



**Zonal Master Plan  
For  
Eco – Sensitive Zone  
of  
Mukundra Hills Tiger  
Reserve**



**Forest, Environment and Climate Change Department  
Government of Rajasthan**

**ZONAL MASTER PLAN**  
**OF**  
**ECO SENSITIVE ZONE**  
**OF**  
**MUKUNDARA HILLS TIGER RESERVE**  
**KOTA, RAJASTHAN**



## **Foreword**

The primary aim of declaring any area as an eco-sensitive zone is to establish a buffer zone or transition zone in order to safeguard the wildlife sanctuary's ecosystem and to enhance both the biotic environment of the sanctuary and the buffer zone surrounding it. The Eco-Sensitive Zone around Mukundara Hills Tiger Reserve Wild Life Sanctuary notified by Government of India notification mandates the State Government to prepare a Zonal Master Plan.

The Zonal Master Plan has been prepared with focus on the biological and environmental conservation of the Mukundara Hills Tiger Reserve ESZ. The Zonal Master Plan also places a strong emphasis on the potential expansion of ecotourism and prescribes zoning and development control standards in accordance with the Gazette Notification for sustainable tourist activities and the notification of eco-sensitive zones.

Department of Environment and Climate Change has prepared the Zonal Master Plan with technical assistance of Malaviya National Institute of Technology, Jaipur, Forest Department and finalized the plan after seeking public comments.

I sincerely hope that Zonal Master Plan would serve as a guiding light, not only for the enhancement of the wildlife sanctuary but also for the entire eco-sensitive zone. It will promote sustainable tourism and that all stakeholders will join hands to ensure the successful implementation of the Zonal Master Plan for the Eco-Sensitive Zone in the future.

Shikhar Agrawal  
Additional Chief Secretary

## PREFACE

The key objectives of this study are to create a Zonal Master Plan of Eco-Sensitive Zone of Mukundara Hills Tiger Reserve, advise development regulations, and suggest proposals to mitigate negative environmental effects. The Zonal Master Plan of Eco-Sensitive Zone of Mukundara Hills Tiger Reserve addresses all the key development issues, including land-use, infrastructure, and transportation, with a primary focus on ecology, environment, and wildlife. The Zonal Master Plan includes tourism plan including studies to analyse the current conditions of various significant tourist destinations, their current situation and infrastructure availability, tourism statistics, environmental issues, and identification of potential tourism sites, as well as the creation of facilities for overall improvement of tourism footfall and tourism sites. The records will make it easier to determine the historical significance and heritage value of potential tourist destinations.

The primary aim of declaring any area as an eco-sensitive zone is to establish a buffer zone or transition zone in order to safeguard the wildlife sanctuary's ecosystem and to enhance both the biotic environment of the sanctuary and the buffer zone surrounding it. As a result, it's important to identify the numerous factors that contribute to environmental deterioration and provide solutions.

The zonal master plan focuses on the biological and environmental issues of the Mukundara Hills Tiger Reserve ESZ. In addition, it focuses on an analysis of the present situation in order to comprehend and implement the necessary action to protect and regulate the ecological environment and natural resources of the ESZ region.

The Zonal Master Plan also places a strong emphasis on the potential expansion of ecotourism and prescribes zoning and development control standards in accordance with the Gazetted Notification by government of India), for sustainable tourist activities and the notification of eco-sensitive zones.

## ACKNOWLEDGEMENTS

In Process of planned development of Mukundara Hills Tiger Reserve Eco-Sensitive Area, we would like to thank all the distinguished public representative, citizens, and departments concerned, who helped us with the formulation of the project and who dedicated their valuable time for providing information and guide in the preparation of this project report.

We express our special gratitude to Shri Shikhar Agrawal, Additional Chief Secretary (Department of Environment and Climate Change, Govt. of Rajasthan), Deputy Conservator of Forest (Wildlife), MHTR and Dr. Nand Kumar, Associate Professor, Malaviya National Institute of Technology, Jaipur who supported us for preparation of Zonal Mater plan.

We thank all those officers who supported us directly or indirectly in formulation of this Zonal Master Plan report. The data received from primary surveys was gathered from citizens and we also thank them for the same. We hope that this document will act as a guide to improve the environment not only in wild life sanctuary but also of eco sensitive zone and help to promote sustainable tourism. At the end we hope that in future all the stakeholders will help in implementation of Zonal Master Plan of ESZ area.

**Dr. Monali Sen**

Director and Joint Secretary  
Department of Environment  
and Climate Change

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## CHAPTER-1

### 1.1 Introduction to Mukundra Hills Tiger Reserve-

#### 1.1.1. Name:

Mukandara Hills Tiger Reserve (MHTR) is named after the Mukandara hill range which got its name from former ruler of Kota Shri Maha Rao Mukund. Subsequently, the eco sensitive zone has been named as ESZ of MHTR, Kota.

#### 1.1.2. Location:

The administrative head quarter of MHTR is situated at Kota, Rajasthan. However, this tiger reserve is spread over four districts of Rajasthan which are Kota, Bundi, Chittorgarh and Jhalawar. MHTR approximately lies between 24° 38' to 25° 7' N Latitude and 75°26' to 76°12' E Longitude. The ESZ of the MHTR is located around the boundaries of the MHTR as shown in the maps attached.

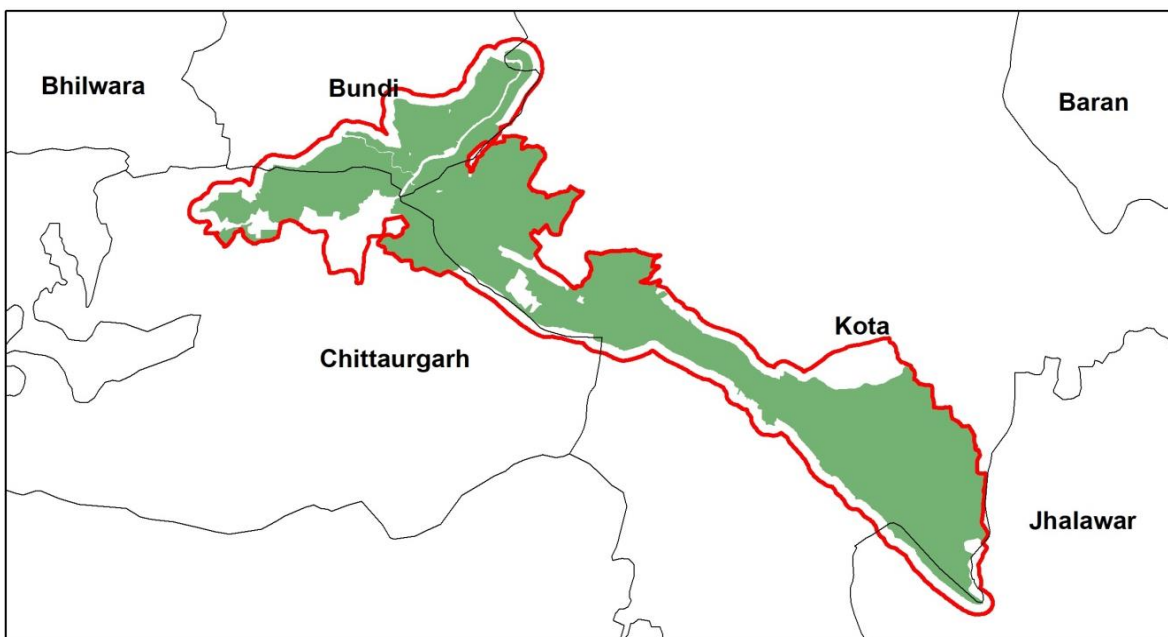
#### 1.1.3. Constitution:

Prior to the formation of the state of Rajasthan, these forests were part of the erstwhile Kota, Chittorgarh, Bundi and Jhalawar princely states and managed as hunting reserves. After independence, these forests came under the control of the Government of Rajasthan. A part of the forest was declared as Darrah Sanctuary under Section 5 of the Rajasthan Wild Animals and Birds Protection Act 1951 vide Notification No. F 39 (2) Forest / 55 dated 07.11.1955 read with Rajasthan Entrance to the Game Sanctuaries Rules 1958 although the ex-rulers retained their rights of hunting in these areas till 1971-72. Later on Jawahar Sagar Sanctuary and Mukandra National Park were notified in the years 1975 and 2007. Subsequently Mukandara Hills Tiger Reserve was notified vide S.No: F3 (8) FOREST 2012 dated 09-04-2013 which includes Mukandara National Park, Darrah Sanctuary, Jawahar Sagar Wildlife Sanctuary and part of National Gharial Sanctuary.

The 2006 amendment to the Wildlife Protection Act 1972 has defined “core” and “buffer” areas of a Tiger Reserve, the former being the critical or inviolate area and latter, the peripheral area to foster co-existence with local people for safeguarding the integrity of the core.



Some forest areas of Kota, Bundi and Chittorgarh have been transferred to administrative control of the Tiger Reserve administration which serve as multiple use area and may encompass conservation of community reserves, apart from revenue lands, private holdings, villages, towns and other production sectors.



*Map showing location of Mukundra Hills Tiger Reserve*

#### 1.1.4. Extent (Area Statement & Legal Status) Area Statement:

The total area of Mukandara Hills Tiger Reserve is 759.99 sq km as follows:

Total Core (Critical Tiger Habitat) Area - 417.17 Sq Km

The area statements of various components are given as under:

District wise area of MHTR Core or Critical Tiger Habitat (CTH)				
S. No.	District	Forest area (in Sq. Km)	Revenue area (in Sq. Km)	Total area (in Sq. Km)
1	Kota	230.46	11.98	242.44
2	Bundi	97.60	0.00	97.60
3	Jhalawar	30.69	1.84	32.53
4	Chittorgarh	43.11	1.49	44.60
	Total	401.86	15.31	417.17

## 1.2 Historical Overview

### 1.2.1. Early History

The Mukundra Hills region has a rich cultural history that dates back to the prehistoric period. Archaeological excavations have revealed evidence of human settlements and activities in the region, including rock paintings and tools that are believed to be over 10,000 years old.

During the medieval period, the Mukundra region was ruled by various Rajput kingdoms, including the Chauhans, the Bundelas, and the Hadas. The region was known for its strategic location, natural resources, and rich wildlife, which attracted the attention of the local rulers. The Mukundra region was also an important center of culture, art, and architecture during the medieval period. The region was known for its beautiful palaces, temples, and forts, which reflected the rich cultural heritage of the Rajput kingdoms.

The British officials who visited the region during the colonial period were impressed by the rich biodiversity of the region, which they described as a "hunter's paradise". The

British officials often went on hunting expeditions in the region, which led to a decline in the wildlife populations.

In the post-independence period, the Mukundra region came under the jurisdiction of the Kota princely state, which was merged with the state of Rajasthan in 1949. In 1955, the Mukundra Hills Wildlife Sanctuary was established in the region, which aimed to protect the rich biodiversity of the area. Over the years, the sanctuary has been expanded and upgraded to a national park and later to a tiger reserve. Today, the Mukundra Hills Tiger Reserve is an important center of conservation and eco-tourism in the region, attracting visitors from all over the world.

### **1.2.2. British History**

During the British colonial period, the Mukundra Hills region was under the jurisdiction of the princely state of Kota, which was a part of the Rajputana Agency. The British officials who visited the region were impressed by the rich biodiversity of the area, which they described as a "hunter's paradise". This led to a decline in the wildlife populations as the British officials went on hunting expeditions in the region.

In the early 20th century, the British officials recognized the need to protect the wildlife of the region and established several game reserves, including the Mukundra Hills Game Reserve. The reserve was later expanded to become the Mukundra Hills Wildlife Sanctuary in 1955, which aimed to protect the rich biodiversity of the area.

During the colonial period, the region was also an important center of agriculture, particularly for the production of cotton and opium. The British officials encouraged the farmers in the region to grow these cash crops, which were in high demand in the international market. The region also had several mines that produced minerals like limestone and copper, which were used in the construction and manufacturing industries.

The British officials also established several administrative and military centers in the region, including the city of Kota, which served as the headquarters of the Kota princely state. The city was also an important center of education and culture, with several colleges and institutions being established by the British officials.

Overall, the British colonial period had a significant impact on the social, economic, and cultural life of the Mukundra Hills region. While the region benefited from the development of infrastructure, agriculture, and education, the exploitation of the natural resources and wildlife led to environmental degradation and loss of biodiversity.

### **1.2.3. Post-Independence**

After India gained independence from British rule in 1947, the Mukundra Hills region became a part of the newly formed state of Rajasthan. The Mukundra Hills Wildlife Sanctuary, which was established during the colonial period, was expanded in 1978 to become the Darrah Wildlife Sanctuary, which covers an area of approximately 250 square kilometers.

In recent years, the state government of Rajasthan has taken several measures to promote ecotourism and sustainable development in the Mukundra Hills region. The Mukundra Hills Tiger Reserve was established in 2013, with the aim of protecting the rich biodiversity of the area and promoting responsible tourism.

The state government has also implemented several community-based conservation initiatives, which aim to involve the local communities in the conservation of the wildlife and natural resources of the region. These initiatives include the promotion of sustainable agriculture and livestock management practices, the establishment of eco-friendly industries, and the provision of alternative livelihoods to the local communities.

In addition, the state government has also focused on improving the infrastructure and facilities in the region, such as the construction of roads, bridges, and tourist lodges. The promotion of tourism and sustainable development in the region is expected to provide economic opportunities to the local communities while also promoting the conservation of the natural resources and wildlife of the Mukundra Hills.

## **1.3 Eco Sensitive Zone Of MHTR**

### **1.3.1. Introduction**

The wild animals in jungle do not recognize any geographical boundaries while moving in search of food, water or any other life-processes. In the process therefore, they come

out of the jungle at times. There are valuable wild animals in the MHTR which has been notified as National Park and is an important Protected Area. So, in order to give a safe cushion to the wild animals as per the notification and guidelines of the MoEF&CC, the eco sensitive zone for Mukundara Hills Tiger Reserve has been declared to create some kind of “Shock Absorber” for the wild animals of the MHTR. The ESZ serves as a buffer zone between the core area of the reserve and human settlements, and its primary objective is to regulate human activities that could potentially harm the biodiversity of the region. The ESZ is a crucial part of the conservation efforts for the Mukundra Hills Tiger Reserve, as it helps to maintain the ecological balance of the region while also promoting sustainable development. The management of the ESZ is the responsibility of the state forest department, in close association with several other line departments, which works closely with the local communities to ensure that the regulations are implemented effectively.

### **1.3.2. Notification of the Eco Sensitive Zone**

In exercise of the powers conferred by sub-section (1) and clauses (v) and (xiv) of sub-section (2) and sub-section (3) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986) (in this notification referred to as the Environment Act) read with sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986, the Central Government has notified an area to an extent varying from 0 (zero) to 1.0 kilometre around the boundary of Mukundara Hills Tiger Reserve in Kota, Jhalawar, Bundi, Chittorgarh Districts in the State of Rajasthan as the Eco-sensitive Zone (hereafter in this notification referred to as the Eco-sensitive Zone).

The ESZ of Mukundra Hills Tiger Reserve covers an area of approximately 248.70 square kilometers and is located around the Mukundra Hills Tiger Reserve. It comprises of 75 revenue villages, and its boundaries were notified by the Ministry of Environment, Forest and Climate Change (MoEFCC) in 2020. The ESZ serves as a buffer zone between the core area of the reserve and human settlements, and its primary objective is to regulate human activities that could potentially harm the biodiversity of the region.

The ESZ is a crucial part of the conservation efforts for the Mukundra Hills Tiger Reserve, as it helps to maintain the ecological balance of the region while also promoting sustainable development. The management of the ESZ is the responsibility of

the state forest department, which works closely with the local communities to ensure that the regulations are implemented effectively.

### 1.3.3. Extent and Boundaries of Eco-sensitive Zone:

The boundaries of the eco-sensitive zone (ESZ) of Mukundra Hills Tiger Reserve were notified by the Ministry of Environment, Forest and Climate Change (MoEFCC). The ESZ covers an area of 248.70 square kilometers and extends beyond the boundaries of the reserve to include the surrounding regions.

The boundaries of the ESZ were determined based on factors such as the distribution of wildlife, habitat types, hydrology, topography, and socio-economic factors. The aim of the ESZ is to provide a buffer zone around the tiger reserve to ensure the protection of wildlife and their habitats, while also promoting sustainable development in the surrounding regions.

