

**Management Plan**  
**of**  
**Khijadiya Bird Sanctuary**

2014-15 to 2023-24

By

**Shri. M. M. Bhalodi, GFS**

Deputy Conservator of Forests,  
Marine National Park, Jamnagar.

Under the Guidance of

**Shri. R. D. Kamboj, IFS**

Chief Conservator of Forests,  
Marine National Park, Jamnagar

Under the Direction of

**Dr. C. N. Pandey, IFS**

Chief Wildlife Warden

Gujarat State

Contributions:

© Chief Conservator of Forests, Marine National Park, Jamnagar  
Gujarat Forest Department

Published by: Marine National Park, Jamnagar, Gujarat Forest Department

Year: 2014

Suggested citation:

Bhalodi, M. M., Kamboj, R. D. and Pandey, C. N., 2014. Management Plan of Khijadiya Bird Sanctuary. Gujarat Forest Department. 148 pp.

## Preface

Khijadiya Bird Sanctuary is a unique mosaic wetland ecosystem located close to Gulf of Kachchh on the Central Asian flyway, a regular route for the migratory birds that comes from Iran, Afghanistan and Pakistan. The Khijadiya Bird Sanctuary harbors about 257 species of birds of which about 16 are globally threatened and endangered species. Keeping in view the uniqueness of this sanctuary, globally renowned ornithologist Late. Dr. Salim Ali, in 1984 had remarked that he has not seen so many bird species in such a small area indicating the uniqueness of the ecosystem. This wetland acts as a breeding ground for several Resident/Resident-Migrant species of waterfowl. The habitats in this wetland not only favor bird population but also harbor a wide array of other associated animals and biodiversity. This sanctuary has to be preserved as it is a gift of nature to the humanity. Various activities like habitat management, eco development, eco tourism, Nature Education Camps etc. have been proposed to conserve this unique ecosystem as well as create awareness among the public about the usefulness and inevitability of such ecosystem. The proposed Management Plan has come up in good way which serves the purpose of protection and conservation & development of Khijadiya Bird Sanctuary. I congratulate Shri M. M. Bhalodi GFS, Dy. Conservator of Forests, Marine National Park, Jamnagar for preparing this management plan under the guidance of Shri. R. D. Kamboj IFS, Chief Conservator of Forests, Marine National Park, Jamnagar. I believe this Management Plan will be effective not only for conservation of Khijadiya Bird Sanctuary, but also for the development of the villages situated around the sanctuary.

**Dr. C. N. Pandey**  
Chief Wildlife Warden,  
Gujarat State, Gandhinagar.

# Acknowledgement

I am grateful to Dr. C. N. Pandey IFS, Chief Wildlife Warden, Gujarat State for encouragement and constant support during preparation of this plan. His timely advice has proved immensely useful in concretizing many of the recommendations included in this Management Plan.

I am extremely thankful to Shri R. D. Kamboj IFS, Chief Conservator of Forests, Marine National Park, Jamnagar for his constant guidance and timely advise that made possible to come out with this Management Plan. He was kind enough to share his experience and valuable comments during the entire period.

I have great pleasure to express my gratitude to Shri B. H. Dave GFS, Assistant Conservators of Forests, Marine National Park and Shri G. A. Soda GFS, Assistant Conservators of Forests, Social Forestry who had been Range Forest Officer for Khijadiya Bird Sanctuary, for sharing their experience. The staff of Khijadiya Bird Sanctuary Shri. K. P. Jadeja, Forester, Shri P. R. Sindhiya and Shri. J. T. Jadeja, Beat guards provided crucial inputs for which they deserve my compliments.

I am thankful to Dr. Chandresh Dave and Dr. D. Adhavan for contributing in shaping this Management Plan in its present form.

I am immensely thankful to Jilla Panchayat and Meteorological Department for sharing data.

I am thankful to the field and office staff of Marine National Park for their support and cooperation rendered during preparation of this Management Plan.

**M. M. Bhalodi**  
Deputy Conservator of Forests  
Marine National Park  
Jamnagar

---

# Executive Summary

## Introduction to area

Khijadiya Bird Sanctuary (KBS) is a unique mosaic wetland ecosystem located virtually on the Tropic of Cancer between 22°31'27" N latitude and 70°07'17" E longitude and spread over 604 ha on the coast of Gulf of Kachchh. It is declared as sanctuary under Wildlife (Protection) Act, 1972 vide Government of Gujarat, Agriculture, Forest and Cooperation Department Notifications Nos. AKH-81-81-WLP-1081-102123/P2 dated 27/5/1981 and AKH-209/82-WLP-1081/102123-V2 dated 6/11/1982.

## Statement of significance

This dynamic and complex wetland eco-system with multiplicity of habitats provide various ecological and economic services and supports 257 species of birds including various categories of species scheduled in Red Data list of IUCN. This sanctuary provides a favourable breeding, feeding and roosting grounds for the birds during various seasons of the year. It is significant as it is in Central Asian flyway that acts as a regular route for the migratory birds that comes from Iran, Afghanistan and Pakistan to visit the sanctuary and its neighboring areas.

## Background information

The Khijadiya wetland came into existence since the artificial reclamation earthen bund constructed just parallel to the coastline by the Princely state of Nawanagar in 1920 and the State Government in 1956 to prevent rain water draining into the southern coast of Gulf of Kachchh. The areas around Khijadiya Bird Sanctuary are revenue waste lands and cultivated lands on the landward side and intertidal area towards the seaward where it interfaces with marine sanctuary area and salt works. Scrubby and herbaceous vegetation covers the wetland complex which is dominated by *Prosopis juliflora*.

The climate of the Khijadiya Sanctuary is coastal tropical monsoon and classified as arid to semiarid type with four seasons. According to the data, it is observed that temperature reaches up to 44 °C during the months of April and May, due to which the evaporation increases and water sources dries up rapidly, whereas during winter, temperature drops down to 7 °C. The monsoon generally sets in the beginning of July and continues till the end of September, while the rest of the periods are almost dry.

The forests of Khijadiya Bird Sanctuary are of '5/DS1 - Dry Deciduous Scrub Forest' type with few species of tropical dry deciduous xerophytes. Overall, 27 species of trees belonging to 15 different families, 13 species of shrubs belonging to 11 families, herbs including creepers, sedges and grasses

---

of 124 species belonging to 35 families and 19 species of climbers belonging to 8 families have been recorded from KBS and in its surrounding area. On the basis of water level and vegetation, the habitat types in the sanctuary have been classified as Deep Open Water habitat, Shallow Water habitat, Emergent Aquatic Vegetation habitat, Coastal marsh land with mangroves, Grasslands, Woodlands and Shore lands and small mounds.

The main attraction of Khijadiya Bird Sanctuary is its rich avifaunal diversity that constitutes one of the most significant waterfowl habitats in North-West India. Owing to its strategic location in the vicinity of the Gulf of Kachchh and on the Central-Asian migratory flyway, this sanctuary attracts a number of migratory waterfowl as well as resident and resident migratory birds including Scolopacids (Sandpipers and allies), Ruff & Redshank, Godwits, Curlew & Whimberl, Stints & Sanderling, Charadriids, Crab Plover, Ruddy Turnstone & Red-necked Phalarope, Gulls, Threskiornithids and large sized water fowl including Pelicans, Flamingos and Migratory Cranes. Nesting of these birds in different habitats of the sanctuary have also been recorded from 2001 to 2013. However, there are certain limiting factors like salt water influx in freshwater area, less rainfall, over grazing, cattle movement that result in trampling of nests and eggs, illicit cutting of *Prosopis* for fire wood and fodder and water withdrawal for irrigation that disturbs the avifaunal diversity.

Apart for avifaunal diversity, the sanctuary also acts as a hermitage for other associated organisms which interact with one another and abiotic environmental factors. These organisms include fishes, amphibians, reptiles, mammals and other microscopic and macroscopic organisms that plays significant role in bio-geocycling process.

### **History of management and present practices**

Khijadiya Bird Sanctuary was managed without any sanctioned Management Plan till 2002, where all the works were carried out based on various schemes in an *ad hoc* manner. The first Management Plan for the Sanctuary was prepared for the period from 2002 to 2011. During old Management Plan, there were no reports on timber operation including bamboo and firewood harvest. No minor forest produces collection is permitted from the sanctuary area. No leases have been granted in the Sanctuary area as it does not contain any important mineral. However, outside sanctuary area, lease has been granted to Khijadiya salt work for extraction of salt.

Programs and activities like Global Bird Watcher's Conference, Destination Khijadiya - 2010, was organized jointly by Forest Department and Tourism Corporation of Gujarat State to attract the attention of national and international bird watchers and ornithologists which was unique of its own kind. During this event, about 78 participants from 37 countries and about 200 participants from different states of India have participated and presented their papers/posters etc.

As a part of tourism developmental activities, an interpretation center was constructed at Khijadiya during the year 2007-08 with informative display materials on avian life. Drinking water facility and toilet blocks were also constructed for the convenience of tourists during the tenure of old

---

Management Plan. Along with that, effective patrolling and awareness programme on wildlife conservation decreased the trend in offences in the sanctuary.

The old Management Plan had given due importance to the ecological monitoring and research in the sanctuary. It was proposed to monitor the physio-chemical, vegetation and wildlife population changes with regular monitoring of health and diseases and to maintain data storage system. GEER Foundation, Gandhinagar conducted studies on the Ecology and Biodiversity of Khijadiya Bird Sanctuary and its environs. Intensive management zone, Administrative zone and Tourist zone for managing and wildlife conservation in the sanctuary from 2002-11 were proposed in old Management Plan. Review of the previous Management Plan has been discussed in Chapter 3.

### **The Protected area and the interface land use situation**

The sanctuary area is not habited by human population; however it is surrounded by four villages viz., Khijadiya, Dhunvav, Jambuda and Vibhapar occupying an area of 31.9 sq. km. with the total population of 17607 individuals. Livestock rearing is the second most important livelihood activity next to agriculture for the villagers in the surroundings of Khijadiya Bird Sanctuary.

### **Proposed Management Plan**

Keeping in mind, the facts for requirement of new scientific inputs, new Management Plan has been designed with the objectives to protect and conserve the Khijadiya Bird Sanctuary. The objectives includes, optimizing its biological and ecological potential, protect nesting, maintain scientific database, create awareness and sensitize people in general towards conservation, promote sustainable eco-tourism and to ensure sustainable livelihood for communities residing in the surrounding villages by addressing the limiting factors like draining of excess water for irrigation in the surrounding area, dependence on fire wood and fodder and grazing.

### **Zonation**

In addition to the zonation of the previous Management Plan, it is proposed to comprise a buffer zone in the proposed Management Plan for the surrounding villages to address their concerns of development in environmentally sustainable manner by undertaking eco development activities. The new Management Plan consists of Wilderness Zone, Administrative zone, Tourism Zone and Buffer zone with the theme plans on the management of the habitats. In addition to that, it is also proposed to develop and manage the peripheral areas including catchment areas and extension of the sanctuary.

### **Eco-tourism, Interpretation and Conservation education**

The Khijadiya Bird Sanctuary is an attractive destination for tourists due to its mosaic of habitats in small area with rich avifaunal diversity. Keeping the aesthetic beauty of the sanctuary and ecotourism in mind, the Management Plan proposes to develop more facilities including Nature Education Camps and Bird Education Centre for students, tourists and nature lovers. Besides that, eco development work including construction of R.C.C. road and sewage network, providing solar

---

cooker, biogas plant, employment for youth through ecotourism, conducting tailoring classes, vaccination camps for cattle etc. are proposed in the Management Plan.

### **Research monitoring and training**

Research and regular monitoring are prime requirements for effective conservation and management of any ecologically sensitive area/protected areas. To meet the need of regular monitoring, a fully equipped Environment Laboratory (soil, water and meteorological lab), with facility to carry out research on avifaunal habitat, food and feeding, breeding, threats and disease outbreak with respect to climate change will be constructed at Khijadiya Bird Sanctuary camp site along with qualified staff and a Scientific researcher, Analyst and Lab Technician. The staff of KBS will be exposed to training on various aspects of avifauna of the sanctuary.

### **Organization and Administration**

As per article 33B of Wildlife (Protection) Act, 1972, an advisory committee for each sanctuary has been mandated. However, this committee is yet to be constituted in respect of Khijadiya Bird Sanctuary and this committee shall render advice on measures to be taken for better conservation and management of the sanctuary including participation of the people living around the sanctuary. The requirement of staff and their amenities for the betterment of the sanctuary is also discussed in chapter 10.

