

# MANAGEMENT PLAN

For

## Baleshwar Conservation Reserve

PLAN PERIOD 2025-26 to 2034-35



*Prepared by*

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Under the guidance of

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## ***EXECUTIVE SUMMARY***

The Forest Department has issued a notification No. प.एफ.न.3 (03) वन / 2023 जयपुर dated 08.09.2023 declaring a new Conservation Reserve by combining Neemkathana and Patan Protected Forest Blocks named Baleshwar Conservation Reserve. Protected forest blocks in Neemkathana and Patan tehsils have been included in the Conservation Reserve.

The Forest Department has included the forest land of Gaondi, Gadrata, Dokan and Patan. The department has named it Baleshwar Conservation Reserve. Its northern boundary will be the northern boundary of Forest Block Dokan. The southern boundary will be the southern boundary of Forest Block Gaondi. The eastern boundary will be the eastern boundary of Forest Block Gadrata and the western boundary will be the western boundary of village Ganeshwar of Forest Block Gaondi. 11778.25 hectares of land of Gaondi Forest Block of Neemkathana and 730.60 hectares of land of Dokan Forest Block have been included in the Baleshwar Conservation Reserve area.

Patan's Gaonwadi forest block of 1523.5 hectares, Dokan's 4550.40 hectares, Patan's 825 hectares and Gadrata's 2761.75 hectares have been included. After consultation with the local communities, the state government has declared it a conservation reserve keeping in mind the faunal, botanical, geological, natural and zoological importance. The forest department has been preparing for a long time to develop Baleshwar as a leopard conservation reserve. A proposal regarding this was sent to the state government in 2017.

This conservation reserve is 90 km from Sikar city. It is located at a distance 40 km from Neem ka thana. National Highway No. 08 is connected from Delhi to Mumbai and in between the state road is connected to Kotputli - Kuchaman. So it is easily in approach by road. This area is approximate 15 km from railway station and 10 km from Neemkathana city. Baleshwar Conservation Reserve extends up to 221.6905 Sq. Km. (22169.05 ha.) it is one of the most spectacular landscapes in our vast and varied country and contrary to the popular notion that hilly terrian of lifeless stretches of unending aridity, this unique area is host to a rich diversity of life.

The intension behind the creation of the Baleshwar Conservation Reserve is to preserve a representative sample of the hilly area ecosystem for the benefit of future generations. The main intension is to protect flora & fauna present in this area specially Dhonk, Kumtha& creation of habitat for Panther. The idea was also to protect hilly area eco-system in its natural form for times to come. This Management Plan has been prepared to fulfill the

objectives envisioned while creation of this Conservation Reserve. All the measures have been adopted to retain the unique characteristics of the hilly area intact.

The commonly adopted pattern of Management Plan is followed in this plan as well. In addition, few chapters have been included that are unique to this plan.

The chapter; Closure History has been prepared similar to the Compartment History of Working Plans. There are nine high protection closures created for securing the habitats of Panther. Active management of the administration is concentrated in and around these closures. The historical details in GT Map, Google Map of each closure and its proposed management are detailed in this chapter called Closure History.

In order to ensure continuity in management especially in the fields that require technical knowhow, Standard Operations Procedures have been prepared. This chapter has outlined the procedure to be adhered to while carrying out the various Annual operations of the Conservation Reserve.

A chapter on Basic Development Plan has been prepared to provide the villages and City people trapped around the Conservation Reserve with basic living conditions that include electricity, health and education services.

## ***Acknowledgement***

We are privileged to have this opportunity of working in the Baleshwar Conservation Reserve among the beautiful forest patches and local communities of Baleshwar Conservation Reserve (BCR). The preparation of the management plan has been an immense learning experience as the process of planning involved interactions with the local Panchayats of this CR, communities of the village and officials & staff of Forest Department. Discussions with different stakeholders was another dimension of learning since the land use of the area is complex and different departments have their unique responsibilities in managing different attributes of the landscape.

With increasing role of nature education and awareness creation among the public, Baleshwar Conservation Reserve has a crucial role to play in developing an eco-conscious new generation and protecting the hilly terrain land. It is this backdrop that this management plan has been developed. Many people from various capacities have contributed in preparation of this document by means of ideas and words.

The understanding of roles of major stakeholders of BCR gave us major insights about how the management planning has to be undertaken to secure the integrity of this ecosystem. This management plan is the outcome of efforts of a number of individuals. We would like to acknowledge our sincere gratitude to the following:

### **Forest Department:**

We sincerely thank Smt. Sikha Mehra, Principal Conservator of Forests and Chief Wildlife Warden, Rajasthan for his guidance and suggestions that helped in improving this plan. PCCF (Working Plan) gave very valuable suggestions in giving final shape to the draft and interpretation of various judgements of Hon'ble Supreme Court for which we are grateful.; We thank Shri Rajesh Gupta, Addl. Principal Conservator of Forests, Wildlife for being the guiding throughout the preparation of this plan. Shri Rajeev Chaturvedi, Chief Conservator of Forests IFS, CCF, Jaipur for his guidance, valuable suggestions and critical comments in finalizing the plan.

We are grateful to ACF Sikar & RFO, Neemkathana and RFO, Patan for surveys and other documents used in this plan. Along with the other office personals and field staff of the Baleshwar Conservation Reserve deserve special acknowledgement for their help in the collection and compilation of the information on the Conservation Reserve.

### **Stakeholders of BCR:**

Stakeholders for forest conservation include:

Governments: Ministries and agencies that manage forests, land, and water resources

Private sector: Companies that operate within or outside the forest landscape, and engage in the supply chains of forest-related products and services

Local people: Panchayat Pradhan; Panchayat Members; members of Self-Help Groups and residents of village of Ganwadi, Dokan, Patan, Gadrata villages who live around the forest and depend on its resources for sustenance.

Industrialists: Use forest products as raw materials for production

Conservationists: Enthusiasts for the conservation of wildlife and nature, Research Fellow;

Last but not the least, I would like to thank Shri Dadu Pariyavaran Sansthan, for their active discussions during problem analysis, objective setting and strategy formulation of the plan as well as the designing, formatting and writing of this document.

**Deputy Conservator of Forests  
Sikar**

**Baleshwar Conservation Reserve Neem ka Thana, Sikar**

## INDEX

| Topic                                                                                    | Page no. |
|------------------------------------------------------------------------------------------|----------|
| The Executive Summary                                                                    |          |
| Acknowledgement                                                                          |          |
| Content                                                                                  |          |
| Preamble / Introductory Chapter                                                          |          |
| The Protected Area: The Existing Situation                                               |          |
| <b>Chapter 1 Introduction and Background Information</b>                                 |          |
| 1.1 Name and Status of Constitution/Notification                                         |          |
| 1.2 Map of Conservation Reserve                                                          |          |
| 1.3 Location, Physical Boundaries, and Extent                                            |          |
| 1.4 Description of identified landscape                                                  |          |
| 1.5 Statement of Significance                                                            |          |
| <b>Chapter 2: Profile</b>                                                                |          |
| 2.1 General Information                                                                  |          |
| 2.2 Current Land Uses/Activities in the Area                                             |          |
| 2.3 Terrain Characteristics                                                              |          |
| 2.4 Water Resources (Wetlands, river systems, drainage)                                  |          |
| 2.5 Forest Types, and cover attributes                                                   |          |
| 2.6 Flora and Fauna                                                                      |          |
| 2.7 Corridor linkages                                                                    |          |
| 2.8 Socio- economic and Socio-cultural profile /Coastal and Island Community description |          |
| 2.9 Traditional and Indigenous Knowledge                                                 |          |
| <b>Chapter 3: Present management and practices</b>                                       |          |
| 3.1 Management History                                                                   |          |
| 3.2 Habitat Management and Protection                                                    |          |
| 3.3 Forest Resource dependency of local communities/Major Land use in larger landscape   |          |
| 3.4 Eco-Tourism and Interpretation                                                       |          |
| 3.5 Monitoring: Monitoring and Evaluation practices used in the CR to date               |          |
| 3.6 Administration and Organisation – Structure and Responsibilities Chapter             |          |
| <b>Chapter 4: Corridor status and functionality</b>                                      |          |
| 4.1 Types of corridor                                                                    |          |
| 4.2 Areas favouring only movement                                                        |          |
| 4.3 Areas favouring movement and short stay                                              |          |
| 4.4 Areas with potential for movement, stay and reproduction                             |          |
| <b>Chapter 5: Managerial strategy (corridor management) with thematic actions</b>        |          |
| 5.1 Action portfolio for maintaining functionality                                       |          |
| 5.2 Action portfolio for dealing with human-wildlife interface                           |          |
| 5.3 Action portfolio for active management                                               |          |
| <b>Chapter 6: Implementation strategy</b>                                                |          |
| 6.1 Inclusive management                                                                 |          |
| 6.1.1 Village cluster level micro planning                                               |          |
| 6.1.2 Actions                                                                            |          |
| 6.1.3 Agreed actions, quid-pro-quo                                                       |          |
| 6.1.4 PES: Community stewardship remuneration                                            |          |
| 6.2 Monitoring performance                                                               |          |
| 6.2.2 Monitoring and evaluation by the committee                                         |          |

|                                                                        |  |
|------------------------------------------------------------------------|--|
| <b>ANNEXURES</b>                                                       |  |
| 1. Annexure: I Flora                                                   |  |
| 2. Annexure: II Mammals, checklist of the birds, Checklist of reptiles |  |
| 3. Annexure: III Notification                                          |  |
| 4. Annexure: IV Area Statement                                         |  |



## PREAMBLE

This management plan has been prepared for the Baleshwar Conservation Reserve. The management plan is an overall monitoring tool, which is to be applied by the managers to ensure that the ecological integrity of the Conservation Reserve is preserved and that the balance between protection and wise use of resources is reasonable. It puts together the history and present management practices of the Conservation Reserve and future plans for improvement. It ensures continuity in the management of the Protected Area by prescribing goals to be accomplished and means of achieving them.

This management plan is for the period 2023-24 to 2032-33 and it prescribes the management strategies to be adopted for protection, maintenance and improvement of the unique ecological elements of Conservation Reserve for posterity. The prescriptions are based on the scientific analysis of field data, logical interpretation of the results, discussions with Stakeholders, field staff and academicians.

All existing guidelines for the preparation of a management plan have been incorporated to the best possible extent. Since the policies and priorities of management have undergone changes

with time, periodic review of this plan is proposed after five years.

Deputy Conservator of Forests  
Sikar

## LIST OF ABBREVIATIONS

|       |                                                                      |
|-------|----------------------------------------------------------------------|
| ACF   | Assistant Conservator of Forests                                     |
| APCCF | Additional Principal Chief Conservator of Forests                    |
| APO   | Annual Plan of Operation                                             |
| BCR   | Baleshwar Conservation Reserve                                       |
| BNHS  | Bombay Natural History Society                                       |
| BSR   | Basic Shedule of Rates                                               |
| CAMPA | Compensatory Afforestation Fund Management and Planning Authority    |
| CCF   | Chief Conservator of Forests                                         |
| CDH   | Conservation Development and Harvest                                 |
| CR    | Conservation Reserve                                                 |
| CR    | Community Reserve                                                    |
| CRPC  | Code of Criminal Procedure                                           |
| CSS   | Centrally Sponsored Schemes                                          |
| CUG   | Common User Group                                                    |
| CWLW  | Chief Wild Life Warden                                               |
| CWLW  | Chief Wildlife Warden                                                |
| DCF   | Deputy Conservator of Forests                                        |
| DFO   | Divisional Forest Officer                                            |
| DS    | Deciduous                                                            |
| EDC   | Ecological Development Committee                                     |
| EDC   | Eco-Development Committee                                            |
| FCC   | False Colour Composition                                             |
| GPS   | Global Positioning System                                            |
| HA.   | Hectare                                                              |
| HWC   | Human Wildlife Conflict                                              |
| IPC   | Indian Penal Code                                                    |
| IUCN  | International Union for Conservation of Nature and Natural Resources |
| IVRI  | Indian Veterinary Research Institute                                 |
| KADP  | Kandi Area Development Project                                       |
| LULC  | Land Use Land Cover                                                  |
| MDR   | Major District Road                                                  |
| NCR   | National Capital Region                                              |
| NGI   | Non-Governmental Individual                                          |
| NGO   | Non Government Organization                                          |
| NTFP  | Non Timber Forest Produce                                            |
| OBC   | Other Backward Caste                                                 |
| PA    | Protected Area                                                       |
| PIT   | Passive Integrated Transponder                                       |
| PRA   | Participatory Rural Appraisal                                        |
| PSC   | Planning Sub Committee                                               |
|       |                                                                      |
| PSCT  | Punjab Shivalik Conservation Trust                                   |
| RCC   | Reinforced Cement Concrete                                           |

|       |                                                     |
|-------|-----------------------------------------------------|
| RFO   | Range Forest Officer                                |
| RH    | Relative Humidity                                   |
| SC    | Scheduled Caste                                     |
| SHG   | Self Help Group                                     |
| SOP   | Standard Operation Procedure                        |
| SWOT  | Strengths Weaknesses Opportunities and Threats      |
| TESSA | Toolkit for Ecosystem Service Site-based Assessment |
| VFPMC | Village Forest Protection and Management Committee  |
| WHS   | Water Harvesting Structure                          |
| WII   | Wildlife Institute of India                         |
| WWF   | World Wide Fund                                     |

# Chapter 1

## Introduction and Background Information

### 1.1 Name and Status of Constitution/Notification

#### 1.1.1. Name

This plan is proposed for the "Baleshwar Conservation Reserve", Sikar Rajasthan, notified vide notification dated 08 September 2023 by Government of Rajasthan. The name Baleshwar based on Baleshwar Dham, People from all over the country come to visit Baleshwar Dham in Neemkathana, know the importance of this Dham. Baleshwar Dham is a pilgrimage site, located in the valleys of Aravali, is famous for its natural as well as religious importance. Apart from Rajasthan, Haryana, Punjab, devotees from all over the country come here. In the month of Sawan, about two lakh devotees come to visit Mahadev.

#### 1.1.2. Constitution

The land of Ganwari, Dokan, Patan and Gadrata Forest Blocks was declared 'Protected Forest' in 1964. The Forest Department has issued a notification declaring a new Conservation Reserve by combining Neemkathana and Patan Protected Forest Blocks named Baleshwar Conservation Reserve. Protected forest blocks in Neemkathana and Patan tehsils have been included in the Conservation Reserve.

After consultation with the local communities, the state government has declared it a conservation reserve keeping in mind the faunal, botanical, geological, natural and zoological importance. The forest department has been preparing for a long time to develop Baleshwar as a leopard conservation reserve. A proposal regarding this was sent to the state government in 2017.

This area has now been declared as Baleshwar Conservation Reserve under the section 36-A of Wild Life Protection Act 1972, vide notification No. प.एफ.न.3 (03) वन / 2023 जयपुर dated 08.09.2023.(Anx-1)

## **1.3 Location, Physical Boundaries, and Extent**

### **Location**

This Conservation reserve is situated between 27°36' to 27°52' North latitude and 75° 51' to 76° 01' East longitudes. Nearest Railway Station is Neem Ka Thana located at 15 km towards the South-east and nearest airport is Jaipur about 125 km.

### **Boundaries of the reserve are as follows:-**

The Forest Department has included the forest land of Gaondi, Gadrata, Dokan and Patan. The department has named it Baleshwar Conservation Reserve. Its northern boundary will be the northern boundary of Forest Block Dokan. The southern boundary will be the southern boundary of Forest Block Gaondi. The eastern boundary will be the eastern boundary of Forest Block Gadrata and the western boundary will be the western boundary of village Ganeshwar of Forest Block Gaondi.

**Northern Boundary - Northern Boundary of Dokan Block**

**Southern Boundary - Southern Boundary of Gaondi Block**

**Eastern Boundary - Eastern Boundary of Gadrata Block**

**Western Boundary - Western Boundary of Ganwari Block**

The legal status of the area is Protected Forests and is characterized by numerous hillocks, streams, sand dunes and flat areas. Villages like Nimod, Dokan, Ganwari, Dariba, Kundala, Jharinda, Toda, Ladi Ka Bas, Jilo, Raila, Ghasipura, Ganeshwar, Moklawas, Shyampura.

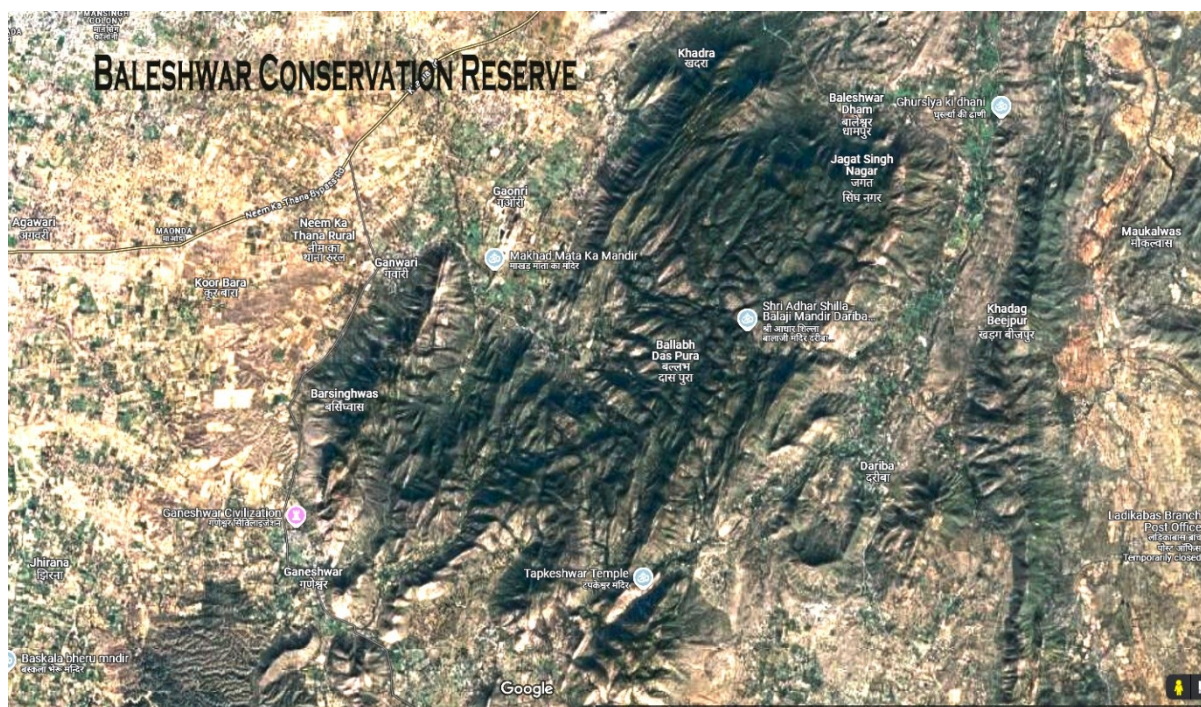
### **1.1.4. Extent**

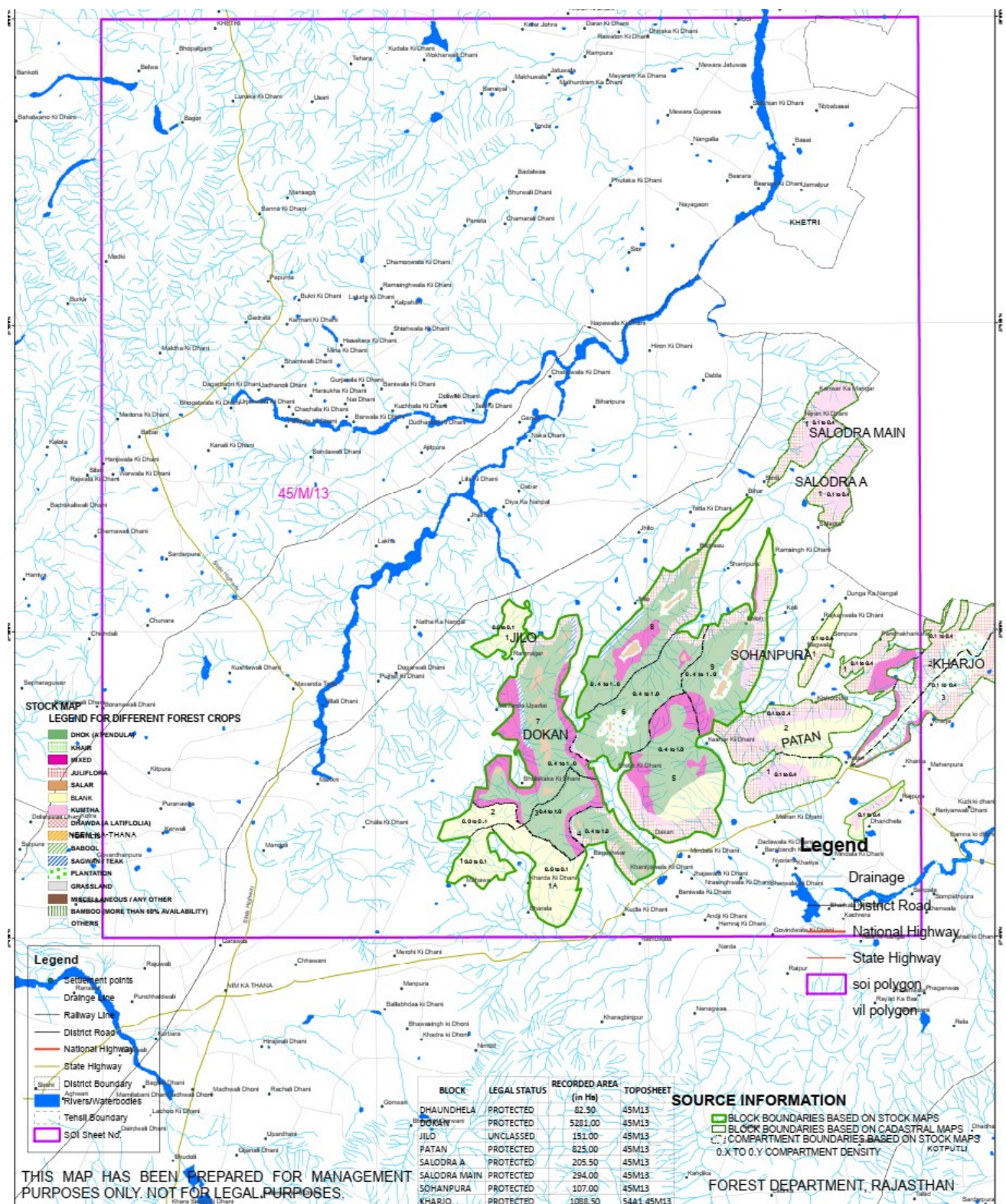
Area of Baleshwar Conservation Reserve (BCR) is 22169.05 Ha and the entire area falls in the Neem ka Thana District. 11778.25 hectares of land of Gaondi Forest Block of Neemkathana and 730.60 hectares of land of Dokan Forest Block have been included in the Baleshwar Conservation Reserve area.

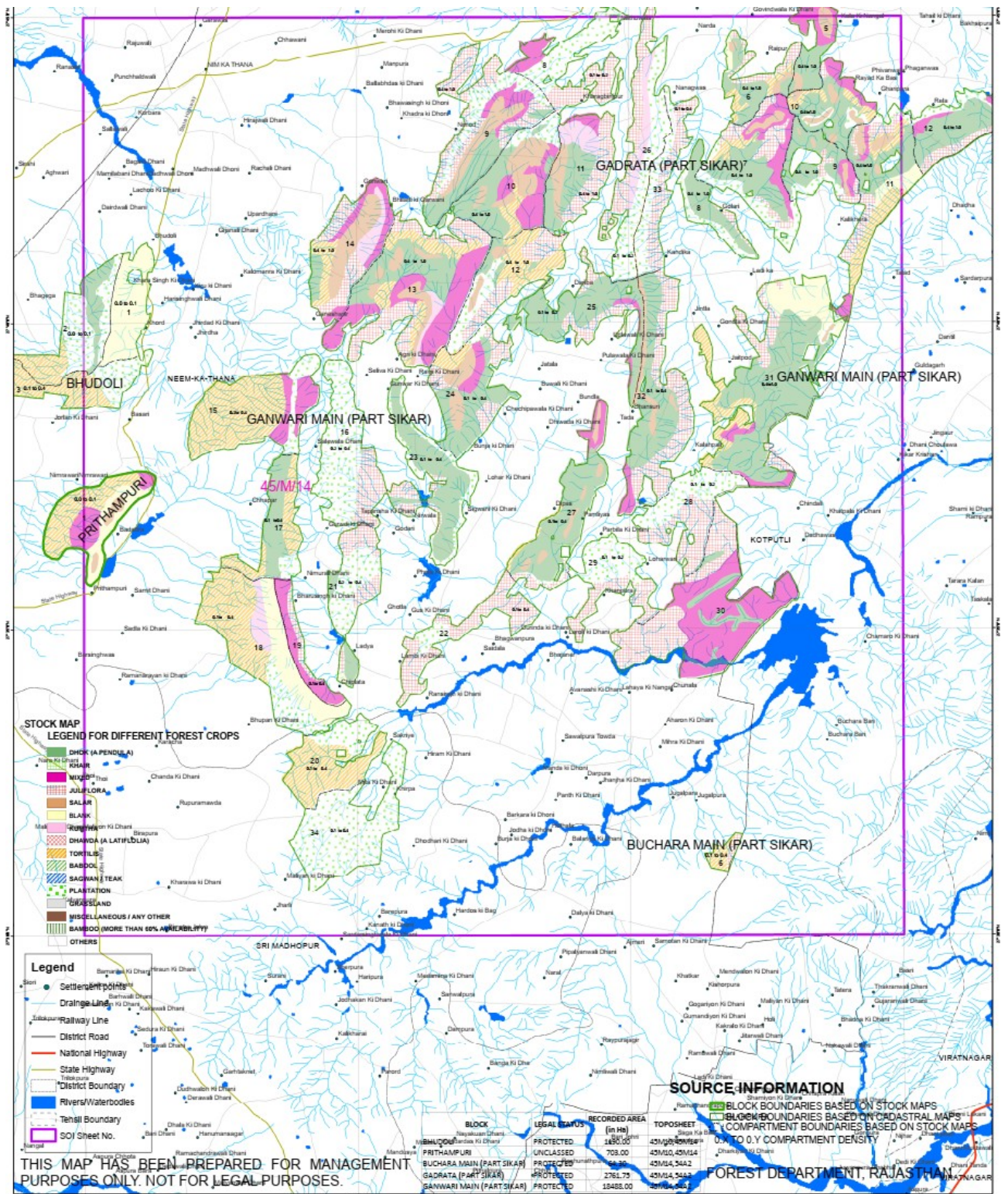
Patan's Gaonwadi forest block of 1523.5 hectares, Dokan's 4550.40 hectares, Patan's 825 hectares and Gadrata's 2761.75 hectares have been included.

#### 1.4 Indicative map to depict connectivity with other PAs, CRs, biodiversity rich sites

This Reserve can be approached by both railway and road from places like Neem Ka Thana, Sikar and Jhunjhunu. The nearest Railway Station is Neem Ka Thana situated approx 15 km distance. The nearest airport is at Jaipur which is approximately 125 km away.







## 1.5. STATEMENT OF SIGNIFICANCE

### 1.5.1. Unique habitat values

The landscape is characterised by hilly terrain with scattered trees of *Anogeisuss pendula* (Dhonk), *Boswellia serrata* (Salar), *Prosopis juliflora* (Vilayatibabool) and *Acacia senegal* (Kumta) and undulating flat areas of grass lands.

### 1.5.2. Unique biodiversity values

During the present time, the rapid destruction of natural ecosystem is the most serious threat for the survival of plants and other natural resources. Many activities of human societies are responsible for the degradation of the environment. Our use of natural resources has grown dramatically, particularly since the mid-20<sup>th</sup> century, so that we are endangering the key environmental systems that we rely upon. Threats to the species are principally due to a decline in the areas and quality of their habitats.

Loss of biodiversity may trigger large unpredictable change in an ecosystem. It is mainly due to habitat destruction, over exploitation of biological resources, pollution and introduction of exotic plants and animals. There are other reasons also for significant depletion of biodiversity. Prominent among them are the expansion of agriculture and industries, urbanization, road construction and large scale developmental projects. Excessive and uncontrolled biotic interferences also resulted in depletion of biodiversity. It has been estimated that 140 species of plants, animals and microbes are lost every day from earth. Rapid destruction of forest is the main cause for loss of biodiversity on land.

The world conservation strategy (IUCN, UNEP and WWF, 1980) defines conservation as “the management of human use of biodiversity so that it may yield the greatest sustainable benefit to present generation while maintaining its potential to meet the needs and aspirations of future generations.” The above definition invokes two complementary components “Conservation and Sustainability”. The creation of protected area network helps to reduce biodiversity loss and provides significant contributions to global conservation efforts.

According to Champion and Seth (1968) classification, the vegetation falls under Tropical dry deciduous Forests, Northern Tropical dry deciduous Forest, Dry deciduous scrub Forests, Desert Thorn Forests, Desert dune Forests, Tropical thorn Forests. Most of the undisturbed areas are covered by Dhonk, Salar, Kumta, Khejdi (*Prosopis cineraria*), Babul (*Acacia*

*nilotica*), Guggal (*Commiphora* spp) and Khirni (*Wrightia tinctoria*). 21 species of mammals, 85 Birds, 29 species of reptiles and 4 species of amphibian are found in this Reserve.



### **1.5.3. Demographic uniqueness**

Sikar city has a population of about 237,579 according to the provisional Census report of India, in 2011; out of which male and female are 123156 and 114423 respectively. The sex ratio of Sikar city is 929 per 1000 males. In education section, total literates in Sikar city are 158413 of which 91403 are males while 67010 are females. Average literacy rate of Sikar city is 77.13 percent of which male and female literacy was 86.29 and 67.37 percent respectively. Total children age group (0-6) in Sikar city are 32189 as per figure from Census India report on 2011. There were 17236 boys while 14953 are girls. Child sex ratio of girls is 868 per 1000 boys.

## **Neem-Ka-Thana Town Population Census 2011 – 2024**

Neem-Ka-Thana is a Municipality city in district of Sikar, Rajasthan. The Neem-Ka-Thana city is divided into 25 wards for which elections are held every 5 years. The Neem-Ka-Thana Municipality has population of 36,231 of which 19,065 are males while 17,166 are females as per report released by Census India 2011.

Population of Children with age of 0-6 is 4627 which is 12.77 % of total population of Neem-Ka-Thana (M). In Neem-Ka-Thana Municipality, Female Sex Ratio is of 900 against state average of 928. Moreover Child Sex Ratio in Neem-Ka-Thana is around 785 compared to Rajasthan state average of 888. Literacy rate of Neem-Ka-Thana city is 82.32 % higher than state average of 66.11 %. In Neem-Ka-Thana, Male literacy is around 91.86 % while female literacy rate is 71.93 %.

Neem-Ka-Thana Municipality has total administration over 6,202 houses to which it supplies basic amenities like water and sewerage. It is also authorize to build roads within Municipality limits and impose taxes on properties coming under its jurisdiction.

### **Neem-Ka-Thana 2024 Population**

Current estimated population of Neem-Ka-Thana Municipality in 2024 is approximately 50,000. The schedule census of 2021 for Neem-Ka-Thana city is postponed due to covid. We believe new population census for Neem-Ka-Thana city will be conducted in 2024 and same will be updated once its done. The current data for Neem-Ka-Thana town are estimated only but all 2011 figures are accurate.

### **Neem-Ka-Thana Caste Factor**

Schedule Caste (SC) constitutes 18.33 % while Schedule Tribe (ST) are 4.81 % of total population in Neem-Ka-Thana (M).

### **Neem-Ka-Thana Work Profile**

Out of total population, 9,626 were engaged in work or business activity. Of this 8,580 are males while 1,046 are females. In census survey, worker is defined as person who does business, job, service, and cultivator and labour activity. Of total 9626 working population, 91.32 % were engaged in Main Work while 8.68 % of total workers were engaged in Marginal Work.

#### Neem-Ka-Thana Population Religion Data

| Religion    | Percentage |
|-------------|------------|
| Hindu       | 93.63%     |
| Muslim      | 6.17%      |
| Christian   | 0.10%      |
| Sikh        | 0.02%      |
| Buddhist    | 0.00%      |
| Jain        | 0.02%      |
| Others      | 0.00%      |
| No Religion | 0.06%      |

#### 1.5.4. Tourism importance

This area is very important from the tourism point of view. There are many tourist places here, some of the major ones are:

##### **Ganeshwar**

A major tourist attraction and picnic spot of Sikar region. There are remains of civilizations settled here about four thousand years ago. Ganeshwar civilization is said to be the mother of the Copper Age civilization.

##### **Forts**

The forts of Neemkathana and Sikar have played an important role in shaping the history of this region. Each fort has its own unique story.

Some more special Tourism places are:

- Sikar Fort
- Sai Dham (Mundwara)
- Madho Niwas Kothi
- Radha Damodar Mandir
- Bolta Balaji mandir
- Rani Mahal
- Devi Pura Balaji
- Santoshi Mata Mandir
- Maroo Park
- Nehru Park
- Ganesh Mandir, Fatehpuri Gate
- Temple of Gopinathji, Subhash Chowk
- Diwan Ji Ki Nashiya, Jatiya Bazar
- Diwan Ji ki Haveli
- Shobhagyavati mandir
- Shri Ram Hanuman mandir (Radha kishan pura Sikar)
- Harsh Mount
- Jeen Mata Temple

### 1.5.5. Pilgrimage importance

People from all over the country come to visit Baleshwar Dham in Neemkathana, know the importance of this Dham. Sikar's Baleshwar Dham pilgrimage site, located in the valleys of Aravali, is famous for its natural as well as religious importance. Apart from Rajasthan, Haryana, Punjab, devotees from all over the country come here. In the month of Sawan, about two lakh devotees come to visit Mahadev. Know the history and importance of the pilgrimage site below.

The famous Baleshwar Dham of the district is located 15 km from Neemkathana. In the deep valleys of the Aravalli mountain range in the eastern direction, there is a wonderful great pilgrimage of spiritual faith with archaeological importance, which is famous by the name of Swayambhu Baleshwar Mahadev. Since ancient times, the child form of Adidev Swayambhu Lord Shiva has been recognized as a huge Shivalinga here. Throughout the year, the huge Shivalinga of the child form of Shiva attracts the devout Shiva devotees and has the power to fulfill all their wishes. It is a popular belief that Baleshwar Mahadev is a self-manifested Shivalinga, that is, he himself appeared by tearing the chest of the earth. In the month of Sawan, the hills remain covered with greenery. The famous Mahadev temple of the pilgrimage center Baleshwar is located in the foothills of the hill. Apart from Rajasthan, Haryana, Punjab, devotees from all over the country come here. In the month of Sawan, about two lakh devotees come to see Mahadev.

An inscription written in Prakrit language is found below the Ganesh idol on the northern wall of the temple complex, which praises the antiquity and grandeur of this place. Thousands of years ago, Suryavanshi kings had built a huge Shiva temple on this fertile rocky holy land surrounded by water sources to protect this Swayambhu Linga, which was recognized as a pilgrimage center in the whole of India. Over time, this center of faith fell prey to natural disasters and atrocities by terrorists. Yet, the statue has not suffered any damage till date. It has been the family deity of many tribal communities along with the Patan royal family. Even today, the supernatural image of the worldly faith of all sections of the region along with the Patan royal court can be seen towards this place. The fragrant breeze of Rudra Sukta and Mahamrityunjaya Mantra from the mouth of Vedic Brahmins in groups can be experienced all year round.

Earlier, there was another popular belief that the cows, which were not milked by the tribal shepherds, themselves used to perform milk Abhishek of the child form of Shiva. From the leaf sheds, a small hut was built and sixty years ago, the small hut was again

converted into a temple complex. Ten years ago, a family of Shiv devotees residing in Delhi had again renovated the temple, at that time, after digging the foundation to a depth of fifteen-twenty feet, we had the good fortune and opportunity to see the infinite length and height of this self-created Linga, Baleshwar in child form and the size of the largest form. Hari Anant Hari Katha Ananta. Here, the daily Abhishekam of the self-manifested Shivling with water streams, accompanied by chants of Om Namah Shivay, Har-Har Mahadev, Jai Bholenath, Bam-Bam, Jai Baleshwar Nath, Jai Baleshwar Baba etc., captivates the mind and fills the devotees with Bhakti Ganga.

People also say that in the Mahadev temple of Baleshwar, devotees see the child form of God. There is a fig tree just behind the temple. This is of the time when they started worshipping the Shivling. Water seeps from the hill through the roots of the fig tree and collects in the pit. Elders say that bathing with the water collected under the fig tree cures diseases. It is also interesting that only one and a half feet of water collects under the tree, neither more nor less, while devotees bathe here throughout the day. There is also a pond built here, it is used to have water earlier, but it got damaged.



## DESCRIPTION OF LANDSCAPE

This Conservation reserve is located in the semi-arid area of the State. Terrain is mostly undulating with the highest point standing at 792 meter from mean sea level. Annual variation in temperature is quite high. In summers, the temperature soars to 44 °C and in winters it drops to near about 4 °C to 0°C. The villagers around the conservation reserve cultivate Bajra, Wheat, Barley, Mustard, some Pulses etc. on their land. In spite of the absence of any perennial streams and river around the area, Communities living around the conservation reserve are known for sheer brilliance of their acumen in water engineering. They knew the art of growing water intensive crop like Wheat, Barley, Gram, Mustard etc. in this semi arid area through water harvesting practices.



## CHAPTER 2

### PROFILE

#### 2.1 General Information

The native flora and fauna have adapted themselves to survive in the harsh living conditions. The man, through his long association with the area has evolved several cultural practices, not seen in other parts of India. Several breeds of domestic livestock and crops have adapted to live in these conditions. There has been tremendous growth in human and animal populations and intensive development activities that are not ecologically desirable.

In order to protect a representative ecosystem and its wildlife, the characteristics of the area and with human population and where the wildlife could be allowed to flourish.

#### BOUNDARIES

The conservation reserve is situated in Neemkathana & Patan tehsil with villages like Nimod, Dokan, Ganwari, Dariba, Kundala, Jharinda, Toda, Ladi Ka Bas, Jilo, Raila, Ghasipura, Ganeshwar, Moklawas, Shyampura etc. located inside and outer boundaries.

Boundaries of the reserve are as follows:-

Northern Boundary - Northern Boundary of Dokan Block

Southern Boundary - Southern Boundary of Ganwari Block

Eastern Boundary - Eastern Boundary of Gadrata Block

Western Boundary - Western Boundary of Ganwari Block

Area is open and internal boundaries are required to control the grazing only.

#### 2.2 Current Land Uses/Activities in the Area

##### Land-Use Pattern

Sikar district provides the livelihood to maximum number of people in the district. To assess its industrial potential, it would be worthwhile to explore the land-use pattern, irrigation

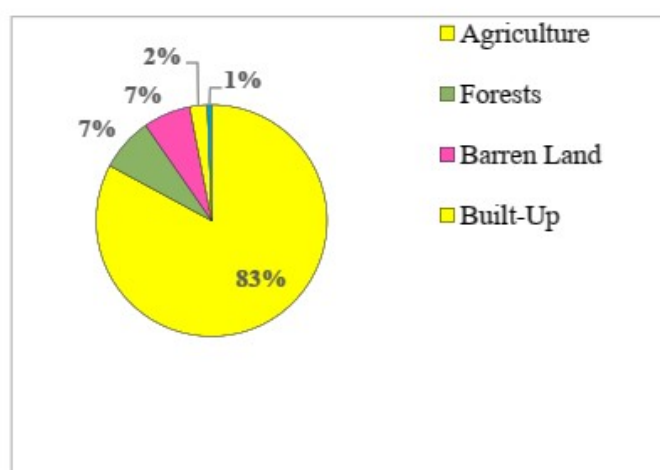
facilities, crops, livestock, dairy, cattle development, etc. This will provide a broad spectrum of resources inventory and resource base on which foundation of industrial growth are generally laid down.