The notification of the ESZ has led to the implementation of several measures for the conservation of the reserve and the sustainable development of the region. These measures include the regulation of mining and quarrying activities, the promotion of ecotourism, the conservation of water bodies and catchment areas, and the promotion of traditional livelihoods such as agriculture and horticulture. The ESZ notification is an important step towards providing the cushion between the Mukundra Hills Tiger Reserve and the surrounding villages. The Eco-sensitive Zone shall be to an extent of 0 (zero) to 1.0 kilometer around the boundary of Mukundra Hills Tiger Reserve and the area of the Eco-sensitive Zone is 248.70 square kilometers. The State Government has justified that the zero extent of Eco-Sensitive Zone is due to co-termination of Eco-sensitive Zone with buffer area of Mukundra Hills Tiger Reserve. The extents of Eco-sensitive Zone at various directions are given as: -

The extents of Eco- sensitive Zone at various directions

Direction	Extents (in kilometre)
North	1.00
North- East	0 to 1.00
East	0

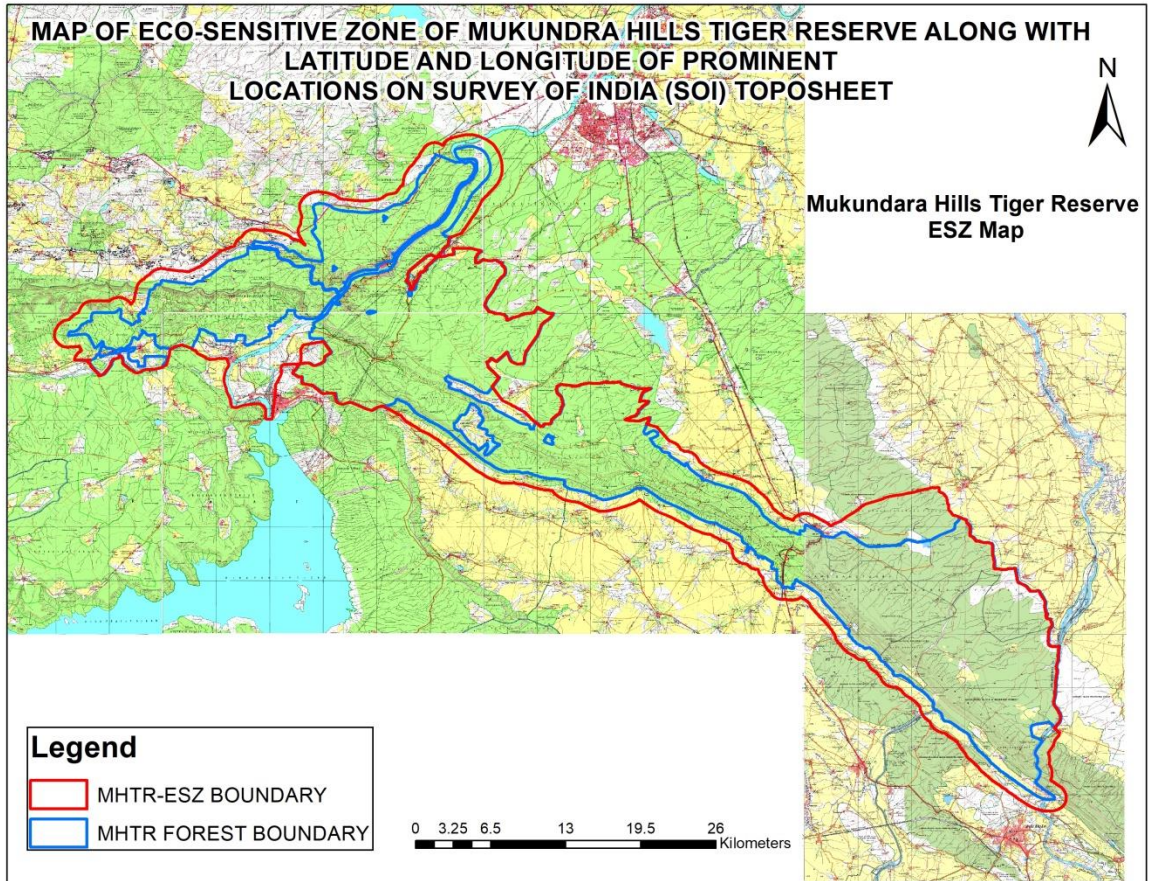
South-East	0 to 1.00
South	0 to 1.00
South-West	0
West	1.00
North-West	1.00
North	<p>Northern outer boundary of forest block Bard kalaji kishor sagar block boundary, up to Kanwas Range office then Dara kanwas road up to Kanwas tri junction.</p> <p>From Kanwas tri junction in a width of 1 kilometre along the boundary of the core of the Tiger Reserve to compartment number 57 of Doliya forest block.</p> <p>From the outer boundary of compartment number 57 of Doliya block to outer boundary of compartment number 58, 59, 51, 37, 35, 33, 32, 31, 43, 48 &amp; 46 which the buffer boundary of the Tiger Reserve including compartment number 31 to 35, 37 to 43, 46 to 51, 57 to 60 and 69.</p> <p>In one Kilometer width from the outer boundary of compartment number 46 to village Chand baori which is core area of the Tiger Reserve</p> <p>Along the outer boundary of 34, 30, 29, 28, 16, 15, 13, 12, 17, 18, 21 including compartment number 7, 12-22, 24-31 of Futa forest block which is the buffer area of the Tiger Reserve.</p> <p>From the outer boundary of compartment number 21 of Futa forest block to outer boundary of compartment number 10, 15, 12, 11, 8, 7, 1 of forest block Radi Dand including compartment number 2, 3, 4, 5, 6, 9, 13, 14, 16-22 which is the buffer area of the Tiger Reserve to village Borabas from the habitation of village Borabas to compartment number 1 of forest block Chand baori to forest block Borabas in a width of 100 meter which is the core area of the Tiger Reserve.</p> <p>Along the outer boundary of forest block Loh Dungari which is the buffer area of the Tiger Reserve to along kota road to Gapernath Nallah which from the boundary of core and buffer area of the Tiger Reserve.</p> <p>In a width of 1 kilometre from Gapernath Nallah to in front of Gardiya Mahadev which is the core area of the Tiger Reserve.</p>

	In a width of 1 kilometre from opposite bank of Chambal at Gardiya Mahadev which is also the boundary of National Chambal Ghadiyal Sanctuary to forest block Ambarani and Gudha Rajpura which is the boundary of Tiger Reserve to Bhunjar (Nausera) Ghata.
East	In one Kilometer width from the junction point of Ahu and Kalisindh along the Kalisindh river to along the outer boundary of compartment number 57 & 56 of forest block Mashalpura-B which falls in the core area the Tiger Reserve.

	Including Revenue area of village Rajpura, outer boundary of river Kalisindh and outer boundary of compartment number 41, 40, 39, 31, 30, 29, 12, 11, 10, 9, 8, 4, 2, 1 which is also the outer boundary of forest block Mashalpura-B and of the buffer area of the Tiger Reserve to outer boundary of compartment number 1 of Mashalpura-A
South	<p>From the river Brahmni which forms the boundary of Jawahar Sagar Sanctuary and the Tiger Reserve to junction of river Chambal to Rana Pratap Sagar Dam in a width of 0 kilometre due to Bhainsroadgarh Sanctuary on the other side.</p> <p>From Rana Pratap Sagar Dam along with the road running parallel to Canal to Rawatbhata barrier chouraha to road leading to Borabas till village Badoli in a width of 0 kilometres which is the boundary of Jawahr Sagar Sancuary.</p> <p>In a width of 1 kilometre from village Badoli along right side of road to Borabas to boundary of forest block Kaniya Talab.</p> <p>In a width of 1 kilometre along core area including compartment no. 1 &amp; 2 of Kaniya Talab.</p> <p>From the outer boundary of compartment number 5, 18, 17, 16, 15, 13, 10, 9 &amp; 8 of Kaniya Talab which forms the buffer are of the MHTR.</p> <p>In a width of 1 kilometre along boundary of forest block Kala Kot to outer boundary of Burjwali chowki forest block which is boundary of core area of</p>



	<p>Tiger Reserve and also district boundary between Kota &amp; Chittorgarh.</p> <p>In a width of 1 kilometre from the outer boundary of Burjwali chowki forest block to Ghatoli forest block, Manoharpura forest block to forest block Amjhar-A.</p> <p>In a width of 1 kilometre from the outer boundary of Amjhar-B including Amjhar river to Kota-Jhalawar Road.</p> <p>In a width of 1 kilometre along the outer boundary of Kheemach-B and outer boundary of Mashalpura-B which is core area of Tiger Reserve and boundary of Darrah Sanctuary up to river Ahu to junction of river Ahu and Kalisindh.</p>
West	<p>In a width of 1 kilometre from Bhunjar (Nausera) Ghata to Bhunjar Khurd village Lotiyana which is the boundary of Tiger Reserve.</p> <p>In a width of 0 kilometre from village Lotiyana to Brahmni river which is the buffer area of the Tiger Reserve.</p>



**GOOGLE MAP OF ECO-SENSITIVE ZONE OF MUKUNDRA HILLS TIGER RESERVE ALONG WITH PROMINENT LOCATIONS**



**Map of Eco-Sensitive Zone of Mukundra Hills Tiger Reserve**

## **1.4 Background Information and Attributes**

### **1.4.1. Linkages**

In the context of the Mukundra Hills Tiger Reserve, linkages refer to the ecological connections between the reserve and other forested areas in the region. These linkages play a crucial role in maintaining genetic diversity, facilitating movement of wildlife, and enhancing the overall resilience of the ecosystem.

The Mukundra Hills Tiger Reserve is connected to several other protected areas and forests in the region, including the Ramgarh Tiger Reserve, Ranthambore National Park, the Bhaisrodgarh Wildlife Sanctuary. These linkages are important for the long-term survival of the species in the region, as they provide connectivity between different populations and habitats.

The state forest department has recognized the importance of these linkages and has taken several measures to protect and enhance them. For example, the department has established wildlife corridors and has undertaken afforestation programs to create buffer zones around the reserve. The department has also collaborated with local communities to reduce human-wildlife conflicts and to promote the conservation of the region's natural resources.

Overall, the protection and enhancement of linkages are critical for the long-term conservation of the Mukundra Hills Tiger Reserve and the region's biodiversity.

### **1.4.2. Natural Setting**

The natural setting of Mukundra Hills Tiger Reserve is characterized by rugged terrain, hilly landscape, and forested areas. The reserve is located in the southeastern part of Rajasthan and is part of the Hadoti biogeographic region. It is situated at an elevation ranging from 300 to 700 meters above sea level and covers an area of approximately 759 square kilometers.

The terrain of the region is characterized by hills, valleys, and ravines, and is mainly composed of sandstone and shale. The region is drained by several small rivers, including the Mej, the Kali Sindh, and the Parwan. The region experiences a semi-arid climate, with hot summers and cool winters. The average annual rainfall in the region is



around 600 mm, with most of the precipitation occurring during the monsoon season from July to September.

The vegetation in the Mukundra Hills Tiger Reserve is dominated by dry deciduous forests and thorny shrublands. The forested areas in the region comprise of species such as teak, sal, dhok, tendu, and amla, among others. The thorny shrublands are characterized by species such as khejri, ber, and phog, among others. The reserve is also home to several rare and endangered species of flora and fauna, including the Bengal tiger, Indian leopard, sloth bear, and Indian wolf, among others.

Overall, the natural setting of Mukundra Hills Tiger Reserve is unique and diverse, and it plays a crucial role in maintaining the ecological balance of the region. The conservation efforts in the region aim to protect and enhance this natural setting while also promoting sustainable development and livelihoods for local communities.

### **1.4.3. Ecological Overview**

The ecological overview of the Mukundra Hills Tiger Reserve (MHTR) and its eco-sensitive zone is an important aspect of the Zonal Master Plan (ZMP). This overview provides a detailed understanding of the ecological characteristics, biodiversity, and natural resources of the region. This information can help in developing strategies and policies for the sustainable management and conservation of the area.

The MHTR is located in the Aravalli range of Rajasthan, India, and covers an area of approximately 759 square kilometers. The region is characterized by rugged terrain, with hills and valleys covered by dry deciduous forests, scrublands, and grasslands. The forested areas of the region are dominated by trees such as teak, sal, tendu, dhok, and khair, and provide important habitats for several species of wildlife.

The region supports a rich and diverse wildlife community, including several endangered and threatened species such as the Bengal tiger, Indian leopard, sloth bear, Indian wolf, Indian fox, and many others. The area is also home to a diverse birdlife, with over 200 species of birds recorded in the region.

In addition to its wildlife, the MHTR and its eco-sensitive zone also supports several important natural resources such as rivers, lakes, and mineral resources. The region is home to several important water bodies, including the Mukundra River, Jawai River,

and Gagron Lake, which provide important habitats for aquatic species and support the local communities with water for irrigation and other purposes. The region also contains important mineral resources such as limestone, which is extensively mined in the area.

Overall, the ecological overview of the MHTR and its eco-sensitive zone provides valuable insights into the biodiversity and natural resources of the region. It is essential to consider this information when formulating policies and strategies for sustainable development and conservation of the area.

#### 1.4.4. Flora and Fauna

##### Flora

Mukundra Hills Tiger Reserve (MHTR) and its eco-sensitive zone is home to a rich variety of flora and fauna. The reserve is spread over an area of about 759 square kilometers and is a mix of dry deciduous forests, grasslands, and rocky terrain. The vegetation in the MHTR and its eco-sensitive zone is mostly composed of species that are adapted to the harsh arid climate of the region. The following is a detailed overview of the flora found in the Mukundra Hills Tiger Reserve and its eco-sensitive zone.

**Dry Deciduous Forests:** The dry deciduous forests of the MHTR and its eco-sensitive zone are mostly dominated by trees such as teak, salai, tendu, dhok, and khair. These trees are well adapted to the arid climate and shed their leaves during the dry season to conserve water. The salai tree is particularly important as it is used for its resin, which has medicinal properties. The teak tree is also an important source of timber and is used for a variety of purposes such as furniture making and construction.

**Grasslands:** The grasslands in the MHTR and its eco-sensitive zone are an important habitat for several herbivorous animals such as chital, Sambar, and Bluebull. The grasslands are dominated by species such as *Sehima nervosum*, *Aristida setacea*, and *Lasiurus scindicus*. These grasses are adapted to the arid climate and can withstand long periods of drought. The grasslands also provide a rich source of food for several species of birds such as the Indian roller, the shikra, and the Eurasian collared dove.

**Rocky Terrain:** The rocky terrain in the MHTR and its eco-sensitive zone is composed of granite and quartzite and is home to several unique species of plants. The most

dominant plant species found in the rocky terrain are cactus and succulents. These plants are well adapted to the rocky terrain and can survive long periods of drought. The cactus plants are particularly important as they provide a source of food and water for several species of animals such as the Indian hare and the black-naped hare.

**Riparian Vegetation:** The MHTR and its eco-sensitive zone is home to several rivers and streams that support rich riparian vegetation. The most common trees found in the riparian vegetation are Kadam, Arjun, and Peepal. These trees are important as they provide shade and a source of food for several species of animals such as monkeys and langurs. The riparian vegetation also supports a rich variety of aquatic plants such as water hyacinth and water lily.

**Endemic Species:** The MHTR and its eco-sensitive zone is home to several species of plants that are endemic to the region. These species are adapted to the arid climate and have evolved unique mechanisms to survive the harsh conditions. One such species is the *Adhatoda vasica*, which is a medicinal plant used for treating respiratory diseases. Another important endemic species is the *Indigofera heterantha*, which is used for dyeing textiles.

**Threats to Flora:** The flora of the MHTR and its eco-sensitive zone is threatened by several factors such as habitat loss, overgrazing, and illegal logging. The increase in human activities such as agriculture and mining has led to a decline in the forest cover in the region. The overgrazing by livestock has also led to a decline in the grasslands and has affected the food sources of several herbivorous animals. The illegal logging of trees such as teak and salai has also led to a decline in the forest cover in the region.

**Conservation Efforts:** Several conservation efforts have been undertaken to protect the flora of the MHTR and its eco-sensitive zone. The Forest Department has implemented several measures such as afforestation, protection of riparian vegetation, and controlled grazing to conserve the forest cover in the region. The department has also launched several.

## Fauna

The Mukundra Hills Tiger Reserve (MHTR) is located in the southeastern part of Rajasthan, India, and covers an area of 759 square kilometers. The reserve is situated in the Aravalli Mountain range and is characterized by rugged terrain and dense forests. The area is known for its rich biodiversity and is home to a variety of flora and fauna species.

The MHTR is primarily known for its tiger population, but there are several other important fauna species found in the reserve. These include:

**Leopard:** The leopard (*Panthera pardus*) is a large carnivore that is found throughout India. It is an elusive animal and is difficult to spot in the wild.

**Sloth bear:** The sloth bear (*Melursus ursinus*) is a medium-sized bear that is found in the Indian subcontinent. It is known for its shaggy coat and long, curved claws.

**Striped hyena:** The striped hyena (*Hyaena hyaena*) is a carnivorous mammal that is found in parts of Asia and Africa. It is known for its distinctive striped coat and is often regarded as a scavenger.

**Indian wolf:** The Indian wolf (*Canis lupus pallipes*) is a subspecies of the gray wolf that is found in the Indian subcontinent. It is a social animal that lives in packs and is known for its distinctive howl.

**Indian fox:** The Indian fox (*Vulpes bengalensis*) is a small carnivorous mammal that is found in the Indian subcontinent. It is known for its reddish-brown coat and bushy tail.

**Chital (Spotted Deer):** The chital (*Axis axis*) is a species of deer that is found in the Indian subcontinent. It is known for its distinctive spotted coat and is a common prey species for tigers and leopards.

**Sambar deer:** The sambar deer (*Rusa unicolor*) is a large deer species that is found in the Indian subcontinent and Southeast Asia. It is known for its shaggy coat and is an important prey species for tigers and leopards.

**Wild boar:** The wild boar (*Sus scrofa*) is a species of pig that is found throughout Asia and Europe. It is known for its coarse coat and tusks.

**Indian hare:** The Indian hare (*Lepus nigricollis*) is a species of hare that is found in the Indian subcontinent. It is known for its long ears and agile movements.

**Indian pangolin:** The Indian pangolin (*Manis crassicaudata*) is a species of scaly anteater that is found in the Indian subcontinent. "In the MHTR and its eco-sensitive zone, the Indian pangolin population is estimated to be very small, with only a few individuals recorded in recent years due to the species' high vulnerability to habitat loss and poaching for their scales."