### **Budget**

The detailed budget required for the proposed Management Plan for ten years through state plan and Centrally Sponsored Scheme (CSS) is Rs. 3054.12 lakhs. With this fund the maintenance works will be carried out regularly as the sanctuary area is highly prone to degradation due to proximity to the sea leading to weathering effects.



---

# List of Abbreviations/Acronyms used in this Management Plan

APCMKW	Action Plan for the Conservation and Management of Khijadiya Wetland.
C	Celsius
CSS	Centrally Sponsored Scheme
c.mt	Cubic meter
DO	Dissolved Oxygen
DOW	Deep Open Water
EAV	Emergent Aquatic Vegetation
Eco.-Devlp.	Eco-Development
EDC	Eco-development Committee
Forest Res.	Forest Research, Training and Orientation
GEER	Gujarat Ecological and Educational Research Foundation
ha	Hectors
IDWH	Integrated Development of Wildlife Habitat
IFDP	Integrated Forest Development Project
IUCN	International Union for Conservation of Nature
Km	Kilometer
KBS	Khijadiya Bird Sanctuary
MSNP	Management of Sanctuary and National Park
mm	Millimeter
NGO	Non-Government Organization
NEC	Nature Education Camp
Nal Sarovar	Development of Nal Sarovar
SOW	Shallow Open Water
Sq. km	Square kilometer
WEIT	Wildlife Education, Interpretation and Training

---

# Contents

## Part - I

<b>Chapter 1 Introduction to the area.....</b>	<b>1</b>
1.1 Location, constitution and extent: .....	1
1.2 Approach and Access .....	2
1.3 The Statement of Significance: .....	2
<b>Chapter 2 Background Information and Attributes .....</b>	<b>5</b>
2.1 Genesis of the Khijadiya Bird Sanctuary.....	5
2.2 Boundaries .....	5
2.2.1 Legal boundaries.....	5
2.2.2 Ecological boundaries.....	6
2.3 Geology, Rock and Soil.....	6
2.4 Climate.....	6
2.4.1 General.....	6
2.4.2 Temperature.....	7
2.4.3 Precipitation.....	7
2.4.4 Relative humidity .....	8
2.4.5 Winds.....	8
2.5 Water source and its catchment areas.....	8
2.6 Range of wildlife, status distribution and habitat .....	9
2.6.1 Biogeographic classification.....	9
2.6.2 Habitat types .....	10
2.6.3 Fauna.....	15
<b>Chapter 3 History of Management and Present Practices .....</b>	<b>37</b>
3.1 General .....	37
3.2 Timber operations including bamboo and firewood harvest.....	37
3.3 Non wood forest produces collection.....	37
3.4 Leases .....	37
3.5 Other programmes and activity .....	38
3.5.1 Global Bird Watcher’s World Conference, Destination Khijadiya - 2010 (25 <sup>th</sup> to 27 <sup>th</sup> November, 2010).....	38
3.6 Forest Protection.....	38
3.7 Tourism .....	39

---

3.7.1 Development of interpretation center: .....	41
3.8 Research and ecological monitoring .....	41
3.9 Wildlife conservation strategies and their evaluation. ....	43
3.10 Administrative set up .....	47
3.11 Threats:.....	48
<b>Chapter 4 The protected area and the interface land use situation .....</b>	<b>49</b>
4.1. The existing situation in the zone of influence .....	49
4.1.1 Location, extent, boundaries and natural attributes.....	49
4.1.2 Human population in and around Khijadiya Bird Sanctuary .....	49
4.1.3 Livestock.....	50
4.1.4 Land use pattern in surrounding areas of KBS .....	51

## Part - II

<b>Chapter - 5 Proposed Management.....</b>	<b>53</b>
5.1 The vision .....	53
5.2 Objectives of Management .....	53
5.3 Limitations in achieving the objectives .....	54
5.3.1 Anthropogenic issues.....	54
5.3.2 Administrative issues.....	54
<b>Chapter - 6 Strategies .....</b>	<b>55</b>
6.1 Settlement, survey and demarcation.....	55
6.2 Zonation .....	56
6.2.1 Wilderness Zone.....	56
6.2.2 Administrative zone.....	57
6.2.3 Tourism Zone .....	57
6.2.4 Buffer zone .....	58
6.3 Theme Plans.....	58
6.3.1 Habitat Management .....	58
6.3.2 Deep Open Water habitat (DOW).....	59
6.3.3 Shallow Open Water habitat (SOW) .....	59
6.3.4 Emergent Aquatic Vegetation (EAV).....	59
6.3.5 Coastal marsh land with mangrove .....	59
6.3.6 Grassland habitat.....	60
6.3.7 Woodland habitats .....	60
6.3.8 Shore land and small mounds .....	60
6.4 Development and management of peripheral areas including catchment area .....	60
6.4.1 Extension of Khijadiya Sanctuary .....	61
6.5 Protection .....	62

---

<b>Chapter - 7 Eco-tourism, Interpretation and Conservation education.....</b>	<b>63</b>
<b>Chapter - 8 Eco-Development .....</b>	<b>67</b>
<b>Chapter - 9 Research, monitoring and Training .....</b>	<b>69</b>
9.1 Research and ecological monitoring.....	69
9.2 Monitoring.....	69
9.2.1 Monitoring Physical Changes.....	70
9.3 Monitoring Changes in wildlife population .....	71
9.3.1 Succession changes .....	71
9.3.2 Change in Number, Mortality, Population structure and Growth rate.....	71
9.3.3 Monitoring Wildlife health and disease.....	71
9.4 Monitoring Health and Disease .....	71
9.4.1 Animal indicator approach.....	71
9.4.2 Examination of live animal and bird.....	71
9.4.3 Examination of dead animal and bird.....	71
9.5 Data storage system .....	72
9.5.1 Field observation diary.....	72
9.5.2 Computer .....	72
9.5.3 Research.....	72
9.6 Training.....	72
<b>Chapter - 10 Organization and Administration .....</b>	<b>73</b>
10.1 Structure and responsibilities .....	73
10.2 Staff amenities.....	74
<b>Chapter - 11 The Budget .....</b>	<b>77</b>
11.1 The Plan Budget.....	77
<b>References.....</b>	<b>78</b>
<b>Annexures .....</b>	<b>79</b>

### List of Tables

Table-1: Vegetation Profile of KBS .....	9
Table-2: Statement showing yearwise number of Nests of different species in KBS.....	33
Table-3: Food availability in different habitats of Khijadiya Bird Sanctuary .....	36
Table-4: Entry fee and other fees levied from tourists visiting Khijadiya Bird Sanctuary.....	39
Table-5: Statement showing the distance of surrounding villages from KBS .....	50
Table-6: Statement showing the number of farmers in different categories during 2011 .....	50
Table-7: Village wise periphery of Khijadiya Bird Sanctuary.....	55

---

## List of Figures

Fig. 1: Location of Khijadiya Bird Sanctuary.....	1
Fig. 2: A map of Khijadiya Bird Sanctuary.....	5
Fig. 3: Trend in precipitation during last two decades in and around Jamnagar city.....	7
Fig. 4: Great Crested Grebe swimming in the deep open water habitat.....	10
Fig. 5: Eurasian Spoonbills feeding in the Shallow open water habitat.....	11
Fig. 6: A Purple Swamp hen feeding at the Emergent Aquatic vegetation.....	12
Fig. 7: Coastal Marshland with Mangroves.....	12
Fig. 8: Grassland ecosystem.....	13
Fig. 9: Nest in the Wood land ecosystem.....	13
Fig. 10: Small mounds.....	14
Fig. 11: Map showing Freshwater Wetland & their Environs.....	15
Fig. 12: Northern Shoveller.....	16
Fig. 13: Wood Sandpipers feeding with Asian Open Bill and Glossy Ibis.....	19
Fig. 14: Ruffs feeding at the water body.....	19
Fig. 15: Black-tailed Godwit.....	20
Fig. 16: Curlew.....	20
Fig. 17: Flock of Great White Pelican.....	23
Fig. 18: Flamingos.....	23
Fig. 19: Great Crested Grebe with its juvenile.....	24
Fig. 20: Black-necked Stork.....	25
Fig. 21: Painted Stork.....	26
Fig. 22: Spoonbills feeding.....	26
Fig. 23: Black-headed Ibis.....	27
Fig. 24: Cattle Egret.....	27
Fig. 25: Little Cormorants.....	28
Fig. 26: Indian Shag with Western Reef Egret and Spoonbill.....	29
Fig. 27: Darter.....	29
Fig. 28: Common Coot.....	30
Fig. 29: Purple Swamphen.....	30
Fig. 30: Pheasant-tailed Jacana.....	31
Fig. 31: Black-winged stilt.....	31
Fig. 32: Spot-billed Duck.....	32
Fig. 33: Trend in offences registered at Khijadiya Bird Sanctuary.....	39
Fig. 34: Tourist flow to KBS from 2003-04 to 2012-13.....	40
Fig. 35: Human census in surrounding villages of KBS.....	50
Fig. 36: Live stock details of surrounding KBS.....	51
Fig. 37: Land use pattern of surrounding village areas of KBS.....	51
Fig. 38: Map of Khijadiya Bird Sanctuary showing different zonation. (Representative map).....	57



---

# Part - I





---

# Chapter 1

## Introduction to the area

### 1.1 Location, constitution and extent:

Khijadiya Bird Sanctuary is located virtually on the Tropic of Cancer between 22°31'27" N latitude and 70°07'17" E longitude. This wetland area is located in semi-arid region of Jamnagar district, southern coast of the Gulf of Kachchh, Gujarat (Fig. 1).

The Khijadiya Bird Sanctuary was declared under Wildlife (Protection) Act, 1972 vide Government of Gujarat, Agriculture, Forest and cooperation Department Notifications Nos. AKH-81-81-WLP-1081-102123/P2 dated 27/5/1981 and AKH-209/82-WLP-1081/102123-V2 dated 6/11/1982 with the total area of 604.86 ha.

This Sanctuary has two distinct freshwater tanks which came into existence after the construction of bunds to prevent freshwater runoff into the sea. The freshwater tanks and their peripheries are spreaded over 600 ha. of area.

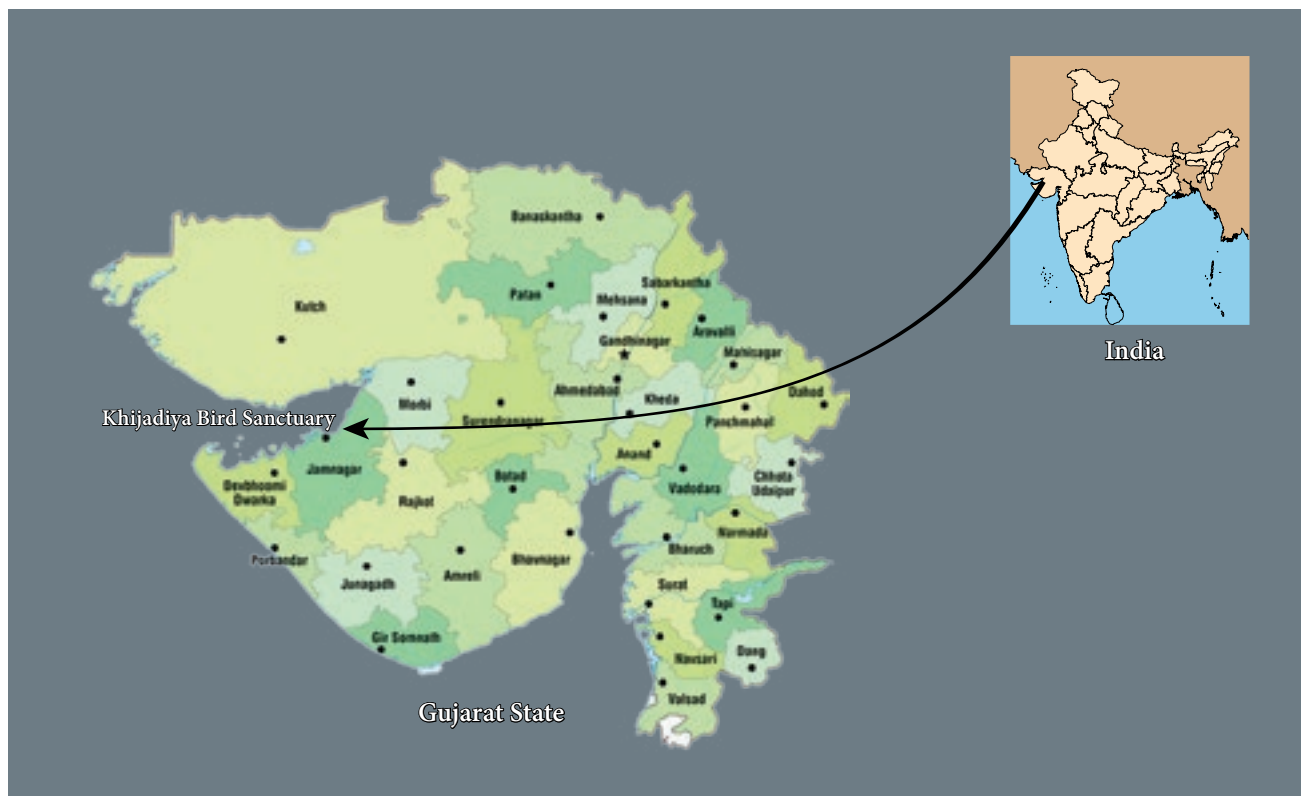


Fig. 1: Location of Khijadiya Bird Sanctuary

---

## 1.2 Approach and Access

The Khijadiya Bird Sanctuary (KBS) is located about 12 km Northeast from Jamnagar city, the District Headquarter with Railway station and Airport in Saurashtra region of Gujarat state. It is situated 4 km away from Khijadiya Patiya on Jamnagar - Rajkot State Highway No. 25, 18 km from Jamnagar Railways station and 22 km from Jamnagar Airport. The Sanctuary is 345 km away from Gandhinagar, the capital of Gujarat. Nearest Railway Station, Hapa is situated on Jamnagar - Rajkot route with broad gauge Railway track which is just 12 km away from the Sanctuary.