#### Classification of Land Use for Sikar District

| Sr.no.             | Classification                                                                       | Area in Hectare |
|--------------------|--------------------------------------------------------------------------------------|-----------------|
| 01.                | Forest                                                                               | 63951.922       |
| 02.                | Land put to non-agriculture                                                          | 52864           |
| 03.                | Other uncultivated<br>a) permanent pastures<br>b) land under miscellaneous tree crop | 40529<br>88     |
| 04.                | Culturable waste fallow land                                                         | 9581            |
| 05.                | Net area sown                                                                        | 522857          |
| 06                 | Total geographical area                                                              | 774244          |
| 07.                | Double cropped area                                                                  | 220109          |
| Total Cropped area |                                                                                      | 1684040         |

#### Land Utilization Pattern

Land form, slope, soil typology and availability of natural resources are the important factors which direct the land utilization pattern of a settlement. The most dominant land use in district is agriculture which encompasses 83 percent (6928.83 sq.km.) of TGA. Sub-class Cropland is the most dominant in agriculture class and it covers approximately 3580.73 sq. km. of TGA as represented in (ISRO, 2020)

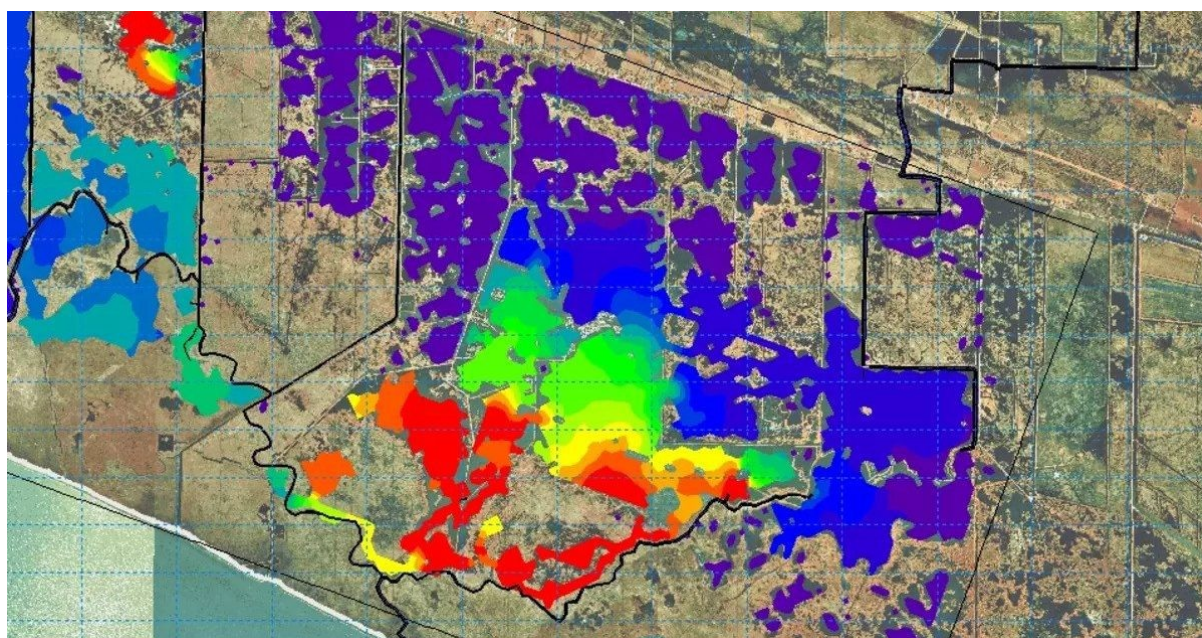


With significant differences in percentage, forest class stands second after agriculture and it encompasses approximately 624.27 Sq. Km. Barren land and Built-up classes of land use

cover

553.84 and 204.8 Sq. Km. In built-up class, rural sub-class is most prominent in the district with approximately 70% (142.61 Sq. Km) of total built-up area. Only 1% of TGA is comprised of water bodies and wetlands

| <b>Land Use Classes / Year</b> | <b>2005-06</b> | <b>2011-12</b> | <b>2015-16</b> |
|--------------------------------|----------------|----------------|----------------|
| Agriculture                    | 6926.64        | 6299.59        | 6928.86        |
| Barren                         | 827.84         | 554.9          | 553.84         |
| Built-Up                       | 156.71         | 202.75         | 204.88         |
| Forests                        | 672.64         | 625.25         | 624.27         |
| Water-Bodies                   | 45.09          | 49.18          | 50             |



## Land use mapping

### 2.3 TERRAIN CHARACTERISTICS

#### TOPOGRAPHY

##### 2.3.1 Landforms:

This area is mainly covered by the Aravalli mountain ranges which appear to be crossing each other and rising in the southern and eastern parts in the form of small and large mountain ranges. The highest Aravalli peak in this area is Harsh Shikhar whose height is 913 meters above mean sea level.

The northern and western parts are situated in the Thar Desert and are completely desert. The eastern part is semi-desert as well as hilly area. The plain area is mainly the south-eastern part. The lacks rivers flowing throughout the year.

In the lower land, a series of hills can be seen mainly towards the north-eastern part. These mainly include the Aravalli and Delhi region system hills which are mainly quartzite, dolomite, gneiss, magmatite, phyllite, granite, pegmatite, marble and rhizolite. Most of the hills are treeless and the growth of trees is very low. On those hills which are situated away from the pressure of population, a good root stock of Dhauk, Kumtha, Salar, Dhak etc. is still present. There are some forest blocks in Sikar forest division where density of vegetation is found.

Generally, drainage of rainwater is good in This area and among the seasonal rivers, Kattli river flows in the eastern part of the district, which after flowing for some distance merges with other streams and disappears in the desert. Apart from this, Shobhavati river flows in the eastern part of Sikar range area which is completely a seasonal river and flows for a few days only in the year when there is good rainfall. Apart from the above rivers, small streams also emerge from these mountain ranges which disappear in the desert. Some forest blocks situated on the border of Jaipur district, half of which is located in Jaipur district, form the catchment area of Sahibi River.

Apart from this, most of the area is desert and semi-desert. Where the main source of water is underground water. In the plains, irrigation is done from underground water only. There is no lake or pond in the district for continuous availability of water. Since the recharge of water sources depends only on rain water. Therefore, the water level goes down in summer and the level of wells is gradually returning to normal level and going down every year.

Due to uncontrolled drainage of rain water, very deep ditches and lanes are formed on the sides of drains. Due to which large caves have been formed at many places. Due to soil erosion due to high velocity of water, trees get uprooted. Due to soil erosion, local farmers and their fields are also in danger and farmers are also promoting this erosion further by not using agricultural methods on the principle of watershed development.

## 2.3.2. Geology, Rocks and Soil:

### 2.3.2.1 Geology and Rocks:

The Aravalli and Pre Aravalli rock systems in the region are one of the oldest systems. Which is 2500 crore years old. The Delhi system and post Delhi system are mainly as follows-

S. No. System series Types of rocks

1 New and sub-new Layers of alluvium, aeolian sand

2 Post Delhi - Granite, amphibolite, pegmatite

3 Delhi mountain range Ajabgarh Phyllite, marble, quartzite

4 Pre-Aravalli and Aravalli mountain range Alwar Granite, gneiss, schist, magmatite

The Aravalli range extending from north-east to south-west direction in Rajasthan is considered to be the oldest folded range of the world which still exists in the form of ranges. This mountain range was mostly levelled during the Paleozoic period, and later restored during the Mesozoic period and the effect of this uplift is manifest in exceptionally sharp local bends and faults along the Great Boundary Fault, which is traced for about 480 km.

Across the Aravalli range, great variations are observed in the degree of metamorphism of the three systems which constitute the Aravallis, namely the Aravallis, the Rhyolas and the Delhi. The Aravalli System and the two Proto-Aravalli Groups, namely the Bendandanesi Complex and the Bundelkhand Gneiss, are older than the Aravallis, which impose a clear erosional unconformity on them. The junction of the two Proto-Aravalli Groups is hidden at great depths and the relationship between the two is not clear. Nevertheless it can certainly be said that the Bendeganisi Complex and Bundelkhand Gneiss are the oldest rocks in India on which the Aravallis and subsequent rock formations and structures are formed. Rajasthan Geological sequence is a very complex rock formation in a solid geological structure.

The Aravalli Group extends up to a depth of 3000 m and mainly consists of quartzite, conglomerates, shales, phyllites, mixed gneiss.

There is a large thickness of argillaceous gneiss in the Aravalli Group. Metamorphism has taken place in these rock formations and it is clearly marked from east to west. In the east you find gneiss and towards the west you pass through slates, phyllites and fine mica schists with garnet and magnetite. In some areas there has been alteration with acidic granite resulting in

mixed gneiss. Generally it is observed that igneous intrusions other than white quartz veins are not particularly common in the

### **The Aravalli**

The northern exposures of the Aravallis are found in South Alwar. The bedrocks occur as anomalies which are irregular and extend southwestwards to the plains of Gujarat. They cover a large part of Mewar and Ajmer-Merwara. Where they are interrupted by irregular anomalies of the full-Aravalli gneiss. The other rocks of the sequence are mainly arkose grit and quartzites which represent the basal beds. The Bundelkhand gneiss or gneiss mixtures with an eroded anomaly configuration are overlying the Bundelkhand gneiss or gneiss mixture. Intercalations of granitic material are also seen in the crystalline and mixed gneiss. Gneiss is extensively developed in this group and its various types characterise the group.

The Raylo range is found in the lower middle part of Aravalli and is covered by Delhi Group. The confluence of both the examples is marked by erosional anomalies. Raylo has been separated from Delhi Group and included in a separate range. Generally white and crystalline limestone of average thickness of about 612 meters forms the main rock of this range. Marble deposits of Makrana (Nagaur) and Andhi (Jaipur) Tahla (Alwar) area in Rajasthan fall in the Raylo range.

A very variegated type of limestone is found in almost complete sequence near Ras in the south-west. The rocks are expressed for about 80 kilometers in a width of about 1.6 kilometers. The main varieties are: - crude white calcite, marble, diopside and white mica interlayered with fine blue-grey sandy limestone.

The older rocks of Rajasthan have undergone more intense folding and igneous differentiation and these rocks differ from the rocks of the same age in other parts of India in these characteristics. In Rajasthan, they are known as Delhi Group. There is no heterogeneity local between Delhi and Aravalli Group. It is found in the north-east from Alwar and in the south-west. Delhi is situated on sediments, Aravalli Schist or Pro-Aravalli gneiss and granite.

The distribution of the above rock groups between Ajabgarh and Alwar range is according to the succession in Jaipur and Alwar. The Alwar range is not uniform in its entire structure and is well developed in north-south whereas it almost disappears in the middle. In the southern part of the contour where the Delhi range is on the Aravallis, it is fine grained quartzite rocks with intercalations of biotite schist.

In the lower part of the Ajabgarh Range a large thickness of biotite schists intercalated with pegmatites and aplites occurs in large walls and veins. The least metamorphic state observed in these rocks is that of phyllites. A mixed gneiss fractionation

from phyllites and biotite schists is also observed. These large-scale facies of pegmatites and aplites are formed due to the alternation of dark silicates like calc-schist banded and flagellated helices, banding, and yellow silicates like biotite and entonite with yellow silicates like diopside, dimolite and feldspar.

The Delhi is interpenetrated by slabs and walls. In the south, siliceous biotite limestone forms a long plateau which starts near Beawar and extends to Mewar in the south-west. The Delhi rocks are comparatively thinner and less metamorphosed in Mewar.

### **2.3.2.2 Soil**

The plains have loamy and hard clay soil, some area mainly have hard clay soil with boulders in the Terai region of the Aravali range, loamy soil and sand dunes in the desert region and gravelly soil in the river ghats and at many places there is hard soil with pebbles and gravels. In this area, according to the nature of this soil, Rebains (caves) are formed and in the desert area of Panchayat Samiti Ghoud, there is sand soil, loamy soil and hard clay soil and in some areas where there are hills of Aravali range, hard, clay soil with boulders is also found.

#### **Soil fertility and crops:**

The amount of nutrients (Nitrogen/Phosphorus/Potash) in the soil of this area is not the same. Generally, nitrogen is available in very less quantity in the soil. Whereas the availability of potash is medium and phosphorus is found in medium to high quantity. Phosphorus is found in high quantity in the soil of many of this area.

The fertility of the land also keeps changing with time. To maintain the fertility in this soil, artificial nitrogen fertilizer has to be given in the form of chemical fertilizer. Fertilizers giving potash will also be required in the soil. It is necessary to maintain the fertility of the land at a proper level by artificially fulfilling the deficiency and excess of nutrients so that the production can be continuously increased in a proper amount from the land. Millet is the main agricultural input in the Neemkathana, but wheat is the main crop grown mainly in Neemkathana.

### **2.3.2.3 Mineral sources:**

Many types of important mineral wealth are found in Sikar district, the sale of which gives the state a lot of revenue every year. According to the information received from the Mineral Department, the following types of minerals are found:-

**(a) Major minerals:**

- (1) Feldspar
- (2) Quartz
- (3) Limestone
- (4) Dolomite
- (5) Calcite
- (6) Silica sand
- (7) Iron
- (8) Uranium

**(b) Minor minerals:**

- (1) Masonry stone
- (2) Limestone (burning)
- (3) Marble
- (4) Brick clay
- (5) Kankar clay
- (6) Granite
- (7) Quartzite
- (8) Fuller's earth

In the tests conducted by the Geological Survey of India, many types of minerals have been discovered

- (1) Dolomite - Dolomite is found in large quantities in Neemka Thana and Patan.
- (2) Feldspar - Located around Dudawas and Haridas Ka Bas of the district.
- (3) Iron - Deposits of iron ore are found at places like Narada, Manovas, Wagoli and Sarai of the district.
- (4) Silica Sand - The main sources of silica sand (clay) are sandstone, quartzite, pegmatite veins etc. According to the survey report of GSI in the year 1992-93 and 1993-94, silica is present in Sikar district.
- (5) Uranium - Uranium is present in the explorations done by GSI in Khandela and Ghateshwar areas.
- (6) Marble - It is also found in abundance in Maanda, Patan and Neem Ka Thana ranges of the district.

(7) Limestone - Limestone having cement like properties is found in abundance in the areas around Neem Ka Thana, Maonda, Jhamas, Raipur and Balupur in the district.

(8) Granite - Granite of Sikar district is of good quality. Ajitgarh-Grey and Ajitgarh-White are famous varieties. Its main places of availability are Dabla, Jeetala, Khakhipur, Ajitgarh, Jatpura, Siroli, Saladipur etc.

(9) Copper - Baleshwar copper deposit discovered by GSI is located 10 km east of Neem Ka Thana railway station.

(10) Cheja stone - Cheja stone is the last mineral but is not less important than any other mineral. It is mined on almost all the hills of the district. In the past years, excessive exploitation/mining has taken place due to its extensive use in the construction work of the city, which was further accelerated due to the growing expansion of the city, but after the Supreme Court passed an order dated 12.12.1996 to immediately stop non-forestry activities in forest areas, keeping in view the importance of environment, mining operations have been stopped at most of the sites (in forest areas). The state is getting good revenue from Cheja stone.

### **2.3.3 TERRAIN:**

The conservation area is a hilly terrain. Its topography is divided in breakable. After rainy season this area is converted into grassland and vegetative growth.

### **2.3.4 Climate:**

The climate of this region in eastern Rajasthan is very hot with hot summers, scanty rainfall and short winters. According to meteorologists, the climate falls under the semi-arid climate zone. Mainly the seasons are divided as follows:-

1. Autumn
2. Summer
3. South-west monsoon
4. Retreating monsoon season

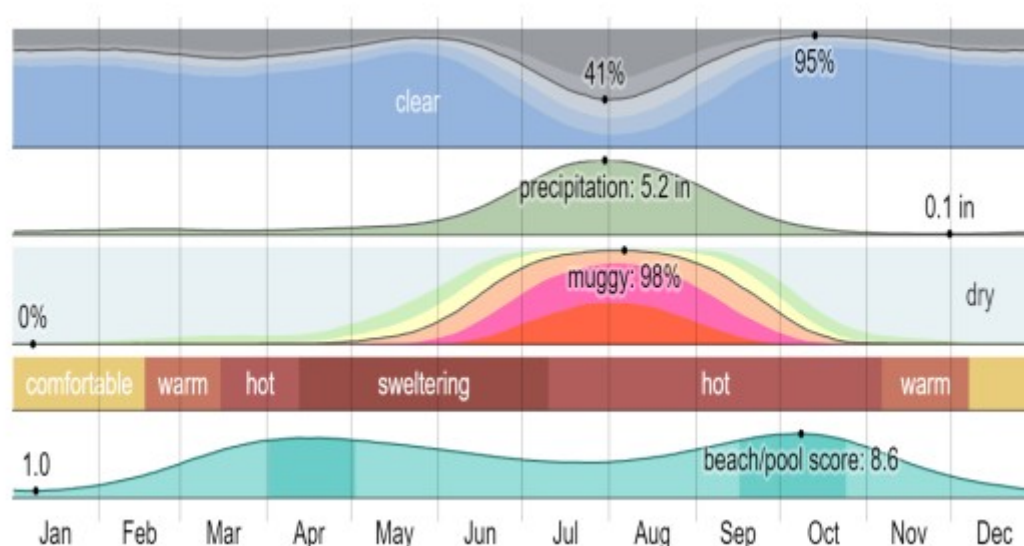
But according to ancient Indian knowledge (Hindi Samvatsara) the year is divided into seasonal cycles of 2 months each as follows.

| Sr. No. | Season | Months as per Indian Calendar<br>(Samvatsara) | Months as per<br>English Calendar |
|---------|--------|-----------------------------------------------|-----------------------------------|
|         |        |                                               |                                   |

|   |        |                    |                   |
|---|--------|--------------------|-------------------|
| 1 | Spring | Chaitra-Baisaakh   | March-April       |
| 2 | Summer | Jyestha-Ashadha    | May-June          |
| 3 | Rain   | Shravan-Bhadrapada | July-August       |
| 4 | Autumn | Ashwin-Kartik      | September-October |
| 5 | Hemant | Margashirsha-Paush | November-December |
| 6 | Winter | Magh-Phalgun       | January-February  |

In Neem Ka Thana Range, the wet season is hot, muggy, and partly cloudy and the dry season is warm and mostly clear. Over the course of the year, the temperature typically varies from 47°F or above 109°F.

The best time of year to visit Neem Ka Thana Range for hot-weather activities are from early April to early May and from mid-September to late October



The hot season lasts for 2.7 months, from April 1 to July 5, with an average daily high temperature above 96°F. The hottest month of the year in Neem Ka Thana Range is June, with an average high of 101°F and low of 82°F.

The cool season lasts for 2.4 months, from December 6 to February 17, with an average daily high temperature below 75°F. The coldest month of the year in Neem Ka Thana Range is January, with an average low of 48°F and high of 69°F.

### 2.3.4.1 Clouds:

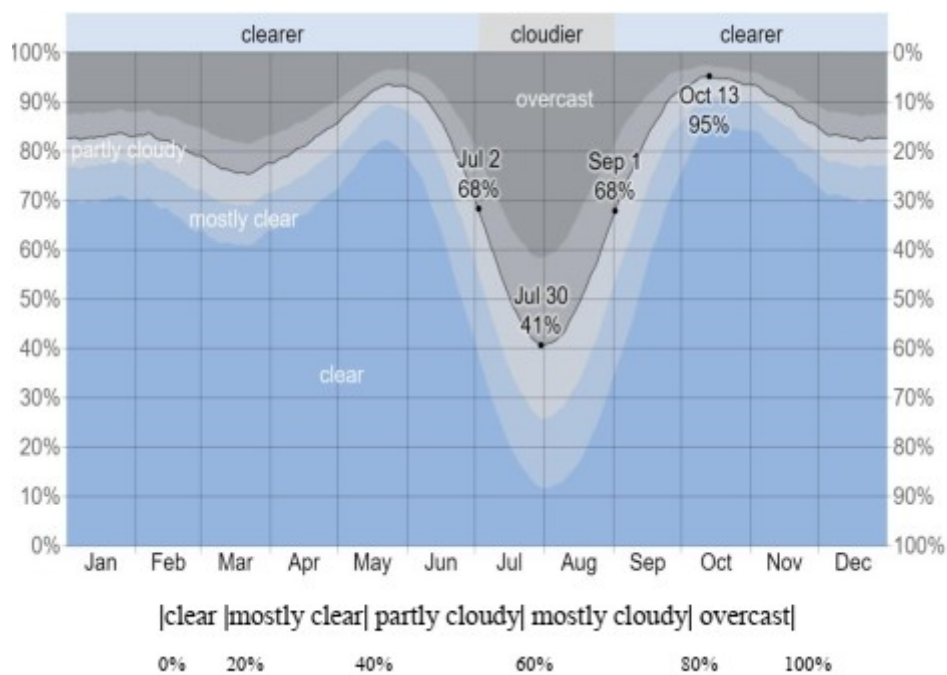
In Neem Ka Thana Range, the average percentage of the sky covered by clouds experiences extreme seasonal variation over the course of the year.

The clearer part of the year in Neem Ka Thana Range begins around September 1 and lasts for 10 months, ending around July 2.

The clearest month of the year in Neem Ka Thana is October, during which on average the sky is clear, mostly clear, or partly cloudy 94% of the time.

The cloudiest part of the year begins around July 2 and lasts for 2 months, ending around September 1.

The cloudiest month of the year in Neem Ka Thana Range is August, during which on average the sky is overcast or mostly cloudy 49% of the time.



| Fraction | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Cloudier | 17% | 18% | 23% | 19% | 9%  | 15% | 48% | 49% | 18% | 6%  | 11% | 17% |
| Clearer  | 83% | 82% | 77% | 81% | 91% | 85% | 52% | 51% | 82% | 94% | 89% | 83% |

### 2.3.4.2 Precipitation:

A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Neem Ka Thana varies significantly throughout the year.

The wetter season lasts 2.7 months from June 20 to September 10, with a greater than 25% chance of a given day being a wet day. The month with the most wet days in Neem Ka Thana Range is July, with an average of 13.5 days with at least 0.04 inches of precipitation.

The drier season lasts 9.3 months, from September 10 to June 20. The month with the fewest wet days in Neem Ka Thana Range is November, with an average of 0.5 days with at least 0.04 inches precipitation. Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. The month with the most days of rain alone in Neem Ka Thana Range is July, with an average of 13.5 days.

Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 48% on July 26.



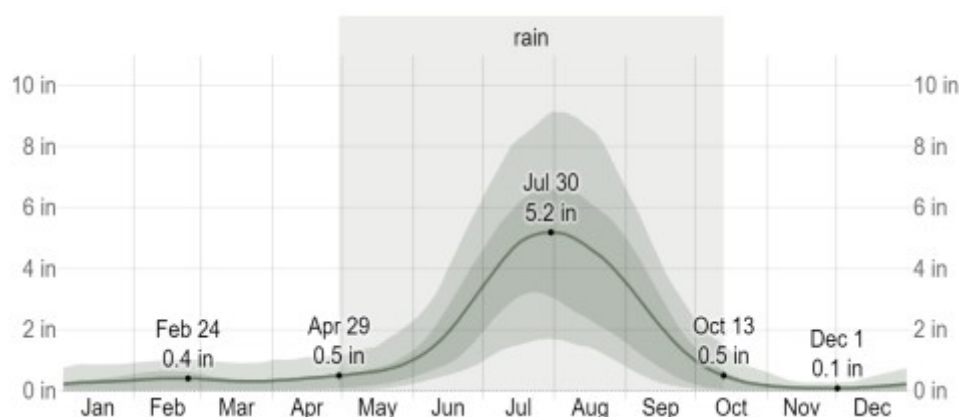
| Days    | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul   | Aug   | Sep  | Oct  | Nov  | Dec  |
|---------|------|------|------|------|------|------|-------|-------|------|------|------|------|
| Of Rain | 1.4d | 1.7d | 1.7d | 1.8d | 3.5d | 7.0d | 13.5d | 12.7d | 6.3d | 1.7d | 0.5d | 0.7d |

#### 2.3.4.3 Rainfall:

It is to show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-days period centered on each day of the year. Neem Ka Thana Range experiences extreme seasonal variation in monthly rainfall.

The rainy period of the year lasts for 5.5 months, from April 29 to October 13, with a sliding 31-days rainfall of a least 0.5 inches. The months with the most rain in Neem Ka Thana is July, with an average rainfall of 4.8 inches.

The rainless period of the year lasts for 6.5 months, from October 13 to April 29. The month with the least rain in Neem Ka Thana Range is November, with an average rainfall of 0.1 inches.

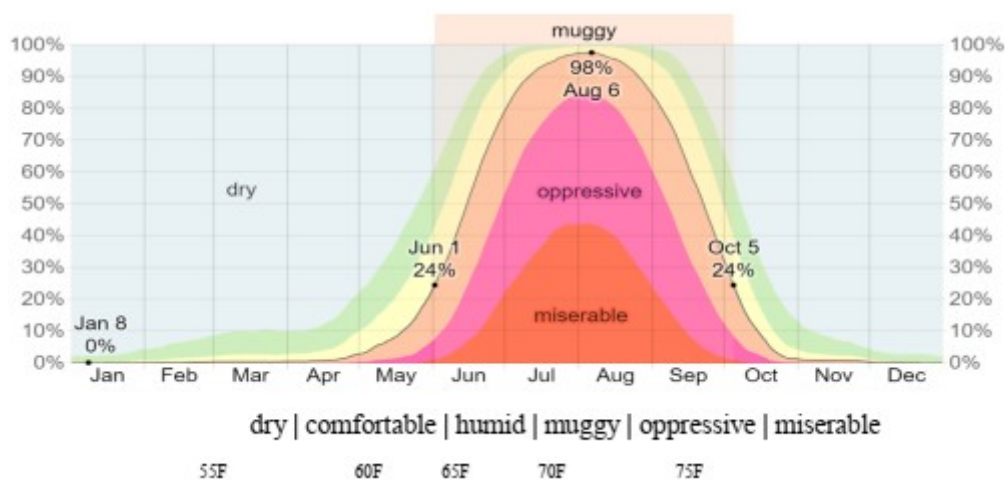


| Rain fall | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|
|           | 0.3" | 0.4" | 0.3" | 0.4" | 0.6" | 1.9" | 4.8" | 4.7" | 2.2" | 0.4" | 0.1" | 0.1" |

#### 2.3.4.4 Humidity:

We mark the base of humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points feel drier and higher dew point feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night.

Neem Ka Thana Range experiences extreme seasonal variation in the perceived humidity. The muggier period of the year lasts for 4.1 months, from June 1 to October 5, during which time the comfort level is muggy, oppressive, or miserable at least 24% of the time. The month with the muggiest days in Neem Ka Thana Range is August, with 29.1 days that are muggy or worse. The month with the fewest muggy days in Neem Ka Thana is January, with 0.0 days that are muggy or worse.



|            | Jan  | Feb  | Mar  | Apr  | May  | Jun   | Jul   | Aug   | Sep   | Oct  | Nov  | Dec  |
|------------|------|------|------|------|------|-------|-------|-------|-------|------|------|------|
| Muggy Days | 0.0d | 0.0d | 0.1d | 0.3d | 3.1d | 15.4d | 28.4d | 29.1d | 18.3d | 3.4d | 0.2d | 0.0d |

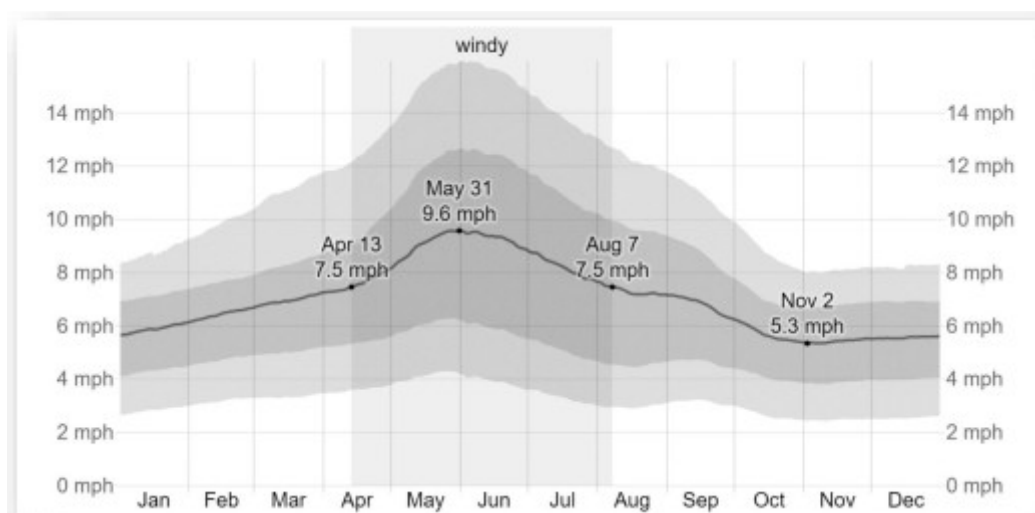
#### 2.3.4.5 Wind:

This section discusses the wide area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly average.

The average hourly speed in Neem Ka Thana experiences significant seasonal variation over the course of the year.

The windier part of the year lasts for 3.8 months, from April 13 to August 7, with average wind speed of more than 7.5 miles per hour. The windiest month of the year in Neem Ka Thana Range is June, with an average hourly wind speed of 9.3 miles per hour.

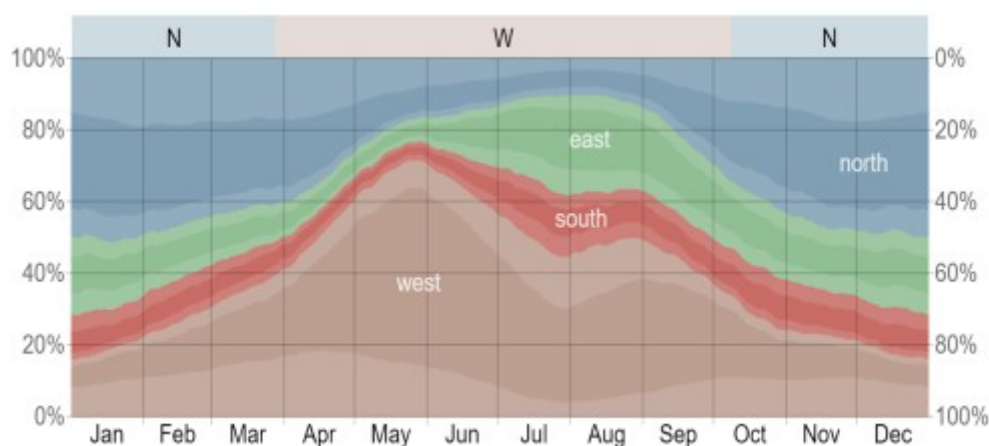
The calmer time of year lasts for 8.2 months, from August 7 to April 13. The calmest month of the year in Neem Ka Thana Range is November, with an average hourly wind speed of 5.4 miles per hour.



|                  | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Wind Speed (mph) | 5.9 | 6.4 | 7.0 | 7.6 | 9.1 | 9.3 | 8.2 | 7.3 | 6.8 | 5.7 | 5.4 | 5.6 |

The predominant average hourly wind direction in Neem Ka Thana Range varies throughout the year.

The wind is most often from the west for 6.4 months, from March 28 to October 8, with a peak percentage of 72% on May 28. The wind is most often from the north for 5.6 months, from October 8 to March 28, with a peak percentage of 49% on January 1.



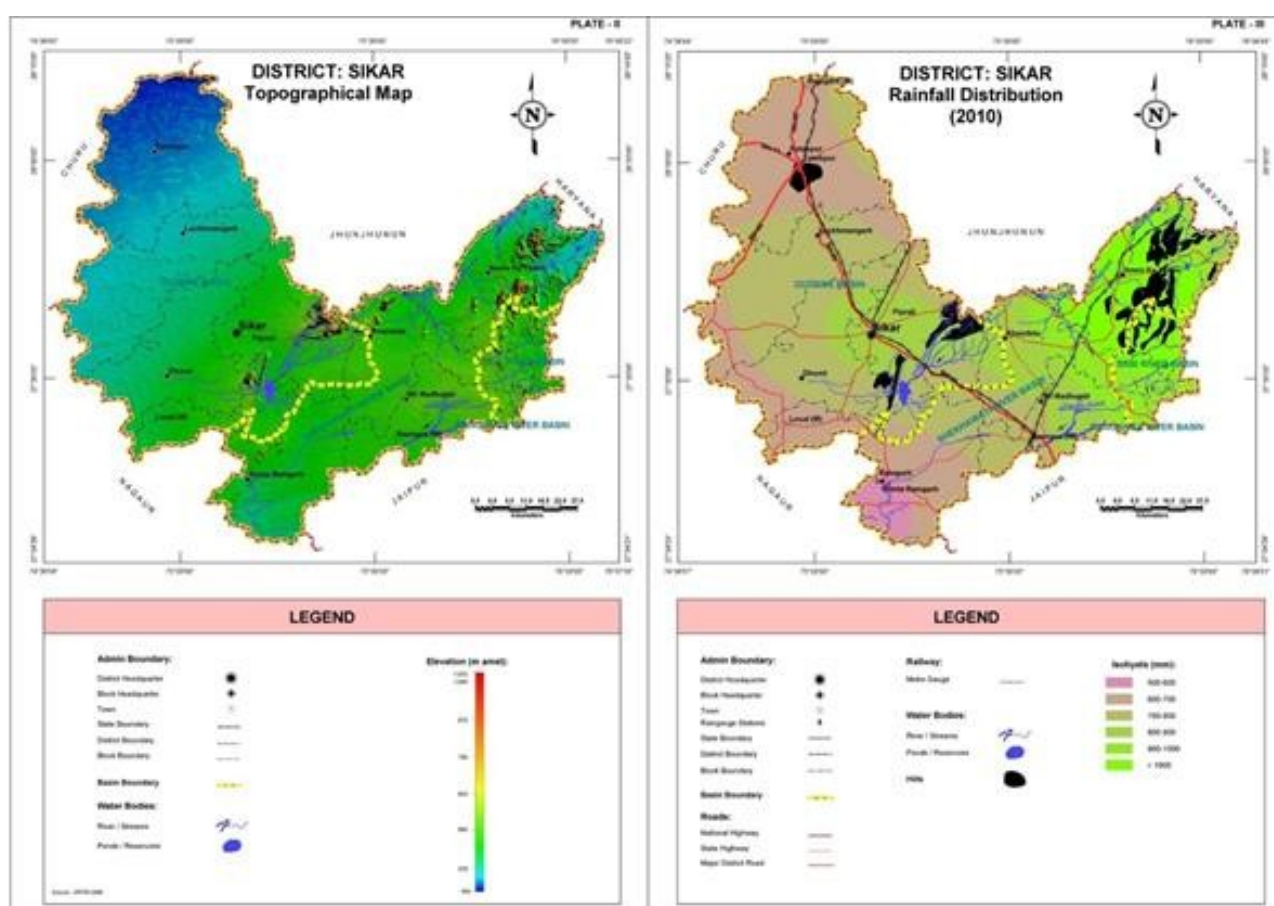
#### 2.3.4.5 Drought, and its periodicity; natural hazards and disasters frequency, intensity, loss of lives, property and economic loss and other consequences

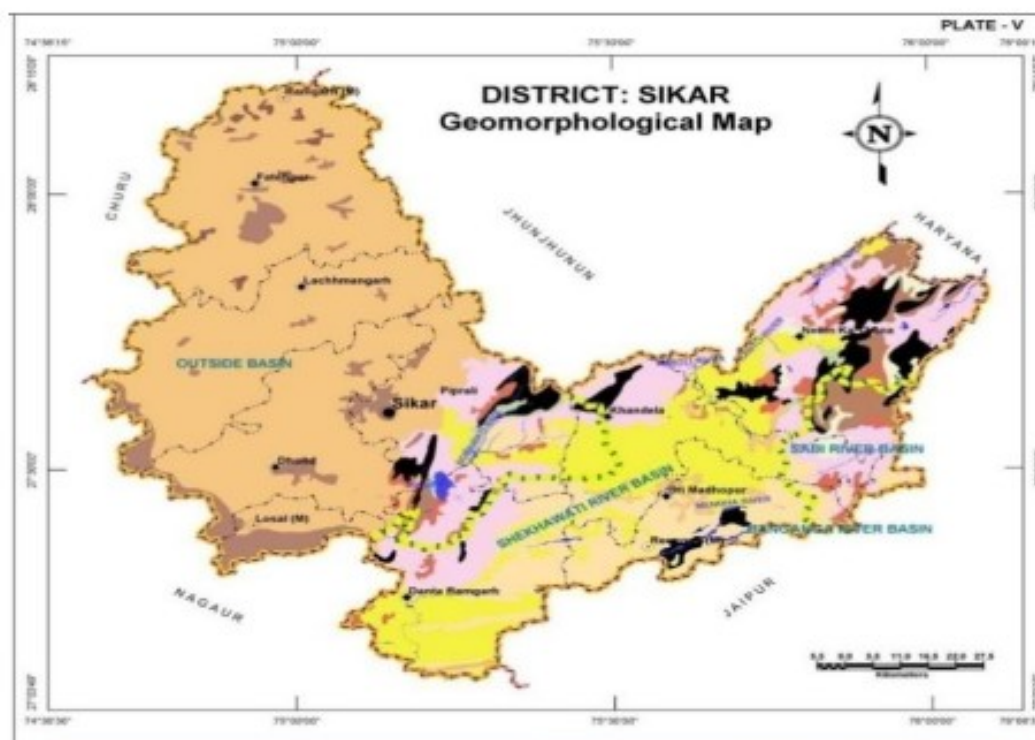
There are not any loss of lives and property due to natural hazards in this area. Only low average of rainfall is a basic natural problem to be faced. Flora & fauna is affected due to pala in winters.

**2.3.4.6 Effectiveness/problems of rescue, relief and rehabilitation-** Help is taken from local authorities villages, police & administration during natural disasters & hazards.

**2.3.4.7 Government and non-government agencies with which convergence of conservation programmes is possible; likewise disparities are a problem**

Many of the government departments like Agriculture, local bodies, police, women empowerment, administration, PHED, Social Justice, Horticulture and Animal Husbandry have a greater role to play in reducing biotic pressure on natural resources. Public Works Department and Energy Department are the ones having mandates that are non eco friendly and rather damaging the wildlife.





## 2.4 WATER SOURCES:

Main source of water for human as well as wildlife is rain water. And the rain water is sufficient only for 3-4 months up to Nov-Dec. Water is a limiting factor in this region. Reserve is also having a network of artificial water supply system. An underground storage tank with a good amount of capacity has been constructed and it is filled with water supplied by PHED system. Few water holes of the reserve are connected through pipe line networks. Water is pumped from this storage tank to different water holes during scarcity days.

Underground water of the area is at very low level. In the Neem Ka Thana Range the main source of water is only rain water source. And in the reserve area of Neem Ka Thana there are no artificial water resources like electrified wells except one passing through this reserve area. As we know water is an essential and lifesaving thing for human as well as animals. The main source of water is rain, and well is also a source with is to be developed by the humans.

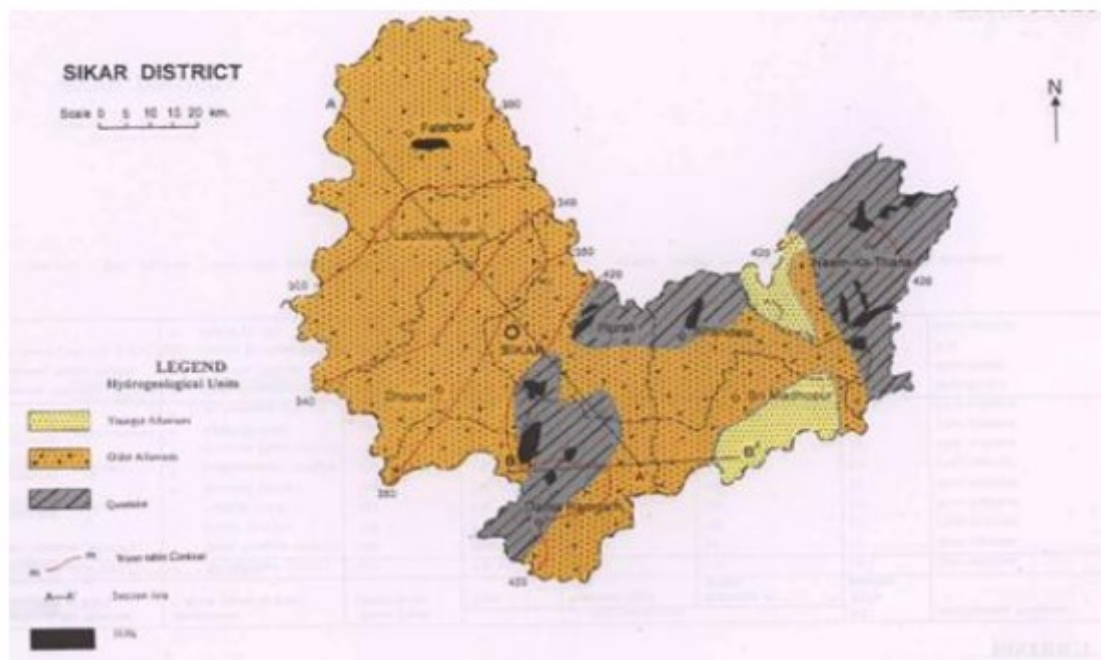
There are no perennial rivers in area. There are some old water structures present in the area and during the rainy season, the water accumulates in these several low lying areas of water bodies. During summers water for wild animals is supplied by Water tankers for drinking

purposes respectively. The ground water is the only source for water in the area except rainfall. In future, olden pucca taka will be renovated to fulfill the requirement of drinking water for wild animals.

### Hydrogeological Framework

The availability, occurrence and movement of groundwater is mainly controlled by the topographic features, physical characteristics and structural features present in the geological formations. Ground water occurs under unconfined to semi-confined conditions. The principal aquifer in the area is Quaternary sediments covering major part of the district (resting in western and central parts of the district) whereas quartzite, schist, phyllite, limestone and dolomitic limestone of Delhi Super Group also constitute important aquifers (resting in the eastern and north central parts of the district mainly in Neem ka Thana, Khandela, Danta Ramgarh and part of Piprali blocks)

Ground water occurs in the pore spaces and interstitial openings of Quaternary alluvium while in hard rock formations, occurrence and movement of groundwater is controlled by secondary porosity i.e., through the bedding planes, fissures, joints, fractures, solution cavities and other structurally weaker planes.