#### 1.4.5. Habitat Types

Mukundra Hills Tiger Reserve and its eco-sensitive zone is known for its diverse habitats, which support a wide range of flora and fauna. Here are some of the key habitats present in the reserve:

**Dry Deciduous Forests:** These forests dominate a significant portion of the tiger reserve. They consist of trees that shed their leaves during the dry season to conserve moisture. Common tree species include Dhok (*Anogeissus pendula*), Khair (*Acacia catechu*), Tendu (*Diospyros melanoxylon*), Babul (*Acacia nilotica*), Khejri (*Prosopis cineraria*), and Salar (*Boswellia serrata*). These forests provide shelter, food, and breeding grounds for a variety of wildlife species.

**Tropical Dry Forests:** Found in areas with slightly higher rainfall, tropical dry forests in the tiger reserve exhibit greater species diversity. They are characterized by trees like Teak (*Tectona grandis*), Salai (*Boswellia serrata*), Bamboo (*Dendrocalamus strictus*), and Bamboo Orchids (*Arundina graminifolia*). These forests support a wide range of herbivores, carnivores, and avifauna.

**Scrub Forests:** Scrub forests are comprised of low, thorny shrubs and small trees adapted to arid conditions. They are found in areas with rocky terrain and provide habitat for species such as Thorny Bush Frog (*Pseudophilautus amboli*), Indian Bushlark (*Mirafra erythroptera*), and Indian Spiny-tailed Lizard (*Uromastix hardwickii*). These habitats are essential for the survival of reptiles and small mammals.

**Grasslands and Savannas:** Mukundra Hills Tiger Reserve (MHTR) and its eco-sensitive zone primarily consist of dry deciduous forests, scrub forests, and grasslands rather than savanna grass. Savanna grasslands are typically characterized by a mix of tall



grasses and scattered trees. While the grasslands in MHTR provide grazing grounds for herbivores, they are more akin to open grasslands and savannas rather than true savanna grasslands.

The grasslands in MHTR and its eco-sensitive zone are dominated by species such as *Cenchrus ciliaris*, *Dichanthium annulatum*, *Chrysopogon fulvus*, and *Heteropogon contortus*. These grasses are well-adapted to the arid conditions and support herbivores like Chital (*Axis axis*), Sambar Deer (*Rusa unicolor*), and Nilgai (*Boselaphus tragocamelus*). The grasslands in the reserve contribute to the overall biodiversity and serve as important habitats for various wildlife species.

While true savanna grasslands may not be prevalent in MHTR, it's worth noting that the vegetation composition can vary within the reserve, and some areas may exhibit characteristics of open grasslands with scattered trees. The specific distribution and composition of grasslands can vary depending on factors such as soil types, rainfall patterns, and ecological conditions in different parts of the reserve.

**Wetlands:** Mukundra Hills Tiger Reserve and its eco-sensitive zone encompasses several wetland habitats, including lakes, ponds, and marshes. These water bodies support aquatic plants such as Lotus (*Nelumbo nucifera*), Water Hyacinth (*Eichhornia crassipes*), and Duckweed (*Lemna minor*). Wetlands provide breeding sites for amphibians, nesting grounds for water birds, and are frequented by animals like Marsh Crocodile (*Crocodylus palustris*) and various fish species.

**Riverine Forests:** The tiger reserve is intersected by rivers and streams, giving rise to riverine ecosystems. These habitats feature tall trees, including Sal (*Shorea robusta*), Arjun (*Terminalia arjuna*), Banyan (*Ficus benghalensis*), and Peepal (*Ficus religiosa*). Riverine forests provide shade, nesting sites, and water sources for a diverse range of wildlife species, including birds, mammals, and reptiles.

**Rocky Hills and Plateaus:** The hilly areas of Mukundra Hills Tiger Reserve consist of rocky outcrops, plateaus, and cliffs. These habitats support species that are adapted to rugged terrain, such as Indian Eagle-Owl (*Bubo bengalensis*), Indian Rock Python (*Python molurus*), and Striped Hyena (*Hyaena hyaena*). The rocky hills provide nesting sites for birds of prey and shelter for small mammals.

These different habitats within the tiger reserve support a diverse array of wildlife, including tigers, leopards, chital (spotted deer), sambar deer, nilgai (blue bull), wild boars, Indian foxes, hyenas, and a wide variety of bird species. It is important to assess the conservation needs and management strategies for each of these habitats and the species that depend on them to ensure their long-term survival and well-being.

### **Ecological Significance of the Mukundara Hills Tiger Reserve and its Eco-Sensitive Zone**

**Biodiversity Conservation:** MHTR and its eco-sensitive zone is ecologically significant due to its rich biodiversity, supporting a diverse array of flora and fauna. The reserve provides habitats for numerous species, including endangered and critically endangered ones. Preserving MHTR is vital for conserving these habitats and safeguarding the biodiversity of the region.

**Tiger Conservation:** MHTR and its eco-sensitive zone plays a crucial role in the conservation of tigers, which are apex predators and key indicators of a healthy ecosystem. The reserve provides suitable habitat and prey base for tigers, contributing to their conservation efforts. Protecting MHTR ensures the survival and genetic diversity of this iconic and endangered species.

**Habitat Connectivity:** MHTR and its eco-sensitive zone serves as an essential corridor, connecting different wildlife habitats and facilitating the movement of species. It enhances genetic exchange, prevents genetic isolation, and maintains population viability. Preserving habitat connectivity in the zonal master plan is important for ensuring the long-term conservation of wildlife.

**Avian Diversity:** MHTR and its eco-sensitive zone supports diverse avifauna, including resident, migratory, and endemic bird species. The various habitats within the reserve attract a wide range of birds, making it significant for bird conservation. Protecting and enhancing bird habitats in the zonal master plan contribute to maintaining the ecological balance and biodiversity of MHTR.

**Ecological Services:** MHTR and its eco-sensitive zone provides important ecological services, such as carbon sequestration, soil conservation, water regulation, and maintenance of water quality. The preservation of the reserve ensures the provision of

these services, benefiting both local communities and wildlife. Incorporating measures to protect and enhance these services is crucial in the zonal master plan.

**Research and Education:** MHTR and its eco-sensitive zone serves as a site for scientific research and environmental education. It offers opportunities for studying ecosystems, conducting wildlife research, and generating valuable insights for conservation strategies. The zonal master plan can include provisions for promoting research and educational activities within the reserve.

By emphasizing the ecological significance of MHTR and its eco-sensitive zone zonal master plan, it demonstrates a commitment to biodiversity conservation, habitat protection, and sustainable management practices. It serves as a guiding framework for effective and holistic management of the reserve, ensuring its long-term ecological integrity and the well-being of its wildlife populations.

### **Threats to the Ecological Integrity of the Mukundra Hills Tiger Reserve and its Eco-Sensitive Zone**

In order to develop a comprehensive zonal master plan for Mukundra Hills Tiger Reserve (MHTR) ESZ, it is important to assess and address the threats to the ecological integrity of the reserve. Here are some significant threats that need to be considered:

**Habitat Loss and Fragmentation:** One of the major threats to MHTR and its eco-sensitive zone is habitat loss and fragmentation due to human activities such as agriculture, infrastructure development, and encroachment. These activities result in the conversion of natural habitats into fragmented patches, disrupting wildlife movement and reducing available habitat for various species. Mitigation measures should focus on minimizing habitat loss, maintaining connectivity, and implementing land-use planning strategies to avoid further fragmentation.

**Poaching and Illegal Wildlife Trade:** Poaching and illegal wildlife trade pose significant threats to the biodiversity of MHTR and its eco-sensitive zone even though the incidents are very little. Tigers, leopards, and other valuable wildlife species are targeted for their body parts, skins, and bones, which are in demand in illegal markets. Strengthening anti-poaching efforts, improving surveillance and patrolling, and raising

awareness about the consequences of wildlife crime are essential components of the zonal master plan.

**Human-Wildlife Conflict:** As human settlements and agricultural activities expand around the reserve, conflicts between humans and wildlife, particularly large mammals, may increase. Crop raiding, livestock predation, and human injuries or fatalities can lead to negative attitudes towards wildlife and retaliatory actions. Implementing measures such as community-based conservation programs, predator-proof enclosures for livestock, and early warning systems can help mitigate human-wildlife conflicts and promote coexistence.

**Invasive Species:** Invasive plant and animal species can negatively impact the native biodiversity of MHTR and its eco-sensitive zone by outcompeting native species, altering habitats, and disrupting ecosystem processes. Monitoring and management plans should be developed to control and prevent the spread of invasive species within the reserve.

**Climate Change:** Climate change poses long-term threats to the ecosystems and species of MHTR and its eco-sensitive zone. It can alter rainfall patterns, temperature regimes, and vegetation composition, affecting habitat suitability for wildlife. The zonal master plan should incorporate strategies for climate change adaptation and mitigation, such as promoting resilient landscapes, conserving carbon-rich habitats, and implementing measures to reduce greenhouse gas emissions.

**Pollution and Habitat Degradation:** Pollution from sources such as industrial activities, agricultural runoff, and waste disposal can degrade water bodies, soil quality, and overall habitat health within MHTR and its eco-sensitive zone. Efforts should be made to monitor and reduce pollution sources, promote sustainable agricultural practices, and ensure proper waste management within and around the reserve.

Addressing these threats in the zonal master plan will help ensure the long-term ecological integrity of MHTR and its eco-sensitive zone and support the conservation of its biodiversity. It requires collaboration with local communities, stakeholders, and relevant authorities to implement effective conservation measures, raise awareness, and promote sustainable practices.

#### 1.4.6. Geology, Rock and Soil

##### Geology

Mukundra Hills Tiger Reserve and its eco-sensitive zone is located in the Hadoti region of the Indian state of Rajasthan. The reserve covers an area of approximately 760 square kilometers and is situated on the Vindhyan plateau, which is one of the oldest geological formations in India. The Vindhyan rocks are believed to have been formed during the Proterozoic era, between 1600 and 543 million years ago, and are rich in fossils.

The rocks in the Mukundra Hills Tiger Reserve and its eco-sensitive zone are primarily composed of sandstone, shale, and limestone. The sandstones are the most common rock type in the area, and they vary in color from reddish-brown to yellowish-white. The sandstones are highly porous and have been eroded over time to create deep canyons and gorges throughout the reserve.

The sandstones in the reserve are believed to have been deposited in a shallow marine environment, where they were subjected to strong currents and wave action. The sandstone formations in the Mukundra Hills Tiger Reserve are also known for their unique structures, which include cross-bedding, ripple marks, and channel fill deposits.

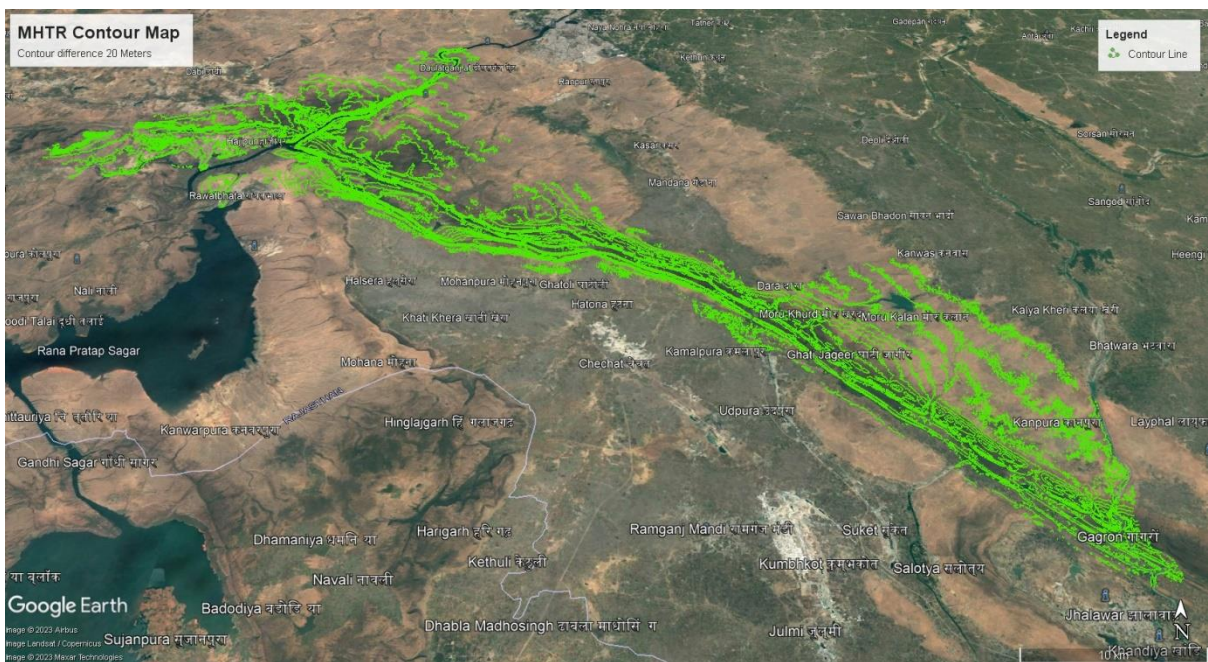
The shale formations in the reserve are composed of fine-grained sedimentary rocks that were formed from the accumulation of mud and clay. These rocks are usually gray or black in color and are interbedded with the sandstone formations. The shale formations in the reserve are important because they contain a number of important fossil deposits that provide valuable insights into the evolution of life on Earth.

The limestone formations in the reserve are also noteworthy, as they contain a number of important fossil deposits. These fossils provide valuable insights into the evolution of life on Earth and have helped researchers better understand the history of the region. The limestone formations in the reserve are primarily composed of calcium carbonate and were formed in a marine environment.

In addition to its unique geology, the Mukundra Hills Tiger Reserve and its eco-sensitive zone is also home to a wide variety of plant and animal species, including tigers, leopards, sloth bears, Indian wolves, and a number of bird species. The reserve is an

important conservation area and is working to protect these species and their habitats for future generations.

In conclusion, the Mukundra Hills Tiger Reserve and its eco-sensitive zone is a unique geological formation in India that is characterized by its sandstone, shale, and limestone formations. The reserve is an important conservation area that is home to a wide variety of plant and animal species, and its geological formations provide valuable insights into the evolution of life on Earth.



*Contour Map*

### Seismic Activities

There is limited information available on the seismic activities in the Mukundra Hills Tiger Reserve and its eco-sensitive zone, as the region is not considered to be a seismically active area. However, the state of Rajasthan, where the reserve is located, has experienced some seismic activity in the past.

Rajasthan is located in the stable continental interior of the Indian Plate and is considered to be a relatively low seismic hazard region. However, there have been some moderate earthquakes in the state in the past, most notably in the Alwar region in 1947, which had a magnitude of 6.1 on the Richter scale.



In general, the seismic activity in the Mukundra Hills Tiger Reserve and the surrounding areas is low and not considered to be a significant threat to the region. However, it is important to monitor seismic activity in the area to better understand any potential risks and to ensure the safety of the people and wildlife living in the reserve.

## **Soil**

Mukundra Hills Tiger Reserve is located in the Hadoti region of Rajasthan, India. The soil in the reserve varies depending on the topography of the area, but it can generally be classified into three types: alluvial, black, and red soils.

### **Alluvial Soil:**

The alluvial soil found in the reserve is formed by the deposition of sediment by rivers and streams. It is generally deep, well-drained, and fertile, with a pH ranging from neutral to slightly alkaline. The texture of the soil varies from sandy loam to clay loam, depending on the location within the reserve. The alluvial soil is rich in nutrients and organic matter, making it suitable for the cultivation of a wide range of crops, including wheat, rice, sugarcane, and vegetables.

### **Black Soil:**

The black soil found in the reserve is formed by the weathering of volcanic rocks, such as basalt. It is characterized by its high clay content, which gives it its characteristic black color. The texture of the soil is typically heavy, with a high water-holding capacity. Black soil is also known for its high fertility, with a pH ranging from neutral to slightly alkaline. It is suitable for the cultivation of crops such as cotton, wheat, and pulses, and it is an important soil type for the agricultural economy of the region.

### **Red Soil:**

The red soil found in the reserve is formed by the weathering of igneous rocks, such as granite and gneiss. It is characterized by its low fertility, high acidity, and low water-holding capacity. The texture of the soil varies from sandy to clayey, with a high proportion of coarse fragments such as rocks and gravel. The red soil is not suitable for intensive agriculture, as it lacks essential nutrients and organic matter. However, it

supports a diverse range of natural vegetation, including dry deciduous forests and scrubland.

In addition to these soil types, there are also some areas of laterite soil in the reserve. Laterite soil is formed by the weathering of rocks in hot and humid conditions, and it is characterized by its high iron and aluminum content. The texture of the soil is typically clayey, with a high proportion of rock fragments. Laterite soil is not suitable for agriculture but supports a unique range of flora and fauna.

Overall, the diverse range of soil types in Mukundra Hills Tiger Reserve supports a wide range of agricultural and natural ecosystems, making it an important conservation area in Rajasthan, India.

#### **1.4.7. Waterbodies, Watersheds and Drainage**

Mukundra Hills Tiger Reserve is surrounded by several waterbodies, drainage systems, and watersheds.

##### **Waterbodies:**

There are several waterbodies located in and around the Mukundra Hills Tiger Reserve and its eco-sensitive zone, including the sawanbadhu dam, jawarsagar dam, etc.. This reserve is also home to several natural waterbodies, such as lakes, ponds, and wetlands, which support a diverse range of flora and fauna. These waterbodies are important for maintaining the ecological balance of the reserve and provide critical habitats for aquatic species.