## 1.3 The Statement of Significance:

Khijadiya is a distinctive manmade, coastal, freshwater wetland in semi arid biogeographic zone in India. It came into existence due to two bunds/embankments built to apprehend salinity ingress from the sea into the mainland and to prevent freshwater draining into the sea. This created a unique complex “Saltwater-Freshwater” ecosystem with variety of habitat types and ecosystems. These include freshwater wetland, seasonal rivers, intertidal zone, tidal creeks, mangroves, saltpans and agriculture fields. This dynamic and complex wetland eco-system with multiplicity of habitat types provide various ecological and economic services. It supports 257 species of birds including various categories of species scheduled in Red Data List of IUCN. This wetland system provides favourable breeding, feeding, roosting, and staging grounds for a great variety and density of birds during various seasons of the year. Due to these peculiarities, this wetland is identified as one of the Wetlands of International Importance by Wetlands International (Li *et al.*, 2009) and an Important Bird Area (IN-088) by Birdlife International, (Islam & Rahmani, 2004). The Khijadiya wetland is also declared as one of the Wetlands of National Importance by the Government of India, Ministry of Environment and Forests.

### *Global significance*

1. The KBS is located adjacent to the boundaries of Marine Sanctuary. Due to its strategic location close to the Gulf of Kachchh, an Central Asian flyway, it act as a regular route for the migratory birds that comes from Iran, Afghanistan and Pakistan to visit the sanctuary and its neighboring areas.
2. Among the various waterfowl recorded here in the past, Ferruginous Duck, Dalmatian Pelican, Indian Skimmer, Lesser Flamingo, Black-headed Ibis, Painted Stork, Open bill Stork etc. are threatened species as per criteria of the IUCN/Birdlife International. Black-necked Stork is amongst the most threatened storks in the world.
3. It supports a large heronry where many globally threatened species breed.
4. Due to some peculiarities, it is recognized as wetland of International importance.

### *National significance*

1. KBS is a unique manmade, coastal freshwater wetland in 4B Gujarat-Rajwara biotic province of the Semi-arid biogeographic zone of India. This is a unique complex of “Saltwater-

---

Freshwater” ecosystem with variety of habitats and ecosystems that include freshwater wetland, seasonal rivers, intertidal zone, tidal creeks, mangroves, saltpans and agriculture fields.

2. KBS regularly holds large congregation of water birds that includes flocks of Greater Flamingo, Lesser Flamingo, Painted Stork, Spoonbill, Ibis, Pelicans, Common Crane, Demoiselle Crane, migratory ducks, and shorebirds such as Ruff, Godwits which are regularly visits this wetlands. More than 20,000 water birds are regularly counted by local NGOs and Sanctuary administration during wetland water bird monitoring activities.
3. Several Resident/Resident-Migrant species of waterfowl breed here regularly. These include few rare breeders for Gujarat State viz. Black-necked Stork, Great Crested Grebe and the Glossy Ibis.
4. KBS supports 4 species of prawns, 21 species of butterflies, 5 species of fishes, 7 species of reptiles and 7 species of mammals.
5. On flora side, KBS supports 27 species of trees, 13 species of shrubs, 124 species of herbs and 19 species of climbers.
6. KBS regularly provides important feeding grounds to highly specialized Lesser Flamingo and Greater Flamingos.
7. Due to its unique peculiarities, the Khijadiya Bird Sanctuary has been included in the wetland of National Importance.

### ***Local significance***

1. It provides shelter to many water birds during summer when most of the inland water bodies dry up.
2. KBS also very useful in recharge of groundwater table of nearby areas. Further, it also controls floods.
3. The freshwater tanks and bunds checks salinity ingress in the vicinity from the Gulf of Kachchh benefiting the peasantry of the region.
4. Apart from its values as an avian/wildlife habitat, the wetlands at the Sanctuary are also important for nature education.
5. KBS is an important place for academicians and researchers to study the avifaunal aspects in this region.
6. It provides recreational value due to its scenic and aesthetic environment.



---

## Chapter 2

# Background Information and Attributes

### 2.1 Genesis of the Khijadiya Bird Sanctuary

The Khijadiya Bird Sanctuary came into existence since the artificial reclamation earthen bund constructed just parallel to the coastline of the southern coast of Gulf of Kachchh. The reclamation bund was constructed by the Princely state of Nawanagar in 1920 and the State Government in 1956 to prevent fresh rain water draining into the Gulf of Kachchh with prime objective of preventing the salinity ingress. The reclamation earthen bund was constructed from Jodiya town which is north-east to Jamnagar to Salaya on western direction of Jamnagar city. The part of the reclamation bund passes near the Khijadiya Bird Sanctuary where it intercepts waters of Kalindi and Ruparel rivers resulting into formation of two freshwater wetlands.

### 2.2 Boundaries

#### 2.2.1 Legal boundaries

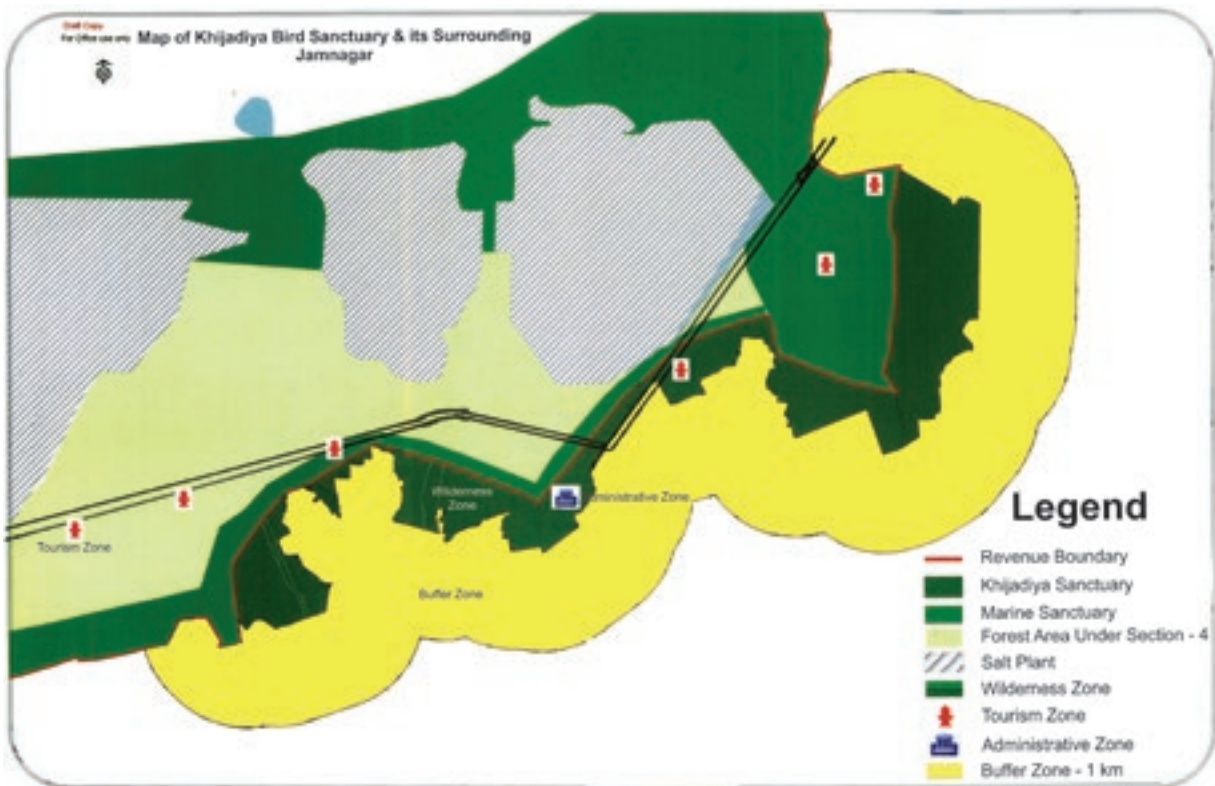


Fig. 2: A map of Khijadiya Bird Sanctuary

---

The area has been declared as sanctuary vide the gazette notification Nos. AKH-81-81- WLP-1081-102123/P2 dt. 27-5-1981 and AKH-209/82-WLP-1081/102123-V2 dt. 6-11-1982. According to the notifications, the boundaries of the sanctuary are as follows.

North : Sea shore land and revenue areas of Jambuda village

East : Revenue areas of Jambuda and Khijadiya villages

South : Gauchar land and revenue areas of Dhunvav, Khijadiya and Jambuda villages

West : Sea shore land and revenue areas of Khijadiya, Dhunvav and Jambuda villages

The above notifications are given in Annexure - 1 and map showing boundary demarcation is given at Fig. 2.

### **2.2.2 Ecological boundaries**

The large areas around Khijadiya Bird Sanctuary are revenue waste lands and cultivated lands on the landward side and intertidal sea coast at the seaward side where it interfaces with marine sanctuary area and salt works.

Scrubby and herbaceous vegetation covers the wetland complex which is dominated by *Prosopis juliflora*. The surrounding agricultural land is mainly used by villagers for cultivation of cotton, jowar, millet, cereals etc. The land towards the gulf is saline and comes under marine sanctuary. Khijadiya littoral zone consists mainly of sedimentary mudflats with scattered sandy/rocky shore habitats. It is declared as Marine Sanctuary and is fully protected. Around the periphery, the sanctuary is covered with mangroves. A medium sized creek passes through the mangrove area, which always remains flooded with sea water and supports the mangrove ecosystem.

## **2.3 Geology, Rock and Soil**

The Khijadiya Bird Sanctuary is situated in North-East coastal region of Jamnagar district. This sea-coast region is a complex system, which remains flooded with fresh water during monsoon period. The geological study of the rocks shows that they are calcareous sand stones with a low level coastal plains and mud flats towards sea side. The soil is silty clayey which varies in proportions of silt and clay. The coast of Khijadiya comprises of scattered sandy shorelines followed by intertidal zone of mudflat that has a very slight slope seaward. The coast is subject to constant changes due to actions of winds, waves, tides and cyclones which erode, transport and deposit rock, gravel, sand and mud off the shore. Beaches, marshes and mangroves in coastal zone are derived from the action of sea and landscape, as a work of surface sediments. The wetlands around Khijadiya coast are sources of relatively abundant coastal sediment where surface deposits are observed more in these areas.

## **2.4 Climate**

### **2.4.1 General**

The climate of the Khijadiya Sanctuary is coastal tropical monsoon and classified as arid to semiarid type.

The sanctuary experiences four seasons a year. The winter season starts from December to February followed by summer from March to May. South Westerly monsoon sets during late June and lasts till August - September. However, the period between Octobers to December in the post monsoon period is a salubrious season. The area is characterized by severe cold during winters and scorching hot during summers. The rainfall is unpredictable and scanty with an annual average of meager 400 mm, of which more rain occurs during the months of June-July and August and sometimes even during September.

### 2.4.2 Temperature

As there is no temperature recording facility available at Khijadiya Bird Sanctuary, the data of Jamnagar city has been considered. According to the data, it is observed that temperature is very high during the months of April and May, due to which the evaporation increases and water sources dries up rapidly. Wild animals particularly Blue bulls migrate to adjoining agricultural fields in search of water and food causing damage to agricultural crops. During winter, temperature drops up to 7 °C where as in summer it raises up to 44 °C.