## **2.5 Forest Types and cover attributes**

### **2.5.1 Structure and condition of forests:**

Except the Aravalli mountain, all ranges fall in the category of desert or semi-desert areas where there is very little natural forest area.

#### **2.5.1.1 Classification of forests:**

According to the 1968 edition of the book “Revised Classification of Indian Forest Types” written by Champion and Seth, the forests of this district come under the category of “Dry Tropical Forests”. According to Champion and Seth, the following group and sub-group types and sub-types of forests can be classified in this district.

#### **Group 5 - Tropical Dry Deciduous Forests**

##### **Subgroup 5B - Northern Tropical Dry Deciduous Forests**

##### **Type 5B/C2. Northern dry mixed deciduous forest**

The sequence of forests at the surface climax is as follows:

The degraded stages of tropical dry deciduous forests are as follows:

**5B/E<sub>1</sub>- *Anogeissus pendula* Forest**

**5B/E<sub>2</sub> - *Boswellia* Forest**

**5B/E<sub>3</sub>- *Babul* Forest**

**5B/E<sub>5</sub>- *Butea* Forest**

The degraded stages of tropical dry deciduous forests are as follows:

**5DS<sub>1</sub> - Dry deciduous scrub**

**5E<sub>1</sub>/DS<sub>1</sub> - *Anogeissus pendula* Scrub**

**5DS<sub>3</sub> - Euphorbia scrub**

**5DS<sub>4</sub> - Dry grass Land**

##### **Subgroup 6B —Northern tropical Thorn forests**

**Type 6B/C<sub>1</sub> - Desert Thorn forest**

**Type 6B/C<sub>2</sub> - Ravine Thorn forest**

The degraded stages of Tropical thorn forests are as follows:-

**6DS<sub>1</sub> - Zizyphus Scrub**

**6DS<sub>2</sub> - Tropical Euphorbia Scrub**

- 6/E2 - Kumtha Forest**
- 6/E4 - Pilu Forest**
- 6/E1/DS1/IS1 - Desert Dune scrub**

### **2.5.1.2 Northern Dry Mixed Deciduous Forest**

This type of forests are generally found in Shrimadhapur, Khandela, Neemkathana and Piprali areas. But it has also been observed that Dhonk, Salar, Kumtha and Dhak species also belong to this category. This group grow well in the valley where soil and moisture are found. On plateaus and slopes with good drainage, Salar has a tendency to replace this type of forests, while on other dry slopes, Dhonk trees replace them.

In this forest, Kumtha, Salar, Kadaaya, Senjana, Siras, Gular, Dhak, Papadi, Khair etc. are found in the upper canopy trees and Khirni, Amaltas, Raunj, Ber etc. are found in the form of small trees. Danceran, Adusa, Jhadber etc. are found in the lower canopy. Satyanashi, Neel, Amaranthus species, Hibiscus lobatus, Salvia, Egyptia, Polygonum etc. are found on the land surface. The main grasses found are Lapla, Dhaman, Karad, Surwal etc. The specialty of these forests is that they remain without leaves from March to June, when fruits and flowers appear.

Ecological situation: The mixed forests described above are climatic dermatology forests, but the nature of most of the species is to replace surface dermatology in pure group because in the Aravalli mountain ranges, the result of surface dermatology is found in groups of different species in different surface conditions.

### **2.5.1.3 Dhonk Forest**

Most of the trees found in this type of forest are of Dhonk species. And 80 percent of the forests are of this type. Main supporting species of Dhonk are Salar, Khirni, Dhak, Churel, Khair, Ronj, Kumtha, Siras, Peepal etc. are found in the forest divisions of Harsh Parvat and Neem Ka Thana. Kair, Jhadber, Adusa, Vajradanti, Danceran etc. are found in the lower canopy. Grasses like Lapla, Doob, Karad etc. are found in this area. Creepers like Kali Dudhi, Badh, Shatabdi Koch etc. are found in these forests.

These forests are at a considerable distance from the inhabited area. Some forests which were close to the inhabited area have been destroyed to a great extent. The height of the thicket varies from 3.0 to 15.0 m and its diameter varies from 3.0-8.0 cm. The main constituent species such as salar and gurjan vary from 10.0 to 15 m and 5.0 to 12.0 m in diameter and 15.0 to 30.0 m and 8 to 30 m respectively.

Crop density varies from 0.3 to 0.7. Regeneration status varies from poor to good. Most of the regeneration is of native origin. Regeneration is limited to a few interior areas where the effect of biological factors is minimal.

### **Ecological Status:**

In dry mixed deciduous forest, several tree species are capable of forming a species-pure forest area. Such forest types are highly tolerant of soil, air and vegetation.

It is found in dry forests under harsh conditions of biotic factors. Dhaunk is an excellent example of this. Due to illegal felling and grazing, Dhaunk trees have disappeared from some areas. Bamboo is also found along with Dhaunk in moist areas. Dhaunk and Kumtha are found together on dry slopes. In places with some thorny species, where there is settled sand, Kumtha and some thorny plants are also found.

In the last four-five decades, 80 percent of the trees in Dhaunk forests have disappeared due to uncontrolled grazing, illegal felling and clearing. The growth of some trees has stopped, they have become bushy and the density of Dhaunk has also reduced. In these areas, apart from the main species, encroachment of Thor, Dancerain, Kalisali and some species of grass like Lapla, Sporobolus, Lamp etc. has started. The wood of the Dhaunk trees was illegally felled for fodder and fuel. The small plants and the regeneration from the copses were grazed and crushed by the cattle. In such areas, thorny plants like Ronjh, Jhadiber, Kumtha, Khair etc. grow again. Hence, due to excessive felling, pruning etc., the Dhaunk trees have taken a bushy shape.

### **2.5.1.4 Salar Forest**

This is a type of open forest in which the upper forest is of the Salar trees – small trees. Their height varies from 10 m to 20 m and girth from 30 cm to 50 cm. Trees of this species have become dwarf in Harsh, Neemka Thana and Patan Range areas. Their trunk has become crooked and thick. Jhijha, Siras, Khirni etc. are its associate species. Bamboo is found in moist areas. In such areas, grass species like Lamp, Seen etc. are found. A parasite called Banda (*Dedrothe falcata*) depends on Salar. It has deciduous leaves from February to June.

### **Ecological situation:**

In some areas, Salar forests are permanent in nature and these trees are fire resistant. Due to excessive lopping, Salar trees have been almost destroyed and their natural regeneration is negligible.

The floristic composition have some rare, endemic and threatened plants have also been recorded which are enumerated in alphabetical order with local name, family, habit, conservation status, major threats and present status in the study area (Table). The threatened status of the plant was determined according to IUCN Red List Category Straties and Criteria (1994-2007) and also with the help of using available Red Data book and standard publications (Walter and Gillet, 1998; Rao *et al.*, 2003; ENVIS centre on floral diversity, BSI Kolkata, 2016). Rarity of species was determined by field study, visual estimation, literature and herbaria and from discussions with the traditional healers, tribals and the old aged citizens. The categories at extinction risk include: Extinct (EX), Extinct in the Wild (EW), Critically endangered (CR), Endangered (EN), Vulnerable (VU), Rare (R), Near threatened (NT), Least concern (LC) and Not evaluated (NE). Floral list is enclosed Annexure-

## **2.6 Flora and Fauna**

### **2.6.2 Faunal Diversity:**

A detailed list of wild animals found in this area has been submitted at the beginning of the plan. The commonly found mammals, birds, reptiles, amphibians and fishes are as follows:

#### **2.6.2.1 Mammals:**

Common Mongoose, Jackal and Monkey were observed which are protected under schedule II and Nilgai is Schedule-II animal as per Wildlife Protection Act 1972. Common Indian monitor is schedule-I as per Indian Wildlife Act and should be protected. Impact on wildlife due to mining activity is assessed along with mitigation measures.

There are not many mammalian wild animals in the forest area or non-forest areas of this area. During the peak summer when there is a shortage of water, shade and food in the forest areas, only then signs of the presence of wild animals are found in the population or fields. There is no wildlife sanctuary area in the forest division, however, various types of wild animals and birds can be seen in ponds, johads, anicuts etc. The mammalian animals commonly found in the district are as follows:-

- \* Sambhar \* Chinkara
- \* Wolf \* Nilgai
- \* Langur \* Indian Fox
- \* Wild cat \* Squirrel
- \* Bat \* Hare
- \* Rat \* Monkey

\* Mongoose \*Jhau rat

\* Sehi

#### **2.6.2.2 Bird class:**

The most commonly spotted bird species of this area were Cattle Egret, Intermediate Egret, Red-wattled Lapwing, Rock Pigeon, Eurasian Collared-Dove, Spotted Dove, Chestnut-headed Bee-eater, Bank Myna and Common Myna. The Indian Peafowl was observed which is listed as schedule –I as per WPA, 1972 and others listed as schedule IV as per WPA, 1972. Due to the presence of ponds and anicuts, a suitable environment is available for migratory and non-migratory birds. During winter months, some of the following migratory birds can be frequently seen at the numerous ponds and anicuts spread across the region:

\* Bar Headed Goose \* Grey Lag Goose

\* Common Teal \* Greater Flamingo

\* Common Pochard \* Great White Pelican

Some of the local migratory birds frequently visiting the region during summer season are:

\* Some Quails \* Some Bee-eaters

\* Indian Pitta \* Grey-bellied Cuckoo

Some of the main birds locally found in the region are:

\* Painted Stork \* Green Bee-eaters

\* Shikra \* House Sparrow

\* Various types of parrots \*various types of Munias

\* Various Sandgrouse \*various types of Mynas

\* Various types of Owls

Birds of water sources are found around ponds, check dams, anicuts, mining areas etc. Trees of different species like Banyan, Peepal, Mango, Babul etc. are found on the Paal which provide a suitable shelter for birds. Snails, frogs and many types of animals suitable for birds are found in these water sources. Due to the high temperature at water sources in winter, insect eating birds get enough food even in winter. For this reason, migratory and non-migratory birds can be seen at all water sources in the district in winter.

The following bird species are on the verge of extinction:

\* Black Bittern \* Spotted Creeper

\* Lesser Flamingo \* Scaly Breasted Munia

\* Spanish Sparrow \* Indian White Backed Blucher

#### **2.6.2.3 Reptile Class:**

The reptile, Common Garden Lizard, Common Indian Monitor, House Gecko and FanThroated Lizard, Rosebelly, Worm-eating Snake and Himalayan Wolf Snake were observed; Indian Cobra and Russell's viper were provided protection as per Schedule-II of Wild life Protection Act, (1972).

Due to availability of sufficient water reserves in the district, reptile class animals are found in large numbers. The list of reptile class animals found here is as follows:

\* Monitor Lizard,

\*Sand boa Snake

#### **2.6.2.4 Amphibian Class:**

Due to availability of sufficient water reserves in the district, suitable environment and surroundings are available for breeding and growth of amphibious creatures. Toads and frogs are generally found in sufficient numbers in the district. Sufficient space and sufficient food material is available for these creatures in and around water sources.

#### **2.6.2.5 Fish categories:**

Katla, Sambal Rohu Bam Kishu NirjiLanchi Bata Singha Singha

Habitat quality, quantity and key areas & vertebrate are animals that has a backbone and skeleton it includes humans it includes frogs, birds, reptiles, fishes, mammals. Vertebrates are an interesting collection of animals, birds, reptiles, amphibious and fishes etc. Its meaning is joint of Developmental biology. It comprises all species of animals. Vertebrates are the most organized organisms on earth list is enclosed

**2.6.2.6** The limiting facts about Conservation & Protection is essential of vertebrates. This Conservation reserve will conserve vertebrates.

**2.6.2.7** Important of vertebrate, their status, distribution and habitat. An animal without a social line of bones (backbone) going along its body. An animal with no spine is called invertebrates list on

Eg. Curbs, butterflies, keetpatangs. These are spread in Conservation Reserve areas.

## **2.7 Corridor linkages (Natural, Anthropogenic and Functionality)**

Corridor linkages are connected areas that can be used as pathways or habitats to improve connectivity between different areas of land. They can be an important part of wildlife conservation strategies, as they can help with habitat loss and fragmentation.

It is no secret that habitat destruction and fragmentation are the leading causes of biodiversity loss worldwide, and climate change is only making it worse.

Species blinking out, shrinking populations, and significant range contractions caused by human activities have negative impacts on biodiversity as well as ecosystem functions and services. Extinction events have happened before in our Earth's history, but this time, they are happening much faster.

Here are some benefits of corridor linkages:

### **Habitat**

Corridors can provide habitat for resting and feeding, and can help species continue their migration.

### **Connectivity**

Corridors can help increase gene flow and population viability, and allow species to recolonize areas.

### **Human-made linkages**

Human-made linkages, such as wildlife overpasses and underpasses, can help mitigate habitat loss.

However, corridor linkages can also have some negative effects:

Edge effects: Corridors can be dominated by edge effects, which can increase the risk of disease and parasitism.

Invasive species: Corridors can facilitate the spread of invasive species.

Dispersal barriers: Linear corridors can create new barriers when they intersect other habitats.

Some alternatives to linear corridors include semi-open corridors, which can connect both open habitats and woodlands.

## **The Importance of Corridors for Biodiversity**

Yet, the bulk of data demonstrates that more than ever, maintaining ecological connectivity through corridors is key to the conservation of our natural world. Connected, protected, and conserved areas are stronger and corridors are a major component in successfully fighting fragmentation and strengthening biodiversity. These physical links are one of the most

important ways to ensure species are able to move between protected areas and maintain genetic strength.

Wildlife has many reasons to travel across landscapes and between large protected havens. Daily movements, seasonal migrations, shifting habitats, escaping natural ecosystem disturbances, or the need to adapt to climate change are all possible.

What they face as barriers to their movement can vary as well. Fencing, highways, towns, and other development often stand in the way of finding mates, food, or new places to thrive. Connectivity conservation is therefore needed at local, regional, and global levels and across landscapes with various degrees of influence from people.

Connectivity management ranges from smaller scales, such as between streams or berry patches, to regional and even continental scales, such as major rivers or mountain ranges. Increasingly, looking at landscapes at the scale at which wildlife uses it has become a focus in the conservation world.

## **2.8 Socio- economic and Socio-cultural profile /Coastal and Island Community description**

This area has made significant progress in the quest of socio-economic development over the previous few years. The accurate and comprehensive picture of the economy has been critical since it serves as the foundation for the planning of significant and inclusive development. There are significant variations in levels of social and economic development between regions, as well as within regions. Regional differences in development in India have remained unchanged, notwithstanding general development efforts over the plan years. Regional gaps in poverty, income, and unemployment have been expanding among a state's several regions (vertical) and districts within those areas (horizontal).

## **DEMOGRAPHIC PROFILE**

The Population of the World is growing at an unprecedented rate. The current population of the world has already reached 7 billion and is likely to reach over 9 billion by 2050 (UNFPA, 2012). It is reported that even if the fertility rate decreases "continued population growth is inevitable". Future population growth would mean increase in social, economical and environmental disparities, inequities and impacts. Increasingly, most developing countries have witnessed growth in population and it is further projected that future human population growth will remain concentrated in the poor countries (Grundy, 2002), especially those in the most vulnerable parts of the countries. In fact, since ancient times, India has been the home of

a considerably large size of population. Though census taking in the country is a matter of only recent past, based on archaeological and historical evidences, scholars have tried to construct the trends in population growth since ancient times.

**POPULATION:** According to the census 2011 Sikar district has a population of 26,77,333 of which male and female were 13,74,990 and 13,02,343 respectively. In 2001 census, Sikar had a population of 2,287,788 of which males were 1,172,753 and remaining 1,115,035 were females. In addition to this, 79.35 percent population live in the rural areas, while 20.65 percent reside in urban areas of the district. The percentage of scheduled caste and scheduled tribes population are 14.85 and 2.73 respectively. Sikar district ranks 6th in terms of population, 17th in terms of area and 10th in terms of population density. Sikar district has six tehsils, in which Danta Ramgarh tehsil has the highest number of villages (242) whereas Fatehpur tehsil has lowest number of villages (127). The district has 1167 villages, out of them 1162 villages are inhabited and 5 villages are uninhabited. In Sikar district 183 new villages and 6 new census towns have created as compared to 2001 Census. In the district, Palsana (Tehsil: Danta Ramgarh) is the most populous (13,186 persons) village; and Chak Majipura (Tehsil: Danta Ramgarh) is the least populous (06 persons) village. The district consists 76.3 percent rural and 23.7 percent urban population whereas the state percent of rural and urban population is 75.1 and 24.9 respectively. The sex ratio of the district (947) is significantly higher than the state sex ratio (928). The literacy rate in the district is 71.9 percent which is higher than the state average (66.1 percent) and it ranks 4th among the other districts of the state. Gender gap of the literacy rate is 26.9 percent in the district. The scheduled caste and scheduled tribe population in the district is 15.6 percent and 2.8 percent respectively whereas the state percent of scheduled caste and scheduled tribe population is 17.8 and 13.5 respectively. The economy of the district is mainly dependent on agriculture as 58.5 percent workers in the district are either cultivators or agricultural labourers. However the district percentage of such workers is lower than the state average of 62.1 percent. Work participation rate (WPR) of the district has recorded 37.6 percent and gender gap in WPR is 21.0 percent points. In the district among the workers the percentage of cultivators, agricultural labourers, workers in household industry and other workers (category of workers) are 49.8, 8.7, 2.3 and 39.2 percent respectively.

**URBANIZATION AND ECONOMIC GROWTH:** Only 30 percent of India's population lives in urban areas. This is much lower than in China, Indonesia, South Korea, Mexico, and Brazil. Some of this may be due to much lower per capita incomes in India. The Committee's

projections suggest that India's urban population as presently defined will be close to 600 million by 2031, more than double that in 2001. Already the number of metropolitan cities with population of 1 million and above has increased from 35 in 2001 to 50 in 2011 and is expected to increase further to 87 by 2031. The expanding size of Indian cities will happen in many cases through a process of peripheral expansion, with smaller municipalities and large villages surrounding the core city becoming part of the large metropolitan area, placing increasing strain on the country's urban infrastructure. Future growth is likely to concentrate in and around 60 to 70 large cities having a population of one million or more. Decentralization of municipal governance and greater reliance on institutional financing and capital markets for resource mobilization are likely to increase the disparity between the larger and smaller urban centers. A satisfying outcome will depend on the formulation of effective public policies to accelerate allround development of smaller urban centers and to refashion the role of the state as an effective facilitator to compensate for the deficiencies of market mechanisms in the delivery of public goods. Three decades of rapid economic growth would normally have propelled migration from rural areas but growth in India has not had this effect thus far. This is because industrialization has been capital intensive and the services boom fuelled by the knowledge economy has also, been skill intensive. A few cities of India have acted as centers of knowledge and innovation. As more cities provide economies of agglomeration and scale for clusters of industries and other non-agricultural economic activity, the urban sector will become the principal engine for stimulating national economic growth. Industrialization will absorb more people as India advances further in its integration with the world economy. At the present juncture, India faces the challenge of continuing on its high growth trajectory while making growth more broad-based and labour intensive. The fortunes of the agricultural sector are crucially linked to the manner in which growth in the industry and services sectors unfolds. People living in rural areas typically tap the opportunities that cities provide for employment, entrepreneurial avenues, learning, and monetary repatriation. As urbanization grows, demand for food items other than food grains, i.e. vegetables, lentils, milk, eggs, etc., also grows. This leads to investments in infrastructure, logistics, processing, packaging, and organized retailing. These investments and other economic inter-linkages connect and build synergy between rural and urban centers. Of course, government policy should also focus on enhancing the productive potential of the rural economy. From the report, that India's urban future promises to be an inclusive one, with the benefits extending to rural areas as well. Already, there is evidence to suggest that

rising standards of living in India's urban areas in the postreform period have had significant distributional effects favoring the country's rural poor.

**OCCUPATIONAL PATTERN:** According to Census 2011, there are 49.81 percent cultivators, 8.73 percent agriculture laborers, 2.26 percent engaged in household industry and the remaining 39.20 percent engaged in other works in the district. The district provide the livelihood to maximum number of people in the district. To assess its industrial potential, it would be worthwhile to explore the land-use pattern, irrigation facilities, crops, livestock, dairy, cattle development etc. This will provide a broad spectrum of resources inventory and resource base, on which foundation of industrial growth are generally laid down. If we classify occupational pattern of working force between males and females, this comes out to be as follows:

#### **Working Force in Sikar District, 2011**

|   |                      | <b>Main workers</b> |                |              | <b>Marginal workers</b> |                |              | <b>Total workers</b> |                |              |
|---|----------------------|---------------------|----------------|--------------|-------------------------|----------------|--------------|----------------------|----------------|--------------|
|   |                      | <b>Males</b>        | <b>Females</b> | <b>Total</b> | <b>Males</b>            | <b>Females</b> | <b>Total</b> | <b>Males</b>         | <b>Females</b> | <b>Total</b> |
| 1 | Cultivators          | 207912              | 105318         | 313230       | 49712                   | 138369         | 188081       | 257624               | 243687         | 501311       |
| 2 | Agricultural labours | 30955               | 11444          | 42399        | 19650                   | 25840          | 45490        | 50605                | 37284          | 87889        |
| 3 | Household Industry   | 13023               | 3298           | 16321        | 2209                    | 4246           | 6455         | 15232                | 7544           | 22776        |
| 4 | Others               | 294288              | 32473          | 326761       | 40105                   | 27662          | 67767        | 334393               | 60135          | 394528       |
|   | Grand Total          | 546178              | 152533         | 698711       | 111676                  | 196117         | 307793       | 657854               | 348650         | 1006504      |

#### **Human Development Index (HDI)**

Human Development Index (HDI) which provides a composite measure of mainly three dimensions:

1. A decent level of living(Per capita income)
2. Living a long and healthy life
3. Access to Education

#### **Comparison Human development index of Shekhawati region and Sikar by Rajasthan (2008)**

| <b>Districts</b>  | <b>Education Index</b> | <b>Health Index</b> | <b>Income Index</b> | <b>Human Development Index</b> |
|-------------------|------------------------|---------------------|---------------------|--------------------------------|
| Jhunjhunu         | 0.850                  | 0.850               | 0.433               | 0.711                          |
| Sikar             | 0.837                  | 0.830               | 0.428               | 0.698                          |
| Shekhawati Region | 0.844                  | 0.840               | 0.431               | 0.705                          |
| Rajasthan         | 0.755                  | 0.735               | 0.640               | 0.710                          |

Source: HDI, Institute of development studies, Jaipur (2008)

It reflects from the above table 4.1.5 HDI (2008) that education index of Shekhawati region is 0.844 which is higher than the educational index of Rajasthan (0.755) having a difference of 0.089. Health index of Shekhawati region is 0.840, whereas health index of Rajasthan is 0.735. Thus, health condition of human resource dwelling in Shekhawati is quite good as compare to state and Income index of Shekhawati region is 0.431, whereas income index of Rajasthan is 0.640 which is higher than Shekhawati region. It means that require developing more infrastructure facilities to raise income level of the study area. The HDI of Shekhawati region is 0.705, whereas HDI of Rajasthan is 0.710 which is 0.005 higher than Shekhawati region. But there are two variables of HDI i.e., educational index and Health index of Shekhawati region is quite higher than Rajasthan's variables. Thus overall education and health parameters of Shekhawati region are good thus we can conclude that human resource of Shekhawati region will be future contributor in nation building.

## **2.9 Traditional and Indigenous Knowledge**

### **2.9.1 Traditional Uses of Plants**

#### **Indigenous Huts**

Wood or timber is a fundamental part of the traditional life particularly in the construction of shelters. Folk people designed their dwellings according to the available material and prevailing environmental conditions. Locally available plants are used for the construction of the skeleton of the hut. The later consists of pillar, beam, poles, wall, roof, doors and thatch etc.

During the survey in the nearby villages of Beed conservation Reserve, circular type of huts with conical roof was observed. There are usually no windows in the huts (*Jhumpas*).

The entrance to the *jhumpa* is low so that one has to bend before entering. Apart from a low door, there is no opening in the structure. Fodder and grains are also stored in specially built *jhumpas*. A shelter made from bricks with thatched roof "*Chhan*" was also a common feature of the rural area. The cattle are tied at one corner of this "*Chhan*".

Sometimes, it is used as kitchen. A special type of hut “Obra” made of mud with thatched roof is used to containing food items. The walls are covered with a plaster of clay, cow-dung and hay making a termite free (antiseptic) façade (Plate 5.4). The wood of various plants used in the construction of huts are: *Acacia nilotica*, *Salvadora oleoides*, *Tecomella undulata*, *Zizyphusnummularia*, *Clerodendrum phlomidis*, *Calotropis procera*, *Saccharum munja*, *Crotalaria burhia* and *Leptadeniapyrotechnica*.

### **Agricultural Implements**

The agricultural implements consist of plough, harrow, levellers, cold crushers, seed drillers and hoes. Besides, there are several other implements like *kuhad*(axe), *kulhadi*(pick axe), *favda*(spade), *Khurpi*(weeding hoe), *dantali*(rake with wooden teeth), *dortii*(sickle) and *paner*(crowbar). The wooden part of these implements is made from locally available plants.

#### **Sower (Orna)**

This agricultural implement made of hollow bamboo is used by the farmer for sowing seeds like bajra, wheat, juwar, moong etc. It is tied behind the plough and sseds are dropped into the conical mouth, trickle down to the furrows.

#### **Land – levellar (Pata)**

It is used for levelling the ground evenly so as to maintain and preserve the moisture content of the field. A levellar is also employed for covering seeds after broadcasting. Normally wood of *Acacia nilotica* is used for levellar.

#### **Plough**

Plough is an agricultural implement which is used to cut the soil and make it suitable for the process called seed sowing. Indigenous plough is made up of wood with an iron share point. It consists of body, shaft pole, share and handle. It is generally drawn with camel in Jhunjhunu district. The horizontal part of plough is made up with wood of *Acacia nilotica* and *Acacia leucophloea*.

## **Harrow**

After the ploughing, harrow is used to break the clods. It fundamentally consists of a long metal blade fixed to the lower end of a wooden plank. These were originally drawn by draft animals, but in modern practices, they are trailed after the tractor by a drawbar. The wooden plank is made of wood of *Acacia nilotica*.

## **Pulley (Bhuun)**

A pulley is used to draw water from the well. It is made of *Acacia nilotica* or *Prosopis cineraria* wood. The pulley is mounted on two obliquely placed poles of *Acacia nilotica* or *Tecomella undulata* converging at the upper end where it is fixed and held in place by two upright sticks. The *patia* (a wide slab of wood) rose above ground over the mouth of well with the aid of two pillars called *khambas* made of *Dalbergia sissoo*, *Acacia nilotica*, *Prosopis cineraria* and *Tecomella undulata*. The sticks assisting the pulley are fixed on these *khambas*.

## **Transport**

### **Wheel Barrow or Gada**

It is a simple construction used to carry grains, fodder and wood from one place to another. It is composed of two small wheels tied to the yoke with the help of two diverging sticks and tied to the camel or oxen. The wheel is constructed from the wood of *Dalbergia sissoo* and *Tecomella undulata*. Bully is constructed from the wood of *Acacia nilotica* and *Azadirachta indica*.

## **Protection from Farm enemies: Fencing**

Boundaries for houses and land holdings, called *Baras*, are made of the dry branches of thorny bushes, a deterrent for straying cattles. About five to six feet high thorn fencing is put around the compound to ward off animals, thieves and also as protection against strong wind. Spiny stem and branches of *Zizyphus nummularia*, *Acacia nilotica*, *Acacia catechu* and *Capparis decidua* are tied with the aerial roots

of *Ficus benghalensis* or with young shoots of *Leptadeniapyrotechnica* for fencing around the house. *Saccharum munja*, *Opuntia elatior*, *Ipomoea fistulosa* and *Maytenusemarginata* are used for field fencing.

### **Machan**

A temporary hut erected on poles, *machan*, is formed to protect the crops from wild animals. It is formed from wood of *Acacia nilotica*, *Zizyphusnummularia* and *Prosopis cineraria*.

### **Gate for huts (Jhanto or Jhanti)**

A fencing using various live plants or dead ones or their wood is generally seen on the opening of a hut which forms the gate. Vertical support of the gate is made of *Tecomella undulata*, *Clerodendronphlomoides* or *Lyciumbarbarum* and tied with ropes of *Leptadeniapyrotechnica*.

## **2.9.2 Household Articles:**

### **Grain Grinder (Chaki)**

Indian traditional grinder “*Chaki*” or “*Ghatt*” is made of two circular stones in opposing pairs to crush grains. This is the simple way of making flour. The wooden handle of “*Chaki*” is made from wood of *Tecomella undulata* or *Dalbergia sissoo*.

### **Wooden Mortar and Pastle Set**

Wood of *Acacia catechu*, *Azadirachta indica* and *Dalbergia sissoo* are chosen for making a pestle. Mortar is made of the wood of *Acacia leucophloea*, *Acacia nilotica* and *Albizia lebbeck*.

### **Butter Churn (Bilona Stand and Jherna)**

A butter churn is a device used to convert cream into butter. A traditional butter churn is operated by the pulling the rope to spin the churning stick inside the

narrow neck clay pot. Butter churn stand is made from wood of *Prosopis cineraria*, while churning stick is prepared from roots of *Zizyphusnummularia*.

### **Winnowing pan (*Chhajlo* or *Supra*)**

It is used for removing chaff from grains by the rural ladies. The flowering scape and culms of *Saccharum munja* are woven into winnowing trays (*Chhajlo*), which is used for cleaning grains .

### **Brooms**

Different types of brooms made up of plant materials are used by folk people. The stalk and culm of the inflorescence of *Desmostachya bipinnata*, *Saccharum munja* and *Saccharum spontaneum* are used for broom. Stem and branches of *Leptadenia pyrotechnica*, *Sida ovata* and leaves of *Phoenix sylvestris* are also used for making broom .

### **Cots and Ropes**

Sheath blade of *Saccharum benghalense* is beaten and used for making ropes (*Munji*). These ropes are employed for cots. Vertical, horizontal and base parts of cots are made from stem of *Zizyphus mauritiana*, *Azadirachta indica*, *Acacia nilotica*, *Dalbergia sissoo* and *Tecomella undulata*. Legs of cots are made from *Dalbergia sissoo*, *Acacia nilotica* and *Tecomella undulata*. Young branches of *Leptadenia pyrotechnica* are employed for making ropes. These ropes are used by rural people to tie the stack of grasses and a circular ring made from these ropes is used to form *haarion* in which pots are placed.

## **2.9.3 Miscellaneous Articles**

### ***Rakhwala* or *Bijuka***

To protect the grains from birds and animals various kinds of figures resembling human are erected in the crop fields in nearby villages. Two wooden

sticks of *Prosopis cineraria* or *Acacia nilotica* are tied in cross wise manner and planted in the ground by tying grasses and leaves to these sticks giving the shape of hands. Earthen pot (*Matka*) is placed in reverse position as head. This wooden framework is decorated by putting old clothes of farmers (*dhoti*, *kurta*, *safaar payjama*). They are known by several names *Bijuka*, *Darawa*, *Howa* or *Rakhawala* etc.

### **Musical Instruments**

Time immemorial some old traditions followed in the regions is a boom for the local populations. Conventionally the people inhabiting the Shekhawati region of Rajasthan were known for their love for music and style of singing. The tribals and rural people are fond of songs and music. Here are a few local instruments frequently used in traditional Rajasthani folk music.

#### ***Chang or Dhap***

The *chang* provides the beats for a festive singing and dancing tradition from the Shekhawati belt of Rajasthan and genre '*Chang Nritya*' gets its name from the principal instrument so employed. *Chang* comprises of a circular, shallow wooden frame and at times is also a pentagon. It is mounted with leather on one end and is left open on the other. The bottom of the palms provide the base while playing the *Chang* and the treble is generated by small pencil thin sticks that are used to strike the leather surface. Players carry the *Chang* as they sing, dance and play it simultaneously. Shekhawati region is famous for '*Chang dance*' which starts from the Maha Shivratri festival and ends on *Dhulandi*, day after the Holi festival .

#### **Dhol**

It is a very popular folk drum instrument of music. It produces very powerful sound and is mainly used by '*Rana*' or '*Dholi*' community on the occasion of festival of Gangaur. The dhol is a barrel shaped drum made up of wood of *Azadirachta indica*, *Dalbergia sissoo* and *Mangifera indica*. They have parchments of animal skin on both the ends held by strings. Normally a '*Dhol*' is "18 to 20" inches in length and 12" in breadth. Dholis hang their Dhols from the shoulder or place it on their lap and play it with one or two wooden sticks that are made of *Calotropis procera* or *Clerodendrum phlomidis*.

## **Flutes**

Tribal flutes are made up of *Denrocalamus*. A flute or bansuri is a simple cylindrical tube of uniform bore and vary in size. It is held horizontally and is inclined downwards when it is played. To produce sound melody one has to cover the finger holes with the fingers of the left and right hand. Variations in pitch are produced by altering the effective length of the air column.

## **Dholak**

Dholak is a very popular folk drum of tribals as well as in of Northern India. It is barrel shaped with a simple membrane on the right hand side, basically it is just a smaller version of the dhol. The left hand side membrane has a special coating on the inner surface (dholak masala), which lowers the pitch and provides a well defined tone. Both ends and wooden body is tied with strips of *Dendrocalamus strictus*. The wood of *Acacia nilotica*, *Azadirachta indica*, *Dalbergia sissoo* and *Mangifera indica* is used in this instrument.

## **Tambura**

The tambrua is a stringed instrument that is played as a folk instrument by tribals. It is one of the long neck lutes. It is usually stringed with 4 or 5 metal strings. The instrument is played by plucking the string with ones finger. Long piece of wood is attached over rounded part of the body. The wooden materials used for the construction of the body are *Acacia catechu*, *Mangifera indica*, *Moringa oleifera* and *Dalbergia sissoo*.

## **Algoza**

Algoza is a pair of wooden flutes and the player works the Algoza by alternating three fingers on the holes on each side. A vigorous and swinging rhythm is created when the player breaths into the algoza rapidly. Hollow dry stem of *Calotropis procera* or bamboo are used for the pipes of the instrument which may be tied by string or held at an angle.

## **Ravanhatha**

Ravanhatha is an ancient bowed violin. The bowl is made of a cut coconut shell that is covered with goat hide. A long piece of *Dendrocalamus strictus* is attached to this shell. The two main strings are made of steel and horsehair respectively. It is played with a curved bow of horse tail hair draw across the strings

with rhythmic jerks. It is held by the left hand, the resonator resting on the left side of the chest

## **Fun with Plants**

### **Wooden tricycle (*Gadula*)**

A trick made up of three wooden wheels which are attached to each other with three flat wooden piece of *Prosopis cineraria* or *Acacia nilotica*. Sometimes it is made by *Tecomella undulata*. This tricycle will be fun for baby from about a year old. The toddler pushes it with the built in handle and learn to walk.

### **Slingshot (*Gulel*)**

It is a Y shaped toy which requires a Y shaped stick, some rubber bands or rubber cut from old inner tube, small diameter string and some old shoe leather or suitable material to make a small pouch to hold projectile. The hardest part of making the slingshot is finding good handle. *Maytenusemarginata* is commonly used for making gulel in the study area, because it has a lot of forked limbs and the wood is light weight and strong. Children used this gulel for running away birds, because they spoil their foodgrains and fruits.

### **Pupadi**

The leaves of *Ficus benghalensis*, *F. religiosa* and *Holoptelia integrifolia* are folded and held between the lips and blown like a whistle. This is the simplest musical instrument of rural children.

### **Toy Truck (*Gadi*)**

Rural children played with self made toy truck trailed by them on the roads. Wheels are made of wood of *Acacia nilotica* or *Prosopis cineraria*. Sometimes wheels made of iron wire or rubber is also used.

### **Gilli – Danda**

Children play on ground with gilli-danda, made from wood of *Prosopis cineraria*.

### **Bow and Arrow (*Tir-Kaman*)**

Children play with self-made bow and arrow. It is made of wood of *Morus alba*.

### **Swings (*Hindo*)**

Rope Swings are created by tying one end of a length of rope to a tree branch. A knot or loop is usually put on the other end to prevent fraying and help the swinger stay on. A wooden plank, made from *Acacia nilotica* or *Tecomella undulata* is suspended on both sides by ropes from a tree branch.

### **Plant Species in Rituals**

Many plant species are utilized in different traditional magico-religious by the folk and rural people inhabiting near Baleshwar forest area. Traditional socio-religious information of plant species used in different rituals was collected through participation in ceremonies and semi-structural personal interview with the knowledgeable elderly people. The collected plant species were carefully identified and enumerated with the help of relevant scientific literature.

#### **2.9.4 Wild Edible Plants**

The Baleshwar protected forest is enriched with many wild edible plants which are still consuming more or less by tribal and rural people inhabiting near the area. Information regarding the utilization of wild edible fruits and vegetables were obtained through interview, field observation and group discussion. The wild edible plant species are arranged alphabetically along with their botanical name, local name, family and their usage.

## **Chapter- 3**

### **Present Management and Practices**

#### **3.1 Management History**

##### **3.1.1 General History of Forests:**

This area has been a part of Sikar Forest Division, Sikar Forest Division was created in the year 1980. Before the year 1980, the forest area of this forest division was a part of Jaipur Forest Division.

In the year 1885, Shri E. McMoyer was appointed Deputy Forest Conservator, North Western Region, by the Government of India on the request of the State Government to discuss about forest conservation. Shri Moyer conducted a thorough inspection of the forests of the state and divided the forest area into 4 divisions, Northern, Southern, Eastern and Western Divisions. He divided the forests into 3 categories.

- (a) First Class Forests (Class I Forests) Grazing was completely prohibited in these areas.
- (b) Second Class Forest (Class II) Area opened for free or paid grazing by limited animals.
- (c) Third Class Forest (Class I) Illegal felling was prohibited in this area, but grazing was allowed.

He laid special emphasis on protection from forest fires and demarcation. He advised to implement the 'Bhavnadantk' system for the management of forests. He also mentioned conservation treatment (Bhavnadantk) and afforestation work at a limited level. For plantation, he advised to plant seeds of mango, jamun, sheesham, bamboo and local species like babool, khejri, kheri, siras, ronjh etc.

For the management of these forests existing at present, in the year 1923, Shri G.A. Karol Forest Superintendent expressed the need for a forest policy which was the first attempt made for forest conservation. For the management of forests, he appointed some forest staff and established nurseries. He proposed annual pruning and thinning every five years. He also suggested that plantation areas should be effectively closed for grazing for 5 years.

In 1926, he prepared a forest management system and started exploitation by making some pits (Bavancham). Since the sequence of exploitation of forests was not determined in the system, good forest areas were exploited. Besides, due to unscientific felling of trees, tall

stumps were left and due to ineffective fencing, new branches were destroyed due to illegal grazing. This had very disastrous adverse effects on regeneration.

During November 1936, the Government of India appointed Mr. H.S. George, IFS, Deputy Forest Conservator, Central Zone, Jaipur State. He suggested that the forest areas should be surveyed on a map of 4 inches per 1 mile scale by the Indian Survey Department and that forest boundaries should be determined. Various rules were also made regarding the removal of dry wood and thorny bushes, cultivation of lac, removal of Kadaya lap, etc.

Forest Manual was prepared in 1937, which mentioned various types of instructions like the structure of the forest department, duties and standards for the staff of all cadres, constitution of State Forest and its determination, etc.

In 1940, the control of the forest department remained under Colonel Kesari Singh. Colonel Kesari Singh developed hunting grounds, so that some selected places should be selected and managed only for wildlife. The forests of Sikar and Khetri bases were managed by their private forest departments and sometimes only technical advice was given by the Forest Conservator, Jaipur.

### **3.1.2 Past methods of management:**

Earlier, the forest area was managed by the general coppice system. The rotation period of which was fixed for 30 years. There were no annual copses prescribed in any regular felling category. In 1937, permits were issued for commercial cattle rearers like Banjara etc. at the following fees -

1. Cow - 06 paise/cow unit/per year
2. Buffalo - 12 paise/cow unit/per year
3. Camel - 50 paise/cow unit/per year
4. Goat 12 paise/cow unit/per year

Forest areas were divided into the following 3 sections -

Class - I (Class I) This class included all such areas in which strict control management was to be implemented so that scientific exploitation and reproduction could be done. Grazing was prohibited in these areas.

Class - II (Class II) This class included all such areas which were in transitional stage (transitional) and which were proposed to be converted from second class to first class after land conservation works. Controlled grazing was allowed in these areas.

Class-III (Bhuttam) All such remaining areas were included in this class in which the possibilities of improvement were weak, in which it was not possible to get work done nor it was possible to stop grazing. At the time of Jagir abolition, leases were issued to contractors of good forest areas at a nominal fee. Some areas were initially completely cleared by felling (Basmantmisad) but later felling work was started by making an executive plan. Special works for improvement in forest areas:

During the year 1945-46, forest checkpoints were also constructed at many places during the time of Colonel Bhairu Singh for the plantation of species like Dhaunk, Acacia, Neem, Juliflora etc.