##### **Watersheds:**

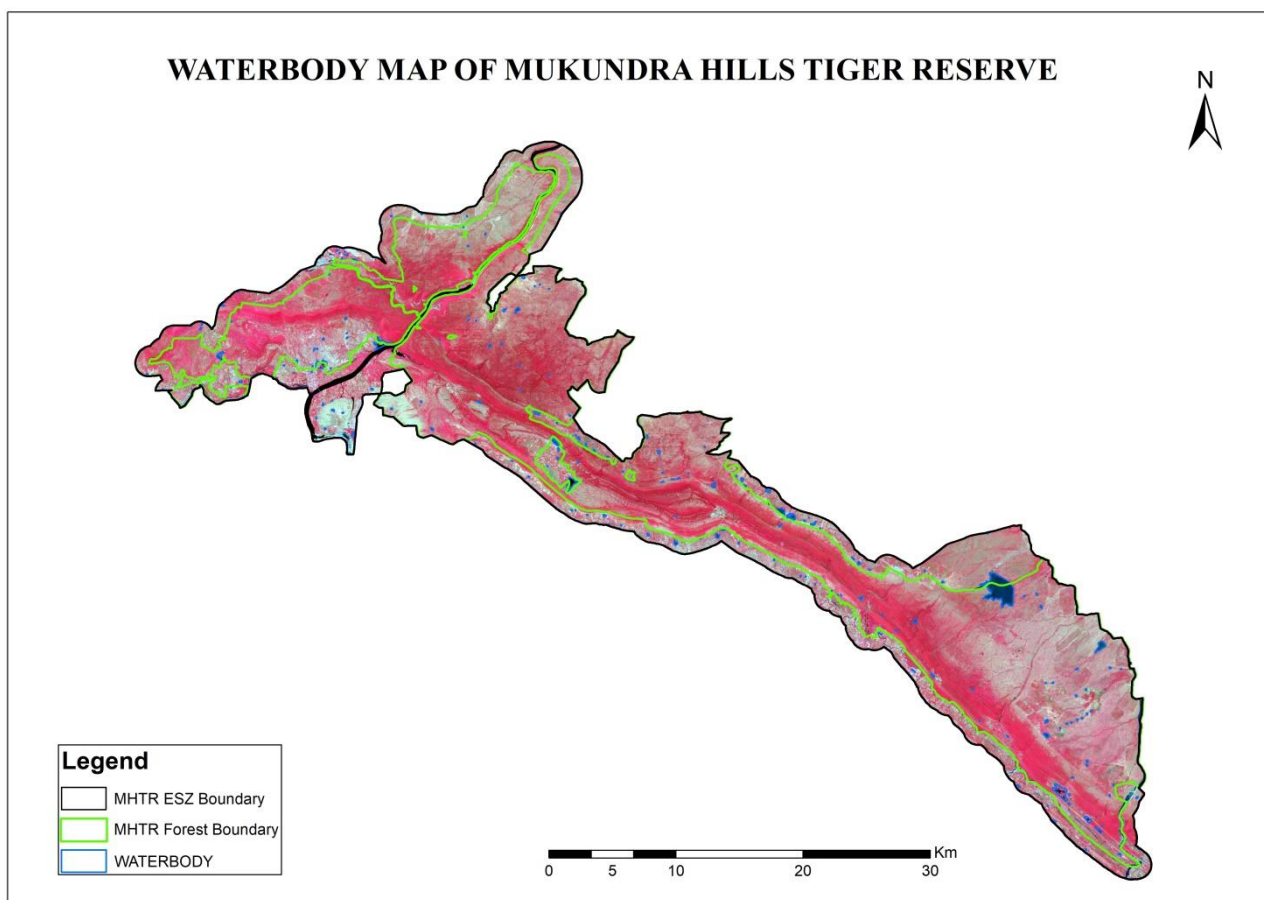
The Mukundra Hills Tiger Reserve and its eco-sensitive zone is located in the Chambal River basin and is part of the larger Ganga River basin. The reserve is located in the upper catchment area of the Chambal River and is an important watershed for the region. The Chambal River basin is one of the most important river systems in India, and supports a range of ecosystems and communities. The watersheds in the reserve are crucial for maintaining the ecological balance of the area and providing critical habitats for wildlife.



In conclusion, the waterbodies, drainage systems, and watersheds in the Mukundra Hills Tiger Reserve and its eco-sensitive zone are important components of the ecological balance of the area. They provide critical habitats for aquatic species, support agriculture and hydroelectric power generation, and are crucial for maintaining the water balance of the region. The conservation and sustainable management of these systems are essential for the long-term ecological and economic sustainability of the region.

**Drainage Systems:**

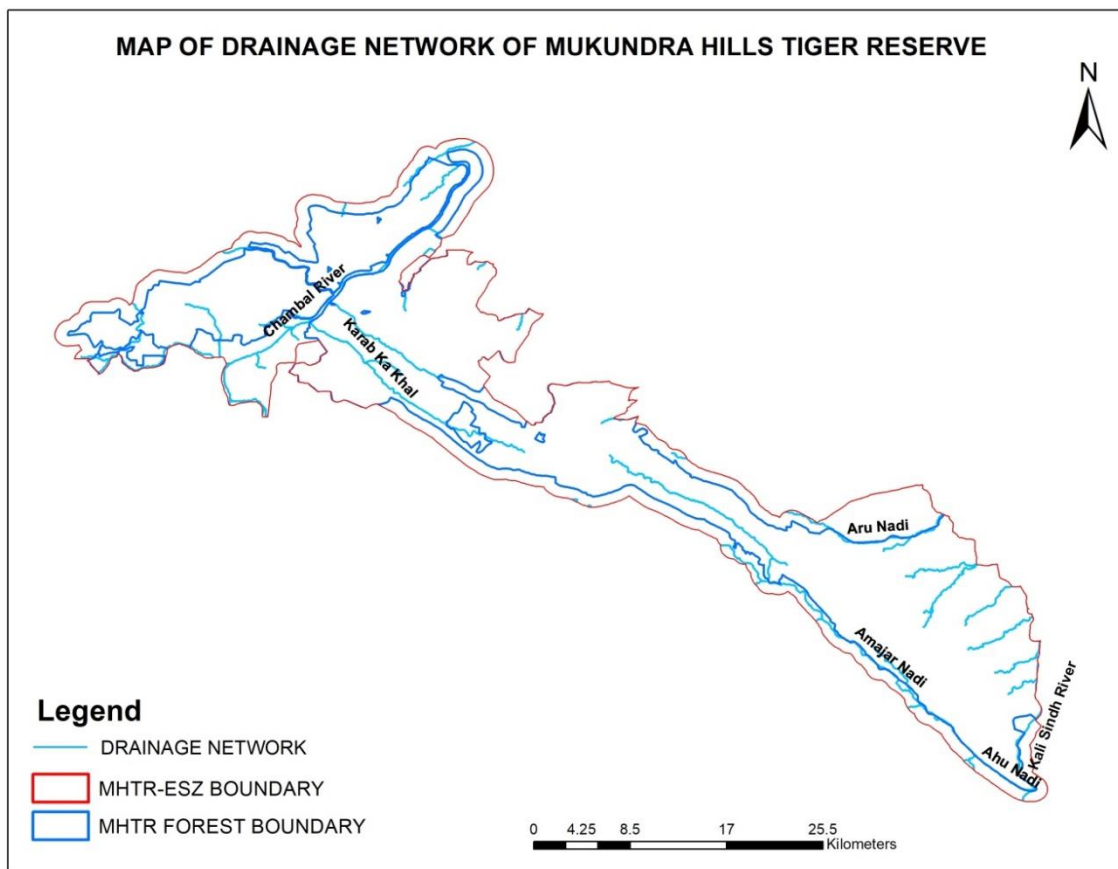
The Mukundra Hills Tiger Reserve and its eco-sensitive zone is drained by several rivers and streams. Other rivers and streams in the region include Eru River, Amjar river, Aaru River and Kali Sindh River, which all flow into the Chambal River. The drainage systems in the reserve play a crucial role in maintaining the water balance of the area, and provide critical habitats for aquatic species such as fish, turtles, and crocodiles.



*Map of Waterbodies of MHTR*

## Drainage and Watersheds

The Mukundra Hills Tiger Reserve (MHTR) is located in the southern part of the Aravalli Range in Rajasthan, India. The reserve covers an area of about 759.99 square kilometers and is drained by several rivers and streams that flow through the region. The drainage system of the reserve is complex, with several watersheds that contribute to the overall water availability in the region.



*Map of Drainage System of MHTR*

The watersheds in the Mukundra Hills Tiger Reserve and its eco-sensitive zone are primarily controlled by the topography of the region. The reserve is characterized by a hilly terrain with several ridges and valleys that contribute to the overall drainage of the region. The watersheds in the reserve are typically small, with an average size of about 10 square kilometers.

**Kharab ki Khal:**

Kharab ki Khal is a seasonal river that flows through the Mukundra Hills Tiger Reserve in Rajasthan, India. The river originates in the hills and flows through the reserve, providing important water sources for wildlife in the area. The river is also an important source of water for the local communities living in the region.

During the monsoon season, the river swells and floods the surrounding areas, creating a lush green landscape. However, during the dry season, the river can dry up completely, which can have significant impacts on the wildlife and the local communities who depend on it.

In recent years, there have been efforts to conserve and restore the Kharab ki Khal River and its surrounding ecosystems, including through the establishment of the Mukundra Hills National Park and the Mukundra Hills Tiger Reserve. The reserve has also implemented measures to regulate water usage and to promote sustainable livelihoods for local communities, which can help to conserve this important river and the biodiversity it supports.

There are several watersheds in the Mukundra Hills Tiger Reserve that are essential for the overall water management and conservation in the region. Here are some of the important watersheds:

**Chambal River:**

Chambal River is a major river that flows through the Mukundra Hills Tiger Reserve and its eco-sensitive zone in Rajasthan, India. The river originates in the Vindhya Range and flows through Madhya Pradesh, Uttar Pradesh, and Rajasthan, before merging with the Yamuna River in Uttar Pradesh.

The Chambal River is an important lifeline for the local communities living in the region and supports a rich biodiversity. The river is home to several species of freshwater turtles, including the critically endangered three-striped roof turtle, and several species of fish, including the critically endangered Ganges River dolphin. The river is also home to several species of crocodiles, including the critically endangered gharial.

The Mukundra Hills Tiger Reserve and its eco-sensitive zone is home to a section of the Chambal River, which provides important habitat for these aquatic species. The reserve has implemented several conservation measures to protect the Chambal River and its surrounding ecosystems, including the establishment of river patrols to prevent illegal fishing and poaching, and the promotion of sustainable livelihoods for local communities to reduce the pressure on the river's resources.

Overall, the Chambal River is an important ecological and cultural resource for the region, and efforts are being made to conserve and protect it for future generations.

**Aru Nadi:**

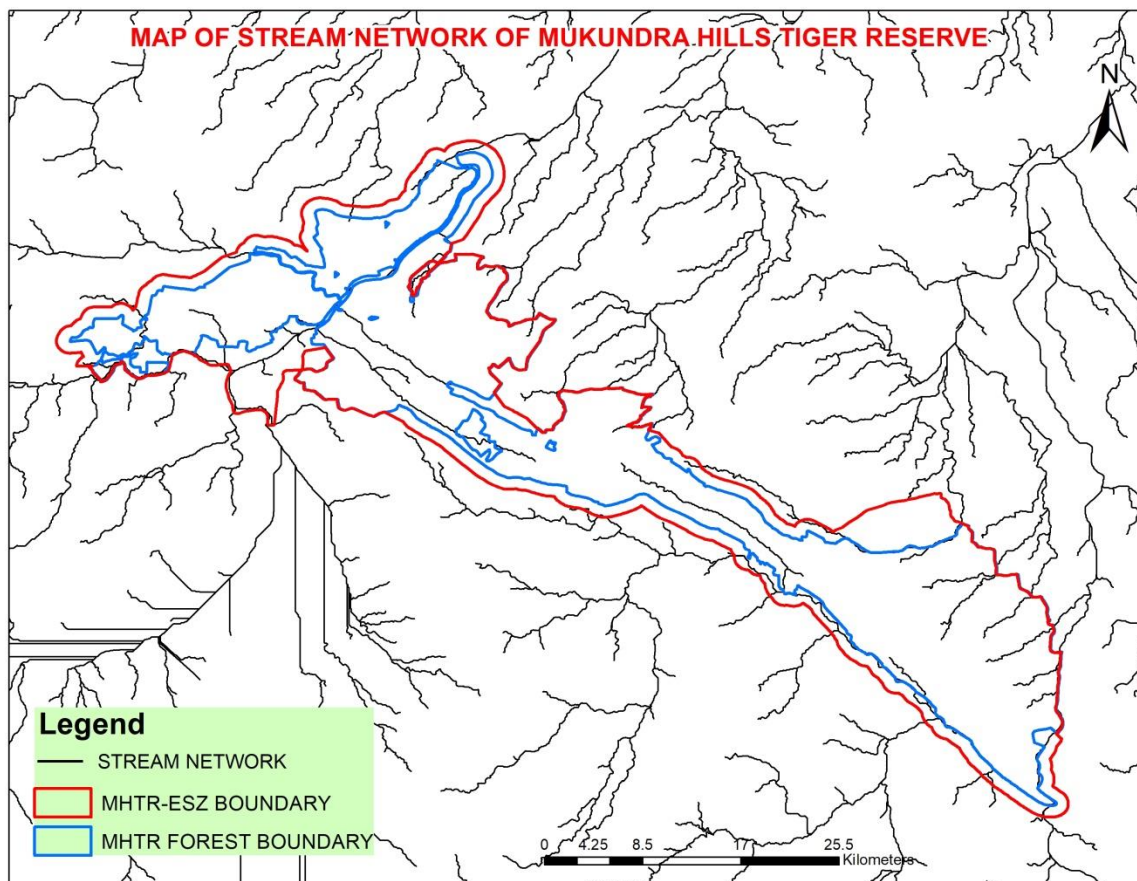
Aru Nadi, also known as Aru River, is a river that flows through the Mukundra Hills Tiger Reserve and its eco-sensitive zone. The river originates in the hills and flows through the reserve, providing important water sources for wildlife and local communities in the region.

The Aru Nadi/River is seasonal and flows for only a few months in a year, mainly during the monsoon season. During this time, the river swells and floods the surrounding areas, creating a lush green landscape and providing important habitat for several species of wildlife. However, during the dry season, the river can dry up completely, which can have significant impacts on the wildlife and the local communities who depend on it.

**Kali Sind River:**

Kali Sindh River is a significant river that flows through the Mukundra Hills Tiger Reserve (MHTR) and its eco-sensitive zone. The river originates in the Vindhya Range and flows through the state of Madhya Pradesh before entering Rajasthan and flowing through the MHTR.

The Kali Sindh River is an important water source for the local communities living in the region and supports a rich biodiversity. The river is home to several species of fish and turtles, as well as several species of birds that depend on the river for their survival. The river is also an important habitat for several species of crocodiles, including the mugger crocodile, which is classified as vulnerable by the IUCN.



*Stream Network of MHTR*

## Ground Water

Groundwater is a crucial resource in the arid and semi-arid regions of India, and the Mukundra Hills Tiger Reserve (MHTR) in Rajasthan is no exception. With a low annual rainfall, the region is heavily dependent on groundwater for meeting the water needs of the local communities, agriculture, and wildlife.

### Groundwater Availability:

The MHTR region is located in the Hadoti region of Rajasthan, which is characterized by a semi-arid climate with low rainfall. The region receives an average annual rainfall of around 650-700 mm, which is unevenly distributed across the year, with most of the rainfall occurring during the monsoon season (June to September). Due to the hilly terrain, the recharge of groundwater in the region is limited, and the water table is generally deep.

According to the Water Department report, the groundwater availability in the MHTR region is limited, and the aquifers are generally unconfined with low to moderate yield. The water table in the region ranges from 30 to 60 meters, and the aquifers are primarily composed of sandstone and shale formations. The groundwater recharge in the region is mainly through rainfall and runoff, which percolates into the soil and recharges the aquifers. However, due to the limited rainfall and hilly terrain, the recharge of groundwater is limited, and the aquifers have a low storage capacity.

#### **Groundwater Quality:**

The groundwater quality in the MHTR region is generally good, with low to moderate levels of total dissolved solids (TDS) and electrical conductivity (EC). The groundwater in the region is generally hard, with high levels of calcium, magnesium, and bicarbonates. The Water Department report notes that the groundwater quality in the region may deteriorate due to anthropogenic activities such as agricultural runoff, urbanization, and industrial pollution.

#### **Groundwater Extraction:**

Groundwater extraction in the MHTR region is mainly through tube wells and open wells, which are primarily used for irrigation and domestic purposes. The Water Department report notes that the groundwater extraction in the region is unsustainable, and there is a need for better management and regulation of groundwater use.

#### **Recharge Structures:**

To enhance the groundwater recharge in the MHTR region, the Water Department and forest department has constructed several recharge structures such as check dams, percolation ponds, and recharge wells. These structures help in increasing the groundwater recharge and augmenting the water availability in the region.

Check dams are small, low-cost structures built across the streams and rivulets to impound the runoff and recharge the groundwater. Percolation ponds are shallow depressions built on the ground surface to capture the rainwater and allow it to percolate into the soil and recharge the aquifers. Recharge wells

## **Climate**

The Mukundra Hills Tiger Reserve (MHTR) and its eco-sensitive zone is characterized by a semi-arid climate. The climate of the region is influenced by the Himalayan and Arabian Sea branches of the southwest monsoon, which brings most of the rainfall to the region.

The monsoon season in the region lasts from June to September, and the average annual rainfall in the region is around 650-700 mm. However, the rainfall is highly variable and unevenly distributed across the year, with most of the rainfall occurring during the monsoon season. The region receives less rainfall than the other regions of Rajasthan, which makes it prone to drought and water scarcity.