### 2.4.3 Precipitation

The monsoon generally sets in the beginning of July and continues till the end of September, while the rest of the periods are almost left dry. Though the rainy season extends up to 3 months, the numbers of rainy days are as less as 14 to 21 days per year and long dry spells in between are common. It is a drought prone area. However, during last decade there had been sufficient rainfall (average 1100 mm) in this region compared to earlier decade (average 488 mm). This led to increase in groundwater table resulting into lessening the pressure of utilizing water from the sanctuary areas for agricultural purpose. The rainfall data of Jamnagar city and its surroundings for last two decades is given in Annexure - 2 and trend in precipitation is depicted in Fig. 3.

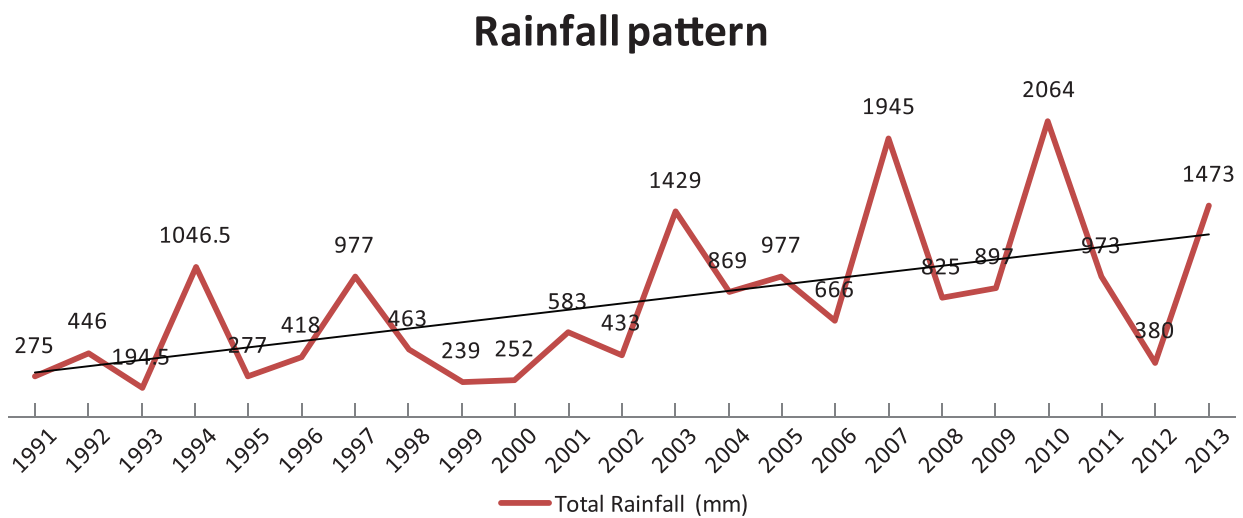


Fig. 3: Trend in precipitation during last two decades in and around Jamnagar city.



---

#### 2.4.4 Relative humidity

During the south west monsoon season the relative humidity is generally over 60 per cent. In rest of the year, air is comparatively dry with afternoon humidity ranging between 20 to 30 per cent.

#### 2.4.5 Winds

During most of the year the wind blows from north-west direction in the sanctuary area. However, during monsoon, the wind blows from south-west direction and brings rain, where as during winter, the wind direction changes sometimes from south-west to south-east and are always cold.

### 2.5 Water source and its catchment areas

The freshwater tanks of Khijadiya Bird Sanctuary are fed by two rivers, viz., Kalindi and Ruparel. These rivers are not perennial, mostly flows only during monsoon and post monsoon periods. Each river feeds separate freshwater tank, i.e., Kalindi River feeds Khijadiya-Dhuvanv tank and Ruparel River feeds Jambuda tank.

The villages on catchment area of Kalindi River are Khankotda, Gangajala, Pasaya-Beraja, Moda, Aliya-Bada, Shekhpatt, Bhimarana and Dhuvav and the villages on catchment area of Ruparel River are Nani Banugar, Moti Banugar and Jambuda.

Agriculture is the main economic activity practiced by the villagers residing in the catchment areas of both the rivers.

The gross catchment area at the reclamation bund site is 362.44 sq. km and dependable water yield from the catchment area is 6679.00 MCF in the year having normal rainfall.

There are three pucca waste weirs on Dhunvav reclamation bund with lengths of 339.7 m, 164.40 m and 399.70 m on cause way nos. 1, 2 and 3, respectively. The total length of the waste weir is 903.85 m.

The total length of the earthen reclamation bund is 5996.15 m; the top width of the bund is 4 m with maximum height of 6.06 m. The reclamation bund prevents salinity ingress in about 800 ha of adjoining agricultural land.

Being a plain region without any perennial river, the freshwater wetlands face water scarcity during summer season. The water is usually retained in the freshwater wetlands till the month of March every year. It may be interesting to note that the steady water loss of 0.8-0.9 cm/day has been recorded at Khijadiya lakes during the study carried out in February and March 1984.

Freshwater wetland/water body of Khijadiya/Dhunvav is quite deeper than Jambuda. Approximate average depth during monsoon has been recorded around 4-5 ft, at Khijadiya/Dhunvav water body with the maximum depth over 6 ft at certain spots. At Jambuda the depth has been recorded to be 2-3 ft on an average.



---

## 2.6 Range of wildlife, status distribution and habitat

Khijadiya Bird Sanctuary is located in Biogeographic 'Zone -4-Semi Arid zone' of India and 4b-Semi Arid Gujarat-Rajputana Biotic Province.

### 2.6.1 Biogeographic classification

#### *Flora*

As per the revised classification of Indian Forest Types by Champion & Seth, the forests of Khijadiya Bird Sanctuary are of '5/DS1 - Dry Deciduous Scrub Forest' type with few species, typical of tropical dry deciduous xerophytic forests are also seen.

**Table - 1: Vegetation Profile of KBS**

Sr. No	Vegetation type	No. of Species
1	Trees	27
2	Shrubs	13
3	Herbs	124
4	Climbers	19
	<b>Total</b>	<b>183</b>

GEER Foundation, Gandhinagar carried out a study during the year 2003-05 and recorded a total of 183 species of flora in and around Khijadiya Bird Sanctuary (Table - 1). Various species of flora belongs to varied life forms like Hemi-cryptophytes, Phanerophyte, Chamaephytes and Therophytes. The following table indicates the vegetation profile recorded in the sanctuary and it's vicinity during the study period.

#### *Trees*

Overall, 27 species of trees belonging to 15 different Families were recorded from KBS and in its surrounding area (Annexure - 3). Most of the trees are planted on bunds and mounds in freshwater reservoirs. It was found that *Prosopis juliflora* (Gando Baval) is the dominant species at KBS.

#### *Shrubs*

A total of 13 species of Shrubs belonging to 11 Families were recorded in KBS and in its surroundings (Annexure - 4). Most of the shrubs recorded were terrestrial plants that commonly occur in waste lands. In this category no single plant Family was found dominating the group.

#### *Herbs*

The herbs including under shrubs, creepers, sedges and grasses collectively constituted 124 species belonging to 35 Families (Annexure - 5). Among 124 species, 2 species of creepers, 9 species of sedges, 20 species of grass and 4 species of aquatic angiosperm plants were recorded.

---

## ***Climbers***

A total of 19 species of climbers belonging to 8 families were recorded in KBS and its surroundings (Annexure - 6).

Vegetation other than Angiosperms has also been reported at Khijadiya Bird Sanctuary which is listed in Annexure - 7.

### **2.6.2 Habitat types**

On the basis of water level and vegetation, various types of habitats have been identified in Khijadiya Sanctuary. It acts as a perfect ecosystem where community of different species interacts with one another and with their physical environment of matter and energy.

#### **2.6.2.1 Deep Open Water (DOW)**

Wetland areas have a depth of more than 60 cm and supports aquatic vegetation and it is classified as Deep Open Water habitat. This type of habitat supports submerged vegetation and some floating vegetation. The wetland areas are seen on both the sides of the sanctuary i.e., Jambuda and Dhunvav/Khijadiya. Especially during the monsoon season, the entire wetland gets inundated with fresh rainwater. This kind of habitat is very good for surface feeding and diving birds like Coots, Pochards, Wigeon and Pelicans.



Fig. 4: Great Crested Grebe swimming in the deep open water habitat

#### **2.6.2.2 Shallow Open Water (SOW)**

Wetland area having depth of water level is less than 60 cm without any aquatic vegetation comes under this category of habitat in the Khijadiya Bird Sanctuary. Majority of the wetland areas in both the parts have this type of habitat. This kind of habitat is good for surface feeding birds like Common teal, Pintail, Shoveller, Flamingo, Spoonbill, Heron, Painted Stork and Black-necked Storks.



Fig. 5: Eurasian Spoonbills feeding in the Shallow open water habitat

As the water level in this habitat decreases, the submerged flora starts growing and flowering. These flowers float on the surface of water and render beauty to the water body. Jambuda water body has only few pockets of submerged angiosperm vegetation when compared to Dhunvav/Khijadiya water body. Most of the areas have macro-algae constituting the submerged vegetation. Due to less water depth, algal species like *Chara* sp. and *Nitella* sp. were absent in Dhunvav/Khijadiya water body during monsoon. *Spirogyra* sp. and *Ocillatoria* sp. have been found common in both the freshwater bodies.

### 2.6.2.3 Emergent Aquatic Vegetation (EAV)

The depth of this sanctuary's wetland ecosystem is variable but the surface water has dense growth of emergent aquatic vegetation. The emergent vegetation reduces the light penetration. Due to this interspecific competition, the density of submerged vegetation declines. This kind of habitat attracts Moorhens, Jacanas, Bitterns, Egrets, Herons and Coots as it favors for their nesting.

Dense and sparse vegetation was observed in and around the Khijadiya/Dhunvav water bodies, whereas the vegetation is scattered and scanty in Jambuda water body. Among the emergent hydrophytes, *Cyperus* spp., *Scirpus grossus*, *Fimbristylis* sp. were the dominants recorded here. The evolving vegetation play an important role in trapping the soil particles and helps in binding and reducing the soil erosion. They protect the shores of water bodies while the other vegetation at KBS almost dry up after January.

*Najas* sp., *Vallisneria* sp., *Hydrilla* sp., *Nymphaea stellata* were found to be more on Khijadiya water body as compared to Jambuda. This type of vegetation provides important feeding ground to most of the avifauna. Whereas, reeds and sedges provide resting, roosting/nesting ground for several birds. *Scirpus* patches are also used by some species of birds for resting and roosting/nesting. It also provides nest material. Jacanas use parts of these plants and some grasses for cushioning the nest.





Fig. 6: A Purple Swamp hen feeding at the Emergent Aquatic vegetation

#### 2.6.2.4 Coastal marsh land with mangrove

This kind of habitat is found at the external side of the Khijadiya Bird Sanctuary but forever, part of Marine Sanctuary having vast area of mudflats. The areas along the reclamation bund are Part-2 and Part-1 towards sea side. This is very ideal habitat for the wandering birds like Sand pipers, Stint, Plovers etc.

This habitat is at the opposite side of the freshwater pond and covered with vegetation of *Avicennia marina*, *Salicornia* sp., *Suaeda nudiflora*, *Suaeda fruticosa* and scattered patches of *Aeluropus lagopoides* near the salt marsh. An interesting presence of the endemic mangrove associate *Urochondra setulosa* is reported at Khijadiya, this species is only found in Gujarat. *Avicennia marina* grows stunted in the salt marsh at the opposite side of Khijadiya and not towards Jambuda.



Fig. 7: Coastal Marshland with Mangroves



---

### 2.6.2.5 Grasslands

The areas with grassland are found mainly in part one of the Khijadiya Bird Sanctuary in Jambuda side and this is very special habitat for Lark sp., Sand grouse and Hill Partridge.

The grass patches along the reclamation bund in both the parts of the Khijadiya Bird Sanctuary attracts Hill partridge where its population is found to be more.



Fig. 8: Grassland ecosystem

### 2.6.2.6 Woodlands



Fig. 9: Nest in the Wood land ecosystem



---

Khijadiya Bird Sanctuary also has timbered vegetation at Dhunvav side with huge trees of *Acacia nilotica* which act as nesting shed for Black necked stork, Painted Stork, Egrets, Heron, Cormorants and Darters. Apart from *Acacia nilotica*, dense growth of *Prosopis juliflora* also found in Dhunvav part of the Khijadiya Bird Sanctuary which is also plays important role in breeding and nesting for the birds like Storks, Spoonbills, Cormorants, Darters etc. This habitat is also utilized by other mammals like Blue bulls, feral pigs as it provides suitable conditions for food, shelter and breeding.

