north part of ESZ area.

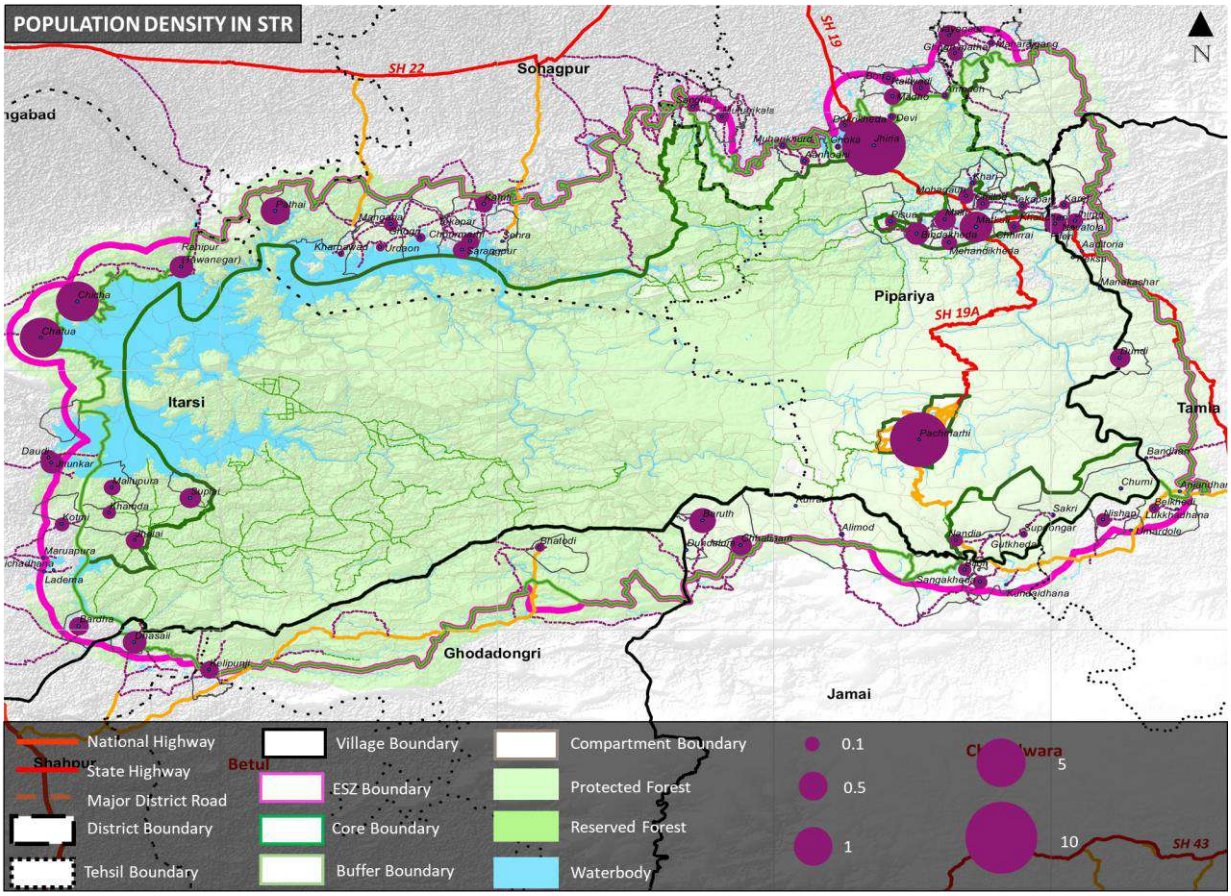


Figure 3-15 :Population Density in STR

3.4 POPULATION PROJECTIONS

Population projection has been done by taking cumulative average of four population forecasting methods i.e., Arithmetic Increase Method, Incremental Increase Method, Geometric Increase Method and Exponential Method.

Considering population of last 3 decades, i.e., Census 1991, Census 2001 and Census 2011 population projection has been done. Population projection has been done for 67 villages of ESZ, while 3 villages are relocated (Jhalai, Pathai and Dundi) and 1 village- Chichadhana is uninhabited as per Census 2011. Population projection is not done for remaining 9 villages of ESZ due to non-availability of data in Census.[1]

There are only two urban area in ESZ as per Census 2011: 1. Pachmarhi and 2. Tawanagar (Ranipur)

Table 3-3 : Population projection for villages is shown in the table below:

Population Projection for Villages of ESZ of STR						
Sr. No.	**Village**	**1991**	**2001**	**2011**	**2021**	**2031**
1	Kharpawad	NA	268	341	418	453
2	Urdon	245	344	434	566	714
3	Mangaria	242	328	399	504	617

Population Projection for Villages of ESZ of STR						
Sr. No.	**Village**	**1991**	**2001**	**2011**	**2021**	**2031**
4	Ghogri	254	337	437	569	722
5	Kamti	707	744	771	807	841
6	Sarangpur	350	415	516	635	772
7	Tekapar Chourmahri	583	692	859	1056	1282
8	Aanhoani	254	224	289	336	408
9	Dokrikheda	322	446	418	445	437
10	Jhiria	51	135	313	683	1471
11	Amadeh	69	97	139	195	263
12	Raitwadi	238	312	349	414	475
13	Bori	311	325	593	877	1268
14	Madho	132	147	134	128	116
15	Devi	116	109	137	159	191
16	Chillod	149	174	200	233	268
17	Khari	137	152	160	172	183
18	Mohagaun	170	239	282	353	428
19	Bindakheda	NA	341	445	556	704
20	Matkuli	2056	2423	2625	2943	3236
21	Mehandikheda	NA	111	198	306	470
22	Malli	105	140	188	250	324
23	Bindakheda	NA	341	445	556	619
24	Pisua	406	467	592	731	895
25	Jhirpa	849	1023	1131	1295	1453
26	Khanchari	506	591	687	806	935
27	Karer	232	303	314	353	380
28	Tekapar	488	531	630	734	856
29	Nishan	617	588	797	976	1222
30	Belkhedi	422	387	555	697	897
31	Bijori	565	1020	1275	1794	2408
32	Sangakheda	821	820	1150	1455	1860
33	Pachmarhi	12495	11370	12062	12281	12955
34	Tawanagar (Ranipur)	5248	5041	4561	4108	3595
35	Daudi	NA	589	789	1184	1578
36	Jhunkar	754	994	1276	1649	2077
37	Bardha	282	945	1191	2230	4245
38	Dhasaii	386	532	612	750	888
39	Alimod	384	474	671	900	1184
40	Anjandhana	NA	338	411	468	531
41	Baruth	314	409	545	717	921
42	Belkhedi	422	387	555	697	897
43	Bhatodi	337	367	622	893	1257
44	Chatua	214	272	358	465	590
45	Choka	98	99	115	129	148
46	Chhatiaam	433	449	400	365	315
47	Churni	134	115	218	316	457
48	Dundi	41	58	88	127	177

Population Projection for Villages of ESZ of STR						
Sr. No.	**Village**	**1991**	**2001**	**2011**	**2021**	**2031**
49	Ghogri matha	235	270	359	456	574
50	Jhalai	225	260	372	494	647
51	Kelipunji	530	697	577	540	433
52	Khamda	206	209	302	390	507
53	Maharajgang	239	355	416	528	644
54	Kotmi	501	584	454	378	248
55	Kursidhana	683	413	808	1119	1621
56	Mallupura	91	122	252	419	665
57	Muharikala	575	507	547	559	598
58	Muharikhurd	256	292	272	268	250
59	Nandia	305	346	438	538	658
60	Chicha	NA	625	884	1170	1564
61	Nayagaon	938	1220	1368	1620	1861
62	Pathai	170	198	231	271	315
63	Sanghii	299	352	452	566	701
64	Sakri	53	71	96	128	167
65	Supdonagar	399	377	521	645	815
66	Suplai	341	424	582	769	996
Grand Total		38,985	44,335	51,208	60,139	72,247

3.5 EXPANSION OF SETTLEMENT AREA

Table 3-4 : Proposed Expansion of settlement area

Sr. No.	Population of Villages	Proposed Expansion Area
1	Population less than 500	100 m buffer on existing settlement area
2	Population 500-1000	200 m buffer on existing settlement area
3	Population more than 1000	300 m buffer on existing settlement area

List of villages with their expansion area is given in annexure 3.2.

3.6 SOCIO-ECONOMIC STATUS OF LOCAL PEOPLE

3.6.1 Cultural Profile

Culture resembles the way of life lived by a group of people. The diversified art & cultural forms generated by the tribal and rural people has continued to evince their creative magnificence. Apart from their outstanding brilliance from the perspective of aesthetics, the tribal/folk art and culture forms have played an instrumental role in reinforcing national integrity, crystallizing social solidarity, fortifying communal harmony, intensifying value-system and promoting the elements of humanism among the people of the country.

Satpura tiger reserve also has some of the tribes that are culturally vibrant. These tribes are Gond, Korku and Baiga Tribe.

The Gond Tribe

The Gonds are the tribal community mostly found in the Gond forests of the central India.The name by which the Gonds call themselves is Koi or Koitur which means unclear. Gonds are one of the largest tribal group in the world[3].

Gonds settled in the Gondawa in the ninth and thirteenth century AD. In the fourteen century they ruled several parts of the central India. They built number of forts, palaces, temples, tanks and lakes during the rule of the Gonds dynasty. The Gondwana kingdom survived till late 16th century. Gond dynasties ruled in four kingdoms - Garha-Mandla, Deogarh, Chanda, and Kherla in the central India.

[3] Forest Report

Gonds are mainly divided into four tribes namely - Raj Gonds, Madia Gonds, Dhurve Gonds, Khatulwar Gonds. Gonds men wear Dhoti, which is the lonf piece of cotton cloth wrapped around the waist passing through the legs. Women wear soft cotton saris along with the Choli or blouse. The staple food of Gonds are the two millets known as Kodo or Kutki. Rice is the ceremonial feast of the Gonds, which they prefer eating during the time of festivals. Most of the Gonds are the meat consumers

Gonds fair and festivals are influenced from the Hindu traditions. Keslapur Jathra is the important festival of the Gonds. In this festival they worship the snake deity called Nagoba, whose temple is found in the Keslapur village of Indervelly mandal of Adilabad district.

Figure 3-16 : Gonds fair and Festivals

Gusadi dance is the most famous dance performed by the Gonds. It is performed by wearing head gears decorated with the peacock feathers. They wear cotton cloth around their waist. They smear ash all over their body and beards made of animal hair is also important part of the dance costumes. Madai is the major festival celebrated among the Gonds. It is the festival when Gonds meet their relatives settled in various parts of the country. During this festival they also sacrifice goat beeath the sacred village tree to appease the tribal Goddess. In the night they enjoy liquor and dance along with the tribal music. Apart from this they also celebrate Hindu festival called Dusshera.

Figure 3-17 : The Tribal dance

Gonds have been largely influenced by the Hindus and for the long time have been practicing the Hindus culture and traditions. Gonds are the worshipers of Janani or the mother of creator. They use the title Thakur. Gonds mainly worship Pharsa Pen, who is worshiped under the form of the nail and sometimes a piece of iron chain. Besides Pharsa Pen, they also believe in several other Gods namely Mariai – the Goddess of plague and other diseases, and Bhimsen – the Hindu God.

Figure 3-18 : Ancient God of Gond Tribe

According to Gonds every hill, river, lake, tree is also inhabited by a spirit. They say that the earth, water and air are ruled by the great number of deities which must be appeased by sacrifices. They have priests (devari) who perform all the religious formalities on all the occasions. Gonds also pay homage to the Gods of household, Gods of Cattle, Gods of fields. Animal sacrifice on the religious occasions is the common practice among the Gonds.[4]

The Korku Tribe

The Korku are an ancient tribe of India believed to be of Austro-Asian origin. They trace their origin to the eastern Indian region of Chota Nagpur but large numbers of these people are settled in the forest reserves of central India

Korku tribe follows the culture of male domination i.e. Man is the head of the family as well as of the society. The highly respected male of the society is called to be “Padiar & Bhumka (Purohit)”.

Traditional Outfits: The male of this tribe use to wear dhoti, bandi, towel or Angocha on head whereas the ladies use to wear lugdua and choli. The ladies of this tribe are very much fond of ornaments.

Food: Korku tribe use to live in hilly region therefore they use to eat Bajra, Kutki, Makka and Jwar. They also eat “Lachka” just to fill their belley, it is a semisolid food.

The people of this tribe use to build their houses in front of each other and straight in a line. They use to prepare their houses from Bamboo, wood, mud and grass.

Fairs and Festivals: Korku tribe is highly influenced by the Hindu religion that’s why they use to celebrate similar type of **festivals** and they are:

[4] Tribal Museum of Bhopal

- Jiroti
- Pola
- Dev Dussehra
- Diwali
- Madhya Dussehra
- Holi etc

Figure 3-19 : Handmade products by tribes

Korku tribe mainly use to worship gods such as Moon, Mahadev, Dogand Devta, Murda dev, Meghnad. The people of this tribe use to believe in black magic and call it as "Tona Totka".

The korku tribe use to live in hilly areas therefore they depend more on agriculture. They used to do the "Jhum Cultivation" also known as shifting Cultivation. They used to do the following jobs also:

- Collect forest products
- Hunt animals
- Fisheries
- Animal Husbandry

Korku tribe is extremely weak in its economical section that's why it's among the most backward and poor tribes of India[5].

5 ARTICLE: THE KORKU TRIBE OF MADHYA PRADESH BY SAISHTA PARVEEN

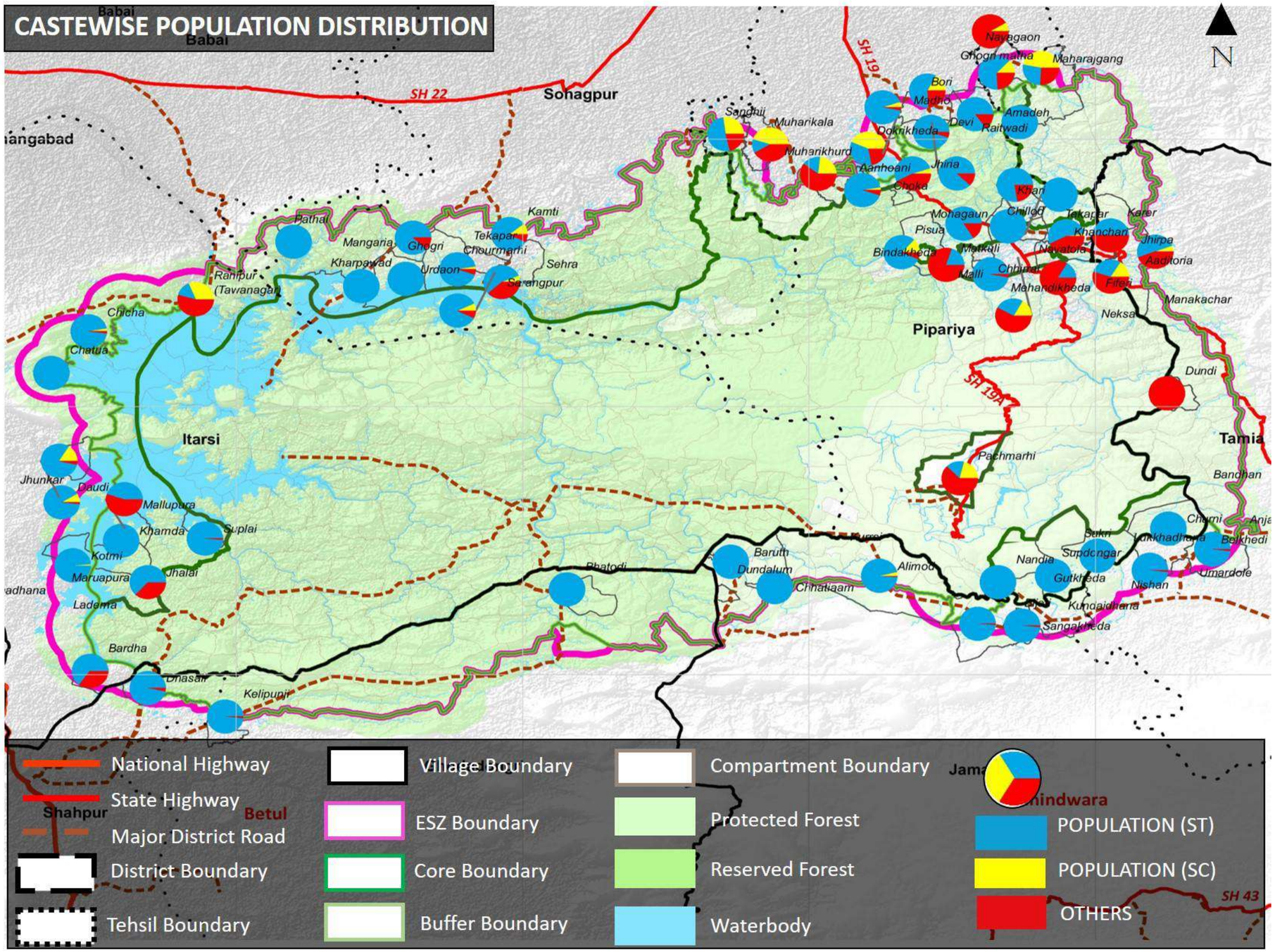


Figure 3-20 : Cast wise Population Distribution

CASWISE POPULATION DITRIBUTION

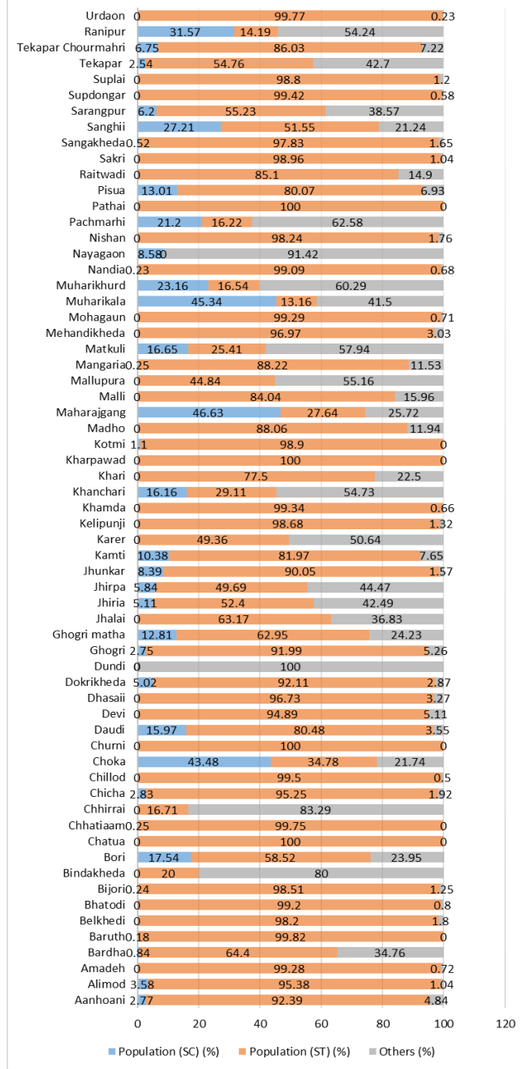


Figure 3-21 : Cast wise Population Distribution

All the notified villages under ESZ are having maximum ST population except Nayagaon and Dundi. There are 40 villages having more than 70% ST population. Pachmarhi and Ranipur (Tawanagar) being an urban area having less ST population.

The economic profile of villages is very simple, mostly they are associated with agricultural activities. In most of the villages crops like Dhan, makka or maize, Wheat, soyabean, Kuttki (Rice), Jawar and chana etc. are cultivated. Apart from crop cultivation village people also make some of the products out these crops such as flour, Dalia etc. which are healthy to eat. Along with agriculture, poultry farming is also observed in some of the villages. Around 25 families of Daudi village is depended on poultry framing for their livelihood. In some villages chironji (Raw product to make pickle) is collected from the trees and sold by the villagers

3.6.2 Worker Profile

The working population and work participation rate highlight the occupational distribution of a region. The work force distribution also presents data regarding number of main and marginal workers.

- Main workers are those who had worked for the major part of the year preceding the date of enumeration i.e., those who were engaged in any economically productive activity for 183 days (or six months) or more during the year.
- Marginal workers are those who worked any time at all in the year preceding the enumeration but did not work for a major part of the year, i.e., those who worked for less than 183 days (or six months) and also migrate to other place for work.
- Non-workers are those who had not worked any time at all in the year preceding the date of enumeration.
- The time series data on work force distribution by category of workers like cultivators, agricultural labourers, workers in rural Household industries, etc. also presents a picture of structural change occurring in the economy.
- Cultivators are classified as the person engaged in cultivation of land owned or held from Government or held from private persons or institutions for payment in money, kind or share. Cultivation includes effective supervision or direction in cultivation. A person who has given out her/his land to another person or persons or institution(s) for cultivation for money, kind or share of crop and who does not even supervise or direct cultivate on land, is not treated as cultivator.
- Agricultural Labourers: A person who works on another person's land for wages in money or kind or share is regarded as an agricultural labourer. She or he has no risk in the cultivation, but merely works on another person's land for wages. An agricultural labourer has no right of lease or contract on land on which she/he works.
- Household Industry is defined as an industry conducted by one or more members of the household at home or within the village in rural areas and only within the precincts of the house where the household lives in urban areas. The larger proportion of workers in the household industry consists of members of the household.
- Workers other than cultivators, agricultural labourers or workers in Household Industry, as defined above are termed as 'Other Workers' (OW). Examples of such type of workers are government servants, municipal employees, teachers, factory workers, plantation workers, those engaged in trade, commerce, business, transport, banking, mining, construction, political or social work, priests, entertainment artists, etc.

To understand the workforce participation rate and the structural occupation of the villages within ESZ, analysis was done with help of Census 2011 & 2001 data and primary data. The data is shown in the form of graphs and maps.

Total Workforce participation rate

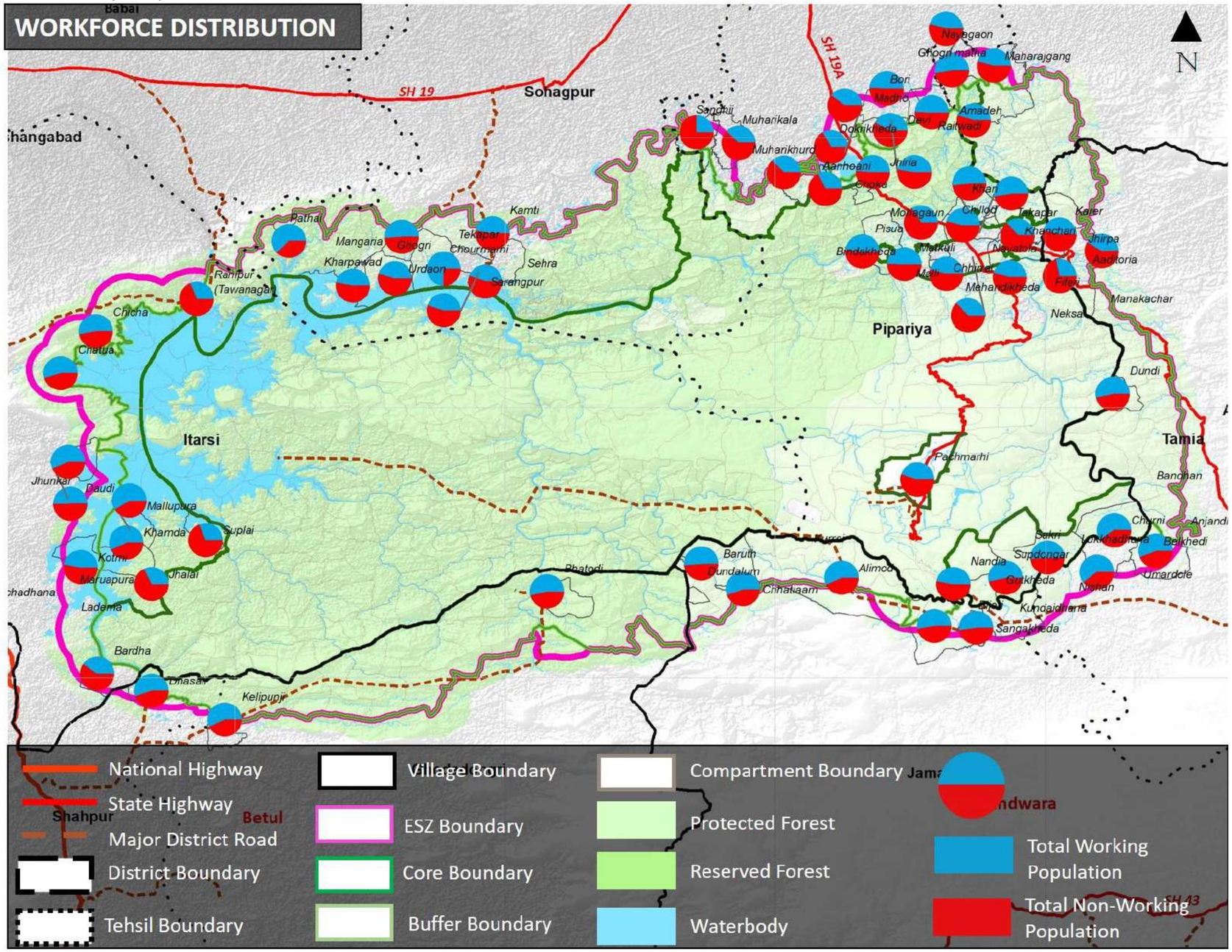


Figure 3-22 :Workforce Distribution

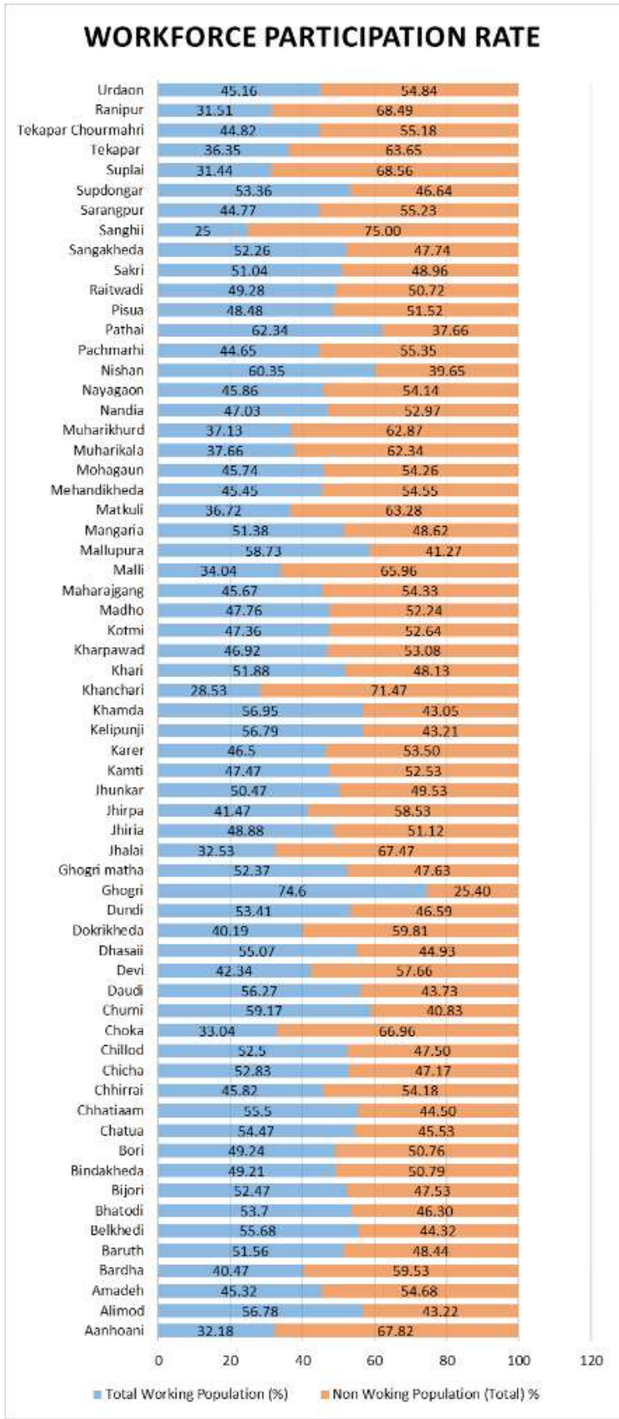


Figure 3-23 : Workforce Participation Rate

From the graph of total workforce participation, it can be observed that the average total workforce participation of all the villages is 47.3% which is similar to the 47% State rural average workforce participation. Workforce participation is percentage of total working population to the total population of the area. Here, it can be seen that 12 villages are having worker participation less than 40% (Aanhoni, Choka, Jhalai, Khanchari, Malli, Matkuli, Muharikala, Muharikhurd, Sanghii, Suplai, Tekapar and Ranipur). While, Pathai, Nishan and Ghoghri villages are having worker participation rate more than 60%.

Workforce Distribution

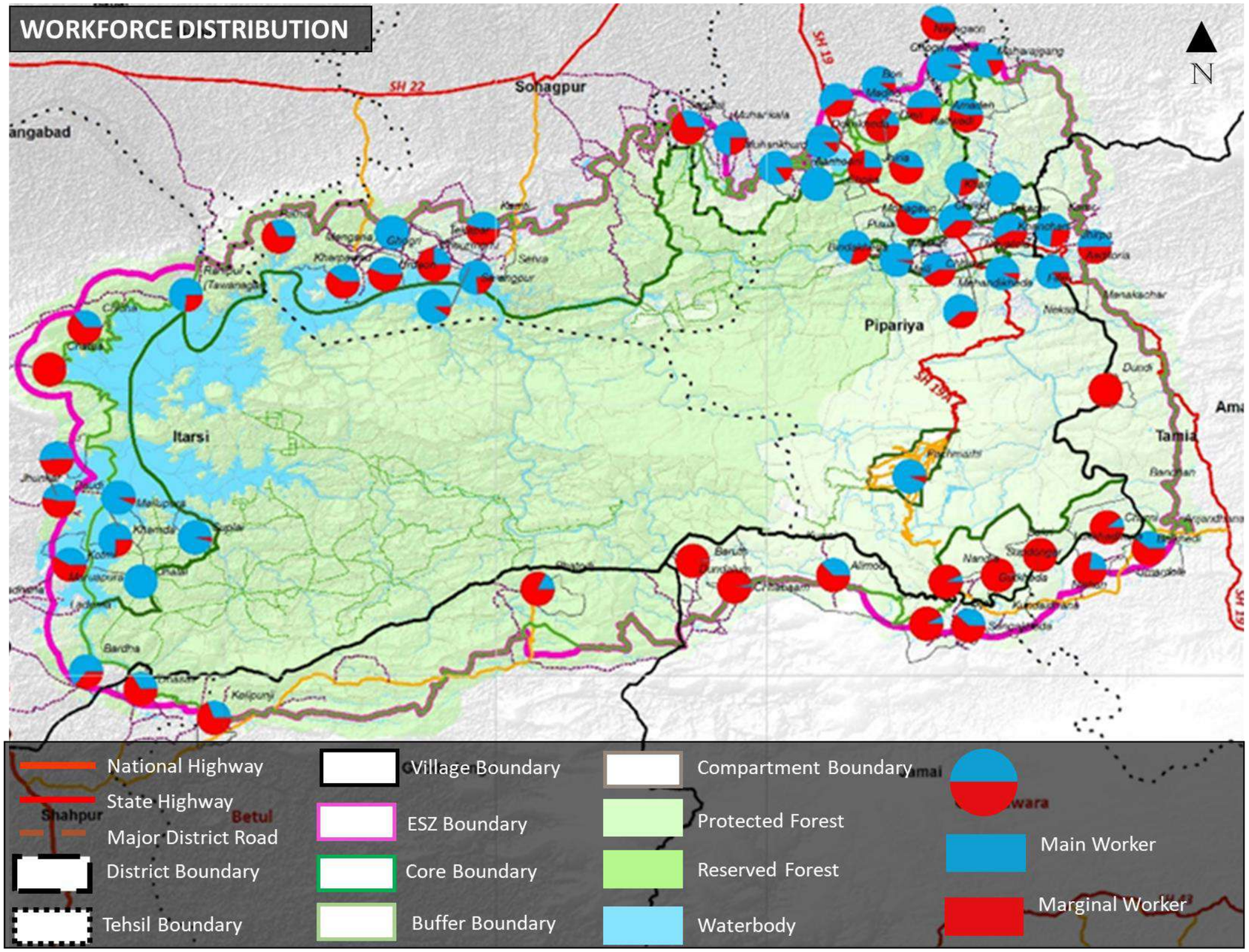


Figure 3-24 : Workforce Distribution

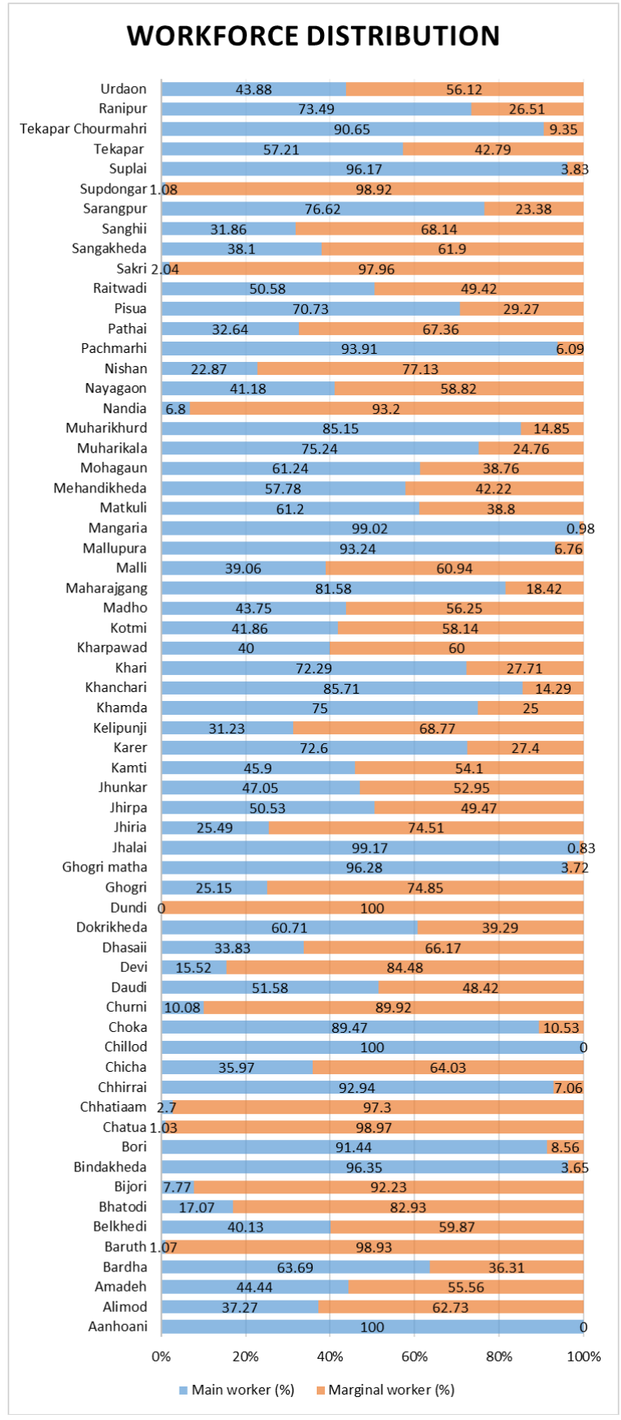


Figure 3-25 : Workforce Distribution

Workforce distribution is distribution of main and marginal worker to the total working population. From the map and chart, it can be seen that in the southern side of the region, there are more marginal workers than main workers. While, villages of Piparia tehsil is having main workers more than marginal workers except Jhiria, Malli & Sanghii villages. From the graph of Main and marginal workforce it can be observed that the average Main workforce participation in all the village is 52.8% which is less than 67.7% state rural average Main workforce participation and average marginal workforce participation is 47.16% which is higher than 32.3% state rural average marginal participation. Therefore, as compared to state rural average the villages have higher marginal workforce, which indicates lack of sustainable source of income throughout the year.

Main vs Marginal Worker (Female)

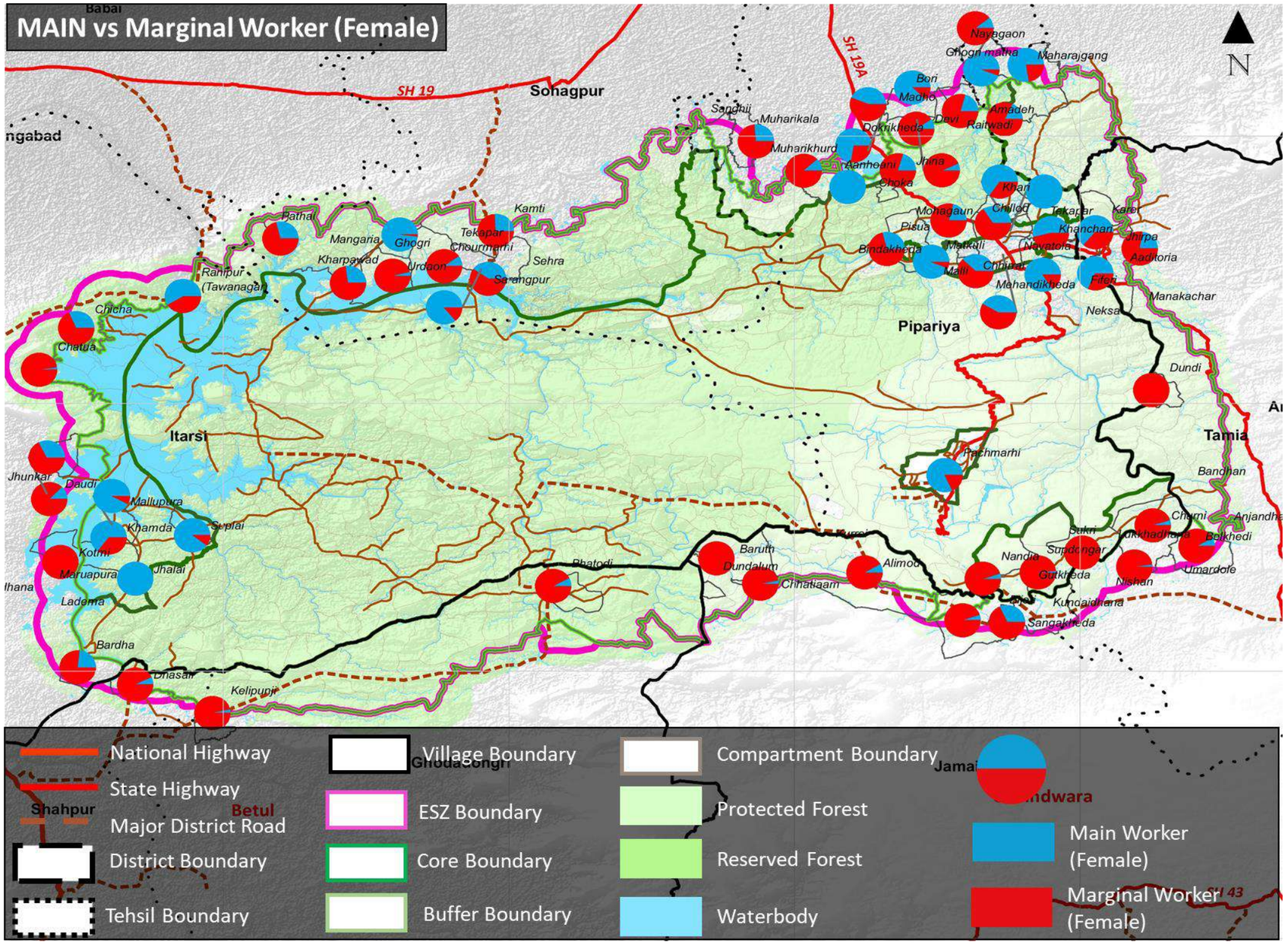


Figure 3-26 : Main vs Marginal Worker (Female)

Female workforce distribution is distribution of female workers in main and marginal female to the total female workers. From the above map, it can be seen that villages in pipariya tehsil having more main female workers. From the above maps it can be observe that the average female workforce participation of all the villages within ESZ is 40% which higher than the 39.3% state average female workforce participation. From the graph above it can be seen that in most of the villages such as Malli, Sarangpur,Nishan, Nandia, Kharpawad, Kelipunji, Dundi, Amadeh, Chhatiaam, Chhatua, Alimod are the villages with more number of marginal female workers as compare to main female workforce.

But in Sanghii village none of the females are engaged in any kind of economic activities. Therefore, encouraging women to work for their own independence and providing women empowerment in this village by understanding the cultural aspects would be beneficial for sustainable development of the village.

Main Workers (Male vs Female)

WORKFORCE PARTICIPATION RATE

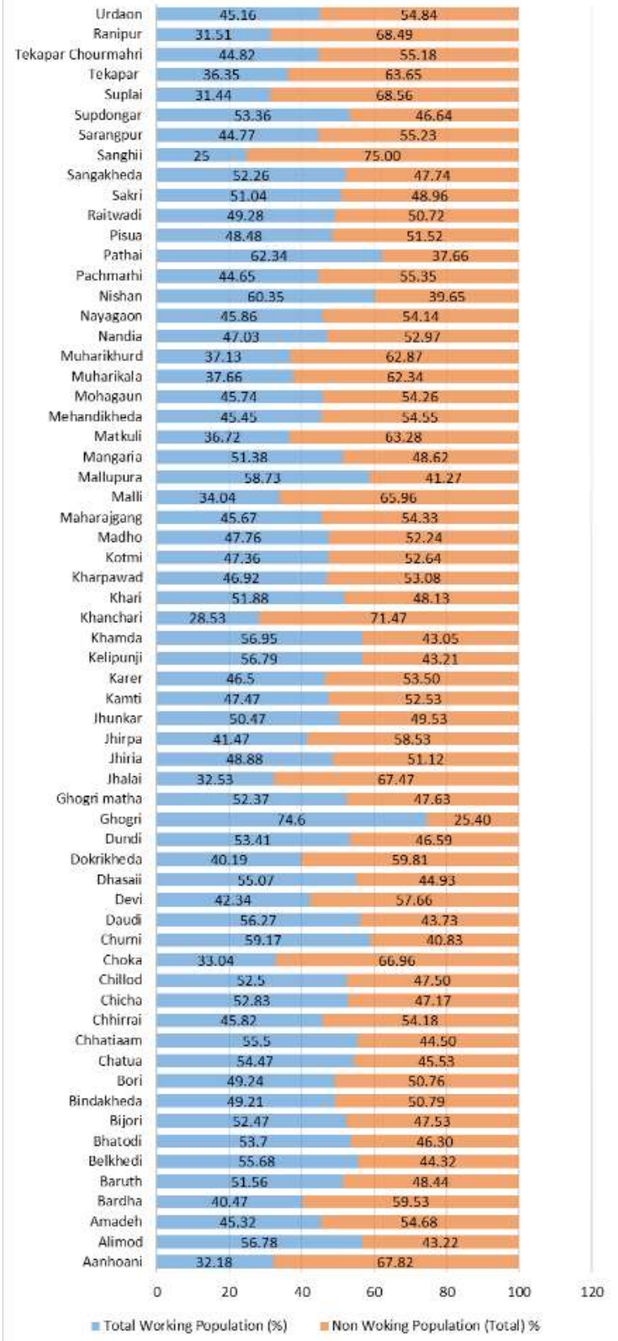


Figure 3-27 : Main vs Marginal Worker (Female)

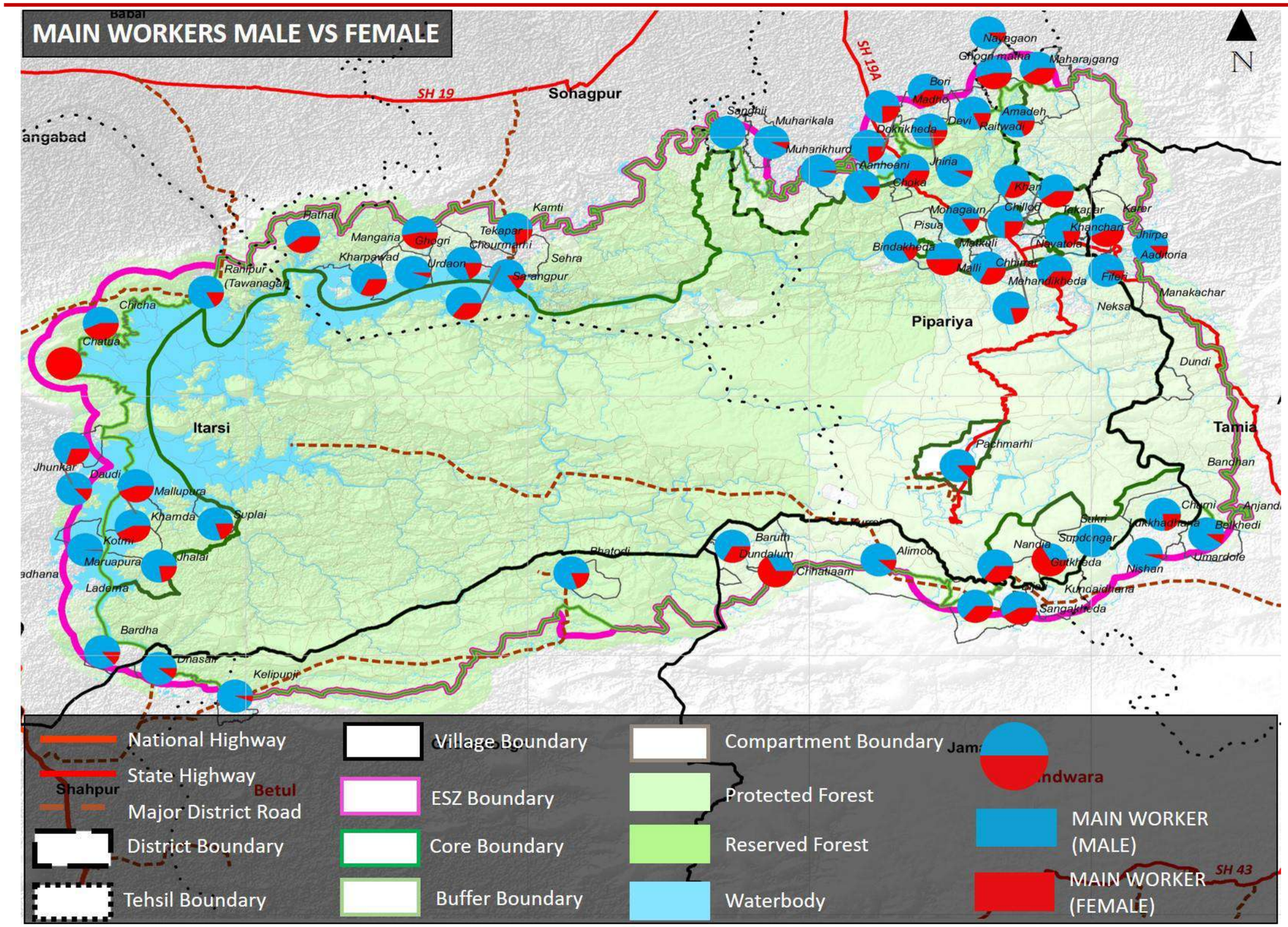


Figure 3-28 : in Workers Male vs Female

From the map and graph, it can be seen that there are more male main workers than female main workers in most of the villages of ESZ. Chatua, chhatiaam and Supdongar villages have more than 60% female main workers. While, Belkhedi, Kelipunji, Kotmi, Madho, Muharikala, Nishan and Urdaon villages have less than 10% female main workers. In Sangii and Sakri villages, there are no female workforce participation in main workers.

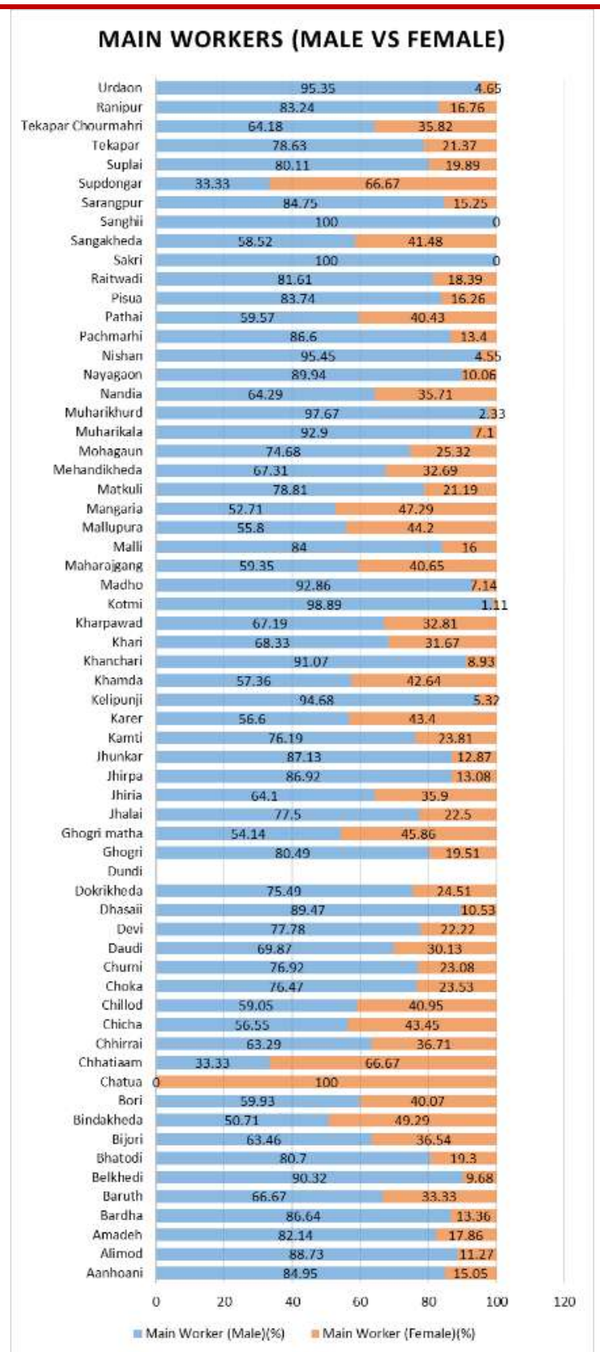


Figure 3-29 : Main Workers Male vs Female

Non Workers (Male vs Female)

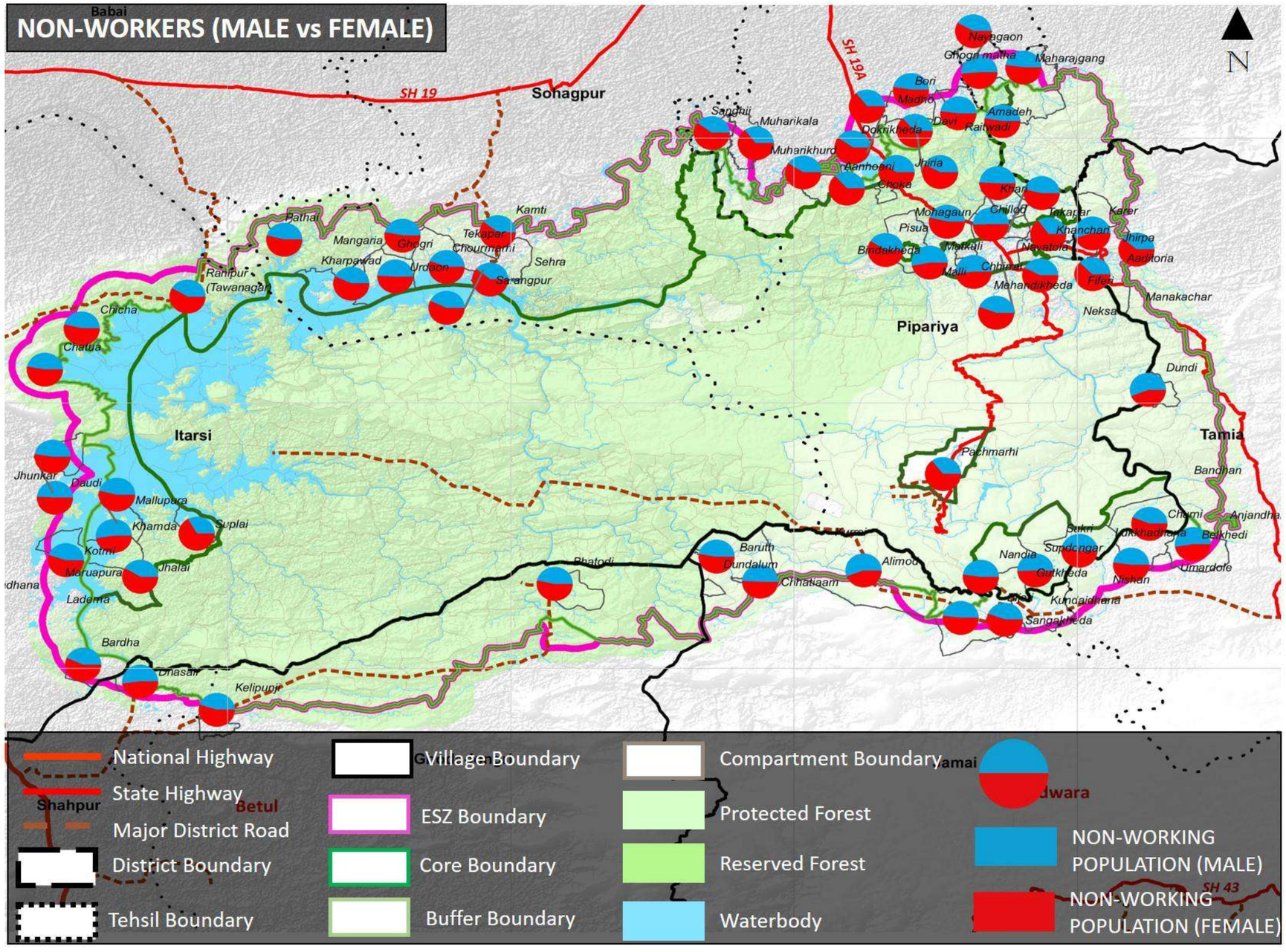


Figure 3-30 : Non-Workers (Male vs Female)

From the above graph and map, it can be seen that most of the villages have almost similar proportion of male and female non-working population. Some of the villages have more female non workers than male non workers. i.e., Aanhoni, Devi, Dokrikheda, Jhirpa, Kamti, Khanchari, Muharikala, Pachmarhi, Sarangpur, Suplai and Tekapar villages have more than 60% female non workers of total non-working population.