The protected forest area which is controlled by Patan and Neem ka Thana range was under Khetri station. In Khetri station, plantation work was first started in 100 acres of area in Gadarata in 1924, Seeds of 80 kg of acacia (Babool), 150 kg of Dhaak and 70 kg of Neem were planted. In 1925, this plantation area was expanded and 40 kg of seeds of teak, endu etc. were planted in this area. This work was also completed under the supervision of Mac'donell. Research plots were set up for the species of acacia, Pro. juliflora, churail, mulberry, faras and grasses like antropogon, savan, dhaman, karda, panicum antidotel etc.

After the formation of Rajasthan in 1950, many reform works were started such as afforestation work in those areas which were affected by wind erosion, reforestation of old Jagir forest areas, creation of paddocks, soil conservation work in various areas, commercial plantation work was done. During the implementation of various five year plans, old nurseries were expanded and new nurseries were created to prepare a good quantity of plants.

(1) Nursery and plantation work -

The following works of afforestation were done in these forest areas with the formation of Rajasthan. Nurseries were created.

(2) Improvement work of defined forests -

| Range       | Sr. No. | Block         | Area    |
|-------------|---------|---------------|---------|
| Neemkathana | 1       | Pappurna      | 1962-63 |
| Neemkathana | 2       | Badi Pappurna | 1963-64 |
| Neemkathana | 3       | Gawadi        | 1964-65 |

**Period from 1966 to 1980**

For the first time in the history of forest management of Jaipur district, a plan for scientific management of forests was prepared by Shri Verma ji. Forest blocks and divisions were marked on GT sheets. Their boundaries were determined in the prescribed area and the history of the divisions was recorded. Neemkathana was included in this work plan. 160,830 hectares of forest area was included in 23 forest blocks under Neem Ka Thana Range. Out of this, 11 forest blocks of 80690 hectares were included in Jhunjhunu district, which were included in the work plan of Shri S.K. Verma.

The main objectives of Shri Verma's work plan were to improve the condition of grass/pastures by including high quality grass species and cyclic grazing. To give importance to the protection and conservation of wildlife for economic prosperity and entertainment. To ensure the receipt of maximum and continuous revenue and produce from forests in accordance with the scientific principles of forest policy. To achieve these objectives, the following forest management circles were structured:-

1. Coppice with Standard Management Circle (CMS)
2. Rehabilitation Management Circle (RTM)
3. Improvement (Overlap) Management Circle (IMO)
4. Plantation Management Circle (Plantation Management Circle)
5. Grass and Pasture Management Circle (Grass-Grass Management Circle)
6. Protection Management Circle (PRM)
- 7 Restoration Management Circle (Vaastu Rejuvenation Management Circle):

All the defined Dhonk forest, Khair forest and desert dunes, bushes were included in this management circle. In this management circle, the area of Neem Ka Thana was determined

under this circle. Neem Ka Thana Range (Dokan and Gawadi) were included. The details of the included area of Dokan forest blocks of Neem Ka Thana are as follows:-

**Sl.No. Range Forest Block Division No. Area**

**1NeemkathanaDokan 1 242.8 3 145.6 8 98.7 10 195.4 11 218.5 14 153.7 15 356.1 16 335.9 17 178.1 20 182.1 22 182.1**

**Total 11 Portfolio 23 89.20**

**2 NeemkathanaGawdi1 341.9 2 232.7 3 283.3 4 1225.9 5 481.5 6 457.2 8 1080.3 9 657.9 10 517.911 416.712 414.7**

**Total 11 Portfolio 6110.00**

Out of the above mentioned 13728.5hectare area, the sequence of works under this Management Circle for 3650 hectare area during the work planning period was as follows-

7.2.8 Improvement Works Management Circle (Overlap): Such areas were included in this Management Circle which were found in the form of sandy dune areas deposited on the foothills of the hills. Thus, this Management Circle will also overlap with all other Management Circles. 3120.1 hectare area of Gavari Forest Block in Neem Ka Thana Range was under this Management Circle.

**S.No. Range Forest Division Portfolio Number Area**

**1 Neemkathana Gawadi 4 1225.9**

**16607.3**

**17 1286.9**

**Total 3 3120.1**

The work sequence of the area to be treated was as follows year wise-

**Year Range Forest Division Portfolio Proposed Area**

**1967.68 Neemkathana Gawadi 4 200**

**1968.69 Neemkathana Gawadi 4 200**

**1969.70 Neemkathana Gawadi 17 200**

**1970.71 Neemkathana Gawadi 17 200**

**1976.77 NeemkathanaDokan 1 100**

## Security Management Circle (SMC)

Kept in this management circle. In these circles, barren hills of deforested and treeless forest areas were included. The details are as follows:-

S. No. Range Forest Block Division Number Area

1 NeemkathanaDokan 2 210.4 4 226.6 5 226.6 6 307.5 7 216.9 9 283.3 12 153.8 13 348.0 18 117.3 19 416.7 21 210.4 23 315.6 Total 1 2 3037.5

2 NeemkathanaPatan 1 258.9 2 258.9 3 242.8

Total 3 760.6 9 NeemkathanaGadrata 1 to 17 consecutive 4435.4 10 NeemkathanaGavadi 7 and 13 to 25 12355.0

**Main objective:** To provide effective security to these areas and to give sufficient time for the area to re-establish itself by keeping the areas free from grazing, encroachment etc.

### Wildlife Management:

Details of wild animals were mentioned in detail in Verma ji's work plan and the importance of wildlife protection was accepted and emphasis was laid on their preservation and strict restrictions were laid on the trade of wildlife horns, skins and trophies. It was proposed that hunting of unwanted wild animals should be done only by valid license holders. Proposals were given for the development/improvement of the zoo. The work of maintaining wildlife was done by the Wildlife Branch of the State Forest Department as per the availability of budget provisions and later in the year 1972, Wildlife Protection Act 1972 was implemented for effective protection of the wild animals available in the forest division.

1. Vegetation and ecology of dense forest area of more than 0.4 in the forest protection overlap minutes in the work plan (from 2012-13 to 2021-22)

In this work plan to save Tiki, such dense areas were kept in a separate category in the land conservation and management agenda. In the forest protection (overlap) circle, apart from fencing in the outer areas of all forests, demarcation and settlement and treatment related to revenue, intensive patrolling and forest land protection were proposed.

2. Medium dense forests and open forests were included in the land conservation and rehabilitation work circle. Tree plantation management agenda, grass grazing agenda were

also kept. Those areas have been kept in the wildlife management circle which have been declared as wildlife protected areas or the process of declaring them as such was proposed. All forest areas and non-forest areas were kept in the wildlife overlap management agenda and technical treatments were proposed. Non-timber forest product (overlap) work circle was also determined. In the plantation management agenda for vilayati acacia, treatment of singling instead of felling was proposed. Forest medicine development was included in the minor forest produce (overlay) management agenda. Provision was made to prepare management plan for ecotourism. Tourist and religious places situated in forest areas were included.

Such religious and historical places which have the possibility of ecotourism in forest areas were identified and proposals were made to develop them for ecotourism which are located in forest areas. Baleshwar, Ganeshwar, Tapkeshwar, Daudham, Kalakota and Chatarpura of Gawadi block are protected forests due to religious places. Activities were proposed to protect these areas and develop them as tourist places and to awaken the general public for forest conservation.

### **3.2 Habitat Management and Protection**

Strengthening of communication system is the need of the hour for forest security and conservation and to prevent forest crime, illegal mining, hunting etc. for which modern weapons and mobile patrolling team/rescue team with weapons to deal with organized crime are proposed as per the police system. Women personnel to deal with women criminals, prison to keep criminals, cavern house to keep cattle, means of wireless and mobile telecommunication and availability of jeeps/gypsies in ranges and motorcycles at check posts are proposed.

Reform of mining areas: Such areas which have been affected due to leases approved in these areas in the past years, illegal mining and in which no mining lease is approved now, will be included for remediation.

#### **3.2 .1 Forest settlement and demarcation:**

The status of entry (revenue revenue) of forest land in revenue records as per the format mentioned in Rajasthan Forest Settlement Act 1958 is satisfactory. There has been a lot of progress in the maintenance of towers on the forest boundary in the last decade, the work of

installing some towers is still pending. In the absence of towers, the status of forest boundary is not clear, which encourages those who encroach on the forest boundary and creates difficulty in the work of forest protection. The determination and maintenance of forest boundary should be done according to Section 6 of the Rajasthan Forest Settlement Act. Some limit of the plantations to be done on forest land under various development schemes should be made on the forest boundary as far as possible so that maximum forest boundary can be demarcated. It is proposed to install the remaining towers within the time limit of 5 years prescribed in this action plan.

### **3.2.2 Illegal felling:**

Illegal felling is continuing due to which not only forests are getting destroyed but natural disasters like soil erosion and famine are increasing. This is now the result of population growth. Honorarium should be fixed for each meeting of village-wise forest protection and management committees at local level for regular organization and conduct of their proceedings so that good coordination and harmony can be established between forest workers and local people through regular meetings.

### **3.2.3 Saw Machine Control**

Except the registered saw machines of this area, action will be taken to immediately close all the remaining unregistered saw machines and action will be taken against the saw machine owners under Rajasthan Saw Machine Act.

| S. No. | Name | Range | Number of registered saw machines | Number of unregistered saw machines |
|--------|------|-------|-----------------------------------|-------------------------------------|
|--------|------|-------|-----------------------------------|-------------------------------------|

|   |             |    |    |  |
|---|-------------|----|----|--|
| 2 | Neemkathana | 17 | 52 |  |
|---|-------------|----|----|--|

|   |       |   |    |  |
|---|-------|---|----|--|
| 6 | Patan | 3 | 18 |  |
|---|-------|---|----|--|

### **3.2.4 Encroached Area:**

In many places in forest areas, forest areas are encroached in the form of strips on forest border, around rivers, streams and water flow and in scattered form in the forest area in the form of small holdings. These encroachments will be evicted as per rules and the area will be treated as per its classification. The details of encroachment on forest land are as follows -

Sl. No. Name Range Case Number Affected Area (in hectares)

2 Neemkathana 17 52

6 Patan 3 18

### **3.2.5 Control on illegal transportation**

Looking at the statistics of forest crimes, it is known that illegal transportation of forest produce also takes place here. In this, mainly wood from revenue area is illegally transported on unregistered aramsheens. Therefore, it is proposed to control illegal transportation by reorganizing the patrolling team and providing them vehicles and other resources.

### **3.2.6 Illegal Mining**

Illegal mining was taking place in the following areas of Sikar Forest Division, and the problem of illegal mining has been serious in the past. In such forest blocks where there has been a problem of illegal mining in the past and this area has been affected by mining in the past, it is proposed to treat these areas. The division wise details of previously mined areas in the following forest areas of this forest division are as follows:-

Sl.No. Range Forest Block Division No. Area Hectare Mined Area

1 ShrimadhopurGaonwadi - Partial 34 686.4 10

2 NeemkathanaGaonwadi - Partial 9 900.7 5

3 NeemkathanaGaonwadi - Partial 15 812.02 5

4 NeemkathanaGaonwadi - Partial 16 645.27 5

5 NeemkathanaBucharā 'A' 1 166.70 5

6 NeemkathanaSaiwad A 1 81.3 5

7 NeemkathanaSaiwad 'Main' 3 439.7 5

8 Patan Dokan 8 745.26 45

9 Patan Dokan 9 720.37 50

10 Patan Gaonwadi - Partial 31 1426.75 25

11 Patan Gawadi - Partial 32 923.61 15

12 Patan Gawadi - Partial 33 392.19 15

### **3.2.6.1 Treatment of mining areas:**

1. Prepare a time-bound action plan for the areas to be improved.
2. For the development of each mining affected area, make a detailed assessment of its existing status, categorize them and prepare a microplan for the development of the area as per the requirement of the area.
3. Use the local technology available for the development of the area, so that by obtaining information about the efforts made in other areas with a view to improving similar areas, prepare a category-wise model of improvement.
4. Get the participation of local citizens in the mining affected forest area improvement work.
5. Construction of cement masonry wall for complete closure of mining affected areas
6. Strictly closing the access roads to the mining area and destroying them and doing land conservation work on them.

Sowing or spreading seeds in the notches in mining affected areas. Care should be taken that the seeds do not reach these areas.

Double the quantity of seeds should be planted or spread in the mines. These seeds should be of the species of Raujh, Kumtha, Khair, Ber, Julieflora and suitable thorny species. If these seeds also do not regenerate, then only the seeds of Pro Julieflora should be planted or spread. In such mining affected areas, suitable useful local species of trees and grass seeds should be planted for three consecutive years.

For the development of every mining affected area, its existing status should be assessed in detail (Purification Assessment), and after categorizing them, a time bound micro plan of development should be prepared according to the area. During the survey of mines, GPS readings should be taken and the related work should be recorded in the register.

Wherever soil of sufficient depth is available, large saplings of Bad, Peepal, Karanj, Churail should be planted and the water collected in the mine area during rainy season should be used for irrigation of plants (by irrigation).

Tree plantation work should be done as per the method shown earlier.

While selecting the work sites for tree plantation work, old mining areas should be given priority.

In the sensitive areas of illegal mining/encroachment, 60 km of stone wall should be built.

### **3.2.7 Forest fire protection system (Forest Fire Protection System)**

The present system of fire protection is not satisfactory. In this district, fire lines are only for name sake because due to continuous neglect, their condition is very dilapidated. There is always a danger of fire in the forests of this district and every year fires also occur in them. Hence the following steps will have to be taken for safety.

#### **Fire Line Development**

Fire line development in a conservation reserve refers to the creation of controlled boundaries or barriers to manage and prevent the spread of wildfires within protected or sensitive areas. These fire lines are typically constructed by clearing vegetation or digging trenches to halt or redirect the fire's progression, ensuring that critical habitats and ecosystems are protected from destruction.

Here are the key steps and considerations involved in fire line development in a conservation reserve:

1.     **Assessment and Planning:**
  - **Fire Risk Analysis:** Determine areas most at risk from wildfires and identify vulnerable habitats or species.
  - **Location:** Plan the fire line in areas that do not disrupt important ecological features or wildlife corridors.
  - **Access Points:** Ensure the fire line is accessible for firefighting personnel and equipment.
2.     **Fire Line Construction:**
  - **Clearing Vegetation:** Remove vegetation, such as shrubs, grasses, and trees, that could fuel a fire. This can be done manually or using machinery.
  - **Trenching or Plowing:** In some cases, creating a physical barrier, such as a trench or plowed soil, may be necessary.
  - **Water Sources:** Access to water is critical for fire management, so positioning fire lines near water bodies or establishing water points along the line is important.

3. Monitoring and Maintenance:
  - Regular Inspections: Fire lines must be regularly inspected and maintained to ensure their effectiveness, especially after rainfall or plant regrowth.
  - Vegetation Control: Invasive or fast-growing plants may need to be managed to ensure the fire line remains clear.
4. Ecological Considerations:
  - Minimizing Ecological Impact: It's essential to balance fire line construction with the goal of preserving natural ecosystems, ensuring that fire lines do not disrupt biodiversity or wildlife habitats.
  - Buffer Zones: Create buffer zones around fire lines to prevent accidental ignition outside the reserve and to protect neighboring land.
5. Coordination with Local Authorities:
  - Collaboration: Fire line development often requires coordination with local fire management authorities, environmental agencies, and community stakeholders to ensure that fire management plans align with broader regional fire safety goals.

Fire lines are a critical tool for wildfire management, but their design and implementation must be carefully considered to maintain the integrity of conservation areas while also mitigating fire risks.

To keep the forest areas safe from fire, it is necessary that information about fire incidents is received on time and the spot is reached immediately. It is also necessary to be trained for fire extinguishing. For this, the following steps will be taken:

1. The members of the Forest Protection and Management Committee should be given necessary knowledge and training regarding the sources of fire incidents, their characteristics, permanent and temporary damage caused by them and their prevention.
2. Especially in the summer months, the members of the committee should be made bound to monitor the fire incidents.
3. In case of a fire incident, the name, designation and contact number of the contact officer etc. should be prominently displayed in the forest areas, populated areas and on the roads passing through the forest area.

4. Those who report incidents of fire in forest areas and those who help in preventing fire should be encouraged by giving those suitable rewards or prizes.
5. Every incident of fire in forest areas should be taken seriously. Even the smallest incident should be recorded. The regional forest officer should himself investigate it and learn a lesson from it. Recurrence of fire incidents in the area should be curbed.
6. Register of fire incidents, register of fire lines and map of fire incidents should be maintained at check post, range and forest division level.
7. Maintenance and cleaning of fire lines should be done every year.
8. Fire guards should also be deployed in summer season.
9. There should be provision of funds in the annual budget for compliance of the above.
10. Fire watch towers should be constructed at various places.

This reserve is protected by the concerned RFO and field Staff.

### **Hunting**

Hunting is completely prohibited in the area and hunting is not a problem in this area.

### **Poaching**

Presently there is a no problem of Poaching in the Conservation area. Staff is vigilant about poaching.

### **Illegal cutting of trees**

In the past, Illegal cutting of trees was in practice but now a days area is being closed by Pucca wall. This activity has reduced. Adjoining people are now protecting Khejri and Dhonk.

### **Encroachment, other illegal activities and Illegal removal of NTFP**

Around 20.54 ha. of land is under encroachment and action to get rid of them is being taken. Illegal NTFP collection is not prevalent. Grass is shared through the EDC/VFPMC.

### **Livestock grazing**

The main occupation of people around the area is animal husbandry and agriculture. Grazing by cattles will be completely prohibited by the pucca wall construction around the area is in progress for protection.

### **Wild fires**

There are 64-69 Ha. area recent affected by wild fires.

### **Insect attacks and pathological problems**

There are no reports of insect attacks or pathological problems.

### **Wildlife health**

In general the health of wildlife is good.

### **Inter agency programmes and problems**

MJSA, Campa, CSS, State plan, MNAREGA Schemes for plantation & conservation and developments are the programmes of government that are undertaken. Inside the conservation area such works are seldom undertaken like eco restoration, Boundary wall and city afforestation etc. The major problem is to get funds from these agencies.

### **3.3 Forest Resource dependency of local communities/Major Land use in larger landscape**

The dependency of local people on forest products is recognised as an essential driver of sustainable forest conservation and restoration, but empirical studies evaluating it are scant. Some households were interviewed in surroundings village, along with key informed interviews and focus group discussions with the villagers and government staff. Results suggest that education level, livestock size, and distance to the forest as the key factors that are negatively and significantly associated with forest dependency; whereas, only landholding size was negatively and significantly associated with forest dependency in some areas. On the other hand, the other two variables, family size and age, were insignificant. The income derived from forest has been accounted second-largest share after agricultural income to the total annual household income. Fuelwood was the major forest product and was largely extracted by the local communities. The active participation of locals in biodiversity conservation and forest management is required.

The rural communities of Rajasthan are less dependent on the forests in comparison to other Indian states. However, their dependence is still substantial, especially for fuel wood, timber and fodder, the forests also provide the rural communities with fruits, gum, and bark, which they can sell to supplement their income.

In this area, Pani Poola, Gum, Dhak, Honey-wax, Luganpatari, Grass, Fruits-Flowers etc. are found.

### **Pani Poola:**

Munja is found in forest areas, caves, and development works being done on community land, pastures, grazing lands and on the boundary of agricultural land. It is also known as Pani Poola. The department earns income. Munja has made its place as a very useful product in rural lifestyle.

The suitable place for Munja is open deep soil areas without vegetation.

In forest areas, Munja is available in good quantity only for the first 3-4 years of plantation, after which the production of Munja also gradually decreases when the plants grow. Munja is auctioned every year in July-August at the forest division/range level and is harvested every year in October-November. Regular harvesting leads to good growth of Munja. If Munja is not cut, its production and quality gradually decreases.

- Munja is mainly used for huts for local residents, cattle sheds, huts for fodder, rope making, Mudda industry, Vinegar industry etc.
- Munja has an important place in the construction of huts in tourist areas and cheap temporary housing for villagers through Vinegar in urban areas.
- Fifty-fifty percent of the net income from the auction of Munja should be given to the Forest Department and the Gramya Van Suraksha and Management Committee so that public participation can be increased by taking the cooperation of villagers to ban illegal extraction.

### **Loom Patadi:**

Lum Patadi of Khejri tree holds an important place among non-wood forest products.

Khejri has two fruits in a year and its fodder is nutritious and is a lifesaver for farmers in dire circumstances like famine. The raw pods of Khejri are known as "Sangri". A delicious vegetable is made from dried Sangri. It is sold at a very high price in the local market. Apart from this, small and less thick branches of Khejri are used in Havan and as fuel.

### **Paan - Cheela:**

It was found in abundance in the hilly region and its foothills, but due to increasing population pressure, illegal mining and illegal felling, the number of Dhaak trees has decreased considerably. Nevertheless, Dhaak is still found in the above mentioned forest blocks. At these places, auction of Dhaak leaves as "Paan-Chhila" was done every year till

the year 2005-06, but now it could not be done due to minimum quantity of trees of the said species in the area.

Paan-Chhila is mainly used for the leaf plate industry. In rural areas, families of the barber caste used to collect Dhaak leaves to fulfill the local demand.

Participation and protection in management should be encouraged as before through the medium of rural forest protection and management committees.

### **Honey and Wax**

Honey and wax are found in forest areas. Honey is used in medicine making, cosmetics, beverages and as a material for worship of God. Wax is a multi-purpose forest product. The district receives an income of about Rs 35-40 thousand per year from honey and wax contracts. Participation and protection in management should be encouraged as before through village forest protection and management committees.

### **Gum, Tannin and Lac Minor Forest Produce**

It would be better to use the bark of the indigenous Babul found in the area for dyeing. Efforts to produce “lac” on ber bushes can prove useful. Amla, Bil and Ber fruits should also be collected under public participation as above. In the past years, so much gum and oleo-resin has been extracted from Kadaaya and Salar that the trees have dried up. The state government has imposed a complete ban on the extraction and collection of Salar and all other types of gum for an indefinite period. The help of local protection committees should also be taken to stop the illegal collection of these minor forest produce. There should be a provision to distribute 10 percent of the incentive amount as a reward to informers or people who cooperate in preventing damage in forest areas so that forest workers and representatives of committees keep getting public support.

### **Reproduction of Salar - Salar trees can be reproduced through root suckers as follows:**

1. Around the selected Salar trees, in accordance with the canopy of the tree, obstructing the slope, dig a circular trench of 45 cm wide and 45 cm deep of appropriate length with a radius of three to five meters downwards and compact the soil in the shape of a mound at the bottom.
2. The roots of Salar which are visible in the trench should be peeled and cut with a sharp tool on both sides of the trench. Salar root shoots should be produced from these cut roots.

3. To establish the root shoots developed in this way, after the first rain, in the month of September-October, these root shoots should be cut and separated from the roots of the mother tree. Trees should be prepared by maintaining the root shoots. The work of reproduction through root suckers in the salar should be done in such a way that all the trees available in the selected area can be treated in five-six years. This will help in getting trees of different age groups of these trees in the future.

### **Ratanjot:**

Ratanjot is mainly an oil seed whose demand has increased in recent years. Grazing is done in the forest.

This species is not grazed by cattle, but in the district, Ratanjot is mostly found in the form of fencing of houses, on the boundary of fields and at some places along the roads. In departmental plantations, seeds should be planted along the fencing and on the contour trench and furrow mound at the end of June. By planting seeds in the plantation pit or other dug soil, contour furrows of soil conservation works or in dug soil elsewhere, this valuable species can be nurtured by germinating and protecting Ratanjot. There is a need for detailed scientific study regarding the amount of usable oil and other chemical substances in the seeds of Ratanjot found in the district.

### **Minor forest produce with medicinal properties:**

Considering the condition of forests, minor forest produce with medicinal properties can be promoted in the forest area. But authentic information about their current availability, area of their existence and extent etc. is not available. There is a need to collect information by conducting detailed survey and study for the management of plants and tree species having medicinal properties found naturally in the district. At present, a programme can be taken up to conserve and promote the following important medicinal species on visual basis:

Google is available in abundance in Dokan forest block of Patan range, which needs conservation. Apart from this, Karanja, Safed Musli, Konch, Chirmi, Google, Amaltas, Shatavari, Amla, Brahmi, Adhatoda, Kadaaya, Bel, Ashwagandha, Shankhpushpi etc.

## **3.4 Eco-Tourism and Interpretation**

This area is very important from the tourism point of view. There are many tourist places. People from all over the country come to visit Baleshwar Dham in Neemkathana,

know the importance of this Dham. Sikar's Baleshwar Dham pilgrimage site, located in the valley of Aravali, is famous for its natural as well as religious importance. Apart from Rajasthan, Haryana, Punjab, devotees from all over the country come here. In the month of Sawan, about two lakh devotees come to visit Mahadev. Know the history and importance of the pilgrimage site below.

The famous Baleshwar Dham of the district is located 15 km from Neemkathana. In the deep valley of the Aravalli mountain range in the eastern direction, there is a wonderful great pilgrimage of spiritual faith with archaeological importance, which is famous by the name of Swayambhu Baleshwar Mahadev. Since ancient times, the child form of Adidev Swayambhu Lord Shiva has been recognized as a huge Shivalinga here. Throughout the year, the huge Shivalinga of the child form of Shiva attracts the devout Shiva devotees and has the power to fulfill all their wishes. It is a popular belief that Baleshwar Mahadev is a self-manifested Shivalinga, that is, he himself appeared by tearing the chest of the earth. In the month of Sawan, the hills remain covered with greenery. The famous Mahadev temple of the pilgrimage center Baleshwar is located in the foothills of the hill. Apart from Rajasthan, Haryana, Punjab, devotees from all over the country come here. In the month of Sawan, about two lakh devotees come to see Mahadev.

An inscription written in Prakrit language is found below the Ganesh idol on the northern wall of the temple complex, which praises the antiquity and grandeur of this place. Thousands of years ago, Suryavanshi kings had built a huge Shiva temple on this fertile rocky holy land surrounded by water sources to protect this Swayambhu Linga, which was recognized as a pilgrimage center in the whole of India. Over time, this center of faith fell prey to natural disasters and atrocities by terrorists. Yet, the statue has not suffered any damage till date. It has been the family deity of many tribal communities along with the Patan royal family. Even today, the supernatural image of the worldly faith of all sections of the region along with the Patan royal court can be seen towards this place. The fragrant breeze of Rudra Sukta and Mahamrityunjaya Mantra from the mouth of Vedic Brahmins in groups can be experienced all year round.

Earlier, there was another popular belief that the cows, which were not milked by the tribal shepherds, themselves used to perform milk Abhishek of the child form of Shiva. From the leaf sheds, a small hut was built and sixty years ago, the small hut was again converted into a temple complex. Ten years ago, a family of Shiv devotees residing in Delhi had again renovated the temple, at that time, after digging the foundation to a depth of fifteen-twenty feet, we had the good fortune and opportunity to see the infinite length and

height of this self-created Linga, Baleshwar in child form and the size of the largest form. Hari Anant Hari Katha Ananta. Here, the daily Abhishekam of the self-manifested Shivling with water streams, accompanied by chants of Om Namah Shivay, Har-Har Mahadev, Jai Bholenath, Bam-Bam, Jai Baleshwar Nath, Jai Baleshwar Baba etc., captivates the mind and fills the devotees with Bhakti Ganga.

People also say that in the Mahadev temple of Baleshwar, devotees see the child form of God. There is a fig tree just behind the temple. They tell of the time when they started worshipping the Shivling. Water seeps from the hill through the roots of the fig tree and collects in the pit. Elders say that bathing with the water collected under the fig tree cures diseases. It is also interesting that only one and a half feet of water collects under the tree, neither more nor less, while devotees bathe here throughout the day. There is also a pond built here, it used to have water earlier, but it got damaged.

There is ample scope for ecotourism here. To create a sense of love and awareness towards heritage and nature, dense forests near religious places, which are protected by the sentiments of local residents, which are the natural forests known as Gods' Forests, will be protected by increasing the participation of local villagers. The following are the objectives of promoting ecotourism.

- (1) Natural forests are protected by local residents around religious places as Gods' Forests. Such forests should be developed for tourism, local villagers should be involved in it and economic support should be made and biodiversity conservation should be ensured by increasing their participation.
- (2) Conservation of forts, palaces and other heritage sites situated in forest areas so that ecotourists can reach here for the purpose of education and entertainment.
- (3) Training local residents as nature guides and making them partners in ecotourism so that an additional source of their income is created and their attachment to environment and natural resources can become deeper.
- (4) Creating a sense of conservation of forests and wildlife among the common people. Organizing environmental camps for students to increase their love and understanding for nature.
- (5) To help in improving the educational level of people by increasing their interest in nature. To create awareness among the general public about nature, environment and local culture.
- (6) To remove the myths and fear about wild animals and to create a sense of their importance, conservation and tolerance towards them.

(7) To inspire people to experience the natural beauty and its direct/indirect benefits themselves.

We would like to give recommendations and future scope:

- For sustainable ecotourism, there is a crucial need to create an effective balance between three elements: environment, tourist, and administration;
- Public and private ownership is required to enhance tourism-based services;
- Proper connectivity must be ensured to all the tourism-based locations;
- To maintain environmental harmony, it is essential to limit tourism activity in the ecofragile area. The administration must ensure it through proper channels;
- Rejuvenate the degraded forest by implementing various rules and regulations, and also limit access in that particular part;
- Educate the community regarding today's environmental conditions so that they care about a different aspect of life;
- Unemployment among the new as well as the old generation is also a major concern that must be removed by giving proper opportunity in tourism-based activity without harming nature;
- The administration must utilize human resources in different tourism activities by giving effective and essential training;
- The government must promote Rajasthani folk cultures by including them in different traveling packages;
- Encourage different co-operative societies to make agro-horticultural and animal-based products and run different types of businesses like canteen/restaurants in the tourist spots through those;
- It is essential to make an eco-friendly environment for sustainable ecotourism development;
- Advertisement and publicity are a crucial part of attracting tourists to the location; the government must take the initiative to give a proper allotment of funds from time to time in this regard;
- Utilize eco-friendly vehicles at a tourist location to make the environment free from pollution;
- Tourist circuit maps must highlight major tourist interest locations;
- In the sandy area, tourists may suffer a lack of connectivity and shortage of essential goods at major locations which must be neutralized by providing different rental-based bus and car operations;

- In contemporary times, the internet has become a crucial medium for exchanging geospatial data between users at various locations. It is imperative to enhance location-based information activities to enable tourists to provide feedback on their experiences at multiple scales. Such feedback can help to attract more tourists to the location and improve the image of the site among future visitors, making it an effective strategy for sustainable tourism development.

### **3.5 Monitoring: Monitoring and Evaluation practices used in the CR to date**

#### **3.5.1 RESEARCH & MONITORING**

There is lot of scope of research regarding flora and fauna in the conservation reserve area. Students will be allowed to research in the area as per approved management plan necessary permissions from CWLW office as per requirement. Any NGO or any other government organization will be allowed research as per prevailing rules of protected area. Monitoring of this area will be done by CWLW Rajasthan, CCF Jaipur and DCF Sikar and Subordinates.

#### **3.5.2 TRAINING**

Regular trainings for staff and Eco Development Committee members are carried out every year in improvement of various skills. This will also improve interaction between management and people.

##### **3.5.2.1 On the job Training**

There is a need for regular training of the officers to update their knowledge about the rules. Training workshops are also helpful in sharing of information between people doing similar jobs in different working conditions. Regular trainings and capsule courses will help to keep their knowledge updated regarding latest circulars, policies and their implementation in wildlife management.

Trainings should be organized for the staff every year hiring resource persons from such reputed NGOs. Knowledge of forest wild life area different court orders IPC, CrPC and Evidence Act is very essential for officers and staff to deal with the wildlife offence cases successfully. Help of Police, Law and Judicial departments will be taken for conducting purposeful trainings at regular intervals.

The staff and other persons to be engaged for wildlife census will also be given training in this regard. In addition field staff will also be trained in latest technology and procedures used in wildlife management. For the same experts will be called from reputed organization like WII, BNHS, SACON or WWF.

### **3.5.2.2 Formal Training courses**

Various formal training courses will be conducted on following subjects

Wildlife protection training

Flora and Fauna conservation training

Development works training

Fire protection training

Forest and wildlife offences training

Other training as per forest department manuals.

### **3.5.2.3 Establishing a learning centre**

On the Range office, Neemkathana and Patan a learning centre will be established and it will be the best training centre of flora and fauna conservation, management.

### **3.5.2.4 Themes identified for training**

- ✓ Wildlife Monitoring Techniques.
- ✓ Wildlife Health Indicators for monitoring in the field
- ✓ Dealing with man animal conflict and animals in distress
- ✓ How to handle dead animals and how to collect evidences from the spot
- ✓ How to prepare herbarium
- ✓ Weapon training
- ✓ Handling of tranquilizing gun
- ✓ Wireless equipment handling and care.
- ✓ Legal aspects
- ✓ Detection and framing of offences.
- ✓ Fire Drills - especially before the fire season for better fire fighting.
- ✓ Identification of pugmarks, tracks, dung pellets
- ✓ Identification of birds.
- ✓ Training in First Aid to man as well as animals.
- ✓ Training in use of audiovisual equipment.
- ✓ Computer Applications

✓ Vehicle repair in case of emergency

### 3.5.3 ECOSYSTEMS, WILDLIFE CONSERVATION STRATEGIES AND THEIR EVALUATION

Previously this area was managed through the prescriptions given under various Working Plans. However, due to biotic pressure the area has qualitatively suffered over the years. Grazing which was widespread has been stopped after notification of the reserve. Regular foot patrolling is being done to check this menace. Construction of masonry boundary walls and ditch fencing has helped in restoring the ecological integrity of the area. With inclusion of the area under protected area network, efforts towards biodiversity conservation becomes paramount.

The active management of the habitat has to be done in the area created for biodiversity conservation and for creating inviolate spaces for the panther. Grazing by domestic livestock has been stopped in the area since creation. The abundance of grasses will be increased by sowing of seed pallets during monsoon season as well as by planting grass slips prepared in the nursery. In future, this area will develop in plantations, SMC works, grasslands conservation, Seed sowing of indigenous species and habitats of fauna. Fruit plants preferred by wild animal and other species like Rohida, Khejri, *Acacia nilotica*, *Ailanthus excelsa*, *Cenchrus ciliaris*, *Zizyphus*, *Acacia senagal*, Bad, Peepal, neem, shahtoot, Jamun, Citrous spp. and *Capparis decidua*., *Cenchrus setegris* are planted to enrich the habitat.

Drinking water is being provided to the animals and birds by old talab, water hole, kheli and by a dispenser system called Water guzzler. This system has been very effective in preventing water wastage while providing drinking water to birds and animals. Rain water and water from tube wells will be used for fauna.

Patrolling along the outer boundary of the areas has the protection strategy from the inception of the area. This will help in identifying the breaches in the fence and staff could quickly repair the same. The staff rounds up the cattle pushed inside

A fine before releasing them as per prevailing rules. The areas by the villagers and impose During the rainy season, patrolling is intensified in the areas outside the area to check illegal cultivation.

Range Offices are situated in the Neemkathana& Patan and subordinate staff will look after Protection activities and patrolling in the areas & outside the area tor prevention of poaching.

Range forest officer and subordinate staff will also look into the strategies and comment on their efficacy and problems.

### **3.6 Administration and Organisation – Structure and**

For administrative convenience, the total area of conservation is under Neemkathana and Patan Range forest office, the office is also situated nearby conservation area for its better management. Deputy conservator of forest, Sikar also have regular visits and provide instruction to the sub ordinate staff for the better management of all works and progress. Five forester, ten assistant forester/Forest guards and Twelve Cattle guards are essential for administration.

## **Chapter 4**

### **Corridor status and functionality**

Wildlife corridors are strips of habitats that connect larger landscapes or ecosystems which may be fragmented by human settlements, infrastructure and other forms of disturbances. These corridors allow for the movement of wildlife across ecosystems, to enable foraging for food, connecting different populations for mating and other motives for migration.

Corridors can also be classified according to their shape: linear, stepping stone and landscape corridors. In India, wildlife corridors are most often differently identified and managed depending on the umbrella species – usually a charismatic or iconic species that are the focus of conservation efforts – that frequents each one. Currently, in the state recognises tiger corridors. As umbrella species, tiger corridors benefit a host of other wildlife and flora that inhabit the same landscape.

This conservation reserve situated beyond tiger reserves and not connected to tiger habitat which fragmented by human settlements, infrastructure and other forms of disturbances.

#### **4.1 Types of Corridor**

What is a Wildlife Corridor?

Corridors are passageways that connect one area to another. They may be seen in buildings connecting rooms together and thus referred to as a hallway. In cities, corridors and alleys may connect streets together with narrow passageways between groups of buildings. A wildlife corridor is a type of corridor that connects two areas of habitat together. The wildlife

corridor definition states that is a connection between two patches of land to provide a safe passageway for animals to travel through without having to cross potentially dangerous environments.

### **Types of Wildlife Corridors**

Wildlife corridors can be classified in a multitude of ways. One of the simplest classification systems is to divide them as either manmade or naturally-occurring. Manmade wildlife corridors are created to allow animals to pass between fragmented habitats. For instance, a new highway may bisect one part of the forest to another. While it may not seem particularly difficult to cross a narrow strip of road, highways can cause an astonishing number of deaths for wildlife each year via car collisions. Manmade wildlife corridors can be created and implemented for wildlife to safely travel from one area to the next without the need to cross the road, such as an overpass or underpass.

Wildlife corridors are areas of habitat that connect fragmented habitats, and can be designed for a variety of purposes:

- Ecological connectors: Wildlife corridors help smaller animals and plants move between isolated habitats.
- Human-wildlife conflict reduction: Wildlife corridors can help reduce conflicts between humans and wildlife.
- Conservation: Corridor projects can involve conservation on agricultural land, which can benefit local economies.

#### **4.1.1 Fragmentation analysis**

##### **Habitat Fragmentation**

May contain: nature, landscape, outdoors, scenery, aerial view, urban, neighborhood, and building

Example of habitat fragmentation

By habitat, we mean homes: space for food, water, nesting and shelter. When native vegetation is cleared or permanently altered, fragmented patches or islands are formed. Populations of plant and animal species within the islands are isolated and severely affected.

Habitat loss and fragmentation lead to a breakdown in ecological processes such as wildlife migration, seed dispersal, pollination of plants, and other natural functions that are essential for ecosystem health. The result is a decline in biodiversity (biological diversity) and local extinction of sensitive species.

Small fragmented habitat patches are correlated with lower species biodiversity, which means lower species richness and lower abundance/number of individuals. Habitat fragmentation is caused by natural factors and human activities. Natural fragmentation such

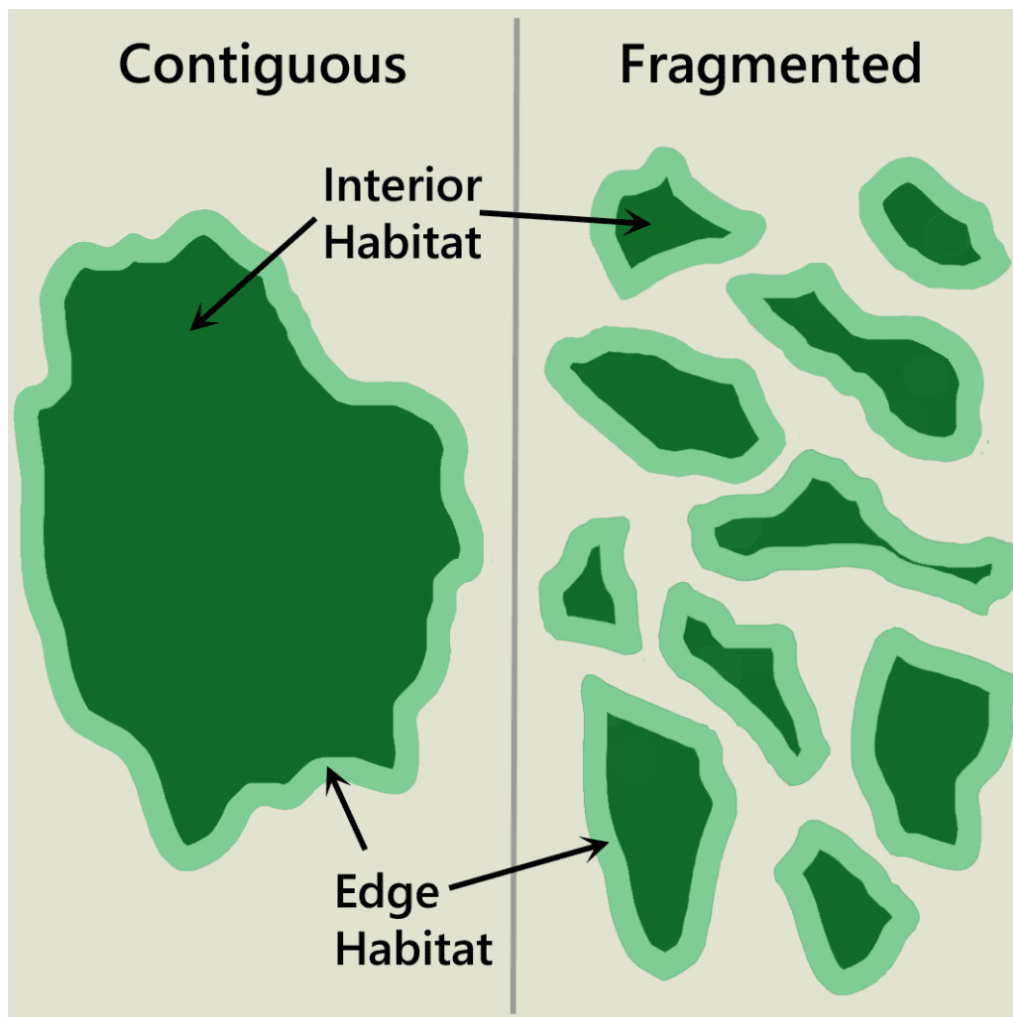
as fires, extreme weather, and glaciers change a landscape slowly. Over time forests have evolved with fires and extreme weather events, and if left to nature, restoration of these lands after natural fragmentation occurs quickly. However, human induced fragmentation generally changes landscapes at faster rates, over larger areas, and human changes are often harder to reverse. Some examples of human activities include agriculture, mining, housing development, industrial processing plants, and road construction.