The waterfowls prefer *Prosopis juliflora* because of its peculiar canopy pattern, where branches give support and space for large sized nests of large birds and also provides safe place due to thorny branches. Such canopy is lacking in *Acacia nilotica* and hence, it is less preferred by birds.

#### 2.6.2.7 Shore land and small mounds

This type area is found on the fringes of the wetlands in both the part of the Khijadiya Bird Sanctuary which is occupied by the birds like Lapwing, Pratincoles, Waterhen etc. Reed-meadow seral sedge state, that is a stage where sedges, grasses and *Cyperaceae* plants grow together, is found on the margin of lakes predominantly near most to the mounds. The vegetation in this stage includes *Cyperus bulbosus*, *Cyperus rotundus*, *Fimbristylis sp.*, *Bulboschoenus maritimus*, *Bulbostylis barbata*, *Echinochloa colonum*, *Paspaladium geminatum*, etc. These plants have significant role in the circulation of air in the lake as they helps in exchange of Carbon-di-oxide (CO<sub>2</sub>) and Oxygen (O<sub>2</sub>).

A detailed analysis of different habitats (land cover classes) is given at Annexure - 16.



Fig. 10: Small mounds

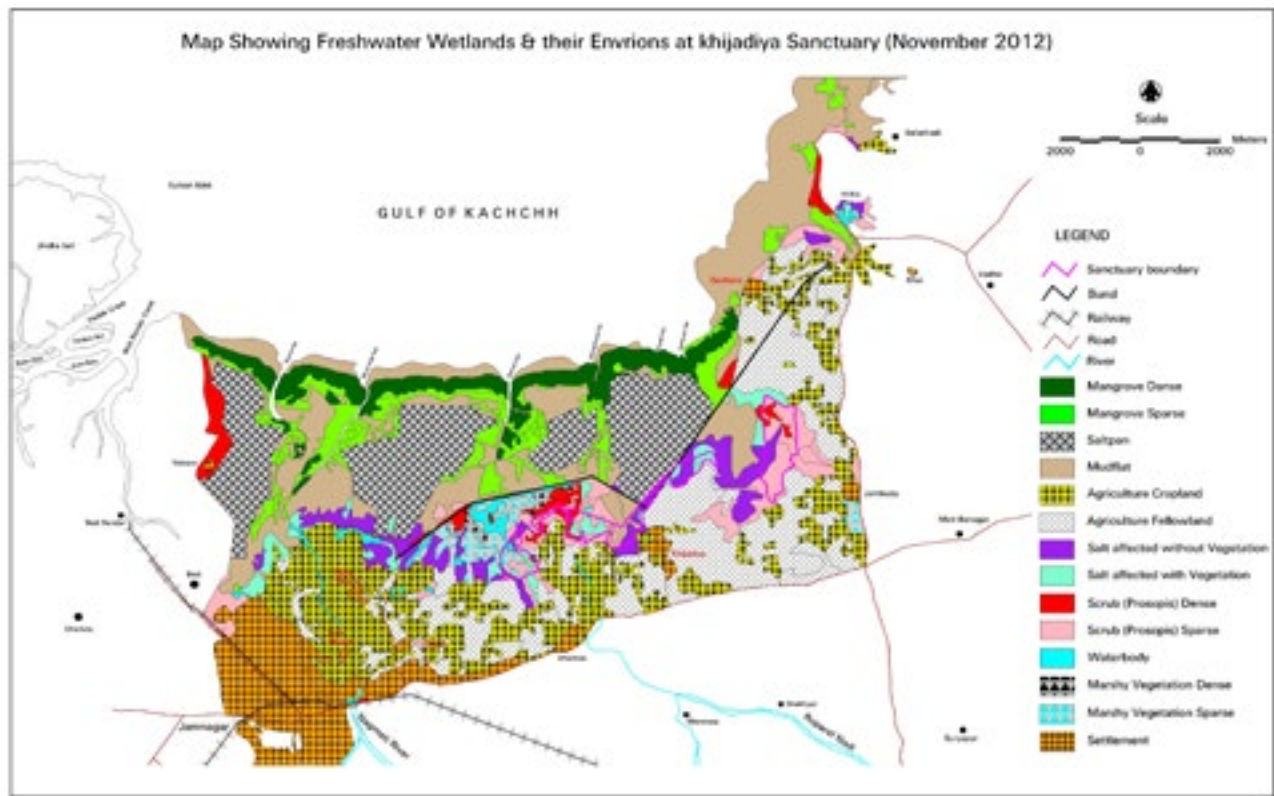


Fig. 11: Map showing Freshwater Wetland & their Environs

## 2.6.3 Fauna

### 2.6.3.1 Faunal status, distribution and habitat.

The main attraction of Khijadiya Bird Sanctuary is its rich avifaunal diversity as about 257 species of birds have been recorded here. Khijadiya freshwater wetlands ('Khijadiya lakes') and their adjacent salt-water coastal wetlands at the Sanctuary constitute one of the most significant waterfowl habitats in North-West India. Owing to its strategic location in the vicinity of the Gulf of Kachchh and on the Central-Asian migratory flyway, this sanctuary attracts a number of migratory waterfowl as well as resident and resident migratory birds. The waterfowl diversity shares the coastal wetlands of the Marine Sanctuary habitat with thousands of wintering water birds, coastal birds and freshwater birds like Cranes, Flamingos, Ducks, Gulls and Terns, Waders etc. The freshwater wetlands at the Sanctuary and its surroundings, at the salt pans, mangroves and creeks provide an assemblage of habitats to large number of waterfowl belonging to Families' Ardeidae, Ciconiidae, Threskiornithidae, Pelicanidae, Phoenicopteridae, Gruidae, Anatidae, Charadriidae, Scolopacidae, Sternidae etc. In addition to it, several species of terrestrial birds also found to occur in the Sanctuary and its environs. Various studies had been carried out by different researchers aiming to understand the species richness with correspondence to the pattern of diversity of birds in the area, dynamics of seasonal species richness and population of waterfowl, habitat utilization pattern and nesting of waterfowl at the sanctuary.

---

The assessment of avifaunal distribution was carried out by GEER Foundation during the year 1999-2005, as it is an important task, not only to study the diversity, but also from the viewpoint of Protected Area management. As a result of this assessment work, a total of 257 species of birds (terrestrial and aquatic) have been recorded through direct and indirect evidences. The survey also revealed that Khijadiya Sanctuary is dominated by waterfowl mainly due to the presence of freshwater wetlands which is near to saline wetlands. The number of resident species is comparatively lower than that of extra-limital (international) and resident-migrants, making it apparent that the protected area plays vital role in supporting migratory and resident migratory birds. This shows that the Protected Area provides significant habitat for a variety of swimming and wading waterfowls mainly due to the existence of freshwater wetlands accompanied by saline water ecosystems like saltpans, creeks and mangroves. Over 60% species of all waterfowls are small waders (e.g. Charadriidae and Scolopacidae family) while among the terrestrial birds, 14% were extra-limital migrants, 18% were resident with migratory population and 68% were residents of Indian Subcontinent. This implies waterfowl population dominates the migratory species and resident ones dominate terrestrial species.

### ***Waterfowl population***

According to the inter-species comparison of various waterfowls, carried out during 1999 to 2000, revealed that at the species level, the Common Crane (10,272 individuals) was dominated with maximum count followed by the Demoiselle Crane (3074 individuals). Among the duck species, Northern Shoveller (Fig. 11) was the most abundant species with total count reaching up to 1045 individuals. Whereas during 2003-05, 114 species of waterfowl were recorded, among them 37% were migratory, 35% were resident-migratory and remaining 28% were resident species.



Fig. 12: Northern Shoveller



---

Among the shorebirds, Scolopacids were found to be more abundant as compared to the Charadriids, i.e. Plovers and Lapwings. It denotes that the group of Cranes with maximum count of 12,366 individuals are been highly influenced demographically. The groups of Flamingos (maximum count of 3000) and shorebirds (maximum count of 3879) are also found to be demographically important groups. In contrasting to family-wise species richness, season wise species richness of waterfowl is also a dynamic phenomenon, as temporally several species of waterfowl recorded at the Khijadiya lakes and their vicinity are either migratory or resident migratory.

### ***Resident Species***

The extent of increase and decrease in the species richness in Khijadiya/Dhunvav side is significant in the case of resident waterfowls as the population increases from mid/late monsoon that is beginning of August (2001) and continues till the beginning of winter which comes in the month of November (2001). The species richness has found to be 67% (from 12 to 20 species) during this season. However, the population gradually declines from 20 to 7 species during mid-winter that is between November and January 2002.

The trend at Jambuda freshwater body is similar to that of Khijadiya water body where the species richness of the resident waterfowl increases from mid to late monsoon and continues till the onset of winter. The species richness was found to be 58% that is, it increases from 12 to 19 species and declined from 19 to 6 species during mid-winter that is from November 2001 to December 2002. This reveals the resident birds' stays for a longer time at Khijadiya/Dhunvav as compared to Jambuda where the water dries soon. The overall species richness of resident waterfowl has remained higher in the freshwater wetlands when compared to saline water wetland. Species richness was more stable during Monsoon 2001 to Mid-winter 2002 at coastal saline water wetland in contrast to freshwater wetlands of Khijadiya /Dhunvav.

### ***Migratory Species***

The influx of migratory waterfowl diversity in Khijadiya bird sanctuary is found to be much higher than the of resident bird species due to its significance owing to the presence of mosaic of habitat. Increased species richness of the migratory waterfowl was observed between August and December. It is inferred, therefore, that migratory waterfowl species, which arrive after August, enjoys very limited time frame of about 4 months to exploit freshwater habitat of Khijadiya Lake. However, the species richness of the migratory birds at Jambuda is similar to Khijadiya except fresh water wetlands, where the population of migratory waterfowl has usually remained higher at Jambuda wetland than at Khijadiya/Dhunvav wetland during the period of population rise (Aug to Dec). There are no significant difference in the diversity between April and December while, the diversity of water fowl consistently declines from the first week of December 2001 to last week of January 2002.

---

### ***Resident-migratory species***

Resident migratory birds include the species that are migratory for Indian sub-continent with resident population and breeds in the country. It is found that the population always remains lower in salt water wetland than freshwater wetland. The species richness of resident-migratory waterfowl (6608 individuals) attained during post-monsoon (October, 2001) and declines in November with consecutive rise up to 6590 individuals in December 2001 with drastic turn down once again in the month of January 2002 with 2607 individuals. The diversity of these birds at Khijadiya/Dhunvav freshwater wetland found to be remains higher than salt water wetland. Whereas at Jambuda wetland, the species richness declines drastically between 1<sup>st</sup> and 2<sup>nd</sup> weeks of December 2001 and between 2<sup>nd</sup> and 3<sup>rd</sup> weeks of January 2002, however, it is negligible between last week of December and first week of January. This confirms that the Khijadiya lakes support waterfowl species for a longer time than Jambuda lakes as the water-spreaded area is larger at Khijadiya as compared to Jambuda. It is also revealed that similar to resident species, the species richness of migratory waterfowl at all the three wetland sites were found to decline between 2<sup>nd</sup> and 3<sup>rd</sup> weeks of January 2002.

Duck species like Gadwall and Eurasian Wigeon are among the migratory ducks, arriving from Northern and Central Asia and Europe. Other species like Northern Pintail, Northern Shoveler, Common Teal, Garganey Teal which are also arrives from Northern/Central Asia and Europe, while Recurvirostrids, Sandpipers, Stints, Plovers, Godwits, Curlew / Whimbrel, Gulls and Terns constitute significant component of waterfowl richness of wetlands in Khijadiya Sanctuary.

### ***Scolopacids (Sandpipers and allies)***

This is a group of small-to-medium sized waders which includes Sandpipers, Shanks, Stints, Dunlin, Curlew, Sandpiper, Sanderling, Snipes, Godwits, etc. Almost all the members of this family are extra-limital migrants.

Two species of Tringa Sandpiper have been observed in both the freshwater and saline-water wetlands whereas the Wood Sandpiper (Fig. 12) occurs only in the fresh water wetland of Khijadiya sanctuary. Even though the Tringa Sandpiper found in both wetlands, their population was found to be more in fresh water wetland. On the other hand, it is noted that Marsh Sandpiper increases drastically during the beginning of winter (November 2001) while the Common Sandpiper rises between monsoon and post-monsoon. However, the number of individuals of these species at the wetland is found to be low sometimes. Apart from these Sandpipers, it is also noted that the species of Xenus/Callidris Sandpiper occurs in both freshwater as well as salt-water wetlands while Terek Sandpiper and Curlew Sandpiper shows affinity only towards salt water wetland.