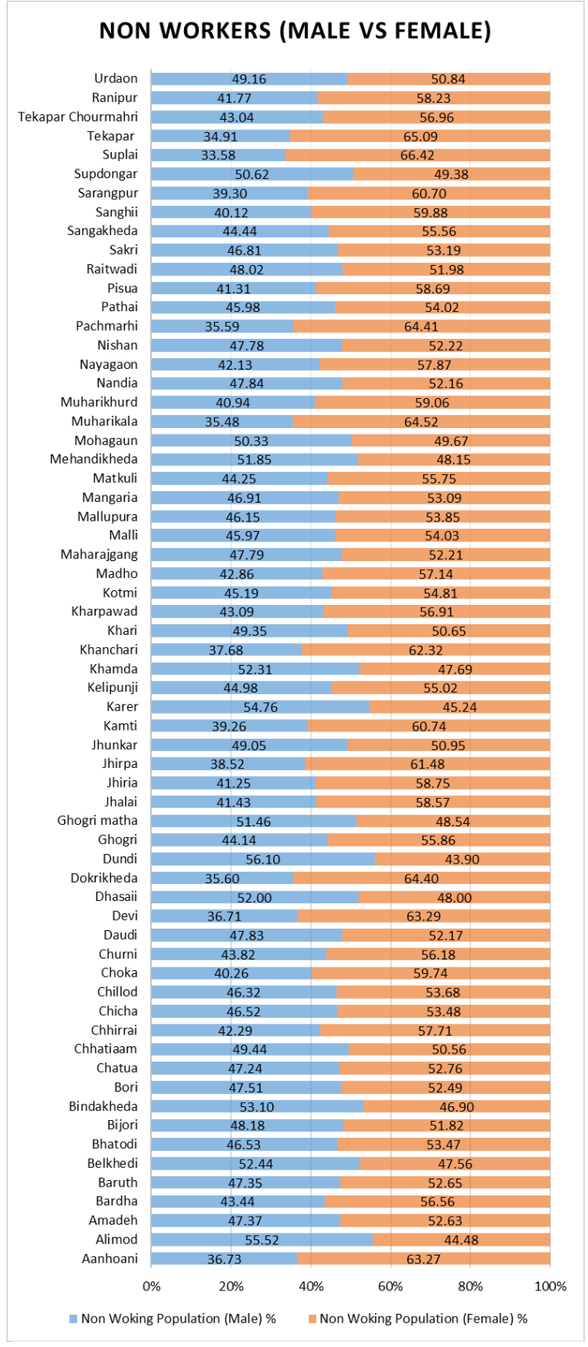


Figure 3-31 : Non Workers (Male vs Female)

Marginal Workers (Male vs Female)

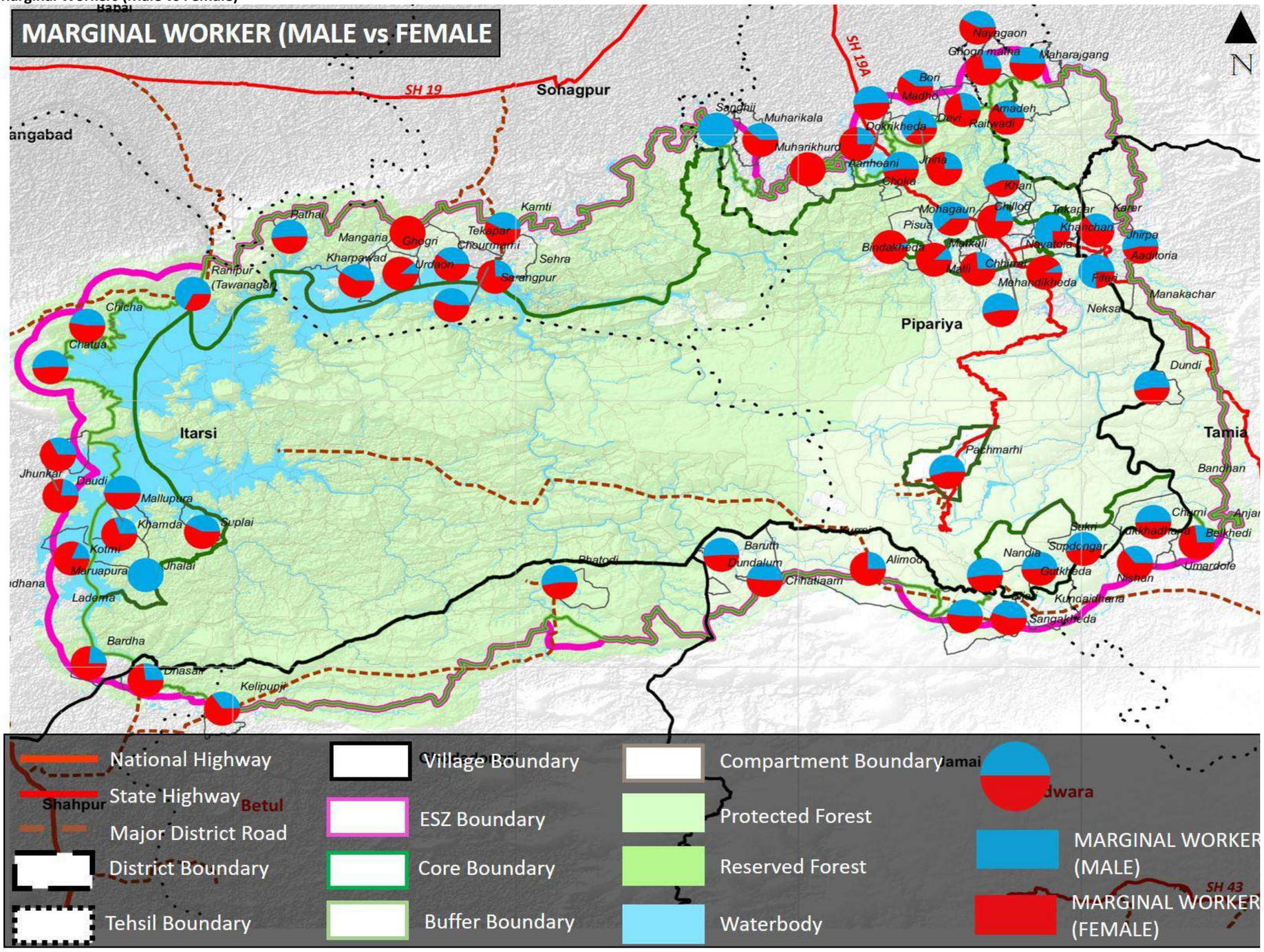


Figure 3-32 : Marginal Worker (Male vs Female)

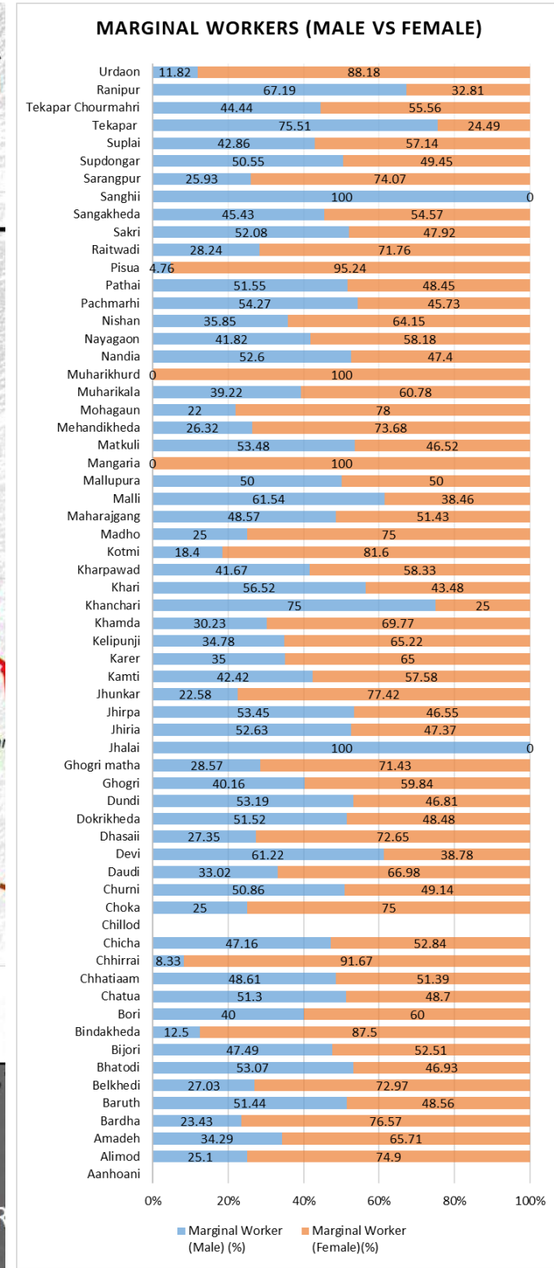


Figure 3-33 : Marginal Worker (Male vs Female)

From the graph and map above, it can be seen that there is more female workforce participation than male in marginal workers. 7 villages have more than 80% female marginal workers i.e. Bindakheda, Chhirai, Kotmi, Mangariya, Muharikhurd, Pathai and Urdaon have more than 80% female marginal workers.

Marginal Workers Classification

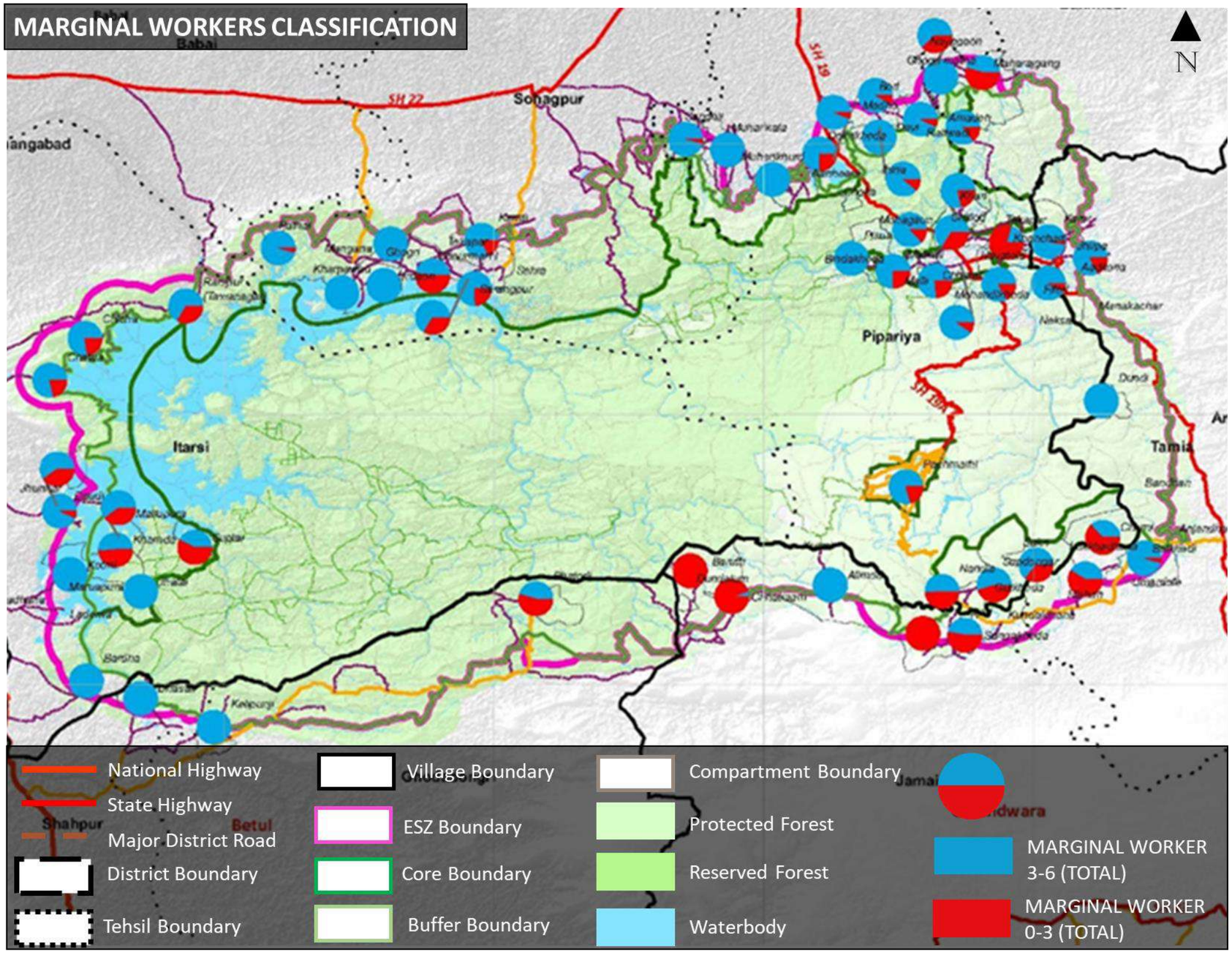


Figure 3-34 : Marginal Workers Classification

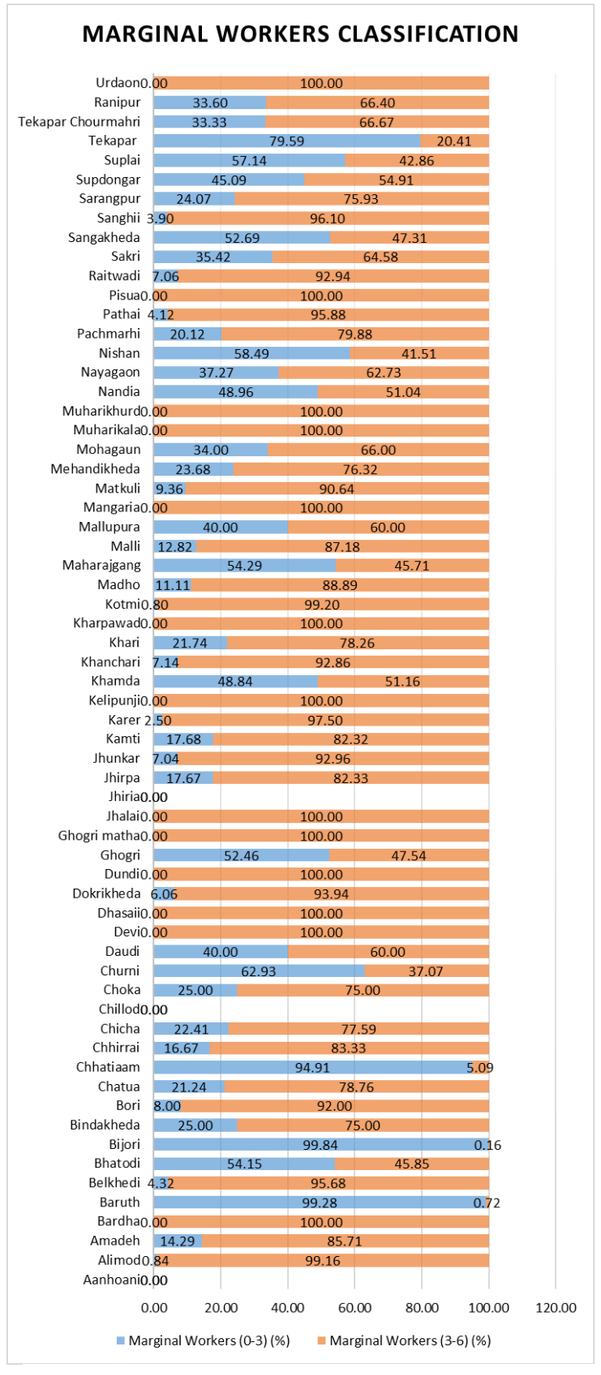


Figure 3-35 : Marginal Workers Classification

From the graph and map above, it can be seen that most of the villages have marginal workers working for 3 to 6 months except villages Baruth, Bijori, Chhatiaam and Jhiria (having less than 10% marginal workers working from 3 to 6 months).

DIFFERENT CATEGORY OF WORKERS

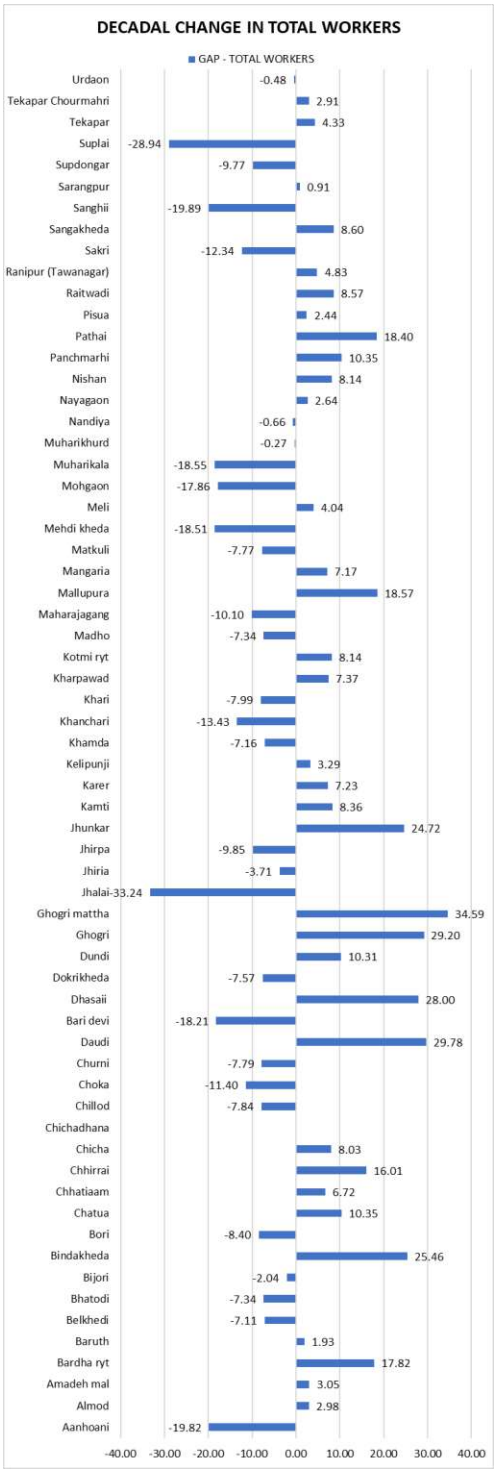


Figure 3-36 : Decadal Change in Total Workers

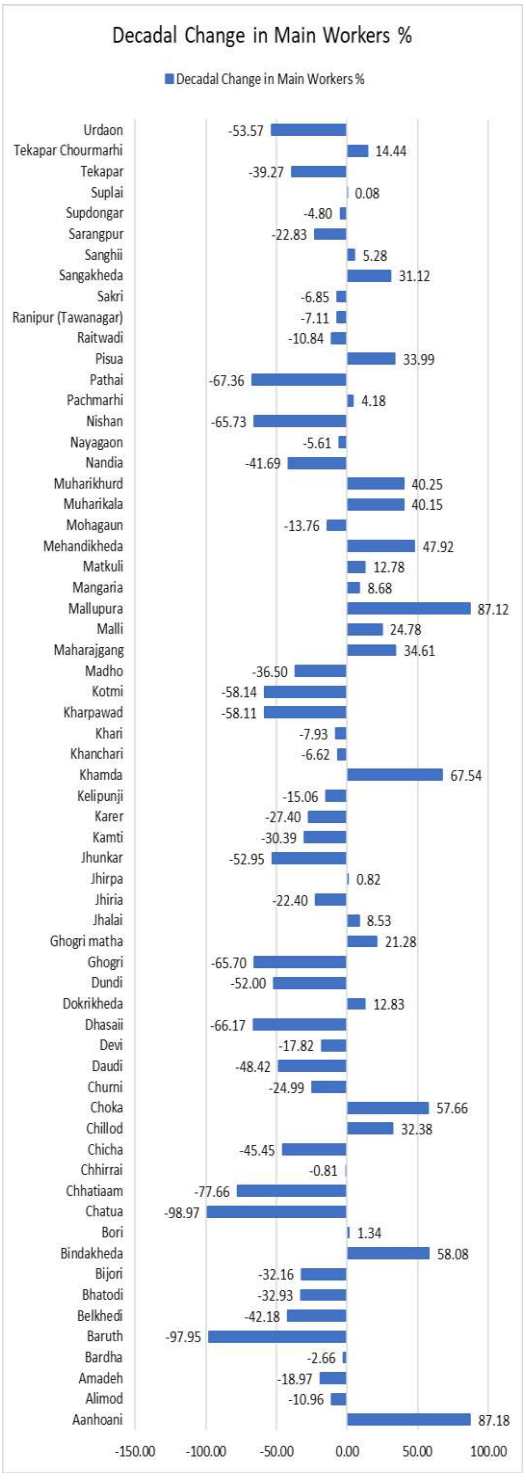


Figure 3-37 : Decadal Change in Main Workers %

From the chart above it can be seen that some of the villages have negative growth in total workers participation. 2 villages Suplai and Jhalai have huge decrease in total worker participation rate. As per Census 2011 and 2001. Comparing Census 2011 with 2001, it is seen that Daudi, Dhasaii, Ghogri, Ghogri matha and Jhunkar villages have shown positive total worker growth rate which is above 20%.

The average decadal change in main workers of ESZ villages is observed to be declined by 10.44%. Declining growth rate of main workers in ESZ villages indicates shifting of villagers to marginal economic activities.

OCCUPATIONAL STRUCTURE

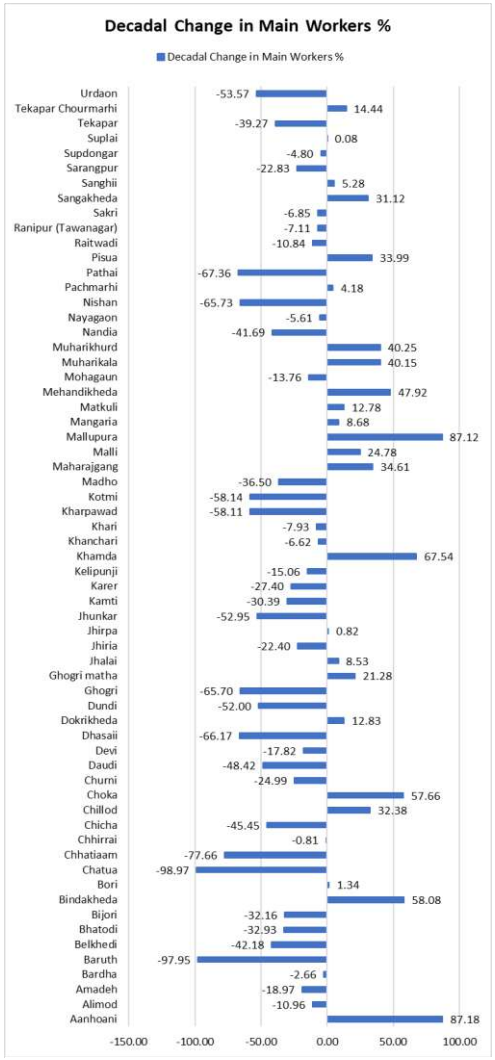


Figure 3-38 : Decadal Change Main Workers (%)

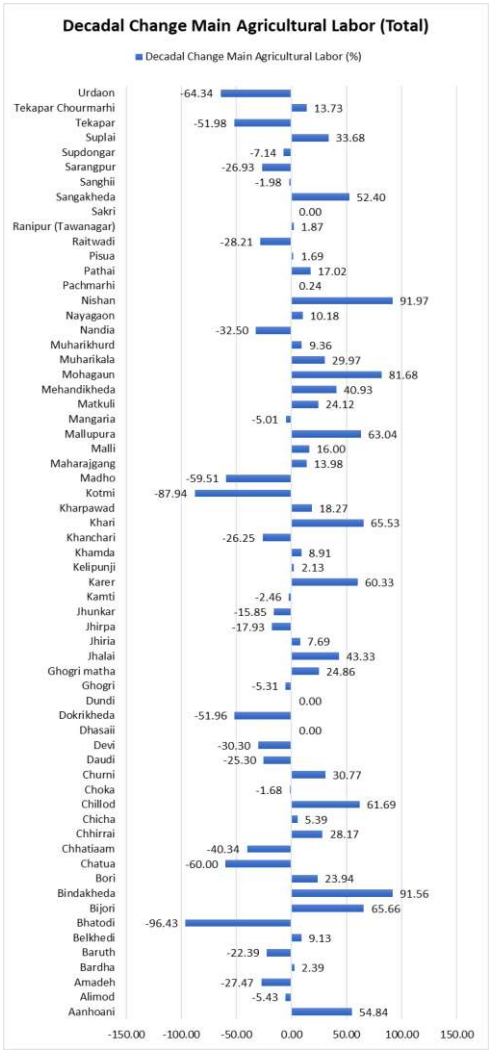


Figure 3-39 : Decadal Change Main Agricultural Labour (%)

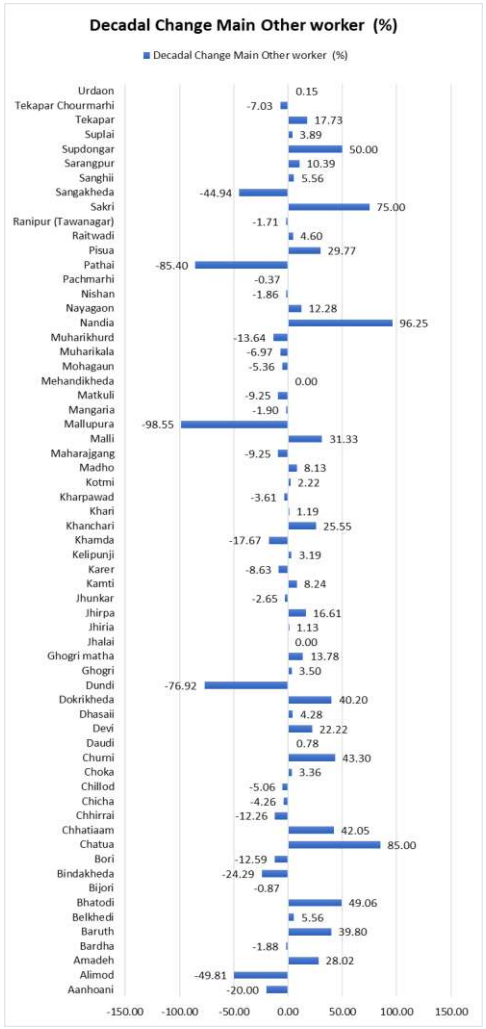


Figure 3-40 : Decadal Change Main Other Worker (%)

From the charts. it can be seen that growth of main cultivators has been decreased in last decade. In all the notified villages in ESZ, cultivators has been converted in to agriculture labours and other workers.

Average declination in main cultivators is 10.62% in 2011. And average growth in main agriculture laboures and other workers is 4.95% and 4.05% respectively.

For declining growth rate of main cultivators, one of the reason is decrease in individual land holding, lack of irrigaton facility or low ground water table.

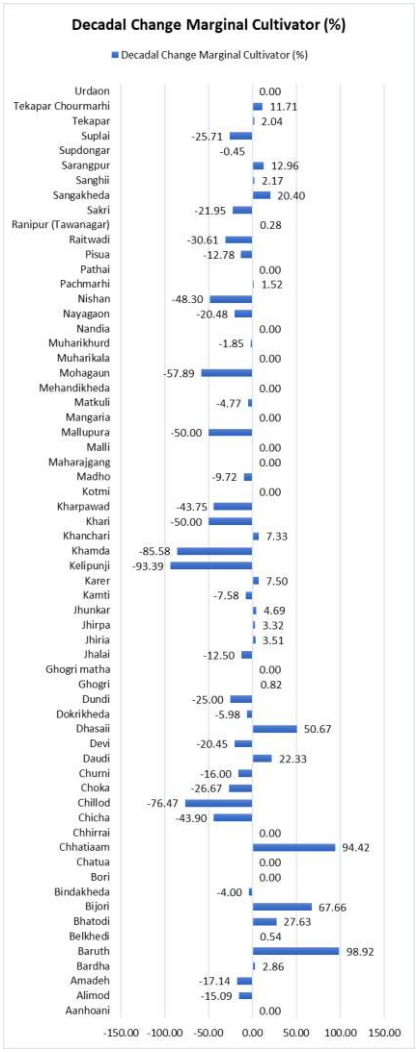


Figure 3-41 : Decadal Change Marginal Cultivator (%)

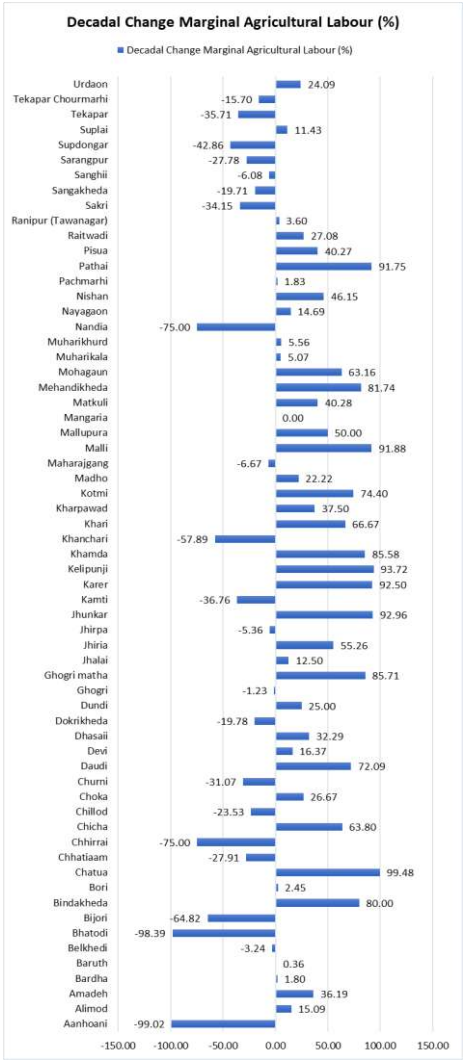


Figure 3-42 : Decadal Change Marginal Agricultural Labour (%)

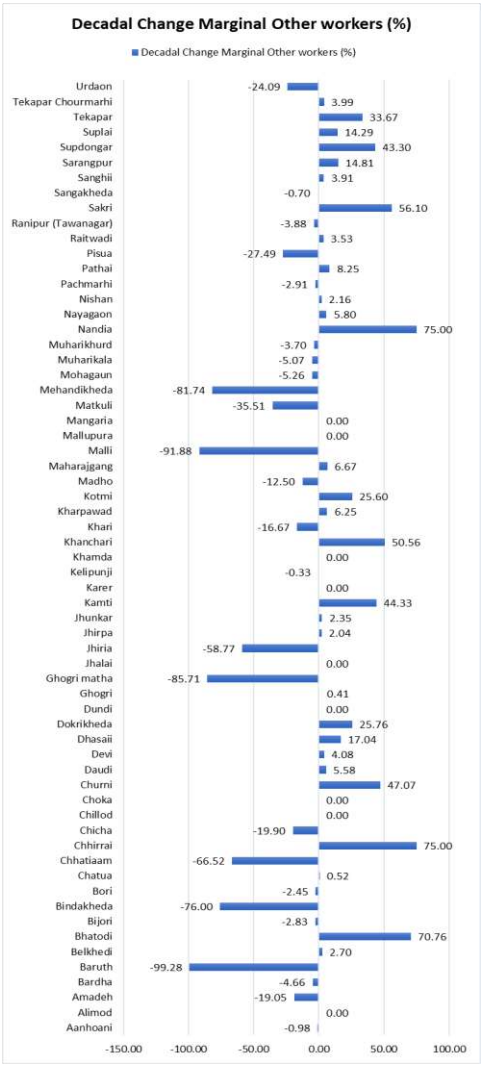


Figure 3-43 : Decadal Change Marginal Other Workers (%)

While comparing decade 2001-2011, it is observed that average growth rate of marginal workers has been increased by 10.44% in ESZ villages. Also, from the charts it can be seen that marginal cultivators has been decreased to 6.11% in 2011 while marginal agricultural labours have been increased to 15.58% in 2011. Also, in 14 villages marginal cultivator has been decreased by 20% in 2011 & in 7 villages it has been increased by 20%.

One of the major issues in the area is unemployment or partial employment. From the primary survey it has come to know that due to lack of irrigation facilities, farmers are not able to carry out agricultural activities for entire year. Also, decrease in individual and holding is one of the major factor affecting agricultural activities. These results in seasonal migration of villagers to nearby town and cities for daily wages or agriculture labours. The agriculture profile is briefly discussed in section 4.2.

3.7 LIVELIHOOD AND DEPENDENCE ON FOREST AND NATURAL RESOURCES

Majority of local community is dependent on agriculture for livelihood activities. Apart from agriculture tourism, tasar farming and Minor Forest Produces. Scenario for agriculture is discussed in section 4.2 and other livelihood and dependency are briefly discussed below.

3.7.1 Tasar Farming

Tasar silkworm rearing has been traditionally practiced by the tribal of Madhya Pradesh in the districts of Hoshangabad, Narsinghpur, Shahdol, Jhabua, Mandla and Balaghat. Tasar development in the STR area is developed because of suitability of temperature and humidity. This factors play very important role to rear the silkworms. The production of silk is majorly done by using Tasar silkworms. These silkworms are fed on primarily on leaves of Saja (*Terminalia tomentosa*) Arjun (*Terminalia arjuna*) and other secondary food plants of Lendia, Dhara and Zizyphus.

With a purpose to provide the opportunity for self-employment through sericulture, the State Government in 1996 introduced a scheme named 'Mulberry Swablamban Yojna'. Yarn bank is located in Matkuli with linkage to districts of Hoshangabad, Betul, Harda and Chhindwara. Madhya Pradesh Silk federation is running eight reeling units through the Self-Help Group of beneficiaries in which 2 of them are located in Malakhedi and Matkuli. The yearly capacity and number of machinery is discussed in below table.

Table 3-5 : Tasar Development Center

Village Name	Number of Reeling machines				Approx. Production Capacity per Year (Kg)
	Multi-end reeling	Twisting Machine	Motorised Charkha	Spinning wheel	
Malakhedi	1	4	5	65	9000
Matkuli	1	0	44	54	6000

Source:Data is as per Madhya Pradesh Silk Federation, 2016.



Tasar Silk worm | Male Tasar silk worm | Mating of Silkworms


Eggs lay on the Arjuna trees for growth of silk worms | Raw Resham to send of reeling

Figure 3-44 : Tussar Production

3.7.2 Non-Timber Forest Produces

In protected areas, collection of non-timber forest produce is prohibited for commercial use. In past collection of Tendu patta in buffer areas of STR only. The collection of NTFP for bonafied use continued. The Non timber forest products can be classified in 2 segments of Nationalized and Non-Nationalized minor forest produces. The Nationalized forest produces are Mahua and kallugham. Other all are in Non-nationalized minor forest produces. Major NTFP collected in the area are Mahua flowers and fruits, Gum, Ber, Amla, Baheda, Harra, Achar, Jamun, Mango, Rohini bark, Honey, Mahul patta, Chhind, Baber grass, Safed Musli etc. The livelihoods of the communities still living inside the tiger reserve is dependent on the selling of NTFP products. Therefore, it is very difficult to regulate this activity. Many wild tubers and ferns are important from medicinal point of view and collected by locals.




Mahua Flower | Tendu Patta | Safed Musli | Honey

Figure 3-45 : Minor forest Produce of STR

3.8 AMENITIES

Amenities can be further classified as physical infrastructure and social infrastructure. Social infrastructure includes basic need of communities like education, health and other facilities, while physical infrastructure includes water supply, draining , roads and other amenities. Each amenities are analysed with census 2011 as well as physical survey and discussed briefly in below sections.

3.8.1 Schools

The role of primary education extremely significant and crucial. Education works as a lever in raising financial and social status of the individuals. Economic condition of a country depends largely on the

educational standards of its people since education up to 8th standard is the right of individual is the foundation and should be the maximum or basic acquisition for the majority.

As per Census 2011 and primary survey, Alimod, Raitwadi, Bhatodi, Bardha, Bijori, Dokrikheda, Jhunkar, Jhirpa, kamti, Kotmi, Mangaria, Matkuli, Muharikhurd, Chicha, Nayagaon, Pisua, Tekapar, Tekapar choumarhi and Suplai villages have all the Basic education facilities whereas villages with population less than 500 such as Choka, Churni, Dundi and Jhiria doesn't have basic education facilities. The people of these villages are dependent on nearest village that has basic education facilities in its vicinity.

Being urban centers in the region, Tawanagar and Pachmarhi are having all the necessary educational facilities in the town.

There are four anganbadi, primary school and two middle school at Pachmarhi. Also, there is one high school in Pachmarhi with 400 students and 10 classes. Kendriya Vidyalaya is also there at Pachmarhi.From primary survey it was found that Pachmarhi also has institutions such as Army education center, Police training center, teacher training center, forest training center.

Table 3-6 : Village wise School students.

Villages	Total Population	Primary school	Middle school	Secondary school	Senior secondary school
1	2	3	4	5	6
Alimod	671	1	1	1	0
Amadeh	139	1	0	0	0
Raitwadi	349	1	1	0	0
Aanhoani	289	1	0	0	0
Bardha	1191	2	1	1	0
Devi	137	1	0	0	0
Baruth	545	2	0	0	0
Belkhedi	555	3	0	0	0
Bhatodi	622	1	1	0	0
Bijori	1275	1	1	1	0
Bindakheda	445	1	0	0	0
Bori	593	1	0	0	0
Chatua	358	1	0	0	0
Choka	115	0	0	0	0
Chhatiaam	400	1	0	0	0
Chhirrai	371	1	0	0	0
Chichadhana					
Chillod	200	1	0	0	0
Churni	218	0	0	0	0
Dhasaii	612	2		1	0
Daudi	789	1		0	0
Dokrikheda	418	1	1	1	0
Dundi	88	0	0	0	0
Ghogri	437	1		0	0
Ghogri matha	359	2		0	0
Jhalai	372	2		0	0
Jhiria	313	0	0	0	0

Villages	Total Population	Primary school	Middle school	Secondary school	Senior secondary school
1	2	3	4	5	6
Jhirpa	1131	3	3	1	1
Jhunkar	1276	2	1	1	0
Kelipunji	530	1		0	0
Kamti	771	1	1	1	1
Karer	314	1		0	0
Khamda	302	1		0	0
Khanchari	687	1		0	0
Khari	160	1		0	0
Kharpawad	341	1		0	0
Maharajgang	416	2		0	0
Kotmi	454	1	1	0	0
Madho	134	1		0	0
Mangaria	399	1	1	0	0
Mallupura	252	1		0	0
Matkuli	2625	2	1	1	1
Mehandikheda	198	1		0	0
Malli	188	1		0	0
Mohagaun	282	1		0	0
Muharikala	547	1		0	0
Muharikhurd	272	1	1	0	0
Nandia	438	3		0	0
Chicha	884	3	1	0	0
Nayagaon	1631	1	1	1	0
Nishan	797	1	1	1	0
Pathai	231	1		0	0
Pisua	592	1	1	0	0
Sanghii	452	0	0	0	0
Sangakheda	1150	1		1	0
Sakri	96	0	0	0	0
Sarangpur	516	1		0	0
Supdongar	521	2		0	0
Suplai	582	1	1	0	0
Tekapar	630	1	1	0	0
Tekapar Chourmarhi	859	2	1	1	0
Urdaon	434	1		0	0

Source: Census 2011 & Primary Survey


Latitude: 22.328051
Longitude: 77.94755
Elevation: 358.39m
Accuracy: 3.2m
Time: 07-26-2019 11:34
Note: ps3, school, dhasai mal


Latitude: 22.594929
Longitude: 78.503838
Elevation: 433.99m
Accuracy: 3.2m
Time: 07-28-2019 17:21
Note: primary school, khandwa


Latitude: 22.394816
Longitude: 78.374353
Elevation: 891.33m
Accuracy: 3.2m
Time: 08-03-2019 14:17
Note: private clinic, almod


Latitude: 22.566818
Longitude: 77.952103
Elevation: 423.97m
Accuracy: 1.9m
Time: 25-07-2019 17:35
Note: ps3, higher secondary
Powered by NoteCam


Latitude: 22.585497
Longitude: 78.172272
Elevation: 444.44m
Accuracy: 1.3m
Time: 30-07-2019 12:26
Note: ps3, primary school, sehra


Latitude: 22.585497
Longitude: 78.172272
Elevation: 444.44m
Accuracy: 2.2m
Time: 30-07-2019 12:25
Note: village meeting, sehra


शासकीय प्राथमिक शाला-सेहरा
Latitude: 22.585517
Longitude: 78.172128
Elevation: 457.04m
Accuracy: 1.5m
Time: 30-07-2019 12:21
Note: ps3, primary school, sehra


Latitude: 22.703435
Longitude: 78.443165
Elevation: 432.66m
Accuracy: 3.4m
Time: 29-07-2019 11:56
Note: ps3, primary school, goghari mattha

Figure 3-46 : Schools in Villages of ESZ

3.8.2 Hospitals and health infrastructure

Basic health care facilities are the necessity as well as right of every individual. Although People residing in rural areas lack basic health care facilities. As per Census 2011, Out of 81 villages of ESZ, Tekapar Chourmarhi, Matkuli, Sangakheda, Nayagaon, Dokrikheda, Jhirpa and Jhunkar villages have basic health facilities and all the other villages are either depended on nearby villages or urban areas or their traditional healthcare methods and medicinal plants. Only Jhirpa, Matkuli and Dokrikheda villages have veterinary clinic available in the village. Tawanagar and Pachmarhi have all the necessary health facilities in the town. Village wise details of health facilities in ESZ villages is shown in annexure- 3.3.

Sufficient social infrastructure as per norms given in RADPFI,2017

Table 3-7 : Hospitals and Health Infrastructure

Use	Standard/Population	Area (in hectares)	Distance from Habitation
a) Primary School	1 for 5000	0.4 to .6 ha	Within 500 metres
b)High School with Primary School	1 for 15000	1 ha	Within 1km
c)Dispensary/Health Centre	1 for 5000	.05 ha	Within 500 metres
d) Community Hall	1 for 5000	.05 ha	Within 1 km
e) Aanganwadi	1 for 5000	.05 ha	Within 500 metres

(UNDP Disaster Risk Management Programme Ministry of Home Affairs, Govt. of India , 2008)




Figure 3-47 : Health facilities in Villages of ESZ

3.8.3 Roads

Head quarter of Satpura Tiger Reserve is at Hoshangabad. Other important centers in STRs are Pachmarhi, Madhai, and Churna. The details of approach to above places are shown as below: -

Hoshangabad

Hoshangabad is the district Headquarter and is parked on Rail and Road heads. In terms of Rail connectivity, Hoshangabad railway station is situated between Itarsi and Bhopal railway station, which are at the distance 17 km and 73 km respectively. It must be noted that Rail journey to Hoshangabad from Itarshi and Bhopal enumerates to the journey time of about 20 min and 1 hr 15 min (i.e 75 minutes) respectively.

It must be noted that Hoshangabad is well connected by roads from all sides. This Headquarter is situated at a road distance of 73 km from Bhopal, at 258 km from Jabalpur and at 294 km from Nagpur. It must be noted that Road journey to Hoshangabad from Itarsi enumerates to the journey time of about 35 min. Thus, average speed of about 30km / hr which is relatively lower for the State Highway. It must be noted that Road journey to Hoshangabad from enumerates to the journey time of about 35 min. Thus, average speed of about 30km / hr which is relatively lower for the State Highway.

From Itarshi and Bhopal enumerates to the journey time of about 20 min and 1 hr 15 min (i.e 75 minutes) respectively.

Bhopal, Jabalpur and Nagpur are nearest Airports too.

Pachmarhi

There is direct road from Pipariya and Chhindwara to Pachmarhi, which are 52 km and 139 km from it. Nearest rail head is Pipariya. Nearest Airports are Bhopal, Jabalpur and Nagpur, which are 210 km, 240 km and 265 km from Pachmarhi.

Madhai

Madhai is 17 km from Hoshangabad - Sohagpur main road (6 km before Sohagpur). Approach to Madhai is also from Pachmarhi via Bori, Churna, connected by forest road.

Churna

Situated in Bori Sanctuary, it is approached from Bhoura of Betul district, which is 57km from Hoshangabad. From Bhoura to Churna, there is 47 km of forest road. Churna can also be approached by Pachmarhi via Bori, which is 58 km of traverse by forest road.

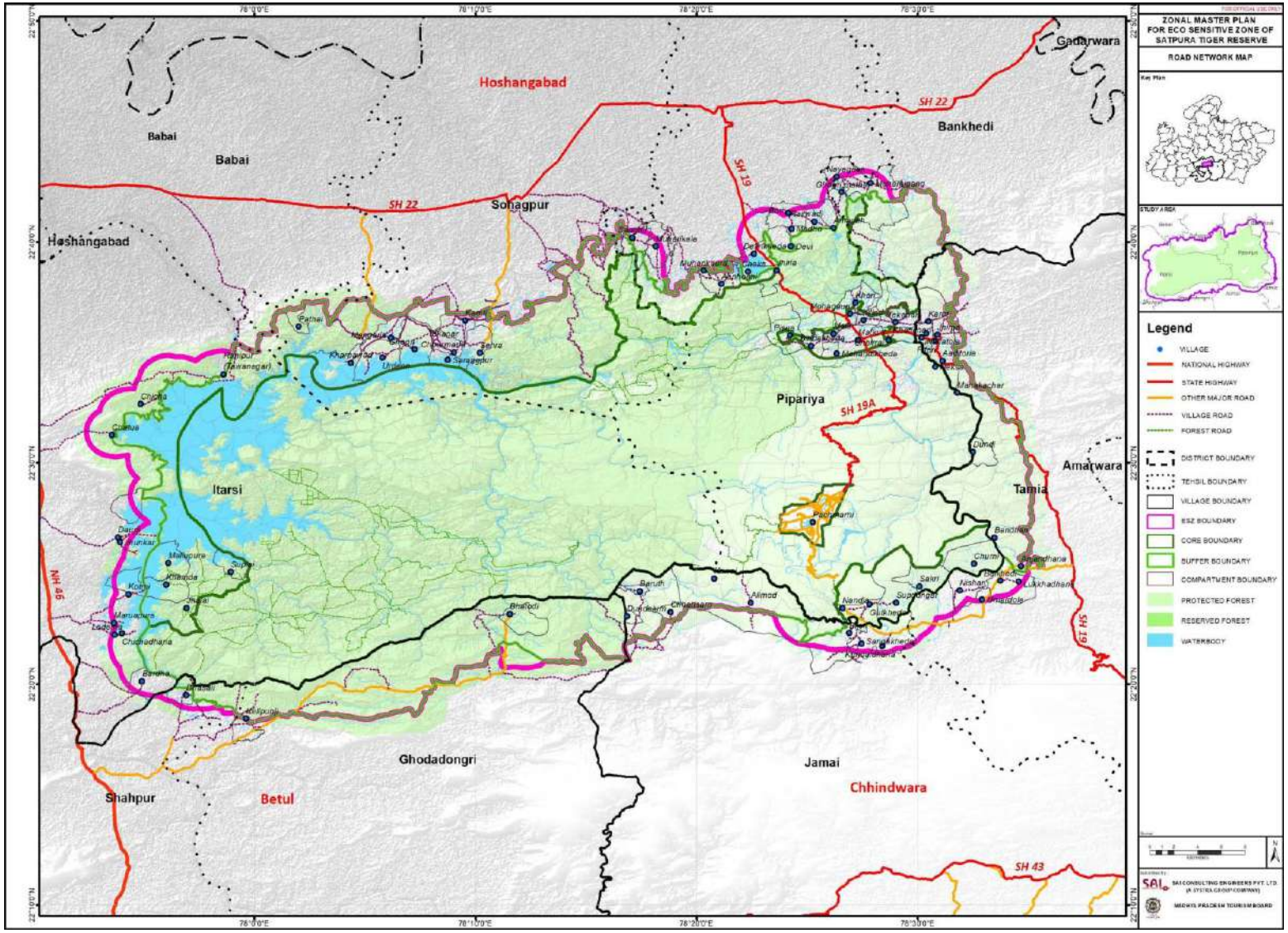


Figure 3-48 : Road Network Map

Table 3-8 : Route 1

Route Number	1
Name of Road	From SH19 to Tawanagar
Direct Connectivity of Villages	Ranipur, Tawanagar
ROW	5 m
Carpeting	Bituminous
Condition of Road	Dilapidated
Indirect Connectivity of Villages	Pathai

Figure 3-49 : Approach to Tawa Nagar

Figure 3-50 : Approach to Tawa Nagar

Figure 3-51 : Approach to Tawa Nagar

Table 3-9 : Approach to Villages of Route 1

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Tawanagar	4561						
Ranipur							
Pathai	231						

Table 3-10 : Transportation mode of Villages of Route 1

Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi/ Van
Tawanagar	4561			
Ranipur				
Pathai	231			

Table 3-11 : Route 2

Route Number	2
Name of Road	From SH19/Sohagpur to Magaria
Connectivity	Magariya, Kharpawad
Carriage Way	5 m
Carpeting	Bituminous
Condition of Road	Atrocious
Indirect Connectivity	Urdon

Figure 3-52 : Approach to Magariya

Table 3-12 : Approach to Villages Route 2 sites.

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Kharpawad	341						
Mangaria	399						
Urdaon	434						

Table 3-13 : Transportation mode of Villages of Route 2

Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi / Van
Kharpawad	341			
Mangaria	399			
Urdaon	434			

Table 3-14 : Route 3

Route Number	3
Name of Road	From SH19/Sohagpur to Sarangpur/ Sehra
Connectivity	Tekapar, Sehra, Sarangpur
Carriage Way	5 m
Carpeting	Bituminous
Condition of Road	Scope for Improvement
Indirect Connectivity	Kamti, Ghoghri

Figure 3-53 : Approach to Sehra



Figure 3-54 : Approach to Kamthi and Ghogri

Table 3-15 : Approach to Villages Route 3 sites.

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Tekapar Chourmarhi	859						
Sarangpur	516						
Kamti	771						
Ghogri	437						
Sehra	NA						

Table 3-16 : Transportation mode of Villages of Route 3

Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi / Van
Tekapar Chourmarhi	859			
Sarangpur	516			
Kamti	771			
Ghogri	437			
Sehra	NA			

Table 3-17 : Route 4

Route Number	4
Name of Road	From SH19 to Matkuli
Connectivity	Dokrikheda, Jhiria, Khari, Mohagaun Maktkuli
Carriage Way	5 m
Carpeting	Bituminous
Condition of Road	Scope of Improvement
Indirect Connectivity	Muharikala, Sanghi, Anhoni, Choka, Pisua, Malli, chilled, tekapar ,

Figure 3-55 : Approach to Matkuli

Figure 3-56 : Approach to Mohagaun & Tekapar

Figure 3-57 : Approach to Tekapar & Anhoni Katcha rasta

Table 3-18 : Approach to Villages Route 4 sites.

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Matkuli	2625						
Dokrikheda	418						
Jhiria	313						
Khari	160						
Mohagaun	282						
Aanhoani	289						
Muharikala	547						

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Pisua	592						
Malli	188						
Choka	115						
Sanghii	452						
Chillod	200						
Tekapar	630						

Table 3-19 : Transportation mode of Villages of Route 4

Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi / Van
Matkuli	2625			
Dokrikheda	418			
Jhiria	313			
Khari	160			
Mohagaun	282			
Aanhoani	289			
Muharikala	547			
Pisua	592			
Malli	188			
Choka	115			
Sanghii	452			
Chillod	200			
Tekapar	630			

Table 3-20 : Route 4.1

Route Number	4.1
Name of Road	From SH19A to bori and Maharajganj
Connectivity	Bori, Madho, devi, Raitwadi, Amadeh,
Carriage Way	5 m
Carpeting	Bituminous
Condition of Road	Atrocious
Indirect Connectivity	Ghogri matha, Nayagaon, Maharajgang

Figure 3-58 : Approach to boridevi

Table 3-21 : Approach to Villages Route 4.1 sites.

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Bori	593						
Devi	137						
Madho	134						
Amadeh	139						
Raitwadi	349						
Ghogri matha	359						
Maharajgang	416						
Nayagaon	1631						
Muharikhurd	272						

Table 3-22 : Transportation mode of Villages of Route 4.1

Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi / Van
Bori	593			
Devi	137			
Madho	134			
Amadeh	139			
Raitwadi	349			
Ghogri matha	359			
Maharajgang	416			
Nayagaon	1631			
Muharikhurd	272			

Table 3-23 : Route 5

Route Number	5
Name of Road	Matkuli to Pisua
Connectivity	Matkuli
Carriage Way	5 m
Carpeting	Bituminous
Condition of Road	Scope of Improvement
Indirect Connectivity	Bindakheda, Mahendikheda, Pisua

Figure 3-59 : Pakka road to bori

Figure 3-60 : Approach to Boridevi, Madho & Raitwadi

Table 3-24 : Approach to Villages Route 5 sites.

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Matkuli	2625						
Pachmarhi	12062						
Bindakheda	445						
Mehandikheda	198						

Table 3-25 : Transportation mode of Villages of Route 5

Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi / Van
Matkuli	2625			
Pachmarhi				
Bindakheda	445			
Mehandikheda	198			

Table 3-26 : Route 6

Route Number	6
Name of Road	Matkuli to Tamia
Connectivity	SH 19- Matkuli, Kanchari, Fifri, Aaditoria
Carriage Way	5 m
Carpeting	Bituminous
Condition of Road	Scope for Improvement
Indirect Connectivity	Navatola, Neska, Manakachar, Dundi, Churni, Lukkadhana, Bandhan, Sakri

Figure 3-61 : Approach to Karer

Figure 3-62 : Approach to Matkuli

Figure 3-63 : Approach to Zirpa

Figure 3-64 : Approach to Karer

Table 3-27 : Approach to Villages Route 6 sites.

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Matkuli	2625						
Khanchari	687						
Fifri	NA						
Navatola,	NA						
Neska,	NA						
Manakachar	NA						
Aaditoria	NA						
Jhirpa	1131						
Karer	314						
Chhirrai	371						

Table 3-28 : Transportation mode of Villages of Route 6

Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi/ Van
Matkuli	2625	1	1	1
Khanchari	687	2	1	1
Fifri		2	2	2
Chhirrai	371	2	2	2
Jhirpa	1131	1	1	1
Karer	314	2	2	2

Table 3-29 : Route 7

Route Number	7
Name of Road	Tamia to Nandia and tamia to Alimod
Connectivity	Khundaldhana, Nandia, Sangakheda, Alimod
Carriage Way	5 m
Carpeting	Bituminous
Condition of Road	Dilapiated
Indirect Connectivity	Bijori, Gutkheda, Supdongda, Kurrai , Baruth, Dundalum, Chhatiaam, Belkhedi, Nishan, Churni, Sakri

Figure 3-65 : Approach to Chunni, Nishan

Figure 3-66 : Approach to Alimod, Belkhedi

Table 3-30 : Approach to Villages Route 7 sites.

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Alimod	671						
Baruth	545						
Bijori	1275						
Supdongar	521						
Chhatiaam	400						
Nandia	438						
Sangakheda	1150						
Belkhedi	555						
Nishan	797						
Churni	218						
Sakri	96						
Kundandhana	NA						
Gutkheda	NA						
Kurrai	NA						

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Dandalum	NA						

Table 3-31 : Transportation mode of Villages of Route 7

Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi / Van
Alimod	671			
Baruth	545			
Bijori	1275			
Supdongar	521			
Chhatiaam	400			
Nandia	438			
Sangakheda	1150			
Belkhedi	555			
Nishan	797			
Churni	218			
Sakri	96			
Kundandhana	NA			
Gutkheda	NA			
Kurrai	NA			
Dandalum	NA			

Table 3-32 : Route 8

Route Number	8
Name of Road	NH 69 to Bhatodi
Connectivity	NH 69, Kelipungi, Bhatodi
Carriage Way	5 m
Carpeting	Bituminous
Condition of Road	Scope of Improvement
Indirect Connectivity	-

Figure 3-67 : Approach to Kelipunji

Figure 3-68 : Approach to Bijori, Alimod, Almod bcrlip board

Table 3-33 : Approach to Villages Route 8 sites.

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Kelipunji	530						
Bhatodi	622						

Table 3-34 : Transportation mode of Villages of Route 8

Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi / Van
Bhatodi	622			
Kelipunji				

Table 3-35 : Route 9

Route Number	9
Name of Road	NH 69 to Suplai
Connectivity	NH 69, Dhasai
Carriage Way	5 m
Carpeting	Bituminous
Condition of Road	Scope of Improvement
Indirect Connectivity	Bardha, Jhalai, Khamda, Suplai, Mallupura

Figure 3-69 : Approach to Kelipunji

Table 3-36 : Approach to Villages Route 9 sites.

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Khamda	302						
Bardha	1191						
Dhasaii	612						
Jhalai	372						
Suplai	582						
Mallupura	252						

Table 3-37 : Transportation mode of Villages of Route 9

Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi / Van
Khamda	NA			
Bardha	NA			
Dhasaii	NA			
Jhalai	NA			
Suplai	NA			
Mallupura	NA			
Daudi	789			
Dundi	88			
Jhunkar	1276			
Chichadhana				
Kotmi	454			
ladema	NA			
Marupura	NA			

Table 3-38 : Route 10

Route Number	10
Name of Road	NH 69 to Tawanagar
Connectivity	NH 69, Tawanagar
Carriage Way	5 m
Carpeting	Bituminous
Condition of Road	Scope of Improvement
Indirect Connectivity	Chatua, Chicha

Figure 3-70 : Approach to Chunni, Nishan

Figure 3-71 : Approach to Chicha

Table 3-39 : Approach to Villages Route 10 sites.

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Chatua	358						
Chicha	884						
Tawanagar	4561						
Ranipur							

Table 3-40 : Route 10.1

Route Number	10.1
Name of Road	NH 46 to Ladema and NH 46 to Daudi
Connectivity	NH 69, Daudi, Maruapura
Carriage Way	5 m
Carpeting	Bituminous
Condition of Road	Scope of Improvement
Indirect Connectivity	Junkar, Kotmi, Chichandhana and ladema

Figure 3-72 : Approach to Daudi

Table 3-41 : Approach to Villages Route 10.1 sites.

Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Chichadhana							
Daudi	789						
Jhunkar	1276						
Dundi	88						
Kotmi	454						
ladema	NA						
Marupura	NA						

For many, roads are a way of life as it allows us as well as goods to travel to the farthest reaches of the globe. But for rural communities, roads have an even more important contribution to community life. Road helps in achieving an unprecedented levels of dust reduction, ensure local residents' health and safety, and everyone can rely on them. From the data of Census 2011 it has been observed that mostly all the villages in ESZ area have Kutcha Roads, however the village-level studies show that proximity to an active local urban centre and to a main road, complemented by good rural road access, has a positive influence on the level of household income. Therefore, ensuring connectivity to the urban centres and Main roads can help in economic development of villagers.

Analysis:

The qualitative analysis was conducted on the likert scale with color band denoting the specific meaning comprises of data set from census 2011 which is supplemented by Primary survey.

Absence is indicated by the Red and cream Band. Red is that mode is absent from both primary survey and Census 2011 dataset.

Presence is indicated by the Green and Orange band. Green is that mode is present from both primary survey and Census 2011 dataset. While orange band indicates that it is present but was marked absent as per census 2011 dataset.

Being urban center in ESZ area Pachmarhi and Ranipur(Tawanagar) already has all these facilities.

Table 3-42 : Status of Connectivity

Route No.	Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
1	Tawanagar	4561						
	Ranipur							
	Pathai	231						
2	Kharpawad	341						
	Mangaria	399						
	Urdaon	434						
3	Tekapar Chourmarhi	859						
	Sarangpur	516						
	Kamti	771						
	Ghogri	437						
	Sehra	NA						
4	Matkuli	2625						
	Dokrikheda	418						
	Jhiria	313						
	Khari	160						
	Mohagaun	282						
	Aanhoani	289						
	Muharikala	547						
	Pisua	592						
	Malli	188						
	Choka	115						
	Sanghii	452						
	Chillod	200						
	Tekapar	630						
4.1	Bori	593						
	Devi	137						
	Madho	134						
	Amadeh	139						
	Raitwadi	349						
	Ghogri matha	359						
	Maharajgang	416						
	Nayagaon	1631						
	Muharikhurd	272						
5	Matkuli	2625						
	Pachmarhi	12062						
	Bindakheda	445						

Route No.	Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
	Mehandikheda	198						
6	Matkuli	2625						
	Khanchari	687						
	Fifri	NA						
	Navatola,	NA						
	Neska,	NA						
	Manakachar	NA						
	Aaditoria	NA						
	Jhirpa	1131						
	Karer	314						
	Chhirrai	371						
7	Alimod	671						
	Baruth	545						
	Bijori	1275						
	Supdongar	521						
	Chhatiaam	400						
	Nandia	438						
	Sangakheda	1150						
	Belkhedi	555						
	Nishan	797						
	Churni	218						
	Sakri	96						
	Kundandhana	NA						
	Gutkheda	NA						
	Kurrai	NA						
	Dandalum	NA						
8	Kelipunji	530						
	Bhatodi	622						
9	Khamda	302						
	Bardha	1191						
	Dhasaii	612						
	Jhalai	372						
	Suplai	582						
	Mallupura	252						
10	Chatua	358						
	Chicha	884						
	Tawanagar	4561						

Route No.	Villages	Total Population	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
	Ranipur							
10.1	Chichadhana							
	Daudi	789						
	Jhunkar	1276						
	Dundi	88						
	Kotmi	454						
	ladema	NA						
	Marupura	NA						

The below table displays the summary of the analysis of Likert scale through the number of villages and percentage.

Absence is indicated by the Red and cream Band. Red is that mode is absent from both primary survey and Census 2011 dataset.

Presence is indicated by the Green and Orange band. Green is that mode is present from both primary survey and Census 2011 dataset. While orange band indicates that it is present but was marked absent as per census 2011 dataset.

Table 3-43 : Connectivity analysis for STR

	State Highway	Major District Road	Other Road	Black Topped (pucca) Road	Gravel (kuchha) Roads	Water Bounded Macadam
Red (Villages)	68	73	18	50	36	72
(%)	83.95	90.12	22.22	61.73	44.44	88.89
Orange (Villages)	3	0	50	7	24	4
(%)	3.70	0	61.73	8.64	29.63	4.94
Green (Villages)	10	11	14	24	20	5
(%)	12.35	13.58	17.28	29.63	24.69	6.17

Inference:

About 56% of the villages have approach road as Gravel Road kaccha road. Only 12.35% and 13.58% of the villages have approach road with State Highway and Other District Road. While, only 6.17% have excess through water Bound Macadam Road.