The temperature in the region is high throughout the year, with the summer months (April to June) being the hottest, with temperatures exceeding 40 degrees Celsius. The winter months (December to February) are relatively cooler, with temperatures ranging from 10 to 25 degrees Celsius. The temperature in the region is influenced by the altitude, with the higher elevations experiencing cooler temperatures than the lower elevations.

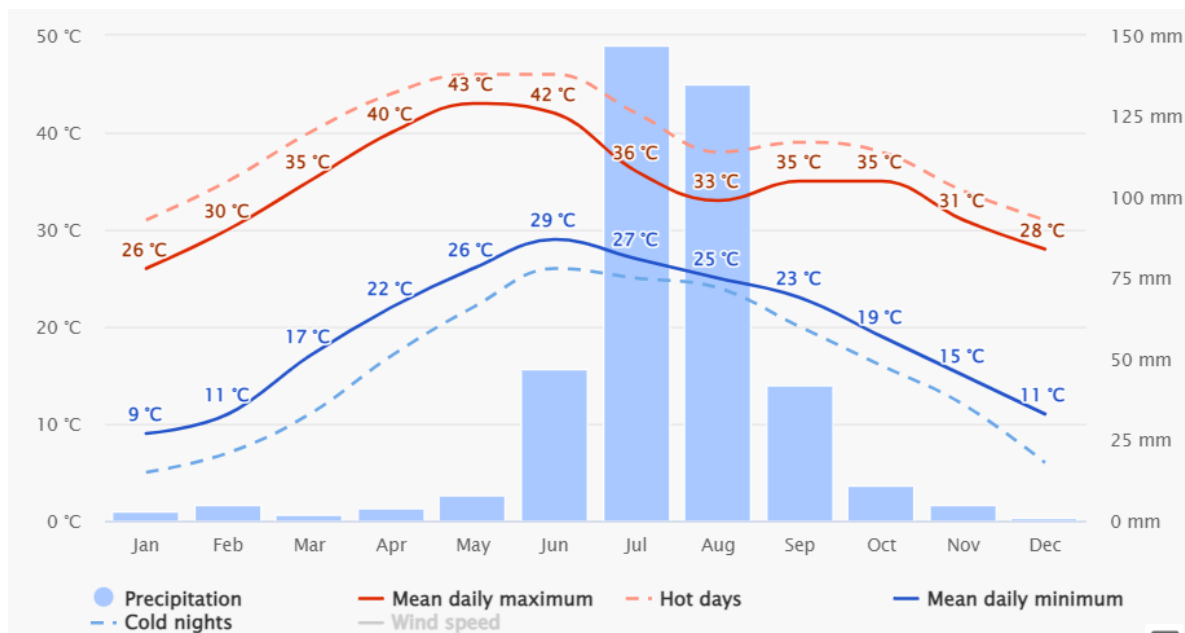
The humidity in the region is generally low, which makes the climate arid. The region experiences frequent dust storms and strong winds, which can cause soil erosion and affect the vegetation cover. The climate of the region has a significant impact on the ecology of the MHTR, as the vegetation and wildlife are adapted to the arid conditions.

## **Temperature**

The temperature in the region is high throughout the year, with the summer months (April to June) being the hottest, and the winter months (December to February) being relatively cooler.



### Average Temperature and Precipitation of Kota



*Average Temperature and Precipitation of Kota*

#### 1.4.8. Rainfall Pattern and Distribution

The Mukundra Hills Tiger Reserve (MHTR) and its eco-sensitive zone is located in the semi-arid region of Rajasthan, which is characterized by low and erratic rainfall. The region receives most of its rainfall during the monsoon season, which lasts from July to September. The amount and distribution of rainfall in the region have a significant impact on the ecology of the MHTR.

#### Humidity

Humidity is an important climatic factor that affects the ecology of the Mukundra Hills Tiger Reserve (MHTR). Humidity is the amount of water vapor present in the air, and it has a significant impact on the growth of vegetation and the survival of wildlife in the region.

The humidity in the region is influenced by a variety of factors, including the temperature, wind patterns, and topography. The region is located in the semi-arid zone of Rajasthan, which means that the humidity is generally low throughout the year. However, during the monsoon season, the humidity levels increase as the region receives heavy rainfall.

### 1.4.9. Wind Direction and Wind Speed

#### Wind Direction:

The wind direction in the MHTR region is influenced by various factors such as the location of the region, topography, and the prevailing atmospheric conditions. The region is located in the western part of Rajasthan and is characterized by a semi-arid to arid climate. The prevailing wind direction in the region is from the northwest during the winter months (October to February), and from the southwest during the monsoon season (June to September).

#### Wind Speed:

Wind speed is the rate at which the air is moving and is measured in kilometers per hour (km/h) or meters per second (m/s). Wind speed in the MHTR region is influenced by various factors such as the location of the region, topography, and the prevailing atmospheric conditions. The wind speed in the region is generally low throughout the year, except during the monsoon season when it can be high.

#### Wind Speed

Local wind systems can also have a significant impact on wind speed in the MHTR region. For example, during the daytime, the hillsides heat up, leading to the formation of an updraft, which can create a local wind system. These local wind systems can have varying wind speeds and can affect the distribution of moisture in the region.

### 1.4.10. Villages in the ESZ

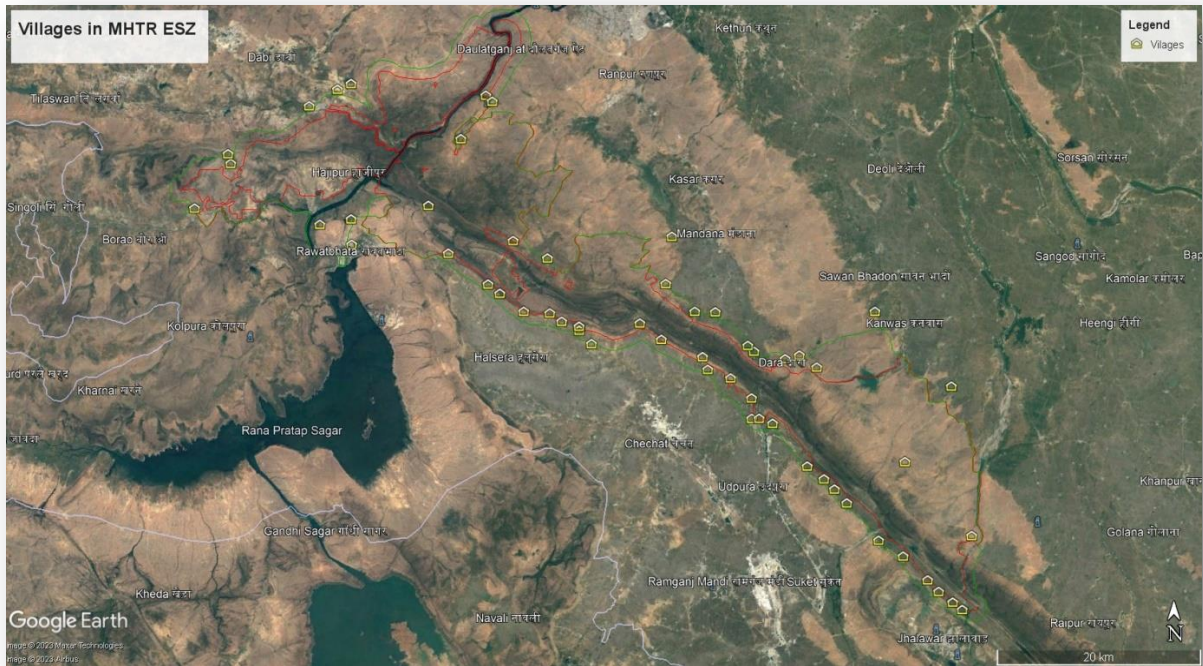
List Of Villages Coming Under Eco-Sensitive Zone Of Mukundara Hills Tiger Reserve Along With Geo-Coordinates

Sr. No	Village Name	Tehsil/ Taluka	District	Latitude (N) (DMS Format)	Longitude (E) (DMS Format)
1.	Rathkakra	Ladpura	Kota	N25°3'11.80"	E 75°43'47.22"
2.	Jamuniya Bawri	Ladpura	Kota	N25°3'54.42"	E 75°43'39.73"
3.	Borabas	Ladpura	Kota	N25°1'14.49"	E 75°41'40.96"
4.	Akhawa agricultral Land	Ladpura	Kota	N25°0'6.51"	E 75°44'54.02"

5.	Chandbawri	Ladpura	Kota	N24°56'6.35"	E 75°44'52.66"
6.	Kolipura	Ladpura	Kota	N24°57'46.11"	E 75°40'0.65"
7.	Girdharpura	Ladpura	Kota	N24°54'46.90"	E 75°44'29.27"
8.	Damodarpura	Ladpura	Kota	N24°52'30.05"	E 75°52'12.25"
9.	Kishanpura	Ladpura	Kota	N24°53'9.70"	E 75°46'59.71"
10.	Nayagav/Jaspura	Ladpura	Kota	N24°54'10.33"	E 75°48'10.68"
11.	Kesavpura	Ladpura	Kota	N24°53'47.50"	E 75°49'39.72"
12.	Mandargarh	Ladpura	Kota	N24°53'34.42"	E 75°51'38.52"
13.	Mohanpura	Ladpura	Kota	N24°53'44.66"	E 75°53'37.56"
14.	Ravtha	Ladpura	Kota	N24°52'26.18"	E 75°53'23.54"
15.	Haripura	Ladpura	Kota	N24°52'23.25"	E 75°55'50.65"
16.	Kawarpura Agricultral Land	Sangod	Kota	N24°52'29.79"	E 75°56'28.72"
17.	Bhawriya Dadpura Agricultural Land	Sangod	Kota	N24°52'24.27"	E 75°56'55.23"
18.	Kothla	Sangod	Kota	N24°50'39.42"	E 75°58'26.02"
19.	Padampura	Kanwas	Kota	N24°50'20.63"	E 75°58'49.70"
20.	Dara Station	Kanwas	Kota	N24°49'58.90"	E 76°0'30.00"
21.	Morukalan	Kanwas	Kota	N24°49'30.46"	E 76°1'8.62"
22.	Amjhar	Kanwas	Kota	N24°47'57.56"	E 75°58'38.37"
23.	Pipalda	Kanwas	Kota	N24°46'54.04"	E 75°58'35.57"
24.	MinyaKhedhi	Kanwas	Kota	N24°48'13.06"	E 75°57'0.35"
25.	Bhatwara	Kanwas	Kota	N24°47'53.79"	E 75°57'44.05"
26.	Bhatwarakidhani	Kanwas	Kota	N24°48'9.35"	E 75°57'34.86"
27.	Jhamra	Kanwas	Kota	N24°49'21.96"	E 75°56'46.22"
28.	Nayagav	Kanwas	Kota	N24°49'24.08"	E 75°56'6.13"
29.	Manoharpura	Kanwas	Kota	N24°50'2.51"	E 75°55'48.71"
30.	Bakshpura	Sangod	Kota	N24°50'57.24"	E 75°53'30.31"
31.	Ghatoli	Sangod	Kota	N24°51'47.22"	E 75°52'10.86"
32.	Balkho	Sangod	Kota	N24°51'26.15"	E 75°50'4.67"
33.	Rail gerabad	Ladpura	Kota	N24°56'40.73"	E 75°50'3.37"
34.	Kailashnagri	Ladpura	Kota	N24°44'41.73"	E 76°07'30.22"

35	DhawadKhurd	Rawatbhata	Chittorgarh	N24°51'39.77"	E 75°48'43.18"
36	Kothra	Rawatbhata	Chittorgarh	N24°52'13.19"	E 75°45'24.44"
37	Karanpura	Rawatbhata	Chittorgarh	N24°51'54.96"	E 75°45'21.20"
38	Dhardi	Rawatbhata	Chittorgarh	N24°52'19.80"	E 75°47'1.16"
39	BamboriKhurd	Rawatbhata	Chittorgarh	N24°52'27.34"	E 75°45'8.60"
40	Bhagwatpura	Rawatbhata	Chittorgarh	N24°53'21.02"	E 75°43'57.71"
41	NaiTalai	Rawatbhata	Chittorgarh	N24°53'48.84"	E 75°43'29.52"
42	Malpura	Rawatbhata	Chittorgarh	N24°53'32.25"	E 75°44'4.47"
43	Dhaneshwer	Dabi	Bundi	N25°3' 56.98"	E 75°35'11.83"
44	Khera	Dabi	Bundi	N25°3' 53.04"	E 75°34'36.60"
45	Gudha	Dabi	Bundi	N25°3' 3.34"	E 75°33'8.19"
46	Bhunjarkhurd	Rawatbhata	Chittorgarh	N25°0' 2.35"	E 75°28'34.35"
47	Bhunjar Kalan	Rawatbhata	Chittorgarh	N25°0' 51.30"	E 75°28'31.83"
48	Lotiyana	Rawatbhata	Chittorgarh	N24°57' 36.20"	E 75°26'24.68"
49	Rawatbhata	Rawatbhata	Chittorgarh	N24°56'6.39"	E 75°35'18.57"
50	Badoliya	Rawatbhata	Chittorgarh	N24°57' 55.75"	E 75°34'59.09"
51	Nagni	Rawatbhata	Chittorgarh	N24°57'26.41"	E 75°36'10.99"
52	JawaraKhurd	Rawatbhata	Chittorgarh	N24°58' 14.63"	E 75°36'47.53"
53	Golbav	Jhalarapatan	Jhalawar	N24°49' 54.33"	E 76°8'2.41"
54	Fazalpur Agricultural Land	Jhalarapatan	Jhalawar	N24°37'23.75"	E 76°10'16.34"
55	Berkheri Agricultural Land	Jhalarapatan	Jhalawar	N24°36' 27.68"	E 76°12'49.12"
56	Naza Agricultural Land	Jhalarapatan	Jhalawar	N24°38' 32.70"	E 76°8'50.34"
57	Dhanwas Agricultural Land	Jhalarapatan	Jhalawar	N24°39' 46.9"	E 76°7'29.27"
58	Khokhanda Agricultural	Jhalarapatan	Jhalawar	N24°40' 34.99"	E 76°6'3.39"
59	Rajpura Agricultural Land	Jhalarapatan	Jhalawar	N24°40' 49.72"	E 76°11'23.14"
60	Badodiya Agricultural Land	Rawatbhata	Chittorgarh	N24°41' 19.97"	E 76°5'12.44"
61	Jhalra Agricultural Land	Ladpura	Kota	N24°42'2.71"	E 76°4'47.43"
62	Jhiri Agricultural Land	Ladpura	Kota	N24°42'35.73"	E 76°4'7.65"
63	Jamuniya Agricultural Land	Ladpura	Kota	N24°43'12.92"	E 76°3'28.50"
64	KharliBawari Agricultural Land	Ladpura	Kota	N24°43'47.67"	E 76°2'54.47"
65	Nayagav Agricultural Land	Ramjangmandi	Kota	N24°44'24.61"	E 76°1'56.12"

66	Manpura Agricultural Land	Ramjangmandi	Kota	N24°45'31.3"	E 76°1'10.69"
67	Dhani Agricultural Land	Ramjangmandi	Kota	N24°44'54.37"	E 76°1'23.70"
68	KukadaKhurd Agricultural Land	Ramjangmandi	Kota	N24°46'38.63"	E 75°59'49.93"
69	Kamalpura Agricultural Land	Ramjangmandi	Kota	N24°46'57.68"	E 75°59'7.17"
70	Minyakhedi Agricultural Land	Ramjangmandi	Kota	N24°48'13.06"	E 75°57'0.35"
71	Pipalda Agricultural Land	Ramjangmandi	Kota	N24°46'54.04"	E 75°58'35.57"
72	Amjhar Agricultural	Ramjangmandi	Kota	N24°47'57.56"	E 75°58'38.37"
73	Kaliya Kui	Sangod	Kota	N24°49'32.41"	E 76°02'24.33"
74	Morukalan	Sangod	Kota	N24°49'41.51"	E 76°01'01.17"
75	Morukhurd	Sangod	Kota	N24°50'12.39"	E 76°01'23.64"



*Villages in ESZ of MHTR*

### 1.4.11. Description Of Villages in ESZ:

There are 75 villages belonging to 4 districts Kota, Bundi, Chittorgarh and Jhalawad falling in the ESZ. The list of the 75 villages is mentioned below:

List of Villages							
Sr. No	Village Name	Type of Village*	Panchayat Name	Tehsil/ Taluka	District	Latitude (N) (DMS Format)	Longitude (E) (DMS Format)
1.	Rathkakra	Revenue	Jamuniya	Ladpura	Kota	N25°3'11.80"	E 75°43'47.22"
2.	Jamuniya	Revenue	Borabas	Ladpura	Kota	N25°3'54.42"	E 75°43'39.73"
3.	Borabas	Revenue	Borabas	Ladpura	Kota	N25°1'14.49"	E 75°41'40.96"
4.	Akhawa agricultral land	Revenue	Borabas	Ladpura	Kota	N25°0'6.51"	E 75°44'54.02"
5.	Chandbawdi	Revenue	Dolya	Ladpura	Kota	N24°56'6.35"	E 75°44'52.66"
6.	Kolipura	Revenue	Borabas	Ladpura	Kota	N24°57'46.11"	E 75°40'0.65"
7.	Girdharpura	Revenue	Dolya	Ladpura	Kota	N24°54'46.90"	E 75°44'29.27"
8.	Damodarpura	Revenue	Bhanwariya	Ladpura	Kota	N24°52'30.05"	E 75°52'12.25"
9.	Kishanpura	Revenue	Doliya	Ladpura	Kota	N24°53'9.70"	E 75°46'59.71"
10.	Nayagav/jaspura	Revenue	Jaspura	Ladpura	Kota	N24°54'10.33"	E 75°48'10.68"
11.	Keshavpura	Revenue	Bhanwariya	Ladpura	Kota	N24°53'47.50"	E 75°49'39.72"
12.	Mandargarh	Revenue	Bhanwariya	Ladpura	Kota	N24°53'34.42"	E 75°51'38.52"
13.	Mohanpura	Revenue	Bhanwaria	Ladpura	Kota	N24°53'44.66"	E 75°53'37.56"
14.	Ravtha	Revenue	Bhanwariya	Ladpura	Kota	N24°52'26.18"	E 75°53'23.54"
15.	Heerapur	Revenue	Mandliya	Ladpura	Kota	N24°52'23.25"	E 75°55'50.65"
16.	Kawarpura agricultral land	Revenue	Bhanwariya	Ladpura	Kota	N24°52'29.79"	E 75°56'28.72"
17.	Bhawriya dadpura agricultural land	Revenue	Bhanwaria	Sangod	Kota	N24°52'24.27"	E 75°56'55.23"
18.	Kothla	Revenue	Kaliya kheri.	Ladpura	Kota	N24°50'39.42"	E 75°58'26.02"
19.	Padampura	Revenue	Kaliya kheri	Ladpura	Kota	N24°50'20.63"	E 75°58'49.70"
20.	Dara station	Revenue	Kishor Sagar	Kanwas	Kota	N24°49'58.90"	E 76°0'30.00"
21.	Morukalan	Revenue	Morukalan	Kanwas	Kota	N24°49'30.46"	E 76°1'8.62"
22.	Amjhar	Revenue	Piplada	Ramjangma ndi	Kota	N24°47'57.56"	E 75°58'38.37"
23.	Pipalda	Revenue	Piplada	Kanwas	Kota	N24°46'54.04"	E 75°58'35.57"
24.	Moryahedi	Revenue	Moikalan	Kanwas	Kota	N24°48'13.06"	E 75°57'0.35"



25.	Bhatwara	Revenue	Pipalda	Ramganj Mandi	Kota	N24°47'53.79"	E 75°57'44.05"
26.	Bhatwara kidhani	Revenue	Pipalda	Ramganj Mandi	Kota	N24°48'9.35"	E 75°57'34.86"
27.	Jhamra	Revenue	Bhanwariya	Ladpura	Kota	N24°49'21.96"	E 75°56'46.22"
28.	Nayaganv	Revenue	Kalya Kheri	Ladpura	Kota	N24°49'24.08"	E 75°56'6.13"
29.	Manoharpura	Revenue	Khedli	Ramganj Mandi	Kota	N24°50'2.51"	E 75°55'48.71"
30.	Bakshpura	Revenue	Mandliya	Ladpura	Kota	N24°50'57.24"	E 75°53'30.31"
31.	Ghatoliya	Revenue	Kundanpur	Sangod	Kota	N24°51'47.22"	E 75°52'10.86"
32.	Balkoo	Revenue		Sangod	Kota	N24°51'26.15"	E 75°50'4.67"
33.	Rail gerabad	Revenue	Bhanwariya	Ladpura	Kota	N 24°56'40.73"	E 75°50'3.37"
34.	Kailash nagri	Revenue		Ladpura	Kota	N 24°44'41.73"	E 76°07'30.22"
35.	Dhawad khurd	Revenue	Dhawad kalan	Rawatbhata	Chittorgarh	N 24°51'39.77"	E 75°48'43.18"
36.	kotra	Revenue	Bambori Kalan	Rawatbhata	Chittorgarh	N 24°52'13.19"	E 75°45'24.44"
37.	Karanpura	Revenue	Karanpura	Rawatbhata	Chittorgarh	N 24°51'54.96"	E 75°45'21.20"
38.	Dhardi	Revenue	Dhardi	Rawatbhata	Chittorgarh	N 24°52'19.80"	E 75°47'1.16"
39.	Bambori khurd	Revenue	Dhawad kalan	Rawatbhata	Chittorgarh	N 24°52'27.34"	E 75°45'8.60"
40.	Bhagwat pura	Revenue	Badodiya	Rawatbhata	Chittorgarh	N 24°53'21.02"	E 75°43'57.71"
41.	Naiyon ki talai	Revenue	Jharjhani	Rawatbhata	Chittorgarh	N24°53'48.84"	E 75°43'29.52"
42.	Malpura	Revenue	Jharjhani	Rawatbhata	Chittorgarh	N24°53'32.25"	E 75°44'4.47"
43.	Dhaneshwer	Revenue	Dhaneshwer	Dabi	Bundi	N25°3' 56.98"	E 75°35'11.83"
44.	Khera	Revenue		Dabi	Bundi	N25°3' 53.04"	E 75°34'36.60"
45.	GUDHA	Revenue	GUDHA	Dabi	Bundi	N25°3' 3.34"	E 75°33'8.19"
46.	Bhunjarkhurd	Revenue	Shripura	Rawatbhata	Chittorgarh	N25°0' 2.35"	E 75°28'34.35"
47.	Bhunjar kalan	Revenue	Shripura	Rawatbhata	Chittorgarh	N25°0' 51.30"	E 75°28'31.83"
48.	Lothiyana	Revenue	Dhanganma u kalan	Rawatbhata	Chittorgarh	N24°57' 36.20"	E 75°26'24.68"
49.	Rawatbhata	Revenue	Rawatbhata	Rawatbhata	Chittorgarh	N24°56'6.39"	E 75°35'18.57"
50.	Badodiya	Revenue	Badodiya	Rawatbhata	Chittorgarh	N24°57' 55.75"	E 75°34'59.09"
51.	Nagni	Revenue	Baroliya/ba doliya.	Rawatbhata	Chittorgarh	N24°57'26.41"	E 75°36'10.99"
52.	Jaora khurd	Revenue	Badoliya	Rawatbhata	Chittorgarh	N24°58' 14.63"	E 75°36'47.53"
53.	Golbav	Revenue		Jhalarapatan	Jhalawar	N24°49' 54.33"	E 76°8'2.41"



54	Fazilpur agricultural land	Revenue	harnawada	Jhalarapatan	Jhalawar	N24°37'23.75"	E 76°10'16.34"
55	Barkheri agricultural land	Revenue	Barkheri	Jhalarapatan	Jhalawar	N24°36' 27.68"	E 76°12'49.12"
56	Nala agricultural land	Revenue	Nala	Jhalarapatan	Jhalawar	N24°38' 32.70"	E 76°8'50.34"
57	Dhanwas agricultural land	Revenue	Kher Khera	Jhalarapatan	Jhalawar	N24°39' 46.9"	E 76°7'29.27"
58	Khokhanda agricultural	Revenue	Salotya	Jhalarapatan	Jhalawar	N24°40' 34.99"	E 76°6'3.39"
59	Rajpura agricultural land	Revenue	Mauborda	Jhalarapatan	Jhalawar	N24°40' 49.72"	E 76°11'23.14"
60	Badodiya agricultural land	Revenue	Badodiya	Rawatbhata	Chittorgarh	N24°41' 19.97"	E 76°5'12.44"
61	JHALARI agricultural land	Revenue	Jhalari	Kanwas	Kota	N24°42'2.71"	E 76°4'47.43"
62	Jhiri agricultural land	Revenue	Salawad khurd	Ramganj Mandi	Kota	N24°42'35.73"	E 76°4'7.65"
63	Jamuniya agricultural land	Revenue	Borabas	Ladpura	Kota	N24°43'12.92"	E 76°3'28.50"
64	Kharli Bawdi agricultural land	Revenue	Bhanwariya	Ladpura	Kota	N24°43'47.67"	E 76°2'54.47"
65	Nayagav agricultural land	Revenue	Kukda khurd	Ramjang mandi	Kota	N24°44'24.61"	E 76°1'56.12"
66	Manpura agricultural land	Revenue	Kukda khurd	Ramjang mandi	Kota	N24°45'31.3"	E 76°1'10.69"
67	Dhani Rewariyon agricultural land	Revenue	Khedli	Ramjang mandi	Kota	N24°44'54.37"	E 76°1'23.70"
68	Kookara Khurd agricultural land	Revenue	Kukda Khurd	Ramjang mandi	Kota	N24°46'38.63"	E 75°59'49.93"
69	Kamalpura agricultural land	Revenue	Pipalda	Ramjang mandi	Kota	N24°46'57.68"	E 75°59'7.17"
70	Meenya Kheri agricultural land	Revenue	Pipalda	Ramjang mandi	Kota	N24°48'13.06"	E 75°57'0.35"
71	Pipalda agricultural land	Revenue	piplda	Ramjang mandi	Kota	N24°46'54.04"	E 75°58'35.57"
72	Amjhar agricultural	Revenue	Pipalda	Ramjang mandi	Kota	N24°47'57.56"	E 75°58'38.37"
73	Kaliya kui	Revenue	Kishor Sagar	Sangod	Kota	N24°49'32.41"	E 76°02'24.33"
74	Morukalan	Revenue	Moru kalan	Kanwas	Kota	N24°49'41.51"	E 76°01'01.17"
75	Morukhurd	Revenue	Moru kalan	Kanwas	Kota	N24°50'12.39"	E 76°01'23.64"

## CHAPTER 2

### 2.1. Overview

The ESZ has been demarcated up to an extent of 0 (zero) to 1.0 (one) kilometre around the boundary of Mukundara Hills Tiger Reserve and the area of the Eco-Sensitive Zone is 248.70 square kilometres. The location map and of boundaries for the ESZ and Wildlife Sanctuary is presented in Figure 1.1 (see Gazette Notification of 10th January, 2020) which shows the Mukundara Hills Tiger Reserve and ESZ as per Gazette Notification, 2020.

Development Promotion and Control Regulations (DPCR) are a set of guidelines and rules established by local government authorities to govern landuse and development within a specific jurisdiction. These regulations aim to promote orderly and sustainable development while ensuring that it aligns with the overall planning goals and objectives of the area.

### 2.2. Landuses and Allowed Activities in Mukundara Hills Tiger Reserve ESZ

As per Mukundara Hills Tiger Reserve ESZ Notification, the list of activities is categorized in three parts. All the development decisions shall be in conformity with the activities prohibited, regulated and, permitted.

#### Prohibited Activities

As per the Mukundara Hills Tiger Reserve Notification Notification the prohibited activities are given in Annexure 1A.

#### Regulated Activities

As per the Mukundara Hills Tiger Reserve Notification the regulated activities are given in Annexure 1B.

#### Promoted Activities

As per the Mukundara Hills Tiger Reserve Notification the promoted activities are given in Annexure 1C.

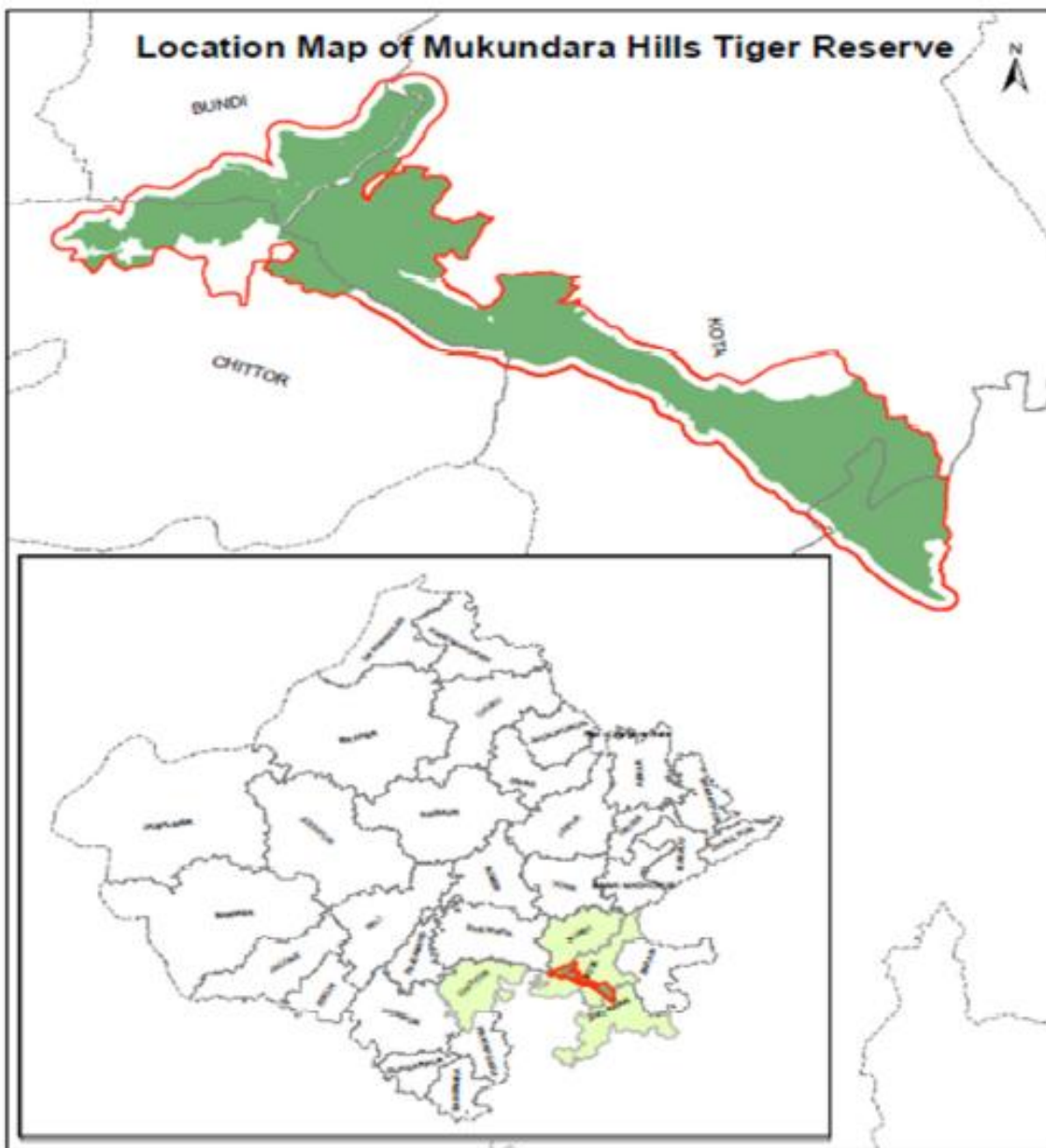


Figure No.: 3.1 Location Map of Mukundara Hills Tiger Reserve

### 2.3. Provision of Mukundara Hills Tiger Reserve ESZ Notification

ESZ Notification dated 10-01-2020 prescribes prohibited, promoted and regulated activities. Further, if any activity is prohibited under ESZ Notification dated 14-12-2018 and by any court orders, that prohibition would prevail over the activities allowed.

## 2.4. Existing Activity/Use

ESZ Notification dated 10-01-2020 prescribed regulations regarding new hotel, resort, commercial establishments, etc. This leads to the requirement of defining what is “existing.”

For purpose of ZMP for the ESZ, hotels, resorts, commercial establishments, etc. shall be considered as existing if they have any of the following issued prior to 10-01-2020 ESZ Notification of Mukundara Hills Tiger Reserve:

- Electricity connection for non-agricultural use.
- Approval by Tourism Department as tourism unit.
- Conversion order/Patta for non-agricultural use.
- Building Plan approval.
- Order regarding change in landuse.
- Proof of deposition of tax as hotel, resort, commercial establishment, etc.
- CTE/CTO/Environmental Clearance.

Additionally, all the duly approved uses existing prior to issue of Mukundara Hills Tiger Reserve ESZ Notification shall be honored.

## 2.5. Building Parameters for Grant of Approval

- The general building parameters for permissions to be granted in ESZ shall be as under:
- Maximum Height – 10.5 mters.
- However, if the allowed height, as per building byelaws is less than 10.5 meters. Then, the lesser height would be applicable.
- Maximum Ground Coverage – 20%
- However, if the plot coverage allowed as per building byelaws is less than 20% then, the lesser ground coverage would be applicable.
- Other building parameters will be as per prevailing Building Byelaws wherever applicable.

## 2.6. Environmental Clearance from State Environment Impact Assessment Committee or MOEF&CC

As per Sub-para 3 and Sub-para 4 of point no. 6 (Terms of Reference) of Mukundara Hills Tiger Reserve Eco-Sensitive Zone Notification, the provision is as under:

The activities that are covered in the Schedule to the notification of the Government of India in the erstwhile Ministry of Environment and Forest 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 Central Government in the Ministry of Environment, Forest and Climate Change for prior environmental clearances under the provisions of the said notification.

### 1. Annexure – 1A List of Activities Prohibited within Eco-Sensitive Zone

S. No.	Activity	Description
(1)	(2)	(3)
<b>A. Prohibited Activities</b>		
1.	Commercial mining, stone quarrying and crushing units.	(a) All new and existing mining (minor and major minerals), stone quarrying and crushing units are prohibited with immediate effect except for meeting the domestic needs of bona fide 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. (b) The mining operations shall be carried out in accordance with the order of the Hon'ble Supreme Court dated the 4 <sup>th</sup> August, 2006, and dated 28 <sup>th</sup> April 2023 in the matter of T.N. Godavarman Thirumulpad Vs. UOI in W.P.(C) No.202 of 1995 and dated the 21 <sup>st</sup> 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.).	New industries and expansion of existing polluting industries in the Eco-Sensitive Zone shall not be permitted: Provided that non-polluting industries shall be allowed within Eco-Sensitive Zone as per classification of Industries in the guidelines issued by the Central Pollution Control Board in February 2016, unless otherwise specified in this notification and in addition the non-polluting cottage industries shall be promoted.
3.	Establishment of major hydro-electric project.	Prohibited (except as otherwise provided) as per the applicable laws.
4.	Use or production or processing of any hazardous substances.	Prohibited (except as otherwise provided) as per the applicable laws.
5.	Discharge of untreated effluents in natural water bodies or land area.	Prohibited (except as otherwise provided) as per the applicable laws.
6.	Setting up of new saw mills.	New or expansion of existing saw mills shall not be permitted within the Eco-Sensitive Zone.
7.	Setting up of brick kilns.	Prohibited (except as otherwise provided) as per the applicable laws.
8.	Commercial use of firewood.	Prohibited (except as otherwise provided) as per the applicable laws.