Fig. 13: Wood Sandpipers feeding with Asian Open Bill and Glossy Ibis

### *Ruff & Redshank*

These are medium sized Scolopacids found in the freshwater and saline wetlands at Khijadiya sanctuary from monsoon (August 2001) to mid-winter (January 2002). In other words, they have depended on Khijadiya wetland for longer time frame. It is interesting that these two species have collectively shown greater affinity with the saltwater wetlands near Khijadiya lakes. However, Jambuda Lake has been found to play more important role by supporting population of both these waders as compared to Khijadiya / Dhunvav Lake.



Fig. 14: Ruffs feeding at the water body



---

## *Godwits*

Black-tailed Godwit (Fig. 14) and Bar-tailed Godwit species are migratory to the Indian Subcontinent, the former being much more abundant and widespread for Gujarat as compared to the latter. Bar-tailed Godwits contributes negligibly towards population dynamics of the Godwits at Khijadiya Sanctuary. Black-tailed Godwit is much more dominant species among the two species of Godwit. It has exhibited its dominance temporally, spatially and also demographically at Kijhadia and Jambuda.



Fig. 15: Black-tailed Godwit

## *Curlew & Whimbrel*

The population dynamics of the Curlew (Fig. 15) and Whimbrel have been almost compatible with each other for long time from the monsoon to mid-winter every year. However, they occur regular (every month) at all wetland sites.

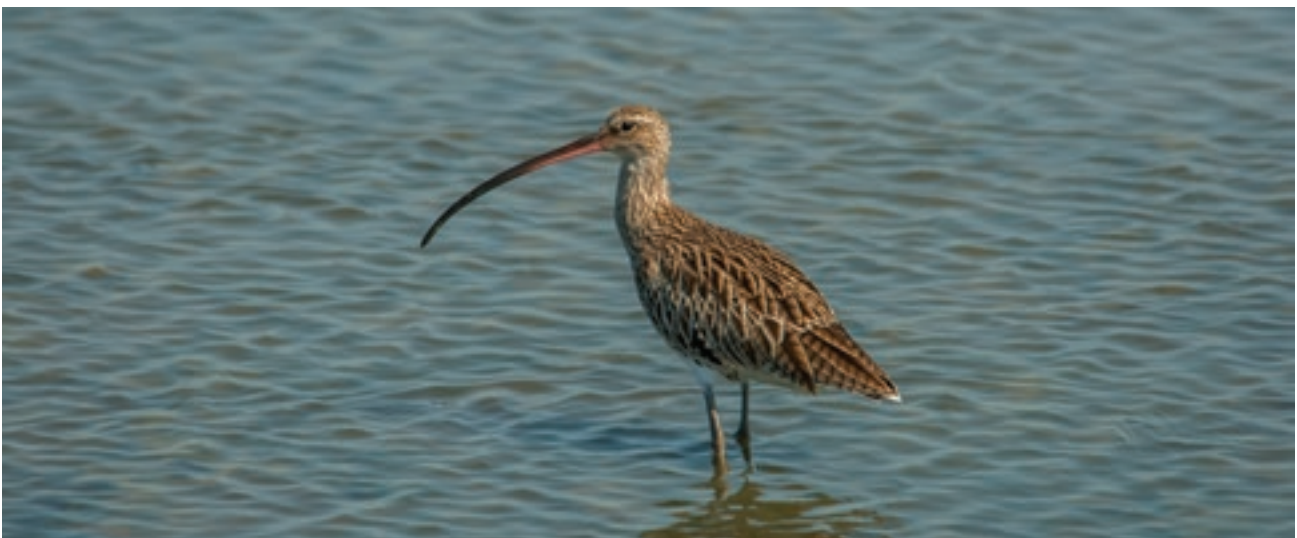


Fig. 16: Curlew

---

Though Whimbrel and Curlew were present in salt water wetland during monsoon, post-monsoon and winter season, their population during every month has been found higher at fresh water wetlands than at salt water wetland.

### ***Stints & Sanderling***

Little Stint, Temmink's Stint and Sanderling are other migratory species to the Indian Subcontinent. The Little Stint is very common and widespread in Gujarat while the Temmink's Stint is comparatively uncommon. Sanderlings are restricted only to coastal habitats and are infrequent. The population of Little Stint attains its maximum in the month of December (2001), after which it declines during January (2002). Jambuda freshwater wetland supports maximum population of the stints for few months, not only in comparison with the other freshwater wetland viz. Khijadiya / Dhunvav but also as compared to salt-water wetland in the vicinity.

The presence of Sanderling at Jambuda side during both the months of its occurrence at Khijadiya Sanctuary was quite interesting, whereas at the other two sites it is recorded only on either months of its occurrence.

### ***Charadriids***

This group includes Plovers like Grey Plover, Ringed Plover, Little Ringed Plover, Kentish Plover and Lesser Sand Plover. Some of the members of this family are resident-migrants (e.g. Kentish Plover) for the Indian Subcontinent, while some are extra-limited migrants (e.g. Lesser Sand Plover). Among these species, Kentish Plovers has contributed more towards the population dynamics of the Plovers throughout the monitoring periods. On the contrary, Grey Plover, Ringed Plover, Little Ringed Plover and Lesser Sand Plover have contributed especially during mid-winter season at Khijadiya Sanctuary. Population of Kentish Plover is considerably higher than other species of Plovers during all the seasons except mid-winter. Kentish Plover has occurred for the longest time duration during the year 2001-2002 (from Sept 01 to Jan 02). The resident-migrant Plover has played a dominant role at Khijadiya Sanctuary during the monsoon year 2001-02.

### ***Crab Plover, Ruddy Turnstone & Red-necked Phalarope***

These migratory waders are usually found in/near coastal wetlands of Gujarat. Red-necked Phalarope has occurred in very low numbers (2-4 ind.) in all the months of the year 2001 (except August). Contrarily, both the other waders (Crab Plover and Turnstone) have occurred only in December 2001. 83 individuals of Crab Plover, two individuals of Ruddy Turnstone and 4 individuals of phalaropes have been recorded from Khijadiya Sanctuary. Jambuda freshwater wetland is important from viewpoint of providing suitable habitat for Red-necked Phalarope, while salt-water wetland is equally important for supporting the population of Crab Plover in December 2001.

---

## ***Gulls***

The population of Gulls attains its peak in the month of December and declines in January (2001-2002). On the whole, there is continuous increase in population of Gulls (considered together) from August-September to December. Jambuda freshwater wetland found more important than Khijadiya/Dhunvav Lake, from the viewpoint of providing habitat to the Gulls. However, salt-water wetland has also been found important to certain extent.

## ***Terns***

Indian River Tern, Little Tern and Indian Skimmer are resident species of Indian Subcontinent, whereas, Common Tern, Whiskered Tern, Gull-billed Tern and Caspian Tern are resident migratory to Indian Subcontinent. River Tern (21 birds) has been recorded in the month of September, 2001. Unlike several other waterfowl discussed hitherto, the maximum population of these Terns is not attained in the midwinter beginning (December), but in monsoon-end (September). Minimum population of these Terns has been recorded in the month of January. It is found that after the drastic increase in the population from August to September the population of these two resident Terns decline till the mid-winter (January). However, the population declines in an erratic manner with stabilized population in Oct-Nov (24-25 birds), increased population (33 birds) in December and finally declines to meager population of 7 birds. It is found that the Little Tern has been always dominant during anyone month as compared to the River Tern.

## ***Threskiornithids***

As far as Khijadiya wetlands are concerned, Threskiornithids includes Black-headed Ibis (a resident species), Glossy Ibis (Resident-Migrant species) and the Spoonbill (Resident-Migrant species). This group is very important as two of the bird species are globally threatened (Black-headed Ibis and Spoonbill), whereas the third-one is a rare breeder for Gujarat, for which the nesting has been recently recorded at Khijadiya wetlands. Among the two Ibises, the Black-headed Ibis has been present always in greater numbers as compared to the Glossy Ibis at Khijadiya Sanctuary. Moreover, Glossy Ibis was rarely (only once) seen in the salt-water wetland, unlike the Black-headed Ibis, which has often occurred in the salt-water wetland. As compared to the freshwater wetlands, the number of individuals of both the Ibises always seen lower in salt water wetlands than Spoonbill.

## **Large-sized Waterfowl**

### ***Pelicans***

They comprises of Rosy or Great White Pelican (Fig. 16) and the Dalmatian Pelican. Great White Pelican occurs at Khijadiya wetlands from monsoon-end to mid-winter end, whereas Dalmatian Pelican occurs from post-monsoon season to mid-winter end. During the period of its occurrence, Great White Pelican has occurred in numbers as low as 35 (in end of mid-winter, i.e. January) and as high as 751 individuals. On the contrary, Dalmatian Pelican have occurred minimum of 55 (in October) and maximum up to 86 (in November) individuals during the year 2000-01.



Fig. 17: Flock of Great White Pelican

### *Flamingos*



Fig.18: Flamingos

There are two different species of Flamingos namely the Greater Flamingos and the Lesser Flamingos are seen in Khijadia. It is observed that the Greater Flamingos occurs from monsoon to mid-winter-end, whereas, Lesser Flamingos occurs from post-monsoon season to mid-winter end of every year.



---

During the period of their occurrence, 515 individuals to (in mid-monsoon, i.e. during August) 5505 individuals of Greater Flamingos (in post-monsoon season) were recorded. On the other hand, minimum of 157 individuals (in October) and maximum of 1246 individuals (in midwinter beginning i.e. December) of Lesser Flamingos were observed. The highest population of the Greater Flamingo has been recorded during August to October.

### ***Migratory Cranes***

Common Crane and the Demoiselle Crane are the representatives of migratory cranes that occur in Khijadiya wetlands. The Demoiselle Cranes have been recorded at the Khijadiya wetlands from monsoon to end of mid-winter of every year, whereas Common Cranes occurs from post-monsoon season to mid-winter end. During the monsoon, the population of Demoiselle Crane has been comparatively higher, however, at the end of January, the population of Common Cranes increases. It is observed that both species prefers only freshwater wetlands, and avoid salt-water wetland. Jambuda wetland has supported fairly higher number of the Demoiselle Cranes than Khijadiya. However, in the case of Common Crane, higher population at Jambuda has been observed only till the beginning of winter, after which the population was shifted to Khijadiya/Dhunvav wetland which acts as nesting ground.

### **Nesting of Waterfowl**

Nestings of the bird species have been recorded from the 2001 to 2013 at Khijadiya wetlands (Table 2), this includes the species with their nests. Floating nests were not built during the year 2012, as there was no enough rainfall to fill the water bodies. The nesting activities enhance the significance of the Khijadiya wetlands as one of the best waterfowl habitats in Gujarat. The observation regarding nesting is summarized below.

### **Great Crested Grebe**



Fig. 19: Great Crested Grebe with its juvenile



---

The nesting of this species was first recorded in the year 1985 at Khijadiya wetland. The sanctuary serves suitable environment for nesting of this Resident Migratory species. There were approximately 1 to 15 nests in Part I and 5 to 8 nests in Part II observed every year from 2001 to 2013 except 2012. Within the Indian limits, an incidence of nesting of this species is very rare.

### ***Black-necked Stork***



Fig. 20: Black-necked Stork

Globally threatened Black-necked Storks are resident species to the Indian Subcontinent. They are very rare in Gujarat and their nesting is still a rarer phenomenon for the State. At Khijadiya wetlands, the nesting of these storks was recorded during the month of August from 2001 to 2013. Maximum of three nests were recorded every year in the first week of August and during 2001, a pair was observed engaged in nesting. At the time of second observation, the nest construction was completed and perhaps the incubation of eggs was initiated. The Nests were found to be made up of sticks/thick twigs of *Prosopis* on the canopy of *Prosopis* at a height of about 6 ft from the water surface where the water depth was about 4- 5 ft and that was the first nesting record of this species in Khijadiya Sanctuary.

### ***Painted Stork***

Though Painted Storks (Fig. 20) are a common species in Gujarat, they are also globally threatened species. At Khijadiya wetlands, nesting of this resident Stork was recorded during the month of August from 2001 to 2013 on top canopy of *Prosopis chilensis* where the water was about 4-5 feet deep and they were at the height of around 5-6 ft from water level. Nearly 100-62 nests were spotted visually every year during the study period at Part I and 48 nests were spotted in Namthi creek during the year 2013.



Fig. 21: Painted Stork

### ***Spoonbill***

Spoonbill (Fig. 21) is a schedule -1 bird as per the Indian Wildlife (Protection), Act 1972 and it is also a globally threatened species. During the study period, about 50 nests were recorded with an average of 1-4 eggs in them. Nests were located at the height of 4-8 ft from the surface of 3-4 ft deep water. Approximately three heronries on the *Prosopis chilensis* scrubs and 12 nests in Part II and 50 nests in Namthi creek were recorded (middle-to-top level) in Khijadiya sanctuary during the year 2012 and 2013. Nests were made of dry twigs and leaves of the *Prosopis*.