3.8.4 Transportation Facilities

Mobility can be enhanced by improving transport infrastructure and/or access to means of transport hence they are crucial factors. Good physical accessibility to basic, daily needed facilities such as potable water, medicines etc. can best be provided in villages through efficient available transportation facilities. From Census 2011 it has been observed that existing transportation facilities are insufficient and is available in only 11 villages. Therefore, policy reform and financing measures should be done to reduce constraints to the rural transport services. There is a need to support innovative approaches to the provision of local-level rural transport services. The findings indicate that, because transport impacts on so many aspects of rural development, accessibility concerns should be considered in the preparation of Tourism development plan.

Analysis:

The qualitative analysis was conducted on the likert scale with color band denoting the specific meaning comprises of data set from census 2011 which is supplemented by Primary survey.

Absence is indicated by the Red and cream Band. Red is that mode is absent from both primary survey and Census 2011 dataset. While Cream band indicates that it is absent but was marked present as per census 2011 data.

Presence is indicated by the Green and Orange band. Green is that mode is present from both primary survey and Census 2011 dataset. While orange band indicates that it is present but was marked absent as per census 2011 data. Being urban center in ESZ area Pachmarhi already has all these facilities

Table 3-44 : Analysis for transportation facilities

Route No.	Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi/ Van
1	Tawanagar	4561			
	Ranipur				
	Pathai	231			
2	Kharpawad	341			
	Mangaria	399			
	Urdaon	434			
3	Tekapar Chourmarhi	859			
	Sarangpur	516			
	Kamti	771			
	Ghogri	437			
	Sehra	NA			
4	Matkuli	2625			
	Dokrikheda	418			
	Jhiria	313			
	Khari	160			
	Mohagaun	282			
	Aanhoani	289			
	Muharikala	547			
	Pisua	592			
	Malli	188			
	Choka	115			
	Sanghii	452			
	Chillod	200			
	Tekapar	630			
4.1	Bori	593			
	Devi	137			
	Madho	134			
	Amadeh	139			
	Raitwadi	349			
	Ghogri matha	359			
	Maharajgang	416			
	Nayagaon	1631			
	Muharikhurd	272			
5	Matkuli	2625			
	Pachmarhi				
	Bindakheda	445			
	Mehandikheda	198			

Route No.	Villages	Total Population	Private Bus Service	Public Bus Service	Auto/Taxi/ Van
6	Matkuli	2625			
	Khanchari	687			
	Fifri				
	Chhirrai	371			
	Jhirpa	1131			
	Karer	314			
7	Alimod	671			
	Baruth	545			
	Bijori	1275			
	Supdongar	521			
	Chhatiaam	400			
	Nandia	438			
	Sangakheda	1150			
	Belkhedi	555			
	Nishan	797			
	Churni	218			
	Sakri	96			
	Kundandhana	NA			
	Gutkheda	NA			
	Kurrai	NA			
	Dandalum	NA			
8	Bhatodi	622			
	Kelipunji				
9	Khamda	NA			
	Bardha	NA			
	Dhasaii	NA			
	Jhalai	NA			
	Suplai	NA			
	Mallupura	NA			
	Daudi	789			
	Dundi	88			
	Jhunkar	1276			
	Chichadhana				
	Kotmi	454			
	ladema	NA			
	Marupura	NA			

Source: Primary survey supplemented by Census of India 2011

The below table displays the summary of the analysis of Likert scale through the number of villages and percentage.

Absence is indicated by the Red and cream Band. Red is that mode is absent from both primary survey and Census 2011 dataset. While Cream band indicates that it is absent but was marked present as per census 2011 data.

Presence is indicated by the Green and Orange band. Green is that mode is present from both primary survey and Census 2011 dataset. While orange band indicates that it is present but was marked absent as per census 2011 data.

Figure 3-73 : Pick up Stand, Zirpa

Figure 3-74 : Urdon

Figure 3-75 : Bus Stand, Khari

Figure 3-76 : Bus service in Jhirpa

Figure 3-77 : Bus Service to Kelipunji

Figure 3-78 : Bus stop in Jhunkar village

Figure 3-79 : Taxi/ Para transit mode transport in Sehra

Figure 3-80 : Bus Pick-up stand, Mohgaon

Inference:

About 55% of the villages have access to transport mode of private auto/taxi/van. While Only 18% of villages have transport road access of Private bus. Additionally, no villages had access to transport mode of public busses. It was pointed out that villagers pay about 30-60 INR on their daily commuting which holds sizable contribution of 15-20% of their earning.

Table 3-45 : Status of Mode of Transportation

Mode of Transportation	Absence (Red)	Presence (Orange)	Presence (Green)	Absence (Cream)
Private Bus Service (Villages)	60	13	0	0
Private Bus Service (in %)	82.19	17.81	0	0
Public Bus Service (Villages)	63	0	0	10
Public Bus Service (in %)	86.3	0	0	13.7
Auto/Taxi/ Van (Villages)	34	26	13	0
Auto/Taxi/ Van (in %)	46.58	35.62	17.81	0

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3.8.5 Water Supply

Water is the prime need for living, therefore not only clean water but also sufficient amount of water must be available to people whenever required.

From Census 2011 it was found that the source of water supply in ESZ zone is Tap water, covered well, Hand-pump, Tube well/bore well, Spring, River, Canal, Tank, Lake or pond. The table below shows the availability of various source of water in the villages. Most of the village fetch water from either well or Hand pump whereas some of them also get water from rivers.

Table 3-46 : Water Supply

Villages	Total Population	Tap Water-Treated (Status A(1)/NA(2))	Tap Water Untreated (Status A(1)/NA(2))	Covered Well (Status A(1)/NA(2))	Uncovered Well (Status A(1)/NA(2))	Hand Pump (Status A(1)/NA(2))	Tube Wells/Borehole (Status A(1)/NA(2))	Spring (Status A (1)/NA (2))	River/Canal (Status A(1)/NA (2))	Tank/Pond/Lake (Status A (1)/NA (2))
1	2	3	4	5	6	7	8	9	10	11
Alimod	671	2	1	2	1	1	2	2	1	2
Amadeh	139	2	2	2	1	1	2	2	1	1
Raitwadi	349	2	2	2	2	1	2	2	2	2
Aanhoani	289	2	2	2	1	1	1	1	2	1
Bardha	1191	2	2	2	1	1	1	2	1	1
Devi	137	2	2	2	2	1	2	2	2	2
Baruth	545	2	1	2	1	1	2	2	1	2
Belkhedi	555	2	2	2	1	1	2	2	2	1
Bhatodi	622	2	2	2	1	1	2	2	2	2
Bijori	1275	2	1	2	1	1	2	2	1	2
Bindakheda	445	2	2	2	1	1	2	2	1	1
Bori	593	2	2	2	1	1	1	2	2	2
Chatua	358	2	2	2	1	1	2	1	2	1
Choka	115	2	2	2	2	1	2	2	2	2
Chhatiaam	400	2	2	2	2	1	2	1	2	2
Chhirrai	371	2	2	2	1	1	2	2	1	2
Chichadhana	uninhabited									

Villages	Total Population	Tap Water-Treated (Status A(1)/NA(2))	Tap Water Untreated (Status A(1)/NA(2))	Covered Well (Status A(1)/NA(2))	Uncovered Well (Status A(1)/NA(2))	Hand Pump (Status A(1)/NA(2))	Tube Wells/Borehole (Status A(1)/NA(2))	Spring (Status A (1)/NA (2))	River/Canal (Status A(1)/NA (2))	Tank/Pond/Lake (Status A (1)/NA (2))
Chillod	200	2	2	2	1	1	2	2	2	1
Churni	218	2	2	2	1	1	2	2	1	2
Dhasaii	612	2	2	2	1	1	2	2	1	1
Daudi	789	2	2	2	1	1	2	2	1	1
Dokrikheda	418	2	2	2	2	1	1	2	2	1
Dundi	88	2	2	2	1	1	2	2	2	2
Ghogri	437	2	2	2	1	1	2	1	1	2
Ghogri matha	359	2	2	2	2	1	2	2	2	2
Jhalai	372	2	2	1	2	2	2	2	2	1
Jhiria	313	2	2	2	1	1	2	2	2	1
Jhirpa	1131	2	1	2	2	1	1	2	1	1
Jhunkar	1276	2	2	2	1	1	1	2	1	1
Kelipunji	530	2	2	2	2	1	2	2	1	1
Kamti	771	2	2	2	1	1	2	2	1	1
Karer	314	1	2	2	1	1	1	2	2	2
Khamda	302	2	2	1	2	1	2	2	1	1
Khanchari	687	2	1	2	2	1	2	2	1	2
Khari	160	2	2	2	1	1	1	2	2	1
Kharpawad	341	2	2	2	1	1	2	2	1	2
Maharajgang	416	2	2	2	2	1	2	2	2	2
Kotmi	454	2	2	1	2	1	2	2	1	2
Madho	134	2	2	2	2	1	2	2	2	2

Villages	Total Population	Tap Water-Treated (Status A(1)/NA(2))	Tap Water Untreated (Status A(1)/NA(2))	Covered Well (Status A(1)/NA(2))	Uncovered Well (Status A(1)/NA(2))	Hand Pump (Status A(1)/NA(2))	Tube Wells/Borehole (Status A(1)/NA(2))	Spring (Status A (1)/NA (2))	River/Canal (Status A(1)/NA (2))	Tank/Pond/Lake (Status A (1)/NA (2))
Mangaria	399	2	2	2	1	1	2	2	2	2
Mallupura	252	2	2	1	2	1	2	2	2	1
Matkuli	2625	1	2	1	2	1	1	2	1	1
Mehandikheda	198	2	2	2	2	1	2	2	1	2
Malli	188	2	2	2	1	1	2	2	2	1
Mohagaun	282	2	2	1	2	1	2	2	2	1
Muharikala	547	2	2	2	1	1	2	1	1	1
Muharikhurd	272	2	2	1	2	1	2	2	2	2
Nandia	438	1	1	2	1	1	2	1	1	2
Chicha	884	2	2	2	1	1	2	2	2	2
Nayagaon	1631	2	2	2	2	1	2	2	2	2
Nishan	797	2	2	2	1	1	2	2	1	2
Pathai	231	2	2	2	1	1	2	2	1	2
Pisua	592	2	2	2	1	1	2	2	1	1
Sanghii	452	2	2	2	1	1	2	2	1	2
Sangakheda	1150	2	2	2	1	1	2	2	1	2
Sakri	96	2	2	2	1	1	2	2	1	2
Sarangpur	516	2	2	2	1	1	2	2	1	1
Supdongar	521	1	1	2	1	1	2	1	1	2
Suplai	582	2	2	2	1	1	2	2	1	1
Tekapar	630	2	2	2	1	1	2	2	2	2

Villages	Total Population	Tap Water-Treated (Status A(1)/NA(2))	Tap Water Untreated (Status A(1)/NA(2))	Covered Well (Status A(1)/NA(2))	Uncovered Well (Status A(1)/NA(2))	Hand Pump (Status A(1)/NA(2))	Tube Wells/Borehole (Status A(1)/NA(2))	Spring (Status A (1)/NA (2))	River/Canal (Status A(1)/NA (2))	Tank/Pond/Lake (Status A (1)/NA (2))
Tekapar Chourmarhi	859	2	2	2	1	1	2	2	1	1
Urdaon	434	2	2	2	1	1	2	2	1	2

Source: Census 2011

As per data of Census 2011 Supdonagar, Nandiya, Matkuli and Karer have treated Tap water source. While, Alimod, Baruth, Jhirpa, Khanchari, Nandia and Supdongar have untreated tap water source. Under Nal Jal Yojna and Panch Parmeshwar Yojna, some of the villages are facilitate with tap water connections recently. The villages are Chatua, Bori, Muharikala, Daudi, Jhunkar and Chicha. Jhirpa and Pachmarhi have overhead tank in the village

In Pachmarhi the supply of water is done through tube well and it is major source of water. From the tube well the water is pumped into underground Sump and from underground sump to overhead tank. The quantity of water supply is 56 lpcd and total 7 tube wells are available. Also, on comparing the available water supply with URDPFI it found that as per URDPFI a minimum 135 lpcd water supply should be provided. The ground water level in Pachmarhi is approximately is 250-300 feet

Figure 3-81 : Hand Pump, Nishan

Figure 3-82 : Overhead Tank, Pachmarhi

Figure 3-83 : Hand Pump, Goghari Mattha

Figure 3-84 : Hand Pump, Tekapar

Figure 3-85 : Hand Pump, Belakhedi

Figure 3-86 : Water Tank, Jhirpa

Figure 3-87 : Bore, Kamti

Figure 3-88 : Hand Pump, Matkuli

Figure 3-89 : Hand Pump, Sehra

Figure 3-90 : Hand Pump, Khanchari

Figure 3-91 : Ground water Sump, Jhirpa

Figure 3-92 : Hand Pump, Sehra

Figure 3-93 : Hand Pump

Figure 3-94 : Water Storage tank, Jhirpa

3.8.6 Drainage

Drainage system are important to maintain the hygienic condition of any place; drainage system helps in preventing water logging into the streets. As per census 2011, the villages in ESZ do not have any closed drainage system andv only 10 villages such as Amadeh, Bori, Chhatiaam, Daudi, Chhitiaam, Ghoghri, Jhunkar, Kamti, Khamda, Khanchari, Kharpawad, Matkuli, Mohagaun, Muharikala, Urdaon, Fiferi have open drainage system. There are no villages in the region having 100% coverage of drains. Most of the drain water is directly discharged into water bodies which possible pollute the water bodies at some level. Therefore, provision for drainage should be given to these villages for proper disposal of storm water. Being an urban centre, Pachmarhi have drainage system in the Cantonment area. One sewage treatment plant of capacity 2.15 MLD and sewer line are proposed in Pachmarhi.

Table 3-47 : Drainage Status in ESZ villages

Villages	Open Drainage (Status A(1)/NA(2))
Alimod	2
Amadeh	1
Raitwadi	2
Aanhoani	2
Bardha	2
Devi	2
Baruth	2
Belkhedi	2
Bhatodi	2
Bijori	2
Bindakheda	2
Bori	1
Chatua	2
Choka	2
Chhatiaam	1
Chhirrai	2
Chichadhana	
Chillod	2
Churni	2

Villages	Open Drainage (Status A(1)/NA(2))
Khamda	2
Khanchari	1
Khari	2
Kharpawad	1
Maharajgang	2
Kotmi	2
Madho	2
Mangaria	2
Mallupura	2
Matkuli	1
Mehandikheda	2
Malli	2
Mohagaun	1
Muharikala	1
Muharikhurd	2
Nandia	2
Chicha	2
Nayagaon	2
Nishan	2

Villages	Open Drainage (Status A(1)/NA(2))
Dhasaii	2
Daudi	1
Dokrikheda	2
Dundi	2
Ghogri	1
Ghogri matha	2
Jhalai	2
Jhiria	2
Jhirpa	2
Jhunkar	1
Kelipunji	2
Kamti	1
Karer	2

Villages	Open Drainage (Status A(1)/NA(2))
Pathai	2
Pisua	2
Sanghii	2
Sangakheda	2
Sakri	2
Sarangpur	2
Supdongar	2
Suplai	2
Tekapar	2
Tekapar Chourmarhi	2
Urdaon	1
Fiferi	1

Figure 3-95 : Village Meeting, amadeh

Figure 3-96 : Kacha Road, Kamti

Figure 3-97 : Haat Bazar Ground, Sangakheda

Figure 3-98 : Kacha Road, Nayagaon

Figure 3-99 : Road Nala, Nishan

Figure 3-100 : Main Road Chauk, Sehra

Figure 3-101 : Road, Zirpa

Figure 3-102 : Main Road, Matkuli

Figure 3-103 : Road, Khari

Figure 3-104 : Main Road, Matkuli

Figure 3-105 : Kacha Road, Nayagaon

Figure 3-106 : Road, Mohgaun

Figure 3-107 : Road without drain, Nishan

Figure 3-108 : Meeting

Figure 3-109 : Main Road, Sehra

Figure 3-110 : Main Road, Jhirpa

Figure 3-111 : Main Road to Tekapar

Figure 3-112 : Road with Both side drains, Tawa

Figure 3-113 : Road without drains, Kamti

Figure 3-114 : Road with one side drain, Kamti

Figure 3-115 : Road without drains to Belakhedi

Figure 3-116 : Roads with one side drain, Fiferi

3.8.7 Solid-waste management

Solid waste management is important to keep an area living, breathing, growing and changing. Lack of awareness among people about the importance of solid waste management leads to deleterious impacts on health. Therefore, Solid waste management plan should be given at village level and people should be encouraged to make some arrangements by themselves in order to avoid health hazards. As per census 2011 the villages within ESZ do not have any kind of solid waste management system which increases the chances of both human health hazard and environmental degradation. Status of community waste disposal system after house to house collection, community bio-gas or recycle of waste for production use and villages having no system for solid waste collection is shown in annexure 3.4.

From the Annexure- 3.4 and primary survey it has been observed that there are no solid or liquid waste management in rural areas of the region. Despite of being an eco-sensitive area, there is no waste

management facilities are provided. Villagers have the tendency to throw their household garbage in nearby open spaces of the village. That creates unhealthy atmosphere in the village.

Figure 3-117 : Main Road to Tekapar

Figure 3-118 : Main Road to Tekapar

Figure 3-119 : Pachmarhi town during Nagdwar Mela, 2019.

As per discussion with Sub Engineer, Pachmarhi Cantonment, 5 Acre land has been allotted for dumping of solid waste of the town, which is located on old Pipariya road and is 5 km away from the town. There is 1 garbage collection van and 2 tractors, and 1 truck serve in Pachmarhi Cantonment area for Solid Waste Collection. Segregation of solid waste is done on dumping site in bio-degradable and non-biodegradable. For further improvement and cleanliness, Pachmarhi Cantonment have appointed IIT- Dhanabad for preparation of Solid Waste Management Plan of the town. Solid waste generation of Pachmarhi town is 10.12 quintal/day.

Figure 3-120 : Alimod during Nagdwar Mela,2019.

Figure 3-121 : Solid Waste dumped in the backyard of the restaurants

The photo shown above here is of a restaurant near Jhirpa village on Pachmarhi – Pipariya State Highway-19A. There are many restaurants on the highway. From the interview with the workers and managers of the restaurants it has come to know that there is no provision for Solid or liquid waste management in the area. Generally, they dump the solid waste in the backyard of the restaurant and burn it after a week or two weeks.

The waste management in rural areas can be initiated through sensitization and cooperation of people. The process of waste segregation and collection is to be encouraged for a collective disposal and treatment. Inorganic wastes can be recycled locally or can be collected to be sold RADPFI 2017.

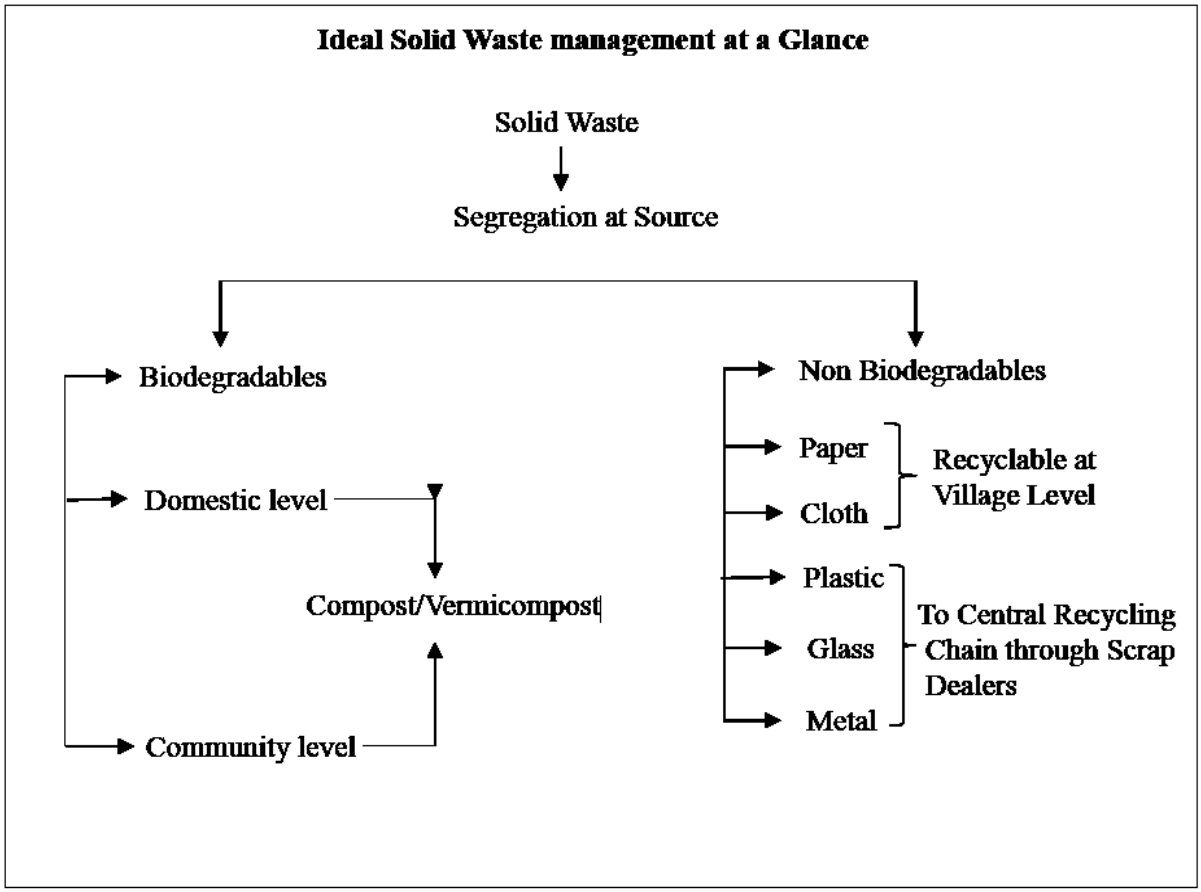


Figure 3-122 : Ideal Solid Waste Management at a Glance.

3.8.8 Public Amenities

Public amenities are the resources or services provided by local government to cities people. As per census 2011 the amenities provided in the villages include, ATM, Banks, Weekly markets, Weekly haats, Post office and mobile coverage. It is observed that mostly all the villages have mobile coverage whereas only Mutkuli, Jhirpa, Sangakhera village have amenities like Weekly haats, markets and post office.

Table 3-48 : Public Amenities

Villages	Total Population	ATM (Status A(1)/NA(2))	Commercial/ Cooperative Bank (Status A(1)/NA(2))	Self - Help Group (SHG) (Status A(1)/NA(2))	Mandis/Regular Market (Status A(1)/NA(2))	Weekly Haat (Status A(1)/NA(2))	Mobile Phone Coverage (Status A(1)/NA(2))	Post Office (Status A(1)/NA(2))
1	2	3	4	5	6	7	8	9
Alimod	671	2	2	2	2	2	2	2
Amadeh	139	2	2	2	2	2	1	2
Raitwadi	349	2	2	1	2	2	1	2

Villages	Total Population	ATM (Status A(1)/NA(2))	Commercial/ Cooperative Bank (Status A(1)/NA(2))	Self - Help Group (SHG) (Status A(1)/NA(2))	Mandis/Regular Market (Status A(1)/NA(2))	Weekly Haat (Status A(1)/NA(2))	Mobile Phone Coverage (Status A(1)/NA(2))	Post Office (Status A(1)/NA(2))
Aanhoani	289	2	2	1	2	2	2	2
Bardha	1191	2	2	2	2	2	1	2
Devi	137	2	2	1	2	2	1	2
Baruth	545	2	2	1	2	2	2	2
Belkhedi	555	2	2	1	1	2	1	2
Bhatodi	622	2	2	2	2	2	2	2
Bijori	1275	2	2	1	2	2	2	2
Bindakheda	445	2	2	1	2	2	1	2
Bori	593	2	2	1	2	2	1	2
Chatua	358	2	2	1	2	2	1	2
Choka	115	2	2	1	2	2	2	2
Chhatiaam	400	2	2	1	2	2	2	2
Chhirrai	371	2	2	1	2	2	1	2
Chichadhana	Uninhabited							
Chillod	200	2	2	1	2	2	1	2
Churni	218	2	2	2	2	2	1	2
Dhasaii	612	2	2	2	2	2	2	2
Daudi	789	2	2	1	2	2	1	2
Dokrikheda	418	2	2	1	2	2	1	2
Dundi	88	2	2	2	2	2	2	2
Ghogri	437	2	2	1	2	2	2	2
Ghogri matha	359	2	2	2	2	2	2	2
Jhalai	372	2	2	1	2	2	2	2
Jhiria	313	2	2	1	2	2	1	2
Jhirpa	1131	2	1	1	2	1	1	1
Jhunkar	1276	2	2	1	2	2	1	2
Kelipunji	530	2	2	2	2	2	1	2
Kamti	771	2	2	1	2	2	2	1
Karer	314	2	2	2	2	2	1	2
Khamda	302	2	2	1	2	2	2	2
Khanchari	687	2	2	2	2	2	1	2
Khari	160	2	2	1	2	2	1	2
Kharpawad	341	2	2	2	2	2	2	2
Maharajgang	416	2	2	2	2	2	1	2
Kotmi	454	2	2	1	2	2	1	2
Madho	134	2	2	1	2	2	1	2

Villages	Total Population	ATM (Status A(1)/NA(2))	Commercial/ Cooperative Bank (Status A(1)/NA(2))	Self - Help Group (SHG) (Status A(1)/NA(2))	Mandis/Regular Market (Status A(1)/NA(2))	Weekly Haat (Status A(1)/NA(2))	Mobile Phone Coverage (Status A(1)/NA(2))	Post Office (Status A(1)/NA(2))
Mangaria	399	2	2	2	2	2	2	2
Mallupura	252	2	2	2	2	2	2	2
Matkuli	2625	2	1	1	1	1	1	1
Mehandikheda	198	2	2	1	2	2	1	2
Malli	188	2	2	1	2	2	2	2
Mohagaun	282	2	2	1	2	2	1	2
Muharikala	547	2	2	1	2	2	1	2
Muharikhurd	272	2	2	1	2	2	2	2
Nandia	438	2	2	2	2	2	1	2
Chicha	884	2	2	1	2	2	1	2
Nayagaon	1631	2	2	2	2	2	1	2
Nishan	797	2	2	2	1	2	2	2
Pathai	231	2	2	1	2	2	2	2
Pisua	592	2	2	1	2	2	1	2
Sanghii	452	2	2	1	2	2	1	2
Sangakheda	1150	2	2	1	1	1	2	1
Sakri	96	2	2	2	2	2	1	2
Sarangpur	516	2	2	1	2	2	2	2
Supdongar	521	2	2	2	2	2	1	2
Suplai	582	2	2	1	2	2	2	2
Tekapar	630	2	2	1	2	2	1	2
Tekapar Chourmarhi	859	2	2	1	2	2	1	2
Urdaon	434	2	2	2	2	2	2	2

Source: Census, 2011 & primary survey

From the above table it can be observed that there are no facility of bank or ATM in major villages. Only Jhirpa and Matkuli are having bank facilities in the village.

Also, there are many villages not having proper mobile network connectivity. Most of the villages having only BSNL network availability in the area.

Tawanagar, Pachmarhi, Matkuli, Jhirpa and Sangakheda have weekly haat bazar that serves surrounding villages of their respective villages.

Figure 3-123 : Haat bazar at Makuli

From primary survey it was found that Sangakheda village has largest weekly Market/hat in the south region of STR. In the weekly haat of Sangakheda village gold and silver ornaments are also being bought and sold. There is huge quantity of agriculture crops are being trade from this haat bazar in Sangakheda.

3.8.9 Energy Access (Sources of energy, Dependence on Forest Produce etc.)

Except 6 notified villages, all notified villages have access for electricity in STR as per Census 2011. These villages are namely, Alimod, Baruth, Chatiam, Dundi, Nishan and Sangakheda. During primary survey and consultation, Nishan, Sangakheda and Baruth had connectivity to power supply. The power supply in notified villages are for agricultural purpose are supplied for 8 hours a day for irrigation purpose only. The brief analysis is as per below table.

Table 3-49 : Power supply in ESZ area

Notified villages	Power Supply For Domestic Use (Status A(1)/NA(2))	Power Supply For Domestic Use Summer (April-Sept.) per day (in Hours)	Power Supply For Domestic Use Winter (Oct.-March) per day (in Hours)	Power Supply For Agriculture Use (Status A(1)/NA(2))	Power Supply For Agriculture Use Summer (April-Sept.) per day (in Hours)	Power Supply For Agriculture Use Winter (Oct.-March)per day (in Hours)
Almod	2	0	0	2	0	0
Amadeh mal	1	6	6	1	6	6
Amadeh ryt	1	8	10	1	8	10
Anhoni	1	6	10	1	6	10
Anjandana	1	9	9	1	9	9
Bardha ryt	1	6	9	1	6	9
Bari devi	1	8	8	1	8	8
Barud	2	0	0	2	0	0
Belkhedi	1	8	8	1	8	8
Bhatodi	1	6	6	1	6	6
Bija kheri	1	6	6	1	6	6
Bijori	1	6	6	1	6	6
Binda Kheda	1	4	6	1	4	6
Bori	1	8	8	1	8	8
Chatua	1	8	10	1	8	10
Chauka	1	8	8	1	8	8
Chhatiaam	2	0	0	2	0	0
Chhirrai	1	6	10	1	6	8
Chichadhana						

Chillod	1	6	6	1	6	6
Churni	1	8	8	1	6	6
Dhasai mal	1	14	14	1	12	9
Dodi	1	8	6	1	8	6
Dokri kheda	1	6	6	1	6	6
Dundi Bhajipani	2	0	0	2	0	0
Ghoghari	1	6	6	1	6	6
Ghoghari mattha	1	4	6	1	4	6
Ghogri	1	6	6	1	6	6
Jhalai	1	6	6	2	0	0
Jhiria	1	6	6	1	6	6
Jhirpa	1	8	14	1	8	14
Jhunkar	1	8	6	1	8	6
Kaili ryt (puriji)	1	12	12	1	12	12
Kamti	1	6	8	1	6	6
Karer	1	6	6	1	6	6
Khamda	1	6	6	2	0	0
Khanchari	1	8	14	1	8	14
Khari	1	10	12	1	6	8
Kharpawad	1	6	6	1	6	6
Maharajganj	1	4	6	1	4	6
Kotmimal	1	4	6	1	6	6
Kursidhana	1	6	6	1	6	6
Madho	1	8	10	1	8	10
Magariya	1	6	6	1	6	6
Mallupura	1	6	6	2	0	0
Matkuli	1	8	8	1	8	8
Mehdi kheda	1	5	5	1	5	5
Meli	1	5	7	1	4	6
Mohgaon	1	7	7	1	7	7
Muhari kalan	1	4	8	1	4	8
Muhari Khurd	1	8	8	1	8	8
Nandiya	1	6	6	2	0	0
Nayachicha	1	6	8	1	6	8
Nayagaon	1	4	6	1	4	6
Nishan	2	0	0	2	0	0
Pathai	1	6	6	2	0	0
Pisua	1	4	6	1	4	6
Sangai	1	6	10	1	6	10
Sangakheda	2	0	0	2	0	0
Sankari	1	6	6	2	0	0
Sarangpur	1	6	6	1	2	2
Silwani	1	7	7	1	7	7

Supdonagar	1	6	6	2	0	0
Suplai	1	6	6	2	0	0
Tekapar	1	6	10	1	6	8
Tekapar Chourmahri	1	6	4	1	6	4
Urdon	1	6	6	1	6	6

3.8.10 Crop, Livestock and Other Produces

The primary economy is agrarian economy in notified villages of Pench Tiger Reserve. The transition of crop pattern has been changed in past few years. Villagers has shifted their focus from traditional crops to cash crops in area and also started use of fertilizers for increase in production. The details for crop pattern in briefly discussed in section 4.2 of chapter 4.

There is very less number of livestock is observed during primary survey and consultation. The villagers explained the reason as present breeds of cow delivers very little amount of milk per day, which is sufficient for daily consumption only. Backyard poultry farming is observed in every notified villages of STR. The details for backyard poultry and promotion of same in ESZ area is briefly discussed in Sub Chapter 12.3.5 of Chapter 12 of part -2.

4 EXISTING LAND USE PRACTICES

4.1 LAND COVER / LAND USE PATTERNS

Land cover refers to the surface cover on the ground such as vegetation, urban infrastructure, water, bare soil etc. Land cover is also often described as what can be seen on land viewed from above. It also means to describe landscape patterns and characteristics that are critical in understanding aspects of the environment, including the availability of and changes in habitat, the potential for dispersion of chemicals and other pollutants, and potential contributors to climate change, such as reflectivity of the land. There are three levels of Land Cover:

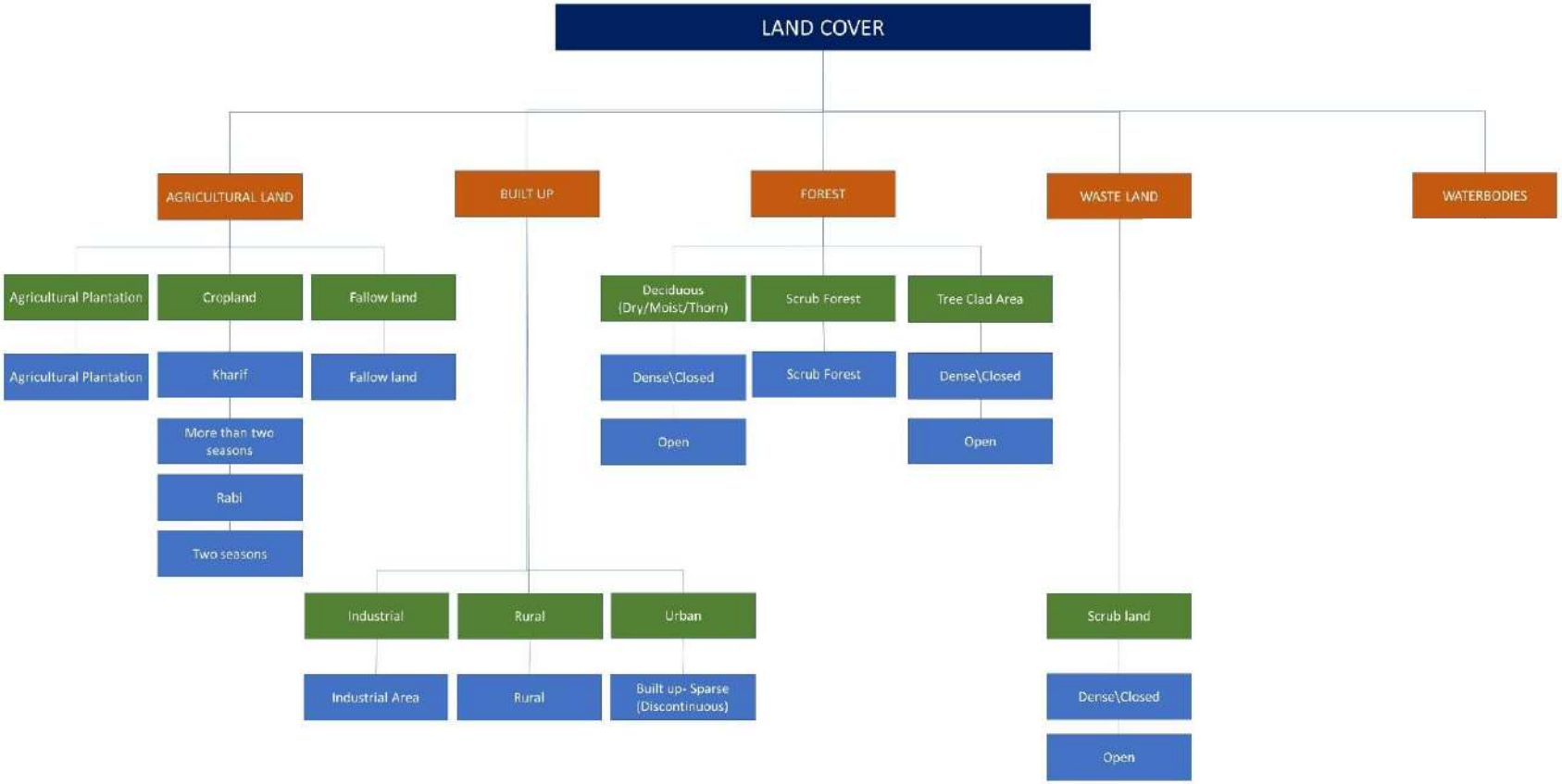


Figure 4-1 : Three Levels of Land Cover

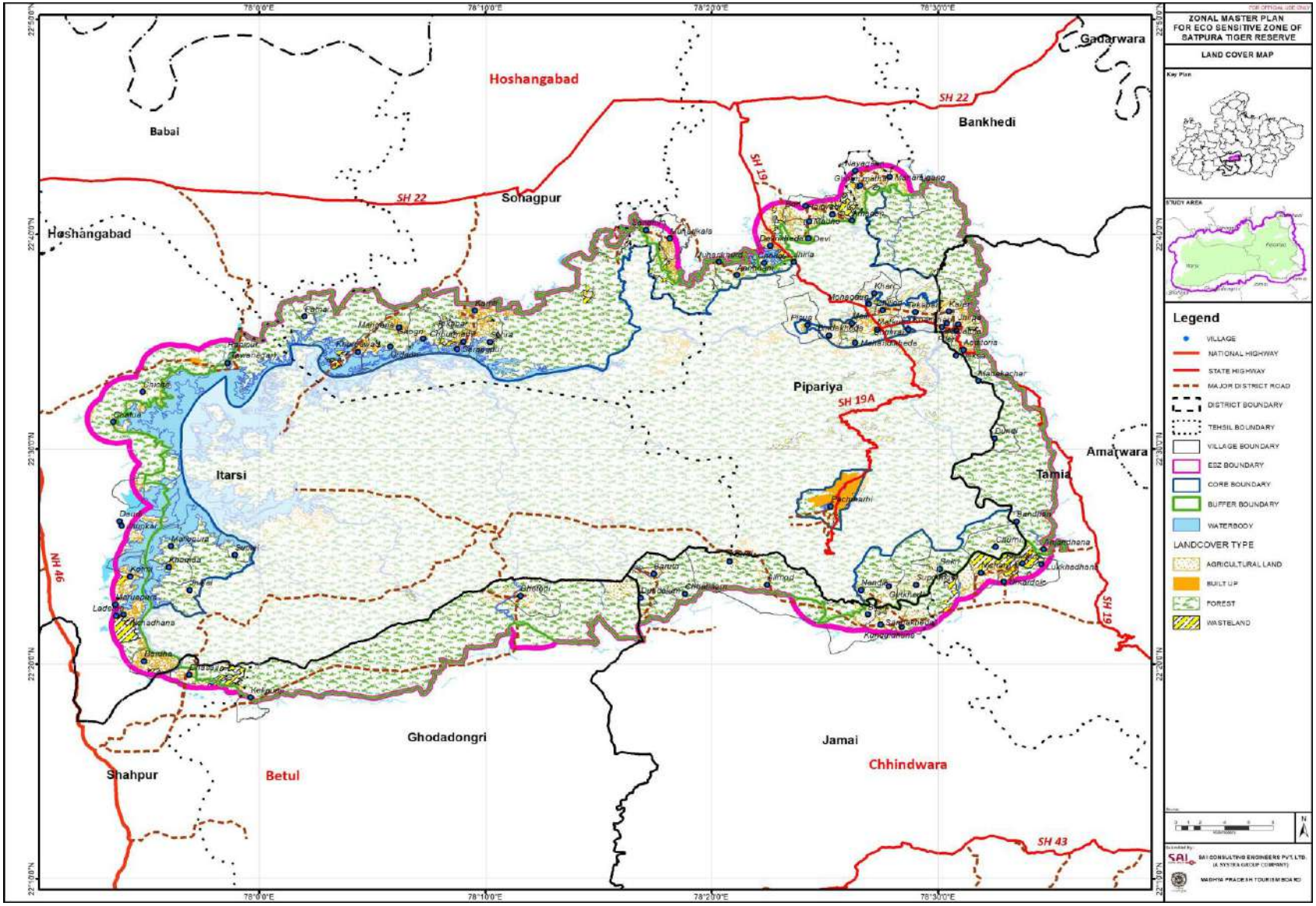


Figure 4-2 : Level-1, Land Cover Map-2015-16

There are main 5 categories of land cover i.e., Agriculture land, built up, Forest, Waste land, Waterbodies.

The land cover map is shown below.

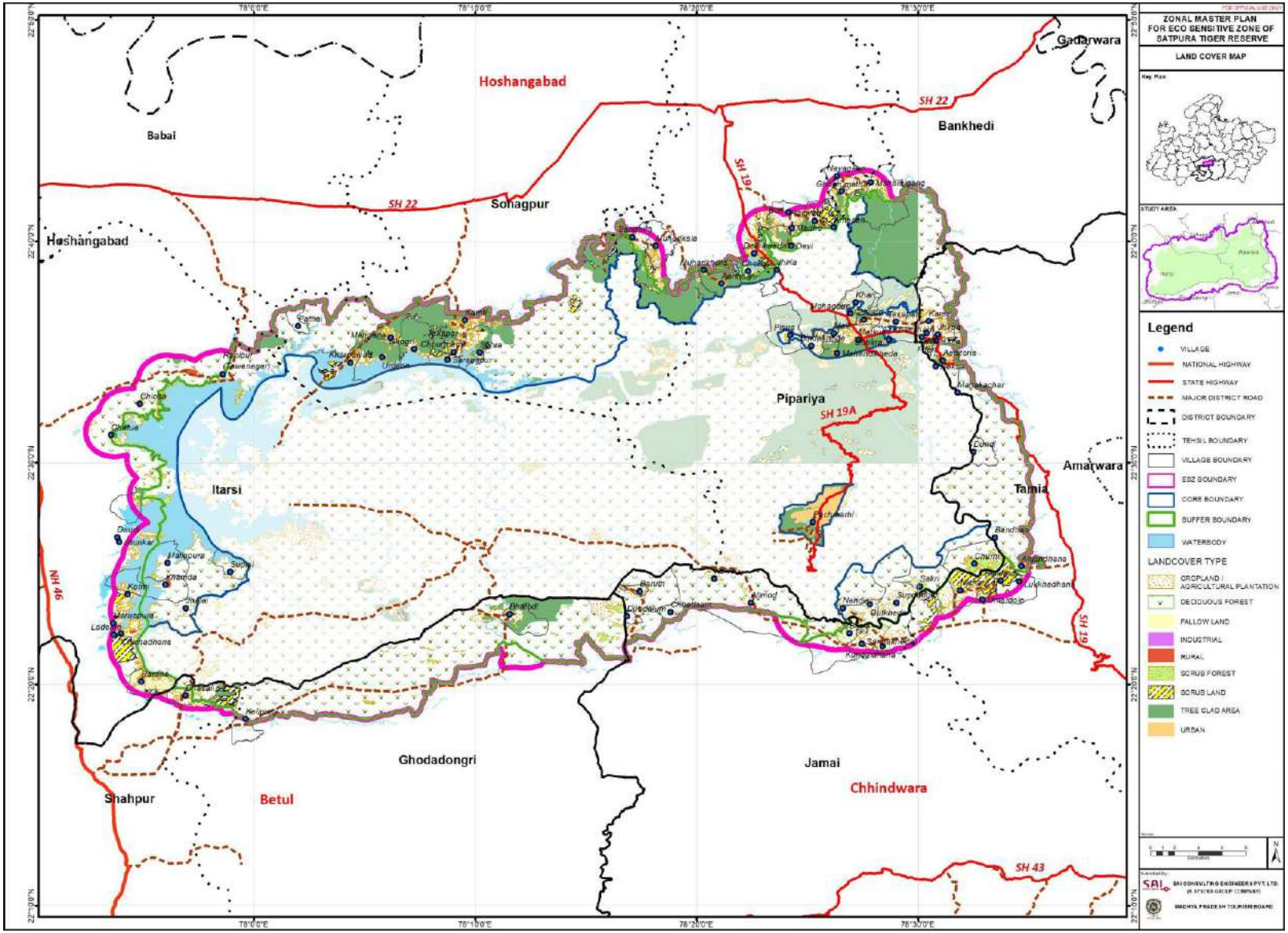


Figure 4-3 : Level-2, Land Cover Map-2015-16

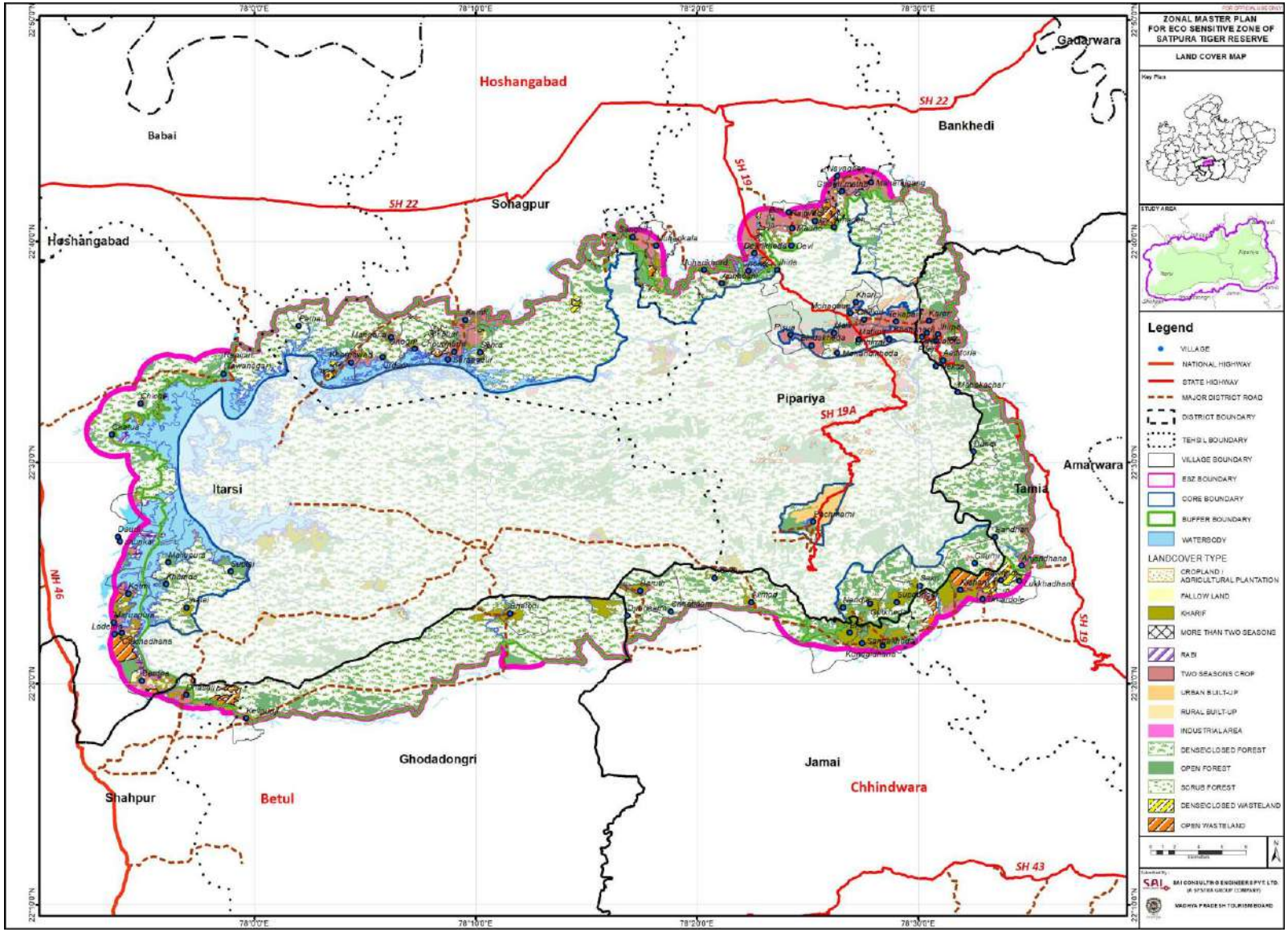


Figure 4-4 : Level-3, Land Cover Map-2015-16

Table 4-1 : Landuse Landcover Area Sheet for ELU 2015-16

LEVEL 1	Area (sq km)	Area (ha)	Percentage to Total land cover area (%)	LEVEL 2	Area (sq km)	Percentage to Total land cover area (%)	LEVEL 3	Area (sq km)	Area (ha)	Percentage to Total land cover area (%)
Agricultural Land	146.26	14,626	13.55	**Agricultural Plantation**	0.11	0.01	**Agricultural Plantation**	0.11	11	0.01
				Cropland	141.26	13.09	**Kharif**	59.28	5928	5.49
							More than two seasons	0.63	63	0.06
							Rabi	6.08	608	0.56
							Two seasons	75.27	7527	6.97
				Fallow land	4.88	0.45	**Fallow land**	4.88	488	0.45
Built up	14.75	1475	1.37	**Rural**	5.37	0.50	**Rural**	5.37	537	0.50
				Urban	9.38	0.87	**Built up- Sparse (Discontinuous)**	9.38	938	0.87
Forest	747.13	74,713	69.22	**Deciduous (Dry/Moist/Thorn)**	585.82	54.27	**Dense\Closed**	487.86	48,786	45.20
							Open	97.96	9796	9.07
				Scrub Forest	14.33	1.33	**Scrub Forest**	14.33	1433	1.33
				Tree Clad Area	146.99	13.62	**Dense\Closed**	125.16	12,516	11.59
							Open	21.83	2183	2.02
Waste Land	32.69	3269	3.03	**Scrub land**	32.69	3.03	**Dense\Closed**	8.63	863	0.80
							Open	24.06	2406	2.23
Waterbodies	138.60	13,860	12.84	**Waterbodies**	138.60	12.84	**Waterbodies**	138.60	13,860	12.84
Total Area	1079.43	1,07,943	100.00	**Total Area**	1079.43	100.00	**Total Area**	1079.43	1,07,943	100.00

From the chart and table, it can be seen that almost 70% area are forest area in the region. There is 13.55% agricultural land is available for 1.37% settlement area.
Mainly agricultural land is spread over in buffer area of the STR & nearby settlement areas.

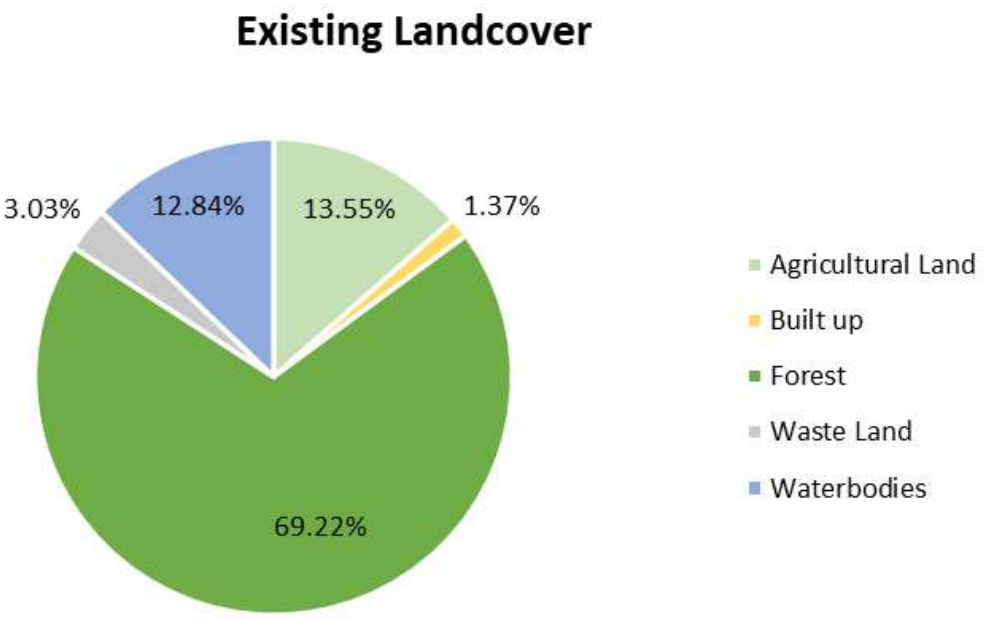


Figure 4-5 : Land Cover

1. Agricultural land:

Agricultural Land may be defined broadly as land used primarily for production of food and fiber. 13.55% of the total area is agricultural land of the region.
Agriculture land is sub classified in Agricultural plantation, cropland and fallow land.
Cropland: Cropland is land used for growing crops. Cropland can further be classified in Kharif crops, Rabi crops, cropland where crops are cultivated in two season & cropland where crops are cultivated more than two seasons.
In west side of the region, agricultural land is mainly developed along the Tawa Reservoir and in all other areas, agricultural land is mainly distributed nearby river or streams.

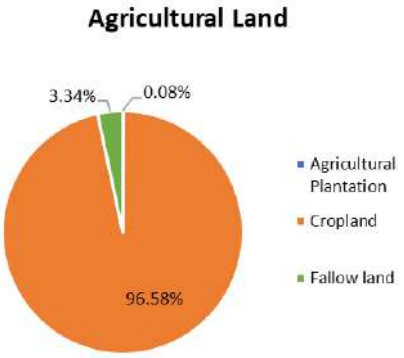


Figure 4-6 : Agricultural Land

Agricultural plantation is done in very small area of the region near Maharajgang village and cropland is spread over in entire buffer area of STR.
A piece of land that is normally used for farming but that is left with no crops on it for a season in order to let it recover its fertility is an example of land that would be described as fallow. There are very few patches of fallow land is available in the region. Fallow land is mainly found nearby following villages: Chillod, Dokrikheda, Devi, Moharikalan, Sehra, Mangaria, Urdaon, Chatua, Jhunkar, Kotmi, Ladema and Bardha. There are no fallow land available in southern part of the region.

Cropland can further be classified in four categories:

Cropland can further be classified in lands where Kharif and Rabi crops are cultivated or two crops are cultivated in a year or more than two crops are cultivated in a year.

Rabi crops are mainly cultivated in nearby areas of rivers and reservoirs i.e. villages in east portion of STR. The main rabi crops are wheat & gram in the area. In southern east portion of the area, there are no cultivation of rabi crops.

Kharif crops are cultivated in all the areas surrounding STR. Main kharif crops of the area are Maize, Paddy, Pulse, Kodo & kutki, Udad, Jowar and Soybean.

There are 53.28% area in the region where crops are cultivated in two seasons in a year i.e. rabi and kharif both crops are cultivated in the area. From the map it can be seen that villages falling in Pipariya and Sohagpur tehsil have agricultural activities in both winter and monsoon seasons. Also, in some of the villages in the western part of the region have agricultural activities in two seasons. Dhasai and Bardha villages are having agricultural activities in two seasons in a year. While in southern east part of the region, there are very few villages having two seasons crops in a year, i.e. Umardole, Anjandhana, Belkhedi, Nishan, Baruth etc.

From the pie chart it is clearly seen that there is very small area i.e. 0.45% having cultivation in more than two seasons in a year.

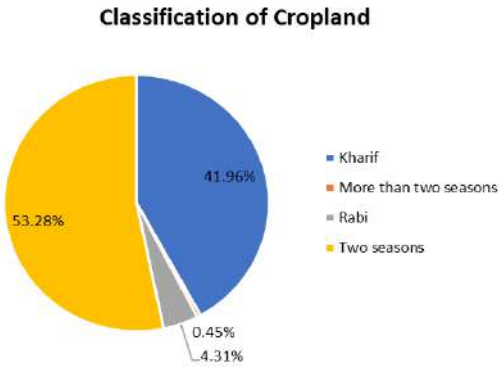


Figure 4-7 : Classification of Cropland

2. Built up: Built up area

Urban or Built-up Land is comprised of areas of intensive use with much of the land covered by structures. Included in this category are cities, towns, villages, strip developments along highways, transportation, power, and communications facilities, and areas such as those occupied by mills, shopping centers, industrial and commercial complexes, and institutions that may, in some instances, be isolated from urban areas.

There are only two urban areas in the ESZ, i.e. Pachmarhi and Tawanagar.

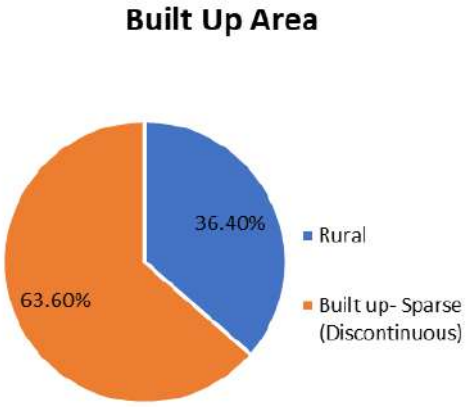


Figure 4-8 : Built up Area

3. Forest:

Forest is mainly sub-classified into three categories- Deciduous (Dry/Moist/Thorn), scrub forest & tree clad area.

A forest that is dominated by trees that lose their leaves in the fall is called a deciduous forest. Tree clad area is Covered with woods or trees.

Deciduous forest and tree clad area is classified in two categories: Dense/ Closed forest and Open Forest. Scrubland is a plant community characterized by scrub vegetation. Scrubland consists of shrubs, mixed with grasses, herbs, and geophytes. Scrublands may either occur naturally or be the result of human activity.

Maximum area is covered by forest i.e. 70% of the total area of the region is covered by forest area. As per level 2 category of land cover, deciduous forest is dominant in the region that cover 78% of the total area. Deciduous forest can further be subclassified in dense/closed and open deciduous forest. From the pie chart, more than 85% dense/ closed deciduous forest in the region that is distributed away from the settlement area while, open deciduous forest is distributed nearby settlement areas.

tree clad area is majorly distributed in area Sohagpur and Pipariya tehsil.

There is only 1.92% area is scrub forest in the region that is spread nearby Tawa reservoir and southern part of the region.