## 1. Annexure -1B List of Activities to be Regulated within Eco-Sensitive Zone

S. No.	Activity	Description
(1)	(2)	(3)
<b>B. Regulated Activities</b>		
9.	Commercial establishment of hotels and resorts.	<p>No new commercial hotels and resorts shall be permitted within one kilometer 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:</p> <p>Provided that, beyond one kilometer 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.</p>
10.	Construction activities.	<p>(a) New commercial construction of any kind shall not be permitted within one kilometer from the boundary of the protected area or up to extent of the Eco-Sensitive Zone, whichever is nearer:</p> <p>Provided that, local people shall be permitted to undertake construction in their land for their use including the activities mentioned in sub-paragraph (1) of paragraph 3 as per building bye-laws to meet the residential needs of the local residents.</p> <p>Provided further 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</p>



		<p>applicable rules and regulations, if any.</p> <p>(b) Beyond one kilometer it shall be regulated as per the Zonal Master Plan.</p>
11.	Small scale non-polluting industries.	<p>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.</p>
12.	Felling of trees.	<p>(a) There shall be no felling of trees in the forest or Government or revenue or private lands without prior permission of the Competent Authority in the State Government.</p> <p>(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.</p>
13.	Collection of Forest produce or Non-Timber Forest produce.	<p>Regulated as per the applicable laws.</p>
14.	Erection of electrical and communication towers and laying of cables and other infrastructures.	<p>Regulated under applicable laws (underground cabling may be promoted).</p>
15.	Infrastructure including civic amenities.	<p>Taking measures of mitigation as per the applicable laws, rules, and regulations available guidelines.</p>

16.	Widening and strengthening of existing roads and construction of new roads.	Taking measures of mitigation as per the applicable laws, rules and regulation and available guidelines.
17.	Undertaking other activities related to tourism like flying over the Eco-sensitive Zone area by hot air balloon, helicopter, drones, Microlites, etc.	Regulated as per the applicable laws.
18.	Protection of hill slopes and riverbanks.	Regulated as per the applicable laws.
19.	Movement of vehicular traffic at night.	Regulated for commercial purpose under applicable laws.
20.	Noise pollution.	Regulated as per the applicable laws.
21.	Ongoing agriculture and horticulture practices by local communities along with dairies, dairy farming, aquaculture, and fisheries.	Permitted as per the applicable laws for use of locals.
22.	Establishment of large-scale commercial	Regulated (except otherwise provided) as per the applicable laws except for meeting local needs.

	livestock and poultry farms by firms, corporate and companies.	
23.	Discharge of treated wastewater or effluents in natural water bodies or land area.	The discharge of treated wastewater or effluents shall be avoided to enter into the water bodies and efforts shall be made for recycle and reuse of treated wastewater. Otherwise, the discharge of treated wastewater or effluent shall be regulated as per the applicable laws.
24.	Commercial extraction of surface and ground water.	Regulated as per the applicable laws.
25.	Solid waste management.	Regulated as per the applicable laws.
26.	Introduction of exotic species.	Regulated as per the applicable laws.
27.	Eco-tourism.	Regulated as per the applicable laws.
28.	Use of polythene bags	Regulated as per the applicable laws.
29.	Commercial sign boards and hoardings.	Regulated as per the applicable laws.

3. Annexure -1C List of Activities to be Promoted within Eco Sensitivie Zone

<b>S. No.</b>	<b>Activity</b>	<b>Description</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
<b>C. Promoted Activities</b>		
30.	Rain water harvesting.	Shall be actively promoted.
31.	Organic farming.	Shall be actively promoted.
32.	Adoption of green technology for all activities.	Shall be actively promoted.
33.	Cottage industries including village artisans, etc.	Shall be actively promoted.
34.	Use of renewable energy and fuels.	Bio-gas, solar light etc. shall be actively promoted.
35.	Agro-Forestry.	Shall be actively promoted.
36.	Plantation of Horticulture and Herbals.	Shall be actively promoted.
37.	Use of eco-friendly transport.	Shall be actively promoted.
38.	Skill Development.	Shall be actively promoted.
39.	Restoration of degraded land/ forests/ habitat.	Shall be actively promoted.
40.	Environmental awareness.	Shall be actively promoted.

## CHAPTER 3

### 3.1. Introduction

Tourism master plan envisages an advance planning for the activities to be done for development of tourism sector. Tourism is an upcoming sector and Rajasthan has ample scope for tourism. The natural heritage, manmade heritage including old forts and palaces, unique buildings and havelis, dams and water reservoirs, old temples and religious places etc. are the places of importance which attract tourist to all parts of Rajasthan. Apart from all these there are beautiful forests and diverse wildlife inside the forest reserves which makes it adventurous to visit the wild life sanctuaries and National parks of Rajasthan. Kota has recently got Mukundara Hills National Park (MHNP) which has been notified as Mukundara Hills Tiger Reserve (MHTR) also and being managed accordingly. Ministry of Environment and Forest & Climate Change (MoEFCC) Government of India has notified the Eco Sensitive Zone (ESZ) of MHTR including 75 villages of district Kota, Bundi, Jhalawad and Chittorgarh. This tourism master plan is prepared with a view to highlight the importance of tourist places around MHTR and develop more such places of tourist interest around it so that when the tourism flourishes in MHTR, the tourist gets the best and comfortable services around the MHTR and its ESZ.

Rajasthan has emerged as one of the popular tourist destinations in India for both domestic and foreign tourists. The number of tourist arrivals in the state has increased fourfold in the last thirty years.

The state is known for its diversity in terms of natural resources, cultural heritage, historical as well as archaeological wonders and rare wild life. The forts and palaces, heritage hotels, colourful fairs and festivals, local art and handicrafts, etc. has been a unique selling proposition for tourists coming to the state. Kota is blessed with all types of tourist destinations in the city and around the city and the district.

Of late tourism in Rajasthan was small industry and was largely confined to the elite foreign tourists and domestic pilgrim traffic. Tourist arrivals were restricted to selected places such as Jaipur, Udaipur, Jodhpur, Ajmer, Pushkar and Nathdwara.

However, over the last few decades, due to the focused efforts of Rajasthan Tourism, various State Government agencies, select entrepreneurs / individuals, tourism has grown from an elite and pilgrim phenomenon to a mass phenomenon putting Rajasthan firmly on the foreign and domestic tourist map. Also, as compared to the past, where the tourism in the state meant desert tourism, heritage tourism (forts, palaces, etc.) and pilgrim tourism, today the tourists have a wide canvas of places, attractions and activities to choose from in the state, which enhances the overall tourism experience.

The industry today employs over one lakh people directly and over three lakh people indirectly contributing Rs 2000 Cr. to the State economy. Given the increasingly important role that the sector plays in the overall socioeconomic development of the state, the State Government of Rajasthan has accorded an industry status to tourism from the year 1989.

To promote tourism in the state, the Department of Tourism (DoT), Rajasthan has played a key role where Rajasthan Tourism Development Corporation (RTDC), was established in November, 1978 primarily to act as catalyst by developing tourism infrastructure facilities, particularly by way of basic amenities like accommodation, catering and organized tours / sight-seeing facilities.

Tourism in Kota is also emerging in the recent years due to the increasing development of tourist destinations, highlighting of heritage, forest and wildlife areas. It creates demand for new hotels, resorts, guest houses, Yatri-niwas, restaurants, wayside Dhabas, markets etc. It is, therefore, need of the time to have a plan for the development and management of the tourism in the district in the coming 15-20 years.

### 3.2. Background Information and Statistics

Statistics of Population of Kota:

1	Households	396501
2	Total population	1951014
3	Male population	1021161
4	Female population	929853
5	Urban population	39.69%

6	Rural population	60.31%
7	Hindu	85.15%
8	Muslim	12.51%
9	Jain	1.32%
10	Sikh	0.57%
11	Others	0.16%
12	Scheduled Tribes (ST)	9.42%
13	Scheduled caste	20.78%
14	Children between 0-6 years	255056 (13.07%)
15	Sex ration	911 F/1000M
16	Literacy rate	66.55%
17	Population density	374 /sq.km
18	Area of Kota district	5217 sq km

(Source: Census 2011)

#### Statistics on Tourism In-flow in Kota

S.no	Year	Number of Domestic tourists	Number of Foreign tourists	Number of Total tourist
1	2018	117596	1889	119485
2	2019	128119	2867	130986
3	2020	102955	721	103676
4	2021	189953	154	190107
5	2022	804971	659	805630
		1343594	6290	1349884

Though the numbers of tourists shown in the above table belong to Kota City mainly, but it is expected that about 10-15 % of the tourists visiting Kota City can prefer going to the new tourist destinations to be developed in the ESZ of MHTR, as the ESZ villages have great potential of natural heritage sites. Particularly, the rural tourism can get a boost if given proper importance and promotion by the tourism authorities.



### 3.3. Heritage Sites

#### (a) Natural Heritage

The Mukundra Hills Tiger Reserve is an important natural heritage site in Rajasthan, India. It is home to a diverse range of flora and fauna, including several rare and endangered species. The region's natural heritage encompasses its unique landscapes, biodiversity, and cultural significance.

The hills and valleys of the reserve offer a rugged terrain that is home to dry deciduous forests and thorny shrublands. These forests are dominated by species such as teak, sal, dhok, tendu, and amla, among others. The thorny shrublands are characterized by species such as khejri, ber, and phog, among others. The reserve is also home to several rare and endangered species of fauna, including the Bengal tiger, Indian leopard, sloth bear, Indian wolf, and several species of deer and antelope.

The cultural significance of the region is also an important aspect of its natural heritage. The region is home to several indigenous communities, such as the Meena and Bhil tribes, who have a long history of living in harmony with the natural environment. These communities have developed traditional knowledge and practices that promote the conservation and sustainable use of natural resources in the region.

The conservation efforts in the region aim to protect and enhance this natural heritage while also promoting sustainable development and livelihoods for local communities. The state forest department has implemented several measures, such as wildlife corridors, afforestation programs, and eco-development initiatives, to protect and conserve the natural heritage of the region.

Overall, the Mukundra Hills Tiger Reserve is an important natural heritage site that showcases the unique biodiversity and cultural significance of the region. The conservation efforts in the region aim to protect and enhance this natural heritage for future generations.

#### Chambal River Gorges

Kota is not only famous for its name as coaching centre, power district, etc but also for its rich biodiversity and geomorphological features formed by the mighty Chambal

River. Most famous among them is the Garadiya view point where the Chambal takes a full U turn. Its spectacular gorges are a unique one and reminds of the Great Canyon.



(Gorges of Chambal)

### Kalisindh River Gorges

Kalisindh river is a major tributary of Chambal River which touches the tiger reserve ESZ in the southern side. It also forms beautiful gorges and scenic natural areas. Gagron fort is also situated on its banks.

Other Natural Heritage Tourist Places:

S. No.	Name of Site	Location	Ownership	Latitude N	Longitude E	Type of site
1	Nav Ghat Waterfall	Jawhar Sagar Range, inside MHTR	MHTR	25°02'58.18"	75°40'31.62"	Waterfall, Gorge, Cliff
2	Garadiya Waterfall	Jawhar Sagar Range, inside MHTR	MHTR	25°07'02.05"	75°43'47.62"	Waterfall, Gorge, Cliff
3	Titanic Island	Jawhar Sagar Range,	MHTR	25°00'59.92"	75°38'18.42"	Rock Formation

		inside MHTR				
4	Geparnath Waterfall	Borabas Range, inside MHTR	MHTR	25°03'37.48"	75°43'17.26"	Waterfall, Gorge, Cliff
5	Borabas Pond	Borabas Range	WRD	25°01'40.56"	75°41'40.03"	Wetland
6	Girdharpu ra Chota Talab	Kolipura Range, inside MHTR	MHTR	24°55'30.69"	75°44'30.87"	Gene Pool, Wetland
7	Girdharpu ra Bada Talab	Kolipura Range, inside MHTR	MHTR	24°53'48.38"	75°45'16.83"	Gene Pool, Wetland
8	Bhawar Kunj	Borabas Range, inside NCS	MHTR	25°08'11.34"	75°47'02.83"	Waterfall, Gorge, Cliff
9	Alniya Pond	Alniya, Kota	WRD	24°59'15.67"	75°54'01.84"	Wetland

## (b) Man-made Heritage Sites

### Gagron Fort

Gagron Fort is a significant heritage site located near Jhalawar district in Rajasthan, India. It is recognized as a UNESCO World Heritage Site and holds immense historical and architectural importance.

The fort is situated at the confluence of the Kali Sindh and Ahu rivers, surrounded by lush greenery and picturesque landscapes. It was built in the 12th century and served as a strategic defense structure during ancient times. The fort's construction exhibits a unique blend of Rajput and Islamic architectural styles.

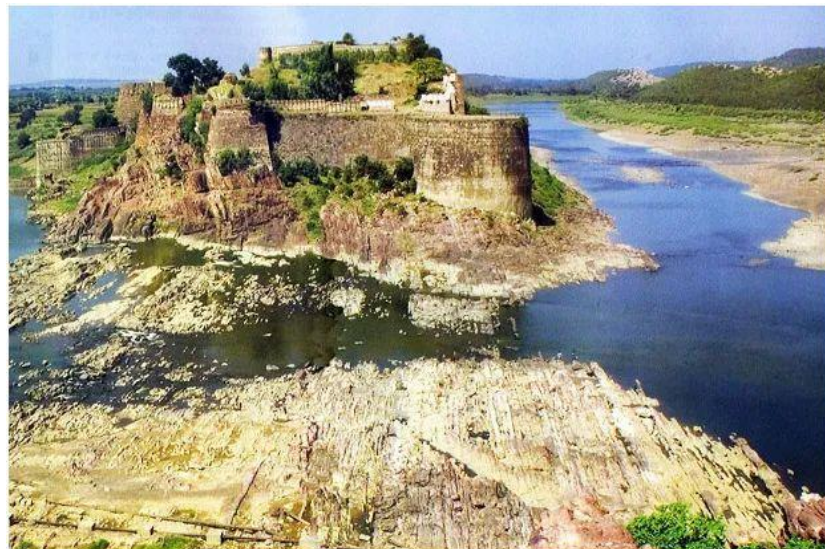
Gagron Fort boasts sturdy walls, imposing gateways, watchtowers, and bastions that reflect its defensive nature. The fortification is enhanced by the natural features of the surrounding rivers and dense forests, creating a formidable stronghold. Within the fort

complex, there are several palaces, temples, and other structures that showcase the rich cultural heritage of the region.

One of the remarkable features of Gagron Fort is its intricate water management system. The fort has several reservoirs and stepwells that ensured a reliable water supply for the inhabitants during times of siege or scarcity.

The fort has witnessed various historical events and has been associated with different ruling dynasties throughout its existence. It has stood as a testament to the valor and architectural brilliance of its builders.

Today, Gagron Fort attracts tourists and history enthusiasts who are captivated by its grandeur and historical significance. Visitors can explore the various sections of the fort, admire the impressive architecture, and immerse themselves in the rich cultural heritage of Rajasthan. Currently the monument is under archeological survey department management.



**Gagron Fort**

### **Abli Meeni Mahal**

This fort is located in the forests of Dara, between Jhalawar and Kota. It is called Abli Meeni Mahal, perched atop the Aravalli Mountain range. The construction of this fort was commissioned by Maharaja Mukundarav of Kota. It is said that during one of his hunting expeditions, Maharaja Mukundarav came across Abli Meeni in the jungles of the

Aravalli hills. Captivated by her beauty, the Maharaja sent her a message of love. In response, Abli Meeni laid a condition that she would marry him only if she could see a lit lamp in her village, Khairabad. In light of this incident, Maharaja Mukundarav ordered the construction of this fort.

The fort was built in the year 1649. Abli Meeni Mahal is a historical and natural site that offers you the opportunity to experience the beauty of nature and observe the wildlife in the surrounding jungle. It stands as a testament to the love story and the architectural prowess of that era. The fort's location amidst the lush greenery and serene surroundings makes it a perfect destination for nature lovers and history enthusiasts alike. Exploring the fort and its intricate design will transport you back in time and give you a glimpse into the rich heritage of Rajasthan.

With its strategic position on National Highway 12, Abli Meeni Mahal serves as a prominent attraction for tourists traveling between Jhalawar and Kota. It provides a glimpse into the glorious past of the region and offers a serene and peaceful environment for visitors to immerse themselves in. The fort's architecture showcases a blend of Rajput and Mughal influences, with its ornate carvings, intricate motifs, and grandeur.

Visiting Abli Meeni Mahal allows you to witness the architectural brilliance of the bygone era while enjoying the tranquillity of the natural surroundings. It is a place where history, nature, and romance intertwine, leaving visitors with a sense of awe and wonder. Currently the monument is under archaeological survey department management.





*Abli Meeni Mahal*

### **Badoli Temple**

Badoli Temple, also known as Baroli Temple Complex, is a group of ancient Hindu temples located in the Badoli village of Rajasthan, India. Situated amidst the picturesque landscape of the Aravalli hills, the temple complex is renowned for its exquisite architecture and historical significance.