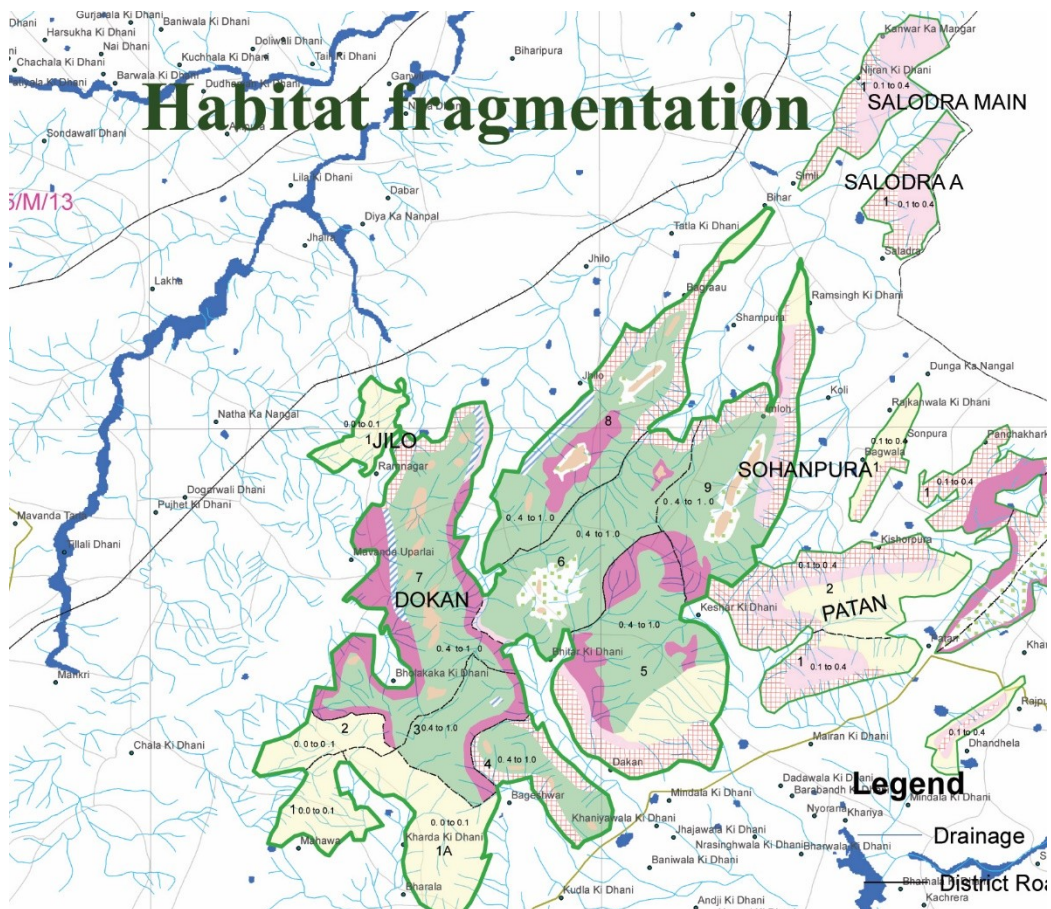
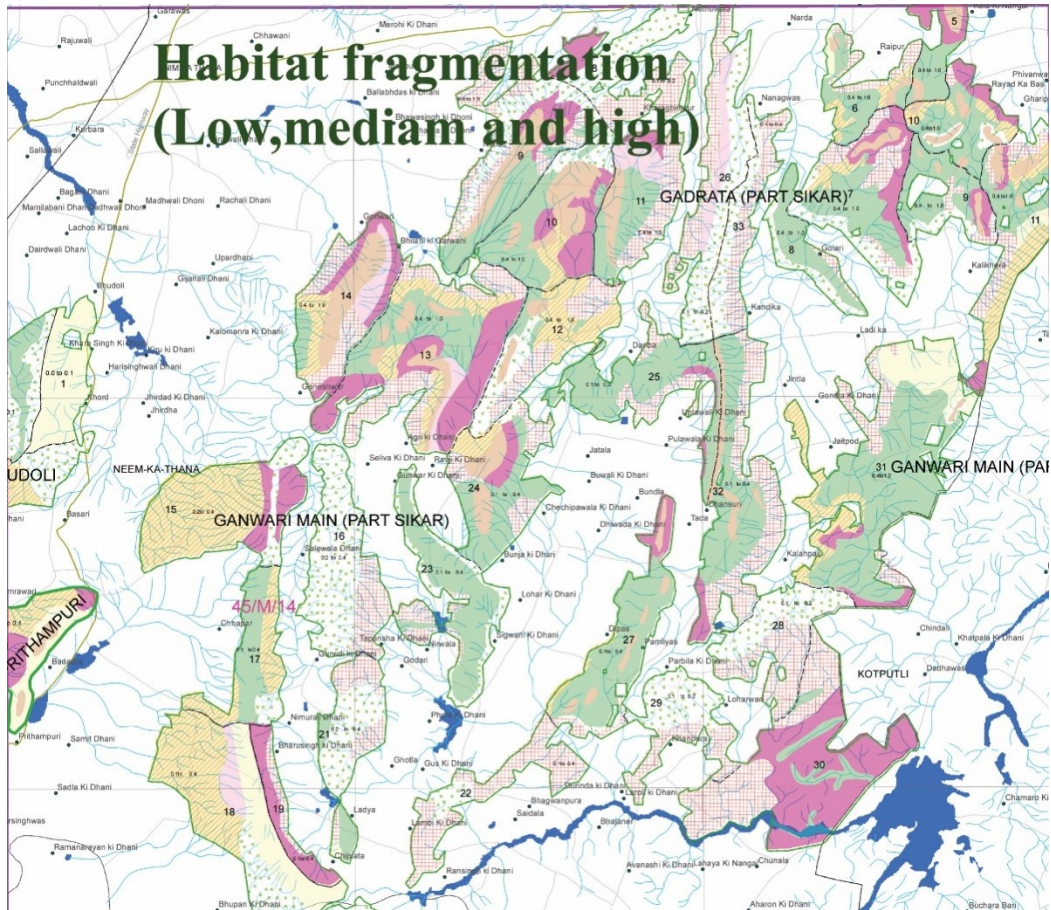
Human activities not only exacerbate habitat fragmentation, but also change the climate. Climate Change is transforming our earth, forming novel ecosystems and communities that have never been observed before. This changing landscape is causing plants and animals to move in search of more favorable climates, but fragmented habitats restrict an animal's ability to migrate and adapt to changing ecosystems.

Connecting habitats through corridors such as road overpasses and underpasses is one solution to restore fragmented patches, building more climate resilient landscapes, and restoring populations and overall biodiversity.

**Habitat fragmentation can occur in several ways, including:**

- Decreased total area: The overall size of the habitat is reduced.
- Decreased interior:edge ratio: The ratio of the interior to the edge of the habitat is decreased.
- Isolation: One habitat fragment is isolated from other areas of habitat.
- Breaking up: A single habitat patch is broken up into multiple smaller patches.
- Decreased average patch size: The average size of each habitat patch is reduced.
- Fragmentation of movement routes: Potential routes for movement between habitat patches are fragmented, such as by a road cutting through a woodland.





#### **4.1.2 Natural**

Naturally occurring wildlife corridors are those that are part of the original landscape. Consider two forests that stand as individual patches on a large valley. A small mammal may need to get from one path of forest to the next, but won't risk crossing through the open valley. Without trees as protection a small mammal can be an easy lunch for aerial predators, such as hawks. Riparian zones are excellent naturally-occurring corridors that allow for this passage. Following a waterway (such as a river or stream) riparian zones typically include a mix of vegetation such as trees and bushes. If a body of water flows between two patches of otherwise isolated habitat, riparian zones can serve as passageways for animals to travel through with at least some sort of cover.

##### **4.1.2.1 Functional status**

The "functional status of wildlife corridors" refers to how effectively these corridors support the movement, health, and survival of wildlife populations. Wildlife corridors are natural or constructed pathways that connect separate habitats, allowing animals to move between them safely for food, mating, and migration. The functional status of these corridors considers several factors:

**Connectivity:** How well the corridor links different habitat areas, allowing for safe passage and genetic flow between animal populations.

**Habitat Quality:** The richness of resources within the corridor (e.g., food, water, shelter) that can sustain wildlife.

**Barrier Reduction:** The corridor's effectiveness in minimizing human-made obstacles like roads, fences, or developments that could hinder animal movement.

**Biodiversity Support:** The extent to which the corridor supports diverse species, including endangered or at-risk species.

Assessing the functional status of wildlife corridors helps conservationists understand how well these pathways fulfill their purpose and what improvements may be needed to ensure the survival and well-being of wildlife populations.

Analyzing the functional status of wildlife corridors involves evaluating their effectiveness in promoting wildlife movement, survival, and ecosystem connectivity. This analysis typically focuses on ecological, physical, and management factors. Here's an outline of key areas for such an analysis:

## **1. Connectivity and Landscape Integration**

**Assessment:** Determine whether the corridor links fragmented habitats effectively. GIS (Geographic Information System) mapping and satellite imagery can identify landscape connectivity.

**Metrics:** Evaluate connectivity indices (e.g., structural or functional connectivity measures), which gauge the ease with which animals can move through the landscape.

**Evaluation of Isolation:** Measure distances between core habitats and examine potential isolation effects on wildlife species.

## **2. Habitat Quality within the Corridor**

**Assessment:** Analyze the vegetation, water sources, shelter, and other resources that make the corridor a viable habitat for wildlife.

**Metrics:** Evaluate biodiversity indices (species richness, abundance, diversity), vegetation coverage, and the presence of critical resources.

**Suitability:** Determine if the habitat within the corridor meets the requirements for the targeted species to travel, rest, and find food.

## **3. Wildlife Movement and Usage Patterns**

**Assessment:** Use camera traps, GPS collars, and field observations to monitor which species use the corridor and how often.

**Metrics:** Track movement frequency, migration patterns, and corridor utilization by various species, focusing on keystone or endangered species.

**Seasonal Variability:** Identify any seasonal changes in wildlife movement and the extent to which the corridor accommodates these patterns.

## **4. Barrier and Risk Analysis**

**Assessment:** Identify any obstacles within or near the corridor, such as roads, fences, or human activity that could impede wildlife movement.

**Metrics:** Measure crossing frequency over barriers (like roads) and analyze mortality rates due to vehicle collisions.

**Human-Wildlife Conflict:** Evaluate the level of human activity near the corridor that might lead to disturbances or conflicts, particularly near populated areas.

## **5. Biodiversity and Species Health Monitoring**

**Assessment:** Track health indicators, population sizes, and genetic diversity of the wildlife populations using the corridor.

**Metrics:** Assess genetic diversity levels to see if the corridor is effective in preventing inbreeding among populations.

Survival and Reproduction: Monitor reproductive success, mortality rates, and signs of stress or disease.

## **6. Long-term Viability and Climate Resilience**

Assessment: Analyze how climate change could impact the corridor's functionality, like shifts in vegetation zones or water availability.

Metrics: Evaluate the corridor's ability to adapt to changes in temperature, precipitation, and extreme weather events.

Future-Proofing: Identify potential risks to corridor sustainability and propose modifications to ensure long-term resilience.

## **7. Management and Conservation Efforts**

Assessment: Review ongoing management practices, including protection against encroachment, habitat restoration, and anti-poaching efforts.

Metrics: Evaluate enforcement effectiveness, conservation investments, and community engagement initiatives to reduce human impact.

Stakeholder Collaboration: Assess cooperation between conservation organizations, government bodies, and local communities.

### **Conclusion**

A comprehensive analysis of wildlife corridor functionality provides insights into their effectiveness and points to needed adjustments. By ensuring robust connectivity, quality habitats, safe movement, and active management, wildlife corridors can fulfill their role in preserving biodiversity and supporting ecosystem health. For that public awareness and other activities will be implied time to time.

### **4.1.3 Anthropogenic status**

The "anthropocentric status" of a wildlife corridor focuses on its value, benefits, and impacts from a human-centered perspective. This type of analysis considers how wildlife corridors affect, benefit, or intersect with human needs, values, and activities. Here's a breakdown of key elements in assessing the anthropocentric status of wildlife corridors:

#### **1. Human Benefits and Ecosystem Services**

Biodiversity and Ecosystem Health: Corridors support biodiversity, which indirectly benefits humans by sustaining ecosystem services like pollination, water purification, and climate regulation.

Carbon Sequestration: Corridors often contain vegetation that sequesters carbon, helping to offset human-caused greenhouse gas emissions and mitigate climate change.

Recreational Opportunities: Wildlife corridors can be used for eco-tourism, hiking, birdwatching, and photography, providing cultural and recreational value to nearby communities.

## **2. Human Safety and Conflict Mitigation**

Reduction in Human-Wildlife Conflicts: Well-planned corridors can reduce conflicts by providing designated paths for wildlife, minimizing encounters with humans, livestock, or agricultural areas.

Vehicle Collision Prevention: Corridors often include wildlife crossings or underpasses that reduce the risk of animal-vehicle collisions, improving safety for both wildlife and motorists.

Disease Management: Corridors help sustain healthy populations of animals, potentially preventing the spread of diseases that might otherwise emerge in stressed, overcrowded populations and affect humans (e.g., zoonotic diseases).

## **3. Economic Impacts**

Increased Property Values: Areas near well-maintained natural corridors can see higher property values due to the appeal of green spaces and natural landscapes.

Job Creation and Economic Activity: Wildlife corridors can boost local economies through eco-tourism, conservation jobs, and infrastructure development (like wildlife crossings).

Agricultural and Livestock Impacts: Effective corridor placement can reduce crop and livestock losses due to animal encroachment, benefiting the agricultural economy.

## **4. Land Use and Development Considerations**

Urban Planning and Land Management: Wildlife corridors must be considered within broader urban and land-use plans, requiring coordination to balance human development needs with conservation.

Infrastructure Development and Costs: Establishing and maintaining corridors can come with costs, particularly for creating safe crossing points, fences, and surveillance systems to prevent poaching. Balancing these investments with other societal priorities can be a challenge.

Resource Allocation: Land designated for corridors often cannot be used for farming, housing, or other human purposes, which may cause tension in regions with high human population densities or resource demands.

## **5. Community and Cultural Value**

Cultural Significance: Many communities see intrinsic value in wildlife and natural spaces, so corridors align with cultural values around conservation and a commitment to environmental stewardship.

Community Engagement and Education: Corridors provide opportunities for educating the public on the importance of biodiversity and environmental conservation, fostering community involvement and support.

Indigenous Land Rights and Stewardship: In regions where Indigenous communities have a strong connection to the land, wildlife corridors can align with traditional ecological knowledge and practices, enhancing both cultural preservation and conservation outcomes.

## **6. Policy and Regulatory Implications**

Policy Development: Implementing wildlife corridors often requires policies around land use, funding, and conservation priorities, which can reflect the government's commitment to environmental sustainability.

Legal Protections: Protecting wildlife corridors may involve legal frameworks to prevent encroachment, poaching, or habitat degradation, which also impacts land-use laws and property rights.

Public Perception and Support: Public support is often necessary to secure funding and policy backing for wildlife corridors, requiring a clear demonstration of the corridor's benefits to society at large.

## **Conclusion**

Assessing the anthropocentric status of wildlife corridors helps balance human interests with conservation goals. By recognizing the economic, safety, and cultural values corridors provide, conservationists and policymakers can advocate for these pathways in ways that align with human priorities, ensuring their maintenance and enhancement in a human-dominated world.

## **4.2 Areas favouring only movement**

The leopard is the top carnivore in this area. Other fauna include jackal, fox, wildboar, bear, neelgai, hare, and mongoose. The leopard is a highly adaptable species with an excellent ability to utilise whatever resources are available in human dominated environments. The spatiotemporal patterns of movements reveal that the leopards were able to live in an incredible degree of proximity to humans. Yet within the constraints of the area they appear to have adopted a strategy of minimising direct contact with humans to the greatest possible extent while simultaneously being dependent on domestic animals for food. This tolerance is not restricted only to leopards, but also includes wolves and a wide suite of smaller carnivores that occur in human-dominated landscapes. None of the leopards were involved in serious conflict (purposeful attacks on humans) despite having an enormous potential for

such encounters. On many occasions, the leopards were seen by people and were sometimes even chased by people, yet no fatal attacks occurred. Perhaps this is because of the adaptability of the species to living in what could otherwise be a potentially high-risk situation because high conflict would also imply high levels of retaliation. The movement of the leopards over long distances is a common habit . The demonstration of the manner in which the resident leopards lived and moved in the immediate proximity to humans reveals the incredible plasticity of this species' ecology and their tolerance for anthropogenic landscapes. It also confirms that the leopards living in this landscape also include resident and reproductive animals, and not only transient dispersers.

### **4.3 Areas favouring movement and short stay**

Mainly areas that favor movement and short stays for migratory birds, often known as stopover sites or staging areas, are essential for allowing birds to rest and refuel during long or short migrations. These sites offer food, shelter, and suitable resting conditions, which are critical for survival and successful migration. Ideal stopover sites have specific characteristics and are often concentrated in areas with abundant natural resources. Here are some key types of areas that serve as effective stopover sites for migratory birds:

#### **1. Wetlands**

Examples: Marshes, swamps, floodplains, and estuaries.

Value for Birds: Wetlands provide rich feeding grounds with abundant invertebrates, fish, and plant material, which are energy-rich food sources for migratory birds. The shallow waters offer safe roosting spots away from predators.

#### **Lakes and Reservoirs**

Examples: Large inland lakes, artificial reservoirs, and lake shores.

Value for Birds: Lakes and reservoirs offer both freshwater for drinking and habitats rich in fish, aquatic plants, and insects. Migratory birds often congregate in these areas to rest and feed before continuing their journey.

#### **Forests and Woodlands**

Examples: Riparian forests, mixed woodlands, and temperate or tropical forests.

Value for Birds: Forested areas provide cover from predators, varied food resources (e.g., insects, berries, nectar), and sheltered roosting sites. These areas are particularly important for small passerines (songbirds) that need a safe stop before crossing open areas.

#### **Grasslands and Agricultural Fields**

Examples: Native grasslands, prairies, and some agricultural fields.

Value for Birds: Open landscapes with dense grasses offer seeds and insects for migratory birds. Some agricultural fields also provide grains, making them attractive for certain species, like waterfowl and cranes.

### **Conservation Importance**

Conserving these stopover sites is critical because they provide essential resources at specific points in a bird's migratory journey. Degradation or loss of these sites can disrupt migration and reduce survival rates, highlighting the need for protecting and maintaining these strategic habitats.

### **Identification of Bird-Rich Sites and Their Habitats**

Based on census data, the habitats of various bird species across different seasons can be readily identified. This will enable focused conservation efforts. As noted, this work should be carried out scientifically, under expert guidance, and will be prioritized.

### **Proposed Measures for Bird Conservation**

Most bird habitats in the district lie outside forest areas, near populated areas and villages. Therefore, effective conservation and development efforts require community involvement, particularly by collaborating with local Gram Panchayats and other governmental institutions and departments. To support and protect the rich birdlife, especially migratory species, the following steps will be undertaken:

1. Trees of species like Banyan, Peepal, Babul, Neem, Guler, Fig, and similar varieties will be encouraged along the banks of ponds and dams. These trees are essential for birds, providing food, shelter, and nesting sites.
2. These trees will also be planted on small islands in larger ponds to enhance habitat options.
3. Marshy and reed-filled areas will be developed along pond banks and islands, as many migratory and resident birds prefer such habitats. Appropriate aquatic plants, wetland crops, and vegetation will be introduced to create suitable swampy or reed-rich environments.
4. Weed management will be undertaken, especially targeting invasive species like Australian acacia and carrot grass, which negatively impact the quality and appearance of water bodies.

Aquatic weeds will be carefully controlled, and terrestrial weeds will be removed completely before they release seeds.

5. Fishing activities will be regulated to ensure that birds have access to their preferred food sources, maintaining the ecological balance of the water bodies.

6. Bird-watching scaffolds, platforms, or towers will be constructed at key water bodies, making bird observation accessible and supporting eco-tourism. These structures will be installed near major ponds along main roads, city outskirts, and significant ponds within or near forested areas, with extensive promotion to attract visitors.

7. Informational boards with detailed descriptions of local bird species will be placed at bird-rich water bodies to educate visitors.

### **Additional Conservation Regulations**

The following additional measures will be considered to support wildlife conservation in the district:

1. Bird-watching programs will be organized on water bodies during winter to attract bird enthusiasts and raise awareness.

2. A "Bird Association" should be established under the guidance of the Deputy Forest Conservator to involve local bird lovers and encourage community-led bird conservation efforts.

3. Public awareness and goodwill toward wildlife conservation should be cultivated through regular participation in events such as Wildlife Week and bird-watching programs, as well as through the Joint Forest Management process.

4. Information regarding compensation for wildlife-related loss of life or property and other wildlife safety and conservation regulations will be widely communicated to the public.

This holistic approach aims to foster sustainable bird conservation through community engagement, habitat preservation, and awareness-building initiatives.

#### **4.4 Areas with potential for movement, stay and reproduction**

Areas with high potential for wildlife movement, stay, and reproduction are often rich in natural resources, low in human disturbance, and provide a diverse range of habitats. These areas act as crucial sites for wildlife to migrate, find temporary or permanent refuge, and reproduce.

Protected Forest Reserves provide food, shelter, and breeding grounds, making them ideal for wildlife species that require extensive territories. They often have limited human interference, allowing for natural behavior patterns.

Wetlands support diverse plant and animal species, serving as breeding grounds and providing critical resources like fish, insects, and aquatic plants. Grasslands support herbivores that feed on grasses and predators that rely on these herbivores as prey. These areas offer space for movement and are often rich in biodiversity.

These areas provide critical resources and refuge, supporting wildlife populations, especially for species that need ample space and varied resources for successful movement, temporary stays, and reproduction.

## **Chapter 5**

### **Managerial strategy (corridor management) with thematic actions**

A managerial strategy for corridor management involves creating a structured plan to conserve and maintain wildlife corridors while balancing ecological needs with human interests. This strategy generally includes thematic actions focusing on habitat preservation, community engagement, policy, and monitoring to ensure that corridors remain functional for wildlife movement, migration, and reproduction. Below is an outline of such a strategy with specific thematic actions:

#### **1. Habitat Conservation and Restoration**

**Goal:** Preserve and restore critical habitats within wildlife corridors to support species movement, food sources, and breeding areas.

**Habitat Preservation:** Identification and protection of key habitat zones within the corridor, focusing on high-biodiversity areas or those with sensitive ecosystems.

**Vegetation Restoration:** Planting of native trees, shrubs, and grasses to enhance habitat connectivity and provide food and shelter for wildlife.

**Water Source Management:** Preservation and rehabilitation of natural water bodies (ponds, streams) to maintain water availability and attract diverse species.

**Invasive Species Control:** Regular removal of invasive plant species that could disrupt native flora and fauna, such as Australian acacia or carrot grass, which impact water quality and habitat structure.

#### **Rotational grazing**

Rotational grazing is a system where livestock are moved between pastures (or paddocks) to allow vegetation in previously grazed areas time to recover. It mimics natural grazing patterns and can improve pasture health, water retention, and biodiversity.

Benefits of Rotational Grazing :

1. **Improves Plant Diversity:** Well-managed grazing can control invasive species and promote native plant growth.
2. **Wildlife Habitat:** Creates a more diverse structure in vegetation, which benefits various wildlife species.

3. Soil Health: Reduces compaction and increases organic matter through managed manure distribution.

4. Drought Resilience: Deep-rooted plants are encouraged, improving water infiltration and storage.

Restrictions and Guidelines:

- Requires NRCS (Natural Resources Conservation Service) or FSA (Farm Service Agency) approval.
- Usually limited to specific times (e.g., outside nesting seasons).
- Stocking rates and rotation schedules must prevent overgrazing.

### **Translocation of animals**

Translocation of animals in conservation reserves refers to the process of moving animals from one location to another as part of a conservation strategy. This technique is widely used to preserve species, maintain biodiversity, and restore or strengthen populations within conservation areas. The primary purpose of animal translocation is to ensure the long-term survival of species that are at risk of extinction, face threats in their current habitats, or need help recovering their numbers.

There are different contexts and types of translocation within conservation reserves:

#### **1. Types of Translocation in Conservation Reserves**

- **Reintroduction:** The return of a species to a location where it has been previously extirpated (locally extinct). This can help restore biodiversity to an area and re-establish a species' role in the ecosystem.
- **Reinforcement (or Augmentation):** The introduction of additional individuals into an existing population to help increase numbers, improve genetic diversity, or strengthen the resilience of the population.
- **Ex Situ Translocation:** The temporary or permanent relocation of species to a controlled environment (like a zoo or breeding facility) for protection, breeding, or health management before reintroduction.

#### **2. Objectives of Animal Translocation**

- **Biodiversity Conservation:** By moving species to conservation reserves or suitable habitats, translocation helps maintain ecological balance and supports overall biodiversity.
- **Genetic Diversity:** Translocation can increase the genetic pool by introducing individuals from different populations, which helps prevent inbreeding and genetic bottlenecks.

- **Restoring Ecosystem Functions:** Certain species play key roles in ecosystems, such as predators controlling prey populations or herbivores shaping plant communities. Translocating such species can help restore the health and balance of ecosystems.
- **Population Recovery:** Moving animals to new or protected areas can support the recovery of species that have declined due to threats like habitat loss, poaching, or disease.

### 3. Challenges and Risks of Animal Translocation

- **Habitat Suitability:** The new location must provide the necessary resources (food, shelter, space) and environmental conditions for the species' survival. If the habitat is unsuitable, the translocated animals may struggle or fail to thrive.
- **Disease Transmission:** Animals moving between different areas could introduce new diseases, which might affect both the translocated species and local wildlife.
- **Behavioral Adaptation:** Animals may not adapt well to new environments, especially if the ecosystems are different from their native habitats.
- **Competition with Local Species:** Translocated animals may outcompete native species for resources, leading to unintended ecological consequences.
- **Costs and Logistics:** Translocation efforts can be expensive and require extensive planning, monitoring, and long-term support to ensure success.

## 2. Connectivity Enhancement

**Goal:** To Ensure that the corridor remains continuous and connected to enable unrestricted wildlife movement.

**Wildlife Crossings and Underpasses:** Install green overpasses, underpasses, and bridges with connectivity through cameras to allow safe crossing points across roads or highways, reducing vehicle collisions and human-wildlife conflict.

**Fencing and Boundaries:** Use strategic fencing in sensitive areas to prevent animals from straying into human settlements, farms, or roads while allowing for natural corridor flow.

**Green Buffer Zones:** Establish buffer zones around the corridor to limit development and reduce noise, pollution, and human disturbances.

## 3. Community Engagement and Education

**Goal:** Involvement of local communities and stakeholders in corridor conservation efforts to build support and cooperation.

**Community Awareness Programs:** Conducting workshops and educational programs on the importance of wildlife corridors and the benefits they bring to local ecosystems.

Collaborative Conservation: Partnership with local Gram Panchayats, village councils, and other local government bodies to ensure community alignment and involvement in conservation.

Livelihood Support: Creating alternative livelihoods (e.g., eco-tourism, wildlife guiding, or handicrafts) for communities to reduce pressure on natural resources within the corridor.

#### **4. Regulatory and Policy Development**

Goal: To Develop and enforce policies that protect the integrity of wildlife corridors and ensure sustainable use.

**Land Use Policies:** Implementation of zoning and land use restrictions to prevent encroachment, deforestation, or agricultural expansion within the corridor.

Legal Protection: Securing officially protected status for critical parts of the corridor to shield them from development or industrial activities.

Compensation Mechanisms: Establishing and publicizing mechanisms for compensating locals for any loss of property or crop damage caused by wildlife to reduce resistance to conservation efforts.

#### **5. Research and Monitoring**

Goal: To Continuously assess corridor health, wildlife use, and the effectiveness of conservation measures.

**Wildlife Population Monitoring:** Regularly conduct species censuses and track population health to identify trends or emerging issues within corridor areas.

Habitat Quality Assessments: Use of remote sensing, field surveys, and ecological indicators to monitor the condition of habitats and assess the impact of conservation actions.

**Technology in Monitoring:** Use of GPS tracking, camera traps, and drones to monitor wildlife movement patterns and detect human disturbances, poaching, or illegal activities.

#### **6. Sustainable Resource Management**

Goal: To Manage natural resources within the corridor in a way that supports both wildlife needs and sustainable human use.

**Water Resource Management:** Implementing practices for sustainable water extraction, particularly in regions prone to water scarcity, to maintain water levels in wetlands, ponds, and rivers.

**Regulated Grazing:** Develop rotational grazing practices in corridor areas to balance livestock needs with habitat conservation.

## Balanced herbivore-carnivore ratio

The maintenance of a balanced herbivore-carnivore ratio in a conservation reserve is critical for ecosystem health and biodiversity. This balance helps in sustaining the ecological processes that maintain the integrity of the habitat. Here are some key considerations for maintaining this ratio:

### 1. Habitat Management:

- **Vegetation Control:** Herbivores rely on plant material for sustenance, and overgrazing by herbivores can lead to habitat degradation. Proper management of vegetation types can ensure herbivore populations do not exceed the carrying capacity of the land.
- **Water Availability:** Herbivores are more dependent on water sources, and overconcentration around water bodies can cause overgrazing. Maintaining a natural spread of water sources can regulate their population.

### 2. Predator Management:

- **Carnivore Presence:** Carnivores naturally regulate herbivore populations. Maintaining an adequate number of apex predators ensures herbivores do not reach unsustainable levels, which can lead to overgrazing and negative impacts on the environment.
- **Restoring Carnivores:** In reserves where predators have been removed or are in low numbers, predator reintroduction programs can help restore balance. This helps reduce herbivore populations and increases the health of plant life.

### 3. Monitoring Populations:

- **Population Surveys:** Regular monitoring of both herbivore and carnivore populations helps in detecting shifts in the balance. Surveys can be used to track population densities, health, and movements.
- **Species-Specific Needs:** Herbivore species, such as grazers, have different dietary needs and space requirements compared to browsers. Carnivores, such as apex predators need sufficient prey and large territories. Understanding these needs is crucial for effective management.

### 6. Research and Adaptive Management:

- **Research:** Continual research into the specific ecological requirements of herbivores and carnivores in the conservation reserve is essential. Understanding seasonal patterns, breeding rates, and migration habits will help managers make informed decisions.
- **Adaptive Management:** The approach to maintaining the herbivore-carnivore ratio should be flexible. Conditions change over time (e.g., climate changes, food availability), so adaptive management strategies are crucial to responding to new challenges.

## **7. Tourism and Recreation Management**

Goal: To Promote eco-tourism that benefits local communities while minimizing the impact on wildlife and habitat quality.

Designated Observation Areas: Creation of designated bird-watching platforms, observation towers, and trails to minimize disturbance to wildlife while promoting tourism.

Educational Signage: Placing informational boards at popular sites to educate visitors about local species, ecosystem services, and conservation efforts.

Tourist Regulations: Enforcing restrictions on visitor behavior, such as noise levels, littering, and area access, to minimize the ecological footprint of tourism activities.

## **8. Emergency Response and Conflict Management**

Goal: To Proactively address human-wildlife conflicts and respond to emergencies to reduce damage to both wildlife and communities.

Rapid Response Teams: Establishing teams for immediate response to wildlife conflicts (e.g., animals entering villages) and emergencies like forest fires.

Conflict Resolution Mechanisms: Developing a structured process for resolving human-wildlife conflicts, including compensation, relocation of problem animals, or installation of deterrents.

Wildfire Prevention: Implementing controlled burning and firebreaks in fire-prone areas within the corridor to reduce the risk and impact of wildfires.

## **9. Financial and Resource Mobilization**

Goal: To Ensure sufficient and sustainable funding for corridor management through public and private partnerships.

Public-Private Partnerships: Engaging businesses and NGOs in funding corridor conservation, potentially in exchange for eco-tourism opportunities or community development programs.

Conservation Grants and Donations: Seeking funding from national and international conservation organizations to support corridor management projects.

Community-Based Financing: Encouraging community-level funds or cooperative financing models for small-scale conservation efforts like planting and maintenance of trees, fencing, or monitoring.

Each thematic action contributes to the overall goal of maintaining functional and sustainable wildlife corridors, ensuring that these pathways support species diversity, ecosystem health, and coexistence with human communities. By implementing a well-rounded corridor

management strategy, conservation efforts can meet ecological needs and gain long-term support from local populations and governing bodies.

### 5.3 Action portfolio for active management

An Action Portfolio for Active Corridor Management includes a range of targeted actions aimed at sustaining and enhancing wildlife corridors to facilitate safe and effective wildlife movement, habitat connectivity, and ecological balance. This portfolio typically combines habitat restoration, regulatory enforcement, community involvement, and technological solutions. Here is a structured portfolio that can serve as a comprehensive framework:

#### 1. Habitat Restoration and Maintenance

**Vegetation Restoration:** Regularly plant native tree and shrub species along corridor paths to enhance habitat quality and connectivity. Focus on species that provide food, shelter, and nesting sites for local wildlife.

**Waterbody Management:** Restore and maintain ponds, streams, and wetlands within corridors to support aquatic life and provide water sources for migratory and resident wildlife.

**Control of Invasive Species:** Actively remove or manage invasive plant species to prevent them from overtaking native flora. Introduce controlled burns or manual removal in particularly affected areas.

**Prey base augmentation:** It refers to efforts aimed at increasing the abundance, diversity, or availability of prey species to support healthy populations of predators, especially large carnivores like lions, tigers, leopards, or wild dogs.

Importance:

- Recovering predator populations: If carnivores are reintroduced or recovering, they need enough prey to thrive.
- Reduce human-wildlife conflict: If natural prey is scarce, predators might hunt livestock or move outside reserve boundaries.
- Ecosystem balance: A healthy prey base maintains predator-prey dynamics and trophic balance.

Methods:

1. Restocking or translocating prey species
  - Requires habitat suitability, disease screening, and monitoring.

2. Habitat improvement
  - Improving grassland quality, water availability, or cover to support herbivore populations.
  - Might involve controlled burns, invasive species removal, or waterhole creation.
3. Protection from poaching
  - Anti-poaching measures to reduce illegal hunting of prey species.
  - Often coupled with community engagement and patrolling.
4. Restricting livestock grazing
  - Domestic animals compete with wild herbivores for food and water.
  - Managing grazing pressure helps native prey species rebound.

## **2. Community Engagement and Education**

**Local Conservation Programs:** Organizing community programs to educate local residents on the importance of wildlife corridors. Conducting awareness drives to minimize disturbances in or near corridors, including activities like noise control and littering prevention.

**Community Incentives:** Offering of incentives, such as payments or community grants, for communities actively involved in corridor conservation or sustainable land management practices.

**Stakeholder Collaboration:** Engaging local leaders, farmers, and landowners in conservation decision-making. Develop agreements with landowners for corridor maintenance or restricted land use to enhance corridor effectiveness.

## **3. Monitoring and Research**

**Wildlife Population Monitoring:** Implementing regular censuses and track animal populations within corridors to identify changes in species abundance, health, and behavior.

**Habitat Quality Assessments:** Use of remote sensing, field surveys, and environmental indicators to evaluate habitat quality, including plant diversity, water quality, and food availability.

Technological Monitoring Tools: Utilization of GPS collars, camera traps, and drones to monitor wildlife movements, assess corridor use, and detect potential threats like poaching or illegal logging.

### **Installation Of Trap Camera**

Camera traps in a conservation reserve is an effective method for wildlife monitoring, studying animal behavior, and supporting conservation strategies. Here's a general outline for the installation process, including key considerations:

#### **1. Objectives of Installation**

- Wildlife population monitoring
- Species inventory
- Poaching detection
- Behavioral studies
- Habitat use analysis

#### **2. Equipment Needed**

- Camera traps (infrared for night vision preferred)
- Mounting straps or brackets
- Memory cards (high capacity, depending on usage duration)
- Batteries or solar panels
- GPS device (for location logging)
- Notebook or mobile data app (for recording site info)

Site Selection: Choose locations based on-

- Animal trails, water sources, feeding areas
- Prior knowledge of animal movement
- Areas of concern (e.g., human-animal conflict zones or poaching hotspots)

#### **4. Placement Guidelines**

- Height: Usually 30–60 cm (1–2 feet) off the ground for medium to large mammals
- Angle: Perpendicular to trails for best side-profile captures

- Distance: Aim for 3–5 meters from expected animal path
- Camouflage: Use natural foliage or non-reflective covers to avoid detection
- Minimize Disturbance: Avoid altering surroundings too much during setup

## 5. Data Management

- Log each camera's GPS coordinates, ID number, and settings
- Regularly check cameras to replace batteries and cards (every 2–4 weeks, depending on activity and battery life)
- Store data systematically: by date, location, camera ID

## 4. Conflict Mitigation and Emergency Response

**Conflict Resolution Teams:** Establish rapid response teams to address human-wildlife conflicts, such as animals entering farms or villages. Provide guidance on deterring wildlife safely and minimizing damage.

**Emergency Resources:** Stocking of corridor areas with resources like fire-fighting equipment and first-aid kits to respond to emergencies, such as wildfires or animal injuries.

**Deterrents and Alarms:** Installation of sound or visual deterrents in areas with a high incidence of human-wildlife conflict to prevent animals from approaching villages, farmland, or other populated areas.

## 5. Sustainable Resource Management

**Water Resource Allocation:** To Ensure sustainable water extraction practices in and around corridors to maintain adequate water sources for wildlife while meeting community needs.

**Sustainable Harvesting Programs:** Implementation of guidelines for sustainable harvesting of non-timber forest products (e.g., medicinal plants, fruits) within corridor areas to reduce habitat disturbance.

**Regulated Grazing:** Working with local communities to establish rotational grazing practices that reduce overgrazing within corridors, maintaining plant cover and habitat quality.

## 6. Promotion of Ecotourism and Education Initiatives

**Designated Wildlife Observation Sites:** To Set up designated viewing platforms, bird-watching towers, and trails to channel visitors to specific areas, reducing habitat disturbance elsewhere in the corridor.

Educational Signage and Materials: Installation of information signage on local flora, fauna, and ecosystem functions at entry points and observation sites to educate visitors about corridor conservation.

Eco-Tourism Guidelines: Development and enforcement of visitor regulations that promote respectful and minimal-impact interactions with the environment, such as noise control and restrictions on waste disposal.

## **7. The Boundaries:**

Details of the boundary of the reserve is already discussed in the earlier chapters. Owing to lengthy boundary, clear demarcation of the forest area from the adjoining landscape is essential. In addition to construction of boundary walls proposed in the plan, construction of permanent RCC boundary pillars indicating the distance and bearing will be taken up on a priority basis. This activity will help in solving certain disputes that will eventually rise in course of time.

The area under conservation reserve is 22169.05 Ha. This forest Block is declared as protected forest by Gazette of State Govt dated 09-04-1964 and it is declared as conservation reserve notified under section 36A of Wildlife (Protection) Act, 1972 vide notification dated 08-09-2023.

The plan is proposed for the Baleshwar Conservation Reserve, Sikar Rajasthan.

(i) DGPS survey of the pillars should be conducted and recorded. The pillars should be 6 ft. or more in height

(ii) The forest lands of PA should be surveyed and demarcated using boundary pillars. (iii) The areas around birds breeding and Panther should be developed as an inviolate core area.

(iv) The PA boundary should be surveyed and demarcated using boundary pillars.

(v) The proposal for Eco Sensitive Zone will be prepared as per prevailing laws and rules and in future it will be sent to the competent authority for approval.

## **7.2 Zonation**

The conservation reserve area is treated as per approved working plan year 2012-13 to year 2021-22. This conservation area treated and managed as single zone.

All the management, conservation, protection, developmental and ecotourism activities will be controlled and managed from Range Office. Dense forest area at some spots in the reserve. Dhok, Salar, google, kumtha, palash, Juiliflora, thorny species, old water bodies, grass

species, adjoining office of forester naka, facilities like Watch Tower, Water Holding Structures, some encroachments, old, pucca talab, old wells, old plantations and some illegal mining pits are present in this zone.