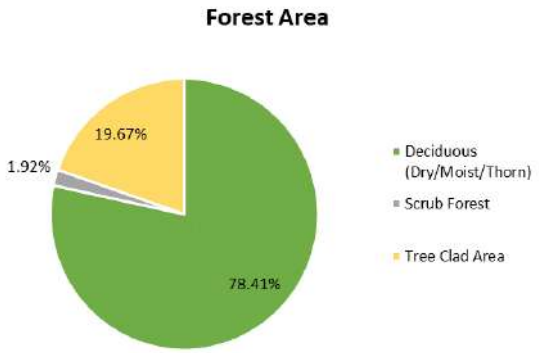


Figure 4-9 : Forest

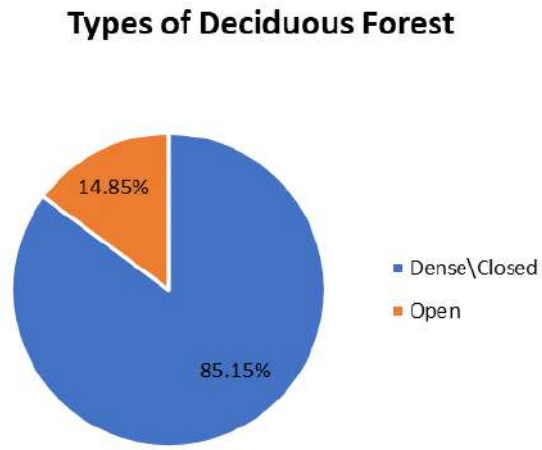


Figure 4-10 : Types of Deciduous Forest

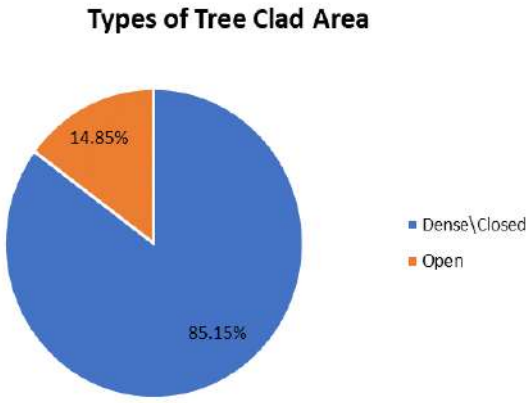


Figure 4-11 : Types of Tree Clad Area

4. Waste land:

Wasteland is that land which has been previously used, but which has been abandoned, and for which no further use has been found or a barren land. wasteland is mainly scrubland in the region.

Waste land is majorly distributed nearby settlement area of the region. Open scrub land is majorly seen in the region than dense scrub land.

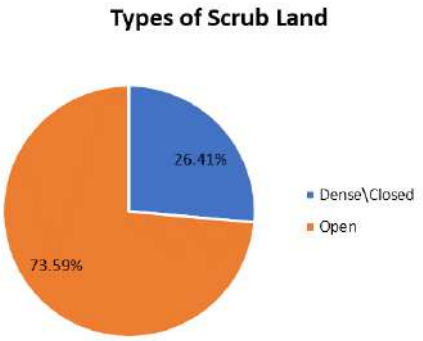
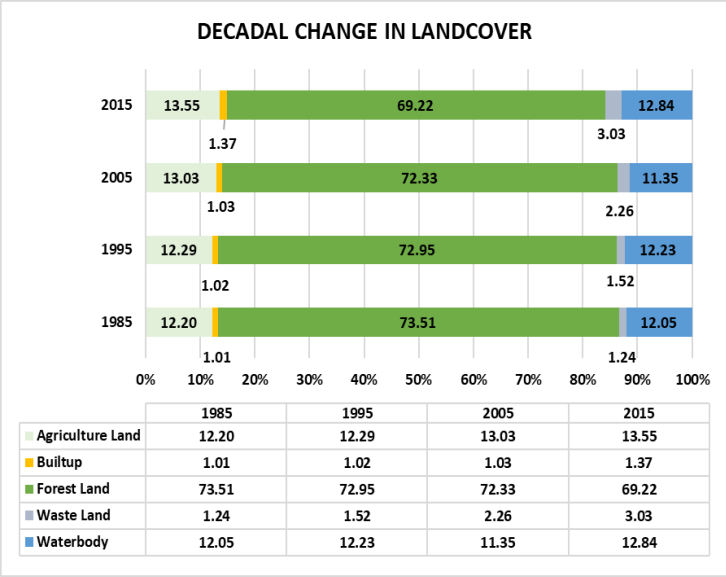


Figure 4-12 : Scrub Land

4.1.1 Decadal changes in Landcover of the region:

Decadal changes in land cover of the region has been studied for year 1985,1995,2005 & 2015. Land cover map for year 1985, 1995 & 2005 has been taken from The Oak Ridge National Laboratory Distributed Active Archive Center (ORNL DAAC). which is responsible for providing scientific and other users access to data from NASA's Earth Science Missions.

From the chart it can be seen that Agricultural land is increased in the region while forest area and waterbody area have been decreased in the region.



	1985	1995	2005	2015
Agriculture Land	12.20	12.29	13.03	13.55
Builtup	1.01	1.02	1.03	1.37
Forest Land	73.51	72.95	72.33	69.22
Waste Land	1.24	1.52	2.26	3.03
Waterbody	12.05	12.23	11.35	12.84

Figure 4-13 : Change in Land Cover

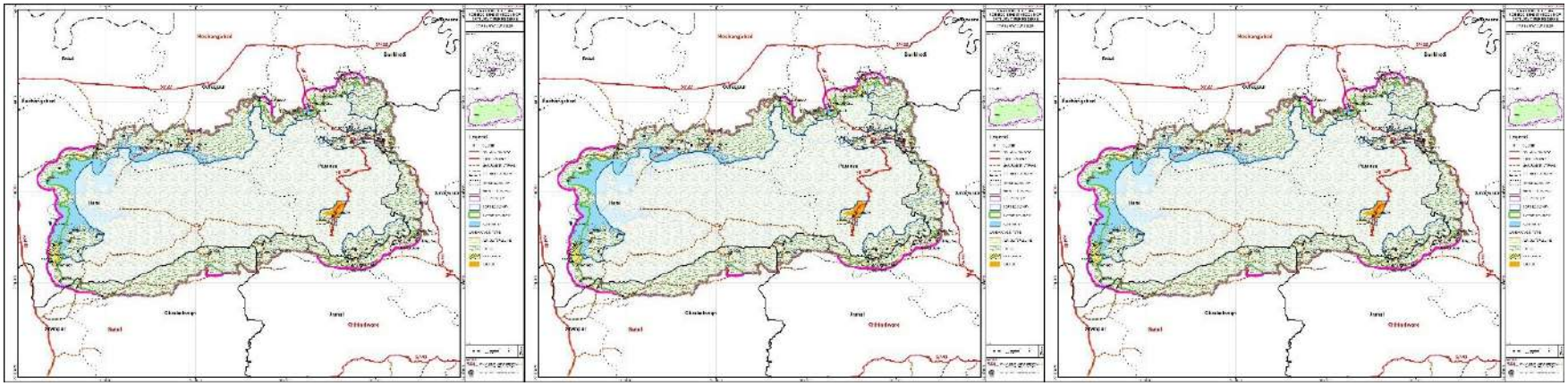


Figure 4-14 : Decadal changes in Landcover of the region

4.1.2 Suitability Analysis for Developable Land in ESZ area of Satpura Tiger Reserve

Developable land area refers to an area within an approved delineated area that can be feasibly developed in accordance with regulations of the concerned departments. A developable land area shall include the land area occupied by or associated with underutilized residential, commercial, industrial or institutional buildings or uses that have the potential to be recycled or converted into residential or mixed-use developments as determined in accordance with regulations of the authority of the area.

Developable land area shall not include:

a. land area that is coming under reserved or protected forest area.
b. Land area where slope is more than 20°
c. Land area that is coming under waterbody and 50 m buffer area from water body.

Based on the criteria described above, identified developable land is 14.80% of total Eco Sensitive Zone area. And available government land in developable area is 1.8% of total ESZ area.

Table 4-2 : Developable Land in ESZ area

Detail	Area (%)	Area (sq km)	Area (Ha)
50 m buffer area to waterbody	2.01	21.65	2165
Government Plot area in Developable land	1.80	19.38	1938
Developable Land	14.80	159.78	15978
Total ESZ area	100.00	1079.43	1,07,943

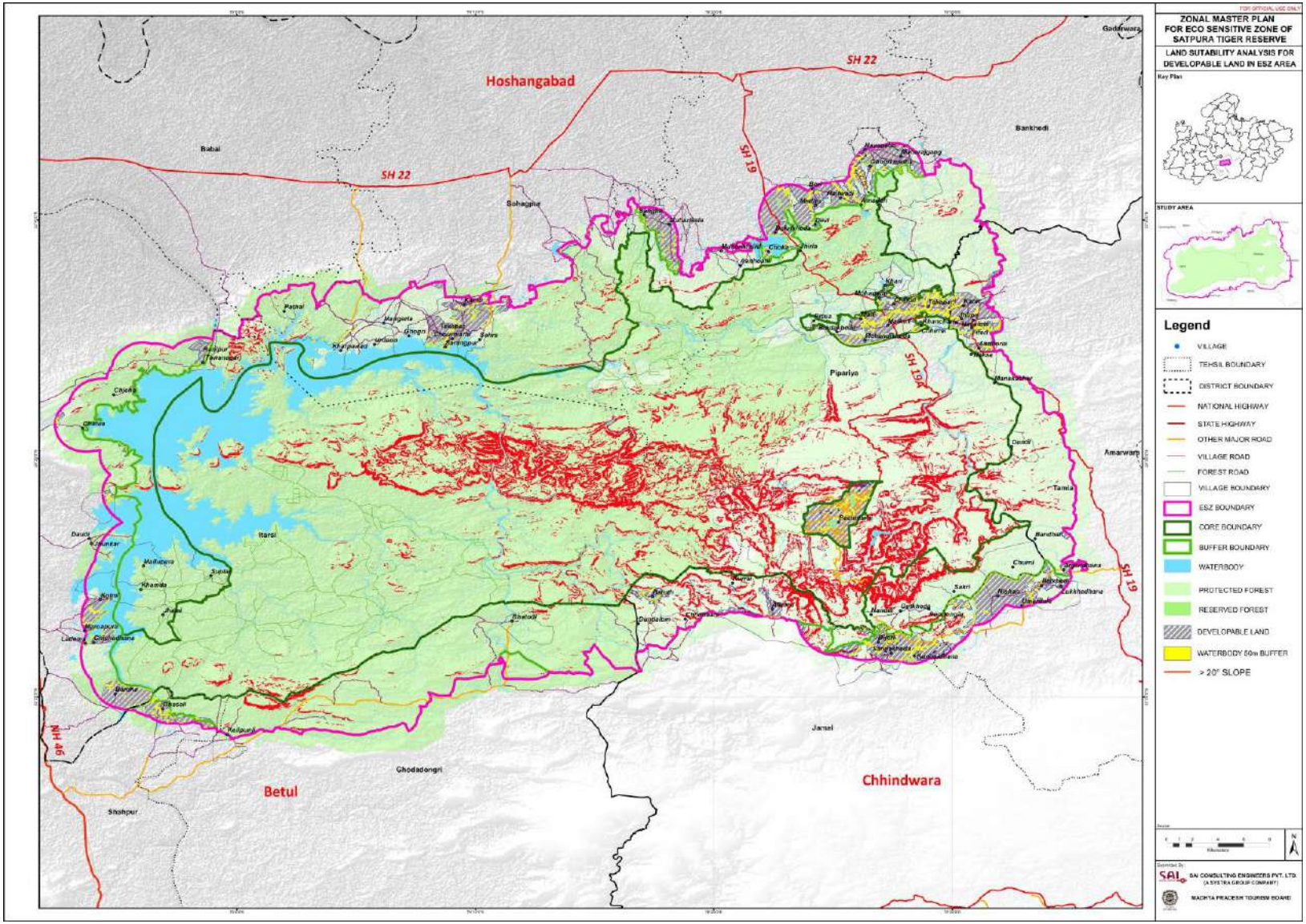


Figure 4-15 : Identified Developable land in ESZ area

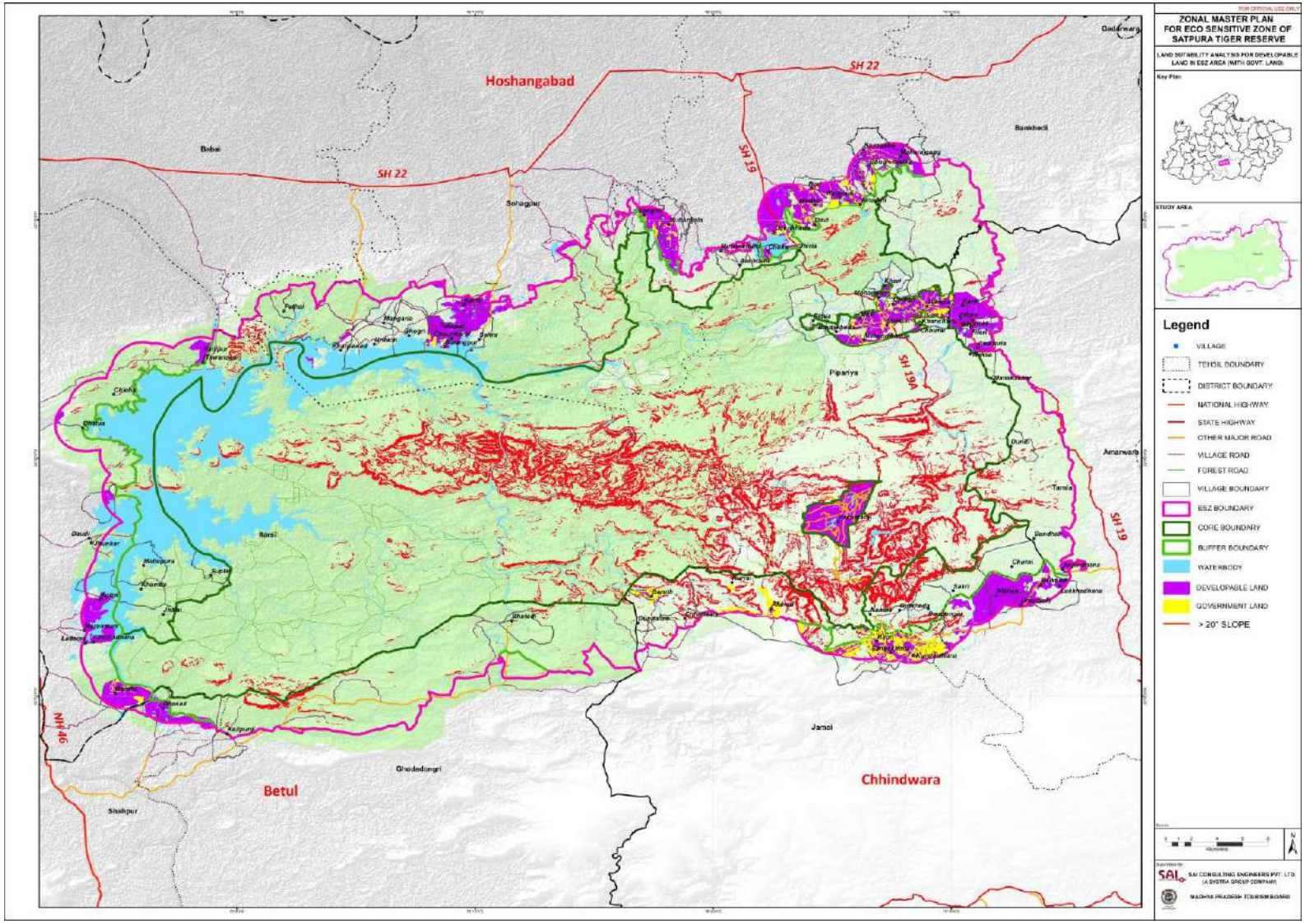


Figure 4-16 : Identified government plots in developable area

4.2 AGRICULTURE PRACTICES

Agriculture is the primary source of livelihood for about 58 per cent of India's population. During 2017-18* crop year, food grain production is estimated at record 284.83 million tonnes. In 2018-19, Government of India is targeting food grain production of 285.2 million tonnes. Milk production was estimated at 165.4 million tonnes during FY17, while meat production was 7.4 million tonnes. As of September 2018, total area sown with kharif crops in India reached 105.78 million hectares.[6]

Agriculture sector in Madhya Pradesh forms the backbone of its economy. It contributes almost one-fourth of the Gross State Domestic Product (GSDP) and is the main source of employment for over 70 percent of the population and constitutes about 60- 75 percent of the rural income.

4.2.1 Agricultural potential in STR

Traversed by the sacred Narmada river and its tributaries, Satpura tiger reserve represents rich agricultural land. The soil type of the STR is Shallow black soil and deep black soil. The STR falls into Satpura plateau and in some parts of Central Narmada Valley. Therefore, due to the soil type the majorly grown crops in this region are Wheat, makka and Jowar.

Locally rabi crops are known as "Unhari". Rabi crops dominate the rural economy to such an extent that the the Kharif crops known as "Sihari" were despised in the past. Rabi cultivation is almost synonymous with agriculture. Among rabi crops wheat is the main crop followed by gram, masoor, pea and linseed. Among the Kharif crops, paddy, jowar, maize, kodo kutki, tur and soyabean are the major crops sown.

From the secondary data (Census 2011) it can be observed that villages of Itarsi tehsil have major crops are makka (maize), dhan, udad & kutki. But during primary survey and discussion with REAO, Kesla, it has come to know that in current practices, makka is the major crop sown in the area followed by chana and wheat. He also mentioned that villagers are shifted to grow hybrid makka instead of desi makka. Few years back all the farmers used to grow desi makka in their farm but now hybrid makka have taken its place. The reason behind it is rate of hybrid makka is higher than desi makka, also production of hybrid makka is higher than desi makka. Production of desi makka has been reduced but still some farmers grow desi makka in some portion of their farm for their own consumption not for sale. It is said that desi makka is good for health as well as it is sweet in taste. Villagers make different food items with desi makka like roti, aata, dry makka etc. Another benefit of desi makka is it consumes less water than hybrid makka. And desi makka produces on organic farming practice which protects fertility of the soil. Moreover, villages near by Tawa dam, used to grow watermelon and other fruits and vegetables in Tawa submerged area during summer and winter season.

Dhan is major crop sown in the villages of Sohagpur tehsil, which is followed by wheat, chana and tuar. In villages of Pipariya tehsil wheat and soybean are major crops o the area which are followd by makka, chana, tuar. While, villages of southern region of STR major crop is makka. Masoor, Jawar, Tuar and Kutki are other main crops of the area.

For Gond and Korku tribes, Kodo & Kutki are their traditional crops. It is said that it is very nutritious food for pregnant women. Also, during their major festivals like holi, Diwali etc. different food items are made from these crops.

Due to lack of irrigation facility in the region, there are very few areas where agricultural activities are performed for entire year. In most of the region, crops are cultivated in mostly two seasons i.e., Winter and Monsoon. During summer season there are no agricultural activities are performed. From primary survey it has come to know that during summer season, villagers are migrates to nearby towns or nearby areas for daily wages or agricultural labour.

4.2.2 Value Addition in Agricultural products

Using Agricultural products agricultural by-products are made by the villagers. Corns are used for making Papad, Roti, Dalia, Aata etc. These products are also healthy to eat and provides health benefits.

There are various forest products collected by villagers like chirongi (aachar), mahuva, Tendupatta, harda, amala, etc. for their own consumption and commercial trading at local level.Chirongi is mainly used to make pickle. Also, there are many herbal benefits of amla, harda & chirongi that is used by villagers.

[6] Statistical data from www.mp.gov.in

4.3 AGRO FORESTRY INDUSTRIES AND REGULATION UNDER EPA, 1986

No such initiatives of agro forestry are observed during primary survey and consultations as well as in data collected from Government Departments. There is no presence of any hazardous or polluted industries in Eco-Sensitive Zone area.

4.4 INFRASTRUCTURE AND DEVELOPMENT ACTIVITIES, THEIR CLASSIFICATION AND REGULATION

Infrastructure in Eco-Sensitive zone of Satpura Tiger Reserve is developed under various schemes of state / center level. At present there is no reulations / restrictions on development of infrastructure in Buffer zone of Tiger Reserve. Following development activities are completed/ ongoing under schemes.

1. Roads - Pradhan Mantri Gramin Sadak Yojana
2. Water Connection – Nal Jal Yojana / Jal Jivan Mission
3. Housing – Pradhan Mantri Awas Yojana
4. Household toilets – Swachh Bharat Abhiyan

Apart from infrastructure various accommodation facilities for tourists are developed in Pachmarhi in Madhai area. At present, new development in Pachmarhi is restricted vide order of Honerable Supreme Court. A committee is regulating the retrofitting and reconstruction of old structure in Pachmarhi Town. For Madhai, a Development Plan is in draft stage, which will publish inshort time by Town and Country Planning, Madhya Pradesh.

4.5 STATE OF NATURAL RESOURCE GOVERNANCE

The natural resources in Protected area are govern under following legislation by concerned government authorities. .

1. Wildlife (Protection) Act, 1972

This act deals with the wildlife protection in notified areas of national parks and sanctuary. **Section 9** of the Wildlife (Protection) Act, 1972 has provision for prohibition of hunting of wild animals specified in schedule 1, 2, 3 and 4. **Section 17A** also prohibits picking, uprooting of specific plants. The section also specify that the Schedule Tribe who is residing in the area, can collect or pick plants for bona fide personal use. Special permission for purpose of education, scientific research, collection, preservation and display in a herbarium of any scientific institution; or propagation by a person or an institution approved by the Central Government in this regard can be provided under **Section 17B**. **Section 17H** defines any plant or part or derivative thereof has been collected or acquired from a sanctuary or National Park declared by the Central Government, such plant or part or derivative thereof shall be the property of the Central Government. **Section 27**, under which the restrictions like entry in forest area, report of fire, wild animal death to Chief Wild life warden and prohibition of molestation and teasing of wildlife in Sanctuary area. The Chief wild life warden may permit for activities like investigation or study on wild life, photography, scientific research, tourism and transaction of lawful business of any person residing in sanctuary area under **Section 28** of the Act.

2. Indian Forest Act, 1927

Section 25 provide powers to stop any public or private way or water-course in a reserved forest by the forest officer with the previous sanction of the State Government. Under **Section 26** person is prohibited who sets fire in reserve forest for any purpose, permits cattle to trespass, cutting or dragging of timber, clear up any land for cultivation and any other purposes and poaching of animals **.** As per **Section 35,** State government may by notification in the Official Gazette, regulate or prohibit cleaning land for agriculture purpose, the pasturing of cattles and the firing or clearing of vegetation in any forest or waste-land**.** Cattle trespassing in a reserved forest any portion of a protected forest which has been lawfully closed to grazing shall be deem to be cattle doing damages to a public plantation within the meaning of section II of Cattle-trespass Act, 1871 (1 of 1871), and may be seized and impounded as such by Forest-officer or Police-officer under **Section 70** of the Act.

3. Forest Conservation Act, 1980

The act came into force on 25th October, 1980 with aim to put restriction on dereservation of forest or use of forest land for non-forest purposes. **Section 2** of the Act deals with use of forest land for non-forest purpose. The non-forest use mean here as land used for purpose of the cultivation of tea, coffee, spices,

rubber, palms, oil-bearing plants, horticultural crops or medicinal plants and any purpose other than reforestation.

4. **Forest Conservation Rules, 2003**

Under the appendix of the rules, **Part- C (1.4)** provides brief about non-forest and forest purpose uses. Cultivation of tea, coffee, spices, rubber and palm is a non-forestry activity while Cultivation of fruit-bearing trees or oil-bearing plants or medicinal plants would require prior approval except the practiced species to be planted are indigenous to the area or it is a part of afforestation programme. Tusser cultivation does not require prior approval of Central Government as it is treated as forestry activity because it does not involve any felling of existing trees as per **Part – C (1.5)**. But Mulberry for silkworm rearing is a non-forestry activity. Surface or underground mining activities in area is required to have prior approval of Central Government as per **Part – C (1.6).**

5. **The schedules Tribes and other traditional forest dwellers (Recongnization of forest rights) Act, 2006**

The purposes of this Act is to secure individual or community tenure or both, shall be the forest rights of forest dwelling Scheduled Tribes and other traditional forest dwellers on all forest lands. Under **section 2** of Chapter 2, the various rights like right to hold and live in the forest land under the individual or common occupation for habitation or for self-cultivation for livelihood, community rights such as nistar, right of ownership, access to collect, use, and dispose of minor forest produce, other community rights of uses or entitlements such as fish and other products of water bodies, grazing (both settled or transhumant) and traditional seasonal resource access of nomadic or pastoralist communities, community tenures of habitat and habitation for primitive tribal groups and preagricultural communities, conversion of Pattas or leases or grants issued by any local authority or any State Government on forest lands to titles, to protect, regenerate or conserve or manage any community forest resource which they have been traditionally protecting and conserving for sustainable use and many more. As per **Section 3(2)**, Central Government shall provide for diversion of forest land for physical and social infrastructure facilities like school, hospitals, water supply etc. which involve felling of trees not exceeding seventy-five trees per hectare.

4.6 SECTORAL AGENCIES AND THEIR ROLE

As mentioned in the notification S.O.2538 (E), the Central Government has constituted a Monitoring Committee for a period of three years, for effective monitoring of the Eco-sensitive Zone, under sub-section (3) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986). The monitoring shall comprise of, namely:

1	Divisional Commissioner, Hoshangabad	Chairman;
2	Divisional Commissioner, Jabalpur	Member;
3	District Collector, Hoshangabad	Member;
4	District Collector, Betul	Member;
5	District Collector, Chinndwara	Member;
6	Superintending Engineer Public Works Department, Shahdol	Member;
7	Superintending Engineer Public Health Department, Hoshangabad	Member;
8	Superintending Engineer Public Health Department, Betul	Member;
9	Superintending Engineer Public Health Department, Chinndwara	Member;
10	Chief Executive Officer of District Panchayat, Hoshangabad	Member;
11	Chief Executive Officer of District Panchayat, Betul	Member;
12	Chief Executive Officer of District Panchayat, Chinndwara	Member;
13	Representative of the Town and Country Planning Department	Member;
14	Representative of the Pollution Control Board	Member;
15	One representative of Non-Governmental Organisation working in the field of environment to be nominated by the Government of Madhya Pradesh for a term of three years in each case	Member;

16	One expert in the area of ecology and environment from a reputed institution of University in the State to be nominated by the Government of Madhya Pradesh for a term of three years in each case	Member;
17	Member, State Biodiversity Board	Member;
18	Field Director, Satpura Tiger Reserve,	Member Secretary.

These committes involves following departments of

1. Environment;
2. Forest and Wildlife;
3. Agriculture and Horticulture;
4. Revenue;
5. Urban Development;
6. Tourism including eco-tourism;
7. Rural Development;
8. Irrigation and Flood Control;
9. Municipal and urban development;
10. Panchayati Raj;
11. Public Works Department.

The role of these involved sectoral agencies which are suggested in notification and also part of monitoring committee are as below:

1. The Monitoring Committee shall monitor the compliance of the provisions of this Notification.
2. The activities that are covered in the Schedule to the notification of the Government of India in the erstwhile Ministry of Environment and Forests number S.O. 1533 (E), dated the 14th September, 2006, and are falling in the Eco-sensitive Zone, except for the prohibited activities as specified in the Table under paragraph 4 thereof, shall be scrutinized by the Monitoring Committee based on the actual site-specific conditions and referred to the Central Government in the Ministry of Environment, Forests and Climate Change for prior environmental clearances under the provisions of the said notification.
3. The activities that are not covered in the Schedule to the notification of the Government of India in the erstwhile Ministry of Environment and Forests number S.O. 1533 (E), dated the 14th September, 2006 and are falling in the Eco-sensitive Zone, except for the prohibited activities as specified in the Table under paragraph 4 thereof, shall be scrutinised by the Monitoring Committee based on the actual site-specific conditions and referred to the concerned Regulatory Authorities.
4. The Member Secretary of the Monitoring Committee or the concerned Collector(s) or the concerned park Deputy Conservator of Forests shall be competent to file complaints under section 19 of the Environment (Protection) Act, 1986 against any person who contravenes the provisions of this notification.
5. The Monitoring Committee may invite representatives or experts from concerned Departments, representatives from Industry Associations or concerned stakeholders to assist in its deliberations depending on the requirements on issue to issue basis.
6. The Monitoring Committee shall submit the annual action taken report of its activities as on 31st March of every year by 30th June of that year to the Chief Wildlife Warden of the State as per pro forma appended at Annexure IV.
7. The Central Government in the Ministry of Envornment, Forest and Climate Change may give such directions, as it deems fit, to the Monitoring Committee for effective discharge of its functions.

5 SUB ZONAL TOURISAM MASTER PLAN-EXISTING SCENARIO

Madhya Pradesh State is blessed with the presence of vibrant culture, historical places, hill stations, and rich wildlife experiences. The state is Equipped with three world heritage sites, plenty of national parks, and wildlife sanctuaries. It has emerged as the true adventure destination of central India which has something for everyone.

The average annual tourist footfall in Madhya Pradesh is 39521843 tourist with about 350086 foreign tourist contributing the share of 0.93%. (Source: Tourist Dataset of MP by MPTB for year 2014 to 2018).

Best way to explore the wildlife of the state is to opt for jeep safari available at national parks. If your wanderlust doesn't just satisfy there, then the historical monuments and temples will surely fill you with so many incredible memories.

5.1 TOURISM IN STR

5.1.1 Classification of Tourism

Broadly tourism in Satpura can be classified into following three categories: -

- Nature/ Site Seeing tourism
- Wildlife tourism
- Religious tourism

All the three types of tourism have different sites, group of visitors and impact on PAs, so objective and strategies will also have to be different. Nature/ site seeing tourism is mainly confined in Pachmarhi plateau. Religious tourism is in Mahadeo-Chauragarh and Nagdwari Areas. Wildlife tourism is regulated and controlled keeping insights of Project Tiger and Wildlife Conservation. Tourism routes and sites are clearly defined in the Core zone. The destinations for the related category of tourism are

Table 5-1 : Classification of Tourism and their Available Destination at Core Area

S.No.	Type of Tourism	Destination
1	Nature or Site Seeing Tourism	Pachmarhi Plateau
2	Wildlife Tourism	Madhai & Churna
3	Religious Tourism	Mahadeo (Chauragarh) & Nagdwari

5.1.2 Nature and Wildlife Tourism

Nature and sight-seeing tourism is chiefly confined to the area around Pachmarhi town. Rest of the area in the Tiger reserve is allocated to wildlife tourism as given in the Tourism map. The next section describes various locations- its description which are frequently visited, additionally pointing towards current status of Infrastructure (i.e., includes both aspect at site and on access of site).

5.1.2.1 Wildlife Tourism Packages

There are few exclusive activities that make the visit to Satpura Tiger Reserve memorable and give unique identity to Satpura, amongst India's Wildlife tourism packages. The activities apart from the standard ones (Gypsy rides, Boating/Canoeing and Elephant Safari) are –

- Walking in specific routes in the core as well as buffer zones of the tiger reserve.
- Cycling through designated nature trails in Tourism zone.
- Setting up of Hides at strategically chosen spots in Tourism Zone for wildlife viewing.

These activities in addition to the standard tourism formula give the avid wildlife lovers an experience of the Jungle from all the different perspectives.

5.2 PLACES OF INTEREST FOR THE TOURISTS

The Places of interest is classified into 4 major categories which are namely pools, Glittering Fall, religious places and vantage viewing points.

DAZZLING POOL

1. Sunder kund (Saunder pool)
2. Tynam Pool (Rajyapal Sar)
3. Apasara Vihar (Fairy Pool)
4. Ramyakund (Irene Pool)
5. Pansy Pool (Vanashri Vihar)
6. Big Dam (Jamuna Kund)
7. Prabhu pool
8. Fallen kund or watermeet

GLITTERING FALL AND PERPETUAL STREAM

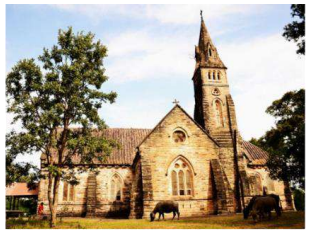
1. Bee fall
2. Apsara vihar
3. Rajat Prapat (Big Fall)
4. Dutchess fall (Jalavtran)
5. Dorothy deep (bharant neer)
6. Fraser Gully (jalgalee)
7. Tridhara (Piccadily Circus)
8. Raj Prapat
9. Jayshri prapat
10. Rajshri prapat
11. Pravas Prapat (Little Fall)

APICAL HIGHLAND AND LACKY HILL VIEW

1. Dhoopgarh Sunset point
2. Mayhew (eashar Shring)
3. Kitty crog (Sudarishya)
4. Machli ka maur
5. Monte Rosa (Astachal)
6. Docrag (Durgam Giri)
7. Titang Pahar
8. Mount Morris (Ekant giri)
9. Island rock (Dwell Shail)
10. The Hoggs Back (Vallabh Prastha)
11. Handikho
12. Lanji hills
13. Club hill (Rajgiri)
14. Rajendra giri(Panorama Hills)
15. Bainsa Sur Hill

EMINENT AND VANTAGE VIEWING POINTS

1. Priyadarshini or Forsyth point
2. Keating point (Sangam Door)
3. Crumpcrag (Sushma Sar)
4. Best view (shilanjali)
5. Malcolm Point (chauradarshan)
6. Collector crag (sadoor darshan)
7. Clematis point (Poorva Darshan)
8. Reechgarh
9. Helen Point (Denwa Darshan)
10. Asanna khud
11. Asanna (Drisdya)
12. Baisy Khud or Prati Dhwani
13. Blundell's Bluft (vatsalya)
14. Lady robert somi view (Vatsalya)
15. Land downe point (latshring)
16. Maine rock
17. Blundell's Bluft (Vatasalya)
18. Rorighat darshan



DEVOTIONAL AND DIVINE SACRED PLACES

1. Mahadeo – Chauragarh
2. Nagdwari
3. Catholic Church
4. Christ Church
5. Jata Shanker
6. Pandav caves
7. Chhota Mahadeo
8. Bada Mahadeo
9. Gupt Mahadeo
10. Ambabaye Temple
11. Chauragadh
12. The Military Church
13. Gufa jal
14. Anhoni Kund and Temple.
15. Vaidehimata Shiv Cave
16. Kal Bharav Mandir Gufa
17. The old Church

Figure 5-1 : Tourist Destinations

POOLS AND FALLS

The presence of large number of streams and pools which enumerate to the beauty of this place and some of these are truly suitable for swimming. Good waterfalls are not numerous where in flow of water is always small except rainy seasons. The table followed by description of such water bodies which provide the element for recreation.

Almost all the waterfalls, streams and pools mentioned have potential for being developed as picnic spots and swimmers paradise. However special attention may be given to develop Bee Dam, Duchess fall, Big falls, Water meet (Sangam), Fairy pool and Saunders pool.

DAZZLING POOL

1. Sunder kund (Saunder pool)
2. Tynam Pool (Rajyapal Sar)
3. Apasara Vihar (Fairy Pool)
4. Ramyakund (Irene Pool)
5. Pansy Pool (Vanashri Vihar)
6. Big Dam (Jamuna Kund)
7. Prabhu pool
8. Fallen kund or watermeet

1. Sunder kund (Saunder pool)

A giant rocky pool in Jambu deep stream, possess crystal clear water and the ambience of beautiful sal forest. It is 2 km trekking distance from Duchess fall towards south direction and picturesque trek to walk upon. The place is visited by about 150 people with the Indian share of 10-12%.

Figure 5-2 : Sunder kund (Saunder pool)

2. Tynam Pool (Rajyapal Sar)

A swimming pool constructed in British period, inaugurated by last British Governor Sir Henry J. Tynam of central provinces in 1945. This freshwater pool is very popular among tourist as it is surrounded by a titanic scenic beauty. It located at a distance of 1 km from Pachmarhi in satpura national park.

Figure 5-3 : Tynam Pool (Rajyapal Sar)

3. Apsara vihar

A pretty miniature bathing pool situated at 2 miles and 1.25 miles from Jai Stambh and Pandav caves respectively. Among all the kunds or pools, this pool is the easiest to approach and it's the best among the natural pool for swimming. Apsara vihar is the most praised swimming pool of the tourists. The place serves as marvelous picnic point where one sense contact with nature's paradise. Rare medicinal plants are also endorsed in the vicinity of this spot. One may delve into the valley considering many picturesque rocky ravines overpassing the drop to 'Rajat Prapat- the preeminent water fall in Central India'.

Almost all the waterfalls, streams and pools mentioned have potential for being developed as picnic spots and swimmers paradise. However special attention may be given to develop Bee Dam, Duchess fall, Big falls, Water meet (Sangam), Fairy pool and Saunders pool.

Figure 5-4 : Apsara vihar

4. Ramyakund (Irene pool)

A miniscule delightful pool was discovered in British era by Mrs. Irene Bose wife of Justice Vivian Bose, was named after her. A relatively less discovered tourist place, whose stream in the subsequent downhill forms the Duchess fall. It is located at the distance of 6 km from Pachmarhi.

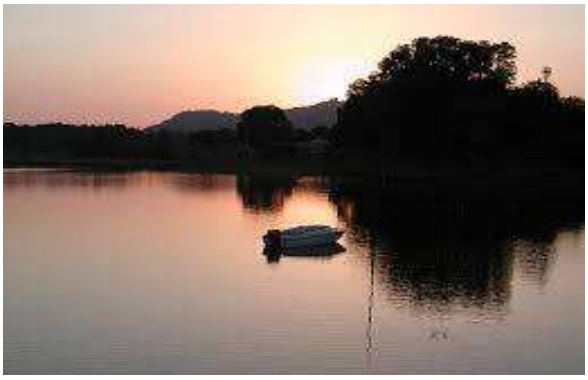


Figure 5-5 : Ramyakund (Irene pool)

DAZZLING POOL

1. Sunder kund (Saunder pool)
2. Tynam Pool (Rajyapal Sar)
3. Apasara Vihar (Fairy Pool)
4. Ramyakund (Irene Pool)
5. Pansy Pool (Vanashri Vihar)
6. Big Dam (Jamuna Kund)
7. Prabhu pool
8. Fallen kund or watermeet

5. Pansy pool (vanashri Vihar)

This is a stunning miniscule lake which offers the pleasant experience of boating. The bordering restaurants and eateries are the preeminent highlights of this place where one can enjoy snacks with a view of the lake. For a breezy evening, Vanashree vihar can serve as a terminal escape spot. There multiple activities such as swings, quad riding, horse and camel rides etc near the lakes offers to indulge and spend the quality leisure time. It is situated at a distance of 2 km.

Figure 5-6 : Pansy pool (vanashri Vihar)

6. Bee dam (jamuna Kund)

The stream here progress in an underground passage. A one of its rare kind of the place furnish thrill to an explorer. It is situated at a distance of 1.6 km.

Other pools like Prabhu pool, fallen kund are addons to beauty of water scenic views.

GLITTERING FALL

Good waterfalls are not numerous where in flow of water is always small except rainy seasons. The below list is followed by the description of all waterfalls, which provide an element for recreation.

1. Beefall

Figure 5-7 : Beefall

GLITTERING FALL AND PERPETUAL STREAM

1. Beefall
2. Apsara vihar
3. Rajat prapat (Big Fall)
4. Dutchess fall (Jalavtran)
5. Dorothy deep (bharant neer)
6. Fraser Gully (jalgalee)
7. Tridhara (Piccadily Circus)
8. Rajat Prapat
9. Jayshri prapat
10. Rajshri prapat
11. Pravas Prapat (Little Fall)

At an elevation of 300 feet, a spectacular fall in Jamuna stream. Bee dam is a source of water for Pachmarhi town. This a panoramic fall within Sal forest is the one of the most visited destination in the Pachmarhi. The bathing pool (i.e., kund) above the fall is very popular among tourist for bathing. It is located at a distance of 6 Km from Pachmarhi.

In context of infrastructure, it just possesses couple of changing rooms (recheck). No provision of sanitation both sewerage disposal and MSW. During site visit, a considerable plastic bottles and bags were found.

2. Apsara vihar

A pretty miniature bathing pool situated at 2 miles and 1.25 miles from Jai Stambh and Pandav caves respectively. Among all the kunds or pools, this pool is the easiest to approach and it's the best among the natural pool for swimming. Apsara vihar is the most praised swimming pool of the tourists. The place serves as marvelous picnic point where one sense contact with nature's paradise. Rare medicinal plants are also endorsed in the vicinity of this spot. One may delve into the valley considering many picturesque rocky ravines overpassing the drop to 'Rajat Prapat- the preeminent water fall in Central India'.

Figure 5-8 : Apsara vihar

3. Rajat prapat (Big Fall)

Rajat Prapat is the altitudinous water fall in Central India. It is located at a distance a km from Apsara Vihar. The entire path to Rajat prapat is rib boned through panoramic natural beauty. The stream flowing down through Apsara vihar drops over more than 350 feet in height forming Rajat Prapat. The finest season to visit is the monsoon, as when the rain droplets falls it conveys the view of pearls toppling from the sky. While, when the sunlight spill, it shines as comparable to silver, that is the elementary reason of popularly renowned as Rajat Prapat or Silver Fall

Figure 5-9 : Rajat prapat (Big Fall)

GLITTERING FALL AND PERPETUAL STREAM

1. Beefall
2. Apsara vihar
3. Rajat prapat (Big Fall)
4. Dutchess fall (Jalavtran)
5. Dorothy deep (bharant neer)
6. Fraser Gully (jalgalee)
7. Tridhara (Piccadily Circus)
8. Rajat Prapat
9. Jayshri prapat
10. Rajshri prapat
11. Pravas Prapat (Little Fall)

A low discharge of water throughout the year except in rainy season but despite this fact, it is worth witnessing. The pool beneath is deep and the water remains icy cool even during the summer. The pool is situated about one and half km from the railings

4. Dutchess fall (Jalavtran)

It is a glittering fall, which drops from the elevation of 330 feet. It is indubitable picturesque and refreshing spot. This fall was named after the daughter of J.S. Beresford, the first chief engineer of then central provinces (1889-1906). A little tough path does not scare tourists being there especially in summer. The approach is steep and difficult, trek strenuous for about 4 km to the base of fall first cascade.

Figure 5-10 : Dutchess fall (Jalvtran)

Almost all the water falls, and streams mentioned have potential for being developed as picnic spots and swimmers paradise. However special attention may be given to develop Bee Dam, Duchess fall, Big falls, Water meet (Sangam), Fairy pool and Saunders pool.

5. Dorothy deep (bharant neer)

An elegant little meandering stream. It flows through beds of osmunda fern and pink or flowering melastrom to a sudden vertical fall over-looked by a shady lodge in the rock. It is situated at a distance of 4.3 km.

6. Fraser Gully (jalgalee)

The stream which drains the eastern slope of Dhupgarh is spanned by a stone bridge. It is situated at a distance of 6.7 km.

7. Tridhara (Piccadily Circus)

The spot has emerged as prominent picnic spot, a place offers a reasonable flat surface for various recreational activities and scenic paramount view of the junction of the meeting of two streams. The spot is currently catering to the people of all age groups and possess a significant potential to be developed as the camping site.

Other Glittering falls like Rajat prapat, Jayshri Prapat, Rajshri Prapat & Pravas Prapat (Little fall) adds to the scenic beauty.

MOUNTAIN, HILL AND HIGHLAND POINTS

5.2.1 Brief description of important tourist attractions

5.2.1.1 Mountains and Valleys

The entire plateau is surrounded by hills of varying heights which have many peaks; some are not easily accessible, and passage is often blocked by and unexpected and impossible khud. The rock of Pachmarhi hills is rough and well weathered and offers some tempting work for the corpsman. It is necessary to caution especially after rains, when the rocks break easily. Details of the hills, mountains, and valleys and development potential which can be harnessed in the following section.

APICAL HIGHLAND AND LACKY HILL VIEW

1. Dhoopgarh Sunset point
2. Mayhew (Eeashar Shring)
3. Kitty carg (Sudrishya)
4. Machli ka maur (Machli-ka-maui)
5. Monte Rosa (Astachal)
6. Docrag (Durgam Giri)
7. Titang Pahar
8. Mount Moris (Ekant giri)
9. Island rock (Dwell Shail)
10. The Hoggs Back (Vallabh Prastha)
11. Handikhoh
12. Lanji hills
13. Club hill (Rajgiri)
14. Rajendra giri (Panorama Hills)
15. Bainsa Sur Hill

1. Dhoopgarh

Reaching an elevation of 1352 m above msl, Dhoopgarh is the highest peak of Central India. It is situated in core area of SNP. At a distance of 10 km from Pachmarhi connected by metal road. The name Dhoopgarh is derived as perceived that this peak witness presence of sunlight (Dhoop) for maximum period and historically, due to its strategic location, it was functional as the observation point (Garh) of Korku kings. The route to this place, provides a natural vantage view of surrounding hill ranges. It is very popular spot visited for panoramic view of sunset.

The following two tructure – Daak and Microwave tower are present which are described further. Daak bungalow which was constructed in the year 1885 by the provincial government has been taken over by STR in the year 2006. It is currently functional visitors center. Another structure, the Microwave tower of Railways was built in 1976 for railway communication on the Dhoopgarh plateau. As this tower is not currently functional for communication, railway authorities are asked to remove it from the said location.

Figure 5-11 : Dhoopgarh

2. Mayhew (eashar Shring)

An accessible, flat topped hill fine views from the top can be scaled without great difficulty on south west side. It is situated at a distance of 3.7 km from Pachmarhi.

3. Kitty carg (Sudrishya)

It offers the marvelous view of the rich natural landscape with barely a burdensome climbing in the hill. This unique splendid view from the top possess a potential to be celebrated for its splendid beauty. It is situated at a distance of 4.2 km from Pachmarhi.

4. Machli ka maur (Machli-ka-maui)

The Picturesque view of the prosperous landscape is offered by this point which can be mount readily from the east and south face. It is situated at a distance of 2.1 km from Pachmarhi

5. Monte Rosa (Astachal)

A conspicuous hill with dual summits, enumerate to its Uniqueness. In addition to its panoramic view of natural landscape. It is situated at a distance of 3.9 km from Pachmarhi

6. Docrag (Durgam Giri)

Although the access path of hill is visualized to be treacherous but principally effortless to climb. It delivers Picturesque and panoramic view of natural landscape. It is situated at a distance of 4.1 km from Pachmarhi

7. Titang Pahar

There is a meager steep rock climb up a miniscule ravine followed by about 2 km of levelled walk and succeed to the short climb, lead to the top of this hill. The potential to be most celebrated, spot for seneic beauty and the Picturesque and panoramic view of natural landscape It is situated at a distance of 7.9 km from Pachmarhi

8. Mount Moris

The place is basically a low ridge. It is situated at a distance of 3.2 km from Pachmarhi

9. Island rock (Dwell Shail)

This is a formidable looking mass standing out rather isolated with precipitous sides and a plateau of several 100 acers on the top. It may be climbed with difficulty from south side but not upto south western ridge. It is situated at a distance of 5.4 km from Pachmarhi

10. The Hoggs Back (Vallabh Prastha)

A ridge mining west to south west separating the plateau two unequal parts. It is situated at a distance of 7.9 km from Pachmarhi

11. Handikhoh

Handi Khoh is popular for its interesting peacefulness and its old-world appeal. According to myth there was a lake in the place called Handi Khoh. It was said that a harmful underhandedness snake, which was in actuality an evil presence, secure or shielded the lake. At some point of time, the place witnessed a battle between the Hindu God, Lord Shiva and the malicious snake. The liberation of energy arose from the anger of the war the lake dried, and the gorge was shaped.

Figure 5-12 : Handikhoh

On the way to Mahadeo, this deep narrow valley is situated at 4 Km. from Pachmarhi. This valley is a horse-shoe shaped ravine, the edge of which drops to 300 feet deep into earth with precipitous sides and contains many rare and endemic flora in it. The valley is rich in medical plants. Its name is derived from Andhi Khoh (Blind valley) or handikodh.

APICAL HIGHLAND AND LACKY HILL VIEW

1. Dhoopgarh Sunset point
2. Mayhew (Eeashar Shring)
3. Kitty carg (Sudrishya)
4. Machli ka maur (Machli-ka-maui)
5. Monte Rosa (Astachal)
6. Docrag (Durgam Giri)
7. Titang Pahar
8. Mount Moris (Ekant giri)
9. Island rock (Dwell Shail)
10. The Hoggs Back (Vallabh Prastha)
11. Handikhoh
12. Lanji hills
13. Club hill (Rajgiri)
14. Rajendra giri (Panorama Hills)
15. Bainsa Sur Hill

12. Lanji Giri

For adventure enthusiastic, lanji giri calls them to douse thei r thirst of adventure. Enjoying rock-climbing in its lonely terrains is a great fun for adventures. But the best joy here is to discover its underground passage.

Figure 5-13 : Lanji Giri

APICAL HIGHLAND AND LACKY HILL VIEW

1. Dhoopgarh Sunset point
2. Mayhew (Eeashar Shring)
3. Kitty carg (Sudrishya)
4. Machli ka maur (Machli-ka-maui)
5. Monte Rosa (Astachal)
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10. The Hoggs Back (Vallabh Prastha)
11. Handikhoh
12. Lanji hills
13. Club hill (Rajgiri)
14. Rajendra giri(Panorama Hills)
15. Bainsa Sur Hill

13. Rajendragiri (Panorama Hills)

Rajendra Giri Point is a picturesque spot and offers panoramic views of the rich natural landscape of Satpura range. The spot is named after Dr Rajendra Prasad, as he was a recurring visitor to Pachmarhi.

The Rajendra Giri Sunset point is the ideal place to relish a tremendous view of nature, notably the sunset. One can consume a quiet evening here with family and friends as it offers a refine setting for relaxation and unfurl.

Figure 5-14 : Rajendragiri

14. Bainsa Sur Hill

From the above description, it is clear that hill tops of almost all hills as stated provide fine views all around but finest of all the views to be obtained in the vicinities of Pachmarhi is that from Mahadeo and chauragarh.

Dhupgrah, the highest summit of Satpura range, is much more frequently ascended. The view to the west, looking over Bori Valley and Betul hills, is specially beautiful at sun set and in the early morning before sunrise. The precipitous Chouragarh is somewhat arduous ascent, but the scenery is more rugged and imposing. Handi-Kho also commands a fine view from its head. It has only one way up; and involves climbing up the face of an almost vertical rock by means of a creeper and there by extends a challenge to mountaineers.

All the hills around Pachmarhi are of great interest for mountaineers, and command beautiful views from there top, but amongst them the four mentioned above are of special interest. They can be developed by providing suitable facilities like drinking waterwheels, road side furniture and railing at suitable places

5.2.1.2 Vantage Viewing Points

Pachmarhi has large number of viewpoints from where one can enjoy the panorama of beautiful natural landscape all around. Almost all are easily accessible by Pucca road or bridle road.

EMINENT AND VANTAGE VIEWING POINTS

1. Priyadarshini or Forsyth point
2. Keating point (Sangam Door)
3. Crumpcrag (Sushma Sar)
4. Best view (shilanjali)
5. Malcolm Point (chauradarshan)
6. Collector crag (sadoor darshan)
7. Clematis point (Poorva Darshan)
8. Reechgarh
9. Helen Point (Denwa Darshan)
10. Asanna khud
11. Asanna (Drisdya)
12. Baisy Khud or Prati Dhwani
13. Blundell's Bluft (vatsalya)
14. Lady robert somi view (Vatsalya)
15. Land downe point (latshring)
16. Maine rock
17. Blundell's Bluft (Vatasalya)
18. Rorighat darshan

1. Priyadarshini or Forsyth point

It is the vintage sightseeing point, marks the place from where Pachmarhi was discovered by Captain James Forsyth (i.e. Bengal lancers officer). The Spot is famust for natural sightseeing of the Chauragarh and Mahadeo Peaks and its surroundings. Priyadarshini point is situated in Compartment No. 301 of the Pachmarhi Sanctuary. At a distance of 5 km from Pachmarhi on the Mahadeo road.

Figure 5-15 : Approach to Zirpa

2. Keating point (Sangam door)

This elevated point offers a pretty view by a glance on downside. The view can be portray as such that The valley towards water greet each other. It is situated at a distance of 4 km from Pachmarhi.

3. Crumpcrag (Sushma Sar)

The outclass view point possess a significant potential to be developed as a marvelous picnic spot provided that water is made available.

4. Best view (shilanjali)

This spot offers a wonderful picturesque and panoramic view of denwa river commencing from the Mahadeo to Dhupgarh. It is situated at a distance of 3.5 km from Pachmarhi.

5. Malcolm Point (chauradarshan)

An elegant scenic view of the natural landscape is obtained from Chauragadh. It is situated at a distance of 4.9 km from Pachmarhi.

6. Collector crag (sadoor darshan)

A picturesque view point seen by looking east down the valley of Banganga. It is situated at a distance of 4.9 km from Pachmarhi.

7. Clematis point (poorva Dashana)

This spot possesses dual utility of both the delightful view point and a celebrated picnic point. It is situated at a distance of 2.5 km from Pachmarhi.

8. Reechgarh

It is an astonishing natural amphitheatre in the rock, advance through a cave enthrall on the southern side. The exit is on the northern side towards Astachal, way to the narrow dry water course. It is a favoured haunt of bees. It is situated at a distance of 5 km from Pachmarhi.

Figure 5-16 : Reechgarh

9. Helen point (denwa darshan)

It commands astonishing view of upper gorges of the denwa river and the prosperous natural landscape. The place possesses a marvelous potential to be delivered as the prominent vantage viewing point. Distance data (NA)

10. Maine rock

A viewpoint from where view in the direction of chauragadh is exceptionally fine. It is situated at a distance of 4.9 km from Pachmarhi.

Other points which offers the beautiful picturesque and a panoramic view of the rich landscape of satpura are described below. The points experience a very rare tourist visits and are located in the close proximity of Pachmarhi, accessed through either pacca roads or bridle roads.

EMINENT AND VANTAGE VIEWING POINTS

1. Priyadarshini or Forsyth point
2. Keating point (Sangam Door)
3. Crumpcrag (Sushma Sar)
4. Best view (shilanjali)
5. Malcolm Point (chauradarshan)
6. Collector crag (sadoor darshan)
7. Clematis point (Poorva Darshan)
8. Reechgarh
9. Helen Point (Denwa Darshan)
10. Asanna khud
11. Asanna (Drisdya)
12. Baisy Khud or Prati Dhwani
13. Blundell's Bluft (vatsalya)
14. Lady robert somi view (Vatsalya)
15. Landdowne point (latshring)
16. Maine rock
17. Blundell's Bluft (Vatasalya)
18. Rorighat darshan

Figure 5-17 : Helen Point (Denwa Darshan)

Table 5-2 : Distance of Tourst Points from Pachmarhi

Name of Point	Distance from Pachmarhi
Asanna Khud	2.1 km
Asanna (Drisdya)	2.9 km
Baisy Khud or Prati Dhwani	4.9 km
Blundell's Bluft (vatsalya)	4 km
Lady robert somi view (Vatsalya)	4.9 km
Landdowne point (latshring)	
Rorighat Darshan	NA

Almost all the viewpoints possess development potential by providing roadside furniture, basic facilities and in some cases access.

MELA RELIGIOUS TOURIST SPOTS

5.2.2 Religious tourism

As a religious centre, Pachmarhi witnesses two important festivals viz. Nagoanchami and Shivratri, which need special mention because large number of people come to this place on these occassions.

There are two Religious places situated inside the core area which acts as the magnet to a huge number of pilgrims every year. It must be noted that as the paramount objective is the conservation of forest, these predominant religious tourism places are kept open for very limited period of time.

1. Mahadeo-Chauragarh

Mahadeo and Chauragarh places holds the privilege to be present in the second and third highest peaks of Central India respectively. These places witness the present of the famous shrines of Lord Shiva which are namely Chouragarh, Mahadeo and Gupt Mahadeo.

According to various literatures like Epigraphia Indica and the Indian antiquary journal, it was found that Mahadeo temple was situated in the Petha Pangaraka (Pagara) Jaagir and its association for pilgrims was of the of immense beliefs to the people of Nagpur and its nearby areas of Nagpur in Maharastra.

Mahashivratri fair is held in Phalgun Bedi 13 which generally falls in the month of February of March. The fair is held near Mahadeo caves about 8 Km. from Pachmarhi. The cave is a natural one with a fairly large opening. nearly 3 to 5 lakhs pilgrims come to attend the fair. The duration of mela is generally three days and most of the people come on Shivratri day.

The natural cave namely Mahadeo Gufa is present, the same place from where a miniature stream of Badganga originates. Chouragarh - the sizable sough religious place for pilgrim from the path outset from Bhura Bhagat to Nadia and Mahadeo respectively. It is perceived that once the prayers (i.e., wishes) of pilgrim are fulfilled by almighty, devotees visit here to offer tridents. The anterior stop for the devotees is at Bhura Bhagat near Sangakheda. Thenceforth, they head towards Chauragarh situated on the eastern side and undertake a steep climb for Mahadeo cave situated on the western side. A large fair is held on Maha Shivratri, for about a fortnight which is attended by four to six lakh devotees. The fair at present is managed by Mahadeo Mela Samiti which is chaired by Additional Collector, CEO janpad, Hoshangabad. It must be noted that, this place is accessible only on that time period where fair is organized. It must also be noted that the temporary infrastructure provision is provided which are not able to cater to the needs of the devotees. This place encounters issues in sanitation due to disposal of Sewerage and Municipal solid waste.

(*Note: Data request sent to CEO, Zilla Panchayat, Hoshangabad on 19 Aug,2019 waiting for the reply*).

DEVOTIONAL AND DIVINE SACRED PLACES

1. Mahadeo – Chauragarh
2. Nagdwari
3. Catholic Church
4. Christ Church
5. Jata Shanker
6. Pandav caves
7. Chhota Mahadeo
8. Bada Mahadeo
9. Gupt Mahadeo
10. Ambabaye Temple
11. Chauragadh
12. The Military Church
13. Gufa jal
14. Anhoni Kund and Temple.
15. Vaidehimata Shiv Cave
16. Kal Bharav Mandir Gufa
17. The old Church

Figure 5-18 : Mahadeo – Chauragarh

2. Nagdwari

The Nagpanchami fair is held in kajari village which is about 12 Kms from Pachmarhi with no specific area where the people congregate in Pachmarhi. The fair is held on shravan sodi 15 (July/August) for a period of three days.

Nagdwari cave is revered as the sacred place, the name is derived as it witnesses the presence of large stone ideal of Nagdewta (i.e., snake denotes as the ornament of lord Shiva). The cave has the dimension of about 100 feet long, 50 feet wide and the height at the center is 14 feet and can accommodate about 1500 people at a time. A fair is organized at the time of Nagpanchmi which attracts about 3-4 lakh devotees. The pilgrim path anterior point is Nagfani (i.e. lies at foothills of Dhoopgarh) Dhoopgarh road and subsequently move towards Nagdwar and Chintaman Pahar. The other sacred places in vicinity of Nagdwari are Swargdwar and Chintaman caves. It a belief that Nag pooja started at this place since 7th century A.D., Chalukya kings of Rajputs – the royal family used to come at this place to conduct rituals on special occasion. Nagdwari is a fort cognate cave and its circumference is about 5 km. There are 5 Devsthan around the cave. The devotees have strong belief that by performing the Nag pooja they will get rid of all evils in the life.