**Badoli Temple**

The Badoli Temple complex dates back to the 9th and 12th centuries and represents the Chalukyan style of architecture. It consists of several temples dedicated to various Hindu deities, including Lord Shiva, Lord Vishnu, and Goddess Durga. The temples are intricately carved and adorned with elaborate sculptures, reflecting the artistic mastery of the artisans of that era.

The main attraction of the complex is the Badoli Temple, dedicated to Lord Shiva. It is a sandstone temple with a beautifully carved shikhara (spire) and intricate sculptures depicting various mythological scenes. The temple stands as a testimony to the rich cultural and religious heritage of the region.

Visiting the Badoli Temple complex offers a spiritual and historical experience. The serene ambiance, surrounded by lush greenery, creates a peaceful atmosphere for devotees and visitors. The intricate architectural details and the ancient sculptures provide insights into the artistic skills and religious practices of ancient India.

The Badoli Temple complex is not only a significant religious site but also an architectural gem. Its historical importance and unique architectural style attract both devotees and art enthusiasts from around the world. Exploring the temple complex allows visitors to delve into the rich cultural tapestry of Rajasthan and witness the timeless beauty of its heritage. Currently the monument is under archaeological survey department management

### **Kishoresagar Talab and Mahal**

It's a state time mahal and talab. It attracts lot of wintering avi fauna.

### **Bhaisrodgarh Fort**

Bhaisrodgarh fort is an old state time fort situated in the bank of Chambal river. It is situated near the confluence of Brahminy river and Chambal. It is also a tourist place which is owned by private person.



Important Man Made Heritage Tourist Places in and near ESZ:

S. No	Name of Place	Location	Ownership	GPS coordinates		Type of building
				Latitude-N	Longitude-E	
1	Abheda Palace	Nanta, Kota	UIT	25°11'59.58'	75°47'27.50'	Historical
2	Brij Vilas Palace	Station Road, Kota	ASI	25°11'08.00'	75°51'15.66'	Historical
3	Garh Palace	Kishorepura, Kota	Private	25°10'31.77'	75°49'47.62''	Historical
4	Godavridham Temple	Rawatbhata Road, Kota	Private/Trust	25°09'31.92'	75°49'17.95'	Spiritual
5	Adhar Shila	Rawatbhata Road, Kota	Private/Trust	25°09'34.10'	75°49'16.33'	Spiritual
6	Laal Haveli	Bajaj Khana, Kota	Chhamuniya Family	25°10'58.28'	75°50'20.54'	Historical
7	Trimurti	Station Road, Kota	UIT	25°11'16.65'	75°51'26.63'	Artefact
8	Bheetariya Kund	Rawatbhata Road, Kota	Govt.	25°09'18.51'	75°49'05.12'	Spiritual
9	Laal Burj / Boundary Wall of Kota Garh	Old City Kota, Kota	UIT	25°10'39.79'	75°50'11.09'	Historical Precinct
10	Seven Wonder's Park	Kotri Mini Flyover	UIT	25°10'48.33'	75°50'55.60'	Artefact
11	Horse Fountain	Kishore Sarovar	UIT	25°11'04.30'	75°51'07.01'	Artefact
12	River Front	Kota Barrage to Nayapura	UIT	25°10'43.81'	75°49'49.48'	Artefact
13	Lakhhi Burj	Kishore Sarovar	UIT	25°11'12.84'	75°50'55.31'	Historical
14	Geparnath Temple	Inside MHTR	MHTR	25°08'31.97'	75°48'12.44'	Spiritual
15	Garadiya Mahadev Temple	Inside MHTR	MHTR.	25°07'02.46'	75°43'46.76'	Spiritual

16	Nahar Singh Mata	Inside MHTR	MHTR	24°58'54.33' ,	75°41'15.51' ,	Spiritual
17	Dad Devi Temple	Daddevi Forest Block	UIT	25°04'35.35' ,	75°55'07.80' ,	Spiritual
18	Chatra Vilas Garden	Nayapura, Kota	UIT	25°11'16.88' ,	75°51'06.99' ,	Aesthetic Precinct
19	Keshar Bagh	Talab Ki Pal, Kota	UIT	25°11'13.94' ,	75°50'56.23' ,	Historical Precinct
20	Charan Chauki	Mavasa Village, Kota	GP	25°05'48.09' ,	75°56'09.86' ,	Spiritual
21	Jag Mandir	Kishor Sarovar, Kota	UIT	25°10'59.07' ,	75°50'57.91' ,	Artefact
22	Kota Barrage	Sakatpura, Kota	WRD	25°10'37.89' ,	75°49'32.14' ,	Architectural Precinct
23	Chambal Garden	Rawatbhata Road, Kota	UIT	25°09'45.43' ,	75°49'24.75' ,	Aesthetic Precinct
24	Khade Ganesh Temple	Rangbadi, Kota	UIT	25°06'47.78' ,	75°49'45.15' ,	Spiritual Place
25	Rangbadi Bala Ji Temple	Rangbadi, Kota	UIT	25°07'14.69' ,	75°50'18.00' ,	Spiritual Place
26	Alniya Dam	Alniya, Kota	WRD	25°00'17.49' ,	75°52'41.11' ,	Architectural Precinct
27	Abli Meeni Palace	Darrah, Kota	ASI	25°48'55.72' ,	75°59'11.59' ,	Historical
28	Bheem Chauri	Darrah, Kota	ASI	25°48'53.56' ,	75°59'08.73' ,	Historical
29	Kansua Shiv Temple	Kansua, Kota	ASI	25°08'43.49' ,	75°52'54.35' ,	Spiritual
30	Shri Mathuradheesh Temple	Patanpol, Kota	Vaishnav Sect	25°10'40.03' ,	75°50'03.34' ,	Spiritual
31	Karneshwar Temple	Jhalawar Road, Kota	UIT	25°06'02.86' ,	75°51'15.25' ,	Spiritual
32	Chattaneshwar Temple	Jhalawar Road, Kota	UIT	25°01'49.67' ,	75°55'03.89' ,	Spiritual
33	Ravtha Palace	Inside MHTR	ASI	24°51'54.14'	75°55'13.06'	Historical

				,	,	
34	Badoli Temple Group	Rawatbhata, Chittorgarh	ASI	25°57'30.49'	75°35'36.05'	Spiritual
35	Gagron Fort	Buffer of MHTR, Jhalawar	ASI	24°37'40.72'	76°11'09.51'	Historical
36	Abheda Pond	Nanta, Kota	FD	25°11'58.95'	75°47'28.35'	Gene Pool Reserve
37	Sothiya Talai	Forest	MHTR	25°08'51.02'	75°45'14.72'	Wetland

### 3.4. Conservation and Management Strategies of Heritage Sites

Conservation strategies for these heritage sites involve a range of measures aimed at preserving their cultural, historical, and architectural significance. Here are some common conservation strategies:

**Documentation and Research:** Thorough documentation of the site's history, architecture, and cultural significance is crucial for understanding its unique characteristics and informing conservation efforts. This involves conducting research, surveys, and assessments to gather comprehensive information.

**Structural Stability and Restoration:** Assessing the structural stability of the heritage site is vital to identify areas in need of restoration or conservation. The restoration process may involve stabilizing foundations, repairing damaged structures, and conserving original architectural features using appropriate materials and techniques.

**Preservation of Art and Sculptures:** Paying special attention to the preservation and restoration of intricate art, sculptures, and decorative elements is essential. This includes delicate cleaning, conservation of colors and pigments, and protecting them from environmental factors such as pollution and weathering.

**Environmental Management:** Implementing measures to protect the heritage site from natural and human-induced threats is crucial. This involves monitoring and controlling factors like water ingress, humidity, temperature fluctuations, vegetation growth, and pests that can adversely affect the site's integrity.

**Visitor Management:** Managing visitor activities and footfall is necessary to minimize potential damage and wear and tear to the heritage site. This can include implementing controlled entry systems, guided tours, and educational programs to raise awareness among visitors about the importance of responsible behaviour.

**Community Engagement:** Involving local communities in the conservation process fosters a sense of ownership and stewardship. Engaging with the community can include promoting awareness, providing training, and generating employment opportunities related to heritage conservation.

**Legal Protection and Policies:** Implementing legal frameworks, regulations, and policies that safeguard the heritage site's conservation is essential. This includes designating the site as a protected monument, enforcing heritage laws, and establishing management plans for its long-term preservation.

**Sustainable Tourism:** Balancing tourism activities with the preservation of the heritage site is crucial. Implementing sustainable tourism practices, such as limiting visitor numbers, creating designated pathways, and promoting responsible tourism, helps minimize the impact on the site.

These conservation strategies aim to ensure the long-term preservation and sustainable management of heritage sites, allowing future generations to appreciate and learn from their cultural and historical significance.

For all these activities necessary permissions as per final ESZ notification and relevant guidelines should be followed.

### **3.5. Ecotourism**

Ecotourism is a form of sustainable tourism within a natural or cultural heritage area where community participation, protection and management of natural resources, culture, indigenous knowledge and practices, environmental education and ethics, as well as economic benefits are fostered and pursued for the enrichment of host community and satisfaction of visitors. According to the United Nation's World Tour Organization (UNWTO), ecotourism refers to forms of tourism which have the following characteristics:

All nature-based forms of tourism in which the main motivation of the tourists is the conservation and appreciation of nature as well as the traditional cultures prevailing in natural areas.

It contains educational and interpretation features.

It is generally, but not exclusively, organized by specialized tour operators for small groups. Service provider partners at the destinations tend to be small locally owned businesses.

It minimizes negative impacts upon the natural and socio-cultural environment. Providing alternative employment and income opportunities for local communities;

It supports the maintenance of natural areas which are used as ecotourism attractions by:

Generating economic benefits for host communities, organizations and authorities managing natural areas with conservation purposes;

Increasing awareness towards the conservation of natural and cultural assets, both among locals and tourists.

The Ministry of Environment, Forest and Climate Change describes Ecotourism as:

'Responsible travel to natural areas that conserves the environment and improves the well-being of local people'.

Such tourism is low-impact, educational, and conserves the environment while directly benefiting the economic development of local communities. Therefore, the focus of ecotourism is on its educational as well as economic benefits and at the same time is compatible with fragile natural ecosystems. This policy is based on the basic understanding that local communities are the most vital pillar of ecotourism in the state. Ecotourism is an important vehicle for reconciling conservation and economic considerations for local stakeholders and includes most of the low impact tourism in the natural heritage areas which Guidelines for ecotourism in and around protected areas, Ministry of Environment and Forest, 2 June 2011 are facilitated by the local communities as partners in the process.

## **Eco-tourism Promotion Strategies**

Promoting eco-tourism involves strategies aimed at encouraging responsible travel practices, raising awareness about environmental conservation, and supporting local communities. Here are some eco-tourism promotion strategies:

**Education and Awareness:** Implement educational campaigns to raise awareness among tourists about the importance of eco-tourism and the benefits of sustainable travel practices. This can be done through informative brochures, interpretive signage, visitor centers, and online platforms.

**Community Involvement:** Engage local communities in eco-tourism initiatives by providing training and employment opportunities. Empowering communities to actively participate in tourism activities fosters a sense of ownership and ensures that local people benefit economically and socially from tourism.

**Conservation Programs:** Collaborate with conservation organizations and local communities to develop and implement conservation programs. These programs may include habitat restoration, wildlife protection, waste management, and sustainable resource utilization to minimize the negative impact of tourism on the environment.

**Partnerships and Collaboration:** Establish partnerships with tour operators, travel agencies, and accommodation providers who prioritize eco-friendly practices. Collaborate with these stakeholders to create eco-tourism packages and experiences that emphasize sustainable tourism practices.

**Interpretation and Guided Tours:** Offer guided tours led by knowledgeable guides who can provide insights into the local ecology, cultural heritage, and conservation efforts. Interpretive signage and information boards can also be placed at key sites to educate visitors about the importance of the ecosystem and conservation measures.

**Supporting Local Products and Services:** Encourage tourists to support local businesses and purchase locally made products, which contribute to the local economy and promote sustainable development. This may include promoting local handicrafts, organic produce, and locally sourced materials.

**Infrastructure and Facilities:** Develop infrastructure and facilities that align with eco-tourism principles. This includes eco-friendly accommodation options, waste management systems, renewable energy solutions, and sustainable transportation alternatives to minimize the environmental footprint of tourism activities.

**Responsible Visitor Behaviour:** Promote responsible visitor behaviour through the dissemination of guidelines and codes of conduct. Encourage tourists to respect the local culture, wildlife, and natural surroundings, minimize waste generation, and follow designated trails and paths to prevent ecological disturbance.

**Monitoring and Evaluation:** Regularly monitor and evaluate the impact of eco-tourism activities on the environment, local communities, and cultural heritage. This helps identify areas for improvement and ensures that eco-tourism practices remain sustainable and effective.

**Eco-tourism/tourism activities to be permitted:**

Ecotourism is unique among commercial opportunities in rural areas because, unlike so many other activities, ecotourism works best when it builds on local knowledge and authenticity. A carefully designed ecotourism initiative shall have the potential to contribute both to ecological conservation and local community development.

Any travel focused on experiencing Rajasthan's fairs and festivals which promote eco-tourism and sustainability of local traditions; are defined as nature-based activities exclusively performed to sensitize people about the beauty, richness and fragility of the state's natural and cultural heritage, and shall not just focus on creating destinations in natural area or using natural environment for outdoor activities. Ecotourism activities have to be coordinated by a qualified nature and cultural interpreter trained to entertain and educate the visitors. Following activities may be permitted under eco-tourism activities within the ESZ of MHTR if it is satisfy the provisions of the final notification of ESZ and other relevant rules and guidelines:

- Boating / River Cruising to view wildlife and experience wilderness;
- Trekking, nature walk, bird and wildlife watching, hiking, flora and fauna observation, photography, etc.;
- Star Gazing in designated sites / forts / other monuments;



- Activities in specified areas of the forests such as jungle safari in vehicles or elephant / camel safari, trekking / nature walk, overnight camping in designated sites, bird watching and study of flora & fauna, etc.
- Ecotourism Assets both within and beyond areas administered by the Forest Department: Natural and cultural
- Lodging in campsites, eco-lodges, homestays and guesthouses that are located in an area of natural and/ or cultural beauty, and involves local specificities.
- Guidelines for Eco-tourism in ESZ of MHTR, Kota

The Department of Tourism (DoT), Government of Rajasthan proposes these guidelines for facilitating identification, promotion and development of lesser-known areas having ecotourism potential in addition to popular destinations. At the same time, these guidelines aim for diversification in the range of tourism activities available at destinations and facilitate involvement of the local communities living in, and dependent on peripheral and other areas for their livelihood. The provisions and directions in the final notification of the ESZ of MHTR is to be strictly followed along with the provisions of various Acts related to Forests and Environment, viz. Wildlife Protection Act 1972, Forest Conservation Act, 1980, Environment Protection Act, 1986, and the directives and guidelines issued by the Central/ State Government from time to time.

#### **Developing Tourist Information Centre:**

A Tourist Information Centre (TIC) should be developed as a dedicated space outside forest area within a building for interpretive displays, programs, services, and information. It should have support facilities like Audio-visual presentations, café; souvenir kiosks etc. for the conveniences of the tourist. A TIC may be developed by public or private sector following the provisions and directions in the notified ESZ and other relevant guidelines and rules.

#### **Heritage Trails And Nature Trails:**

Eco Sensitive Zone (ESZ) of MHTR is surrounded by waters of Chambal River and Kalisindh river. It forms several picturesque points in the ESZ. Important roads also pass through ESZ. There are several points of ecological and natural importance where

the naturalists would like to visit and interact with nature. Moreover, there are several tourist sites of natural, social, religious, historical, heritage and cultural importance lying beyond PA boundaries and forest areas which may be connected to the outer world through nature trails. Under such circumstances, it is essential to develop heritage and nature trails in selected areas giving priority to Historical, heritage and natural forest areas. The trails if any falls inside the PA or forest area should follow all the relevant guidelines and provisions of the acts and rules. Development of trails should follow the provisions and directions in the notified ESZ and other relevant guidelines and rules.

### **Rural Tourism**

Rural Tourism has been advocated to showcase the rural life, art, culture and heritage at rural locations, to benefit the local community, economically and socially. It also enables interaction between the tourists and the locals for a more enriching & rewarding tourism experience. Rural tourism is essentially an activity which takes place in the countryside. It is multifaceted and may entail farm/agricultural tourism, cultural tourism, nature tourism, adventure tourism, and eco-tourism. Rural tourism has certain typical characteristics like; it is experience-oriented, the locations are sparsely populated, it is predominantly in natural environment, it meshes with seasonality and local events, and is based on preservation of culture, heritage and traditions. Government of Rajasthan intends to promote village/rural tourism and spread its socio-economic benefits to rural and backward areas in the state. Rural areas provide many opportunities for the development of tourism, as an alternative means of income-generation. Land is inexpensive in comparison to urban areas; the environment is green and unpolluted; and buildings which previously served other purposes can easily be refurbished. Some of the potential benefits include generation of additional/off-farm income, job creation, farm support, landscape conservation, services retention, and support to rural arts and crafts, nature conservation, environmental improvements, and enhanced role of women.

Rajasthan Government has notified the “Rajasthan Rural Tourism Scheme 2022” to benefit the local community, economically and socially. Under this scheme following units are permitted:

- Rural Guest House
- Agro tourism Unit
- Camping Site
- Caravan Park
- Home stay (Paying Guest house)

These rural tourism units may be permitted in the rural areas falling in the ESZ of MHTR as per the provisions in the final notification of ESZ and other relevant guidelines in this regard.



*For more information log on to : [environment.rajasthan.gov.in](http://environment.rajasthan.gov.in)  
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