In old times, hunting of tiger was common at Shikar hodi and this shows that presence of tigers were there. Presently movement of panther, Bluebull, hyena, fox, peacocks, cats, porcupines, reptiles, mammals, birds, amphibians in the area.

### **7.3 ZONE PLANS**

Eco-trails are connected to water holes to promote tourism activities. Office of the, Forester, Facilities like Watch Tower, Nursery, Wash Rooms, Water Holding Structures all activities like Building construction works, pucca johad renovation, Water holes, Gajjlars, Watch Tower, view points, sign-boards, fire lines, Eco-trails, vriksha Kunj, plantation along inspection path, ANR plantation, Grasses, plantations of silvi- pastoral species, SMC works and alien species, construction of waterholes, view points, talai, watch tower, ecotourism activities IGA by SHG, water tanks, rescue center, Pucca boundary, solar system, solar tubewell, renovation of old structures, Pucca wall, biodiversity closers, eradication/singling of ProsipisJuliflora, Interpretation Center with refreshment and other similar activities are proposed in management plan for 10 years for this Zone. All ecotourism activities will be managed from near ranges office. Grazing will not be permitted in the zone and action against encroachers will be taken up under provisions of the Wildlife Protection Act, 1972.

#### **The management strategies for PA would be**

- a) Relocation in the all three zones as per relocation package approved by the state government
- b) Creation of biodiversity closures in conservation reserve area for ideal habitat of panther and other wildlife.
- c) Protection will be accorded a top priority in the zone.
- d) Tourism activity would be regulated in the zone.
- e) Research activities pertaining to behavior of species and management practices will be taken up.

## **Management of Out side area of PA**

The out side area will be managed with the following objectives

- i. The revenue lands should be identified within 10 km distance from the boundary of this PA
- ii. The government lands / community lands will be restored to wildlife habitats.
- iii. To develop pastures to meet the fodder needs of local people to reduce the biotic pressure on core zone.
- iv. Develop eco-tourism programmer's.
- v. To help the villagers in developing good management practices for agriculture and animal husbandry so as to maintain the balance of ecosystem.
- vi. Basic amenities for people by adopting mitigation measures

## **Finer classification of the area for ease of management prescriptions**

There are 45 villages are situated on under pheriphery either fully or partially forming part of this PA. Every village is unique with respect to its composition, extent, caste equations etc. These 45 villages forming part of the Baleshwar conservation reserve area. PA will manage total three units that will be known by their respective names. The management of the PA would be undertaken based on these management units, which represent each revenue village.

The following activities will be taken up as part of habitat protection and management, monitoring of wildlife and habitat and infrastructure development.

- i. Each management unit will be treated as basic unit for habitat protection and management and monitoring of wildlife and habitat.
- ii. Field staff will be allotted to each of these units and they will be made responsible for all the management interventions in these units.

Eco development committees will be formed in these units.

iv. Micro plans will be prepared after conducting socio economic studies with the objective of conserving the endangered species like panther, restoring the ecosystem, ensuring compatible livelihood opportunities for local people and developing a regulatory mechanism for infrastructure and basic amenity development.

V. Management unit maps describing the boundaries, infrastructures, settlements, encroachments and resources will be prepared for each of the units.

vi. Wildlife population estimation using standard techniques like transects and sign surveys and habitat monitoring using standard techniques will be carried out.

vii. The records of basic amenities available for each unit will be maintained

viii. Employment generation and skill up gradation programmes will be taken up at the management unit level.

#### **7.4 THEME PLANS**

This semi arid ecosystem is characterized by the grassland - sand dunes woodland communities. Interactions between these communities have resulted in conditions that are favorable for sustenance of many life forms. Managing these conditions to sustain the biodiversity of this place becomes the central component of PA management. Besides habitat management, issues like protection, fire, grazing, encroachment, man-animal conflict, animal population, wildlife health, etc., are equally important. Hence, these themes are considered as overlapping the entire area and theme plans for the same is prepared accordingly. Physical and financial targets, map of the zone are annexed as annexure XIII, annexure XIV.

#### **8. MANAGEMENT OF HUMAN SETTLEMENT in and AROUND THE CONSERVATION AREA.**

(i) There are some encroachment inside the conservation reserve and. For the better management of conservation reserve and wildlife.

(ii) It has to be ensured that the basic facilities for a living around the PA are provided to the resident communities in accordance with the provisions in the laws in practice.

(iii) The benefits of conservation must go to the local communities. All the employment opportunities should be given to the local communities. Self help groups, EDC/VFPMC'S

will look after and manage all the ecotourism and developmental activities, management activities inside the conservation reserve. Ecotourism activities will be carried out with the help of SHG & EDC. EDC will decide the guideline for ecotourism in their village meeting.

(iv) In cases where the nearest villagers do not cooperate with the works of the PA, people from adjoining villages should be given the opportunity.

## **8.1 MANAGEMENT OF HUMAN SETTLEMENT IN AND AROUND THE PA**

(i) It has to be ensured that the basic facilities for a living are provided to the resident communities in accordance with the provisions in the laws in practice outside PA.

(ii) The benefits of conservation must go to the local communities. All the employment opportunities should be given to the local communities.

(iii) In cases where the nearest villagers do not cooperate with the works of the PA, people from adjoining villages should be given the opportunity.

## **8.2 HABITAT IMPROVEMENT**

### **8.2.1 Grass land management**

(i) More inviolate areas will be created by chain link fencing for facilitating Panther habitat improvement, breeding of birds as well as for the restoration of degraded grasslands and jaal.

(ii) In the zone, the grassland will be maintained in the optimum density and at optimum height desirable for the feeding and breeding of wildlife like Panthers and birds and fodder species in plantations be give top priority.

(iii) The diversity of the herbaceous and perennial shrubby vegetation in the core zone will be maintained in the levels desirable for the wildlife like Panther, chinkara and birds as decided based on scientific studies.

(iv) Grassland pastures will be developed in the area by planting and seed sowing the palatable indigenous grasses species.

(v) Villagers will be allowed to harvest the grasses from peripheral area of PA as part of scientific management. This will help in minimizing the biotic pressure on core zone. However this will not be permitted during the breeding season of panther and BIRDS.

### **8.2.3 Management of the Invasive Alien Species**

(i) Local villagers will be employed in all operations through EDCs for removing the Invasive Alien Species

(ii) *Prosopis juliflora* which is local in this area, will be eradicated from the area using manual and mechanical means.

(iii) The firewood will be distributed to the villagers for their bonafide livelihood uses.

### **8.3 MANAGEMENT OF ANIMAL POPULATIONS:**

#### **8.3.1 WILDLIFE HEALTH:**

Regular vaccination camps for cattle should be carried out in the villages to prevent outbreak of diseases and possible spread to wild animals.

(i) Education and awareness programmes will be conducted in villages to reduce the number of unproductive cattle and bring in productive local varieties.

(ii) Artificial waterholes will be created for wild animals in various places during pinch period.

(iii) An animal rescue centre already working in the conservation area.

(iv) Equipment for animal immobilization will be procured and staff will be trained in capture and restraint of animals

(v) Trainings will be given to the field staff in diagnosing the symptoms of disease condition in animals.

(vi) Population of species having reached undesired levels will be controlled.

#### **Rescue centres and Treatment facilities**

The role of rescue centres and treatment facilities within conservation reserves is vital to the success of conservation efforts. These directly support ecosystem health, species protection, and scientific research.

##### **1. Wildlife Rescue and Emergency Response**

- Provide immediate care to injured, orphaned, or sick animals found within the reserve.
- Respond to road accidents, poaching injuries, forest fires, or natural disasters.
- Prevent suffering and improve survival chances of individual animals, especially endangered species.

## 2. Rehabilitation and Release

- Rehabilitate rescued wildlife with the goal of returning them to their natural habitat within the reserve.
- Help maintain healthy wildlife populations by reducing unnatural mortality.
- Use soft-release enclosures and post-release monitoring to ensure success.

## 3. Conservation of Endangered Species

- Act as safe zones for critically endangered or vulnerable species.
- Support captive care, breeding, and species recovery programs.
- Example: Hand-raising orphaned rhino or elephant calves for eventual release.

## 4. Disease Surveillance and Health Monitoring

- Monitor and treat diseases that could threaten entire populations.
- Act as frontline centers in detecting and controlling zoonotic diseases or disease outbreaks.
- Work with researchers to track disease patterns and plan vaccinations or quarantines if needed.

## 5. Human-Wildlife Conflict Mitigation

- Rescue wild animals that enter human settlements and safely relocate them back to the reserve.
- Reduce retaliatory killings by providing an ethical alternative for conflict resolution.
- Collect data to help map conflict zones and develop long-term solutions.

## 6. Research and Data Collection

- Support scientific studies on wildlife health, behavior, ecology, and stress responses.
- Provide real-time data for conservation biology, veterinary sciences, and ecosystem health assessments.
- Collaborate with universities and conservation organizations.

## 7. Education and Community Involvement

- Serve as outreach centers for local communities and students.
- Raise awareness about wildlife protection, conservation laws, and ethical coexistence with nature.
- Build trust and engagement with nearby populations, crucial for reserve success.

### **8.3.2 PROTECTION PLAN**

The majority of problems faced by the area in protection are because of the mining zone in the area, various open rasta's inside the PA

#### **Protection strategies to control poaching**

- i. Joint patrolling with Police and staff around the conservation area.
- ii. All the Forest Guards and Asst. Foresters should watch out for signs of in and around their respective areas of jurisdiction. Any suspicious activity would be conveyed to the concerned Range Officer who will undertake necessary steps.
- iii. Every Forest Guard and Asst. Forester should keep informers in the villages and they will be rewarded for the true information from the secret fund.
- iv. RO should patrol the poaching prone areas both inside and outside the PA, keep a track of the movement of known poachers, and check the camps and hotels that serve meat in their menu and create fear in the minds of people as well as strive to arrest the known poachers.
- V. Any public who gives vital information about poachers will be rewarded and the identity of the informers will be kept secret.
- vi. A control room should be established at the Range office which is situated inside the PA and the phone number of this control room should be widely publicized.
- vii. DCF will attend the crime meetings of the SP and sensitize the Thanedars regarding control of poaching.
- viii. The muzzle loader guns available in the district should be asked to be surrendered as they are used in poaching. Necessary communications should be made in this regard
- ix. NOC for new gun licenses should be given to revolver and pistols only by the DCF.
- X. During winter months, regular patrolling should be done by the field staff, RO in the PA where rare and endangered species of fauna and flora are found.

### **8.3.3 MEASURES TO CHECK POLLUTION:**

The rules of eco-sensitive zone will be applied in checking the pollution in the designated areas. City waste water and dead animals should not come inside the PA, in this regard, proper measures should be taken by District collector, Nagar parishad and the concerned department. RO, PCB Sikar will look after pollution issues.

### **Land pollution**

Signage should be installed in the tourism areas to sensitize the tourists about keeping the area clean.

- i. Sufficient number of trash bins should be kept for collecting the trash along the tourist roads and tourism spots inside the PA
- ii. The food waste generated by the camps should be disposed off by the respective camps strictly in accordance with the Solid Waste Management Rules. Necessary communication in this regard should be made with the Rajasthan Pollution Control Board by the DCF.

### **Other types of Pollution**

Use of pesticides in the peripheral village area must be regulated in adjoining areas as per the prevailing rules and regulations. Use of high intensity light beams disturbing the light will be checked as per the prevailing rules.

## **8.3.3 MANAGEMENT OF INFRASTRUCTURE AND COMMUNICATION NETWORK**

### **8.3.3.1 Vehicles**

One bolero's and two motorcycles are used by the field staff for protection and management of Baleshwar conservation reserve area. Range officer, Neemkathana and Patan have been allotted two motor cycles and its headquartor is also situated in the PA.

### **8.3.3.2 Buildings**

Range building exist adjoining to the area and other required buildings like three forest guard chowki, three watch towers and other buildings as interpretation center, staff residential building, Naka etc are proposed in the 10 years plan.

### **8.3.3.3 Wireless communication**

The proposal for Eco Sensitive Zone will be prepared as per prevailing laws and rules and in future it will be sent to the competent authority for approval.

### **8.3.4 ECOTOURISM, INTERPRETATION AND CONSERVATION EDUCATION**

#### **8.3.4.1 Identification of the tourism zone**

a) Tourism activities will be promoted in the following management units during the plan period Pratappura, Gadrata, Papurana, Babai, Mandana, Kalota, Burka, Bagor and Neemkathana city.

b) Nature trails and wildlife watch vehicle safari routes will be marked in the blocks mentioned in Section 8.3.4.1 (a) and developed to provide maximum wilderness experience to the tourists. Along these nature trails, signage and view points with stone benches that blend with the surroundings should be established to provide the visitors with resting places to enjoy the beauty of the PA and relax.

#### **8.3.4.2 Infrastructure development**

a) An interpretation center will be constructed at entrance of conservation reserve area.

b) The interpretation center will display the landscape, vegetation, wildlife and culture of the desert. Apart from visuals and signage, this centre will have a facility to screen movies as well.

c) The world class Interpretation Centre will display information about Geological History of Neemkathana and Patan and PA.

d) Short films on PA/wildlife should be made for uploading in the social media and other forums to publicize it as a tourism destination.

e) An animation film has to be created about the Geological History of Neemkathana.

f) Informative signboards will be displayed at important tourist spots in the city as well as inside the PA. Suitable signboards will also be put up near Railway station, Bus stand etc.

g) Watchtowers will be constructed at some strategic locations and protection posts which will be open for tourists for wildlife watching through telescopes.

h) Observation hides will be constructed using natural material near the water guzzlers/waterholes inside the closures and will be available for genuine wildlife tourists for photography. An authorized nature guide should be hired by the tourists in this case as well.

#### **8.3.4.3 Interpretation and Publicity Activities**

s

- a) Attractive signages; both directional as well as informative, will be established in and around the CR
- b) Information signage will be established in various important locations in the Neemkathana city.
- c) Thematic brochures will be printed for sale as well as distribution to tourists and students.
- d) Information about the conservation area will be regularly published.

#### **8.3.4.4 Conservation Education**

- a) Regular Nature Camps will be conducted for various target groups like school and college students, teachers, media persons, lawyers etc.
- b) Celebration of auspicious days of forestry and wildlife importance will be celebrated in schools and education programmes will also be conducted in collaboration with NGOs.
- c) Staff will also be educated on various issues by getting expert Volunteers.
- d) Professionals should be hired for the documentation of the biodiversity of the CR

#### **8.3.4.5 Income generation activities**

The local population is to be motivated to undertake and expand eco-development activities. It is proposed to undertake activities like popularization of non - conventional energy, varietal improvement of cattle, employment generation by involving the villagers in tourism related activities, community development programmes etc. in a phased manner, for a period of ten years. SHG will work under EDC/VFPMC to run the tourism and other IG activities.

### **8.3.5 VILLAGE LEVEL SPECIFIC STRATEGIES**

#### **8.3.5.1 Entry Point activities**

- a) Entry point activities should be decided after conducting a general body meeting at the village.
- b) Development of pasture lands outside the fenced area should be done.
- c) Veterinary and human health camps will be organized in villages around the PA.

## Entry point activities

Entry point activities in a conservation reserve refer to the initial interventions or projects that engage the local community and lay the groundwork for long-term conservation and sustainable development. These activities are typically low-cost, quick-to-implement, and address immediate needs of the local population to build trust and encourage participation in conservation efforts. some common entry point activities:

### 1. Awareness and Education Programs

- Environmental education workshops in villages and schools
- Nature camps or guided tours to raise awareness
- Training programs on biodiversity and sustainable practices

### 2. Community Development Initiatives

- Construction or repair of community infrastructure (e.g., water tanks, footpaths, solar lighting)
- Support for education (e.g., school supplies, scholarships)
- Health camps and sanitation drives

### 3. Livelihood Support

- Promotion of sustainable livelihoods like eco-tourism, beekeeping, or organic farming
- Skill development workshops (e.g., tailoring, handicrafts, agri-based processing)
- Formation of self-help groups (SHGs) or cooperatives

### 4. Natural Resource Management

- Soil and water conservation activities (e.g., check dams, bunding)
- Afforestation or reforestation efforts involving local species
- Sustainable grazing and fuelwood collection programs

### 5. Capacity Building

- Training community members as eco-guides or forest guards
- Workshops on wildlife conflict mitigation
- Involving local youth in biodiversity monitoring

These entry point activities help create a positive rapport between conservation authorities and local communities, ensuring smoother implementation of more extensive conservation projects in the future.

#### **8.3.5.2 Proposed eco-development activities**

- a) Promote use of non conventional energy (biogas plants, smoke free chullas, solar lights, and solar cookers, LPG etc.) in order to reduce fuel dependency of fuel wood on native vegetation.
- b) Introduce phased reduction of scrub livestock and improvement of livestock breeds (through controlled fertilization of female stock in proper health and age with males of better local breeds, aided by sterilization of scrub bulls by way of organizing cattle improvement camps.
- c) Children from the adjoining villages are to be developed as guardians of the nature. Programmes to educate and encourage them are to be undertaken by involving institutions like WII, BNHS and WWF.
- d) Local handicrafts will be promoted as tourist souvenir which can be sold through memento shops of the PA.
- e) The villagers may be prompted to constitute self-help groups and can be provided assistance depending on their contribution in the activity. Income generation activities may be taken up by the groups with coordination from other agencies.
- f) Every entry ticket imposed into this area is inclusive of an eco-development surcharge. This money is earmarked to carry out eco-development works in the surrounding villages.
- g) Eco- huts at nearby villages/ city would be run by the EDC on a trial basis and based on the results future plans will be decided

#### **8.3.6 Prosopis juliflora Eradication:**

1. Prosopis juliflora can be used as raw material for generating electricity. The branches of Prosopis juliflora can be converted into partial powder and used as fuel for baking bricks.
2. By providing “de-seeding” machine to farmers/panchayat, seeds can be removed from the pods of Prosopis juliflora and nutritious animal fodder can be made from the pods and the seeds can be used as animal fodder by burning or boiling them.

3. Wherever there are heaps of Nilgai, Chinkara etc., they should be burnt to destroy the seeds of *Prosopis juliflora*.
4. Farmers should be made aware that organic fences should not be made from this species.

#### **8.3.6.1 Elimination by smothering method:**

If elimination of *juliflora* is not possible by physical methods, then fast growing and light seeking species (*JatavdahaSaphijKamundkamat*) should be planted in the area. Before planting, weeds should be removed with roots from the planting site and in the surrounding 1 m radius with the help of JCB. When the planted plant increases its height and casts shade on the weeds, the light seeking weeds will be eliminated automatically due to the shade. This method will require a lot of patience, selection of right species and accurate management and monitoring.

#### **8.3.6.2 Elimination of other weeds:**

If financial availability is there, then other weeds will also have to be removed by adopting the principles given earlier. If financial availability is not there, then provision for their elimination should be made in the upcoming plan. But it has to be mentioned here that unless there is a 'landscape approach', it will be difficult to get rid of weeds. Therefore, it is necessary to bring such plans that weeds should be removed from every place in forest area, pasture area, agricultural area, inhabited area and other types of land. By removing weeds from one place and leaving it at another place, the weed seeds will grow again in the left places. This means that the lands which are not under the control of the forest department but are related to other departments or agencies, the "landscape approach" cannot be successful without taking all of them together. Without the cooperation of the District Environment Committee and the District Administration, it is not possible to eradicate weeds from the entire landscape.

Converting invasive weed species into economic benefits by removing them through biological methods:

1. The grown trees/bushes/roots of *Prosopis juliflora* should be converted into coal through scientific methods and disposed of as per the prescribed method.
2. *Prosopis juliflora* can be used as raw material for generating electricity. The branches of *Prosopis juliflora* can be converted into partial powder and used as fuel for baking bricks and the wood of *Julieflora* can be used for making furniture.

3. By providing “de-seeding” machine to farmers/panchayat, the seeds can be removed from the pods of *Prosopis juliflora* and nutritious animal fodder can be made from the pods and the seeds can be used as animal fodder by burning or boiling them.
4. Vermicompost is also prepared using other invasive species which can be prepared with the participation of people to earn economic benefits.



## **Chapter 6**

### **Implementation strategy**

(Dividing CR into one sectors having villages single clusters)

#### **6.1 Inclusive management**

##### **6.1.2 Actions in sync with para**

##### **6.1.2.1 Action portfolio for maintaining functionality**

#### **6.1.2.1.1 Day to Day monitoring (traditional and state of the art)**

##### **Monitoring**

##### **Monitoring of animal population**

Annual monitoring and population estimation of all major species of animals is carried out every year in the month of May by staff of the Forest Department at the time of wild life census.

The procedure to be followed in this exercise is developed as an SOP for convenience in execution and attached as a different chapter in this plan.

##### **Monitoring of vegetation**

Regular vegetation monitoring should be done as per the designed SOP.

##### **Monitoring of weather parameters**

Meteorological data collection has not done in the area but the data collected by Meteorology Department at various stations in Sikar combed obtained.

##### **Monitoring of visitor's data**

After the start of tourism at the area database of the visitors should be maintained. Visitor carrying capacity of the PA has to be calculated and the tourists should be managed accordingly. The problems arising out of visitor movement are also to be studied and solutions are sought for.

Wildlife of various species is found in large numbers in forest areas and revenue areas (regional forest division and revenue). There is no specificity for wildlife management in these areas. Wildlife protection is ensured along with general regional forest management. Therefore, for solid and scientific management of wildlife in the district, it is very important that the actual number of wild animals is found out by employing fully trained and skilled wildlife experts. During this, data related to estimated number of wild animals of all categories, identification of their natural shelters, their majority areas, their roaming and local breeding areas, traditional and current areas of their food availability etc. should be collected and wildlife map should be prepared on the basis of these. Only on this basis, a solid plan of wildlife management can be prepared and implemented. Special monitoring and protection of these sites has to be done. Forest guards and foresters related to the area also have to be given necessary training related to wildlife. Since the wildlife found in these areas is very important, it has become necessary to plan for their protection and management. Therefore, the following action plan is proposed for their management.

(1) For wildlife found in forest areas.

(2) For wildlife found in other areas (revenue).

## **Management plan for wild animals in forest areas**

### **For wild animals in protected forest areas:-**

(a) After carefully studying the wildlife census report from time to time, it has come to light that various types of wild animals have been found in sufficient numbers in each range area. Areas should be identified and various works should be done there as per wildlife management. Each identified area should be at least 500 hectares. Based on the availability of wild animals, the wildlife habitat area of these areas can be increased even more than this, in some ranges this area can be at more than one place, which should be determined by the wildlife expert/wildlife division. (pp) After carefully selecting the areas, deer proof fencing should be done for the protection of the area. Thereafter, works should be done under habitat protection and development, so that the wild animals found there not only get protection, but their housing, food, water facilities can be developed. As a result, these areas will also work as "core areas" for the wild animals in future and after the wild animals are established in sufficient numbers, they can also expand to other areas. These works include construction and maintenance of fire strips, construction and maintenance of routes for movement, construction and maintenance of water holes for water, apart from this, small water points (guzzlers which are 1-1" deep) and round slopes of 6" to 10" depth should be made for the vultures to sit and for fodder, fodder species of plants and grass seeds should be planted. And fruit plants should also be planted in sufficient numbers.

(iii) These protected areas can also be used as translocation/rescue centers. In these, the wild animals caught or injured in the wild animal areas can also be released and adequate attention can be given to them, in this way the wild animals of the same area will be able to live and develop well in the protected area under the same conditions.

(iv) For this type of translocation work, it is mandatory to have at least one tranquilizer gun with supporting equipment and medicines in every forest division so that this forest division does not depend on any other forest division for this work. As a result, the desired protection can be provided to the wild animals at a fast pace. The auxiliary equipment should include a refrigerator and at least two ice boxes for safe storage and transportation of tranquilliser medicines, otherwise the expensive and locally unavailable medicines will become ineffective and it will also become difficult to procure them from far-off places on time. It is necessary to have at least one big and one small strong iron cage for transporting the captured wild animal, along with a suitable vehicle for transportation. It is also necessary to have a trained team for carrying out this work which should have at least 5 employees, who know well how to operate and maintain the tranquilliser gun. This training work should be

conducted by the Wild Life Division and a refresher course should also be conducted every year so that the team can always remain trained for this work. (a) In these forest areas, there are such areas where water is available in sufficient quantity, hence aquatic animals (birds) come and migrate here even in winters. Hence, while selecting protected areas, such areas should also be identified and developed separately in such a way that water is available here throughout the year and the area should be developed in an ideal manner for the residence, food and breeding of these migratory birds, so that more and more native and migratory birds can be seen. For their protection, maintain the water supply by constructing Nadis, Anicuts, Waterholes and Gazellers etc. at appropriate places in the forests.

**(b) The following facts are worth considering for day-to-day monitoring:-**

- More security personnel are required for the protection of wild animals.
- It is proposed to ensure the security of forests so that facilities are available for breeding and resting of wild animals in the forests.
- There should be provisions for giving incentives to those who give information about poaching and illegal hunting.
- Cattle herders set up camps near waterholes in forests, due to which wild animals do not come for water and yearn for water. Therefore, camps for herders should be set up far away from waterholes, ponds etc.
- It is proposed to install walkie-talkies at all necessary places in the area and to provide mobile phones and vehicles to the regional forest officer.

## **Conservation plan**

Apart from all the management measures mentioned above, there is also a provision for the following special management in this conservation reserve.

- (i) The area will be effectively closed by enclosing it with stone wall or trench fencing for 10 years.
- (ii) The deformed trunks will be mutilated.
- (iii) If land conservation permits, dry check dams or bush fence check dams will be constructed.

- (iv) Appropriate plantation will be done in the patches in between.
  - (v) Wherever possible, concrete walls will be constructed under MNREGA scheme.
  - (vi) Habitat development works will be done, anicuts, Nadi ponds etc. will be constructed.
  - (vii) To restore the ancient glory of the area, 1 sq. km. area will be separately enclosed by fencing.
- Fodder grass and vegetables will be reestablished in it, ponds will be built and it will be made a translocation center. Wild animals from the sanctuary and other places will be released in it.

### **Administrative and financial arrangements**

In this area, posts of an assistant forest conservator, range officer, 2 foresters, 2 assistant foresters, 10 forest guards and other staff will be established separately. Vehicles, buildings, posts etc. will also be provided for the staff. Financial provision for these protected areas will be according to this work plan approved separately. No financial provisions have been mentioned in this work plan.

### **Management plan for wild animals found in the revenue area**

Apart from forest areas, there are many such places where a good number of wild animals migrate and roam. Many types of birds make their nests in villages/cities, especially the birds that make nests in groups attract attention. Therefore, such areas/trees should be identified and special attention should be paid to them so that the general public does not damage the trees or their nests or try to drive them away.

Wild animals often come and go near water bodies from time to time, so by identifying such areas, the areas around them should also be developed as per wildlife management so that they can also get adequate protection and proper environment and can develop over time.

Apart from these areas, wild animals are also found in many ponds/big anicuts/rivers/sources etc. This includes various types of fishes, migratory aquatic animals (birds) and other amphibians. Some species are extremely important, therefore keeping this fact in mind, this area should be conserved and developed and trees of such species should be planted for its wild animals which are suitable for their habitat or food and in the course of time other species besides these wild animals can also use these as their habitat/breeding centre.

Necessary information and pictures of these wild animals should be displayed at convenient places in such areas so that the general public can also get information about them and they can also contribute to their conservation and development. Information about wild animals should also be made available to school students from time to time so that they can also get proper information about wild animals. Their details should also be made available to the media from time to time as per rules so that they can be widely publicised and propagated. There are many such areas in different places of this district, as mentioned above, which are waiting for conservation and development. Therefore, the Wildlife Division should identify such areas with the help of local people/administration, prepare a work plan for their planned development, get necessary approval on it and start the work so that the wild animals found in these less known habitats of this district can get protection and by maintaining their critical population, they can again make this district full of wild animals.

### **Problems of protection of wild animals**

There are various types of problems in the protection and conservation of wild animals, which are as follows:

#### **Hunting**

Wild animals sometimes come to populated areas, which poses a threat to their safety. Some people fulfill their desire of hunting by using some excuse or the other or by stealth. Birds, which are migratory, are also hunted.

#### **Road accidents**

Wild animals sometimes come on roads situated in the middle of or near forest areas. While crossing the road or roaming around, they get injured or killed by fast moving vehicles. The injured wild animals become weak to get food and water and many times die in the course of time. Due to superstition, animals like cats have been seen to be crushed by vehicles when they cross the road. Monitor lizards, mongooses, snakes, and mongooses keep falling prey to such accidents. Unsafe water sources

Wells, water tanks and pits are made at various places in the revenue area for various purposes, which are left open for some reason and no boundary wall is made for them. There

is a high possibility of wild animals falling into them. Wild animals fall into them due to carelessness while roaming or while chasing prey or due to some other reason. They are saved if proper help is received on time, otherwise the wild animals are killed. Nowadays such incidents are increasing and a large number of wild animals are being killed.

### **Pollution**

Due to increasing pollution of air, water and land, wild animals are also getting affected in large numbers and as a result of this, they become sick and die. Especially the plastic bags thrown away after use for carrying food items are eaten by wild animals. Birds swallow rubber bands. When animals injected with diclofenac sodium die, their meat proves fatal for vultures. One of the reasons for this is the lack of vultures in Sikar district.

### **Destruction of habitats**

The micro natural habitats of wild animals such as trees, bushes, burrows, caves, small water streams, drains etc. are getting destroyed due to human development activities. Wild animals are suffering heavy losses due to the continuous process of destroying micro habitats for dams, anicuts, road and path construction, mining, building construction and other works. Apart from this, agricultural expansion is playing a role in destroying natural habitats. There is also a decline in pastures. Species such as Vilayati Babul, Julieflora, Carrot Grass, Xanthium etc. are intruding into pastures and other habitats, leading to "habitat change" and "habitat destruction". It is necessary to save the original nature of habitats.

### **Electricity distribution system and lighting system**

Due to the increasing steps of development, electricity production has increased, and in the process of its distribution reaching every village and hamlet, the network of electric poles and wires is spreading. Due to this, many times the free movement of wild animals is obstructed and sometimes wild animals get injured or die by colliding with electric wires and poles. Many times animals are also killed by electric current from the wires. Due to the arrangement of night lighting in villages/cities, many insects gather towards the light, due to which there is a decrease in insects in the outer areas and many insectivorous animals face adverse conditions of food.

### **Crop protection measures**

To get a good crop, the use of chemical medicines, pesticides and fertilizers by farmers is continuously increasing. Apart from this, chemical medicines are also fed to dairy animals, as a result of which chemicals keep accumulating in their bodies, which affect other animals too, including wild animals. Insects like butterflies, bees etc. are killed by spraying chemical medicines in agriculture, which has an adverse effect on activities like pollination.

### **Humans' fear of wild animals**

Humans have been harbouring misconceptions about wild animals for centuries, and are fearful of them without any reason. As a result, due to the fear, confusion and superstitions, many innocent wild animals are killed, such as many non-poisonous snakes, lizards etc. Apart from this, even if many ferocious animals are hiding somewhere due to some reason, humans kill them without any reason to reduce their fear. This tendency can be stopped by public awareness and public education. Destruction of breeding and feeding places

The breeding and feeding places of wild animals are also being destroyed gradually by humans. Humans have started using these places for their own various purposes, as a result the nature of these places has been destroyed and these places are no longer usable for wild animals. Apart from this, due to unwanted entry and interference by humans, wild animals have also started avoiding using these places and this has adversely affected the number of wild animals.

### **Decrease in religious and co-existence feelings**

The feelings of co-existence are continuously decreasing in human society which is moving on the path of development, and this is reflected in its working methods. At present, the feeling of mutual cooperation, kindness and doing good is decreasing day by day in human society and it is becoming selfish. In its thinking, the feeling of helping wild animals has become more important than the feeling of protecting them.

There is no value of wild animals because he is not getting any direct economic or other benefit from them, rather in his view, the wild animals are causing him economic loss by hunting his animals and destroying his crops, although the department provides compensation as per rules in such situations.

Therefore, there is an urgent need to explain the importance of wild animals by maintaining constant contact with the general public and especially the residents living on and near the borders of wild life areas. Earlier, humans knew how to live with wild animals and have lived with them for centuries, but now in this changing context, there has been a huge change in the lifestyle of humans, due to which it is becoming difficult for them to live with wild animals. They want to keep them away from their lives and try to ensure that there is no shelter for wild animals near them. Therefore, there is a need to tell the general public what is the contribution of wild animals in the ecosystem and what is their role in our existence.

#### Other Miscellaneous Reasons

☞ Apart from the above-mentioned main reasons, there are many other small and big reasons which pose a threat to the wild animals. In this era of development, many such constructions have been made which are harmful for the wild animals.

☞ The dams etc. being built for the development of agriculture, on one hand create the problem of displacement and on the other hand also bring about a change in the environment of that river. Apart from this, due to the laying of canals, wild animals fall into it and get injured or killed. Irrigation facilities bring about a change in its ecology. Hence, the habitat starts changing.

☞ The new technology of commercial production of fish and the destruction of forests in the catchment also changes the ecology of water bodies. The conditions of the "water regime" are changing due to the excessive exploitation of groundwater. Efforts are necessary to maintain the conditions of the "water regime" by adopting appropriate groundwater conservation methods. ☞ Modern means of transport (increasing vehicles and road network), communication media and weapons have also affected the conservation of wildlife. Many wild animals are crushed on roads. Modern vehicles and the network of roads have created conditions for hunters to reach their prey and escape easily. Modern weapons have made hunting easier. Hunters do not miss the opportunity to misuse the expansion of communication system.

#### Measures for wildlife conservation

This management programme is suggesting measures for the above-mentioned factors that harm wildlife, which need to be deliberated upon and implemented on a wide scale:-

Special efforts should be made to prevent incidents of hunting etc. through intelligence information system. Apart from forest areas, patrolling teams should also patrol such areas where wildlife often roams or is their habitat or food site. Areas where traditional hunter communities reside should also be monitored. There is a need for continuous public awareness campaign among the communities involved in hunting. Along with this, detailed information should be regularly collected on the following points about the villages situated in and around the habitat and roaming area of wildlife:

- Details of licensed and otherwise gun holders.
- Presence of hunting communities and their complete details.
- Special interest of any unknown person or group in the area.
- Information about the number of cattle and their movement etc.
- Complete details of the cattle herders. By keeping regular contact with them, information about the presence of wild animals, their movement, hunting etc. as well as the possibilities of their illegal hunting can be known.
- Apart from this, an intelligence system should also be developed so that timely information is received in this regard and hunters, poachers etc. can be caught on time.

#### **Road accidents:**

Warning boards should be installed on the sides of the roads and the Public Works Department should also be warned in this regard that roads should not be constructed near the habitats of wild animals or special technology needs to be adopted. And there is a need to make "underpasses" at various places on roads with abundant wildlife. Speed limits should be determined and speed breakers should be made at various places. These areas should be monitored and effective patrolling should also be done by the police so that vehicles cannot run faster than the speed limit. If the driver of the vehicle causing the accident is at fault, his driving license should be cancelled under the Motor Vehicles Act and action should be taken under the Wild Life Act.

#### **Construction of parapets on wells, tanks and pits:**

Panchayat committees should be directed to identify such wells, water tanks or pits every year and either get them filled or get parapets etc. constructed on them so that the possibility of wild animals falling in them becomes negligible. The parapet should not be less than 0.60 m outside the land. Bushes near the wells should be kept clean so that wild animals do not come to roam near the wells. Dangerous wells should be covered with iron nets so that wild animals do not fall inside.

#### **Pollution control:**

Special efforts should be made for pollution control. Areas where pollution has spread should be identified and necessary action should be taken. Special efforts should be made through Panchayat Samitis for a pollution free environment so that their impact on the environment is negligible. Plastic bags should not be thrown here and there. Every possible effort should be made to prevent the entry of toxic substances into water holes. It is necessary to cover the flowing bitumen in the pits with a thick layer of soil. Many times, due to heat, wild animals get trapped in the flowing bitumen lying on the sides of the roads.

#### **Protection of residential places**

Residential places located in the revenue area should be identified and their database should be prepared and patrolling should be done at those places from time to time. Gram Panchayat/Panchayat Samiti should also be informed about this database so that the protection of these places can be accelerated. There is a need to take full cooperation of the local administration and police department for the protection of wildlife-rich areas of the revenue area.

#### **Improvement in the electricity distribution system:**

Electricity distribution should be managed in such a way that the minimum network of wires is spread. By laying underground cables in forest areas, water bodies and wildlife-rich areas, the incidence of electrocution can be reduced. For this purpose, policy formulation at a high level is required.

#### **Crop protection measures:**

A campaign should be launched to encourage farmers etc. in wildlife-rich areas to use indigenous or environment-friendly products for the safety of their crops and increase production, and special attention should be paid to this. This work should be done under a

scheme. For this, they should be given information about eco-friendly (Eco-friendly) substances and the necessary loan should be made available without interest for their use and purchase. Heavy subsidy should also be given on these products. Apart from this, loan and subsidy should be given to those farmers only who use such products which do not contain any harmful elements and such products should be made available at the local level by cooperative or village panchayat only. Humans have fear of wild animals

Special efforts should be made to remove the misconceptions prevalent in human society. This should also be a part of the plan in which efforts are made to discourage the use of harmful chemical products. Till these misconceptions are not removed from the common people, wild animals will continue to be killed without any reason, hence all information, dissemination and propaganda in this regard should be a part of the plan. Many false beliefs and superstitions are prevalent in the society regarding cats, snakes, jackals, owls, bats. Wild animals are also used in folk magic. There is a great need to take initiative and create awareness among the people.

### **Protection of breeding and feeding places:**

Wildlife-rich places in revenue area A positive attitude of the local Panchayat, local administration and police department is necessary for identifying these and protecting them. Remember that a large number of wild animals live outside the forest areas where the forest department has no control. For these areas, other government departments, voluntary organizations, and common people should all work together only then the wild animals can be saved.

To prevent wild animals from coming out of the forests, it is necessary that water storage sites (JanmatBhavsame) should be constructed at safe places in the forests so that drinking water can be arranged for them. These sites should be filled with water regularly and proper budget should be allocated to the forest divisions for this work.

### **Development of religious and co-existence spirit**

For this work, priests of temples/mosques/churches of the village/town should be encouraged. They should be provided with such easy literature in local language in which conservation of

wildlife is linked with religion and compassion towards animals. This will generate compassion towards wildlife along with religious sentiments among the common people and the feeling of co-existence will gradually develop over time. This will be able to create a special place in every religion and will be able to make a huge contribution in wildlife conservation.

#### **Other measures for conservation:**

The active cooperation of the local honorary wildlife warden should be taken. The state government appoints honorary wildlife warden in the district under section 4(1) BB of the Wildlife Act 1972. At present, Shri Basant Kumar Lata has been appointed as the honorary wildlife warden in Sikar district from 6.2.2012. The forest protection and management committees of the entire district also need to be connected with the work of forest conservation in a more effective manner. There is a need to pay adequate attention to vaccination and fire safety measures every year within a radius of 5 km of the domestic cattle living near the wildlife habitats. The team should always be in a state of readiness for the rescue of wild animals that have fallen into wells or entered the population. For this, the regional forest officers should be given the right to arrange vehicles, catch them, spend money for their treatment and there should be a provision to reimburse the expenses incurred from the budget allocated to the Deputy Forest Conservator. A separate budget should be allocated under contingency at the Deputy Forest Conservator level so that it can be used in special circumstances. Due to lack of budget allocation, timely action is not taken, which creates difficulty in saving the wildlife. Also, cages, nets, torches, vehicles etc. should be available in addition at the potential forest area office with wild animals. A team should be deployed at the Forest Division office. All field staff should have the telephone numbers of senior officials available for communication. Field staff (forest guards, foresters and regional) should be provided with mobile phones. There is a need for adequate publicity of the Wildlife (Protection) Act. There is a need to provide accurate information to the general public about the problems that have emerged recently like bird flu, vulture extinction etc.

#### **6.1.2.1.2 Safeguarding against intensive landuses**

There is not any much threat of changes in land use in the protected area. Somehow, here are some ways to safeguard against intensive land use:

##### **Protect natural ecosystems**

Limit the amount of land available for conversion by:

Establishing protected areas

Recognizing the rights of Indigenous Peoples

Planning roads to avoid opening new areas for conversion

Integrating these measures into land-use plans

### **Reduce land-use change**

Address the drivers of ecosystem degradation and conversion by:

Combining incentives and disincentives

Developing context-specific measures

Increasing budgets for protected areas

Creating community-led forest monitoring and pasture management systems

### **Diversify rural incomes**

Provide alternative incomes for rural populations, such as:

Poultry breeding

Honey production

Making furniture and household utensils from local materials

### **Encourage sustainable land use**

Businesses can:

Work with farmers to adopt regenerative agricultural practices

Reduce food loss and waste

Commit to transparency in supply chains

Phase out deforestation and land conversion

Advocate for economic incentives and regulatory frameworks

## **6.1.2.2 Action portfolio for dealing with human-wildlife interface**

### **SOP for Dealing With Man-Animal Conflict**

Human-wildlife conflict results from the interface of wild animals and humans. It is a function of the population sizes of humans and wild animals. Given the rapidly increasing population of human in India, it is certain that this interface will expand in future; exposing wild animals to newer risks.