DEVOTIONAL AND DIVINE SACRED PLACES

1. Mahadeo – Chauragarh
2. Nagdwari
3. Catholic Church
4. Christ Church
5. Jata Shanker
6. Pandav caves
7. Chhota Mahadeo
8. Bada Mahadeo
9. Gupt Mahadeo
10. Ambabaye Temple
11. Chauragadh
12. The Military Church
13. Gufa jal
14. Anhoni Kund and Temple.
15. Vaidehimata Shiv Cave
16. Kal Bharav Mandir Gufa
17. The old Church

Inference:

The above two places are the predominant scared spot which attracts about 6-8 lakh pilgrims with the average of about 7.1 lakh of tourist which holds about 2.3% share of state's religious tourism.

Figure 5-19 : Nagdwari Mela

At present, there is no organized mela ground for this purpose. Since the fair is held in the off-season, it can supplement the income of the local traders, if organized efforts are made.

3. Catholic Church

This historic monument was built in 1892 by the British, the Catholic Church is a blend of the French and Irish architecture. Its Belgian stained-glass windows enumerate rare attraction and beauty to this consequential place. It has a cemetery attached to it, has graves dating since 1859 of World War I and II. It is evident from this place that Pachmarhi has emerged as an Idyllic summer retreat and develop into the summer capital of the central province from 1947- 1967.The influence of British architecture in Pachmarhi is witnessed in one of the delightful churches that is **Christ Church**. It must be noted that the

place retained its British flavour as very negligible things changed and attracted visitors from India and abroad over period of time. This historical monument can be summarized as "**A church that maintains the old-world charm**"

Figure 5-20 : Catholic Church

DEVOTIONAL AND DIVINE SACRED PLACES

1. Mahadeo – Chauragarh
2. Nagdwari
3. Catholic Church
4. Christ Church
5. Jata Shanker
6. Pandav caves
7. Chhota Mahadeo
8. Bada Mahadeo
9. Gupt Mahadeo
10. Ambabaye Temple
11. Chauragadh
12. The Military Church
13. Gufa jal
14. Anhoni Kund and Temple.
15. Vaidehimata Shiv Cave
16. Kal Bharav Mandir Gufa
17. The old Church

4. Christ Church

The Protestant Church of Christ, also known as the Christ Church, is a true-blue colonial architecture of the British era. Built around 1875 by the British, this church's architecture is fascinating, built on the Gothic lines, this church is a red sandstone structure, with the sanctum- sanctorum surmounted by a hemispherical, ribbed dome.

Twelve stained glass panes adorning the walls and alter the present exquisite depictions of Christ's last journey and were imported from Europe. The glass presents a magnificent view when the sun rays fall on it. The nave of the church has been constructed without a single pillar for additional support. Located on a gentle mount that is speckled with large trees, the surroundings give this edifice a noticeably peaceful character.

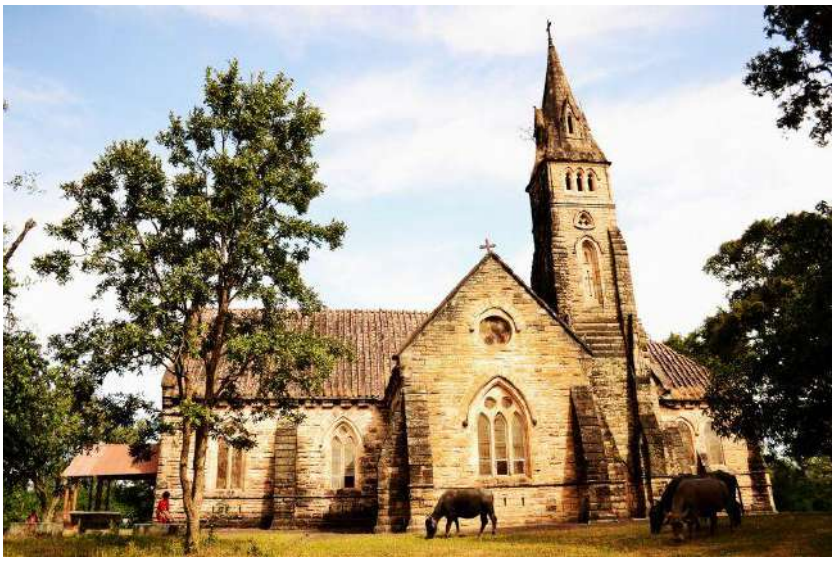


Figure 5-21 : Christ Church

5. Jatashankar

The Oldest shrine of the lord Shiva shrine conceive it as one of the most popular spots for tourist. The small Shiva shrine is hidden under a huge overhanging rock. There is a belief that that Lord Shiva while escaping from Bhasmasur took shelter here. Thus, it is perceived as the sacred paramount place for Hindu pilgrim. It is located in a close proximity of the city at a distance of 0.5 km.

The place is surrounded by vendors who sell the Ayurvedic products like honey, Powder, Sugar etc.

Figure 5-22 : Jata Shanker

It was even inferenced from the site visit; product lacked the trademark and possibility of the product to be mixed and such malpractices was found.

Mahadeo - Chauragarh

Situated inside Pachmarhi Sanctuary, these hills are second and third highest peaks of Satpura ranges, having MSLs. Reaching the elevation of 1328 and 1308 m above msl, Mahadeo and Chauragarh respectively are the second and third highest peaks of Satpura ranges. The places hold immense importance due to presence of three shrines - Bada Mahadeo, Gupt Mahadeo and Chauragarh. On occasion of Mahashivratri a very giant fair is organized, which attracts a sizable 3-5 lakh pilgrims. It is situated at a distance of 10 km from Pachmarhi.

6. Pandav Caves

There a belief that *Pandavas* stayed here during the *'Agyatvas'* in these five caves (Panch *madhi*) and place holds an eminent historic evidence as the name of town "Pachmarhi" is derived from this place. However, archaeological studies ascribe these caves to the Buddhist monastery of 6^{th}-7^{th} century AD, served for various religious and political activities. Presently, a delightful garden is spread over the landscape beside it and its top offers a bird's-eye view of Pachmarhi. This spot is just a km from Jaistambh.

DEVOTIONAL AND DIVINE SACRED PLACES

1. Mahadeo – Chauragarh
2. Nagdwari
3. Catholic Church
4. Christ Church
5. Jata Shanker
6. Pandav caves
7. Chhota Mahadeo
8. Bada Mahadeo
9. Gupt Mahadeo
10. Ambabaye Temple
11. Chauragadh
12. The Military Church
13. Gufa jal
14. Anhoni Kund and Temple.
15. Vaidehimata Shiv Cave
16. Kal Bharav Mandir Gufa
17. The old Church

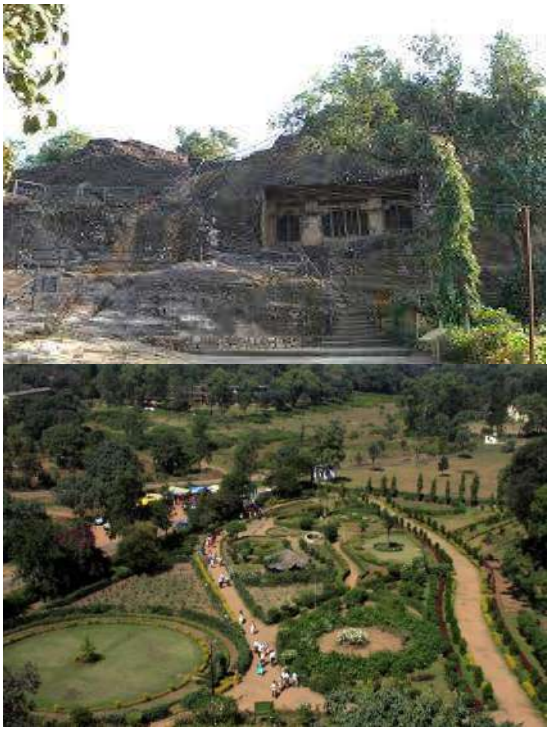


Figure 5-23 : Pandav caves

7. Chhota mahadeo

It is a small Shivling at a narrow point in the valley where rocks overhang the stream and water cascades down from a small spring. Approach is by the path from Tynam pool is mostly downhill. The distance from the Civil Hospital, Pachmarhi is about 3 km.

The accessibility to the Chhota Mahadeo demands onerous trekking. Pachmrarhi's town Solid waste is dumped near the entrance (i.e., near to site parking) of this place.

Figure 5-24 : Chhota mahadeo

DEVOTIONAL AND DIVINE SACRED PLACES

1. Mahadeo – Chauragarh
2. Nagdwari
3. Catholic Church
4. Christ Church
5. Jata Shanker
6. Pandav caves
7. Chhota Mahadeo
8. Bada Mahadeo
9. Gupt Mahadeo
10. Ambabaye Temple
11. Gufa jal
12. Vaidehimata Shiv Cave
13. Kal Bharav Mandir Gufa

Figure 5-25 : Solid Waste dumping

8. Bada Mahadeo

The Bada Mahadev Cave is located almost 10 km away from Pachmarhi. It is a Shrine of Lord Mahadeva or Shiva. It is a 60 ft long cave. It has shrines of Lord Brahma, Lord Vishnu and also of Lord Ganesha inside it. As per local beliefs, the Bada Mahadev Cave is the place where Lord Vishnu killed Demon Bhasmasura taking the form of Mohini, a celestial beauty. It has water dropping from the cave continuously and it gets collected in a pool. Taking bath in this pool is supposed to cure one of all evils. It is a beautiful place to explore nature and also for worship.

Figure 5-26 : Bada Mahadeo

9. Gupt Mahadeo

Gupt Mahadev is a 40 feet long cave, in which idols of Lord Ganesha and Shiva lingam have been enshrined. The path that leads to Gupt Mahadev cave goes from inside the Bade Mahadev. This narrow path can be passed only by eight people at a time. At the entrance of the cave, an idol of Lord Hanuman has been enshrined

Figure 5-27 : Gupt Mahadeo

DEVOTIONAL AND DIVINE SACRED PLACES

1. Mahadeo – Chauragarh
2. Nagdwari
3. Catholic Church
4. Christ Church
5. Jata Shanker
6. Pandav caves
7. Chhota Mahadeo
8. Bada Mahadeo
9. Gupt Mahadeo
10. Ambabaye Temple
11. Gufa jal
12. Vaidehimata Shiv Cave
13. Kal Bharav Mandir Gufa

10. Ambabaye Temple

A sacred place popular among the localites of nearby villages for their daily worship.

Figure 5-28 : Ambabaye temple

Other sacred places -Gufa jal, Vaidehimata Shiv Cave and Kal Bharav Mandir Gufa are present in the ESZ, which holds a prominent importance for daily worship by the villagers.

5.3 EXPLORED AND CONCIEVABLE TOURIST PLACES IN ESZ

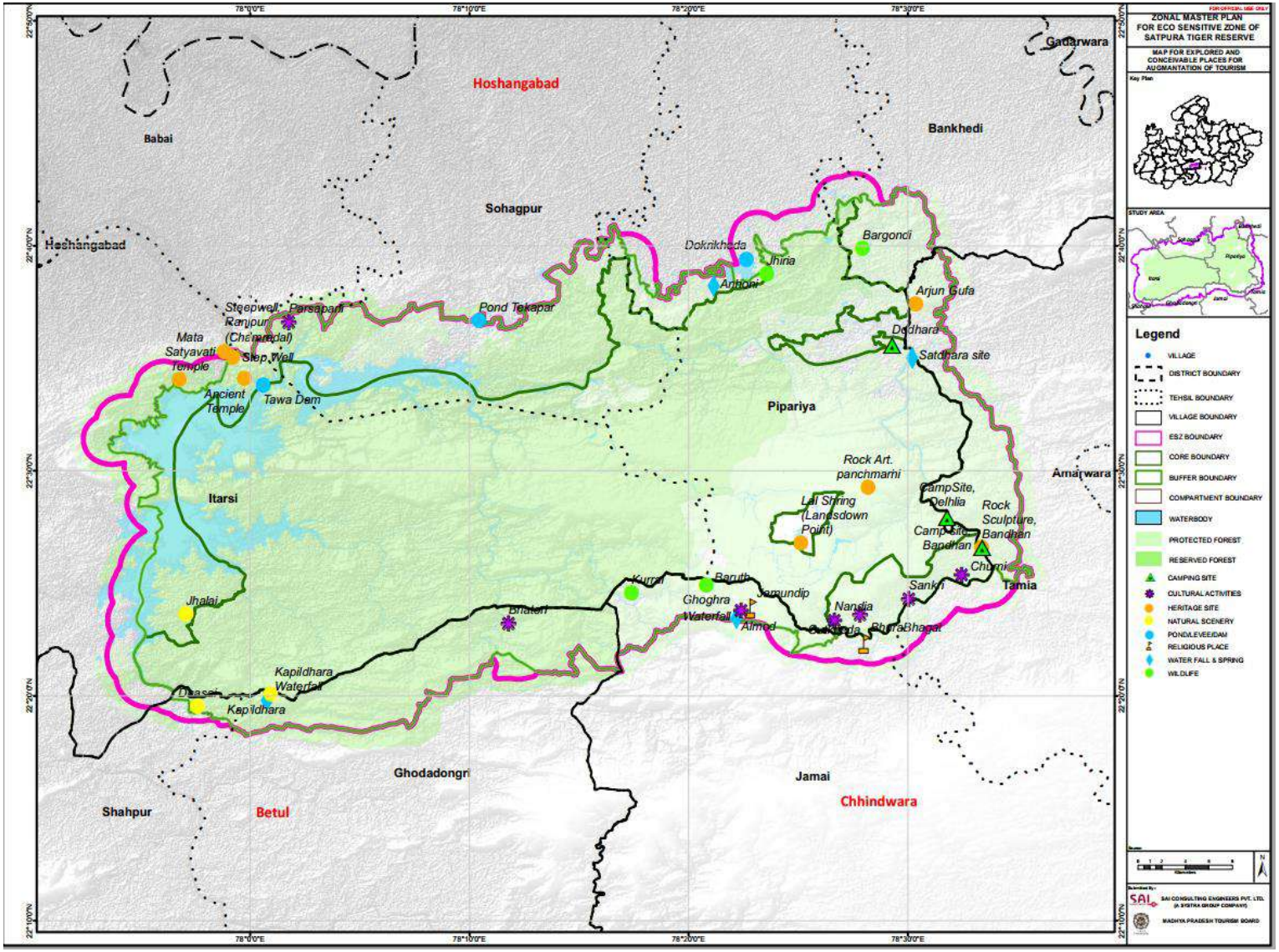
Based on the primary survey, primary stakeholder consultation and expert consultation which includes Indian and foreign archeologist, guides etc. The potential and conceivable places in ESZ were identified, mapped and documented. On the second stage, the information/list were augmented by the expert consultation of the Officers. The bellow section describes each of the spot in the detail.

Table 5-3 : Identified Sites and tremendous Tourism Development Potential Sites

Sr No	Name	Domain	Categories
1	Stepwell, Ranipur (Chamradal)	Heritage	Archaic Heritage Site
2	Step Well		Archaic Heritage Site
3	Mata Satyavati Temple		Archaic Heritage Site
4	Ancient Temple		Archaic Heritage Site
5	Lal Shring (Landsdown Point)		Archaic Heritage Site
6	Rock Art. Pachmarhi		Rock Art, a heritage place
7	Arjun Gufa		Ancient Rock Cave
8	Rock Sculpture,Bandhan		Heritage Place
9	Pond Tekapar	Pond, Levee and Dam	Splendid Miniature Pool
10	Dokrikheda		Incredible Levee
11	Tawa Dam		Marvelous Dam
12	Satdhara site	Water Fall and Spring	Glittering Water Fall with Visitation of elegant nature
13	Ghoghra Waterfall		Glittering Water Fall with Visitation of elegant nature
14	Kapildhara Waterfall		Glittering Water Fall with Visitation of elegant nature
15	Anhoni,Hot water Spring		Sacred and Splendid, Hot water Spring and temple
16	Kapildhara	Natural Scenery	Visitation of elegant nature
17	Jhalai		Visitation of elegant nature
18	Dhasai		Visitation of elegant nature
19	Jamundip	Religious place	Devotional Religious Place
20	BhuraBhagat		Sacred Religious Place
21	Dodhara	Camping site	Natural scenery and viewing point
22	Bandhan		Natural scenery and potential place for camping
23	Delhlia		Natural scenery and potential place for camping
24	Bargondi	Wild life and Natural Scenery	Conceivable Place for Wildlife sighting and elegant natural Scenery
25	Jhiria		Conceivable Place for Wildlife sighting and elegant natural Scenery
26	Kurrai		Conceivable Place for Wildlife sighting and elegant natural Scenery
27	Baruth		Conceivable Place for Wildlife sighting and elegant natural Scenery
28	Churni	Cultural Activities	Potential Area for promoting prosperous Cultural Activities
29	Sankri		Potential Area for promoting prosperous Cultural Activities

Sr No	Name	Domain	Categories
30	Gutkheda		Potential Area for promoting prosperous Cultural Activities
31	Nandia		Potential Area for promoting prosperous Cultural Activities
32	Parsapani		Strategic location to exhibit / endavour Vibrant Culture
33	Almod		Strategic location to exhibit / endavour Vibrant Culture
34	Bhatori		Strategic location to exhibit / endavour Vibrant Culture

The below section identifies the spatial representation of the potential and conceivable tourist places in the ESZ.



(Source: Primary Survey, expert consultation supplemented by the Stakeholders)

Figure 5-29 : Identified Sites and tremendous Tourism Development Potential Sites

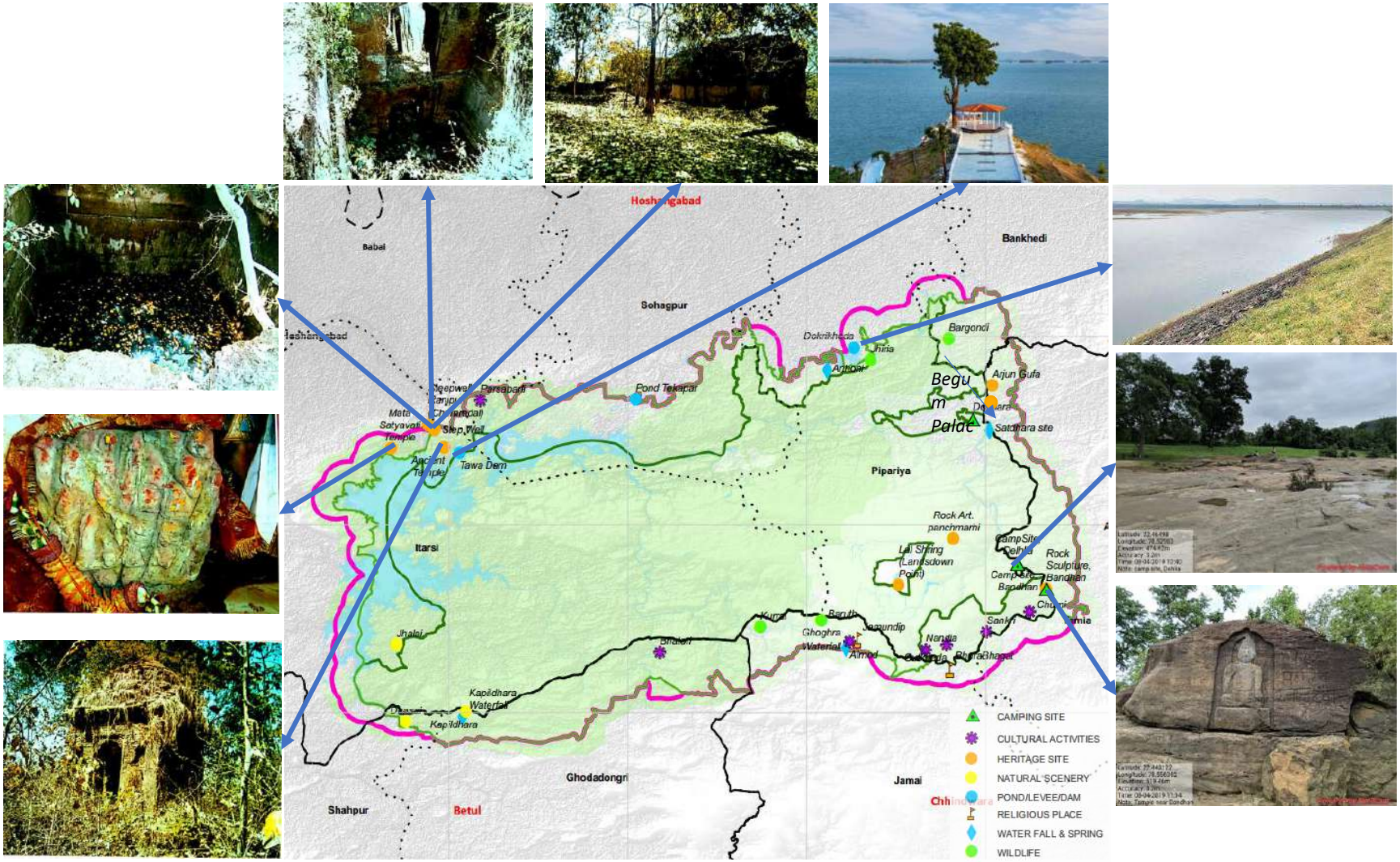


Figure 5-30 : Identified and Potential Sites for Tourism Development

1. Bison lodge

Captain Forsyth spotted the 'GAUR' herd (i.e., bison) at the place and thus named it Bison Lodge. The oldest colonial building of the Pachmarhi plateau built in 1862. It was functional as Head quarter of Forest department of CP & Barar for more than a half century.

It was converted into wild life museum-cum-interpretation center in 1986 with a focus on the history of Flora and fauna of Satpura tiger reserve. Currently, it is also operational as the Eco-paryatan Tourist Office, where ticketing for identified sites in forest region and facilitation spot to hire both Gypsy and Guides (i.e. both are mandatory)

Figure 5-31 : Bison Lodge

2. Jambu deep (Pachmarhi)

The place is encompassed by the natural scenic beauty, delivers picturesque view. It is Prominently famous for Vulture nest sighting.

Jambu Deep have beautiful rock paintings, a protected rock shelters reside to Chalolithic of an early historic period (4500- 1000 years) painted on white pigments. It's placed on right bank of a stream. It is accessed through a dense forest cover which is followed by crossing the stream. Due to the hardship, it is recommended to be extra conscious to visit in Monsoon and expects an individual to be strong enough to take adventures tracking.

3. GUFA at Karrer

Another cave, apart from Arjun gufa has been traced near Karrer. It is believed by the most aged people of Karrai village, that the place holds certain significant importance. And, the place has witnessed certain secrets or important segments of history. Thus, it is enjoyed by the villagers as a picnic point to spend the leisure time.

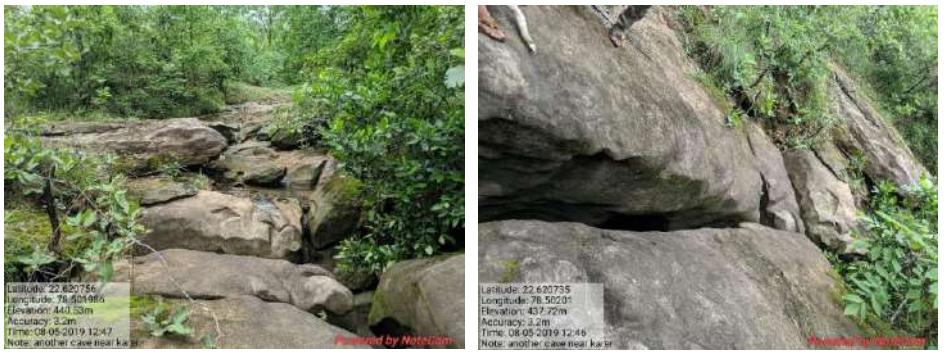


Figure 5-32 : GUFA at Karrer

4. Cultural Stretch

Different from another part of the ESZ, a stretch has preserved the rich cultural passed by ancestor since ages. The Tribal music and dance of Gond and Korku (i.e., saitam and dand) is practiced in this region at regular interval of times. Along with the traditional food, such as sweet kutki puddings (kheer) and kutki laddos.

The stretch includes villages from chunri to Nandia (i.e., Churni-sakri-Supdongar-gutkheda-nandia) are located at elevated location relatively lesser vistited by non-locatites and have preserved the rich culture windicating towards the significant development to be developed as the cultural safari or for various activities of the cultural domain.

Apart from, it there is presence of some location- Parsapani, Bhatori and Almond which possess strategic location to exhibit or endeavor the vibrant culture.

5. Goghara

The glistening water fall from the elevation of about 80 feet. The place is hardly explored by people (i.e., tourist) other than the villagers of almond. Although the stream fall is significantly low in the four months

of summer, the scenic beauty largely remains intact. During the eight months, the place offers a marvelous scenic beauty, and a gigantic waterfall presence makes it very unique. It must be noted that the, its access is a 6 km difficult walk from Almond, which includes 1-2 km on asphalt road, about 2-3 km of walk in undulated terain and the remaining portion from someone's farmland.

Figure 5-33 : Bison Lodge

6. Kapladhar water fall

A marvelous glittering Water fall, and the accompanied scenic beauty makes it a pleasant experience. It must be noted that the place is inaccessible during a significant time of the year. The presence of wildlife and locating of place demands the mandatory presence of guide and the movement to be in group.

During site visit, this place was not accessible and hence picturesque and access profiling is based on interaction with guide.

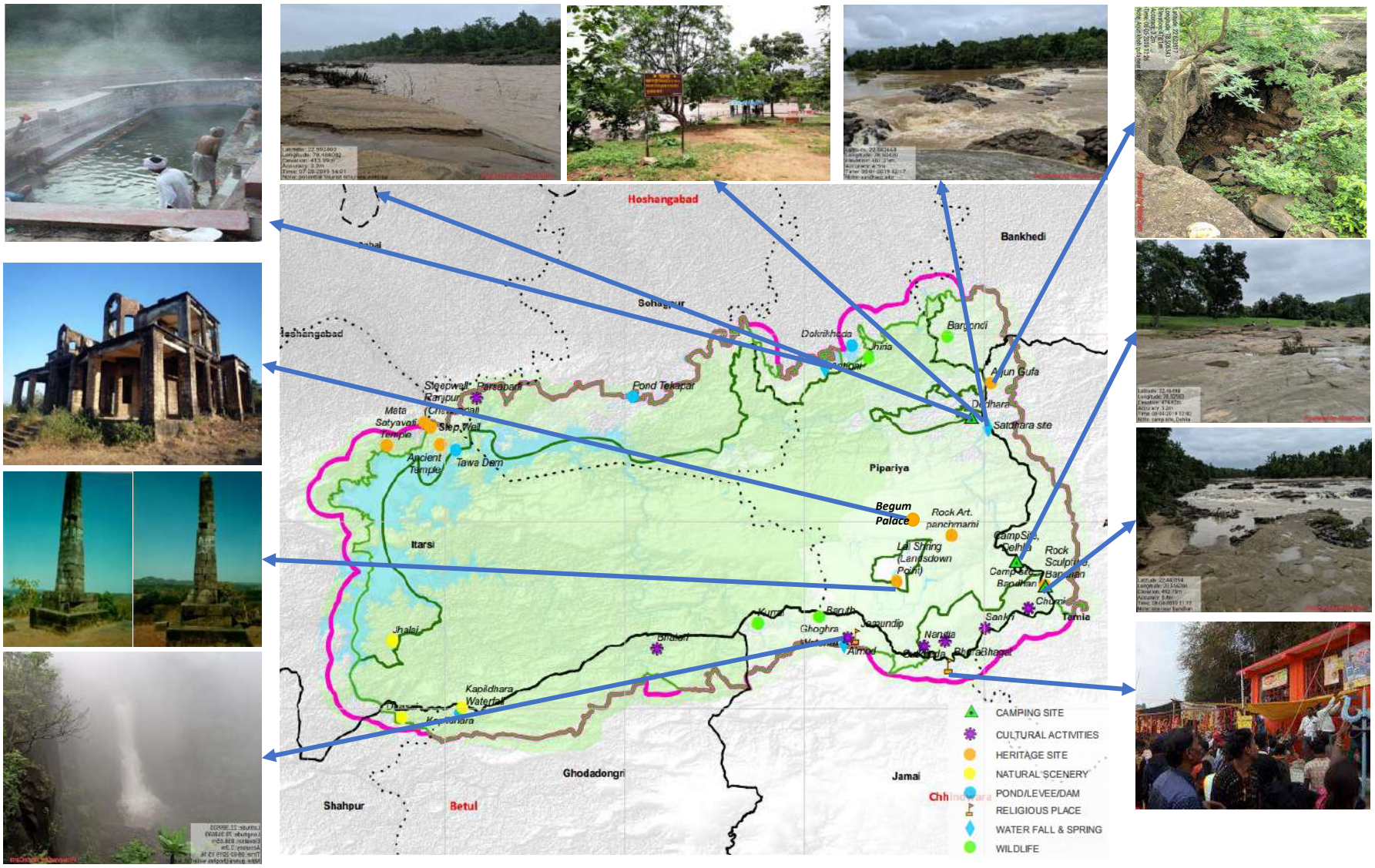


Figure 5-34 : Identified Sites and tremendous Tourism Development Potential Sites

1. Begum Palace

The remains of this archaic heritage structure situated in close proximity to ambey temple in Pachmarhi. It is located at a distance of 5 km from pachmarhi, popularly known as the queen's palace by locals. The place is of approximate dimension of 80 x 100 square feet. The built palace is built at higher elevation. This palace is built of stone, brick, lime, with an iron girder roof. It has six chambers, with fire chamber built in both the inner and inner part, along with the open doors in this palace. The palace is presently in the fractal state.

The notable information is not available regarding its vibrant history. However, with the interaction with the nearby localities, it encountered some myth regarding the existence of Ghost or evil souls which block its access.

Figure 5-35 : Begum Palace

2. Lat Singar:

This memorial – the Lat Singar is situated on the hill top along the western side of Pachachi. It is aforementioned to have been built during the British period and constructed of stone. It is situated on the top of the hill with there is a stone pillar with the height of about 25 feet. The stone plinth portion of the column is of approximate dimension 8x8 square feet, while the top portion is of dimension - 5x5 square feet.it must be noted that on top of that four semi-circular stone are present. This column may have been used as a map marking symbol of Pachmarhi. It is situated at a distance of 130 km from Pachmarhi, with approach road access,

Figure 5-36 : Lat Singar

3. Dodhara

Situated on the bank of river Denwa, the spotcaptures both the divergence and merger of two streams of Denwa. The bank's flat surface remains dry during the 8 months of the year. It is situated at a distance of 2-2.5 km from Chirrai. This steam also appreciates the possibility to undertake various projects for

providing water to Chirrai and other surrounding villages. During site visit, it was pointed that such demand along with some conceptualization has already been presented by the villagers/ their representation to the political representatives and other govt officers of irrigation department.

Figure 5-37 : Dodhara

4. Arjun Caves

A cave has another end opening on two sides out of which one is towards the Pandav Caves, another towards a secret location. The place witness presence of animals particularly Reech(Bear) and its believed the person who has entered and covered a distance inside, has never came out alive. It is at a distance accessible which vehicle during a majority of time in a year, situated at a distance of 4 km from karrai.

Figure 5-38 : Arjun Caves

5. Bandhan

This potential Camping and a picnic place are situated on the bank of river Denwa. The access is through Bridle road from the village Bandhan. Presently, it serves as a day picnic spots to the local villages which are marginal in numbers.

It must be noted that there is presence of the Rock Scriptures of Lord shiva. Although, there is a controversy regarding interpretation of the Rock work, which a group perspective it to be of lord shiva and another of Lord Budha. Even after carrying a detailed stakeholder consultation of surrounding villages in this regard, Substantial information regarding the origin of this sculpture was not found. This sculpture is worth visiting and possess potential to be a part of rich heritage of Satpura range.

Figure 5-39 : Bandhan

6. Karrai and Baruthi

A sincere effort to develop a grassland in this place and Baruthi, has made the place as a rich wildlife sighting experience with the presence of Indian Bison.

Apart from it, there is presence of the following locations – Jhalai, Dhasai, Bardogdi and Dhasai which occupies a strategic location to be developed as the conceivable place for wildlife sighting and experiencing elegant natural scenery.

7. Dehlia

It is the Terminal point of foryst Track. During the peak season, on the banks of river two tent are placed by a private operator. This tent have the occupancy of 80% during the season (i.e., four months).

It must be noted camping is predominantly undertaken by foreign tourist which is about 95% of total tourist (i.e., according to stakeholder consultation with the operator).

The site has a significant potential to be developed as tourist spot due to the

Figure 5-40 : Dehlia

8. Satdhara

Satdhara - Seven little cascades that Denwa throws while negotiating a rocky terrain. The place provides a nice little precursor to what we would expect at Pachmarhi.

Satdhara was an excellent location for camping. The camp site was next to a flowing river which then supposedly splits into seven streams (guess, hence the name Satdhara). It was picturesque, clean water flowing down the rocks.

Figure 5-41 : Satdhara

9. Choti Anhoni Kund and Temple.

In the proximity of the village of Anhoni is a hill stream with hot and boiling sulphur springs that flows along within the forest. Anhoni is principally known for its 'boiling water kund' (kund is a small pond) with beliefs like “A bath in the hot water spring cures skin diseases.”. A few boreholes to a depth of 635m have also been drilled here to conduct the study of the phenomena. It is encompassed with some temples around the Kund and a celebrated picnic spot. This hot water spring which situated in Sohagpur tehsil of Hoshangabad District at a distance of about 15 km from Dokrikheda village. The Kund is surrounded by a temple. From the villagers it has come to know that, this temple is more than 100-year-old. Also, there is a tree nearby the temple and Kund which is also more than 100 years old. There is also a mythological story behind Kund of Choti Anhoni. It is said that Lord Rama during his banishment, stayed here for some days. So, it has its religious importance along with hot spring water in the village.

Figure 5-42 : Anhoni Kund and Temple

10. Tawa Dam & Madhai

Tawa Reservoir is a reservoir on the Tawa River in central India. It is in Hoshangabad District of Madhya Pradesh state, above Baitul district. The reservoir was formed by the construction of the Tawa Dam, which began in 1958 and was completed in 1978. The dam provides for irrigation to several thousand hectares of farming land in Hoshangabad and Harda districts. It is also a big tourist attraction during the monsoon months. A cruise boat service has been started by tourism department for visitors to the dam and reservoir.

Madhai is located at the entrance of the most exquisite and beautiful forests in India - Satpura. Few places in the world can compete with its raw wilderness, absolute tranquility and the air of mystique.

Figure 5-43 : Tawa Dam & Madhai

11. Mata Satyavati Temple

Mata Satyavati Temple is situated at a distance of 12 km from Main Road on the way to forest enclosure Tawa Resort and at a distance of 29 km from Itarsi Tehshil, near ranipur village. This temple was constructed by the former forest officer. At these places, the 20th century AD Goddess Durga and other idols are shrined. An obscure statue 13th century AD presence at this place enumerate to its connotation. (*Source: Directorate of Archeology, Archives & Museums, Bhopal)*

Figure 5-44 : Mata Satyavati Temple

12. Ancient Stepwell and Palace Chamradal:

It is situated at a distance of 18 km from Main road on the way to Tawa Resort, near ranipur village and at a distance of 35 km from Itarsi Tehshil. An ancient stepwell here is built of brick of the dimension 25x25

square feet. In the very close proximity, there was the presence of an ancient palace, whose dimension is approximately of 80x50 square feet. It is perceived that both the heritage site belongs to 19th Sati

AD The stepwell and the palace are predominantly in the fractal state. (*Source: Directorate of Archeology, Archives & Museums, Bhopal)*

Figure 5-45 : Ancient Stepwell and Palace Chamradal

13. Ancient Temple :

Temple - This temple is situated at a distance of about 5 km from Tawa Dam, near Ranipur village. On the eastern bank of Tawa River, a temple is built of brick lime, whose construction belongs to 18th century AD. The temple of the approximate dimension 10x10 square feet, is mostly in the damaged state in the present time.

(*Source: Directorate of Archeology, Archives & Museums, Bhopal)*

Figure 5-46 : Ancient Temple

14. Ancient stepwell and palace –

This place is situated at a distance of about 7 km from Tawa Dame, about 100 m towards east along the access road near ranipur village. The palace was built up on approximate dimension 100x200 square feet.

It must be noted that both the ancestry site, the Palace and the stepwell are built of brick lime in 18th century AD. The stepwell was buildup of approximate dimension 20x20 square fit. The steps and rooms were built in the stepwell and the palace, but presently are mostly in damaged damage. (*Source: Directorate of Archeology, Archives & Museums, Bhopal)*

Figure 5-47 : Ancient stepwell and palace

5.4 IMPORTANT TOURIST LOCATION IN STR:

STR possess one of the most marvelous landscape and the only national part of the country which allows trekking activity in its jurisdiction enumerates to its uniqueness. The below tourist sport hold are significant and have served as an attraction as the Nature's paradise. All the spots other than parsapani lies in the core, parsapani is situated at the junction and offers a very high chances of sighting animals. The below section describes, the description and significance of following points.

5.4.1 Neemghan in core zone of STR

Situated in close proximity of Pachmarhi for the tourists who want a prosperous experience of wildlife and riparian zones. Neemghan is a deserted village converted into grass meadow. It is a unique plateau encompassed by steep hilly ranges on all side, with a higher possibility of wildlife sighting.

It can be accessed through the different approaches namely –

i. Pachmarhi **– From Pachmarhi on Pipariya road for about 9 km, followed by the wild drive (i.e., ride inside forest) for 20 km to reach Neemghan.**
ii. Anhoni **– The access to tourist is only during the drier parts of the year probably post November from Anhoni Barrier via Parraspani. The route from Ahhoni to Neemghan (i.e., Anhoni – Parraspani – Kukra – Jamun Jhiria – Neemghan) is approximately 28km.**
iii. Madhai **– The access from Madhai through Singhpura is 32 km long drive.**

On the way to Neemghan following are major points of attractions: -

- **Panarpani Butterfly Park**

About higher than 50 species of Butterflies were present in this park. In the near past, the conservation of medicinal plants through ex-situ was undertaken. This place was cherished by the late Dr Rajendra prasad, First Vice President of India and perceived it to hold a special position in his life.

- **Rock shelters**

A pre historic rock shelters of primitive and medieval age depicting warriors, hunters, horse riding etc., are present.

- **Coffee plantation**

The maiden coffee plantation of the region, which was heightened during the British period.

5.4.2 Parsapani in Buffer Zone of STR

A phrase which illustrate this place in outshine manner is as follows - “Parsapani - the Unchartered Part of Satpura Tiger Reserve”. Mostly tourist or wildlife enthusiast opt for Madai zone for better wildlife viewing but from the site visit/ stakeholder consultation with the resort owners, over last one year or so tiger population in Madai had shrunk considerably owing to depletion of chital and sambar population. As a result, most tigers inhabit the Churna range and the buffer portion of STR. Although, Madai is still one of the best places for leopard and sloth bear sighting.

As per the consultation with a local naturalist, it was pointed that Parsapani (buffer part of STR) is not only good for tiger sighting but is equally good for sighting other wildlife and instances

The landscape is simply astonishing, with the tall sal trees reaching out to the sky with their branches spreading in gay abandon. It was mentioned that at notable instances the animals like sooth bear, leapord and . It was even mentioned that tiger kill are observed considerably and thus on the same lines tourist astronomical chance of sighting animals. The below are the pics captured by the resort managers/tourist and were collected at the time of consultation, along with other details.

Figure 5-48 : Wild Animals sighting at Parsapani

The tourist at the time of stakeholder consultation mentioned it to be an outstanding day and they fall short of adjectives to explain that marvelous moment.

Parsapani hasn’t been explored much but is actually a utopia for the wildlife enthusiast. Parsapani’s USP lies in its rich biodiversity and exoticness and it will remain one of those places that were people will be willing to revisit in near about future.

Figure 5-49 : Tiger sighting at Parsapani

5.5 ANCIENT ARCHAEOLOGICAL TREASURE – THE DESCRIPTION OF THE ROCK ART

In terms of topography, the entire length of the southern part of Narmadapuram district is the plateau and hills of satpura. The mountain ranges that extends from the middle east to the west of Narmada and tapi are originally called the Satpura-Vidhyanchal mountain's seven son of satpura or satpura (seven turns). Its main division are known as Rajpipla,Kalibhit, Asirgarh, satpuda khas, Mahadev, Saleekdi. The main range of satpuda mountain or Mahadev mountain extends from east to west in the southern part of this district. The upper reaches of the sonbhadra and denwa river determine its southern boundary. To the east, this mountain range is seen in the Gadarwara and amarwara tehshils, across the dudhi river, again in nandankot and Chauragadh. The hills to the west of the Sonbhadra River, which extends along the banks of the Malati River, is known as the Malati Hills. In the north, the river Denwa flows touching them, separating the lower outskirts of the Satpura mountain range.

The Mahadev Giri region includes the Pachmarhi plateau and a cluster of surrounding hills, including Dhupgarh, which is 1350 m high Other important peaks are Chauragarh and Bel Kandhar which are 1316 m and 1152 m high respectively. Bel Kandhar is the finest hills of the entire Satpuda mountain ranges.

The rivers have always inspired humans to settle on their edges. Similarly, the Narmada River attracted humans to settle on its shores, both in the Paleolithic and the minor Stone Age. The period when mammals freely roamed, and the civilization of the earth was progressive through its early stage (Pleistocene). Prehistoric rock shelters and archaeological monuments of Hoshangabad district arrived into the light at several sites, predominantly as a part of Satpura National Park which includes Itarsi - Suktwa Range, Tawa, Bori, Churna, Denwa (Dalakhari), Matkuli, Pachmarhi East and Pachmarhi West Range and Adamgarh Hills.

These rock paintings are available in the deep forest areas located in the mountain ranges of the Satpura National Highlands and Tiger Reserves forest area. The Satpura mountain ranges extend about 900 kms east-west from Amarkantak to Asirgarh ascension of **Maa Salila Punya Daini** Narmada.

More than half of Hoshangabad district belongs to the Satpura mountain ranges. Mahadev mountain ranges are situated in this terrain on the Pachmarhi plateau. On the border of the Mahadev mountain ranges lies the Danava and Sonbhadra rivers. The Mahadev group includes the Pachmarhi plateau, Dhupgarh, Chauragarh and Belkhandar hills as well as a cluster of other hills. Mostly painted Shailashraya is in the valleys of the river Deva along its tributaries Sonbhadra and Nagdwari, along with Bori rivers flowing in the Mahadev mountain ranges.

Mostly the rock paintings are situated in the rock shelters in the upper verge (foothills) of the hills. This view of the use of such natural temples or coves on the sides of the hills by the primitive human to display their art-talent is not limited only in India, but also found in other places of the ancient world. In all the prehistoric picture accounts of the ancient India caves and caves, animals are more or less inscribed in the side view and in front of man than in any other situation.

Prehistoric humans were unaware of the art of animal husbandry, agricultural work and building construction etc. Therefore, they lived in the caves located in the foothills of the hills. They used to mark

the events of daily life affecting the mind and brain while living in these caves - caves, which express his interest, feelings and surroundings towards the formerly art.

ROCK paintings not only shows prehistoric human nature, life, life and external conditions of its social, economic and religious status. But there is also evidence of their creation - modesty, originality and aesthetic sense. It must be noted that the Animals in various styles are portrayed in rock paintings

The marking of human likeness is an excellent example of prehistoric human's inner aesthetic sense as well as his mental maturity. Even after centuries have passed, the form of rock paintings is neither lifeless nor the art form of the figures has disappeared. In the absence of script, the internal philosophy of prehistoric human beings is in the absence of script. The development of Indian prehistoric painting has been different from the development of painting in western countries. Early depictions in countries of Europe only depict animals. Whereas in Indian prehistoric depiction one finds depiction of animals as well as the human scene. In the paintings of western countries, humans are displayed like an innocent creature in front of animals, while the depiction of such an accident has not been recorded in India. Human figures are painted from the very beginning in all rock shelters of Madhya Pradesh. Prehistoric Shailasraya is centered in the hills of Vidhyachal, Satpura and Kaimur. These mountains made of prominence take the form of rock-cut by constructing the caves and caves. These rocks covered with dense forests have become a safe habitat for humans in the Stone Age and even after. On the roofs and walls of these rock shelters, primitive painters have depicted various works of animal, human, hunting, war and daily life according to their interest. In the prehistoric period, the predominant means of human food supply has been hunting. For this reason, the visuals of that games are marked with abundance in the rock shelters of all regions. Among them, the hunting scene of lion, cheetah, reindeer, sambar, deer, bison, rabbit, peacock etc. are common. But the scene of the hunting of the horse is rare, whose marking is visible only in the Adamgarh rock shelters. Masked human figures are available in relatively large numbers in Central-India regions. Most of these rock paintings depict human figures with deer, burrow, horse, mace, bear, bison, crocodile etc.

In the early life period, human interaction has been mostly with the animals, the animals were the source of Jadikajad's mojjj. This is the reason why large number of animal figures have been painted in the rocks. Accordingly, shar, dola, the Depictions of sambar, reindeer, deer, sighters, cows, monkeys, swans, etc are often mixed in all the Rocks. In prehistoric painting, the primitive man did not see the beauty of living his life - art aside from the important dimensions of life. But at the same time there is a difference in the method and style of each day. Depending on the difference in the style of drawing with the change of time, it can be kept at least as much certain specific drawings include Baru, Adh. Various elements of the body such as clothing, tools, fingers, hands and feet etc are displayed to be related to each other in such a way that they appear as a single unit. In Shailashreen Kikla, such pictures are found which also make them feel angry, like Bhakkoda Grief etc. It must be noted that it is observed that sometimes, exaggeration of this was also visible in those days. Most of the links available here are underlined by red line and days by white color. Apart from this, the detail of all the art is uniform in either black, sada, brown or red color. No depiction of Todari Rekha in Rekha style paintings is available in Savitian styles. All the pictures available are marked with a single line. Most are of biliteral type which is lined with red outer line and is white colored. Among the rocks obtained, most of the ion is seen in the rocks. Here the first-level paintings depicting rock paintings on the apex are of the Middle Stone Age, which is in the middle of the rock-cut Khai Rui Almaz, where there are cheekbones of wild boar and fish.

The Chatarth level paintings are painted white in yellow surroundings, the fourth level depictions can be associated with the vibrant historical period. In these paintings, the shield: the pictures of the warriors equipped with swords etc. are on the medieval level. The rock paintings found in this area are preserved in the rock paintings of Pachmadi and Adamgarh hills. These rock paintings depict many panoramic views of the life in the region. In these paintings, scenes of animals and birds from the thickest sticks, arrows, shields and soles are depicted. Scenes of domestic life are particularly found in the rock paintings of Pachmarhi, as well as other rock paintings found in them, the scenes of the game are abundant. Paintings of warriors with bow, arrow and shield, sword are found in abundance in Churna, Badkachar, Madadeva, Bori sanctuary, Bidni and Jala Shailashrias. Apart from hunting scenes, wild and mammal animals, birds and other fauna are also depicted. Amod - Pramod's scenes feature the dance head in dance

postures. Apart from this, rock paintings of Gaja - Rohan or Ashwarnaha are also found in these Kandas - Gafas. Apart from this, a wide variety of human figures, deva figures, insignia and diverse paintings are also inscribed in the rock formations. Scenes of honey accumulation are recorded in rocks and bad stone rocks. In the wild animal depiction, paintings of lion, cheetah, sambar, deer, reindeer, rabbit, sugar, etc. and in mammals, pictures of elephant, nilgai, cow, bull, fish etc. are also seen in Churna and Badini Shailashriya. Apart from hunting scenes, depictions of animals and birds are also mentioned.

5.5.1 Rock Art – A Glimpse about the Significance

The Pre-historic artists have drawn all forms of the life independently and complete in it. The artists embellished various composition on the rock surface. This composition predominantly comprises of scenes of various daily activities such as hunting, food gathering, fighting, dancing, and music, social and daily chores.

(Source: Primary Survey, consultation and was supplemented by Bradshaw Foundation)

Figure 5-51 : Rock Painting

The subject of head hunting in the antiquity of rock art is very uncommon (i.e., very rarely found). At present, in Indian rock painting art, Pachmarhi is the maiden place which contain this unique portrayal of head hunting. Peru in South America is the only other discovered place where scenes of head hunting are found (Bednarick 1989:73).

There is a total of seven depictions of headhunters, which were recorded for the first time by Bradshaw Foundation. It was carried out in bichrome colour, these depictions appertain to the historic period. The action portray in these scenes depict the brutality prevalent in the society of the Stone Age man. The head-hunting scene is very conspicuous in Lanji Hill shelter wherein a human figure is holding a human head in his right hand and portray running, and seeting back over his shoulder, perhaps forsee a chase and proactively trying to skip contact with his enemy. A mammoth and sturdy figure measuring 3 ft in length and 2.5 ft in width accomplished in light red colour has been depicted adds curiousity. A headhunter with identical description as portrayed in this content, has also been recorded at Swem Aam shelter.

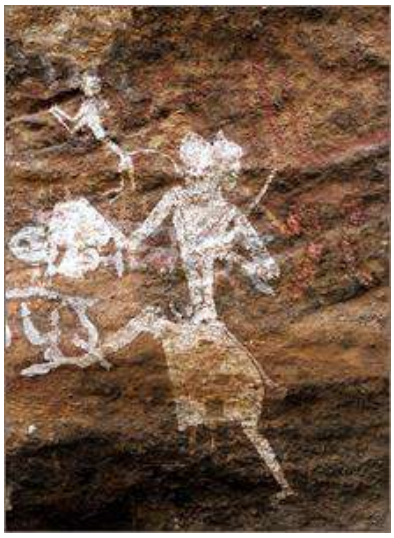


Figure 5-50 : Head Hunter Rock Painting

Another illustration at Nagdwari shelter portrays, a headhunter decorated in red lines, perhaps his tattoo marks, displays one carrying a well-dressed severed head. At Rajat Prapat shelter another additional illustration of four human headhunters running in the same direction, at varied different distances. This rhythmically and full of action illustration is eye catching to the visiters and delivers an insight into the historic life.

Awfully, all the illustration of headhunters is outlined with red colour and brimming with white colour.

Figure 5-52 : Rock Painting

The depiction possesses a sharp facial features and body proportionate. In ancient times, Headhunters were most respected as they ensured protection of the clan, group or community and accomplished victory over the enemies. Probably, that is the reason headhunters in deception are usually found well illuminated with headdress, crown, earrings and bodies covered from waist downwards up to the knees. The illustration portrays one carrying a severed head, which is well decorated with crown, earrings, headdress identical to its hunter, moving in the same direction and of fashion looking back over the shoulder. The action of beheading human beings didn't perceive of a ritual as such actions has not be illustrated in any of the caves. Probably, assumptions behind the prevalent brutality that beheading points towards severe punishment to the culprits who committed a atrocious crime of infringe the law of the land (i.e., right of property) of the tribes. It is mostly perceived as the head of the enemy was severed to ensure elimination and taken back home to confirm victory (i.e., as a symbol of victory) in its own jurisdiction and demonstrated as a war trophy.

Indian history has witnessd the instances of human sacrifice prevalent amongst the tribes in the country, notabely, by Gond and Korku tribes. The tradition of human sacrifice was present in Mahadeo Hill. "In the days that are forgotten, human victims hurled themselves over the rock as sacrifice to the goddess Kali and Kal Bhairav, the consort and son of Shiva, belived to the destroyer". Capt J Forsyth has mentioned about an eyewitness account of an incident of human sacrifice at Mahadeo Hills in his famous book **"The Highlands of Central India" (Forsyth J 1889:180-184).**

Figure 5-53 : Mythological Scenes

5.5.2 Mythological Scenes

The rock art reminiscent of mythological origin as of "tree worship, cross worship, symbols of mother Goddess and demons." Gordon has put forward that only a few Indian rock art paintings have a religious significance (Gordon 1958:109). "Symbols and so-called signs found in rock paintings in different parts of the world are difficult to decipher. It is a code we have been unable to crack", says Benerguer referring to European Ice Age symbols (Benerguer 1973:73).

The paintings of Pachmarhi, which are inclined to be pertinent to mythology, grouped as follows:

1 Mother Goddess
2 Tree Worship
3 Symbol
4 Cross Worship
5 Swastika
6 Labyrinth (chakra)
7 Geometrical figures
8 Superhuman or deity worship

9 Demons 10 Mythical Animals

Writing of inscriptions on the walls of the caves and shelters is corelated with Hermits and Monks who lived in isolation in anticident historic times. A trival practice in abounding hills and forest area inhabited by Hermits. These inscriptions facilitated in placing paintings of ancient period into chronological order. An expedition in Pachmarhi recorded two inscription at **Dorothy Deep** and Mahadeo shelter in Nagri scripth. The inscriptions in Mahadeo are too faded, which makes it unable to translat. While the inscriptions at Dorothy Deep is more legible which consists of two lines written in cremish white colour. It would appear to be from Nagri of probably 11th to 12th centuries. The translation, which does not make any sense, is as follows: "Lenamasiya a vri vri Dha Dha Ve She Jai Jai".

Some of the finest cave shelters or groups of shelters in close proximity to Pachmarhi are as follows:

- **Dhuandhar**, accessible through the footpath to Apsara Vihar, the paintings potray a group of archers with the exemplary Gond bun and hooped earrings which principally in white colour
- **Bharat Neer (Dorothy Deep),** possess a well-executed animal painting which was excavated in the 1930s yielded many pottery shards and microliths.
- **Asthachal (Monte Rosa),** there are four shelters with paintings, analogously early linear drawings.
- Situated in the northern side of **Jambu Dwip valley** are some six shelters with many paintings of animals and human figures, including a detailed battle scene.

5.6 INFRASTRUCTURE PROFILING

A detailed Study was carried out of the existing Infrastructure. The terminology “infrastructure” here represents Access to the site, the basic infrastructure and some supporting infrastructure. The Access to site includes – Access to Site Parking, Access To site (i.e., from Parking), and Parking; while basic infrastructure includes- Access to Safe Drinking Water, Sanitation (i.e., limited to toilets), Presence of Municipal Solid Waste & its collection facility; and last but not least the Adequacy of Security Infrastructure.

INFRASTRUCTURE PROFILING OF IMPORTANT SPOTS

1. Access

Access to Site Parking: It includes Asphalt road on the major roads, or the bridle roads on the minor roads as per the required guidelines, depending on condition which are sub-categorized into four categories.

- **Adequate** – The road is Flat, with very few or no pot holes. It facilitates -the passengers serviceability criteria of smooth trip without very minimum or no jerks.
- **Scope of Improvement**- The road is embedded with considerable number of pot holes or undulations, which in turn violates the passengers serviceability of experiencing smooth travel.
- Dilapidated – The road is possessing significant number of undulations, potholes and not accessible throughout the year.
- Atrocious- The absence of Road.

Parking: It includes the presence of designed/designated parking place, depending on condition which are sub-categorized into four categories.

- **Adequate** – The Tourist Site possess designated designed parking place which is in sufficient amount for parking of Tourist vehicles.
- **Scope of Improvement**- The Tourist Site possess designated non-designed parking place which is in sufficient amount or partial lag for parking of Tourist vehicles
- Dilapidated – – The Tourist Site possess neither designated nor designed parking place which is in sufficient amount or a notable lag for parking of Tourist vehicles.
- Atrocious- – The Tourist Site possess neither designated nor designed parking place which is either not available or a significant lag for parking of Tourist vehicles.

Access to Site: It includes pedestrian road, depending on condition which are sub-categorized into four categories.

- **Adequate** – The pedestrian street is complete with the required street furniture which includes presence of Dustbin, hand railing, navigational signs, places for sitting and other amenities, along with the condition of road.

- Scope of Improvement- The pedestrian street is incomplete (i.e., not totally complete) with the required street furniture which includes presence of Dustbin, hand railing, navigational signs, places for sitting and other amenities, along with the condition of road.
- Dilapidated – The pedestrian street lacks furniture (i.e., partially or totally). But additionally, the road is partially not accessible for the permitted period or pedestrian experiences notable difficulties to reach the sites, during certain time period of the year.
- Atrocious- – The pedestrian street lacks furniture (i.e., partially or totally). But additionally, the road is not accessible for the permitted period or pedestrian experiences notable difficulties to reach the sites, during certain time period or through the year.

2. Security and other infrastructure

Security: It includes the security infrastructure (i.e., CCTV cameras, the shelters to encounter all whether scenarios), and the security personal. Here, the security indicator incorporates facilities and actions for both security from animal conflicts/attack and that of human aggression on fellow tourist.

- **Adequate** – The adequate Infrastructure and personals are available covering the entire region and a quicker response time to compact any eventualities.
- Scope of Improvement- A lag in adequate Infrastructure and personals, thus probability to effectively compact any eventualities cannot be assure at every instances.
- Dilapidated – A significant lag in adequate Infrastructure and personals, thus probability to effectively compact any eventualities cannot be assure for considerable instances.
- Atrocious- Absence of adequate Infrastructure and personals, thus probability to effectively compact any eventualities cannot be assure for considerable instances.

Others (i.e., includes Information Desk, electricity and): It includes the Infrastructure which aims in enriching the experience which includes Information desk, and the information boards mentioning site description in multiple Languages along with other provisions.

- **Adequate** –The availability of all the mentioned Infrastructure and its serviceability criteria confrontation to other guidelines as the case may be.
- Scope of Improvement- A lag in the availability of all the mentioned infrastructure or its serviceability criteria in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be.
- Dilapidated – A significant lag in the availability of all the mentioned infrastructure or its serviceability criteria in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be. And, the instances where the provision is supplemented either partially or completely with private providers which is not inclusive to everyone.
- Atrocious- Absence in the availability of all the mentioned infrastructure or its serviceability criteria in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be, along with absence of the private providers.