Fig. 22: Spoonbills feeding



---

### *Oriental White (or Black-headed) Ibis*

Though it is common waterfowl in Gujarat state, it is a globally threatened species. Five nests were recorded in the month of August 2001 with an eventual increase and during the year 2011, approximately 60 nests from Part I and 12 nests from Part II sides and in the year 2013, 10 nests from Part II and 6 nests from Namthi creek were recorded. From 2001 to 2013, an average of 4 eggs was observed in each nest. The nests were constructed at the height of about 4 ft from the water surface on the canopy of *Prosopis* that existing amidst Khijadiya/Dhunvav Lake.



Fig. 23: Black-headed Ibis

### *Cattle Egret*



Fig. 24. Cattle Egret

---

About 40 - 60 nests were recorded in mid-August from 2001 to 2011. Nearly 16 nests were recorded at the Namthi creek during August 2013. Nests were at a height of 5-10 ft from the water surface with 3 eggs on an average. *Prosopis* and *Acacia* trees act as asylum for these birds to build nests in Khijadiya/Dhunvav Lake. It is also observed that males in breeding plumage were seen incubating the eggs.

### ***Glossy Ibis***

Two nests with eggs and chicks were recorded in December 2001 (Dy.CF MNP) amidst Khijadiya/Dhunvav Lake. From 2002-13, approximately 5 to 8 nests were observed every year.

### ***Night Heron***

Nesting of the Night Heron was recorded in the month of August 2001-2013. An average of 30 - 60 nests of each with 1-4 eggs/chicks was recorded. Approximately 18-20 nests were recorded every year from 2001-11 from Part I side. Nests were of platform shape and located at a height of 3-8 ft above the water surface.

### ***Little Cormorant***

About 50 nests were recorded in the mid-August 2001 and about 64 nests were recorded in mid-August 2002. Nearly 30-40 nests were recorded every year from 2001-11 and 26 nests (approx) were recorded in 2013. The nests were constructed on *Prosopis* trees existing amidst water of the Khijadiya/Dhunvav Lake. They were round in shape and were made from *Prosopis* twigs. The nests were located at the height of about 5-10 ft above water surface. On an average, 1-3 eggs / chicks were present in each nest.



Fig. 25. Little Cormorants



---

### *Large Cormorant*

About 36 nests were recorded in mid-August 2002, each with an average of 1-3 eggs/chicks. In the first week of August 2002, 14 completed nests were recorded. The highest number of about 140 nests was recorded in 2006. All the nests were located on the *Prosopis chilensis* scrubs (middle-to-top level) existing amidst Khijadiya/Dhunvav Lake. Nests were made of dry twigs and leaves of *Prosopis chilensis*.

### *Indian Cormorant (Indian Shag)*

About 100 nests were recorded during August 2001, where as in August 2002, 12 completely constructed nests were recorded. Nearly 13-16 nests were recorded every year till 2011.



Fig. 26. Indian Shag with Western Reef Egret and Spoonbill

### *Darter*



Fig. 27. Darter

---

Four platform-shaped nests this globally threatened species were recorded in Aug. 2001. The nests were made of sticks and were located at the height of 8-10 ft. Nesting of Darter was not recorded in August 2002. However, highest of 100 (approx) heronries and 66 individual nests were observed till 2011 and nearly 26 nests recorded in 2013.

### ***Common Coot***

About 7 floating nests' of coots were recorded in August 2001 in freshwater wetlands of Khijadiya in/near marshy vegetation. Three floating nests were found with 6 eggs in each. Other nests were still under construction. The nests were made up of aquatic plants. In August 2002, only one nest was recorded in Khijadiya/Dhunvav Lake and an average of 142 nests were observed every year till 2011 during August. It was made of *Scirpus* sp. and fresh leaves of *Acacia* sp.



Fig. 28. Common Coot

### ***Purple Moorhen***



Fig. 29. Purple Swamphen

---

About three nests were found under construction in August 2002 and highest of 40 nests were recorded in 2010. They were located in the freshwater lake of Khijadiya/ Dhunvav. Nests were made up of *Cyperus* sp. which was located over the water surface at the height of 1/2 ft. In 2001 August, 1 nest with 1 egg was recorded in Jambuda freshwater lake. An average of 25 nests was observed from 2001-2013.

### ***Pheasant-tailed Jacana***

About 2 half built nests with two eggs were located in the freshwater lake of Jambuda. Approximately 14-16 nests were recorded every year from 2001-13, on the water surface which were covered by the growth of *Nymphaea* sp. It was found that the nests were made of *Nymphaea* sp. and *Cyperus* leaves/twigs.



Fig. 30. Pheasant-tailed Jacana

### ***Black-winged Stilt***

In September 2001, 6 nests with average 2-4 eggs in each nest were recorded. In the first week of August 2002, 4 incompletely constructed nests were seen on the mounds existing amidst the freshwater lake of Jambuda. The highest number of about 150 nests was recorded in 2006 with an approximate value of 120-135 nests were observed rest of the years from till 2011.



Fig. 31. Black-winged stilt



---

### *Spot-billed Duck*

Three nests of this Resident-Migrant duck were sighted on manmade mounds adjacent to the freshwater lake of Jambuda with an average depth of about 1 foot. 12-19 nests were spotted every year from 2001-13. An average six to ten eggs were present in each nest where eggs in one of the nest was already hatched. Nests were made of grass and some feathers. Apart from the waterfowl mentioned above, Little Tern has also been reported to be nesting near the creek and salt pans (Dy. CF, MNP). The researcher including Prof. R. M. Naik and his team have also reported (in 1991) nesting of this tern in the salt-pan area, especially on the bunds of the salt-pans and on the gypsum heaps.



Fig. 32. Spot-billed Duck

Detailed Year wise statement on Nesting of different species in Khijadiya Bird Sanctuary is given in table 2 and faunal list of KBS is given in Annexure - 8 to 14. Out of 257 species of birds, 91 species breed in the sanctuary and 105 species are migratory among them 9 species have been listed under different categories of Threatened species by IUCN (Annexure-15).

As all the birds occupy Khijadiya sanctuary for feeding, sheltering, mating etc and fly away when the environment does not favor them for the same. They choose nearby area where they are favored and return to the place when they get favorable condition.



Table-2: Statement showing yearwise number of Nests of different species in Khijadiya Bird Sanctuary

Sr. No	Birds	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	Great crested grebe	1	1	12	9	8	18	21	12	10	28	32	-	23
2	Black-necked Stork	1	1	1	3	3	3	3	3	3	4	4	-	2
3	Painted stork	100	68	35	15	36	140	78	85	22	121	56	-	18
4	Spoonbill	50	52	45	57	63	75	73	97	48	93	62	-	16
5	Oriental white (or Black-headed) ibis	5	32	37	40	15	21	28	30	36	40	82	-	13
6	Glossy Ibis	2	-	1	-	-	1	-	-	-	-	-	-	-
7	Cattle egret	40	12	7	9	32	41	46	50	17	36	66	-	18
8	Night heron	30	-	55	50	55	67	60	63	28	70	22	-	18
9	Little cormorant	50	64	85	35	72	138	84	127	38	106	93	-	36
10	Indian cormorant (Indian Shag)	100	12	70	20	15	19	12	10	14	19	16	-	-
11	Large cormorant	36	14	40	28	36	140	60	53	24	98	78	-	13
12	Darter	4	-	8	5	15	11	24	60	72	182	86	-	26
13	Common coot	7	1	15	19	18	41	15	29	39	143	22	-	17
14	Purple moorhen	1	3	6	9	7	16	19	17	9	40	14	-	11
15	Pheasant-tailed jacana	-	2	09	10	03	10	14	18	12	10	16	-	18
16	Black-winged stilt	6	4	58	68	89	41	59	70	66	83	35	9	40
17	Spot-billed duck	3	0	5	4	8	9	6	10	9	14	8	-	4

---

### ***Globally Threatened Birds at Khijadiya Sanctuary***

As per the Birdlife International 2001 / IUCN Red Data List 2000, globally threatened birds like Indian Skimmer, Osprey and Pallas's fish Eagle are also attracted by the vegetation of Khijadiya Sanctuary.

It is also noteworthy to mention that a number of species belonging to Schedule I of the Wildlife (Protection), Act 1972 have been observed at KBS which include species like Hawks / Falcons (e.g. Peregrine Falcon, Shikra, Kestrel, Red-necked Falcon etc.), Asian Open bill, Eurasian Spoonbill and Osprey. These species, however, may or may not be considered globally threatened.

#### **2.6.3.2 Limiting Factors**

##### ***Natural threats***

There is a potential danger from the salt water influx in freshwater area. This is because, long term mixing of the salt water into the freshwater wetlands may cause soil degradation and in turn may affect the productivity of the basin of the wetland and further affect the food-web on freshwater wetland. Scarcity of rainfall is another limiting factor as in 2012, due to less rainfall, the water bodies of the sanctuary were not filled up, which led to no place for floating nests and scarcity of food for piscivorous birds.

##### ***Anthropogenic Pressures***

The livestock acts as a major threat to the habitats at Khijadiya Sanctuary as over grazing can lead to reduction of food and ground cover which are valuable components of the natural habitats of Khijadiya. Cattle movement may also result in trampling of nests and eggs. Illicit cutting of *Prosopis* for fire wood and fodder are also potential threats for the natural vegetation cover.

Utilization of the rainwater of Khijadiya wetlands and their environs by the villagers for the purpose of irrigation may have an adverse impact on the freshwater wetlands of Khijadiya. Excessive withdrawal of water (with the help of pumps) may increase the salinity and lead to changing in the habitat and its productivity. Therefore, there should be regular monitoring and conservation of the freshwater resource available in the area.

#### **2.6.3.3 Associated Fauna**

Apart from birds, the sanctuary is diversified with various other organisms, as the species interactions have profound effects on communities and population size. The organisms like polychaete worms, gastropods, insects and crustaceans are in abundance. The ecological niche is also enriched with vertebrates including 5 species of Fishes, few species of amphibians, 7 species of Reptiles and 8 species of mammals (Annexure 9 and 10). Besides this, the sanctuary also acts as paradise for many (Annexure 13) and other microscopic and macroscopic organisms, where most of the microorganisms engage themselves in bio-geo cycling process.

---

### ***Plankton***

Plankton are microscopic organisms that float or drift in the aquatic ecosystem. Such a floating organisms were collected from the freshwater wetland of Khijadiya Sanctuary and identified as *Amoeba* sp., *Balantidium* sp., *Opalina* sp., *Paramecium* sp., *Paranema* sp., *Vorticella* sp., *Dosilia* sp., *Corvospongilla caunteri*, *Hydra* sp. and *Cyclops* sp. (Annexure 14). The plankton are favored with high nutrients as the water bodies are enriched with birds dropping. The healthy status of plankton directly reflects strength of food web and food chain, through which the energy is being carried from lower trophic level to higher trophic level.

### ***Fish and Prawn***

The healthy status of plankton supports the organisms in the next trophic level. The organisms like Mudskippers (*Boleophthalmus dentatus*), Thread fin (*Polynemus tetradactulus*), Mullet (*Mugil carinatus* and *M. oligolepis*), Medium shrimp (*Metapenaeus affinis*), Kachchh shrimp (*M. kutchensis kutchensis*), Rainbow shrimp (*Parapenaopsis sculptilis*) and Brine shrimp (*Artemia salina*) are found to be in good population at Khijadiya Sanctuary (Annexure 11 and 12). These organisms enrich the vicinity as they plays important role in food chain.

### ***Mammals and Reptiles of Khijadiya***

Since the sanctuary has rich and diverse vegetation, it also acts as hermitage for many mammals and reptiles. The mammals include Blue bull (*Boselaphus tragocamelus*), Jackal (*Canis aureus*), Wolf (*Canis lupus*), Jungle Cat (*Felis chaus*), Five-stripped Palm Squirrel (*Funambulus pennantae*), Common Mongoose (*Herpestes edwarsi*) and Indian Hare (*Lepus nigricollis*). On the other hand the reptiles include Common Garden Lizard (*Calotes versicolor*), Saw-scaled viper (*Echis carinatus*), Common Skink (*Mabuya cserinata*), Cobra (*Naja naja*), Common Rat Snake (*Ptyas mucosus*), Common Indian Monitor (*Varanus bengalensis*) and Jon's Earth Boa (*Eryx johni*).