- Therefore, assessing and mitigating these risks become crucial for wildlife management and conservation in the shared habitats. The leopard in many such areas which are not traditional habitat ranges of such felids make it compulsory for wildlife managers to be always ready for such unprecedented events. Whenever, there is news of any wild animal depredation (especially carnivore) following protocol to be observed:

- Inform the local police administration through letter or message to deal with the crowd
- An Officer not below the rank of Range Officer/Naka in-charge should reach the site immediately.
- Convincing advice should be given to the villagers to avoid further damage if necessary, immobilization team should be called to restrain the animal.
- Captured animal should be tagged with a PIT Tag before release.
- Manage Human-Wildlife Conflict according to the advisory for management of Human-Wildlife Conflict (HWC).

### **The advisory for management of Human-Wildlife Conflict (HWC)**

#### **Management of Human-Wildlife Conflict**

On 05th January 2021 has released the advisory for management of Human-Wildlife Conflict (HWC) in the country. The advisory makes important prescriptions for the States/ Union Territories for dealing with Human-Wildlife conflict (HWC) situations and seeks expedited inter-departmental coordinated and effective actions.

HWC situations is required as organised arrangement and action. It is in this context that following set of guidelines has been prepared for setting up of Human Wildlife Conflict mitigation and management plans in all the forest management units.

Conflicts occur more outside Protected Areas and reasons of this also are normally associated with the treatment of forests outside PAs. Intensity of human presence due to activities of harvest, regeneration and upkeep of forests, existence of human habitations as enclosures, grazing etc are some reasons for human presence in forests. Besides, human habitations along the forest fringes also face HWC.

In these circumstances, it is necessary that states institute a Human Wildlife Conflict Management Strategy on priority and in the first place, formulate Human Wildlife Conflict Management Plans (HWCMPs) for identified conflict zones, for primarily initial mitigation and quick response action. This can reduce the chances of HWC largely and can also

inculcate confidence in forest administration apart from improving the interface with the communities.

Long term measures for mitigation of Human Wildlife Conflict include improvement of forest habitats, better protection, enhancement of information and knowledge on the wildlife through research and at times population management based strategies. Such action are part of forest management and policy and legal enabling arrangement for such strategies are to evolve with time and need. However, short term actions are needed for quick response if and when incidences take place involving human beings or wild animals.

In this context, following basic components are suggested in this regard in the interactions held so far, as the primary tenets of management of human wildlife conflict, and should be adopted at the earliest in the States, in the areas identified as most vulnerable to begin with.

### **Salient features of the advisory**

Basic tenets of the management action on Human Wildlife Conflict, to be put in place in the localities identified as vulnerable to the Human Wildlife Conflict situations.

### **Quick Response logistics**

Publicity: Help lines. Public information on help lines and other reporting places and means in case of any conflict situation requiring support of forest department.

Hubs in place for receiving the information and onwards transmission for quick response - it can be set up in the easily accessible locations.

Personnel: equipment; mobility and communication in places accessible to potential areas of conflict. These teams may be suitably titled for example “Wild Life Rescue Teams” for easy identification.

Collaboration of local interested organisations should be welcome for such teams.

Clear Standard Operating Procedures (SoPs) for personnel manning the quick response teams. This must include command control hierarchy. on the spot command delegation, delegation for procurement of goods and services if and as required in the operational exigencies.

Intensive training for the personnel involved in this kind of tasks.

### **Rescue mechanisms**

In case of human victims, arrangements for quick transport of victims for treatment to nearest possible place. Standing arrangements for such eventualities in the hospitals/ PHCs of the potential areas.

For animal victims, Rescue Centres for animals involved so that the victim can be treated/ rehabilitated immediately.

Arrangements with veterinary services for quick movement for tranquilising, first aid treatments etc in potential areas. Every newly posted vet in the areas to be trained in these trades in Wildlife Institute of India.

Stock of usually needed equipment and drugs either in forest offices or veterinary centres for cutting on response time.

### **Awareness**

Mobilizing volunteers like “Vanya Praani Mitra” programme of Gujarat Forest Department for interacting with public, interface with forest department and preliminary steps for mobilizing local help in case of emergencies. Local volunteers should also be trained to interact with people, handle the incidences of HWC according to the SoPs for reporting to appropriate contacts and organise locals on immediate initial steps, till the Wildlife rescue team arrives.

Information campaign on conservation friendly practices, cultivation of suitable species which do not attract wildlife of the area, steps to be taken when one comes across any wildlife, and encouraging human activities which may deter wildlife in proximity to human habitations.

Regular meetings of field functionaries in localities on the status and difficulties related to HWC.

Signages in the identified localities for occurrence, precautions and suggested actions in case of encounter with wild animals.

### **Forest management actions**

Clearing vistas along the boundaries of forests in close proximity of the habitations for avoiding chance encounters.

Identifying regular movement corridors of large wild life and adequate publicity for avoiding disturbance in such areas.

Upkeep of status of wildlife in the potential conflict areas, especially migration/ movement pattern.

Maintaining information and data of HWC cases and also the developments in the area which may have bearing on HWC. This may include agricultural practices, NTFP collection, cultural religious or practices inside forests etc.

Arrangements for deployment of personnel and quick action on cognizance on receipt of reports of conflict cases.

Appropriate rules and procedure to be made for speedy and objective assessment of damage and providing relief.

Sufficient delegation at field level for deciding and disbursing the ex-gratia amount, for its effective use for addressing possible trauma due to HWC.

Regular monitoring and review by Chief Wild Life Warden of the situation in all potentially conflict areas.

### **Researches**

Use of local data in spatial patterns - at Division/ range level with GIS based system.

Radio telemetry for identification and pattern of movement of large wildlife in case of threat to humans.

Compilation of animal behaviour in case of species likely to be involved in HWC for strategy for management.

Compilation of comparable cases of conflict, reasons thereof and best practices for helping response decisions and for information of public.

#### **For Herbivore conflict**

Maintaining foraging ground within the forest along boundaries, free of lantana and weeds, and by augmenting palatable grasses and other forage species.

Helping locals in maintaining barriers and scaring away by possible non destructive methods.

In extreme cases, removal of identified animals/ groups responsible for habitual crop raiding, preferably by capture and relocation and in rarest of rare cases, elimination.

In case of species like elephants, maintain traditional migratory routes under forest cover or perennial tree crops to minimize damage. Payment of ecosystem services principles can be an option in identified areas. for encouraging land owners of such areas for adopting desirable land use practices in community interest.

#### **Insurance for damage to life or property due to HWC**

States may consider insurance programmes for damage due to wild life

For this purpose dialogue with insurance sector may provide ways to pursue this option for management of situations arising out of human wildlife conflict. Insurance can be considered for damage to standing crops besides that to life/injuries to human being. Modalities may

vary for such programme from place to place based on assessment of risk by the Insurance companies. Feasibility may be explored at the state level.

The actions indicated above can be organised into a time-bound plan based on priority and need of locations.

**A register has to be maintained in the following format at division level:**

Format 1: Animal attack on Human being / Live stock

| Date of Incident | Place of Incident (inside forest or outside) | Wild Animal species involved | Damage caused by wild animal | Brief description of the incident | Details of compensation |
|------------------|----------------------------------------------|------------------------------|------------------------------|-----------------------------------|-------------------------|
|------------------|----------------------------------------------|------------------------------|------------------------------|-----------------------------------|-------------------------|

### **Role of Stakeholders**

Primary stakeholders are the policy makers, legislatures, MoEF & CC (Wildlife section), Forest department, apart from this the wildlife lawyers and NGOs are the other interested stakeholders.

- NHAI/State Highways Authority: There should be special rules and provision included in Highway manual and the authority which maintains and manages the national highways in consonance with the
- National Highway Act, 1956 to prevent such accidents. Also, mitigation measures for linear infrastructure should be followed.
- Agriculture and horticulture department : Work out modalities and strategy to mitigate and reduce conflict, type of crops grown and insurance to offset loss to the farmer. The Revenue Code should have a chapter on such exigencies
- Role of Police: The Police manual should have instructions how to manage conflict situation and their specific roles
- District Disaster Management Authority : DDMA Manual should incorporate HWC mitigation measures and ensure capacity building of its team to ensure that they provide assistance to the DFO/Wildlife manager in the event of HWC.
- Veterinary Department: The veterinarian should be aware of the provisions in Indian Veterinary Council Act (1984) and Indian Veterinary Council Rules (1985), in respect of capture/ tranquilization and treatment of elephants/s.

## **Addressing Drivers & Pressure**

Degradation, fragmentation & loss of habitat

- Dev activities near forest and growing human population & settlements
- Heavy human dependence on forest, most attacks take place when people are inside forest for fuel, fodder, livelihood or daily activities
- Declining prey base in the forest for carnivores
- Changes in the feeding habits of the animals
- Depletion of forage, water and other critical requirements
- Population beyond carrying capacity
- Most of the orchards and agriculture fields been which were acting as buffer areas between forest land and human settlements have been developed into residential areas
- Linear infrastructure Project (Road, Railway line, canal etc.).
- Lack of livelihood opportunity for local communities

## **Compensation**

Compensation is meant to provide relief to people and to win their support and sympathy for wild animals and forest staff.

1. Inadequate and delayed payment of compensation cause dissension among public.
2. Concept of compensation has changed public perception of wild animals from 'nature's creation' to 'Their (Forest Department's) animals'.
3. Too much emphasis on compensation in wildlife management.
4. Misuse of compensation.

### **• Alternatives to Cash Compensation:**

1. Relief in the form of food-grains & building-material
2. Subsidy for growing alternative crops and alternative livelihoods
3. Support for setting up wildlife-proof barriers
4. Reward by enhanced allocation for eco-development
5. Insurance of human-life and crops
6. Categorizing wildlife-depredation as 'Natural Calamity' and providing relief to the victims through district administration

## **Management of conflict**

Conflict can be minimized by a combination of strategies:

Animal oriented strategies:

- A. Immediate Measures: Measures to drive away the animal from the problem spot.
- B. Long Term Measures: Creating conducive habitat for the animals

C. Special Measures: Measures based on understanding the nature and limitations of the target animals and exploiting the same.

D. Dealing with Problem Animals:

Identify and remove a problem animal when it becomes a liability

#### **A. Immediate Measures**

- Quick Response Teams (RRT & PRT)
- Distribution of crackers, kerosene, search-lights, etc. to villagers
- Crop-guarding posts (Machans)

#### **Managing human-beings**

Human-management strategies should aim at:

- Increasing tolerance of human-beings for wild animals.
- Reducing competition between wild animals and human-beings for resources (space, food and water).
- Minimizing interface (Contact) between wild animals and human-beings.
- Encouraging 'wildlife-compatible' lifestyles.

## **6.2 Monitoring performance**

### **Why monitor?**

The term 'monitoring' has been used to describe many types of activities. It can be defined as the process of gathering information about variables such as rate of loss of forest cover or quantity of wildlife poached per month within a system of interest, such as a protected area. Monitoring information is used to characterize the status of the protected area at different points in time for the purpose of assessing the state and drawing inferences about changes in state over time.

Monitoring is critical to determine trends in biological diversity over space and time with an emphasis on evaluating the effectiveness of management actions and policies.

### **Scientific and Management Objectives for Monitoring**

Such objectives can be usefully categorized into two general classes – scientific and management objectives.

#### **Scientific objectives:**

Scientific objectives focus entirely on learning and developing an understanding of the behavior and dynamics of the monitored system. There are a number of approaches that are used to address scientific objectives from monitoring data

**Management objectives:**

On the other hand, monitoring programs designed to aid management objectives provide information that is useful in making informed decisions about the management of protected areas. The content of this module will focus on this category of monitoring.

Overall, monitoring must be guided by scientific principles in order to provide information that is statistically defensible and useful for managers responsible for managing biodiversity.

**(a) The role of monitoring in the project management cycle**

In relation to the project management cycle, monitoring is defined as the periodic collection and evaluation of data relative to stated project goals, objectives and activities. Many refer to this process as Monitoring and Evaluation, which can be abbreviated as “M&E”. It is an essential part of good conservation management and a key component of the Project Management Cycle.

A conceptual model provides the scientific basis for developing monitoring plans and is viewed as the foundation of all project design, management, and monitoring activities. These models define hypotheses about linkages between changes in the state of biodiversity components, threats and management actions or interventions.

A conceptual model explicitly identifies the components of biodiversity that need to be conserved (Conservation targets), what human and natural factors threaten these targets (direct threats), the roles that resource users, managers and policy makers play that lead to or facilitate the direct threats (indirect threats) and the interventions that will be implemented in order to reduce threats.

**Overall, there are at least three reasons why monitoring is important:**

- i. Monitoring allows us to assess the status of threats and conservation targets. In particular, we need to understand whether threats are decreasing or increasing and whether wildlife populations are increasing, remaining stable or declining.
- ii. Evaluating the effectiveness of management interventions. Monitoring helps us identify which actions lead to the success or failure of a particular conservation approach and evaluate and revise assumptions as to why and where conservation efforts are needed.

Thus, monitoring plays a key role in the process known as adaptive management- which is a dynamic process that involves the integration of monitoring results back into project design and implementation.

**(b) Monitoring provides information for decision-making**

Monitoring is only relevant when it provides information for decision-making. Monitoring that does not provide relevant information for decision-making is not useful for management and is inefficient because it uses human and fiscal resources that could be directed elsewhere. Thus monitoring is useful only if it leads to improved management decisions and therefore, a key component of any monitoring plan is a mechanism to use the new information to guide management decisions.

## **2. What to monitor?**

Decisions about which variables to monitor are determined largely by the objectives of the monitoring programs: Monitoring programs designed to inform management should focus on the state and other variables that are included in the management objectives as well as on variables that are needed to model the managed state variables adequately.

### **a. Levels of Monitoring**

To show that interventions are reducing threats to conservation targets, we need to monitor at all three levels across the causal chain: conservation targets, threats and interventions.

#### **i. Measuring conservation targets (impact monitoring)**

This involves tracking changes in the status of conservation targets.

#### **ii. Measuring changes in the levels of threats (outcome monitoring)**

This involves measuring changes in the status of threats to conservation targets.

#### **iii. Measuring the implementation of interventions (performance monitoring)**

This involves monitoring a planned intervention.

### **(b) Setting priorities and allocating resources for monitoring**

Given that time, financial resources and personnel/staff are limited for almost all conservation projects, managers must achieve a balance between taking conservation action (implementing interventions), evaluating the effectiveness of interventions and monitoring the status of conservation targets and threats. It is often a struggle to make decisions regarding the allocation of limited resources among these competing needs.

### **Time-scale issues and Tradeoffs**

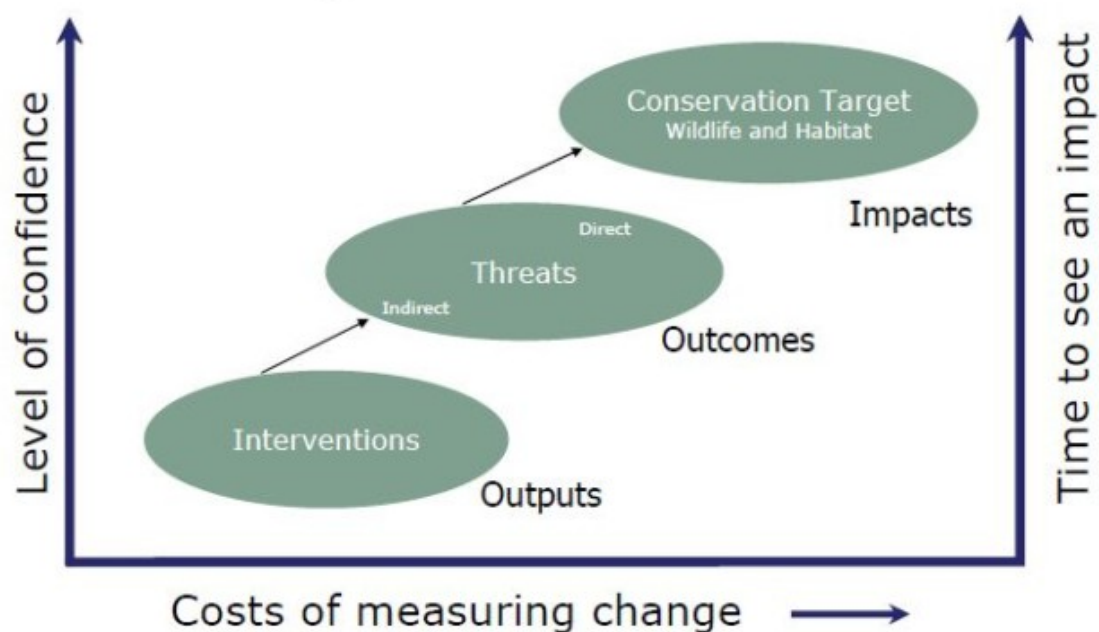
As conservation of wildlife and their habitats is our objective, then we need to monitor their changing status over time. Even in the absence of human pressures, there is natural variation in wildlife populations and habitat quality over time that makes it very difficult to detect changes solely attributable to the interventions that have been implemented in the project.

Measuring change in biological conservation targets is often a long-term effort. However, given the assumed causal connection between the conservation targets, specific threats and

the interventions designed to abate the threats, monitoring threats (outcome monitoring) and interventions (performance monitoring) allows us to measure conservation progress over the short to medium term. However, there

are trade-offs that we must be aware of when we decide to use outcome and performance measures as estimates of progress towards achieving our objective of conserving our conservation targets. The timeframe needed to see results and the costs of monitoring decline as we move from monitoring changes in conservation targets to monitoring reduction in threats to monitoring the implementation of interventions.

However, short and medium-term measures are compromised in their ability to inform us on the true extent to which our conservation objective is being achieved. Thus the level of confidence with which we can say that we are achieving success declines as we use short to medium-term measures



Tradeoffs in costs, time and level of confidence when monitoring project interventions, threats to wildlife and habitats, and the project conservation objective.

Given that it is impossible to monitor every intervention, threat and conservation target at the same intensity or level of precision, it becomes important to set priorities while allocating resources for monitoring. Decisions can be taken based on the following questions

- (i) Which monitoring information does the project require to fulfill either donor or institutional requirements? This should be top priority for allocation of monitoring resources
- (ii) What level of precision is needed to ensure that the monitoring results can be effectively used to influence management decisions?
- (iii) What information would be useful to have but would need additional funding?

There will be trade-offs in cost, precision and confidence associated with different monitoring methods.

There are two key decisions that conservation practitioners need to take in project implementation.

- (1) How should managers allocate resources between implementing interventions and monitoring the impact of the interventions and,
- (2) How should managers subdivide monitoring resources across different levels of monitoring and types of monitoring indicators?

In general the following guidelines are provided to help determine investment in monitoring

- Monitoring results should explicitly guide management decisions about a project.
- To be sustainable, monitoring methods need to be kept as simple and low-cost as possible
- A higher investment in monitoring is needed if (a) the cost of the intervention is high (b) the threat to the biological target is extremely severe and could result in irreversible change (for example extinction).
- There are large gaps in our knowledge

If monitoring a target or threat is very expensive or difficult, it is useful to ‘triangulate’ using easy to monitor proxy variables.

### **Developing a monitoring framework**

A monitoring framework is an outline of steps that will be taken to monitor the effectiveness of interventions in reducing threats to conservation targets.

The monitoring framework is tightly linked to the conceptual model of CR.

#### **(a) Defining clear goals and monitoring objectives for targets, threats and interventions**

For every element of the conceptual model (conservation target, threats and interventions), you need to identify the following:

- 1. A quantitative objective that will be achieved within a given time-frame

2. For conservation targets, a monitoring objective will describe the status (increase, decrease or maintain at same level) of the wildlife species or habitat that will be attained over a fixed time-period.

3. For threats, a monitoring objective will specify by how much the threat will be reduced over a certain time-period.

4. For conservation interventions, a monitoring objective will relate to whether a planned intervention was implemented over a certain time period.

In general, a monitoring objective needs to be:

Impact oriented, representing a change in desired condition or state

Measurable, against a baseline or along a standard scale

Time-bound, achievable within a specific period of time.

### **(b) Establishing indicators and appropriate monitoring methods**

An indicator is a variable or parameter that will be measured over time in order to determine if the project is making progress towards the quantitative objective. There could be one or more indicators for every monitoring objective. Indicators should have the following characteristics.

They should be:

(a) Measurable in either qualitative or quantitative terms. Qualitative data is descriptive such as narratives from interviews with villages and quantitative is numerical measures (i.e., abundance or density).

(b) Precisely defined.

(c) Consistent over time. If an indicator is expected to provide a reliable measurement of change in a factor, then it is important that observed effects be due to changes in the actual condition, not to changes in the indicator. (This criterion generally applies to proxy indicators as opposed to indicators that measure something directly). Proxy indicators are used as a substitute for an indicator that cannot be directly measured or assessed.

(d) Sensitive. A sensitive indicator will change proportionately and in the same direction as changes in the condition or item being measured.

### **Criteria for good design, implementation and management of a monitoring program**

#### **I. Why monitor?**

(1) Identify flexible goals and clear objectives for monitoring

(a) Ensure objectives are responsive to management needs

(b) Ensure objectives are developed in a participatory manner with the relevant stakeholders

(c) Clearly state the time frame for the monitoring program and the time expected to see results

## **II. What should be monitored?**

(1) Identify the variable(s) to be measured and ensure they meet the following criteria:

- (a) Relevant to management
- (b) Scientifically defensible and biologically representative
- (c) Statistically powerful and interpretable
- (d) Measurable and feasible
- (e) Easily understood

(2) Identify your target population

(a) Define the scale at which you need to monitor and the scale at which you will infer your results

## **III. How to monitor?**

(1) Develop formal collaborations with statisticians and scientists in developing monitoring protocols

(2) Develop monitoring methods and data collection protocols

- (a) Address sampling bias in selection of sites to be monitored
- (b) Address detection error in sampling design
- (c) Ensure minimum sample sizes and sampling effort required to achieve objectives
- (d) Ensure adequate precision of estimates to permit detection of change over time

(3) Solicit feedback and review of monitoring protocols from experts

(4) Assess and evaluate if the methods are the most cost-effective to address your monitoring objectives

## **IV. Other important considerations for management and implementation**

(1) Identify the person/persons responsible for implementation

(a) Ensure adequate personnel, skills and training are available for implementation and data analysis

(2) Secure adequate funding for the duration of the monitoring program, including design, implementation, analysis and communication of information

(3) Ensure an information management system is in place for managing and communicating monitoring data

(4) Ensure that monitoring objectives, methods, key assumptions and data recording protocols are carefully documented and accessible by all stakeholders

LIST OF FLORA

## I. वृक्ष / Trees

| S. No. | Scientific name         | Local name        | Family          |
|--------|-------------------------|-------------------|-----------------|
| 1      | Acacia leucophloea      | रौंझा अरौंझा      | Mimosaceae      |
| 2      | Acacia nilotica         | बबूल              | Mimosaceae      |
| 3      | Acacia senegal          | कुमठा             | Mimosaceae      |
| 4      | Acacia tortilis         | इजराइलीबबूल       | Mimosaceae      |
| 5      | Aegle marmelos          | बेल               | Rutaceae        |
| 6      | Ailanthus excels        | अरडू              | Simarubaceae    |
| 7      | Albizia procera         | सफेदसिरस          | Mimosaceae      |
| 8      | Anogeissus pendula      | धौक               | Combretaceae    |
| 9      | Azadirachta indica      | नीम               | Meliaceae       |
| 10     | Bauhinia racemosa       | झीझा              | Caesalpiniaceae |
| 11     | Bauhinia variegata      | कचनार             | Caesalpiniaceae |
| 12     | Bombax ceiba            | सेमल              | Bombacaceae     |
| 13     | Boswellia serrata       | सालर              | Burseraceae     |
| 14     | Butea monosperma        | छीलाढाक           | Fabaceae        |
| 15     | Cassia fistula          | अमलतासकरमेला      | Caesalpiniaceae |
| 16     | Cassia siamea           | केसियास्यामा      | Caesalpiniaceae |
| 17     | Citrus medica           | नींबू             | Rutaceae        |
| 18     | Cordia dichotoma        | गून्दा, लसौड़ा    | Ehretiaceae     |
| 19     | Dalbergia sissoo        | शीशम              | Fabaceae        |
| 20     | Delonix regia           | गुलमोहर           | Caesalpiniaceae |
| 21     | Erythrina suberosa      | गधापलाश / गदापलाश | Fabaceae        |
| 22     | Ficus bengalensis       | बड़, बरगद         | Moraceae        |
| 23     | Ficus glomerata         | गूलर              | Moraceae        |
| 24     | Ficus religiosa         | पीपल              | Moraceae        |
| 25     | Grewia tiliifolia       | धामन              | Tiliaceae       |
| 26     | Holoptelea integrifolia | चूरैल / पापड़ी    | Ulmaceae        |
| 27     | Lannea grandis          | गोदल / गुरजन      | Anacardiaceae   |
| 28     | Mangifera indica        | टाम               | Anacardiaceae   |
| 29     | Melia azedarach         | बकायन / बकान      | Meliaceae       |
| 30     | Mitragynaparvifolia     | कलम, कदम्ब        | Rubiaceae       |
| 31     | Morus alba              | शहतूत             | Moraceae        |
| 32     | Moringa conconensis     | सैजना             | Moringaceae     |
| 33     | Mytensusemarginatus     | ककेड़ा            |                 |
| 34     | Phoenix sylvestris      | खजूर              | Arecaceae       |
| 35     | Emblia officinalis      | आंवला             | Euphorbiaceae   |
| 36     | Inga dulce              | जंगल जलेबी        | Mimosaceae      |
| 37     | Pongamia pinnata        | करंज / कणज        | Fabaceae        |

|            |                                 |                       |                 |
|------------|---------------------------------|-----------------------|-----------------|
| 38         | <i>Prosopis cineraria</i>       | खेजड़ी / जांटी        | Mimosaceae      |
| 39         | <i>Salvadora oleoides</i>       | पीलू खाराजाल          | Salvadoraceae   |
| 40         | <i>Sapinduslemarginatus</i>     | अरीठा / रीठा          | Sapindaceae     |
| 41         | <i>Sterculia urens</i>          | कड़ाया                | Sterculiaceae   |
| 42         | <i>Syzygiumcuminni</i>          | जामुन                 | Myrtaceae       |
| 43         | <i>Tamarindus indica</i>        | इमली                  | Caesalpiniaceae |
| 44         | <i>Tecomella undulata</i>       | रोहिड़ा               | Bignoniaceae    |
| 45         | <i>Wrightia tinctoria</i>       | खिरनी, दूधी           | Apocynaceae     |
| 46         | <i>Ziziphus xylopyrus</i>       | घटबोर                 | Rhamnaceae      |
| II. Shurbs |                                 |                       |                 |
| 1          | <i>Adhatodavasica</i>           | अडूसा                 | Acanthaceae     |
| 2          | <i>Annona squamosa</i>          | सीताफल                | Annonaceae      |
| 3          | <i>Balanites aegyptiaca</i>     | हिंगोट                | Simaroubaceae   |
| 4          | <i>Caesalpinia bonduc</i>       | कटकंज                 | Caesalpiniaceae |
| 5          | <i>Calotropis gigantea</i>      | आंकड़ासफेद            | Asclepiadaceae  |
| 6          | <i>Calotropis procera</i>       | आंकड़ामदार            | Asclepiadaceae  |
| 7          | <i>Capparis decidua</i>         | कैर, करील             | Capparaceae     |
| 8          | <i>Commiphora wightii</i>       | गूगल                  | Burseraceae     |
| 9          | <i>Crotalaria burhia</i>        | सिणिया                | Fabaceae        |
| 10         | <i>DendrocalamusStrictus</i>    | बांस                  | Poaceae         |
| 11         | <i>Euphorbia nivulia</i>        | घोटाथौर, थौर          | Euphorbiaceae   |
| 12         | <i>Grewia tenax</i>             | गगरेन                 | Tiliaceae       |
| 13         | <i>Helicteresisora</i>          | मरोड़फली              | Sterculiaceae   |
| 14         | <i>LeptadeniaPyrotechnica</i>   | खीप                   | Asclepiadaceae  |
| 15         | <i>Nerium Oleander</i>          | कनेरलाल               | Apocynaceae     |
| 16         | <i>Ocimum gratissimum</i>       | वनतुलसी               | Lamiaceae       |
| 17         | <i>Parkinsonia aculeate</i>     | पार्किंसोनिया         | Caesalpiniaceae |
| 18         | <i>Prosopis juliflora</i>       | विलायतीबबूल           | Mimosaceae      |
| 19         | <i>Rhus mysurensis</i>          | डांसर, डांसरेण        | Anacardiaceae   |
| 20         | <i>Sida cordifolia</i>          | खरैटी                 |                 |
| 21         | <i>Tephrosia purpurea</i>       | धमासा                 | Combretaceae    |
| 22         | <i>Ziziphus mauritiana</i>      | बड़ाबौर, बौर          | Rhamnaceae      |
| 23         | <i>Ziziphus numularia</i>       | झाड़ीबेर              | Rhamnaceae      |
| II. Herbs  |                                 |                       |                 |
| 1          | <i>Aerva javanica</i>           | बुई                   | Amaranthaceae   |
| 2          | <i>Agave americana</i>          | रामबांस               | Agavaceae       |
| 3          | <i>Aloe vera</i>                | गवांरपाठा / धृतकुमारी | Liliaceae       |
| 4          | <i>Argemone mexicana</i>        | सत्यनासी              | Papaveraceae    |
| 5          | <i>Barleria cristata</i>        | बज्रदन्ती (नीली)      | Acanthaceae     |
| 6          | <i>Barleriaprinonitis</i>       | बज्रदन्ती (पीली)      | Acanthaceae     |
| 7          | <i>Bougainvilaspp</i>           | बेगनविला              |                 |
| 8          | <i>Parthenium hysterophorus</i> | गाजर घास              | Asteraceae      |
| 9          | <i>Tephrosia purpurea</i>       | झोझरु, सरपंखा         | Fabaceae        |
| 10         | <i>Withaniasomnifera</i>        | असगन्ध / अश्वगन्धा    | Solanaceae      |
| 11         | <i>Daruramatel</i>              | धतूरा                 | Solanaceae      |

|                         |                                 |                   |                |
|-------------------------|---------------------------------|-------------------|----------------|
| 12                      | <i>Dodonea viscosa</i>          | रेलिया            | Sapindaceae    |
| 13                      | <i>Echinopsechinatus</i>        | उंटकटेली          | Asteraceae     |
| 14                      | <i>Euphorbia chamaesyce</i>     | दूधी              | Euphorbiaceae  |
| 15                      | <i>Euphorbia granulata</i>      | दूधेली            | Euphorbiaceae  |
| IV. Climbers and lianas |                                 |                   |                |
| 1                       | <i>Abrus precatorius</i>        | रत्तीबेल, चिरमी   | Fabaceae       |
| 2                       | <i>Asparagus racemosus</i>      | शतावरी            | Liliaceae      |
| 3                       | <i>Cryptostegia grandiflora</i> | दूधी, रवड़ बेल    | Periplocaceae  |
| 4                       | <i>Cuscuta hylina</i>           | अमरबेल            | Cuscutaceae    |
| 5                       | <i>Cuscuta reflexa</i>          | अमरबेल            | Cuscutaceae    |
| 6                       | <i>Citrullus colocynthis</i>    | तूंबा / गड़ तूंबा |                |
| 7                       | <i>Monordia dioica</i>          | ककोड़ा            |                |
| 8                       | <i>Tinospora cordifolia</i>     | नीमगिलोय          | Menispermaceae |
| 9                       | <i>Vallisneria spiralis</i>     | दूधीबेल           | Apocynaceae    |
| V. Grasses              |                                 |                   |                |
| 1                       | <i>Aristida adscensionis</i>    | लंपला             | Poaceae        |
| 2                       | <i>Besmostachyabipinnata</i>    | डाब               | Poaceae        |
| 3                       | <i>Cenchrus biflorus</i>        | भरभूट             | Poaceae        |
| 4                       | <i>Cenchrus setigerus Vahl</i>  | धामण              | Poaceae        |
| 5                       | <i>Cymbopogon foveolatus</i>    | मोथा              | Poaceae        |
| 6                       | <i>Cynodondactylon</i>          | छूब               | Poaceae        |
| 7                       | <i>Dichanthiummannulatum</i>    | करड़              | Poaceae        |
| 8                       | <i>Imperata cylindrica</i>      | डाब               | Poaceae        |
| 9                       | <i>Saccharum munja</i>          | मूंज              | Poaceae        |
| 10                      | <i>Saccharum spontaneum</i>     | कांस              | Poaceae        |

## LIST OF FAUNA

### 1. स्तनधारीवर्ग / Mammals

| S.no. | LFkkuh; uke      | Common name                   | वैज्ञानिकनाम / Scientific name |
|-------|------------------|-------------------------------|--------------------------------|
| 1     | बन्दर            | Rhesus macaque Monkey         | MecacaMultta                   |
| 2     | बघेरा, तेंदुआ    | Beghera/Leopard/Panther       | Panthera pardus (Linn)         |
| 3     | लंगूर            | Common Langur, Hanuman Monkey | Presbytis entellus             |
| 4     | जंगलीबिल्ली      | Jungle Cat                    | Felis chaus                    |
| 5     | नेवला            | Common Mongoose               | Herpestesedwerdsi              |
| 6     | सियार / गिदड़    | Jackal                        | Canis aureus                   |
| 7     | लोमड़ी           | Red Fox                       | Vulpes vulpes                  |
| 8     | जरख              | Striped Hyaena                | Hyaena hyaena                  |
| 9     | बिज्जू           | Common Palm Civet             | Paradoxarus hermaphrodites     |
| 10    | नीलगाय           | Blue Bull                     | Boselaphustragocamelus         |
| 11    | झाउ चूहा         | Hedge hog                     | Hemiecanus auritus             |
| 12    | सांभर            | Sambhar                       | Cervus unicolor                |
| 13    | गिलहरी           | Palm Squirrel                 | Funambulus pennant             |
| 14    | चूहा             | Common House Rat              | Rattus rattus                  |
| 15    | सेही / सेवली     | Indian porcupine              | Hystrix indica                 |
| 16    | खरगोशरेगिस्तानी  | Desert Hare                   | Lepus nigricollis dyanus       |
| 17    | खरगोश            | Indian Hare                   | Lepus nigricollis trufi        |
| 18    | छछुन्दर          | Grey Musk Shrew               | Suncus Murinus                 |
| 19    | चमगादड़          | Bat                           | Megaderma lyra                 |
| 20    | रेगिस्तानीबिल्ली | Desert cat                    | Felis libyaea                  |
| 21    | बघेरा            | Panthera pardus               | Felidae                        |

### II. पक्षीवर्ग / Avifauna

|    |                |                         |                           |
|----|----------------|-------------------------|---------------------------|
| 1  | सुर्खाब        | Brahminy duck           | Tadorna ferruginea        |
| 2  | नक्टा          | Comb duck               | Sarkidiornis melanotos.   |
| 3  | गुरल           | Grey duck               | Anas poecilorhyncha.      |
| 4  | छिपक, चपक      | Indian Nightjar         | Caprimulgus asiaticus     |
| 5  | लघुवलयितटिटहरी | Little ringed plover    | Charadrius Bubius.        |
| 6  | पिहूया         | Pheasant tailed Jacana. | Hydrophasianus chirurgus. |
| 7  | टिहरी          | River Tern              | Sterna aurantia.          |
| 8  | टंजन           | Grey Heron              | Ardea cinerea             |
| 9  | कोकरई          | Night Heron             | Nycticorex nycticorax     |
| 10 | बगूला          | Pond Heron              | Ardeolagrayii.            |
| 11 | बगूला          | Little egret            | Egretta garzetta.         |
| 12 | सुर्खियाबगला   | Cattle Egret            | Bubulcus ibis             |
| 13 | कांचबगला       | Little Green. Bittern.  | Butorides striatus        |
| 14 | लगलग           | White Ibis.             | Tjhrskiormis              |
| 15 | बाज, कालाबाज   | Black Ibis              | Pseudibis papillosa       |

|    |                 |                           |                             |
|----|-----------------|---------------------------|-----------------------------|
| 16 | चमचबाज          | Spoon bill                | Platalealeucoredia          |
| 17 | छोटाकिलकिला     | Small blue kingfisher     | Alcedo atthis               |
| 18 | किलकिला         | White-breasted Kingfisher | Haleyonsmynensis            |
| 19 | लघुहरितपतरिंगा  | Small Green Beeeater.     | Merops orientalis.          |
| 20 | बड़ापतरिंगा     | Blue tailed Beeeater      | Merops philippinus          |
| 21 | नीलकण्ड         | Indian Roller or Blue Jay | Coracias benghalensis       |
| 22 | हुदहुद          | Hoope                     | Upupa epops                 |
| 23 | भटतीतर          | Common Sandgrouse         | Pteroclesexustus            |
| 24 | पहाड़ीभटतीतर    | Painted Sand grouse       | Pterocles Indicus           |
| 25 | हरियल           | Common Green. Pigeon      | Treron Phoenicoptera        |
| 26 | कबूतर           | Blue Rock Pigeon          | Columba livia.              |
| 27 | फाखता           | Red turtle Dove.          | StreptopeliaTraquebarica    |
| 28 | चित्रक, फाखता   | Spotted Dove              | Streptopelia Chinensis      |
| 29 | पारकी, पण्डूक   | Ring Dove.                | Strenptopeliadecaocto       |
| 30 | छोटीफाखता       | Little Brown Dove.        | Streptopelia senegalensis   |
| 31 | पपीहा           | Brain fever Bird.         | Cuculusvarius               |
| 32 | कोयल, कोकिल     | Koel                      | Eudynamysscolopacen         |
| 33 | महोक            | Crow pheasant             | Centropus sinensis          |
| 34 | लगगर            | Laggar-Falcon             | Falco biarmicus Jugger Gray |
| 35 | मोर, मयूर       | Common Pea fowl.          | Pavo cristatus              |
| 36 | लालवनकुटकुट     | Red Junglefowl            | Gallus gallus               |
| 37 | जंगलीमुरगी      | Grey jungle fowl          | Gallus sonneratii           |
| 38 | कालातीतर        | Black partridge           | Francolinusfrancolinus      |
| 39 | सफेदतीतर        | Grey partridge            | Francolinuspondicerianus    |
| 40 | बटेर            | Common Quail              | Coturnix coturnix           |
| 41 | चानक, चाइनाबटेर | Rain Quail                | Coturnix coromandelica      |
| 42 | क्षुपबटेर       | Bush Quail                | Perdica asiatica            |
| 43 | जल कुककुटी      | White breasted Waterhen   | Amauornisphoenicurus        |
| 44 | जलमुर्गी        | Indian Moorhen            | Gallinula chloropus         |
| 45 | सारस            | Sarus crane               | Grus antigone               |
| 46 | भरतपक्षी        | Small Indian Skylark      | Alauda gulgula              |
| 47 | चन्दुल          | Crested Lark              | Galerida cristata           |
| 48 | जंगलीअगिया      | Redwinged Bush Lak        | Mirafra erythro-ptera       |
| 49 | अबाबील          | Common Swallow            | Hirundo rustica             |
| 50 | सफेदलटेरा       | Grey Shrike               | Lanius excubitor            |
| 51 | छोटालटेरा       | Baybacked shrike          | Lanius vittatus             |
| 52 | जंगलीकसया       | Cuckoo shrike             | Coracinamelanoptese         |
| 53 | पीलक            | Golden Oriole             | Oriolusoriolus              |
| 54 | कृष्ण शीशपीलक   | Black headed Oriole       | Oriolusxanthornus           |
| 55 | पहाड़ीभुजंग     | WhitebelliedDrongo        | Dicrurus caerulescens       |
| 56 | भीमराजभुजंग     | Racket tailed Drongo      | Dicrurusparadiseus          |
| 57 | तिल्वर          | Rosy pastor               | Sturnus roseus.             |
| 58 | घूसट शीर्षमैना  | Grey headed Myna          | Stuirmus malabaricus        |
| 59 | बामनीमैना       | Brahminy Myna             | Sturnus pagodaru;m          |
| 60 | देशीमैना        | Common Myna               | Acridotheres tristis        |

|    |                 |                            |                          |
|----|-----------------|----------------------------|--------------------------|
| 61 | गंगामैना        | Bank Myna                  | Acridotheres ginginianus |
| 62 | जंगलीमैना       | Jungle Myna                | Acridotheres Fuscus      |
| 63 | देशीकौवा        | House crow                 | Corvus splendens         |
| 64 | जंगलीकौवा       | Jungle crow                | Corvus macrorhynchos     |
| 65 | तरुपिक          | Tree Pie                   | Dendrocitta Vagabunda    |
| 66 | बुलबुल          | Red vented Bulbul          | Pycnonotus cafer         |
| 67 | भोहोवालीबुलबुल  | White checked Bulbul       | Pycononotusluteolus      |
| 68 | जर्दबुलबुल      | Black Headed Yellow Bulbul | Pycononotusmeanicterus   |
| 69 | सतभाई           | Jungle Babbler             | Turdoides striatus       |
| 70 | डूमरी, चिलचिल   | Common Babbler             | Turdeides caudatus       |
| 71 | शाहबुलबुल       | Paradise Fly-catcher       | Terpsiphone paradise     |
| 72 | जंगलीचिड़ी      | Yellow throated sparrow    | Petronia xanthocollis    |
| 73 | गौरेया          | House sparrow              | Passer domesticus        |
| 74 | बया             | Black breasted weaver bird | Ploceus benghalensis     |
| 75 | बया             | Common weaver bird         | Ploceus philippinus      |
| 76 | मुनिया          | Green munia                | Estrildaformosa          |
| 77 | चरचरा, सरमुनिया | throated munia             | LonchuraMalabarica       |
| 78 | पनडुब्बी        | Snake-bird                 | Anhinga rufa             |
| 79 | कठफौड़वा        | Pied wood-packer           | Picoidesmahrattensis     |
| 80 | कठ फौड़वा       | Glodenbacked wood pecker   | Dinopiumbenghalense      |
| 81 | हीरामनतोता      | Large Indian Parakeet      | Psittaculaeupatria       |
| 82 | लाइबरतोता       | Roseringed Parakeet        | Psittaculakrameri        |
| 83 | तुइयातोता       | Blossomheaded Parakeet     | Psittaculacyanocephala   |
| 84 | घुग्घु          | Indian Great Horned owl    | Bubo bubo                |
| 85 | बिदुकितउलूकक    | Spotted owlet              | Athene brama             |