3. Basic Infrastructure

Drinking Water: It caters to the provision of portable drinking water at various sites. This indicator map the provision of the drinking water depending on adequacy and quality of water into four scenarios as mentioned below:

- **Adequate** – The availability of adequate amount of water and its quality based on the CPHHEO or URDPFI guidelines as the case may be.
- Scope of Improvement- A lag in either availability of adequate amount of water or its quality based on the CPHHEO or URDPFI guidelines as the case may be.
- Dilapidated – A significant lag in either availability of adequate amount of water or its quality based on the CPHHEO or URDPFI guidelines as the case may be. And, the instances where the provision is supplemented with private water providers which is not inclusive to everyone.
- Atrocious- Absence in availability of water and its quality based on the CPHHEO or URDPFI guidelines as the case may be, along with absence of the private providers.

Toilets: It caters to the provision of toilets, a sub-section of sanitation at various tourist sites. This indicator map the provision of the toilets and its serviceability criteria into four scenarios as mentioned below:

- **Adequate** – The availability of adequate facilities of toilet and its serviceability criteria confrontation to the CPHHEO or URDPFI or other guidelines as the case may be.
- **Scope of Improvement**- A lag in either the availability of adequate facilities of toilet or its serviceability criteria in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be.
- Dilapidated – A significant lag in either the availability of adequate facilities of toilet or its serviceability criteria in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be. And, the instances where the provision is supplemented either partially or completely with private providers which is not inclusive to everyone.
- Atrocious- Absence in the availability of adequate facilities of toilet infrastructure and its serviceability criteria in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be, along with absence of the private providers.

Collection facility for waste: It caters to the provision of Collection of Waste, a sub-section of sanitation at various tourist sites. This indicator map the provision of waste collection facilities and its serviceability criteria into four scenarios as mentioned below:

- **Adequate** – The availability of adequate facilities for collection of both municipal and plastic waste which are efficiently performing in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be.
- **Scope of Improvement**- A lag in availability of adequate facilities for collection of both municipal and plastic waste which are efficiently performing in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be.
- Dilapidated – A significant lag in availability of adequate facilities for collection of both municipal and plastic waste which are efficiently performing in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be. And, the instances where the provision is supplemented either partially or completely with private providers which is not inclusive to everyone.
- Atrocious- Absence availability of adequate facilities for collection of both municipal and plastic waste which are efficiently performing in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be, along with absence of the private providers.

Changing rooms: It caters to the provision of changing rooms at recommended tourist sites. This indicator map the provision of the changing rooms and its serviceability criteria into four scenarios as mentioned below:

- **Adequate** – The availability of adequate facilities of changing rooms and its serviceability criteria confrontation to the CPHHEO or URDPFI or other guidelines as the case may be.
- **Scope of Improvement**- A lag in either the availability of changing rooms of toilet or its serviceability criteria in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be.
- Dilapidated – A significant lag in either the availability of adequate facilities of changing rooms or its serviceability criteria in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be. And, the instances where the provision is supplemented either partially or completely with private providers which is not inclusive to everyone.
- Atrocious- Absence in the availability of adequate facilities of changing room infrastructure and its serviceability criteria in confrontation to the CPHHEO or URDPFI or other guidelines as the case may be, along with absence of the private providers.

Table 5-4 : Dazzling Pool

Dazzaling Pool- Name of place	Access to site parking	Access (from parking to site)	Drinking Water supply	Toilets	MSW	Changing Room	Facility for collection of Waste	Security	PARKING
Sunder kund (Saunder pool)									
Tynam Pool (Rajyapal Sar)									
Ramyakund (Irene pool)									
Fallen kund (Sangam)									
Pansy Pool (Vanashri Vihar)									
Prabhu pool									
Big Dam (Jamuna Kund)									
Apasara Vihar									

(Source: Primary Survey)

Table 5-5 : Glittering Fall and Perpetual Stream

Glittering Fall - Name of place	Access to site parking	Access (from parking to site)	Drinking Water supply	Toilets	MSW	Changing Room	Facility for collection of Waste	Security	PARKING
Duchess fall									
Bee fall									
Rajat Prapat									
Jayshri prapat									
Raj Prapat									
Apsara vihar									
Rajshri prapat									
Dorothy deep (bharant neer)									
Fraser Gully (jalgalee)									
Tridhara (Piccadily Circus)									

(Source: Primary Survey)

Table 5-6 : Apical highland and lacky hill view

Lacky Hill and Avical Highland Name of place	Access to site parking	Access (from parking to site)	Drinking Water supply	Toilets	MSW	Changing Room	Facility for collection of Waste	Security	PARKING

Dhoopgarh Sunset point									
Mayhew (eashar Shring)									
Kitty crog (Sudarishya)									
Machli ka maur									
Monte Rosa (Astachal)									
Docrag (Durgam Giri)									
Titang Pahar									
Mount Morris (Ekant giri)									
Island rock (Dwell Shail)									
The Hoggs Back (Vallabh Prastha)									
Handi kho									
The Hoggs Back (vallabh Prastha)									
Lanji hills									
Club hill (Rajgiri)									
Rajendra giri(Panorama Hills)									

(Source: Primary Survey)

Table 5-7 : Eminent and Vantage Viewing Points

Divine and Solemn Religious Places Name of place	Access to site parking	Access (from parking to site)	Drinking Water supply	Toilets	MSW	Changing Room	Facility for collection of Waste	Security	PARKING
Nagdwari									
Mahadeo									
Chauragadh									
Chhota Mahadeo									
Jata Shanker									
Pandav caves									
The old Church									
The Military Church									
Gufa jal									
Bada Mahadeo									
Gupt Mahadeo									
Ambabaye temple									
Anhoni Kund and Temple.									
Vaidehimata Shiv Cave									
Kal Bharav Mandir Gufa									

(Source: Primary Survey)

Table 5-8 : DEVOTIONAL AND DIVINE SACRED PLACES

Name of place	Access to site parking	Access (from parking to site)	Drinking Water supply	Toilets	MSW	Changing Room	Facility for collection of Waste	Security	PARKING
Dohdhara									
Satdhara									
Jamundip (Pachmarhi)									
Ghoghra									
Jambudeep									
Dena									
Delhlia									

Name of place	Access to site parking	Access (from parking to site)	Drinking Water supply	Toilets	MSW	Changing Room	Facility for collection of Waste	Security	PARKING
Bandhan									
Kurrai									
Barud									
Cultural Safari									
Arjun gufa									
Pisua									

(Source: Primary Survey)

5.7 TOURIST ACCOMMODATION IN STR

The tourism in STR is the subordinated to the main objective of Wildlife conservation. The average annual tourist influx amounts to almost 2.5 lakhs each year. The maximum tourist influx is in the months of May-June and November-December.

The park management has a set of rules and regulations for tourism inside the park. Satpura Tiger Reserve provides different activities like elephant rides, boating/canoeing, bicycles and forest guides, apart from the interpretation facilities to the tourists at nominal charges. The park attracts nature lovers, young wildlife researchers, botanist, geologist, scientist, anthropologist, pilgrims, families etc. The park management also provides accommodation for the tourists. The forest Rest houses available for tourists are given below –

Table 5-9 : Forest rest House Available for tourist Accommodation in STR

S. No.	Name of RH /Place	Available Rooms
1.	Mahadeo RH, Pachmarhi	03
2.	Pachmarhi RH	04
3.	Bison Lodge, Pachmarhi	03
4.	Madhai	07
5.	Churna	08
6.	Matkuli	05
7.	Dhain	07
8.	Total	37

(Source: Satpura Tiger Reserve)

It must be noted, that from the above table, the two-forest rest house namely churna and dhain are available for tourist accommodation are situated in the Core area. the rooms for each of them are respectively, 8 and 7 aggregating to total of 15 rooms. The total carrying for the said accommodation assuming 3 people stay at a time in a room comes out to be 45. There are total 96 hotels in Pachmarhi and surrounding areas and 16 resorts in Madhai and surrounding areas. The list of hotels and resorts are annexed as annexure 5.2.

5.8 TOURIST INFLOW IN STR

Year wise Tourist Inflow from the year 2004 to 2018 which shows that the percentage of foreign tourist is very meagre from 0.27% to 2.06% in the **Satpura Tiger Reserve**

Table 5-10 : Visitation Data of 2005 - 2018

Year	Inflow of Tourists				Total Tourists
	Indian *(Numbers and Percentage)*		Foreigner *(Numbers and Percentage)*		
2005-06	1,54,826	99.73%	225	0.27%	1,55,051
2006-07	1,86,639	99.37%	228	0.63%	1,86,867
2007-08	1,93,088	99.24%	307	0.76%	1,93,395
2008-09	2,03,878	99.73%	543	0.27%	2,04,421
2009-10	2,26,552	99.37%	1,443	0.63%	2,27,995
2010-11	2,15,347	99.24%	1,654	0.76%	2,17,001
2011-12	2,72,169	99.11%	2,433	0.89%	2,74,602
2012-13	2,03,295	98.82%	2,428	1.18%	2,05,723
2013-14	2,20,861	98.84%	2,596	1.16%	2,23,457
2014-15	245582	98.82%	2931	1.18%	2,48,513
2015-16	254494	98.35%	4271	1.65%	2,58,765
2016-17	266114	97.94%	5609	2.06%	2,71,723
2017-18	345469	98.18%	6408	1.82%	3,51,877

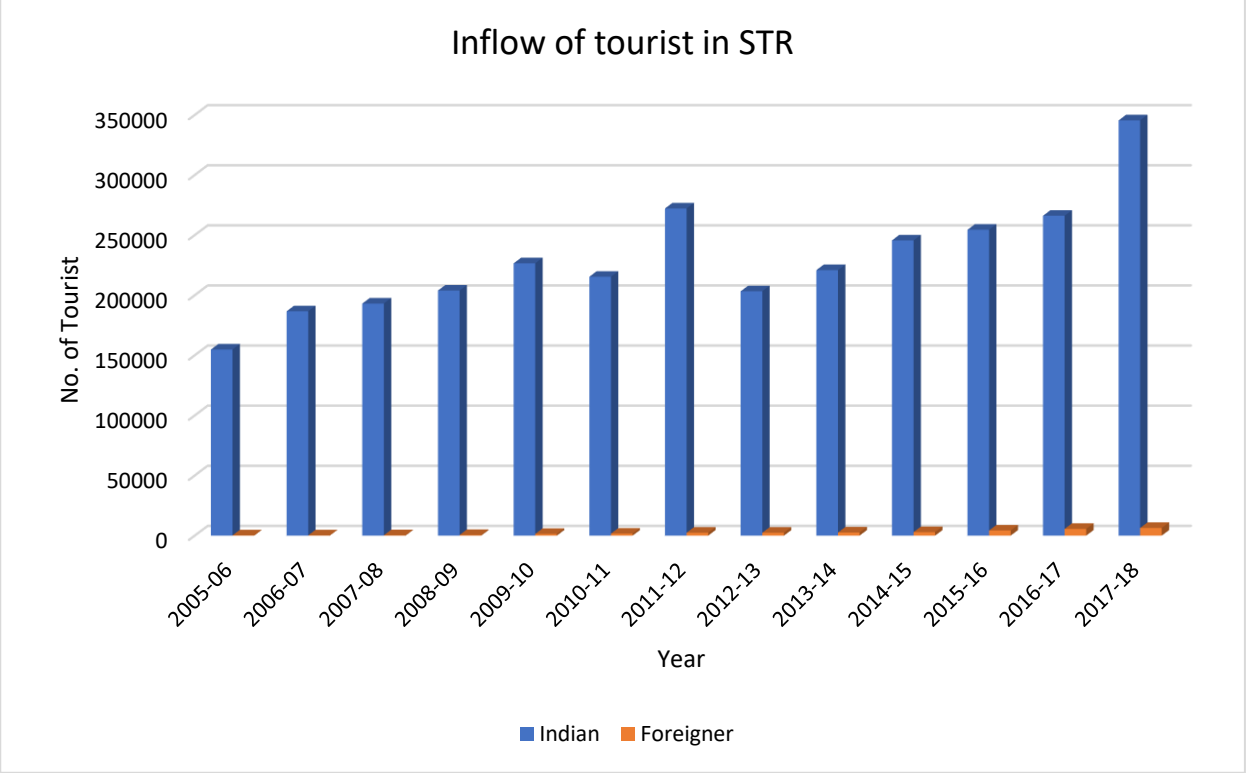


Figure 5-54 : Scatter Plot of Average Forest Fire Frequencies in Madhya Pradesh

(Source: Satpura Tiger Reserve)

In STR, throughout the trend is stable with an annual tourist count of approximately 2,32,300. It can be seen from the below graph that the maximum tourist inflow of 3,51,877 was recorded for the year 2018-19 and the minimum tourist inflow of 2,04,421 was recorded for the year 2008-9

Table 5-11 : Month-wise Influx of Indian Tourist in STR

Month	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Average
April	NA	12,757	15,070	14,806	17,550	15,640	15,165
May	NA	23,348	23,072	30,687	36,715	16,429	26,050
June	NA	30,505	26,462	38,141	38,325	26,165	31,920
July	16,701	15,025	13,429	21,589	19,850	10,360	16,159
August	11,864	15,245	14,052	19,663	1,994	10,852	12,278
September	5,618	13,402	8,001	8,372	1,062	10,866	7,887
October	5,642	29,254	15,184	27,859	12,075	19,793	18,301
November	17,805	15,658	22,426	25,855	25,774	28,438	22,659
December	17,385	26,264	21,382	31,141	26,402	27,732	25,051
January	27,401	18,793	13,387	18,898	20,239	19,363	19,680
February	18,169	17,204	10,281	15,873	13,730	14,124	14,897
March	10,794	11,103	13,571	10,329	23,935	21,099	15,139

(Source: Satpura Tiger Reserve)

The above graph shows the monthly variation of tourist. The average tourist influx for a particular year is 18,766. It is acclaimed that the maximum trend of tourist are in month of May-June in summer with aggregated monthly average of 28,295 tourist (i.e., about 1.5 times higher than monthly average) and another maximum trend of tourist in the month of Nov-Dec in winter with aggregated monthly average of 23,855 (i.e., about 1.3 times higher than monthly average).

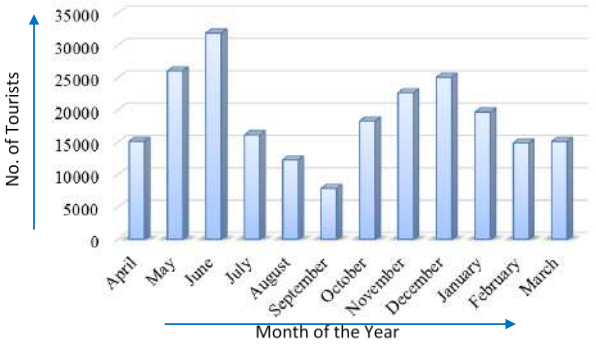


Figure 5-55 : Month-wise Influx of Indian Tourist in STR

Inference:

The increase in number of tourists is in direct co-relation with the school and colleges yearly holidays of Summer (i.e., at times referred as vacation).

The minimum tourist trend is in the month of Aug-Sep in monsoon with aggregated monthly average of 10,083 tourist. The step decline in number of tourists is in direct co-relation with the national park closed in monsoon season (i.e. from mid-june to October starting.).

Table 5-12 : Month-wise Influx of Foreign Tourists

Month	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Average
April	NA	76	89	245	223	384	203
May	NA	31	79	17	101	123	70
June	NA	29	25	10	21	53	28
July	7	12	21	15	11	6	12
August	10	9	19	21	0	22	14
September	9	19	40	28	0	20	19
October	39	51	75	124	47	155	82
November	69	95	265	179	299	478	231
December	66	109	98	177	188	201	140
January	26	178	167	291	343	169	196
February	103	509	375	474	356	421	373
March	80	268	316	779	624	564	439

(Source: Satpura Tiger Reserve)

The above graph shows the monthly variation of tourist. The average tourist influx for a particular year is 151.

Inference:

It is acclaimed that the maximum trend of tourist are in month of Feb-March in winter with its aggregated monthly average of 406 tourist (i.e., about 2.7 times higher than the monthly average). The increase is in the winter season, it can be corelated that foreigners find the atmosphere of this place very pleasant.

The minimum tourist trend is in the month of Aug-Sep in monsoon with aggregated monthly average of only 15 tourists. The step decline in number of tourists is in direct co-relation with the national park closed in monsoon season (i.e. from mid-June to October starting.).

5.8.1 Preference of Tourist for various Points in STR

The below graph delivers the split of current preferred sites for Indian Tourist. It must be noted that this Tourist data set from STR was available only for the year 2018-19. Thus, the analysis is carried out for that year only.

The below table describes the preference of tourist visit at different places, the income generated, and the per capita income generated by STR.

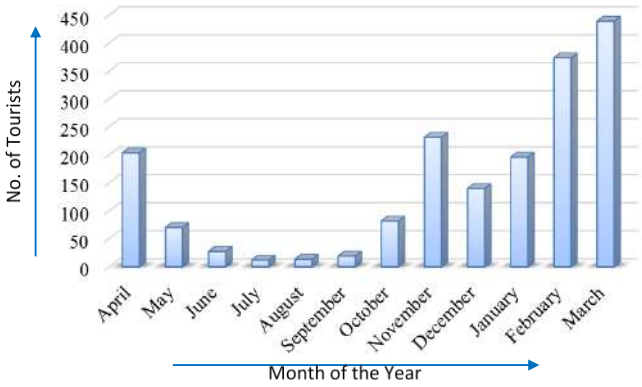
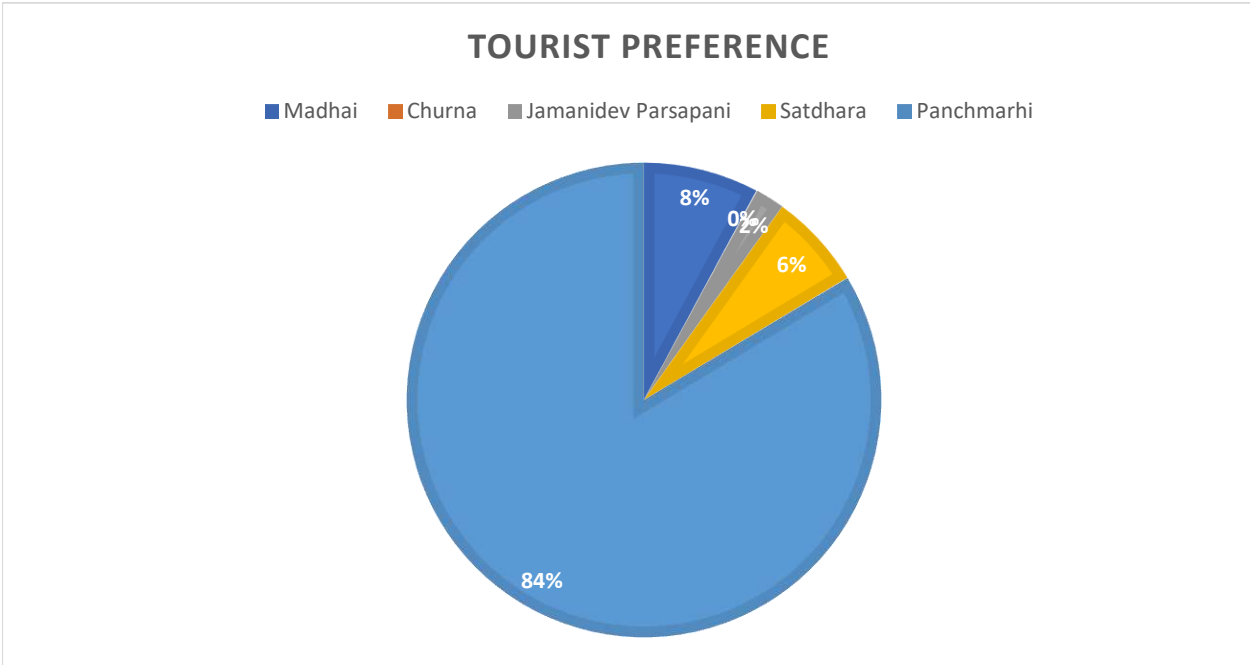


Figure 5-56 : Month Wise Average Influx of Foreign Tourist

Name of Tourist Destination	Tourist		
	Indian	Foreigner	Total
Madhai	25,375	5,561	30,936
Churna	492	0	492
Jamanidev Parsapani	6,252	1,640	7,892
Satdhara	25,716	0	25,716
Pachmarhi	3,31,074	355	3,31,429
Grand Total	**3,66,392**	**7,556**	**3,73,948**

The below graph indicates split of tourist (aggregate) preference, with 84% Pachmarhi stands at the antecedent place; followed by madhai with 8% at the second place; further followed by Satdhara with 6% at the third Place; further followed by Jamanidev Parsapani with 2% and at terminal it is Churna with 0.13%.



(Source: Data set of MPTB and supplemented by STR)

Figure 5-57 : Tourist Preference

Inference:

Pachmarhi and Satdhara which caters to about 90% of category of the Natural or Site seeing tourism scenario dominates tourism for this region. The preference to Wildlife tourism is of the remaining 10%.

Indian Tourist

The below graph indicates split of tourist (Indian) preference, with 85% Pachmarhi stands at the antecedent place; followed by Satdhara with 7% at the second place; further followed by madhai with 6% at the third Place; further followed by Jamanidev Parsapani with 2% and at terminal it is Churna with 0.13%.

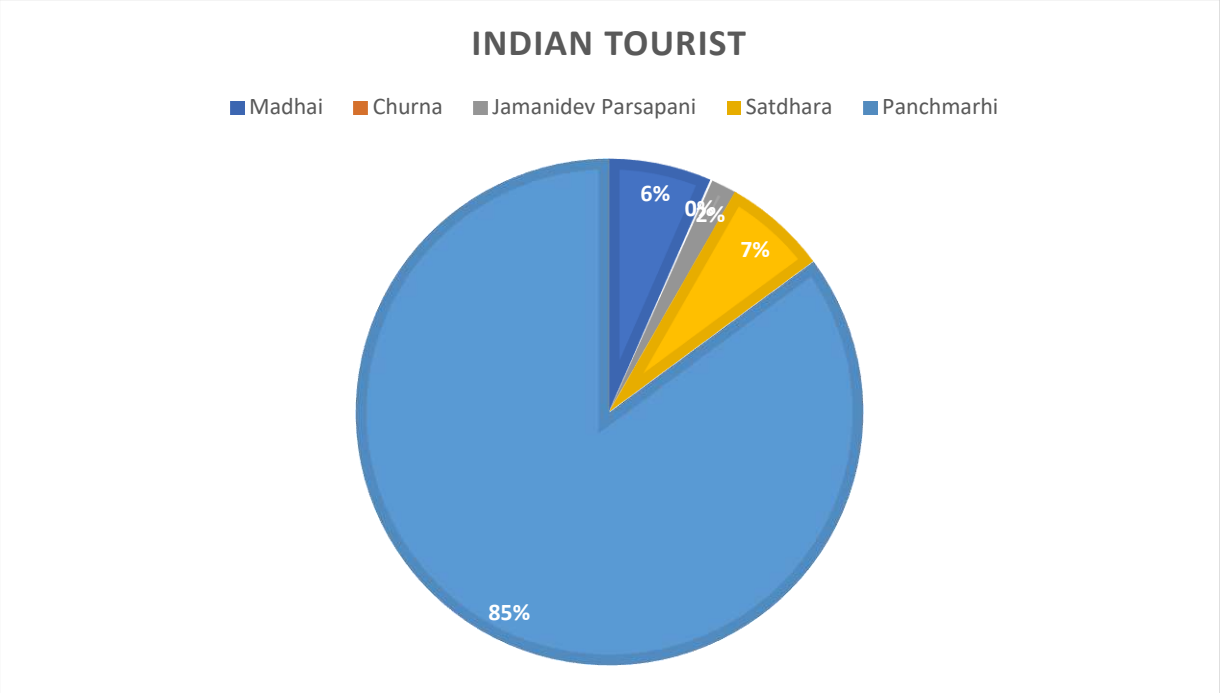


Figure 5-58 : Indian Tourist

(Source: Data set of MPTB and supplemented by STR)

Inference:

For Indian Tourist Pachmarhi and Satdhara which caters to about 92% of category of the Natural or Site seeing tourism scenario dominates tourism for this region. The preference to Wildlife tourism is of the remaining 10%.

Indian Tourist

The below graph indicates split of tourist (foreign) preference, with 73% Madhai stands at the antecedent place; followed by Jamanidev Parsapani with 22% at the second place; further followed by Pachmarhi with 5% at the third Place; and at terminal place Churna and Satdhara lies with no tourist (i.e., 0 %).

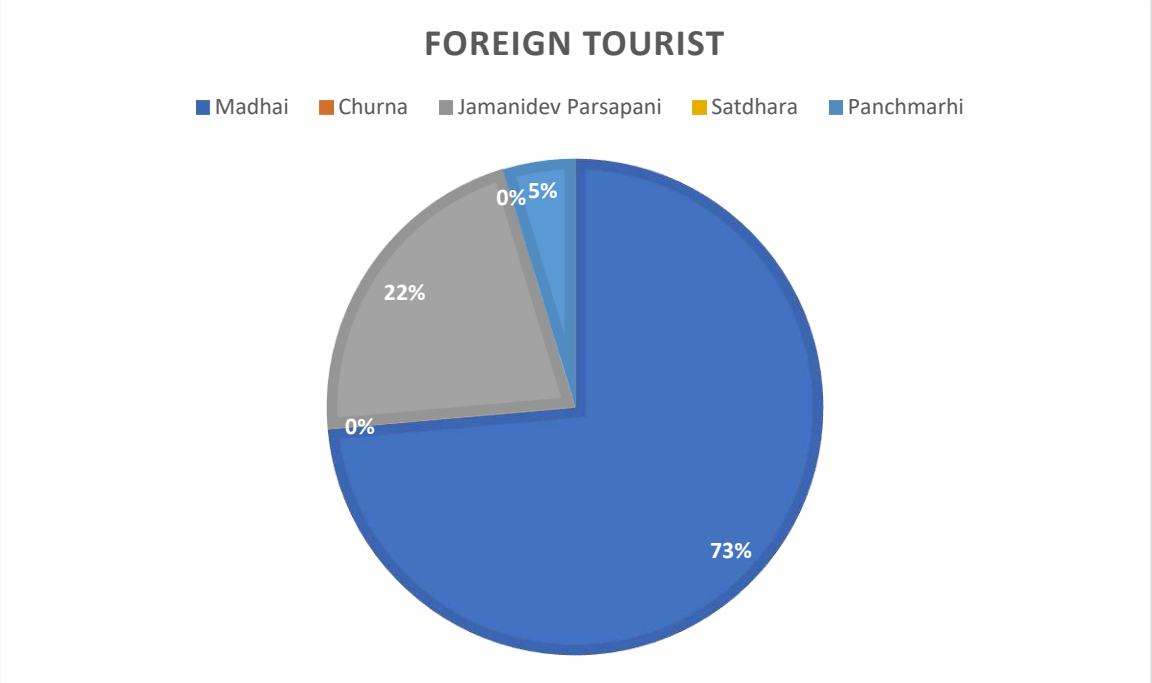


Figure 5-59 : Foreign Tourist

(Source: Data set of MPTB and supplemented by STR)

Inference:

For Foreign Tourist Madhai and Jamanidev Parsapani which caters to about 95% of category of the Wildlife tourism scenario dominates, in tourism for this region. Absolutely zero tourist for Satdharaa and 5% tourist to Pachmarhi indicates the location to be not of any preference. During Stakeholder consultation, (i.e., the foreign tourist it was inferenced that majority of the foreign tourist who visit Pachmarhi as the forsyth track. commences from Pachmarhi.

It was pointed out lower standards of infrastructure and accessibility to the location also adds to the barrier of visiting.

5.8.2 Income generation to STR from Tourism and Tourist per capita spending

The below table describes the preference of tourist visit at different places, the income generated, and the per capita income generated by STR. It must be noted that this Tourist data set from STR was available only for the year 2018-19. Thus, the analysis is carried out for that year only.

Table 5-13 : Income generation to STR

Name of tourist destination	INCOME			PER CAPITA Spending		
	Indian	Foreigner	Total	Overall	Indian	Foreigner
Madhai	50,84,750	6,24,400	57,09,150	184.55	200.38	112.28
Churna	8,55,000	0	8,55,000	1737.80	1737.80	0.00
Jamanidev Parsapani	12,66,050	4,66,450	17,32,500	219.53	202.50	284.42
Satdhara	3,52,450	0	3,52,450	13.71	13.71	0.00
Pachmarhi	2,94,85,831	2,29,975	2,97,15,806	89.66	89.06	647.82
Grand Total of income and Average of per capita spending	3,67,32,371	13,20,825	3,80,53,196	101.76	100.25	174.80

(Source: Satpura Tiger Reserve)

About 3.8 crore income is generated by STR from Tourist at various locations with the contribution of about 3.67 crore from Indian tourist and 13.2 lack from foreign tourist.

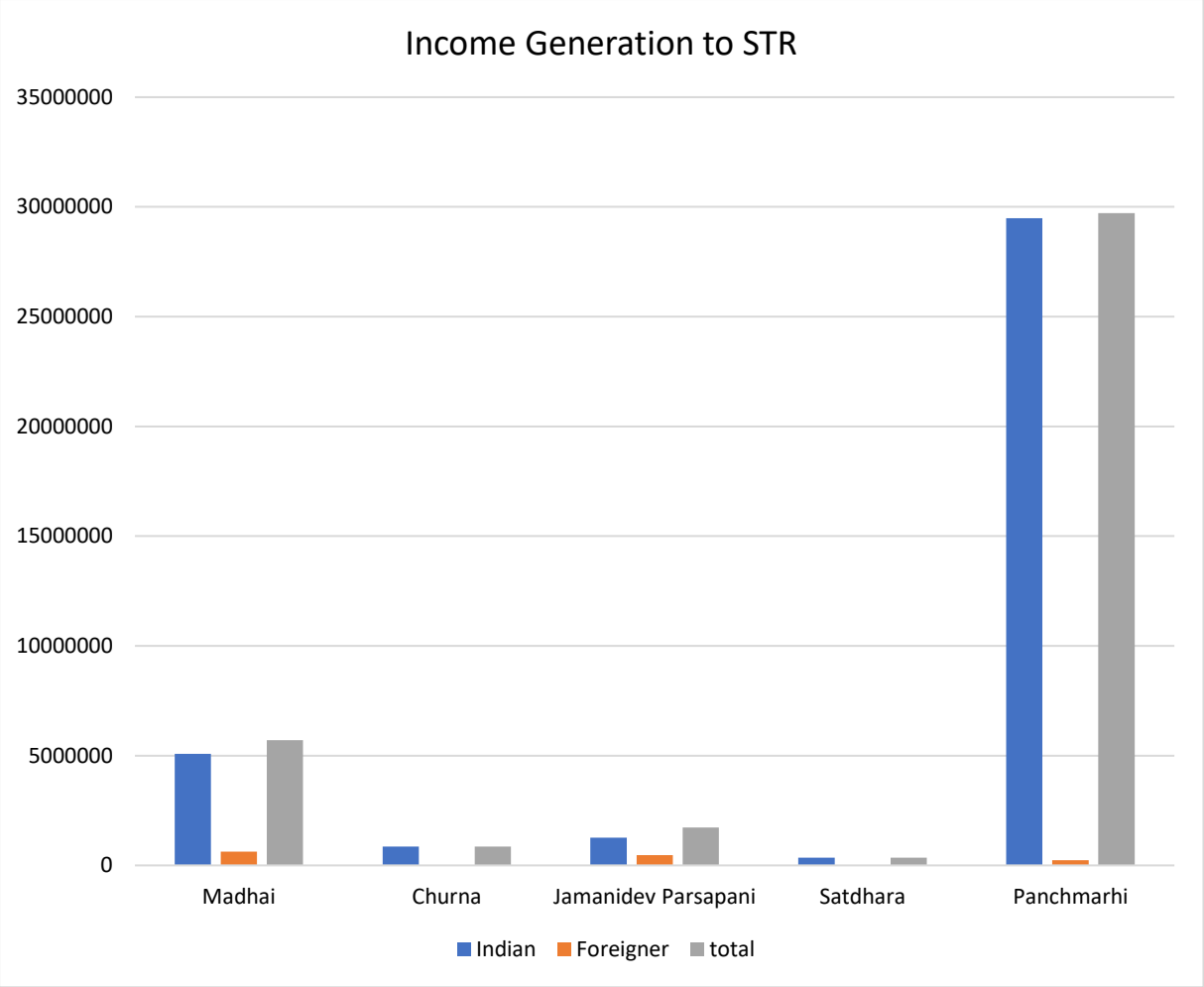


Figure 5-60 : Income Generation to STR

(Source: Satpura Tiger Reserve)

Inference:

It must be noted that about 77% of income generated from Pachmarhi which possess the tourist share of 77%. About 15% of income generated from madhai which possess tourist share of 8% and 5% of income generated from Parsapani which caters to share of 2% of tourist. 2% income generated from Churna which possess the tourist share of 0.143%.

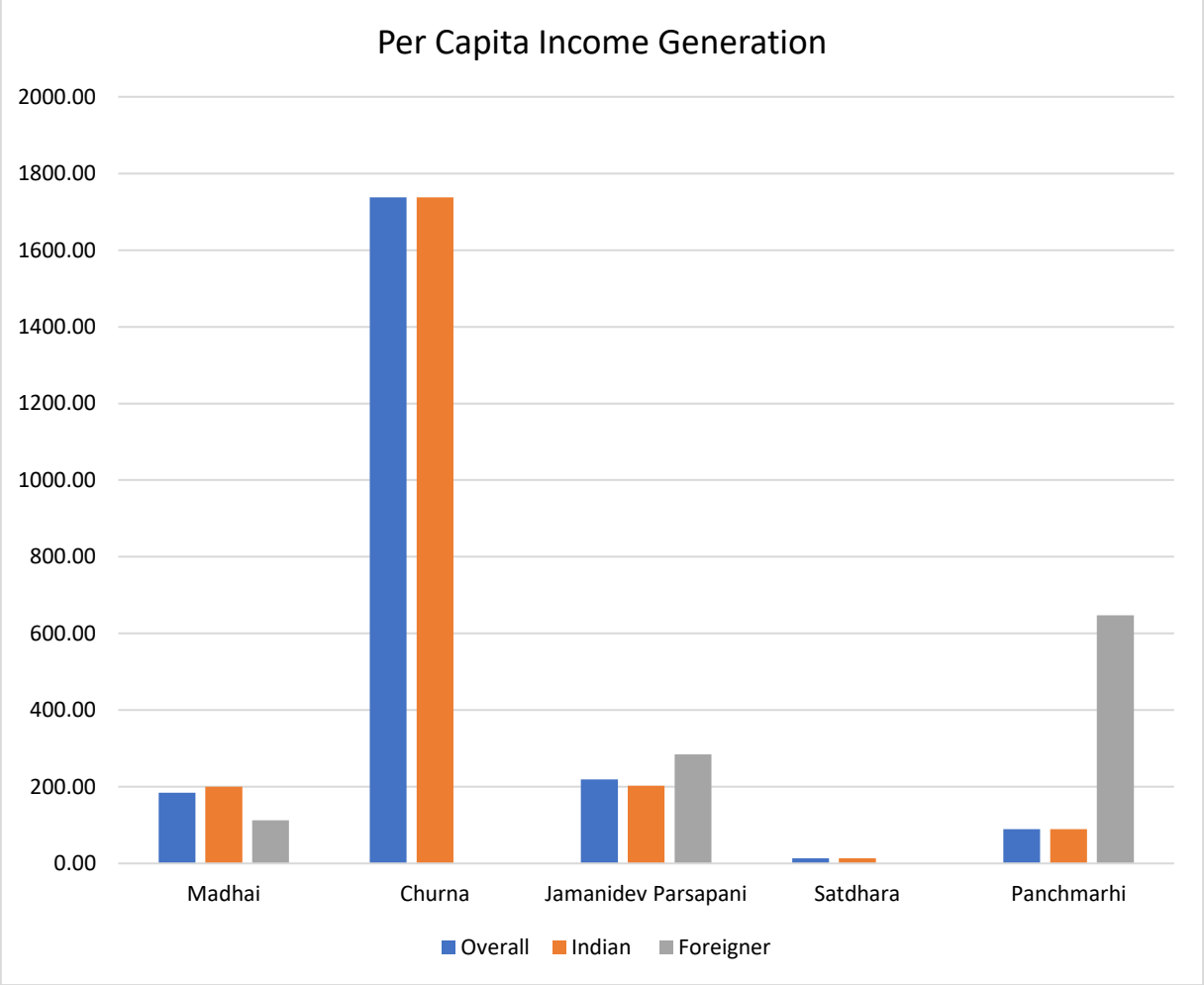


Figure 5-61 : Per Capita Income Generation

(Source: Data set of Satpura Tiger Reserve)

Inference:

From the stakeholder consultation it was pointed, that although Nagdwari and Mahadeo mela and sizable number of spots in SADA are organized in the jurisdiction of STR but all the arrangements including the required infrastructure are provided by the Mela samiti which is headed by the CEO, Hoshangabad. It was pointed from the primary survey that there is clear lag in the provision of service delivery, one of the potential reasons is that fund is not transferred to the mela samiti or respective organization by STR for service delivery. Thus, analogous to the low viscous circle of Infrastructure Provision, displayed in the bellow figure.

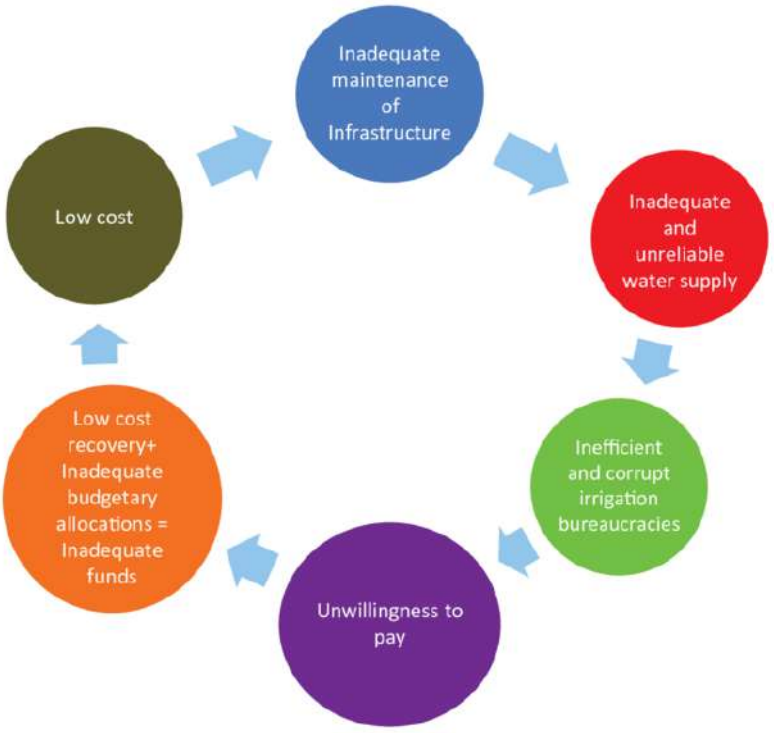


Figure 5-62 : Low Viscous circle of Infrastructure

5.8.3 Tourist Visitation at Important location in ESZ

The following data set of tourists is collected from Forest Department, below table delivers data of a decade from the year 2008-18 of three places which acts as predominant magnet for tourism attraction.

Table 5-14 : Tourist Visiting Different Areas

Year	Churna	Madhai	Pachmarhi
2008-09	523	3352	133799
2009-10	541	7111	222292
2010-11	497	10688	186701
2011-12	548	16266	248759
2012-13	271	17544	222049
2013-14	771	16799	206062
2014-15	778	18461	239526
2015-16	749	28035	242327
2016-17	508	21274	259162
2017-18	418	26083	319128

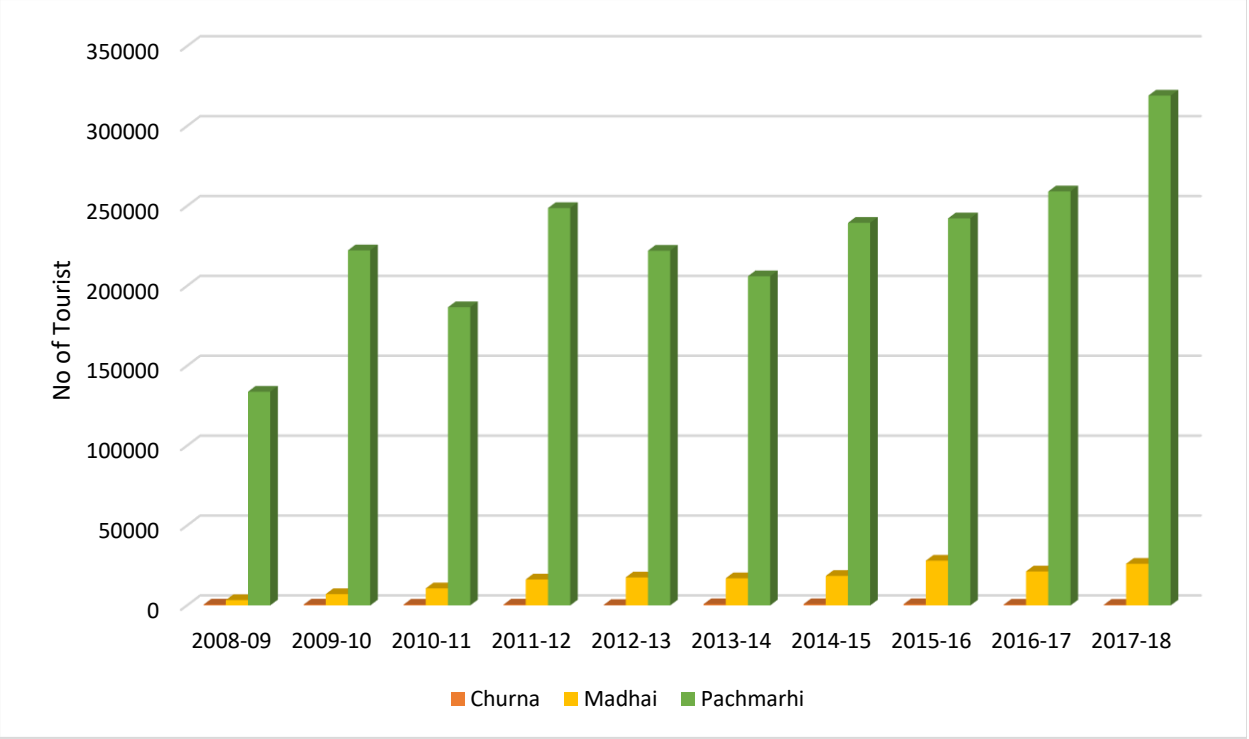


Figure 5-63 : Tourist Visitation at Important Location in ESZ

(Source: Data set of Satpura Tiger Reserve and MPTB)

The above graph shows the inflow of tourist for the last decade from the year 2008-9 to 2017-18. In order to concisely understand the trend two parameters – the average tourist for 5 years of two terms (i.e., from 2008-13 and 2013-18) and the change in percentage (increment and decrement) has been taken into consideration. Pachmarhi attracts about 92% to 97% share of total tourist (i.e., average share of 93%), while Madhai contributes to the share of 7%. However, in case of churna, the contribution is negligible (i.e., tending to 0%).

In case of Churna, the average of tourist inflow for first five years till 2013 is 476 and the same for the next five years till 2018 is 645 (i.e. hike of about 35.5%). *While, by comparing the percentage trend between 2013 and 2018, it indicates the increment of 54.4%.*

In case of Madhai, the average of tourist inflow for first five years till 2013 is 10,992 and the same for the next five years till 2018 is 22130 (i.e hike of more than 100%). *While, by comparing the percentage trend between 2013 and 2018, it indicates the increment of 48.6%.*

In case of Pachmarhi, the average of tourist inflow for first five years till 2013 is 2,02,720 and the same for the next five years till 2018 is 2,53,241 (i.e. hike of about 25%). While, by comparing the percentage trend between 2013 and 2018, it indicates the increment of 43.7%.

Churna

A charming forest equipped with wealthy existence of wildlife. The area is a segment of the oldest notified Reserve forest in India. It was prominent for the excellent quality of teak wood. The enlist are the predominant wild life with a probability to be sighted over here are Tiger, Leopard, Cheetal, Sambar, Gaur, Neelgai, Sloth Bear, Giant squirrel and Flying squirrel. In the close proximity of Churna there is an extremly famous Ancient Rock Shelter, the biggest in the region. A beautiful waterfall namely Churna gadi is situated at a distance of 2 km from Churna. The Rest house of forest at Churna, exhibit the magnificient and picturesque view of vertical cliffs can be seen. These cliffs have resting and nesting spots of vultures. It is access from location whose distance is described:

- From Itarshi 42 km long way to Bhoura.And, further 55 km from Bhoura (on Betul-Bhopal NH No. 69).
- At a distance of 63 km from Pachmarhi passes through Bori – Dhain which lies on the way.

Visitation Tourism Trend

In churna, throughout the trend is stable with an annual tourist count of 560. It can be seen from the below graph that the maximum tourist inflow of 778 was recorded for the year 2014-15 and the minimum tourist inflow of 271 was recorded for the year 2012-13.

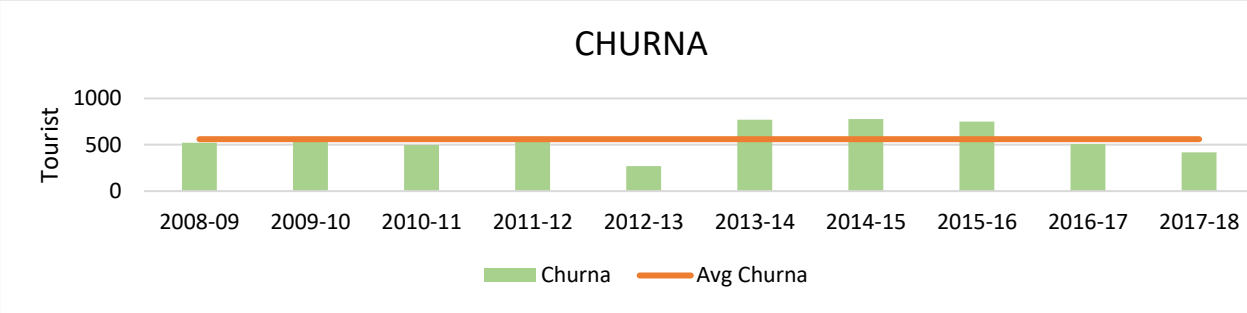


Figure 5-64 : Visitation Tourism Trend

The average tourist inflow in Churna in last 5 years from the time interval 2013-18 is 645 tourists. It is observed that from the Year wise Tourist Inflow that the annual percentage share of foreign tourist is negligible with aggregate foreign tourist of 5 and maximum of 3 tourists for the year 2010-11.

Madhai

Madhai is situtated on the bank of backwater of Denwa River, which is one of the tributaries of the Narmada. Madhai is the most preferred entry point of STR. It has immerged as one of the top sought destination in the state for wildlife tourism. The predominant attractions in the area is richness in wildlife (i.e., include the the number and a range of variety of species encountered) along with the presence of wanderlust and vantage points of the scenic beauty.

Visitation Tourism Trend

In Madhai, a drastic increase in number of tourists has been observed in time interval from 2008 to 2012. While, from 2012 onwards the trend is stable with a tourist count of 16580. It can be seen from the bellow graph that the maximum tourist inflow of 28035 was recorded for the year 2015-16 and the minimum tourist inflow of 3352 was recorded for the year 2008-9.

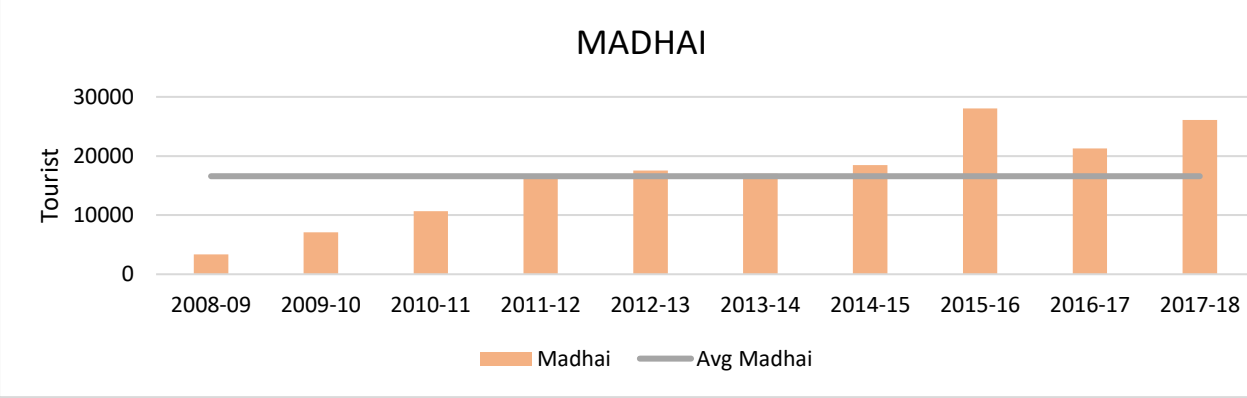


Figure 5-65 : Visitation Tourism Trend

The average tourist inflow in Madhai in last 5 years from the time interval 2013-18 is 22169 tourists. It is observed that from the Year wise Tourist Inflow that the annual percentage share of foreign tourist is considerably high from 15.77% to 20.82%. It must be noted that the average annual share of foreign tourist in the state is 0.93% while that of Madhai is 18.74%, pointing to 20 times higher than state average.

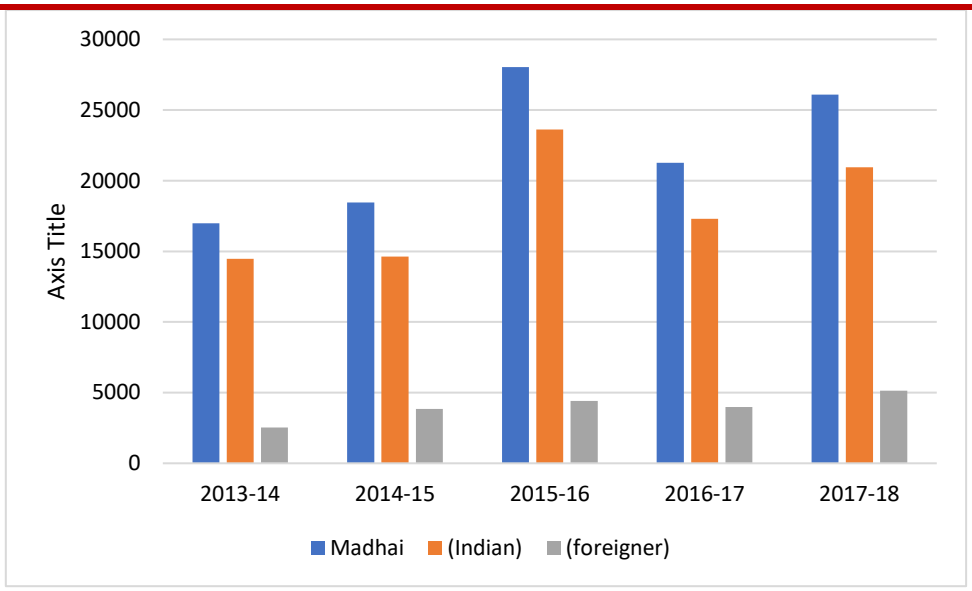


Figure 5-66 : Visitation Tourism Trend

Pachmarhi

Pachmarhi is the only hill station of Madhya Pradesh state situated in the Hoshangabad district in the central India. The history has evident it's importance as strategic location and on the lines, presence of cantonment (Pachmarhi Cantonment) since British Rule. Pachmarhi is popularly renowed as "Satpura ki Rani" (i.e, Queen of Satpura), a height of 1067 m in Satpura Range Valley. Pachmarhi is graced with the presence of Dhupgarh, the highest point (1,352 m) of Madhya Pradesh and the Satpura range, which is a part of Pachmarhi Biosphere Reserve. Tourists flow is continuous throughout the year. To cater the tourists predominantly hotels are located near market. Some few cottages, resort and MP tourism hotels are located in the peaceful location about 2 - 3 km far off from bus stand.

Pachmarhi has a lot of cave paintings in the forests, some of which have been estimated to be as much as 10,000 years old. Shown in the picture is the garden at the base of a tourist attraction called Pandava Caves. The caves are Buddhist in origin, but the name persists. The place has rich timber reserves including teak but being a part of a reserve no new construction or felling of trees is allowed. Having a rich and rare flora as well as fauna, Pachmarhi needs central and state government approval for any new construction outside the town area

Visitation Tourism Trend

In Pachmarhi, a notable increase in number of tourists has been observed in time interval from 2008 to 2010. While, from 2010 onwards the trend is stable with an annual tourist count of 2,27,980. It can be seen from the bellow graph that the maximum tourist inflow of 3,19,128 was recorded for the year 2017-18 and the minimum tourist inflow of 1,33,799 was recorded for the year 2008-9.

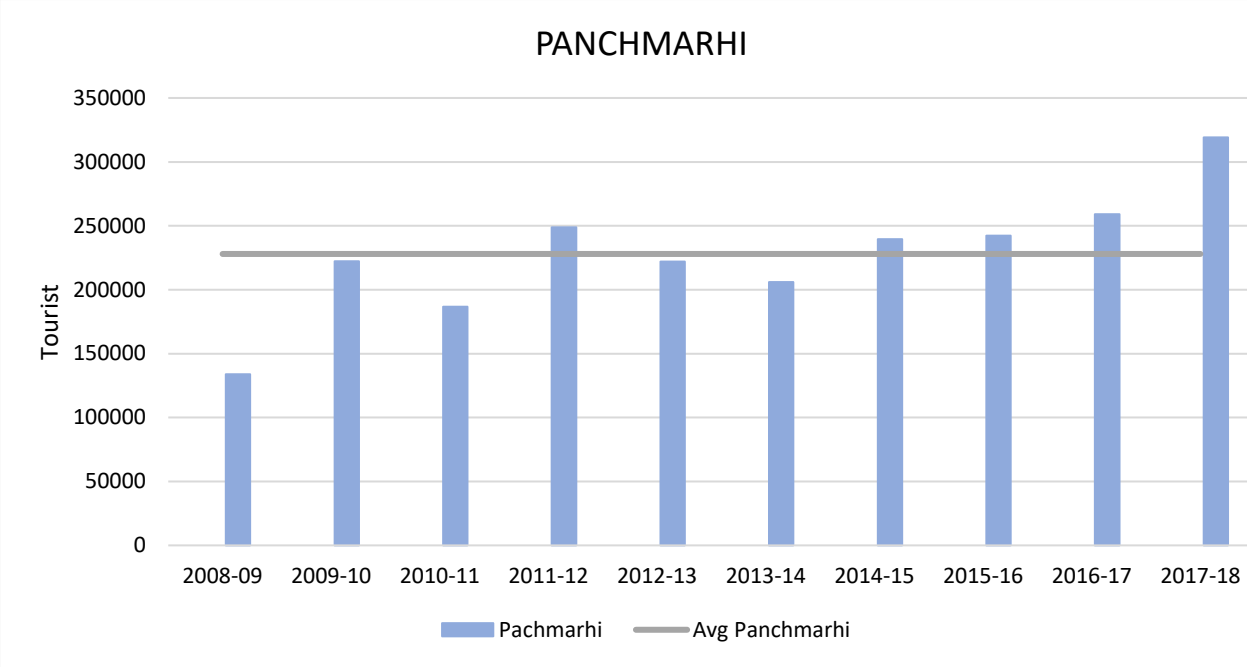


Figure 5-67 : Visitation Tourism Trend

The average tourist inflow in Pachmarhi in last 5 years from the time interval 2013-18 is 22169 tourists. It is observed from the Year wise Tourist Inflow that the annual percentage share of foreign tourist is very merge from 0.02% to 0.24%. It must be noted that the average annual share of foreign tourist in the state is 0.93% while that of Pachmarhi is 0.16%, pointing to 5.8 times lesser than the state average.

Monthly Variation of Tourist and Gypsy Influx

Pachmarhi is the only Hill station of Madhya pradesh, it possesses the tallest Point - Chauragadh and the Middle-point of Indian in the region. It attracts the sizable tourist about 2.66 lac per annum, whose monthly variation has been displayed in the bellow figure.

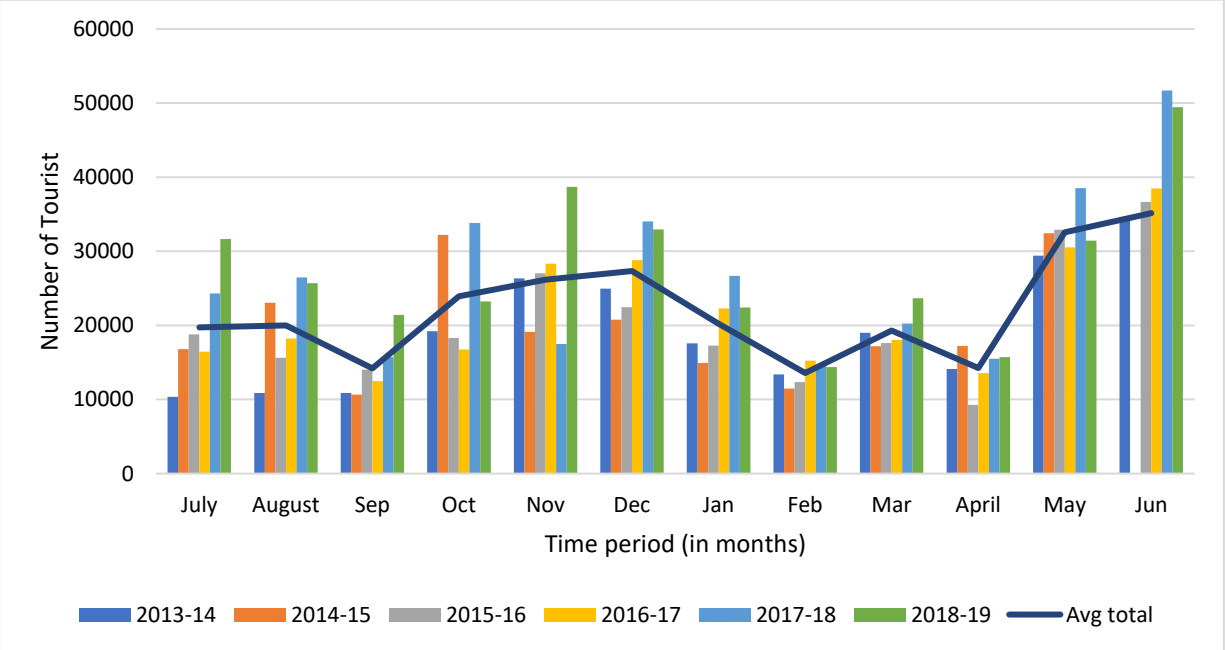


Figure 5-68 : Monthly Variation of Tourist and Gypsy Influx

Inference:

It must be noted that the average influx for the tourist for a particular month is about 22,000 (i.e., considering period of 5 Years) as per Tourist Data set of STR. The Months experiencing higher number of tourist than average are in month of October, November, December, May and June. It must be noted, it

is co-related with the holidays of Schools and colleges- summer vacation for the month of May and June and Winter vacation for month of December. Addition to it, the month of October-November predominantly attracts the Bengali tourist for a period of 10 days and presence of Gujarati tourist for the fortnight during Diwali.