### III. सरीसृप / Reptiles

| S.no. | स्थानीय नाम  | Common name           | वैज्ञानिकनाम / Scientific name |
|-------|--------------|-----------------------|--------------------------------|
| 1     | कछुआपानी का  | Indian sawbaok        | Kachnga tecta                  |
| 2     | कछुआतालाब का | Indian mud turtle     | Lissemys punctata              |
| 3     | कछुआभूमि का  | Starred tortoise      | Geochelone elegans             |
| 4     | छिपकली       | Northern house gecko  | Hemidactylus flaviviridis      |
| 5     | छिपकली       | Fat tailed gecko      | Eublepharismacularivl          |
| 6     | गिरगिट       | Common garden lizard  | Calotes versicolor             |
| 7     | हालनियां     | Indian chameleon      | Chamaeleon zeylanicaul         |
| 8     | गेह          | Common indian monitor | Varanus beagalansis            |
| 9     | छुमुही       | Johr's earth boa      | Eryx johnii                    |
| 10    | धामण         | Common rat snake      | Ptyasmucosus                   |
| 11    | करायत        | Common indian krait   | Bungarus caeruleus             |
| 12    | नग           | Indian cobra          | Naja naja                      |
| 13    | चित्ती       | Russell's viper       | Vipera rapelli                 |
| 14    | सांडा        | Spiny tailed lizard   | Uromastixhardwikii             |
| 15    | पिटवाईपर     | Pitviper              | Ancistrodonhimalayahus         |

### IV. उभयचारीवर्ग / Amphibians

| S.no. | स्थानीय नाम   | Common name         | वैज्ञानिकनाम / Scientific name |
|-------|---------------|---------------------|--------------------------------|
| 1     | सामान्य मेंढक | Common Indian Toad. | Bufo melanostictus             |
| 2     | मेंढक, डेटका  | Marbled Toad        | Bufo stomaticus                |
| 3     | मैंदा, डेटका  | Indian Bull Frog    | Rana tigerina                  |
| 4     | मैंदा, डेटका  | Burrowing Frog      | Rana tomopterna                |

## Notification

**राजस्थान सरकार**  
**वन विभाग**

प.एफ.न. 3(03)वन/2023 जयपुर, दिनांक-

**अधिसूचना**

वन्य जीव (संरक्षण) अधिनियम, 1972 (1972 का केन्द्रीय अधिनियम सं. 53) की धारा 36क की शक्तियों का प्रयोग करते हुये राज्य सरकार एतद्वारा स्थानीय समुदायों के साथ परामर्श करने के पश्चात नीम का थाना जिले की तहसील नीम का थाना व पाटन में स्थित आरक्षित वन खण्ड गोंवडी, गाडाराटा, डोकन एवं पाटन वन भूमि, जिसका विवरण नीचे दी गई अनुसूची-1 एवं सीमाओं का विवरण अनुसूची-11 के अनुसार है, को पारिस्थितिकीय एवं प्राणी जातीय, वनस्पति भू-संरचना सम्बन्धित, नैसर्गिक एवं प्राणीशास्त्रीय महत्व को ध्यान में रखते हुए संरक्षण आरक्षित घोषित करती है, जिसे भविष्य में **बालेश्वर संरक्षण आरक्षित** के नाम से जाना जावेगा।

**अनुसूची-1**

| क्र.सं. | जिला        | तहसील       | वन खण्ड का नाम | क्षेत्रफल (हेक्टर)  | भूमि का वर्गीकरण |
|---------|-------------|-------------|----------------|---------------------|------------------|
| 1       | नीम का थाना | नीम का थाना | गोंवडी         | 11778.25            | रक्षित वन        |
|         |             |             | डोकन           | 730.60              | रक्षित वन        |
|         |             | पाटन        | गोंवडी         | 1523.05             | रक्षित वन        |
|         |             |             | डोकन           | 4550.40             | रक्षित वन        |
|         |             |             | पाटन           | 825.00              | रक्षित वन        |
|         |             |             | गाडाराटा       | 2761.75             | रक्षित वन        |
|         |             |             | <b>योग:-</b>   | <b>22169.05 है०</b> |                  |

**अनुसूची-11**

|              |                                                      |
|--------------|------------------------------------------------------|
| उत्तरी सीमा  | रक्षित वनखण्ड डोकन की उत्तरी सीमा                    |
| दक्षिणी सीमा | रक्षित वनखण्ड गावडी की दक्षिणी सीमा                  |
| पूर्वी सीमा  | रक्षित वनखण्ड गाडाराटा की पूर्वी सीमा                |
| पश्चिमी सीमा | रक्षित वनखण्ड गावडी के ग्राम गणेश्वर की पश्चिमी सीमा |

**राज्य पाल की आज्ञासे**

(मोनाली सेन)  
वि. शोधाधिकारी

प्रतिलिपि निम्नांकित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित है :-

1. सचिव, महामहिम राज्यपाल महोदय, राजस्थान, जयपुर।
2. प्रमुख शासन सचिव, मुख्यमंत्री, राजस्थान, जयपुर।
3. समस्त वरिष्ठ सहायक/ निजी सचिव, मंत्रीगण/राज्य मंत्रीगण, राजस्थान, जयपुर।
4. निजी सचिव, मुख्य सचिव, राजस्थान, जयपुर।
5. समस्त अतिरिक्त मुख्य सचिव/समस्त प्रमुख शासन सचिव/समस्त शासन सचिव, राजस्थान, जयपुर।
6. पुलिस महानिदेशक, राजस्थान, जयपुर।
7. सचिव, राजस्थान विधानसभा, जयपुर।

**Signature valid**  
Digitally signed by Monali Sen  
Designation: Deputy Conservator  
Of Forest  
Date: 2023.09.08 15:15:34 IST  
Reason: Approved

RajKaj Ref No. : 4683310

8. प्रधान मुख्य वनसंरक्षक (एच.ओ.एफ.एफ.), राजस्थान, जयपुर।
9. प्रधान मुख्य वन संरक्षक एवं मुख्य वन्यजीव प्रतिपालक, राजस्थान, जयपुर को प्रेषित कर निवेदन हैं कि उक्त अधिसूचना को REAMS के माध्यम से ई-गजट में प्रकाशित करवाने का कष्ट करें।
10. अति.प्रधान मुख्य वन संरक्षक कार्य आयोजना एवं वन बन्दोबस्त राजस्थान, जयपुर।
11. संभागीय आयुक्त, जयपुर।
12. संभागीय मुख्य वन संरक्षक, जयपुर।
13. जिला कलक्टर, जयपुर।
14. उप वन संरक्षक, सीकर।
15. संसदीय कार्य विभाग।
16. गार्ड फ़ाइल।

विशेषाधिकारी, वन

प्रतिलिपि निम्नांकित को भी सूचनार्थ प्रेषित हैं :-

1. सचिव, पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार, इंदिरा पर्यावरण भवन, जोर बाग रोड़, नई दिल्ली।
2. महानिरीक्षक, वन (वन्यजीव) पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार, इंदिरा पर्यावरण भवन, जोर बाग रोड़, नई दिल्ली।
3. निदेशक भारतीय वन्य जीव संस्थान, पोस्ट बॉक्स नं. 18 चन्द्रबनी, देहरादून।

विशेषाधिकारी, वन

Signature valid

राजस्थान सरकार

Digitally signed by Morali Sen  
Designation: Deputy Conservator  
Of Forest  
Date: 2023.09.08 15:15:34 IST  
Reason: Approved

RajKaj Ref No. : 4683310

AREA STATEMENT  
BALESHWAR CONSERVATION RESERVE

| S. No.       | District      | Forest Block  | Legal Status     | Area (in ha)     | Compartments                    |
|--------------|---------------|---------------|------------------|------------------|---------------------------------|
| 1            | Neem ka Thana | Ganwadi No 68 | Protected Forest | 13301.300        | 8 to 14, 16, 23 to 26, 30 to 33 |
| 2            | Neem ka Thana | Dokan         | Protected Forest | 5281.000         | 1, 1A, 2 to 9                   |
| 3            | Neem ka Thana | Patan         | Protected Forest | 825.000          | 1 to 2                          |
| 4            | Neem ka Thana | Gadrata       | Protected Forest | 2761.750         | 5 to 12                         |
| <b>Total</b> |               |               |                  | <b>22169.050</b> |                                 |

Notified under Wildlife (Protection) Act 1972 as amended

Area data is based on forest block details as notified and maps

Ganwadi forest block is partially included. Total area of block is 19927 ha and it has 34 compartments



**Office of the deputy conservator of forest Sikar**  
**Budgetary provisions of Baleshwar Conservation Reserve for the plan period 2025-26 to 2034-35**

| Sr. no. | Activity                                                                               | Unit | Rate (Lakh) | Year wise physical & financial target |     |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |
|---------|----------------------------------------------------------------------------------------|------|-------------|---------------------------------------|-----|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|
|         |                                                                                        |      |             | Total Target                          |     | 2025-26 |      | 2026-27 |      | 2027-28 |      | 2028-29 |      | 2029-30 |      | 2030-31 |      | 2031-32 |      | 2032-33 |      | 2033-34 |      | 2034-35 |      |
|         |                                                                                        |      |             | Phy                                   | Fin | Phy.    | Fin. | Phy.    | Fin. | Phy.    | Fin. | Phy.    | Fin. | Phy.    | Fin. | Phy.    | Fin. | Phy.    | Fin. | Phy.    | Fin. | Phy.    | Fin. | Phy.    | Fin. |
| A       | Wildlife management &                                                                  |      |             |                                       |     |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |
| (A.I)   | Construction of Pre base                                                               |      |             |                                       |     |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |
| 1       | Construction of                                                                        | No.  | 40          | 1                                     | 40  | 1       | 40   | 0       | 0    | 0       | 0    | 0       | 0    | 0       | 0    | 0       | 0    | 0       | 0    | 0       | 0    | 0       | 0    | 0       |      |
| 2       | Construction of rescue centre/ first aid facility room for wild animal with store room | No.  | 10          | 2                                     | 20  | 1       | 10   | 1       | 10   | 0       | 0    | 0       | 0    | 0       | 0    | 0       | 0    | 0       | 0    | 0       | 0    | 0       | 0    | 0       |      |
| B       | Habitat development                                                                    |      |             |                                       |     |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |
| (B.I)   | Grassland restoration                                                                  |      |             |                                       |     |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |
| 3       | Removal of invasive species for grassland restoration                                  | ha.  | 0.4         | 50                                    | 20  | 5       | 2    | 10      | 4    | 5       | 2    | 5       | 2    | 5       | 2    | 5       | 2    | 5       | 2    | 4       | 1.6  | 3       | 1.2  | 3       | 1.2  |
| 4       | Development of grassland by sowing of seed, planting of sapling                        | ha.  | 0.73        | 100                                   | 73  | 10      | 7.3  | 10      | 7.3  | 10      | 7.3  | 10      | 7.3  | 10      | 7.3  | 10      | 7.3  | 10      | 7.3  | 10      | 7.3  | 10      | 7.3  | 10      | 7.3  |
| (B.II)  | Invasive species management                                                            |      |             |                                       |     |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |         |      |
| 5       | Removal of invasive species to promote native biodiversity                             | ha.  | 0.5         | 340                                   | 170 | 20      | 10   | 20      | 10   | 20      | 10   | 40      | 20   | 40      | 20   | 40      | 20   | 40      | 20   | 40      | 20   | 40      | 20   | 40      | 20   |

|         |                                                              |          |       |       |       |      |       |      |       |      |       |      |     |      |     |      |     |      |     |    |     |    |     |    |     |
|---------|--------------------------------------------------------------|----------|-------|-------|-------|------|-------|------|-------|------|-------|------|-----|------|-----|------|-----|------|-----|----|-----|----|-----|----|-----|
| (B.III) | Protective infrastructure                                    |          |       |       |       |      |       |      |       |      |       |      |     |      |     |      |     |      |     |    |     |    |     |    |     |
| 6       | Construction of boundary wall 6 feet height                  | km       | 40    | 100   | 4000  | 20   | 800   | 20   | 800   | 10   | 400   | 10   | 400 | 10   | 400 | 10   | 400 | 5    | 200 | 5  | 200 | 5  | 200 | 5  | 200 |
| 7       | Repair of boundary wall old/new                              | km       | 0.5   | 50    | 25    | 0    | 0     | 0    | 0     | 0    | 0     | 5    | 2.5 | 5    | 2.5 | 5    | 2.5 | 5    | 2.5 | 10 | 5   | 10 | 5   | 10 | 5   |
| (B.IV)  | Plantation works                                             |          |       |       |       |      |       |      |       |      |       |      |     |      |     |      |     |      |     |    |     |    |     |    |     |
| 8       | ANR plantation & maintainance                                | ha.      | 0.82  | 300   | 246   | 100  | 82    | 50   | 41    | 50   | 41    | 50   | 41  | 50   | 41  | 0    | 0   | 0    | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| 9       | RDF II plantation                                            | ha.      | 0.84  | 800   | 672   | 200  | 168   | 200  | 168   | 50   | 42    | 50   | 42  | 50   | 42  | 50   | 42  | 50   | 42  | 50 | 42  | 50 | 42  | 50 | 42  |
| 10      | Closure for biodiversity conservation                        | ha.      | 0.6   | 100   | 60    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0   | 0    | 0   | 0    | 0   | 0    | 0   | 0  | 0   | 50 | 30  | 50 | 30  |
| 11      | Vrakshkunj 1 ha.                                             | ha.      | 6.61  | 30    | 198.3 | 20   | 132.2 | 5    | 33.05 | 5    | 33.05 | 0    | 0   | 0    | 0   | 0    | 0   | 0    | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| 12      | Vrakshkunj 5 ha.                                             | ha.      | 12.11 | 20    | 242.2 | 10   | 121.1 | 5    | 60.55 | 5    | 60.55 | 0    | 0   | 0    | 0   | 0    | 0   | 0    | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| 13      | Plantation along with protection /tourism path               | per tree | 0.03  | 10000 | 300   | 3000 | 90    | 2000 | 60    | 1000 | 30    | 1000 | 30  | 1000 | 30  | 1000 | 30  | 1000 | 30  | 0  | 0   | 0  | 0   | 0  | 0   |
| 14      | Strengthening of nurseries                                   | No.      | 15    | 2     | 30    | 1    | 15    | 1    | 15    | 0    | 0     | 0    | 0   | 0    | 0   | 0    | 0   | 0    | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| (B.V)   | Water management for wild animals                            |          |       |       |       |      |       |      |       |      |       |      |     |      |     |      |     |      |     |    |     |    |     |    |     |
| 15      | Construction of borewells with accessories with solar Pannel | No.      | 10    | 3     | 30    | 1    | 10    | 1    | 10    | 1    | 10    | 1    | 10  | 0    | 0   | 0    | 0   | 0    | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| 16      | Laying of pipeline                                           | km       | 2.5   | 20    | 50    | 2    | 5     | 2    | 5     | 2    | 5     | 2    | 5   | 2    | 5   | 2    | 5   | 2    | 5   | 2  | 5   | 2  | 5   | 2  | 5   |

|        |                                                               |                |      |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--------|---------------------------------------------------------------|----------------|------|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 17     | Construction of water point/water hole                        | No.            | 1    | 100 | 100 | 30 | 30 | 30 | 30 | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  | 5  |
| (B.VI) | Soil & moisture conservation works                            |                |      |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 18     | Construction of MPT/PT/ANICUT/GABION/ WHS/NADI/ TALAI/GAJILAR | No.            | 2    | 100 | 200 | 20 | 40 | 10 | 20 | 10 | 20 | 10 | 20 | 10 | 20 | 10 | 20 | 10 | 20 | 10 | 20 | 5  | 10 | 5  | 10 |
| (B.VI) | Other habitat improvement works                               |                |      |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 19     | Creation of fire lines                                        | km/6 mtr Width | 0.25 | 200 | 50  | 40 | 10 | 40 | 10 | 20 | 5  | 20 | 5  | 20 | 5  | 20 | 5  | 20 | 5  | 20 | 5  | 0  | 0  | 0  | 0  |
| 20     | Maintenance of fire lines                                     | km/6 mtr Width | 0.25 | 200 | 50  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 20 | 5  | 20 | 5  | 40 | 10 | 40 | 10 | 40 | 10 | 40 | 10 |
| 21     | Fire fighting                                                 | qty            | 1    | 10  | 10  | 0  | 0  | 2  | 2  | 0  | 0  | 2  | 2  | 0  | 0  | 0  | 0  | 2  | 2  | 0  | 0  | 2  | 2  | 2  | 2  |
| C      | Infrastructure &                                              |                |      |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| (C.I)  | Facility for forest staff                                     |                |      |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 22     | Construction of range office cum residence                    | No.            | 15   | 1   | 15  | 0  | 0  | 1  | 15 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 23     | Construction of Forester Naka                                 | No.            | 12   | 1   | 12  | 0  | 0  | 1  | 12 | 1  | 12 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 24     | Construction of guard chowki                                  | No.            | 10   | 4   | 40  | 1  | 10 | 1  | 10 | 1  | 10 | 1  | 10 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 25     | Construction of observation tower/ watch tower                | No.            | 14   | 10  | 140 | 2  | 28 | 2  | 28 | 2  | 28 | 1  | 14 | 1  | 14 | 0  | 0  | 1  | 14 | 0  | 0  | 1  | 14 | 0  | 0  |

|                                              |                                                                     |     |     |    |    |   |     |   |     |   |     |   |     |   |     |   |     |   |     |   |     |   |     |   |     |
|----------------------------------------------|---------------------------------------------------------------------|-----|-----|----|----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|
| 26                                           | Construction of barriers & check posts                              | No. | 2   | 5  | 10 | 2 | 4   | 2 | 4   | 0 | 0   | 0 | 0   | 1 | 2   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |
| 27                                           | Maintenance of buildings                                            | No. | 2   | 9  | 2  | 0 | 0   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   |
| 28                                           | Solar panels                                                        | No. | 10  | 3  | 30 | 2 | 20  | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |   | 0   |   | 0   | 1 | 10  |   | 0   |
| 29                                           | Wireless communication infrastructure development                   | No. | 1   | 10 | 10 | 2 | 2   | 0 | 0   | 2 | 2   | 0 | 0   | 2 | 2   | 0 | 0   | 2 | 2   | 0 | 0   | 0 | 0   | 2 | 2   |
| 30                                           | Providing camera, GPS, computer, laptop etc. monitoring equipment's | No. | 2   | 10 | 20 | 2 | 4   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 0 | 0   | 1 | 2   |
| 31                                           | Providing patrolling vehicle 4 wheeler                              | No. | 12  | 2  | 24 | 1 | 12  | 0 | 0   | 1 | 12  | 0 | 0   | 0 | 0   |   | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |
| 32                                           | Providing patrolling vehicle 2 wheeler                              | No. | 1   | 4  | 4  | 1 | 1   | 1 | 1   | 0 | 0   | 0 | 0   | 0 | 0   | 0 |     | 0 | 0   | 2 | 2   | 0 | 0   | 0 | 0   |
| (C.II) Facility for animal health monitoring |                                                                     |     |     |    |    |   |     |   |     |   |     |   |     |   |     |   |     |   |     |   |     |   |     |   |     |
| 33                                           | Providing rescue kit for staff                                      | No. | 0.3 | 10 | 3  | 1 | 0.3 | 1 | 0.3 | 1 | 0.3 | 1 | 0.3 | 1 | 0.3 | 1 | 0.3 | 1 | 0.3 | 1 | 0.3 | 1 | 0.3 | 1 | 0.3 |
| 34                                           | Providing camera trap                                               | No. | 0.3 | 10 | 3  | 0 | 0   | 5 | 1.5 | 5 | 1.5 | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |
| 35                                           | Providing trap cage                                                 | No. | 0.5 | 10 | 5  | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 |
| 36                                           | Providing required medicine for wild animals                        | No. | 0.5 | 10 | 5  | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 |

|                                   |                                                                    |     |     |    |     |    |     |   |     |   |     |   |     |   |     |   |    |   |    |   |   |   |   |   |   |
|-----------------------------------|--------------------------------------------------------------------|-----|-----|----|-----|----|-----|---|-----|---|-----|---|-----|---|-----|---|----|---|----|---|---|---|---|---|---|
| 37                                | Providing rescue vehicle                                           | No. | 12  | 1  | 12  | 0  | 0   | 1 | 12  | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0  | 0 | 0  | 0 | 0 | 0 | 0 | 0 | 0 |
| 38                                | Maintenance & running of vehicles                                  | No. | 1   | 9  | 9   | 0  | 0   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1  | 1 | 1  | 1 | 1 | 1 | 1 | 1 | 1 |
| (C.III) Restoration of historical |                                                                    |     |     | 0  |     | 0  |     | 0 |     | 0 |     | 0 |     | 0 |     | 0 |    | 0 |    | 0 |   | 0 |   | 0 |   |
| 39                                | Restoration of other water harvesting structures                   | No. | 1   | 10 | 10  | 2  | 2   | 2 | 2   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1  | 1 | 1  | 1 | 1 | 0 | 0 | 0 | 0 |
| D                                 | Tourism                                                            |     |     |    |     |    |     |   |     |   |     |   |     |   |     |   |    |   |    |   |   |   |   |   |   |
| (D.I) Tourism routes and circuits |                                                                    |     |     |    |     |    |     |   |     |   |     |   |     |   |     |   |    |   |    |   |   |   |   |   |   |
| 40                                | Construction of new tourism routes/ patrolling routes and circuits | km  | 5.4 | 50 | 270 | 20 | 108 | 5 | 27  | 5 | 27  | 5 | 27  | 5 | 27  | 5 | 27 | 5 | 27 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41                                | Repair of existing patrolling routes                               | KM  | 1   | 50 | 50  | 5  | 5   | 5 | 5   | 5 | 5   | 5 | 5   | 5 | 5   | 5 | 5  | 5 | 5  | 5 | 5 | 5 | 5 | 5 |   |
| 42                                | Construction of echo friendly pathways                             | km  | 0.2 | 10 | 2   | 2  | 0.4 | 2 | 0.4 | 2 | 0.4 | 2 | 0.4 | 2 | 0.4 | 0 | 0  | 0 | 0  | 0 | 0 | 0 | 0 | 0 | 0 |
| (D.II )                           | Tourism amenities                                                  |     |     |    |     |    |     |   |     |   |     |   |     |   |     |   |    |   |    |   |   |   |   |   |   |
| 43                                | Construction of echo lodges                                        | No. | 2   | 5  | 10  | 1  | 2   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0  | 1 | 2  | 1 | 2 | 1 | 2 | 1 | 2 |
| 44                                | Construction of interpretation centre                              | No. | 25  | 1  | 25  | 1  | 25  | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0  | 0 | 0  | 0 | 0 | 0 | 0 | 0 | 0 |
| 45                                | Construction of Main entry gate and beautification                 | No. | 20  | 1  | 20  | 0  | 0   | 1 | 20  | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0  | 0 | 0  | 0 | 0 | 0 | 0 | 0 | 0 |
| 46                                | Construction of entry gate                                         | No. | 10  | 5  | 50  | 2  | 20  | 1 | 10  | 1 | 10  | 1 | 10  | 0 | 0   | 0 | 0  | 0 | 0  | 0 | 0 | 0 | 0 | 0 | 0 |

|               |                                                              |     |     |     |    |    |     |    |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |     |
|---------------|--------------------------------------------------------------|-----|-----|-----|----|----|-----|----|-----|----|-----|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|
| 47            | Construction of ticket window                                | No. | 2   | 2   | 4  | 0  | 0   | 0  | 0   | 1  | 2   | 1  | 2   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |
| 48            | Construction of facilities & waiting area                    | No. | 3   | 1   | 3  | 1  | 3   | 0  | 0   | 1  | 3   | 1  | 3   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |
| 49            | Signages                                                     | No. | 0.1 | 100 | 10 | 30 | 3   | 20 | 2   | 10 | 1   | 10 | 1   | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 |
| 50            | Construction of jhonpa/view point                            | No. | 2   | 10  | 20 | 2  | 4   | 2  | 4   | 1  | 2   | 1  | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 0 | 0   | 0 | 0   |
| 51            | Providing benches                                            | No. | 0.1 | 50  | 5  | 0  | 0   | 10 | 1   | 10 | 1   | 5  | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 0 | 0   |
| 52            | Creating view point                                          | No. | 1   | 28  | 28 | 10 | 10  | 10 | 10  | 2  | 2   | 1  | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 0 | 0   |
| <b>E</b>      | <b>Community</b>                                             |     |     |     |    |    |     |    |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |     |
| <b>(E.I)</b>  | <b>Livelihood opportunities</b>                              |     |     |     |    |    |     |    |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |     |
| 53            | Tourism guides                                               | No. | 0.5 | 10  | 5  | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 |
| 54            | Providing support for creation & running of self help groups | No. | 1   | 10  | 10 | 1  | 1   | 1  | 1   | 1  | 1   | 1  | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   |
| 55            | Entry point activities                                       | No. | 1   | 10  | 10 | 1  | 1   | 1  | 1   | 1  | 1   | 1  | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   |
| 56            | Man - wild animal conflict /                                 | No. | 3   | 10  | 30 | 1  | 3   | 1  | 3   | 1  | 3   | 1  | 3   | 1 | 3   | 1 | 3   | 1 | 3   | 1 | 3   | 1 | 3   | 1 | 3   |
| <b>(E.II)</b> | <b>Awareness programs</b>                                    |     |     |     | 0  |    | 0   |    | 0   |    | 0   |    | 0   |   | 0   |   | 0   |   | 0   |   | 0   |   | 0   |   | 0   |
| 57            | Conduct campaigns to educate local communities               | No. | 0.5 | 10  | 5  | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 |
| 58            | Educational tour in PA for students & local people           | No. | 0.5 | 10  | 5  | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 |
| 59            | Different educational activities for students for awareness  | No. | 0.5 | 10  | 5  | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 |

|    |                                                                                             |     |     |    |    |   |        |   |        |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |
|----|---------------------------------------------------------------------------------------------|-----|-----|----|----|---|--------|---|--------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|
| 60 | Training of forest staff etc members & local people                                         | No. | 0.5 | 10 | 5  | 1 | 0.5    | 1 | 0.5    | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   |
| 61 | Seminars for awareness & educational purpose                                                | No. | 0.5 | 10 | 5  | 1 | 0.5    | 1 | 0.5    | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   |
| 62 | Providing CCTV cameras                                                                      | No. | 2   | 10 | 20 | 0 | 0      | 2 | 4      | 2 | 4     | 0 | 0     | 0 | 0     | 0 | 0     | 0 | 0     | 2 | 4     | 2 | 4     | 2 | 4     |
| 63 | Preparation of brochure, map, pamphlets, IT equipment's, booklets management plan exp. Etc. | No. | 1   | 5  | 5  | 1 | 1      | 1 | 1      | 1 | 1     | 1 | 1     | 1 | 1     | 0 | 0     | 0 | 0     | 0 | 0     | 0 | 0     | 0 | 0     |
| 64 | Other misc. expenses                                                                        | No. | 1   | 10 | 10 | 1 | 1      | 1 | 1      | 1 | 1     | 1 | 1     | 1 | 1     | 1 | 1     | 1 | 1     | 1 | 1     | 1 | 1     | 1 | 1     |
|    | Total                                                                                       |     |     |    |    | 0 | 1847.3 | 0 | 1471.1 | 0 | 811.1 | 0 | 685   | 0 | 656.5 | 0 | 596.1 | 0 | 421.1 | 0 | 354.2 | 0 | 387.8 | 0 | 366.3 |
|    | Escalation in rates in future per year                                                      |     |     |    |    |   |        |   |        |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |
|    | Grand total                                                                                 |     |     |    |    |   | 1847.3 |   | 1471.1 |   | 811.1 |   | 685.0 |   | 656.5 |   | 596.1 |   | 421.1 |   | 354.2 |   | 387.8 |   | 366.3 |

|         |                                                                     |                |      |     |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |
|---------|---------------------------------------------------------------------|----------------|------|-----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|
| 18      | Construction of MPT/PT/ANICUT/GABION/ WHS/NADI/ TALAI/GAJILAR       | No.            | 2    | 100 | 200 | 20 | 40  | 10 | 20  | 10 | 20  | 10 | 20  | 10 | 20  | 10 | 20  | 10 | 20  | 10 | 20  | 5  | 10  | 5  | 10  |
| (B.VII) | Other habitat improvement works                                     |                |      |     |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |
| 19      | Creation of fire lines                                              | km/6 mtr Width | 0.25 | 200 | 50  | 40 | 10  | 40 | 10  | 20 | 5   | 20 | 5   | 20 | 5   | 20 | 5   | 20 | 5   | 20 | 5   | 0  | 0   | 0  | 0   |
| 20      | Maintenance of fire lines                                           | km/6 mtr Width | 0.25 | 200 | 50  | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 20 | 5   | 20 | 5   | 40 | 10  | 40 | 10  | 40 | 10  | 40 | 10  |
| 21      | Fire fighting equipment's                                           | qty            | 1    | 10  | 10  | 0  | 0   | 2  | 2   | 0  | 0   | 2  | 2   | 0  | 0   | 0  | 0   | 2  | 2   | 0  | 0   | 2  | 2   | 2  | 2   |
| C       | Infrastructure & capacity building                                  |                |      |     |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |
| (C.I)   | Facility for forest staff                                           |                |      |     |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |
| 22      | Construction of range office cum residence                          | No.            | 15   | 1   | 15  | 0  | 0   | 1  | 15  | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| 23      | Construction of Forester Naka                                       | No.            | 12   | 1   | 12  | 0  | 0   | 1  | 12  | 1  | 12  | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| 24      | Construction of guard chowki                                        | No.            | 10   | 4   | 40  | 1  | 10  | 1  | 10  | 1  | 10  | 1  | 10  | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| 25      | Construction of observation tower/ watch tower                      | No.            | 14   | 10  | 140 | 2  | 28  | 2  | 28  | 2  | 28  | 1  | 14  | 1  | 14  | 0  | 0   | 1  | 14  | 0  | 0   | 1  | 14  | 0  | 0   |
| 26      | Construction of barriers & check posts                              | No.            | 2    | 5   | 10  | 2  | 4   | 2  | 4   | 0  | 0   | 0  | 0   | 1  | 2   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| 27      | Maintenance of buildings                                            | No.            | 2    | 9   | 2   | 0  | 0   | 1  | 2   | 1  | 2   | 1  | 2   | 1  | 2   | 1  | 2   | 1  | 2   | 1  | 2   | 1  | 2   | 1  | 2   |
| 28      | Solar panels                                                        | No.            | 10   | 3   | 30  | 2  | 20  | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   |    | 0   |    | 0   | 1  | 10  |    | 0   |
| 29      | Wireless communication infrastructure development                   | No.            | 1    | 10  | 10  | 2  | 2   | 0  | 0   | 2  | 2   | 0  | 0   | 2  | 2   | 0  | 0   | 2  | 2   | 0  | 0   | 0  | 0   | 2  | 2   |
| 30      | Providing camera, GPS, computer, laptop etc. monitoring equipment's | No.            | 2    | 10  | 20  | 2  | 4   | 1  | 2   | 1  | 2   | 1  | 2   | 1  | 2   | 1  | 2   | 1  | 2   | 1  | 2   | 0  | 0   | 1  | 2   |
| 31      | Providing patrolling vehicle 4 wheeler                              | No.            | 12   | 2   | 24  | 1  | 12  | 0  | 0   | 1  | 12  | 0  | 0   | 0  | 0   |    | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| 32      | Providing patrolling vehicle 2 wheeler                              | No.            | 1    | 4   | 4   | 1  | 1   | 1  | 1   | 0  | 0   | 0  | 0   | 0  | 0   | 0  |     | 0  | 0   | 2  | 2   | 0  | 0   | 0  | 0   |
| (C.II)  | Facility for animal health monitoring                               |                |      |     |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |
| 33      | Providing rescue kit for staff                                      | No.            | 0.3  | 10  | 3   | 1  | 0.3 | 1  | 0.3 | 1  | 0.3 | 1  | 0.3 | 1  | 0.3 | 1  | 0.3 | 1  | 0.3 | 1  | 0.3 | 1  | 0.3 | 1  | 0.3 |
| 34      | Providing camera trap                                               | No.            | 0.3  | 10  | 3   | 0  | 0   | 5  | 1.5 | 5  | 1.5 | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| 35      | Providing trap cage                                                 | No.            | 0.5  | 10  | 5   | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 |
| 36      | Providing required medicine for wild animals                        | No.            | 0.5  | 10  | 5   | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 |
| 37      | Providing rescue vehicle                                            | No.            | 12   | 1   | 12  | 0  | 0   | 1  | 12  | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| 38      | Maintenance & running of vehicles                                   | No.            | 1    | 9   | 9   | 0  | 0   | 1  | 1   | 1  | 1   | 1  | 1   | 1  | 1   | 1  | 1   | 1  | 1   | 1  | 1   | 1  | 1   | 1  | 1   |
| (C.III) | Restoration of historical infrastructure                            |                |      |     | 0   |    | 0   |    | 0   |    | 0   |    | 0   |    | 0   |    | 0   |    | 0   |    | 0   |    | 0   |    | 0   |

|        |                                                                    |     |     |     |     |    |     |    |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |     |
|--------|--------------------------------------------------------------------|-----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|
| 39     | Restoration of other water harvesting structures                   | No. | 1   | 10  | 10  | 2  | 2   | 2  | 2   | 1  | 1   | 1  | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 0 | 0   | 0 | 0   |
| D      | Tourism development                                                |     |     |     |     |    |     |    |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |     |
| (D.I)  | Tourism routes and circuits                                        |     |     |     |     |    |     |    |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |     |
| 40     | Construction of new tourism routes/ patrolling routes and circuits | km  | 5.4 | 50  | 270 | 20 | 108 | 5  | 27  | 5  | 27  | 5  | 27  | 5 | 27  | 5 | 27  | 5 | 27  | 0 | 0   | 0 | 0   | 0 | 0   |
| 41     | Repair of existing patrolling routes                               | KM  | 1   | 50  | 50  | 5  | 5   | 5  | 5   | 5  | 5   | 5  | 5   | 5 | 5   | 5 | 5   | 5 | 5   | 5 | 5   | 5 | 5   | 5 | 5   |
| 42     | Construction of echo friendly pathways                             | km  | 0.2 | 10  | 2   | 2  | 0.4 | 2  | 0.4 | 2  | 0.4 | 2  | 0.4 | 2 | 0.4 | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |
| (D.II) | Tourism amenities                                                  |     |     |     |     |    |     |    |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |     |
| 43     | Construction of echo lodges                                        | No. | 2   | 5   | 10  | 1  | 2   | 0  | 0   | 0  | 0   | 0  | 0   | 0 | 0   | 0 | 0   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   |
| 44     | Construction of interpretation centre                              | No. | 25  | 1   | 25  | 1  | 25  | 0  | 0   | 0  | 0   | 0  | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |
| 45     | Construction of Main entry gate and beautification                 | No. | 20  | 1   | 20  | 0  | 0   | 1  | 20  | 0  | 0   | 0  | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |
| 46     | Construction of entry gate                                         | No. | 10  | 5   | 50  | 2  | 20  | 1  | 10  | 1  | 10  | 1  | 10  | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |
| 47     | Construction of ticket window                                      | No. | 2   | 2   | 4   | 0  | 0   | 0  | 0   | 1  | 2   | 1  | 2   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |
| 48     | Construction of facilities & waiting area                          | No. | 3   | 1   | 3   | 1  | 3   | 0  | 0   | 1  | 3   | 1  | 3   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   | 0 | 0   |
| 49     | Signages                                                           | No. | 0.1 | 100 | 10  | 30 | 3   | 20 | 2   | 10 | 1   | 10 | 1   | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 |
| 50     | Construction of jhonpa/view point                                  | No. | 2   | 10  | 20  | 2  | 4   | 2  | 4   | 1  | 2   | 1  | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 1 | 2   | 0 | 0   | 0 | 0   |
| 51     | Providing benches                                                  | No. | 0.1 | 50  | 5   | 0  | 0   | 10 | 1   | 10 | 1   | 5  | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 5 | 0.5 | 0 | 0   |
| 52     | Creating view point                                                | No. | 1   | 28  | 28  | 10 | 10  | 10 | 10  | 2  | 2   | 1  | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 0 | 0   |
| E      | Community engagement                                               |     |     |     |     |    |     |    |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |     |
| (E.I)  | Livelihood opportunities                                           |     |     |     |     |    |     |    |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |     |
| 53     | Tourism guides training                                            | No. | 0.5 | 10  | 5   | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 |
| 54     | Providing support for creation & running of self help groups       | No. | 1   | 10  | 10  | 1  | 1   | 1  | 1   | 1  | 1   | 1  | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   |
| 55     | Entry point activities                                             | No. | 1   | 10  | 10  | 1  | 1   | 1  | 1   | 1  | 1   | 1  | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   | 1 | 1   |
| 56     | Man - wild animal conflict / Compensation & exgrecia               | No. | 3   | 10  | 30  | 1  | 3   | 1  | 3   | 1  | 3   | 1  | 3   | 1 | 3   | 1 | 3   | 1 | 3   | 1 | 3   | 1 | 3   | 1 | 3   |
| (E.II) | Awareness programs                                                 |     |     |     |     |    |     |    |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |     |
| 57     | Conduct campaigns to educate local communities                     | No. | 0.5 | 10  | 5   | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 |
| 58     | Educational tour in PA for students & local people                 | No. | 0.5 | 10  | 5   | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 |
| 59     | Different educational activities for students for awareness        | No. | 0.5 | 10  | 5   | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 |
| 60     | Training of forest staff etc members & local people                | No. | 0.5 | 10  | 5   | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1  | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 | 1 | 0.5 |

|                                        |                                                                                             |     |     |    |    |   |        |   |        |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |
|----------------------------------------|---------------------------------------------------------------------------------------------|-----|-----|----|----|---|--------|---|--------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|
| 61                                     | Seminars for awareness & educational purpose                                                | No. | 0.5 | 10 | 5  | 1 | 0.5    | 1 | 0.5    | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   | 1 | 0.5   |
| 62                                     | Providing CCTV cameras                                                                      | No. | 2   | 10 | 20 | 0 | 0      | 2 | 4      | 2 | 4     | 0 | 0     | 0 | 0     | 0 | 0     | 0 | 0     | 2 | 4     | 2 | 4     | 2 | 4     |
| 63                                     | Preparation of brochure, map, pamphlets, IT equipment's, booklets management plan exp. Etc. | No. | 1   | 5  | 5  | 1 | 1      | 1 | 1      | 1 | 1     | 1 | 1     | 1 | 1     | 0 | 0     | 0 | 0     | 0 | 0     | 0 | 0     | 0 | 0     |
| 64                                     | Other misc. expenses                                                                        | No. | 1   | 10 | 10 | 1 | 1      | 1 | 1      | 1 | 1     | 1 | 1     | 1 | 1     | 1 | 1     | 1 | 1     | 1 | 1     | 1 | 1     | 1 | 1     |
| Total                                  |                                                                                             |     |     |    |    | 0 | 1847.3 | 0 | 1471.1 | 0 | 811.1 | 0 | 685   | 0 | 656.5 | 0 | 596.1 | 0 | 421.1 | 0 | 354.2 | 0 | 387.8 | 0 | 366.3 |
| Escalation in rates in future per year |                                                                                             |     |     |    |    |   |        |   |        |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |
| Grand total                            |                                                                                             |     |     |    |    |   | 1847.3 |   | 1471.1 |   | 811.1 |   | 685.0 |   | 656.5 |   | 596.1 |   | 421.1 |   | 354.2 |   | 387.8 |   | 366.3 |