The Tourist predominantly, opt for gypsy safari for visitation and other activities, which further act as the source of income to sizable population. The below graph displays the Gypsy over period of time.

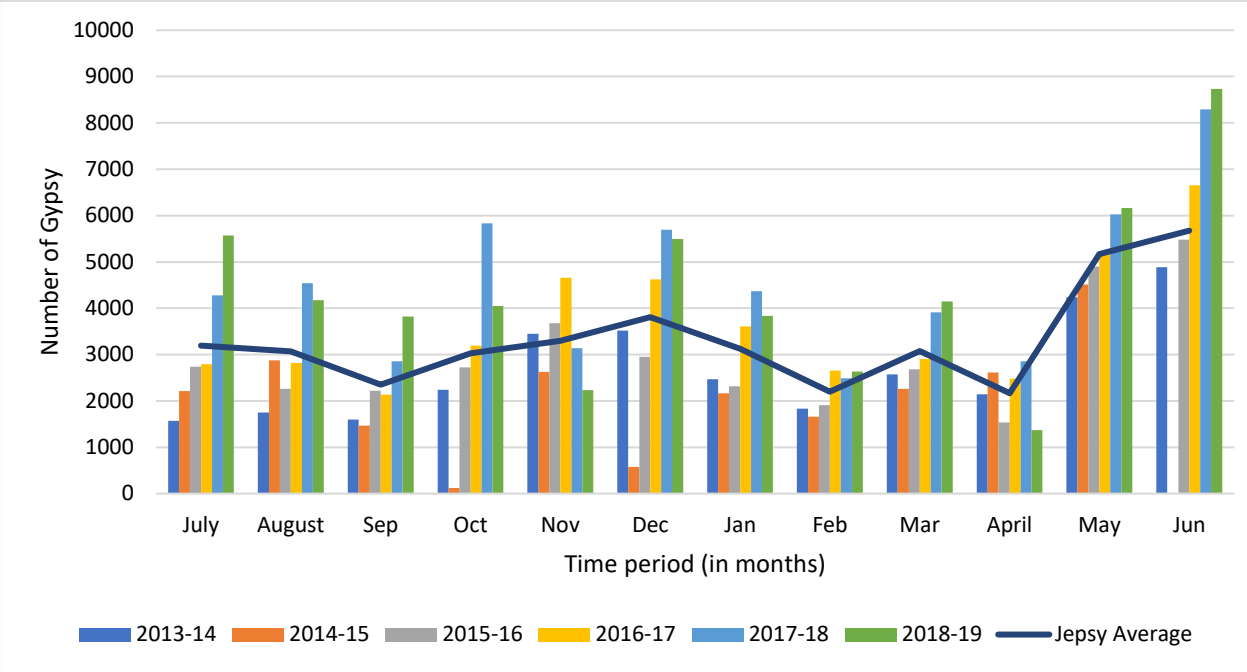


Figure 5-69 : Monthly Variation of Tourist and gypsy Influx

(Source: Data set of STR)

Inference:

It must be noted that the average utilization of gypsy for a particular month is about 3360 (i.e., considering period of 5 Years) as per Tourist Data set of STR. The maximum average is 5680 for the month of June, which has the capacity to cater 34,080, but the carrying is registered as the 35,200 indicating the vehicles are over loaded. The months experiencing higher number of tourist than average are in month of October, November, December, May and June, which is in co-relation to tourist flow.

5.9 ACTIVITIES OF INTEREST FOR TOURISTS

The major Eco-tourism activities carried out in the reserve are described below. All of these activities must be carried in synergy with the guidelines of the Madhya Pradesh forest department, NTCA and MoEFCC. The basis of tourism in STR is the potential it possesses for low carbon ecotourism activities like wildlife safari, bicycling, jungle walks, canoeing which can attracts different groups of tourists including wildlife researchers, nature lovers, and families. The development of tourism complexes will have direct impact on the lives of local residents through new employment opportunities that tourism generates.

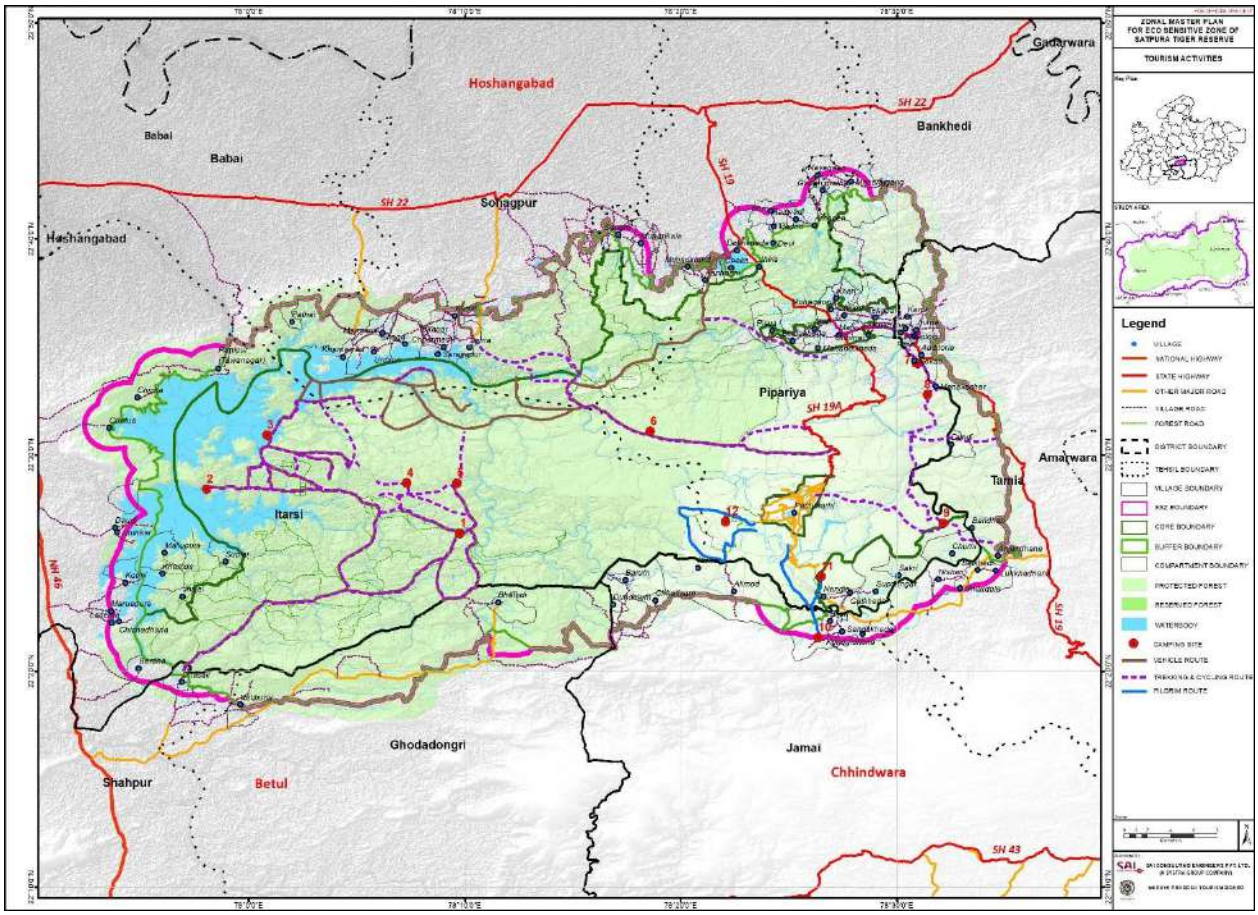


Figure 5-70 : Tourism Activities

(Source: Satpura Tiger Reserve)

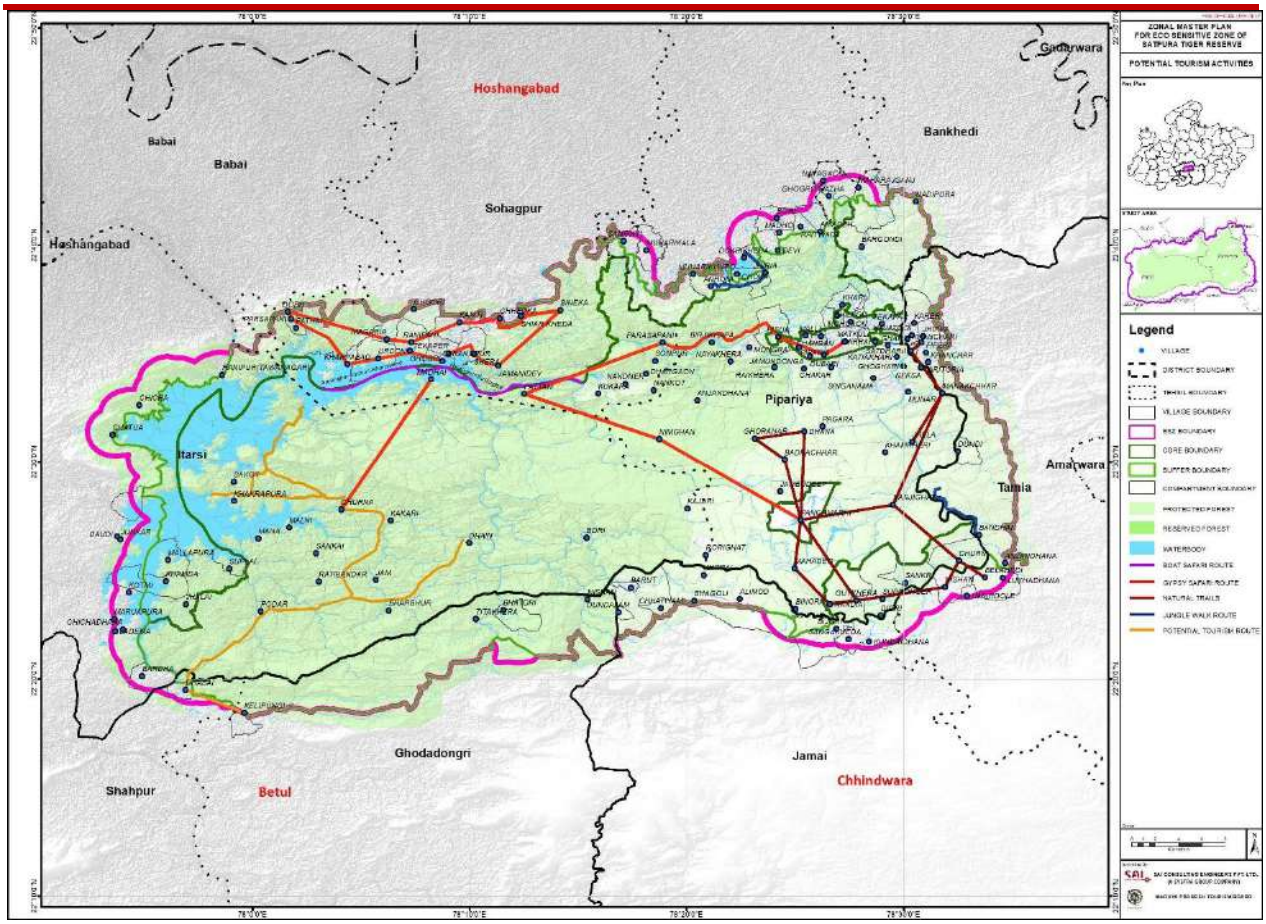


Figure 5-71 : Potential Tourism Activities

(Source: Primary Survey, expert consultation supplemented by the Stakeholders)

5.9.1 Vehicular Excursion

The landscape and the birdlife combined with the mammal life will make it perfect for a person wishing to experience the true Indian jungle. Among the wildlife sighted over here include Tiger, Leopard, Wild Dogs, Sloth Bear, Bison, Sambar, Cheetal, Black Buck, Neelgai, Crocodile etc. This activity ensures that the day is spent well and that the jungle is familiarized to a good extent to the wildlife enthusiast.

The guests get a perfect wildlife experience and a good understanding of the terrain and the beauty of the Satpura Landscape. The entire landscape is suitable for gypsy rides. Presently, entry is allowed from Madhai and Churna only.

But in future more gates may be used for easier approach to different parts of the reserve.

Different kinds of packages are allowed for tourists –

- Morning Safari
- Evening Safari
- Day long safari like Madhai to Churna and back on the same day
- Overnight safari like Churna to Dhain followed by overnight stay at Dhain and back to Churna the next day.

Every vehicle entering the tourism zone must be accompanied by a Forest guide. STR management aims to employ only local villagers (from relocated as well as buffer zone villages) as guides for maximum community involvement in tourism. This would require proper training of the interested youth in the villages through public and/or private agencies.

5.9.2 Trekking/walking

The best way to explore the Jungle is on foot. Especially when you are visiting the dense forests of Satpura Tiger Reserve. This is when one is really part of the Jungle as there is no Jeep or Elephant to ensure a viewing platform. Tracks and signs in the undergrowth can be seen clearly when one takes the time to look at the minor details and clues left by animals and birds. Walking on Game trails or Pugdandees or making your way through the undergrowth can be quite an unforgettable experience. A view of the Sloth Bear, Dogs one of the elusive cats or just the Butterflies and Birds of Satpura can be quite an experience on foot.

Many areas of STR traditionally have attracted trekkers, pilgrims etc. even before the creation of the protected area especially Pachmarhi area. This is because of the religious shrines in Kajari, Nagdwari, Mahadeo and Chauragarh which are now part of the core zone. These are religious centres for communities like Korkus and pilgrims come here mainly from Amravati, Nagpur, Chhindwara and Betul. Pachmarhi area is called a 'Trekker's Paradise' and has always attracted students because of the beauty of the landscape, rock painitngs and botanical diversity. The National Training Centre of Bharat Scouts & Guides is also situated here since the 1950s. The Indian Army also has an education centre where army personnel are trained to do map reading surveys in all kinds of terrains.

Therefore, trekking has always been a part of this protected area.

In case of long route treks like the Forsyth trail, trekking is accompanied by night stay at designated camp sites (e.g. Dahelia camp in case of Forsyth). In case of small treks also, mid-day stop at the patrolling camps or rest houses on the way is allowed as per the Eco-tourism Guidelines of Madhya Pradesh. Certain patrolling camps, therefore, need to be equipped with necessary arrangements for sitting, eating, and relaxation. Camping gear and food may be organised by the Tourist or this can be included in the Guide/Park Fees.

5.9.3 Cycling

Cycling is another environmentally friendly way of experiencing the jungle. It also allows you to cover more ground than on foot which improves chances of seeing wildlife. Several routes have been earmarked that will provide a highly enjoyable experience for half-day or even full – day rides as displayed in the map. All these routes have been selected in a way so that they fall in the areas which are least frequented by tigers and have low prey base along with high landscape value to ensure safety of the tourists without any compromise on the experience. The 3m wide area of the routes is considered the cycling zone.

Tourists can choose their choice of route. For this activity, visitors may bring their own cycles or rent them from members of EDCs/ Satpura Workers society. The cycles must be sturdy off-road mountain bikes capable of dealing with the rugged terrain. Normal road bikes will not be permitted.

Park management also plan to encourage and involve local villagers/ guides to buy their bicycles and rent it to tourists. Those who will be involved in this activity will be responsible for the maintenance of the bicycles and they may be allowed to decide the rent on their own.

5.9.4 Camping

Camping as an activity provides one with an opportunity to be a part of the Jungle and thus experience the jungle in the true sense. This provides the wildlife enthusiasts with great insights into life in the jungle and also provides a sense of fulfilment for a person who wants to be in the "Wild". This is a wonderful opportunity but there are some etiquettes that have to be kept in mind while camping out in the wilderness. These guidelines not only help in having a safe and successful expedition into the wilderness, but also help the people visiting after you have the same level of satisfaction. Apart from this the wildlife that the tourist has come to witness at close range is minimally affected by this new setup in their habitat.

5.9.5 Wildlife viewing from Hides/Machans

Wildlife viewing need not always be about chasing animals through the Jungle. Choosing a strategically chosen perch and waiting can be equally rewarding. Setting up of a hide next to a regularly used game trail or a waterhole during summers can be an unforgettable experience. An experience usually restricted to the professional photographers and researchers is now available to the avid wildlife enthusiast at Satpura Tiger Reserve

5.9.6 Canoeing / Boating

Satpura Tiger Reserve has an extensive water system in the form of the Denwa and Sonbadra rivers and a multitude of rivulets especially along the north-western edge of the park. Therefore, canoeing/boating can be one of the important activities for tourists. It is a relatively quieter mode of approach can help observing a variety of bird life and reptile life (including the Marsh crocodile) at close quarters. Mammals emerging from the bush to quench their thirst will be a great site from the platform provided by the canoe. This definitely promises to be a memorable experience to any wildlife enthusiast.

Presently there are 7 Canoes and 8 Canoe Guides available for tourists to explore the waterways of Denwa. Boating along the Denwa waterways is also one of the attractions for tourists. A motorised mode of transport allows us to travel a longer length of the river and hence makes it possible to explore and understand the entire river stretch and the role it plays in the life of man and beast. The extensive waterways from Madhai overlooking dense forests on both sides are sure to give a tourist a one-of-a-kind experience especially during early morning hours.

As of now all mechanised boats are under the control of the Forest Department. In future, if the number of boats are increased and private motor boats are introduced, solar or electric boats with minimum environmental consequences will be encouraged.

5.10 NEARBY EXCURSIONS

The below section describes the nearby Seneric as well as the strategic tourism places which possess potential to augment torism in the ESZ.

5.10.1 Bhedaghat & Dhuandhar Falls

Bhedaghat is a town and a nagar panchayat in Jabalpur district in the state of Madhya Pradesh, India. It is situated by the side of river Narmada and is approximately 20 km from Jabalpur city. Its most famous sights are the Dhuandhar Falls, Marble Rocks, and the Chaunsath Yogini temple the temple is one of the four major extant temples containing carvings of sixty-four yogini, female yoga mystics. It was built in the 10th century under the Kalachuris. It commands a view of the whole area around and of the river flowing through the marble rocks.

Figure 5-72 : Bhedaghat & Dhuandhar Falls

Its major attraction is a waterfall known as Dhuandhar, which looks like smoke coming out of the river and therefore it got its name as "Dhuan(smoke)-dhar(flow of water)". Another major attraction is 'Bandar Kodini', when one travels in between the marble rocks in a boat, the mountains at both the sides at one point come so close that the monkeys are able to jump across them, hence the name "Bandar Kodini". In a moonlit night, the travel between the marble rock mountains in a boat on the river Narmada is one of the popular tourist attractions here. Bhedabhav is famous for its jumpers

Figure 5-73 : Bhedaghat & Dhuandhar Falls

5.10.2 Tamia

Tamia - It is 87 Km away from Pachmarhi. Tamia is situated in Chhindwara district and is famous for Patalkot. There are 12 villages in the area inhabited by primitive Baiga tribe whose socio – cultural structure is still largely untouched. Area is bestowed with unique geological formations. There is sudden drop in altitude as one moves towards these villages and hence it's named Patalkot. Area is Bio- diversity rich and supports many rare floral species. (for reference)

Introduction

One of the hidden treasures of Madhya Pradesh, Tamia is a picturesque forest destination that offers scenic views of dense forests and mountains. Untouched and unexplored, Tamia is the perfect location to disconnect from the world and experience absolute tranquillity. A few houses on the hill top offer panoramic views of the steep hills, vast greenery and deep valleys. Inaccessible for a very long time, Tamia has stayed away from any form of commercialization, and makes for the perfect monsoon getaway

Figure 5-74 : Tamia forests and mountains

Features

The various features of this hidden hill station are

- Looking down from the top of the valley at patalkot, the place takes the shape of a horseshoe
- The government postal bungalow in tamia is situated at a height of 3,765 feet (1,148 m) above mean sea level and surrounded by dense forests
- The hills of tamia offer breath-taking scenes of sunrises and sunsets
- Tamia has many old and well-maintained houses from the british era at some of the best spots and cliff edges

Points of Interest

Patalkot (Sanskrit for "Very Deep") is a valley spread over an area of 79 sq.km at an average height of 2750–3250 feet above Mean Sea Level from 22.24 to 22.29 ° North and 78.43 to 78.50 ° East. The valley is located at a distance of 78 km from Chhindwara in the North-West direction and 20 km from Tamia in the North-East Direction. 'Doodhi' river flows in the valley. This horse–shoe shaped valley is surrounded by hills and there are several pathways to reach the villages located inside the valley.

5.10.3 Patalkot Valley

Introduction

'Patalkot' name originated from Sanskrit word "*Patal*" that means very deep. There is a myth that after worshipping 'Lord Shiva', Prince 'Meghnath' had accessed to Patal-lok through this place only. In olden times, Kings ruled this place in 18th and 19th Century and that there was a long tunnel connecting this place to 'Pachmarhi' in Hoshangabad District.

Figure 5-75 : Patalkot Valley

Feature

Patalkot is paramount home to a tribal ancient culture skilled at using the forest plants to make effective medicines. The Patalkot forest is so well hidden (i.e., dense forestry) that people on the outside ever new such place ever existed. The modern world has been completely unaware of its existence. In the present time, it encounters the increasing threats of deforestation along with exploitation of the native tribes. The natives tibes includes tribes of Bharias and Gonds, the residents are enlightened about various types of plants and the best to address the following question – "How to collect and grow the plants for daily needs of food, clothing and building their homes'. Paramout thing must be noted is about the enigma of the medicinal plants, A non-tangible heritage passed on to every subsequent generation. The 2000 original natives are generous with their knowledge and offer their medicinal secrets with open hearts. This is how the people there have always survived, by sharing information and supplies with each other. People who came to the forest, however, saw a way to profit from this. They brought in teams of harvesters to strip the forest for valuable herbs. They sold them outside for great profit. Important and endangered medicinal plants are at the verge of death/ extinction. And even more, whole sections of forest were cut to gain easier access to collection sites. In return, outsiders gave the tribal people portable radios that blared through the forest, frightening off wildlife and quickly replacing the communal music that bound the tribes together. This enabled the loggers to cut down the trees very easily

Figure 5-76 : Patalkot Forest

At the present point of time, handed over to the company ORAKA by Eco-tourism department for developing multi-purpose eco-tourism spot. (Further information is scanned)

5.11 SWOT

5.11.1 Strengths

a) Place Relative Significance

India is not only rich in cultural heritage, but it has also been endowed by pits of natural beauties. Its sea beach valleys and mountains, forest and wild life are equally attractive as its paintings, sculpture, and architectures. There are many hill stations in the north situated in the lap of Himalayas. Its western and eastern ghats are full of picturesque sites and scepters. But in the plains such places are very few and Pachmarhi is one of them.

STR has an economic combination of cultural heritage and endowment of nature's beauty. As described earlier, it is a hill station, a health resort, a trekker's paradise, a sacred place for Hindu devotees and a place of endowment interest. Apart from the mountains and hills, Pachmarhi offer suitable training ground for mountaineering. Its convenient transport links with different parts of the country provide and added advantage for its growth.

b) Inherent Characteristics

The highest legal status of Protected Area – The area being declared as a Tiger Reserve since 10th February 2000 thus possess the highest legal status of PA which is being identified and status is being reviewed at the national level. UNESCO declared the region to be Bioreserve in 2009. PA is known to have rich endemic biodiversity and often, the area renowned as a Botanist's paradise. Presence of unique microclimate supporting the wide range of diversity of flora, fauna and especially smaller vertebrates, differentiates and makes it unique.

This is one of the largest areas in the whole Satpura Landscape after Melghat Tiger Reserve. The only national park in India where **trekking is permitted** on selected routes.

c) Eco-sensitive Zonal Master Plan:

Among the very few PA, an exercise is carried out to undertake preparation of Eco-sensitive Zonal Master Plan, below paragraph of reference mentions about work order. The predominant objective includes strategies to augment local economy and enhance tourism, simultaneously ensuring the protection of Biodiversity (i.e., as utmost priority).

One of the deliverables is Tourism Sub-plan. A huge potential that this exercise will promote and augment, the regulated Tourism.

Reference: Work order issued by Madhya Pradesh Tourism Board vide letter no. 918/Plg/MPTB dated 2nd March 2019 to prepare the Zonal Master Plan and Sub-Zonal Tourism Master Plan for Eco-Sensitive Zone listed in Cluster 4 (Satpura Tiger Reserve and Pench Tiger Reserve) of Madhya Pradesh

5.11.2 Weakness

1. Timber boilers - **Almost all the hotels in Pachmarhi use wood-based boilers. It must be noted that fuel wood is purchased from head loaders, which is a significant environmental concern as it causes great damage to surrounding forests.**
2. Encroachments – **The service cum tourism sector which includes the Hotels, Restaurants, taxis etc. caters a huge number of workforce of Pachmarhi. As there are very little private lands parcels are available, a large chunk of land of SADA/Cantonment land is occupied, which ultimately ingress a significant biotic pressure to the surrounding areas.**

3. Sewage and waste disposal

Pachmarhi: Scientific Sewage and waste disposal of Pachmarhi area is currently not operational, thus it causes great environmental damage. Currently, Sewage without any prior treatment is disposed in Bainganga and thus it pollutes the whole stretch of Bainganga along with the stream of Denwaad adjoined to Bainganga. This miniature fall in past served as a famous tourist attraction, has been polluted and is in severe depleted state.

STR: A significant number of visitors, act as a source pollution. The various tourist activities like walking and camping around rivers stream and nalas of the park liter the area which eventually leads to severe problem of solid waste and Plastic waste which further disturbs/deplete the habitat.

5.11.3 Opportunity

1. Increasing tourist flow

Pachmarhi is the one and only hill station of the states which attracts lakhs of visitors every year. The Massive inflow of tourist encourages many activities e.g. construction, pollution, fuel wood consumption etc, both legally and illegally which ultimately ingress significant threats to surrounding areas. This points towards immediate need to regulate tourism to minimize damage.

Satpura has become one of the most famous tourist destinations of Madhya Pradesh. In the future, the tourist foot fall is most likely to escalate quickly. It is necessary that the park authorities anticipate this issue and get appropriate precautionary measures in place to control any adverse impact of tourism.

2. Potential for medical tourist destination and growing interest for Colonial Tourism

India ranking has improved by 6 position in world Tourism competitive index 2019 declared by world economic forum. India score highest in the sector of natural and cultural heritage and hold the global rank of 7. A sizable improvement in the field of Medical Tourism did a significant contribution to the improved ranking.

The STR has the potential for development of both these categories, the heritage and Medical tourism. Pachmarhi was quoted as the paradise for development of sanatorium and Naturo Therapy centers. Thus, providing an opportunity to lead and demonstrate to state as well as nation the possibility of contemporary areas of tourism.

3. Tourist Recreation and Amusement Facilities:

The recreational and amusement facilities available at Pachmarhi are quite inadequate. In evening, the tourists need some passive recreation after a daylong excursion. The need of the hours is to augment/deliver some few cinemas theaters/auditoriums, libraries and gardens.

5.11.4 Threats

1. Developments around the Reserve

To cater to the increasing number of tourists, more tourist facilities and operators have established their presence (i.e., Legally and Illegally). It is mandated that all new infrastructure to obtain clearance from

the LAC which will ensure that such places will conform to the proper norms of waste management, construction rules etc. However, Illegal Accommodation Infrastructure is prominent in numbers.

2. Mass religious Tourism:

Pachmarhi: The Place is popularly renowned as the "SHIV NAHGRI", due to enormous numbers of Shiv Temples shrines, accompanied with other temples and churches. During the mela period the religious spot are kept open without any entry charge and mandatory requirement to have a guide doesn't prevails. During such period as well as throughout the year a significant littering is experienced, which is more prominent to this category of tourism.

Figure 5-77 : Solid Waste Dumping, Pachmarhi

STR: The religious tourism is the predominant source of pollution. It must be noted that sites are located at the higher elevations, thus instances of any littering has a significant possibility to pollute downstream water bodies. It is necessary that an attempt to control pollution is undertaken by Mahadeo Mela Samiti.

During site visit it was inference that during nagdwari mela, the major source of removal of waste was on the rain. As the rain droplets flushes the waste disposal from these pilgrim places (i.e., also includes path) to the downstream. It's analogous to the iceberg model of problem, where things are deeper inside than what is visible. Thus, here although that waste is disposed from the spot to elsewhere in downstream, untimely it will result into severe environmental consequences by deleting the bio diversity of the region.

Figure 5-78 : Environmental Pollution with Ice-berg Trash

3. Non-Inclusive Tourism:

Pachmarhi: Tourism contributes prominently to the economy of Pachmarhi. It is rather difficult to distinguish tourist shopping from the general shopping which also serves the habitants of the town. However, in addition to are Petrol, pump, repair workshop, foreign liquor, medicine and photo studios. A study of existing shopping pattern from the primary survey indicates that these services are available at Pachmarhi. However, the need for developing such facilities needs be overemphasized

Madhai: During site visit, it was inferenced that the contribution of tourism to local economy was significantly low. The Hotels/resorts doesn't employ or employ numbers which tends to nil, in this region. It was also found that the Gypsy safari of the local villagers are given second preference, pointing towards skill and the group willingness. Even, the culture was not showcased/ given opportunity by/to the people which possess potential to augment the income and thereby local economy.

6 CARRYING CAPACITY

6.1 MADHAI

The carrying Capacity of Madhai is carried out based on the two following criteria – The existing accommodation facility for tourist and the condition of access roads.

6.1.1 Accommodation Facility

For calculating the carrying capacity based on the existing accommodation facilities for tourist, the availability of the rooms and its occupancy has been taken into consideration. The permission is granted to 10 hotels for 10 rooms of permanent structure. However, relaxation is delivered for Temporary structure (i.e., Huts). During the Site visit and consultation with the Madhai hotel association, it was found that 3 hotels have not yet got the permission, which are operational illegally. The exact number of those three rooms was not available.

Case 1 –

The total number of hotels are 13, with 10 rooms each. Thus, the aggregate of rooms comes out to be **130 rooms** in madhai. Taking factor of 20% for the non-permanent accommodation (i.e., tourist tents, and Huts), the capacity comes out to be 156 rooms. It is assumed that the average occupancy of a room is 3, which was backed by the consultation with Managers or owners of some hotels. Hence, the carrying capacity comes out to be 468 people.

Case 2 –

The below graph shows the room occupancy trend of MPTB Bision Resort of Madhai for year 2018. The average annual room occupancy rate is 46.79 %, the maximum is 72.22% for the month of November and minimum is 20.43% for month of September. *(Source: Data collected from MPSTDC)*

The data set for the occupancy of all the hotels throughout the year was not available. Hence, The Occupancy data set of MPTDC is taken as the reference point and further interpolated

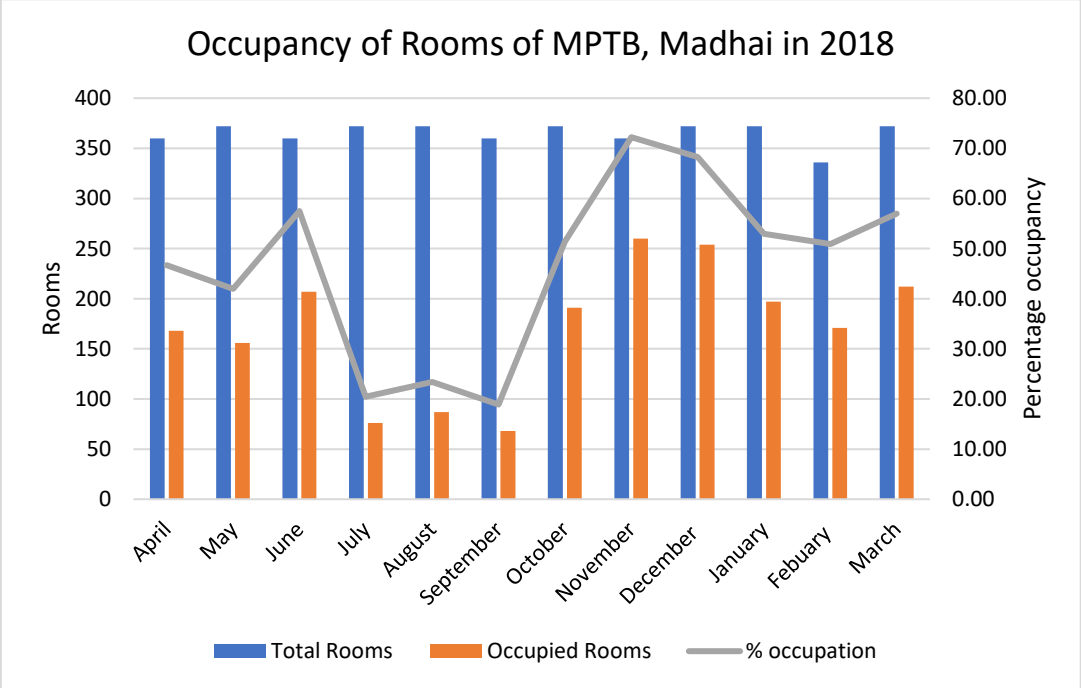


Figure 6-1 : Occupancy of Rooms of MPTB, Madhai in 2018

The accommodation capacity of madhai is 156 rooms, and the average annual occupancy rate is 46.79%. Thus, the average occupant room of a particular day comes out to be 73 rooms. It is assumed that the average occupancy of a room is 3, which was backed by the consultation with Managers or owners of some hotels. Hence, the carrying capacity comes out to be 219 people.

6.2 CONDITION OF ROAD FACILITY

For calculating the carrying capacity based on the condition of roads for tourist, the existing condition of roads (i.e., prone to erosion and paved/unpaved), disturbance to wildlife and temporary not operational during some part of the year has been taken into consideration. It must be noted that the calculation is with reference to guidelines – *Eco-tourism In and Around the protected areas.* Various assumptions undertaken in this calculation is backed by the case study of Kanha National Park and expert consultation of various Forest professional and officers.

6.3 ESTIMATION OF CARRYING CAPACITY OF VEHICLES (CASE -3)

6.3.1 Physical Carrying Capacity (PCC)

This is the "maximum number of visitors that can physically fit into a defined space, over a particular time". It is expressed as:

$$PCC = A \times V/a \times Rf$$

Where, ***A*** = available area for public use
V/a = one visitor / M2
Rf = rotation factor (number of visits per day)

In order to measure the PCC relating to Buffer, the following criteria must be taken into account:

i. Only vehicular movements on roads are permitted
ii. The "standing area" is not relevant, but "closeness" between vehicles is important
iii. There is a required distance of at least 500 m (½ km.) between 2 vehicles to avoid dust (2 vehicles/ km.)
iv. The Buffer is proposed to be open for 10 months and the 9 hrs per day (i.e., Although there is no restriction, but during rainy season, it is not accessible as well as part of preservation of environment the time period is fixed). The PA is open to tourists for 8 months in a year and 9 hours per day
v. Linear road lengths within the tourist zone are more relevant than area, and the total lengths are

The total Road length open for Vehicles in different tourism areas of STR is given below:

Table 6-1 : Description and length of tourism roads

Vehicular Roads	*Length (km)*	*Eroded (High, Medium, low)*	*Travel time*	*Width*	*RF(9 hrs/time (3.5))*
Route 1 – Tekapar-Sehra-jamanidev-bineka	25.25	5 km (Medium)	2.5		2.57
Route 2 – Sarangpur-khapa-parsapani-dhaba-magariya-renipani/kamti	30.5	7 km (medium), 4.5 km (High)	3 hr		2.57
Route 3 – Sohagpur-Syarkheda-chherka-bineka	42.5	5 (medium), 6 (High)	3.5 hr		2.57
Night Patrol Route 1 - Sarangpur-sehra-jamanidev baba-kukra ghat and back	16.8	1.5 km (High), 4 km (medium)	2 hr		2.57
Night Patrol Route 2 – Sarangpur-kamti rd- Nibhoura – canal road	17.5	2.5 km (High), 1.5 km (medium)	2 hr		2.57

Vehicular Roads	*Length (km)*	*Eroded (High, Medium, low)*	*Travel time*	*Width*	*RF(9 hrs/time (3.5))*
Night Patrol Route 3- Sarangpur-khapa-pathai – parsapani- karimati	23	1.5 km (high),4 km (medium)	2.5		2.57
Total	155.5	**42.5**	**15 hr**		

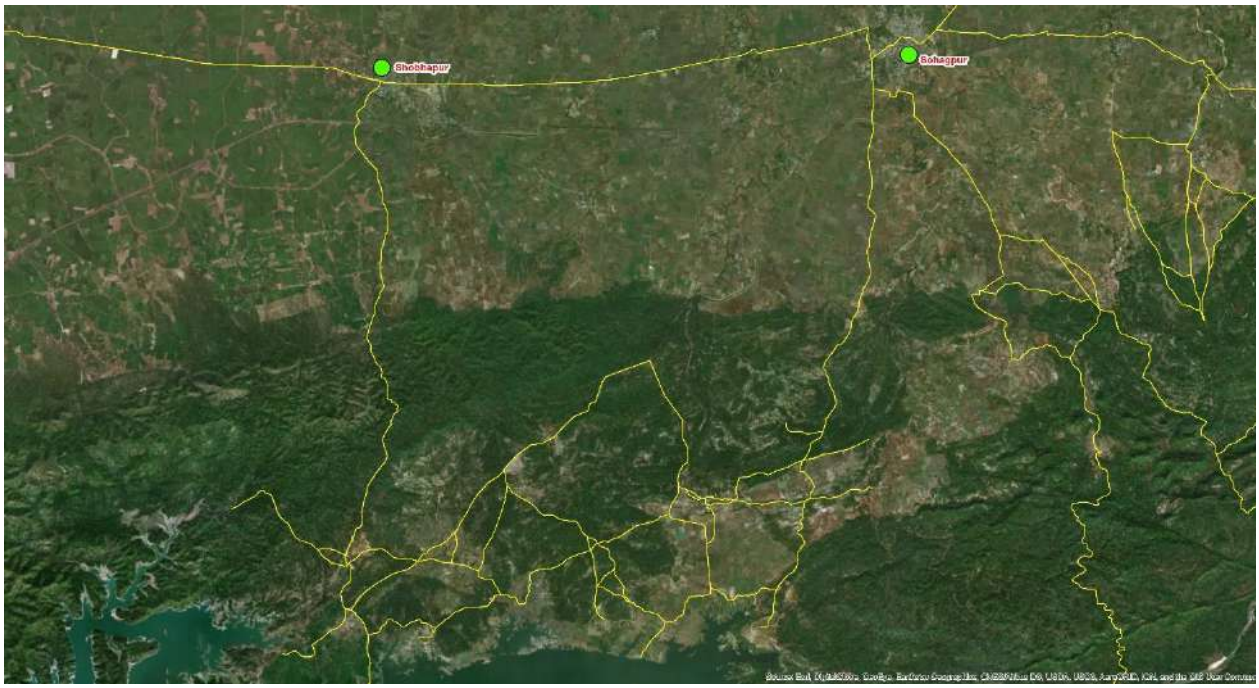


Figure 6-2 : Routes for Safari in Buffer

Due to constant vehicles, use the out of the total road length of 155.5 km, about 71.45 km is prone to erosion, out of which 33 km is more affected.

$$\textbf{Rotation Factor } (\boldsymbol{Rf}) = \frac{No.of\ open\ months}{Average\ Time\ of one\ visit}$$

$$= \frac{9}{3.5}\ hours = \mathbf{2.57}$$

Thus,

$$\boldsymbol{PCC} = 155.6\ \text{km} \times 2\ \text{vehicles/km} \times 3.14$$

$$= \mathbf{800.22}\ \boldsymbol{visits/day}$$

6.3.2 Real Carrying Capacity (RCC)

RCC is the maximum permissible number of visits to a site, once the "reductive factors" (corrective) derived from the particular characteristics of the site have been applied to the PCC. These "reductive factors" (corrective) are based on biophysical, environmental, ecological, social and management variables.

$$\boldsymbol{RCC} = PCC - Cf_1 - Cf_2 \ldots . Cf_n$$

Where, *Cf is* a corrective factor expressed as a percentage. Thus, the formula for calculating RCC is:

$$\boldsymbol{RCC} = PCC \times \frac{100 - Cf_1}{100} \times \frac{100 - Cf_2}{100} \ldots . \times \frac{100 - Cf_n}{100}$$

Corrective Factors are "site-specific", and are expressed in percentage as below:

$$Corrective\ Factor\ (Cf) = \frac{M_1}{M_t} \times 100$$

Where,

M_1 = limiting magnitude of the variable

M_t = total magnitude of the variable

i. <u>Road erosion</u>

Total Road Length (M_t) = 155.55 km

Medium erosion risk = 26.5 km (weightage factor 2)

High erosion risk = 16 km (weightage factor 3)

$$\boldsymbol{M_1} = 26.5 \times 2 + 16 \times 3$$
$$= 53 + 48$$
$$= 101\ km$$

Thus,

$$\boldsymbol{Cf_e} = \frac{101}{155.5} \times 100 = 64.95\%$$

ii. <u>Disturbance to Wildlife</u>

Species which are prone to disturbance owing to visitation are considered i.e Chital or Spotted Deer and Indian Gaur.

$$\textbf{Corrective Factor } (\boldsymbol{Cf_w}) = \frac{Limiting\ months/year}{No.\ of\ open\ months/year} \times 100$$

$$\textbf{Total } \boldsymbol{Cf_w} = Cf_{w1} + Cf_{w2} = 1\%$$

Assumptions:

$$Since, the\ area\ lies\ in\ buffer\ zone, the\ wildlife\ disturbance\ will\ be\ minimum.$$

As the wildlife, occupies the core portion while undergoing the various metabolic process and that is kept closed in Mid-June to commencement of October. However, as per the expert consultation, it was pointed that the possibility of occurrence of event is 1 in 100 events therefore, one percent is taken.

iii. ***Temporary closure of Roads***

For maintenance or other managerial reasons, visitation to certain roads may be temporary restricted within the park. As per the expert consultation, it was pointed that the possibility of occurrence to be kept 20%.

Therefore, the Real carrying capacity is as under:

$$\boldsymbol{RCC} = PCC \times \frac{100 - Cf_e}{100} \times \frac{100 - Cf_w}{100} \times \frac{100 - Cf_t}{100}$$

$$\boldsymbol{RCC} = PCC \times \frac{100 - 55.3}{100} \times \frac{100 - 44.4}{100} \times \frac{100 - 5.9}{100}$$

$$= 800.22 \times 0.3505 \times 0.99 \times 0.8$$

$$= 222.14\ or\ \boldsymbol{222\ visits/day}$$

6.3.3 Effective Permissible Carrying Capacity (EPCC)

ECC is the maximum number of visitors that a site can sustain, given the management capacity (MC) available. ECC is obtained by multiplying the real carrying capacity (RCC) with the management capacity (MC). MC is defined as the sum of conditions that protected area administration requires if it is to carry out its functions at the optimum level. Limitations in management like lack of staff and infrastructure limit the RCC.

Managerial Capacity (MC) for STR = 45%

Therefore,

$$\textbf{Effective Permissible Carrying Capacity} = RCC \times MC$$

$$= 222.14 \times 0.45$$

$$= \boldsymbol{99.96\ or\ 100\ visits/day}$$

This carrying capacity is applied when the potential of all the designated tourism zone is realised. However, at present there is no limiting cap of vehicles. But indirect restrictions are levied through the time interval 11 hrs (i.e., 5 am-11 am & 4 pm-9 pm) and vehicles permitted to enter in only.

6.4 ESTIMATION OF CARRYING CAPACITY OF VEHICLES (CASE 4)

6.4.1 Physical Carrying Capacity (PCC)

This is the "maximum number of visitors that can physically fit into a defined space, over a particular time". It is expressed as:

$$PCC = A \times V/a \times Rf$$

Where, ***A*** = available area for public use
V/a = one visitor / M2
Rf = rotation factor (number of visits per day)

In order to measure the PCC relating to Buffer, the following criteria must be taken into account:

i. Only vehicular movements on roads are permitted

ii. The "standing area" is not relevant, but "closeness" between vehicles is important

iii. There is a required distance of at least 500 m (½ km.) between 2 vehicles to avoid dust (2 vehicles/ km.)

iv. The Buffer is is proposed to be open for 10 months and the 9 hrs per day (i.e., Although there is no restriction, but during rainy season, it is not accessible as well as part of preservation of environment the time period is fixed). The PA is open to tourists for 8 months in a year and 9 hours per day as per guidelines

v. Linear road lengths within the tourist zone are more relevant than area, and the total lengths are

The total Road length open for Vehicles in different tourism areas of STR is given below:

Table 6-2 : Description and length of tourism roads

Vehicular Roads	*Length (km)*	*Eroded (High, Medium, low)*	*Travel time (TT*)*	*Width*	*RF (9 hrs/time TT*))*
Route 1 – Tekapar-Sehra-jamanidev-bineka	25.25	5 km (Medium)	2		4.5
Route 2 – Sarangpur-khapa-parsapani-dhaba-magariya-renipani/kamti	30.5	7 km (medium) , 4.5 km (High)	3 hr		3
Route 3 – Sohagpur-Syarkheda-chherka-bineka	42.5	5 (medium), 6 (High)	3.5 hr		2.57
Night Patrol Route 1 - Sarangpur-sehra-jamanidev baba-kukra ghat and back	16.8	1.5 km (High), 4 km (medium)	2 hr		4.5
Night Patrol Route 2 – Sarangpur-kamti rd- Nibhoura – canal road	17.5	2.5 km (High), 1.5 km (medium)	2 hr		4.5
Night Patrol Route 3- Sarangpur-khapa-pathai – parsapani-karimati	23	1.5 km (high),4 km (medium)	2.5		3.6
Total	155.5	**42.5**	**15 hr**		

Figure 6-3 : Routes for Safari in Buffer

Due to constant vehicles, use the out of the total road length of 155.5 km, about 71.45 km is prone to erosion, out of which 33 km is more affected.

$$\textbf{Rotation Factor } (\boldsymbol{Rf}) = \frac{No.of\ open\ months}{Average\ Time\ of one\ visit}$$

Thus,

$$\boldsymbol{PCC} = ((4.5 * 25.25) + (3 * 30.5) + (2.57 * 42.5) + (4.5 * 16.8) + (4.5 * 17.5) + (3.6 * 23)) \times 2\ \text{vehicles/km}$$

$$= \mathbf{1103}\ \boldsymbol{visits/day}$$

6.4.2 Real Carrying Capacity (RCC)

RCC is the maximum permissible number of visits to a site, once the "reductive factors" (corrective) derived from the particular characteristics of the site have been applied to the PCC. These "reductive factors" (corrective) are based on biophysical, environmental, ecological, social and management variables.

$$\boldsymbol{RCC} = PCC - Cf_1 - Cf_2 \ldots . Cf_n$$

Where, Cf is a corrective factor expressed as a percentage. Thus, the formula for calculating RCC is:

$$\boldsymbol{RCC} = PCC \times \frac{100 - Cf_1}{100} \times \frac{100 - Cf_2}{100} \ldots . \times \frac{100 - Cf_n}{100}$$

Corrective Factors are "site-specific", and are expressed in percentage as below:

$$Corrective\ Factor\ (Cf) = \frac{M_1}{M_t} \times 100$$

Where,

M_1 = limiting magnitude of the variable

M_t = total magnitude of the variable

iv. Road erosion

Total Road Length (M_t) = 155.5 km

Medium erosion risk = 26.5 km (weightage factor 2)

High erosion risk = 16 km (weightage factor 3)

$$\boldsymbol{M_1} = 26.5 \times 2 + 16 \times 3$$
$$= 53 + 48$$
$$= 101\ km$$

Thus,

$$\boldsymbol{Cf_e} = \frac{101}{155.5} \times 100 = 64.95\%$$

v. Disturbance to Wildlife

Species which are prone to disturbance owing to visitation are considered i.e Chital or Spotted Deer and Indian Gaur.

$$\boldsymbol{Corrective\ Factor\ (Cf_w)} = \frac{Limiting\ months/year}{No.of\ open\ months/year} \times 100$$

$$\boldsymbol{Total\ Cf_w} = Cf_{w1} + Cf_{w2} = 1\%$$

Assumptions:

Since, the area lies in buffer zone, the wildlife disturbance will be minimum.

As the wildlife, occupies the core portion while undergoing the various metabolic process and that is kept closed in Mid-june to commencement of October. However, as per the expert consultation, it was pointed that the possibility of occurrence of event is 1 in 100 events therefore, one percent is taken.

vi. ***Temporary closure of Roads***

For maintenance or other managerial reasons, visitation to certain roads may be temporary restricted within the park. As per the expert consultation, it was pointed that the possibility of occurrence to be kept 20%.

Therefore, the Real carrying capacity is as under:

$$\boldsymbol{RCC} = PCC \times \frac{100 - Cf_e}{100} \times \frac{100 - Cf_w}{100} \times \frac{100 - Cf_t}{100}$$

$$\boldsymbol{RCC} = PCC \times \frac{100 - 55.3}{100} \times \frac{100 - 44.4}{100} \times \frac{100 - 5.9}{100}$$

$$= 1103 \times 0.3505 \times 0.99 \times 0.8$$

$$= 306.188 \; or \; \boldsymbol{306 \; visits/day}$$

6.4.3 Effective Permissible Carrying Capacity (EPCC)

ECC is the maximum number of visitors that a site can sustain, given the management capacity (MC) available. ECC is obtained by multiplying the real carrying capacity (RCC) with the management capacity (MC). MC is defined as the sum of conditions that protected area administration requires if it is to carry out its functions at the optimum level. Limitations in management like lack of staff and infrastructure limit the RCC.

Managerial Capacity (MC) for STR = 45%

Therefore,

$$\boldsymbol{Effective\ Permissible\ Carrying\ Capacity} = RCC \times MC$$

$$= 306.18 \times 0.45$$

$$= \boldsymbol{137.78 \; or \; 138 \; visits/day}$$

This carrying capacity is applied when the potential of all the designated tourism zone is realised. However, at present there is no limiting cap of vehicles. But indirect restrictions are levied through the time interval 9 hrs (i.e., 5 am-11 am & 4 pm-9 pm) and vehicles permitted to enter in initial couple of hours only when session (i.e., morning and evening) starts.

Table 6-3 : Summary of various scenarios

Scenario	Selection criteria	Variable	No of rooms/ visits per day
Case 1	Accommodation	On basis of existing capacity of hotels	156 Rooms = 78 visits
Case 2	Accommodation	On basis of occupancy of hotels (i.e., interpolated on the basis of data of MPTB)	74 Rooms = 37 visits
Case 3 (Lowest)	Roads	The uniform time duration for safari is applied to the all the roads. (i.e. as per present case)	100
Case 4 (Highest)	Roads	The non- uniform time duration for travel in the different roads. (i.e. as per present case)	138
Case 5 (optimum)			

Summary of various scenarios

For evaluating the cases, it is assumed that

- Hotels are occupied with the family size of 3.
- Gypsy are occupied by 6 persons (including driver)

Scenario	Selection criteria	Variable	No of tourist per day
Case 1	Accommodation	On basis of existing capacity of hotels	468
Case 2	Accommodation	On basis of occupancy of hotels (i.e., interpolated on the basis of data of MPTB)	219
Case 3	Roads	The uniform time duration for safari is applied to the all the roads. (i.e. as per present case)	600
Case 4	Roads	The non- uniform time duration for travel in the different roads. (i.e. as per present case)	834
Case 5 (optimum)			

6.4.4 Permissible Road Capacity:

It must be noted, the length of all the roads is 6 or above it. As per the guidelines of IRC-60-1990, the maximum permissible carrying capacity of a Road with the ROW 7 m is 10000 PCU for two lanes two-way flow. However, since the preservation of forest and the ecology is the fundamental focus- a rigorous consultation with the transportation expert was undertaken which pointed out that, the maximum permissible road capacity to be proposed is 2500 PCU in aggregate or 1250 PCU one way for two direction.

Note:

1. This will demand the accommodation of taking case 3 is 600 (i.e., assuming all to be Gypsy and each occupied by 6). While the present accommodation carrying capacity is 468.

   Hence, it indicates a clear lag in accommodation for catering 132 people equivalent to 44 rooms (i.e., equivalent to increase in additional demand of 28.20%). It indicates the requirement of the strategy to periodically augment the accommodation facility to minimize the damage to ecology.

2. This will demand the accommodation of taking case 4 is 834 (i.e., assuming all to be Gypsy and each occupied by 6). While the present accommodation carrying capacity is 468.

   Hence, it indicates a clear lag in accommodation for catering 366 people equivalent to 122 rooms (i.e., equivalent to additional demand of 78.20%). It indicates the requirement of the strategy to periodically augment the accommodation facility to minimize the damage to ecology.

3. It must be noted, if the situation prevails that the roads are utilized to the max permissible capacity with tourist influx. This will demand the accommodation of 3750 (i.e., assuming all to be cars and each occupied by three people). While the present accommodation carrying capacity is 456.

   Hence, it indicates a clear lag in accommodation for catering 3294 people. It indicates the requirement of the strategy to periodically augment the accommodation facility to minimize the damage to ecology.

6.5 PACHMARHI

The carrying Capacity of Madhai is carried out based on the two following criteria – The existing accommodation facility for tourist and the condition of access roads.

6.6 ACCOMMODATION FACILITY

For calculating the carrying capacity based on the existing accommodation facilities for tourist, the availability of the rooms and its occupancy has been taken into consideration. The permission is granted to 300 hotels with an average 6 rooms (i.e., predominantly includes permanent structure and simultaneously incorporates Temporary structures). During the Site visit and consultation with the

Pachmarhi hotel association, it was found that significant number of hotels have not yet got the permission, which are operational illegally. The exact number of those three rooms was not available.

Case 1 –

The number of hotels are 300, with 7 rooms each. Thus, the aggregate of rooms comes out to be **2100 rooms** in PANCHMARHI. It incorporates the factor of 10% for the non-permanent accommodation (i.e., tourist tents, and Huts). It is assumed that the average occupancy of a room is 2, which was backed by the consultation with Managers or owners of some hotels. Hence, the carrying capacity comes out to be 4200 people.

Case 2 –

The below graph shows the room occupancy trend from the 10 hotels of MPSTDC for year 2018. The average annual room occupancy rate is 48.133 %, the maximum is 66.1% for the month of June and minimum is 34.3% for month of February. *(Source: Data collected from MPSTDC)*

The data set for the occupancy of all the hotels throughout the year was not available. Hence, The Occupancy data set of MPTDC is taken as the reference point and further interpolated

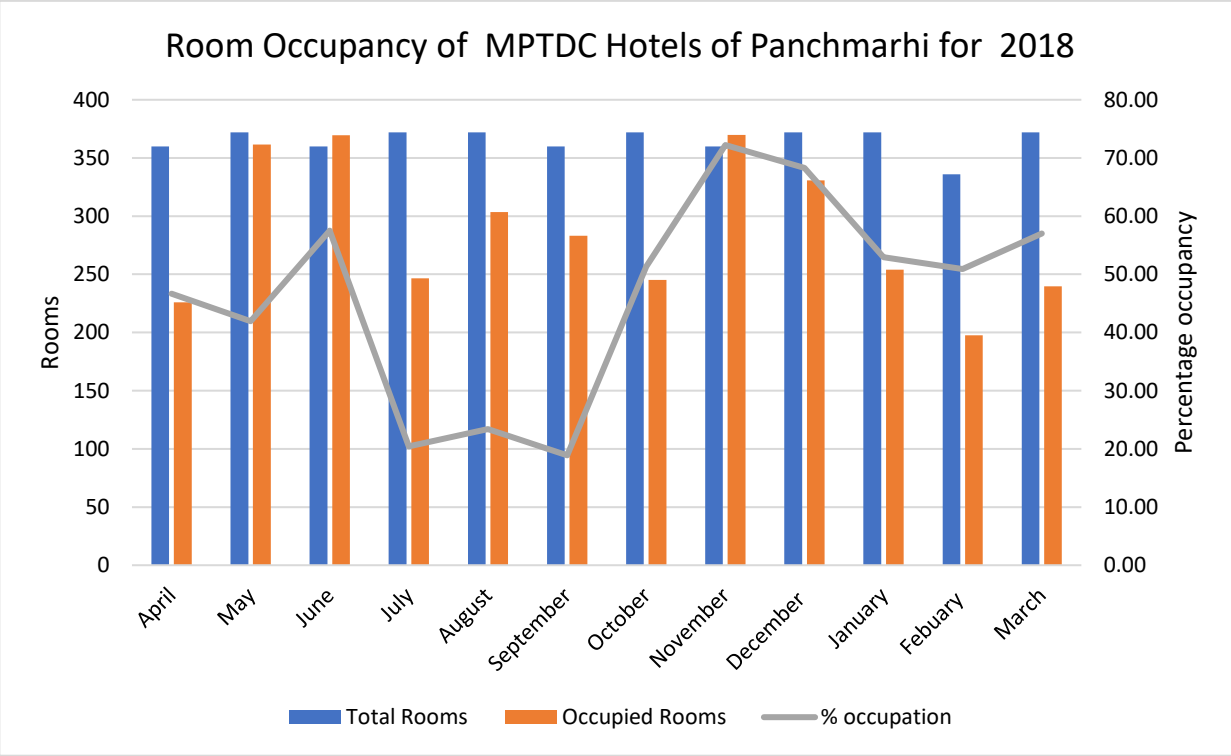


Figure 6-4 : Room Occupancy of MPTDC Hotels of Panchmarhi for 2018

The accommodation capacity Pachmarhi is 2100 rooms, and the average annual occupancy rate is 48.31%. Thus, the average occupant room of a particular day comes out to be 1015 rooms. It is assumed that the average occupancy of a room is 2030, which was backed by the consultation with Managers or owners of some hotels. Hence, the carrying capacity comes out to be 2030 people.

Permissible Road Capacity:

It must be noted, the length of the roads is 6 or above it. As per the guidelines of IRC-60-1990, the maximum permissible carrying capacity of a Road with the ROW 7 m is 10000 PCU for two lanes two-way flow. However, since the preservation of forest and the ecology is the fundamental focus- a rigorous consultation with the transportation and environmental expert was undertaken which pointed out that, the maximum permissible road capacity to be proposed is 5000 PCU in aggregate or 2500 PCU one way for two direction.

4. **It must be noted, if the situation prevails that the roads are utilized to the max permissible capacity with tourist influx. This will demand the accommodation of 7500 (i.e., assuming all to be cars and each occupied by three people). While the present accommodation carrying capacity is 4200**

5. **Hence, it indicates a clear lag in accommodation for catering 3300 people. It indicates the requirement of the strategy to periodically augment the accommodation facility to minimize the damage to ecology.**

6.7 PARKING AREAS

Pachmarhi is the only place in ESZ which has public parking. The analysis in the section indicates its existing capacity.

Calculation of Parking Capacity equivalent PCU (cars) as per IRC code points that the place has following capacity

Off-Street : 115

On Street : 255

Table 6-4 : The analysis points towards a Significant Lag in Parking Infrastructure

Sr No	Parking Type	Vehicle Capacity
1	On-street	15
2	On-street	15
3	On-street	10
4	On-street	5
5	On-street	210
6	Off-Street	75
7	Off- street	40

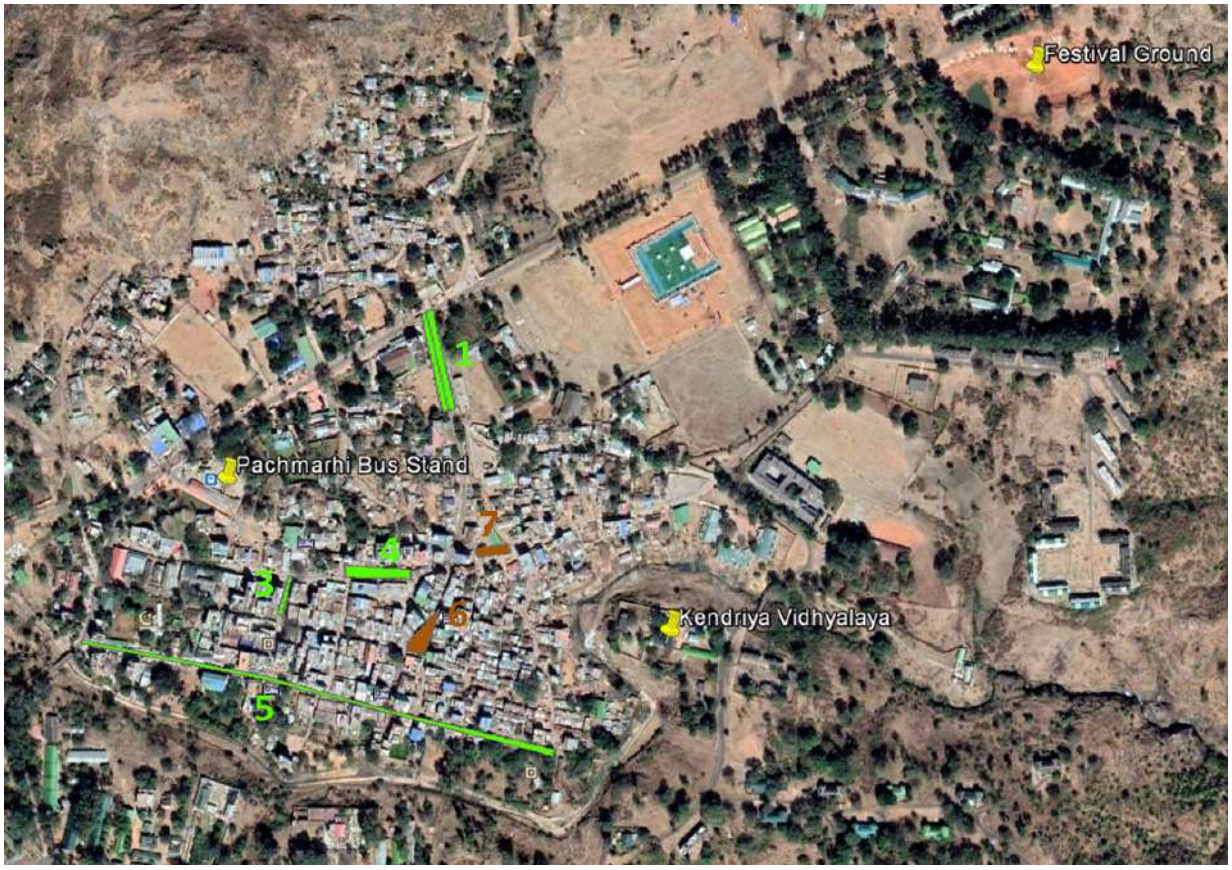


Figure 6-5 : Public Parking Spaces of Pachmarhi

7 PROBLEMS AND ISSUES

7.1 POLLUTION

Satpura Tiger Reserve has dense forest cover in core as well as buffer. The region is lacking in proper monitoring of air, water and noise pollution. For air monitoring only Pachmarhi has monitoring station, which is managed by regional pollution control board, Bhopal. The detailed analysis for pollution is briefly discussed in above section 2.10 of Chapter 2.

7.2 LOSS AND DEGRADATION OF FOREST

To analyse the degreadation of forest land, satellite imagery of years 1985, 2005 and 2015 are considered for analysis. The overlay of satellite imagery of year 1985 and 2015 indicates the pockets of degradation of forest, which are marked as yellow polygon in following figure 6.5. Total area of degraded forest is 3781.45 ha in Eco-Sensitive Zone. The major pockets for degradation can be observed in nearyby areas of notified villages namely, Sangakheda, Chinchdhana, Mangaria and Tekapar.

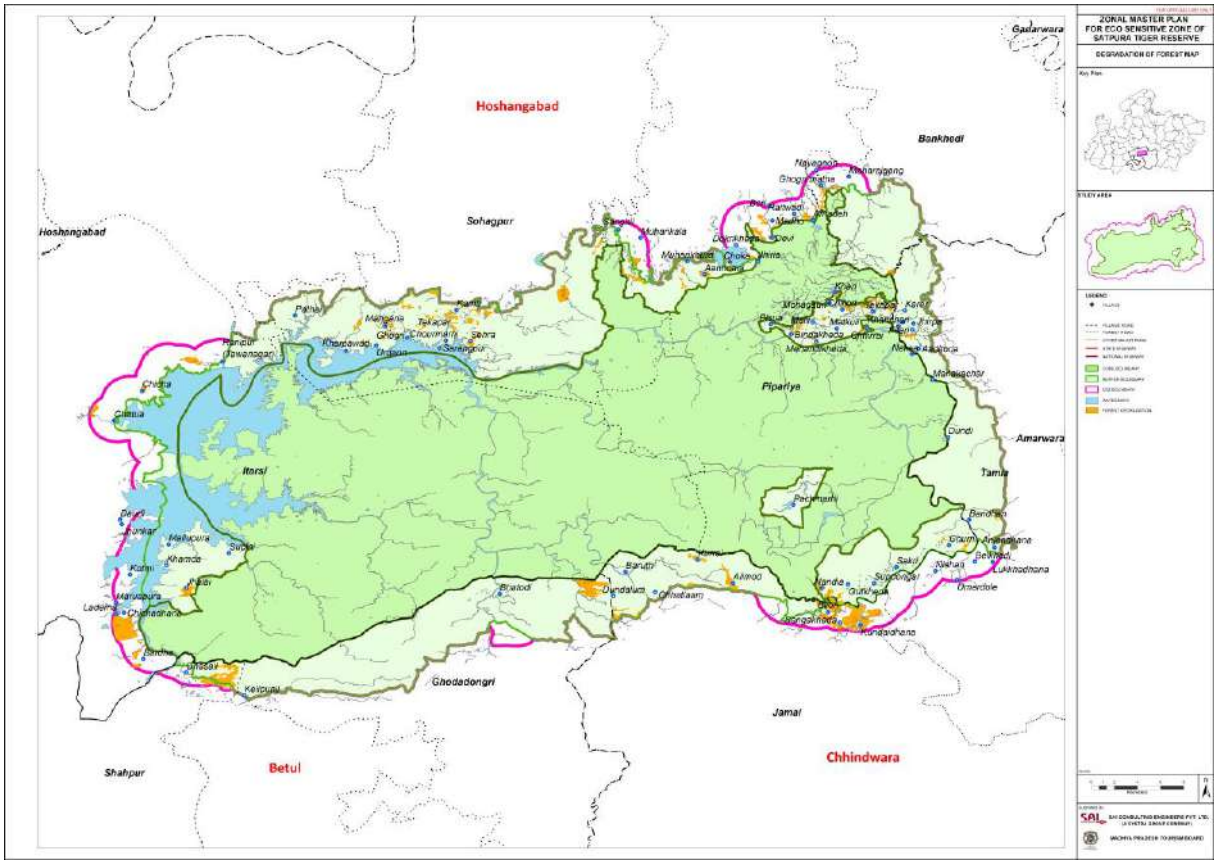


Figure 7-1 : Degradation of Forest in ESZ

7.3 DECLINING BIODIVERSITY VALUES

There are various factors affecting the biodiversity values of STR. The major factors are forest fire which directly responsible for loss of green cover and many diverse species of flora fauna, other human interference like poaching, accidents and illegal wood collections from forest. These factors are briefly explained below sections.

7.3.1 Forest Fire

There are very less number of natural fire cases. Manmade fires are mostly by Mahua and other NTFP gatherers which is to clear the ground or the intentional fires. Average area per incidents are the lowest in Satpura National Park because of thin population. Pachmarhi range has maximum number of villages and population and also has the highest number of incidents. In Bori Sanctuary, incidences are not quite frequent along with the average area involved per incidence because of unapproachable terrain & time taking journey. Fire protection has improved noticeably after introduction to Project Tiger which consists effective fire schemes incorporating various preventive and control measures.

The frequent fire cases have been reported in compartment number 252, 248, 251 and 272 of the East Pachmarhi range. As per the forest records, no animals or dense forest is harmed in this fire incidents, only grasslands were affected only.

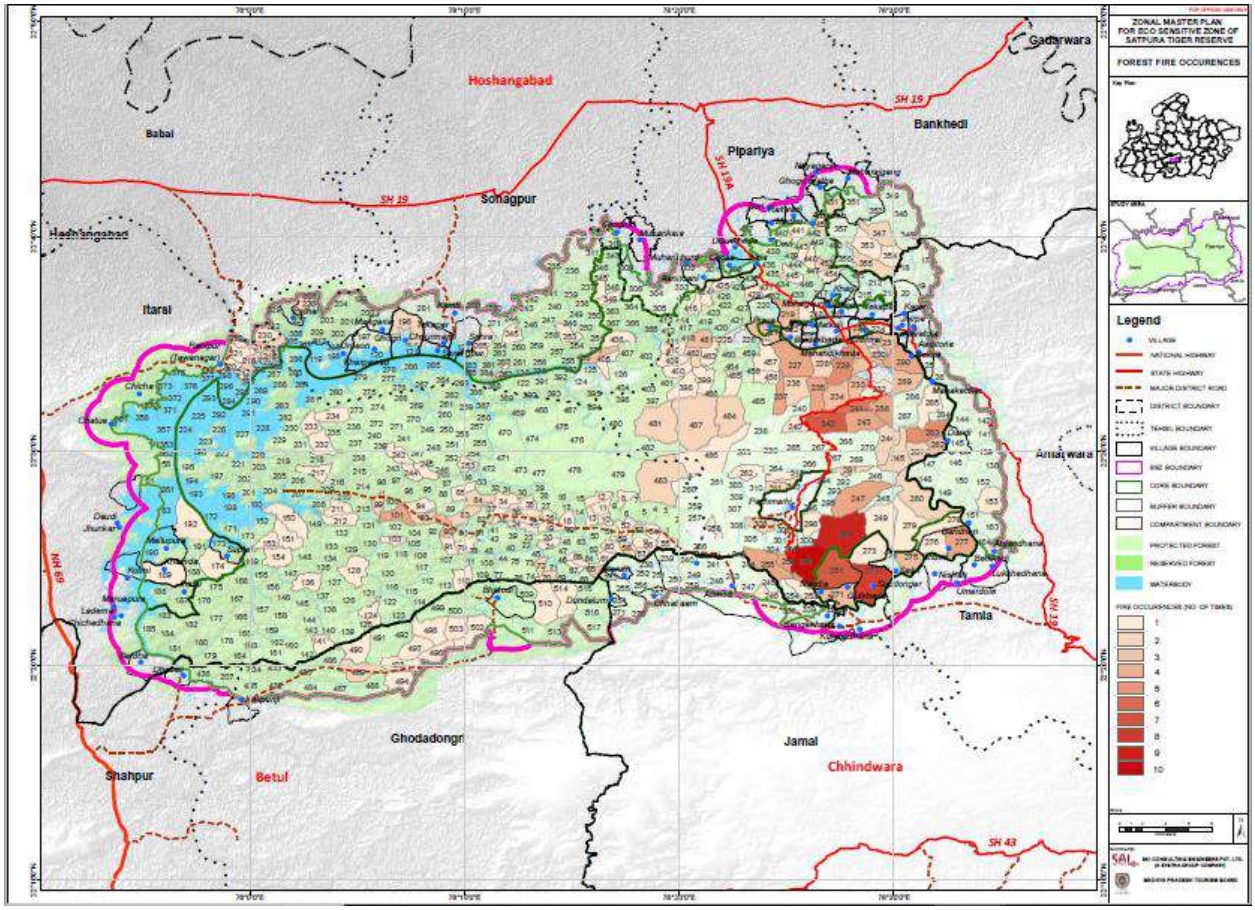


Figure 7-2 : Fire incidents in STR

7.3.2 Poaching

Satpura Tiger Reserve is geographically protected by two sides by backwaters of Tawa reservoir and southern boundary consist of high ridges. The geographical variety is not enough to protect from illegal activities. The case related to organized trade has not been observed in the area. But poaching cases of herbivores are found in the areas. The poaching details and cases are as shown in the table.

Table 7-1 : Range wise poaching in Satpura Tiger reserve

Sr. No.	Species	Range/ Area									
		Matkuli	Panchmarhi (East)	Panchmarhi (West)	Bori	Pipariya	Kamti	Bagra	Churna	Denwa	Total
1.	Sambar	1	1	-	-	1	-	1	1	-	5
2	Spotted deer	1	2	-	-	-	-	-	-	-	3
3	Four-horned Antelope	-	1	-	-	-	-	-	-	-	1
4	Nilgai	-	-	-	-	-	-	-	-	1	1
5	Blackbuck	-	-	-	-	3	-	1	-	-	4
6	Gaur	-	-	-	2	-	-	-	-	-	2
7	Wild pig	2	1	1	-	1	-	1	-	-	6
8	Indian hare	1	1	-	-	-	-	-	-	-	2

Sr. No.	Species	Range/ Area									
		Matkuli	Panchmarhi (East)	Panchmarhi (West)	Bori	Pipariya	Kamti	Bagra	Churna	Denwa	Total
9	Indian crested porcupine	1	2	-	-	-	-	-	-	-	3
Total Herbivorous		**6**	**8**	**1**	**2**	**5**	**0**	**3**	**1**	**1**	**27**
10	Leopard	-	1	-	-	1	-	-	-	-	2
11	Tiger	-	1	-	-	1	1	-	-	-	3
12	Golden Jackal	1	-	-	-	-	-	-	-	-	1
13	Pangolin	-	-	-	-	-	1	-	-	-	1
Total carnivorous		**1**	**2**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**7**
14	Pigeon	-	1	-	-	-	-	-	-	-	1
15	Peafowl		-	-	1	-	-	-	-	-	1
16	Wild fowl	1	-	-	-	-	-	-	-	-	1
Total Birds		1	1	-	1	-	-	-	-	-	3
17	Tortoise	1	-	-	-	-	-	-	-	-	1
18	Monitor lizard		-	-	-	-	-	-	-	1	1
Total reptiles		**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**
19	Fish**	2	2	-	-	1	-	-	-	-	5
20	Crab	-	15	-	-	-	-	-	-	-	15

(Data Source: Officials of Satpura Tiger reserve)

The core area is the low risk area for the animals as restrictions are implemented on core area of the forest. Some poaching cases in core area is also reported. The open forest, Pachmarhi area and road (Pipariya to Pachmarhi) alongside area is high risk area because of human interference. The major poaching cases also reported near the settlements of the STR in East Pachmarhi range. Major herbivore poaching cases reported for Wild pigs, Sambar and Blackbuck. The major incident of poaching is reported for the Herbivores because of meat and agriculture crop safety. There are total 3 incidents of Tiger poaching reported in East Pachmarhi Range, Pipariya range and Kamti Range.

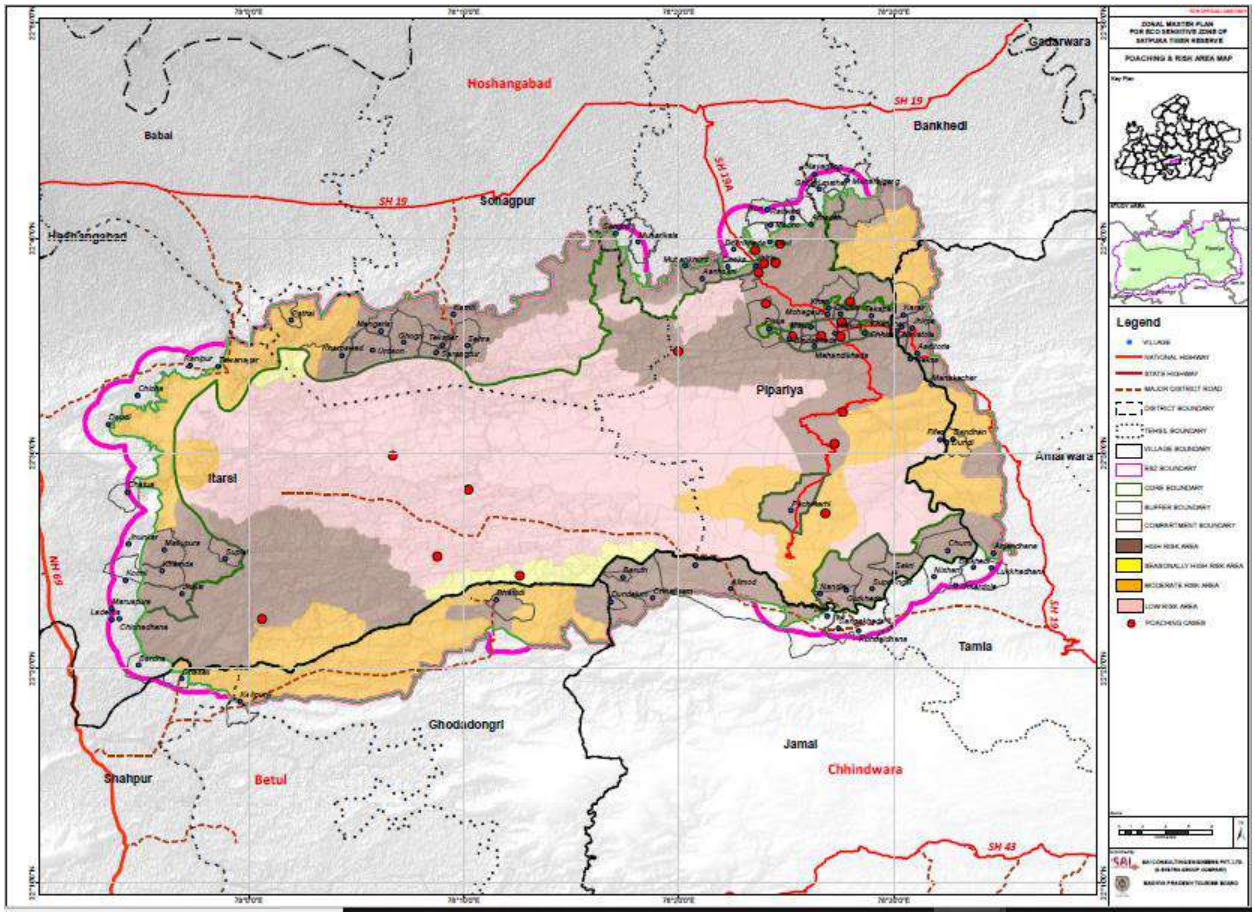


Figure 7-3 : Poaching incidents in STR

7.3.3 Animal Accidents

Other than poaching, the cases for the road trampling, Dog menace, stumbling in wells are reported. To protect the agriculture, produce, farmers does the normal or electric fencing, which causes the harm or death to the wild animals.

Table 7-2 : Animal accidents yearly data

Sr. No.	Year	Road Trampling	Dog Menace	Stumbling in wells	Barbed to Fencing	Electrocution
1	2015	4	3	0	0	0
2	2016	5	12	1	1	3
3	2017	0	13	2	0	2
4	2018	2	15	0	2	2
5	2019*	1	5	0	0	0

(Data Source: Officials of Satpura Tiger reserve)

7.3.4 Illegal timber collection

The collection of timber like Teak and Sal is prohibited in the core zone area. But the problem of illegal timber cutting is most severe in ranges like Matkuli where there are many villages still inside and in the periphery of the core zone. The list of reported cases of illegal timer extraction is given below.

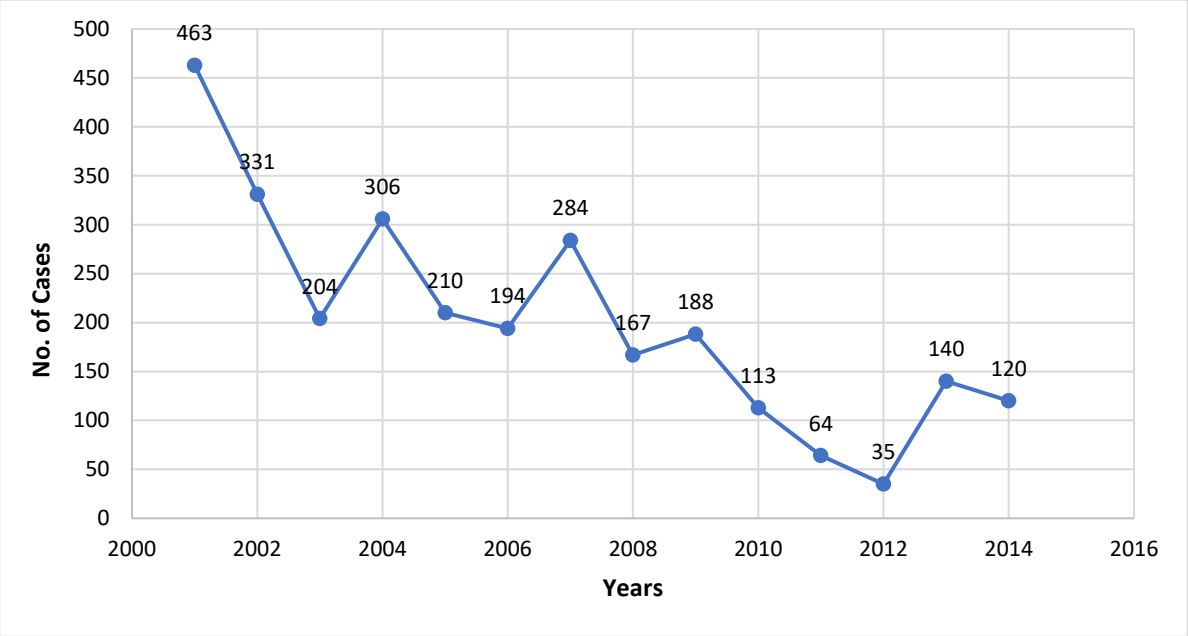


Figure 7-4 : Illegal timber cases reported in STR

7.4 WEED INFESTATION

Lantana camara is a common invasive alien weed of forests which is widely spread in various habitats. Besides outskirts of forests and other opener areas, it is common in pockets in riparian strips. The presence also found in many grasslands. *Lantana camara* is a strong light demander. These weeds can be found in areas of Churna and Bori range adjoining park boundary, part of west Pachmarhi, Pachmarhi and Matkuli range and Southern part of Kamti range.

The eradication of *Lantana camara* is very difficult. Large scale seed production is observed in this species with having qualities of grazing and fire hardy. Its control might happen naturally through a slow process following protection from fire and grazing and developing top canopy shading it out in patches. C.R. Babu Technique is adopted in forest areas to get rid of this species. Almost 70% area of reserve is infested with obnoxious weeds particularly lantana. This is causing habitat destruction and need urgent attention.

Figure 7-5 : Invasive weeds of STR

7.5 DEPENDENCY OF LOCAL COMMUNITIES

Stapura Tiger Reserve has 81 notified village in Eco-Sensitive Zone area. Approximately 69,000 people are habituated in these villages. These communities are linked religiously, socially and economically with forest. Important religios spots of Nagdwari and Mahadeo are located in core forest. These are the deities of local community and they occasionally celebrate festivals by gathering of Melas and performing rituals. These gathering is also benefitted economically for surrounding villages of these religious places because of haat bazar and temporary shops allow them to sell their local products.

Apart from religious, these communities are dependent for domestic usage of water, firesticks and other activities they perform. Villagers also do collect Minor Forest Produces like Achar, Mahua, Tendupatta,

bamboo and other produces for their domestic use as well as for selling and valu addition. Local communities also uses forest for grazing of their livestocks, which is brifed in section 1.12 of Chapter 01.

7.6 LIVELIHOOD ISSUES

- **Lack of awareness:** Lack of Awareness causes hardship in economic opportunity to villagers. Without awareness about various schemes that are required for economic development, villagers lack direction.
- **Water scarcity:** Water scarcity leads to losing of agricultural activities such as irrigation. Without availability of water irrigation process cannot be done properly. Sometimes water scarcity also becomes a major reason behind out migration.
- **Lack of irrigation facilities:** Cultivation of Crops reduces due to lack of irrigation facilities and it ultimately reduces the crop production resulting into increase of Marginal workers.
- **Lack of education facilities:** Lack of education facilities leads to lack of awareness. For positive growth of community's basic education is the key step. Therefore, villages should have Basic education facilities or should at least have accessibility to the facilities.
- **Lack of accessibility:** Lack of accessibility to the villages hinders economic development.
- **Lack of Communication facilities:** There are very few villages having mobile network availability for communication. So, villagers as well as tourists are facing issues while travelling to forest area
- **Lack of Banking facility:** For development of any area, banking facility is basic necessity.
- **Proximity to Reserved forest and protected**: Residing near reserve forest causes drawbacks to the villagers as only certain activities are permitted and villagers has to depend on non-timber products.
- **Wild animal Nuisance:** Due to proximity to forest area the villager has to suffer due to wild animal Nuisance. Their cattle's are also harmed by wild animals which causes economic loss to the villagers in STR.
- **Self-Help Group:** Although there are self-help group in the villages, but activities are not performed at present.

7.7 CONSERVATION-DEVELOPMENT CONFLICTS

1. Draw down Agriculture

Lack of apt area under meadows is somewhat compensated with recession of submerged area of Tawa reservoir. In part of receded areas particularly along Bori Sanctuary agriculture is practised, which otherwise could be used by wildlife. This activity also establishes barrier between water and wildlife. Use of chemical fertilizers & pesticides is affecting wetland and aquafauna.

2. Low female literacy:

The development of any community is indicated by the level of education and that too of both genders. Females constitute about 50% of regions human resource but lack of education snatches their chance to be a part of the progress and development of India.

3. Lack of transportation facilities:

The transportation frequency in the villages is very low and various modes of travel are not available. Villagers are depended on two wheelers or bus for transportation.

4. Loss of cultural significance:

The tribal cultural programs and their assets are disappearing as people are more diverting towards financial stability for which they have move to urban centres.

5. Loss of agricultural production:

Lack of irrigation facilities can lead to loss of agricultural production in the villages of STR.

6. Hindrance to economic development:

lack of accessibility, lack of communication facility, lack of banking facility etc. causes hindrance to economic development of the villages.

7. Developments around the Reserve

To cater to the increasing number of tourists, more tourist facilities and operators have established their presence (i.e., Legally and Illegally). It is mandated that all new infrastructure to obtain clearance from the LAC which will ensure that such places will conform to the proper norms of waste management, construction rules etc. However, Illegal Accommodation Infrastructure is prominent in numbers.

8. Mass religious Tourism:

Pachmarhi: The Place is popularly renowned as the "SHIV NAHGRI", due to enormous numbers of Shiv Temples shrines, accompanied with other temples and churches. During the mela period the religious spot are kept open without any entry charge and mandatory requirement to have a guide doesn't prevails. During such period as well as throughout the year a significant littering is experienced, which is more prominent to this category of tourism.

Figure 7-6 : Solid Waste Dumping, Pachmarhi

STR: The religious tourism is the predominant source of pollution. It must be noted that sites are located at the higher elevations, thus instances of any littering have a significant possibility to pollute downstream water bodies. It is necessary that an attempt to control pollution is undertaken by Mahadeo Mela Samiti.

During site visit it was inference that during nagdwari mela, the major source of removal of waste was on the rain. As the rain droplets flushes the waste disposal from these pilgrim places (i.e., also includes path) to the downstream. It's analogous to the iceberg model of problem, where things are deeper inside than what is visible. Thus, here although that waste is disposed from the spot to elsewhere in downstream, untimely it will result into severe environmental consequences by deleting the biodiversity of the region.

9. Non-Inclusive Tourism:

Pachmarhi: Tourism contributes prominently to the economy of Pachmarhi. It is rather difficult to distinguish tourist shopping from the general shopping which also serves the habitants of the town. However, in addition to are Petrol, pump, repair workshop, foreign liquor, medicine, and photo studios. A study of existing shopping pattern from the primary survey indicates that these services are available at Pachmarhi. However, the need for developing such facilities needs be overemphasized

Madhai: During site visit, it was inferenced that the contribution of tourism to local economy was significantly low. The Hotels/resorts doesn't employ or employ numbers which tends to nil, in this region. It was also found that the Gypsy safari of the local villagers are given second preference, pointing towards skill and the group willingness. Even, the culture was not showcased/ given opportunity by/to the people which possess potential to augment the income and thereby local economy.

10.Increase in tourist flow

Pachmarhi being only hill station of MP, attracts lakhs of visitors every year. Massive inflow of tourist is encouraging many activities e.g. construction, pollution, fuel wood consumption and many more are causing threats to surrounding areas. There is need to regulate tourism to minimize damage

11.Inaccessibility and lack of awareness: -

Most of the area is inaccessible and developmental activities have not reached as they should have been, this situation has created ill will in certain quarters towards conservation and fumed by anti-conservation activists. Further illiteracy and ignorance have given out a situation of lack of awareness.

7.8 SYNTHESIS OF PROBLEM AFFECTING THE CONSERVATION GOAL IN THE ESZ

The area is rich in the biological diversities. The major threats for illegal activities and biotic pressure on the forest in the STR. The threats can be for wildlife or for the vegetation or habitants of the both. The threats are briefly discussed as below.

7.8.1 For wildlife

Three species, tiger, leopard and the sloth bear have been targeted countrywide by gangs of organized criminals for international illegal trade in skins and body parts. Another potential threat is from large-scale fishing in the Tawa reservoir. With having a number of boats in the reservoir and movement of people, poachers finds an easy access way at any point of their choice in the STR.

Fishing is widely practiced in the Tawa reservoir and use of gill nets is common. There has been reports for the fishing done by gill nets entangles crocodiles and causes mortality. Secondly, being an irrigation reservoir the demand for irrigation increases with the advancement of the dry season which is normally nest digging and egg laying commences before the onset of rains for crocodiles This causes in water level recedes to levels much below the nests. Either the eggs will not be laid or even if the eggs hatch the hatchlings will have very poor chance of reaching the water. Thirdly, the nesting habitat is reduced considerably due to cultivation in draw down areas, sites of boat landings, tourism provisions and many more.

Large-scale fishing is known to negatively affect the status and distribution of otter as it seems to have declined considerably as compare to 1986. Otter is affected by chemically contaminated fish as Sewage and other effluents from the Pachmarhi plateau are entering some of the streams.

The threats for wild animals in the area as listed below:

- Poaching
- Habitat loss and alteration due to invasive weeds, fire hazard, tree hacking down, encroachment etc.
- Road accidents
- Electrocution
- Drought
- Degradation of grasslands

7.8.2 For Wild plants

Species like *Psilotum nudum, Lycopodium cernum, Cythea gigantea, Angiopteris evecta, Isoetes panchananii, Isoetes mahadevansis, Ophioglossum nudicaul, Utricularia exoleta, Drosera burmanii,* and *Drosera indica* have small and scattered populations, they also are habitat specialists and endangered because of human activities like construction of roads in the forest, expansion of human habitations, increasing tourism and road traffic, visitors dumping solid waste on prime sites like, Bee Fall, Duchess Fall, Little Fall, Handi-Khoh, trampling by livestock, over collection by botany students for study, and by those engaged in the trade of ornamental plants directly lead to habitat loss. Some of these are heavily collected during the botanical excursions of educational institutions. Species like *Chlorophytum spp, Gloriosa superba, Raulffia serpentina,* and *Asparagus recemosus* are in considerable demand for their medicinal value and therefore there is over collection leading to their local disappearance from the managed forests. These threats hold good for all species of *pteridophytes* and *bryophytes.*

Populations of some of the tree species that are socio-economically important and also among those that are the commonest in the region like *Embelica officinalis, Buchnania lanzan, Terminalia chebula, Madhuca latifolia*, are on a rapid decline in the managed forests. Their recruitment classes are poorly represented, and seed banks are almost non-existent. The population of *Diospyros melanoxylon* indicates poor regeneration from seed origin.

- Expansion of invasive weeds
- Forest fire
- Grazing and trampling
- Collection by students and scholars
- Drought
- Canopy opening in certain pockets due to illicit felling

7.8.3 Habitats

Among the invasive species, *Lantana* is the most widespread. Specially, the areas of Churna and Bori range adjoining Park boundary, part of West Pachmarhi, Pachmarhi and Matkuli range and southern part of Kamti range are heavily infested. To eradicate lantana is a difficult process as it might happen naturally through a slow process by developing top canopy shading it out in patches.

In traditional forestry snags and den trees have no place in timber stands and for commercial purpose felled and removed in felling as they are considered useful as firewood and always in great demand. A large number of animal species are dependent on these elements. Such species perform key ecological functions in maintaining the forests as a vibrant and resilient system. The consistent removal of such species can be threat to some of the vital ecological processes, functions and the integrity of forests as habitats of wild plants and animals, as well as the regenerating capacity of the forests.

The area is rich in the biological diversities. The threats will always be there for the area for illegal activities, environment degradation and many more. The threats for wildlife or for the vegetation or habitants of the both can be summarized as follow: -

7.8.4 Biotic pressure

There are 63 villages within and 81 villages of buffer and ESZ in Satpura Tiger Reserve. The human population along with cattle population is increasing. The major population of area is dependent on forest for their livelihood. This dependency can be causing adverse impact on natural resources. This impact is also playing role to degrading Habitats. As Pachmrahi is the major tourist destination it also creates a biotic pressure to forest because of large number of floating populations.

7.8.5 Limited meadows

Satpura Tiger Reserve have only 4 small meadows and the area under them is well below 1% of the total area. There is sizable population of Cheetal, Nilgai and many more herbivores which thrive on meadows.

7.8.6 Draw down Agriculture

Lack of apt area under meadows is somewhat compensated with recession of submerged area of Tawa reservoir. In part of receded areas particularly along Bori Sanctuary agriculture is practised, which otherwise could be used by wildlife. This activity also establishes barrier between water and wildlife. Use of chemical fertilizers & pesticides is affecting wetland and aquifauna.

7.8.7 Inaccessibility and lack of awareness

Most of the area is inaccessible and developmental activities have not reached as they should have been, this situation has created ill will in certain quarters towards conservation and fumed by anti-conservation activists. Further illiteracy and ignorance have given out a situation of lack of awareness.

7.8.8 Pilgrim fairs and festivals

There are two major pilgrim shrines within reserve, where lakhs of devotees throng every year. These 2 Melas are organised in the core zone of the forest. The Nagdwarimela is organised in September and Mahashivratri mela is organised in March. Approximately, 3 lakh people visit the mela and shops and all established in the route of trek. The food is being prepared inside the Mela, which can lead to the fire and tree cutting for wood in forest area. The 2nd pollution is plastic water bottle which people carry to drink water. The open defecation in the area leads to the pollution of water bodies and land pollution. During fair time human fecal material makes area very un-scenic also. Incidentally the area is nesting and roosting areas of endangered vultures & other wildlife too. Massive disturbance and use of resources and thereby polluting environment is big problem in areas surrounding these sites

7.8.9 Increase in tourist flow

Pachmarhi being only hill station of MP, attracts lakhs of visitors every year. Massive inflow of tourist is encouraging many activities e.g. construction, pollution, fuel wood consumption and many more are causing threats to surrounding areas. There is need to regulate tourism to minimize damage

7.9 KEY PERFORMANCE INDICATORS (KPI)

Key Performance indicatords are helpful to identify the status of present activities and regulations for hazardous activities in Eco-Sensitive Zone area . An in-depth analysis has been carried out for Eco-Sensitive Zone

7.9.1 Benchmarks / Norms / Standards

In accordance with the gazette notification no. S.O.2538(E) by Ministry of Environment, Forest and Climate Change on 9th August 2017 list of prohibited, regulated and promoted activities is as below table 7-3. These activities are considered as parameters / indicators for Eco-Sensitive Zone.

Table: Benchmark / Indicators for Eco-Sensitive Zone

Table 7-3 : Benchmarks / Norms / Standards

S No	Activity	Description
A. Prohibited Activities		
1	Commercial Mining	(a) All new and existing (minor and major minerals), stone quarrying and crushing units are prohibited with immediate effect except for meeting the domestic needs of bona fide local residents including digging of earth for construction or repair of house and for manufacture of country tiles or bricks for housing and for other activities. (b) The mining operations shall be carried out in accordance with the order of the Hon'ble Supreme Court dated the 04" August, 2006 in the matter of T.N. Godavarman Thirumulpad Vs. UOI in W.P.(C) No.202 of 1995 and dated the 21st April, 2014 in the matter of Goa Foundation Vs. UOI in W.P.(C) No. 435 of 2012.
2	Setting of industries causing pollution (Water, Air, Soil, Noise, etc.).	No new industries and expansion of existing polluting industries in the Eco-sensitive zone shall be permitted. Only non-polluting instries shall be allowed with ESZ as per classification of Industries in the Guidelines issued by Central Pollution Control Board in February 2016. unless so specified in this notification In addition, non-polluting cottage industries shall be promoted.
3	Establishment of major hydroelectric project.	Prohibited (except as otherwise provided) as per applicable laws.
4	Use or production or processing of any hazardous substances.	Prohibited (except as otherwise provided) as per applicable laws.
5	Discharge of untreated effluents in natural water bodies or land area.	Prohibited (except as otherwise provided) as per applicable laws.
6	Establishment of large-scale commercial livestock and poultry farms by firms, corporate, companies	Prohibited (except as otherwise provided) as per applicable laws except for meeting local needs.
7	Setting of new sawmills.	No new or expansion of existing sawmills shall be permitted within the Eco-sensitive Zone.
8	Setting up of brick kilns.	Prohibited (except as otherwise provided) as per applicable laws
9	Use of polythene bags.	Prohibited (except as otherwise provided) as per applicable laws
10	Commercial use of firewood	Prohibited (except as otherwise provided) as per applicable laws
B. Regulated Activities		
11	New wood-based industry	Prohibited (except as otherwise provided) as per applicable laws

S No	Activity	Description
12	Commercial establishment of hotels and resorts.	No new commercial hotels and resorts shall be permitted within one kilometre of the boundary of the Protected Area or upto the extent of Eco-sensitive Zone. Whichever is nearer, except for small temporary structures for Eco-tourism activities. Provided that, beyond one kilometre from the boundary of the protected Area or upto the extent of Eco-Sensitive zone whichever is nearer, all new tourist activities of expansion of existing activities shall be in conformity with the Tourism Master Plan and guidelines as applicable.
13	Construction activities	(a) No new commercial construction of any kind shall be permitted within one Kilometre from the boundary of the Protected Area or upto exient of the Eco-sensitive Zone whichever is nearer: (a) Provided that, local People shall be permitted to undertake construction in their land for their use including the activities listed in sub paragraph (1) of paragraph 3 as per building byelaws to meet the residential such as: (i) Widening and strengthening of existing roads and construction of new roads. (ii) Construction and renovation of infrastructure and civic amenities. (iii) Small scale industries not causing pollution termed as per Classification done by Central Pollution Control Board of February 2016. (iv) Cottage industries including village industries; convenience stores and local amenities supporting eco-tourism including home stay; and (v) Promoted activities listed in this Notification. (b) Provided that the construction activity related to small scale industries not causing pollution shall be regulated and kept at the minimum, with the prior permission from the competent authority as per applicable rules and regulations, if any. (c) Beyond one kilometre it shall be regulated as per the Zonal Master Plan.
14	Small scale nonpolluting industries.	Non Polluting industries as per classification of industries issued by the Central Pollution Control Board in February 2016 and non-hazardous, small-scale and service industry, agriculture, floriculture, horticulture of agro-based industry producing products from indigenous materials from the Eco-sensitive Zone shall be permitted by the competent Authority.
15	Commercial Goat and sheep farming.	Regulated under applicable laws.
16	Felling of Trees.	(a) There shall be no felling of trees on the forest or Government or revenue or private lands without prior

S No	Activity	Description
		permission of the competent authority in the State Government. (b) The Felling of trees shall be regulated in accordance with the provisions of the concerned Central of State Act and the rules made thereunder.
17	Goat Farming	Regulated under applicable laws.
18	Collection of Forest produce or Non-Timber Forest Produce (NTFP)	Regulated under applicable laws.
19	Migratory graziers	Regulated under applicable laws.
20	Erection of electrical and communication towers and laying of cables and other infrastructures.	Regulated under applicable law. Underground cabling may be promoted.
21	Infrastructure including civic amenities	Shall be done with mitigation measures, as per applicable laws, rules and regulation and available guidelines.
22	Widening and strengthening of existing roads and construction of new roads.	Shall be done with mitigation measures, as per applicable laws, rules and regulation and available guidelines.
23	Undertaking other activities related to tourism like over flying the ESZ area by hot air balloon, helicopert, drones, Microlies, etc.	Regulated under applicable law.
24	Protection of Hill Slopes and riverbanks.	Regulated under applicable laws.
25	Movement of vehicular traffic at night.	Regulated for commercial purpose under applicable laws.
26	Ongoing agriculture and horticulure practices by local communities along with dairies, dairy farming, aquaculture and fisheries.	Permitted under applicable laws for use of locals.
27	Discharge of treated wastewater/effluents in natural water bodies or land area.	The discharge of treated wastewater/effluents shall be avoided to enter into the water bodies, Efforts to be made for recycle and reuse of treated wastewater. Otherwise the discharge of treated wastewater/effluent shall be regulated as per applicable laws.
28	Commercial extraction of surface and ground water.	Regulated under applicable law.
29	Open well, Bore Well etc. for agriculture or other usage	Regulated and the activity should be strictly monitored by the appropriate authority.
30	Solid Waste Management/Bio-medical Waste Management.	Regulated under applicable laws

S No	Activity	Description
31	Introduction of Exotic species.	Regulated under applicable laws
32	Eco-tourism	Regulated under applicable laws
33	Commercial Sign boards and hoardings.	Regulated under applicable laws
C. Promoted Activities		
34	Rainwater harvesting	Shall be actively promoted.
35	Organic farming	Shall be actively promoted.
36	Adoption of green technology for all activities.	Shall be actively promoted.
37	Cottage industries including village artisans, etc.	Biogas, solar light etc. to be actively promoted.
38	Use of renewable energy and fuels	Shall be actively promoted.
39	Agro-Forestry	Shall be actively promoted.
40	Use of eco-friendly transport	Shall be actively promoted.
41	Skill Development	Shall be actively promoted.
42	Restoration of Degraded Land/Forests/Habitat	Shall be actively promoted.
43	Environmental Awareness	Shall be actively promoted.

Applicable standards for environment and development are provided as table of standards in annexure – 7.1.

7.9.2 Status of Performance Indicators

A brief analysis for Eco-Sensitive Zone of Satpura Tiger Reserve based on above parameter is given briefly in below table with identification of issues and location of issues identified.

Table 7-4 : Status of KPI

S No	Key-Performance Parameters	Details / Sub Performance Parameters	Existing Status	Location of issues identified
1	Commercial Mining	(a) All new and existing (minor and major minerals), stone quarrying and crushing units are prohibited with immediate effect except for meeting the domestic needs of bona fide local residents including digging of earth for construction or repair of houses and for manufacture of country tiles or bricks for housing and for other activities.	Absence of commercial mining activities in Eco-Sensitive Zone boundaries at present.	Not Applicable

S No	Key-Performance Parameters	Details / Sub Performance Parameters	Existing Status	Location of issues identified
		(b) The mining operations shall be carried out in accordance with the order of the Hon'ble Supreme Court dated the 04th August, 2006 in the matter of T.N. Godavarman Thirumulpad Vs. UOI in W.P.(C) No.202 of 1995 and dated the 21st April, 2014 in the matter of Goa Foundation Vs. UOI in W.P.(C) No.435 of 2012.		
2	Setting of industries causing pollution (Water, Air, Soil, Noise, etc.).	No new industries and expansion of existing polluting industries in the Eco-sensitive zone shall be permitted. Only non-polluting industries shall be allowed within ESZ as per classification of Industries in the Guidelines issued by Central Pollution Control Board in February 2016, unless so specified in this notification. In addition, non-polluting cottage industries shall be promoted.	Absence of polluted industries in Eco-Sensitive Zone boundaries at present.	Not Applicable
3	Establishment of major hydroelectric project.	Prohibited (except as otherwise provided) as per applicable laws.	Currently, a hydro-electric power plant already exists at Tawa Reservoir.	Tawanagar (Ranipur)
4	Use or production or processing of any hazardous substances.	Prohibited (except as otherwise provided) as per applicable laws.	There are no use or production or processing of any hazardous substance in ESZ area at present	Not Applicable
5	Discharge of untreated effluents in natural water bodies or land area.	Prohibited (except as otherwise provided) as per applicable laws	At present there are no provisions of treatment of wastewater in ESZ area. All the wastewater is directly disposed to nearby waterbodies	Settlements areas of ESZ
6	Establishment of large-scale commercial livestock and poultry	Prohibited (except as otherwise provided) as per applicable laws except for meeting local needs.	There are no largescale commercial livestock and	Not Applicable

S No	Key-Performance Parameters	Details / Sub Performance Parameters	Existing Status	Location of issues identified
	farms by firms, corporate, companies.		poultry farms in ESZ area at present	
7	Setting of new sawmills.	No new or expansion of existing sawmills shall be permitted within the Eco-sensitive Zone.	There are no sawmills in operation in ESZ area	Not Applicable
8	Setting up of brick kilns.	Prohibited (except as otherwise provided) as per applicable laws	There are no brick kilns present in ESZ area	Not Applicable
9	Use of polythene bags.	Prohibited (except as otherwise provided) as per applicable laws	Currently there are no restrictions on use of polythene bag in Buffer and ESZ area.	Settlements areas and Tourism sites of ESZ
10	Commercial use of firewood	Prohibited (except as otherwise provided) as per applicable laws	Commercial use of firewood is not found in ESZ area at present	Not Applicable
11	New wood based industry	Prohibited (except as otherwise provided) as per applicable laws	No wood-based industries exist in ESZ area	Not Applicable
12	Commercial establishment of hotels and resorts.	No new commercial hotels and resorts shall be permitted within one kilometre of the boundary of the Protected Area or up to the extent of Eco-sensitive zone, whichever is nearer, except for small temporary structures for Eco-tourism activities. Provided that, beyond one kilometre from the boundary of the protected Area or upto the extent of Eco-sensitive zone whichever is nearer, all new tourist activities or expansion of existing activities shall be in conformity with the Tourism Master Plan and guidelines as applicable.	There is presence of hotels and resorts in some part of ESZ area.	Madhai, Matkuli, Pachmarhi, Tawanagar
13	Construction activities	(a) No new commercial construction of any kind shall be permitted within one Kilometre from the boundary of the Protected Area or up to extent of the Eco-sensitive Zone whichever is nearer:	There are no specific regulation for new commercial construction at present in ESZ area.	Major commercial construction in form of Hotels, Restaurants and Dhabas are bound in

S No	Key-Performance Parameters	Details / Sub Performance Parameters	Existing Status	Location of issues identified
				Matkuli and Pachmarhi area.
		(a) Provided that, local people shall be permitted to undertake construction in their land for their use including the activities listed in sub paragraph (1) of paragraph 3 as per building byelaws to meet the residential needs of the local residents such as:	No restrictions for existing settlement	All notified villages of STR
		(i) Widening and strengthening of existing roads and construction of new roads;	The connectivity to the villages are poor in ESZ area. Approximately 56% villagers have connectivity through Kacha Roads in ESZ area.	Existing connectivity is as per Table No 3.43.
		(ii) Construction and renovation of infrastructure and civic amenities;	Absence of infrastructure facilities for public transport. i.e. Bus Stand, Bus depo etc.	Notified villages of STR except Pachmarhi
		(iii) Small scale industries not causing pollution termed as per Classification done by Central Pollution Control Board of February 2016;	No regulations at present on commercial and industrial construction	All notified villages of STR
		(iv) Cottage industries including village industries; convenience stores and local amenities supporting eco-tourism including home stays; and		
		(v) Promoted activities listed in this Notification.		
		(b) Provided that the construction activity related to small scale industries not		

S No	Key-Performance Parameters	Details / Sub Performance Parameters	Existing Status	Location of issues identified
		causing pollution shall be regulated and kept at the minimum, with the prior permission from the competent authority as per applicable rules and regulations, if any.		
		(c) Beyond one kilometre it shall be regulated as per the Zonal Master Plan.		
14	Small scale non-polluting industries.	Non-polluting industries as per classification of industries issued by the Central Pollution Control Board in February 2016 and non-hazardous, small-scale and service industry, agriculture, floriculture, horticulture or agro-based industry producing products from indigenous materials from the Eco-sensitive Zone shall be permitted by the competent Authority.	There are some tasar process centers available in ESZ area at present	Tasar/ Silk process centres at Matkuli, Dokrikheda and Pachmarhi
15	Commercial Goat and sheep farming.	Regulated under applicable laws	There are no commercial goat and sheep farming in ESZ area at present	Not Applicable
16	Felling of Trees	(a) There shall be no felling of trees on the forest or Government or revenue or private lands without prior permission of the competent authority in the State Government.	The regulations are as per Indian Forest Act, 1980 and Wild-life Protection Act, 1972 at present situation.	Not Applicable
		(b) The felling of trees shall be regulated in accordance with the provisions of the concerned Central or State Act and the rules made thereunder.		
17	Goat Farming	Regulated under applicable laws.	local communities are doing goat farming in settlement areas only	Notified Villages of ESZ
18	Collection of Forest produce or Non-Timber Forest Produce (NTFP).	Regulated under applicable laws.	NTFP like tendupatta, achar, chirongi, harda etc, are collected from	Forest area of ESZ

S No	Key-Performance Parameters	Details / Sub Performance Parameters	Existing Status	Location of issues identified
			the forest in supervision of forest department by local villagers	
19	Migratory graziers	Regulated under applicable laws.	No such provisions at present in STR	Whole ESZ area.
20	Erection of electrical and communication towers and laying of cables and other infrastructures	Regulated under applicable law. Underground cabling may be promoted.	Electric cablings are already established by state electricity board in village areas. Also, communication towers are there in most of the areas expect Madhai area and Southern part of ESZ area	Settlements areas of ESZ
21	Infrastructure including civic amenities	Shall be done with mitigation measures, as per applicable laws, rules and regulation and available guidelines.	Infrastructure including civic aminities are done by PHE department	Settlements areas of ESZ
22	Widening and strengthening of existing roads and construction of new roads.	Shall be done with mitigation measures, as per applicable laws, rules and regulation and available guidelines.	The connectivity to the villages are poor in ESZ area. Aprroximately 56% villagers have connectivity through Kacha Roads in ESZ area.	Existing connectivity is as per Table no. 3.43
23	Undertaking other activities related to tourism like over flying the ESZ area by hot air balloon, helicopter, drones, Microlites, etc.	Regulated under applicable law	No such practices at present.	Not Applicable

S No	Key-Performance Parameters	Details / Sub Performance Parameters	Existing Status	Location of issues identified
24	Protection of Hill Slopes and riverbanks	Regulated under applicable laws	No such provisions at present in STR	Not Applicable
25	Movement of vehicular traffic at night.	Regulated for commercial purpose under applicable laws.	Not restricted at present.	Whole ESZ area.
26	Ongoing agriculture and horticulture practices by local communities along with dairies, dairy farming, aquaculture and fisheries.	Permitted under applicable laws for use of locals.	Ongoing agricultural activities includes farming of various cash crops like maize, wheat, soybean etc. and vegetables are produced by local communities in their agriculture land. At present organic farming practice is not being done by local communities in villages of ESZ. Dairy farming, aquaculture and fisheries are not done by local communities in ESZ area	Agriculture areas of ESZ
27	Discharge of treated waste water/effluents in natural water bodies or land area.	The discharge of treated wastewater/effluents shall be avoided to enter into the water bodies. Efforts to be made for recycle and reuse of treated wastewater. Otherwise the discharge of treated wastewater/effluent shall be regulated as per applicable laws.	At present there are no provisions of treatment of wastewater in ESZ area. All the wastewater is directly disposed to nearby waterbodies	Whole ESZ area.
28	Commercial extraction of surface and ground water	Regulated under applicable law.	No such provisions at present in STR	Whole ESZ area.

S No	Key-Performance Parameters	Details / Sub Performance Parameters	Existing Status	Location of issues identified
29	Open Well, Bore Well etc. for agriculture or other usage	Regulated and the activity should be strictly monitored by the appropriate authority.	No such provisions at present in STR	Whole ESZ area.
30	Solid Waste Management/Bio-medical Waste Management	Regulated under applicable laws	There are no solid waste management system in villages of STR at present except Pachmarhi	Only pachmarhi have solid waste management system and landfill site
31	Introduction of Exotic species.	Regulated under applicable laws.	Lantana are the major exotic species found in the ESZ area.	Forest area of ESZ
32	Eco-tourism	Regulated under applicable laws	Tourism is allowed in Buffer Area with prior permission of forest department. Nature trails and camping is the major Eco-Tourism activities in ESZ area.	Core and Buffer area of ESZ
33	Commercial Sign boards and hoardings.	Regulated under applicable laws.	Commercial sign boards are moslty seen in tourism areas like madhai and pachmarhi	Sarangpur, Pachmarhi
34	Rainwater harvesting	Shall be actively promoted.	No such practices at present.	Not Applicable
35	Organic farming	Shall be actively promoted.	At present, mostly all the farmers are using chemical pesticides and fertilisers in agricultural practice in order to increase production. Organic farming	Agriculture areas of ESZ

S No	Key-Performance Parameters	Details / Sub Performance Parameters	Existing Status	Location of issues identified
			is not in practice in local communities of ESZ	
36	Adoption of green technology for all activities	Shall be actively promoted.	No such practices at present.	Settlements areas of ESZ
37	Cottage industries including village artisans, etc.	Shall be actively promoted.	currently there are very few cottage industries operating in ESZ area, like in tawanagar and chicha some agarbatti making and packing were done for some private companies by local communities of village	Whole ESZ area.
38	Use of renewable energy and fuels	Bio gas, solar light etc. to be actively promoted	No such practices at present.	Whole ESZ area.
39	Agro-Forestry	Shall be actively promoted.	At present, agroforestry is not practiced in ESZ area	Not Applicable
40	Use of eco-friendly transport	Shall be actively promoted.	No such practices at present.	Not Applicable

S No	Key-Performance Parameters	Details / Sub Performance Parameters	Existing Status	Location of issues identified
41	Skill Development	Shall be actively promoted.	Currently, training is only provided to Guides and Gypsy drivers only.	Location for training: Bison museum, Pachmarhi
			At present no skill development centers are there in ESZ area. Although some NGOs are working fir skill development of villagers of ESZ with SRLM department	Not Applicable
42	Restoration of Degraded Land/ Forests/ Habitat	Shall be actively promoted.	Based on satellite imagery analysis, It is observed that approximately 31 sqkm forest cover is reduced in last 3 decades. The increase in area of wastelands 16.65 sqkm is also observed.	As per Figure No 7.1
43	Environmental Awareness	Shall be actively promoted.	No such observations are noted in ESZ area.	Not Applicable

8 OVERALL SWOT ANALYSIS

STRENGTH	OPPORTUNITY
• Fertile Soil • Agricultural activities • Proximity to rivers • Natural Sceneric views and landscape • Tribal Population • Involvement of Women in SHGs • Proximity to forest: advantage for natural wellbeing and creates livelihood opportunities for villagers • Place Relative Significance • Inherent Characteristics • Less air pollution • Waterbodies along with wildlife	• Organic Farming • Social Forestry • Potential of Agro-based Industries • Household Industry Development • Film Shootings • Tourism Potential • Cultural Values • Women Empowerment • Potential for medical tourism Development • Growing Interest for Colonial Tourism • Tourist Recreation and Amusement Facilities • Eco-sensitive Zonal Master Plan • Pleasent atmosphere • River crouse along with wildlife
WEAKNESS	**THREAT**
• Shift of main to marginal workers • Decreasing ground water level • Lack of Irrigation Facility • Lack of Mobile Network Coverage & Banking facility • Wild Animal Nuisance • Lack of Solid waste management & waste water treatment • Proximity to Forest: A disparity between boosting economic activities and retaining environment • Lack in Infrastructure • Non-Inclusive Tourism • Timber boilers • Encroachments of SADA land • Heritage Monuments hampered by human activities, (i.e., Neither marked nor Preserved) • Absence of Thematic Tourism and Package Tours • Significant lag in Parking Places • Poor condition of approach roads to the villages • Poor transport services in villages • Decreasing forest cover • Less number of monitoring points for measurement of pollution • No required system to allow tourism in Tawa reservoir by the state goverment	• Hindrance to economic development • Decrease in agricultural practice • Water Scarcity • Lack of Development opportunities • Increasing rate of Unemployment (Main Workers) • Environment Degradation • Developments around the Reserve • Mass religious Tourism: • Low Viscous Circle of Infrastructure • Increasing tourist flow • Increase in pollution level