Table-3 Food availability in different habitats of Khijadiya Bird Sanctuary

Food item	Open water		Emergent Aquatic vegetation	Coastal Marsh land	Shore land	Surrounding		Woodlands
	Deep	Shallow				Agri.	Fallow	
Fish	*	*	*	*	--	--	--	--
Frogs	*	*	*	--	--	*	*	*
Aquatic Insects	*	*	*	*	--	--	--	--
Worms, Snails, Crustaceans	*	*	*	*	--	--	--	--
Mollusks	*	*	*	*	*	--	--	--
Insects	--	--	--	--	*	*	*	*
Reptiles and lizards	--	--	--	--	*	*	*	*
Rodents and Small birds	--	--	--	--	--	*	*	*
Algae, Aquatic Plants	*	*	*	*	--	--	--	--
Shoots, crops, terrestrial vegetation	--	--	--	--	*	*	*	*
<b>Total</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>4</b>

---

## Chapter 3

# History of Management and Present Practices

### 3.1 General

Till 2002, Khijadiya Bird Sanctuary was managed without any sanctioned Management Plan. The first Management Plan for the sanctuary was prepared by Shri S. P. Jani, Dy. Conservator of Forests under the guidance of Shri R. J. Asari, IFS, Conservator of Forests, for the period from 2002 to 2011. Prior to 2002, in absence of Management Plan, the developmental works were mainly carried out based on various schemes in an *ad hoc* manner. Mostly soil and moisture conservation works, uprooting of *Prosopis juliflora* and planting of silvipastoral species including fruit trees were carried out. The main job of the forest staff was to vigil and protects the sanctuary. Utmost importance was later accorded to the Nature Education Camps (NEC) and tourists in the sanctuary. Tourists were encouraged to visit and learn about migratory and resident birds of the sanctuary.

### 3.2 Timber operations including bamboo and firewood harvest

The vegetation type in the Sanctuary area comes under Dry Deciduous Scrub Forest type with few species typical of tropical dry deciduous xerophytes. The area has no history of timber, firewood or bamboo harvesting over it.

### 3.3 Non wood forest produces collection

There is lot of demand for fuel wood for cooking and other uses in the year of droughts when there is little or no agricultural waste to burn and fuel wood demand spurts up. Total estimated requirement of firewood for adjoining villages comes to 4000 M.T per year and that of small timber is about 400 Cmt per year.

No minor forest produces collection is permitted from the sanctuary area.

### 3.4 Leases

No leases have been granted in the Sanctuary area as it does not contain any important mineral. However, outside sanctuary area, lease has been granted to Khijadiya salt work for extraction of salt.

---

### 3.5 Other programmes and activity

#### 3.5.1 Global Bird Watcher's World Conference, Destination Khijadiya - 2010 (25<sup>th</sup> to 27<sup>th</sup> November, 2010)

To attract the attention of national and international bird watchers and ornithologists, Global Bird Watcher's Conference, Destination Khijadiya - 2010, was organized jointly by Forest Department of Gujarat State and Tourism Corporation of Gujarat. The event was unique of its own kind and people's participation for the program on wetlands, involving large number of nature lovers and academia was probably the first time ever organized in the country. This event has not only succeeded in increasing tourist flow to KBS, but has also earned a place of pride for the Jamnagar district and Gujarat State as well.

During this event, various infrastructural developmental activities like road repairing, earthen bund repairing, construction of new watch towers, turn tables, renovation of existing watch towers and interpretation center were carried out. A coffee table book was prepared on the bird's life of Khijadiya Bird Sanctuary and signages were erected at various places in the sanctuary to provide information to the visitors. Roads were repaired /carpeted with murrum by Jilla Panchayat and Salinity prevention Department.

About of Rs. 120.85 lakhs was utilized from the grant allotted to the Forest Department by the Collector, Jamnagar district. The expenditures on lodging and boarding, infrastructure facilities and management were borne by Tourism Corporation of Gujarat Ltd. and Public Works Department.

The event hosted about 97 foreign bird watchers/ornithologists from 37 countries along with more than 200 bird watchers/ornithologists, travel writers and travel agents etc. from different states of India. The event was given due coverage by National and International media (print and electronic) to popularize KBS on wider scale.

On the first day, the inaugural session was conducted in presence of distinguished delegates and guests followed by various technical sessions and a cultural program in the evening. On the Second day, all the participants were taken to KBS for bird watching followed by technical session by the experts. On the third day, all participants were taken to Narara Reef near Vadinar village of Jamnagar district. There, the participants experienced the vivid marine life of Marine National Park.

### 3.6 Forest Protection

The sanctuary area is free from poaching of birds due to vigilance of staff as well as local people who protect and do not hunt birds due to their religious sentiments against killing of wildlife. For effective protection of the sanctuary, the Management Plan had proposed improving of communication facilities in terms of providing vehicles (1 Jeep and 1 motorcycle), wireless network and walkie-talkies to the staffs. However, no vehicle could be provided during the period of the Management Plan. Nevertheless, with effective patrolling and awareness programme on wildlife conservation,



decreasing trend in offences in the sanctuary was observed during tenure of past Management Plan (Fig. 31).

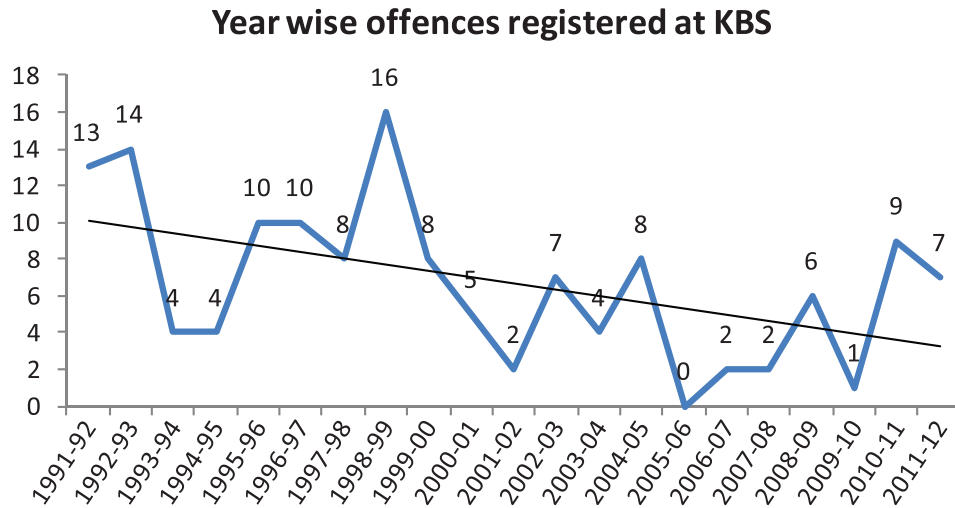


Fig. 33. Trend in offences registered at Khijadiya Bird Sanctuary

An analysis of the information on offences reveals that during last two decades about 140 offence cases have been registered of which the major one is illegal grazing (92 cases) followed by illegal cutting (24 cases). Minor incidences (3 cases) of fire have also been recorded.

Detailed information on year wise offences is given at Annexure - 22.

### 3.7 Tourism

The entry in the sanctuary is regulated as per Government Resolutions issued from time to time. The latest Government Resolution was issued vide No. GVN/9/2006/WLP/1092/3056/G.1 dt. 25/05/2006 and this is given in Annexure - 21.

Tourists have to get permission to visit the Khijadiya Bird Sanctuary from the Range Forest officer, Jamnagar Marine National Park. The permission can be obtained from Range Forest office, Marine National Park office at Jamnagar or from the sanctuary administration office at Khijadiya. The tourists are required to pay entry fees and other fees as stipulated by the Government from time to time. Table - 4 gives current fee structure in use since year 2006.

**Table - 4: Entry fee and other fees levied from tourists visiting Khijadiya Bird Sanctuary**

Sr. No.	Particulars	For Indian Nationals (Rs.)	For Foreigners (USD)
1	Individual Persons per day	20	5
2	Entry fee for vehicles including visitors per day:		
	1. LMV-Car, Jeep (up to 6 persons)	200	20
	2. Matador station wagon (up to 15 persons)	500	50
	3. Heavy motor vehicle - bus (up to 60 persons)	1750	175

Sr. No.	Particulars	For Indian Nationals (Rs.)	For Foreigners (USD)
3	Professional photography (per day/camera)		
	Still photography	100 per day	10
	Documentary	5000 per day	500
	Feature film	25000 per day	1000
	No camera fee for amateur photography by visitors is charged.		
	Security deposits		
	1. Documentary	15000	1000
	2. Feature film	50000	2000

(25% more rates on entry fee shall be levied on every Saturday-Sunday)

For development of eco-tourism, the plan proposal was to construct an Interpretation Center at Khijadiya Bird Sanctuary and construction of watch towers with hides to facilitate bird watching with minimal disturbance to the birds. As per the proposal, 1 Interpretation Center was constructed at Khijadiya during the year of 2007-08 with informative display materials on avian life. Apart from this, drinking water facility and toilet blocks were also constructed for the convenience of tourists during the same financial year.

Figure 34 explains the flow of tourist to the Khijadiya Bird Sanctuary. Earlier there were a few tourists visiting KBS. However, in last 2-3 years the trend has dramatically changed and in the year 2010-11, the more number of tourists visited the sanctuary.

### Number of Tourists visiting Khijadiya Bird Sanctuary

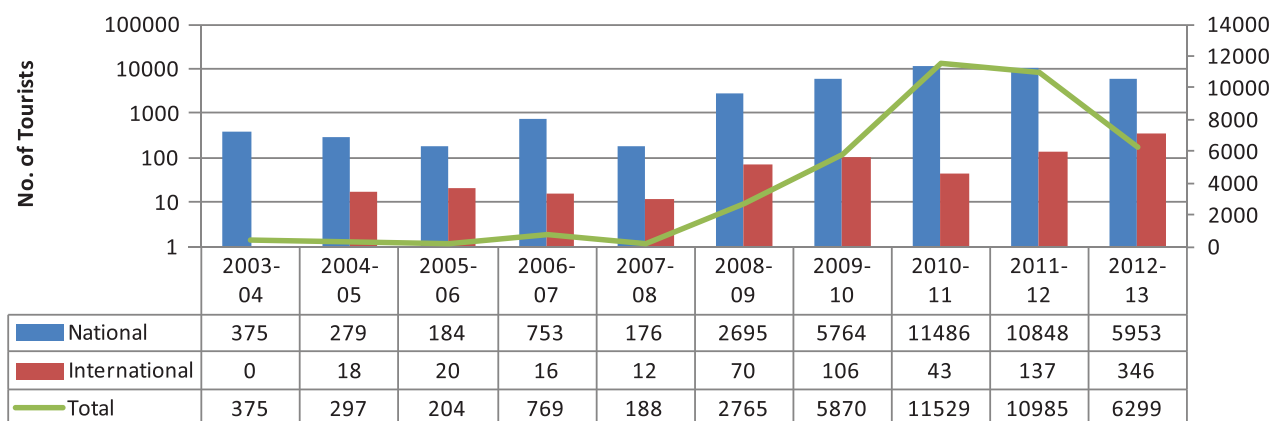


Fig. 34: Tourist flow to KBS from 2003-04 to 2012-13.

---

### 3.7.1 Development of interpretation center:

An interpretation center has been developed during the earlier Management Plan in the year 2007-08. The information of the sanctuary, its environs and behavior of the birds have been provided in the interpretation center for the visitors. This facility has been further strengthened during 2010-11 on account of the first Global Bird Watchers conference hosted at Jamnagar from November 25<sup>th</sup> to 27<sup>th</sup>, 2010. The life size models of certain important birds, their nesting, behavior and habitat have been depicted in detail in the interpretation center. The display boards imparting valuable information about the sanctuary and its environs along with important bird life in local as well as English language have also been installed in the interpretation center. A diorama depicting the diversity of habitats and bird life in the sanctuary has also been structured. For the benefit of participants of Nature Education Camps, a small hall with audio-visual facilities and enough sitting arrangement has been operationalised at the complex.

### 3.8 Research and ecological monitoring

The Management Plan had given due importance to the ecological monitoring and research in the sanctuary. It was proposed to monitor the physio-chemical, vegetation and wildlife population changes with regular monitoring of health and diseases and to maintain data storage system. It was also proposed for the establishment of 1 Field Research Station/Laboratory and a meteorological center. During the current Management Plan, GEER Foundation, Gandhinagar conducted studies on the Ecology and Biodiversity of Khijadiya Bird Sanctuary and its environs.

The GEER Foundation studied the physio-chemical parameters of water and soil characteristics, vegetation profile and status of waterfowl for the year 2003-04 to 2004-05 and their associated fauna and made certain recommendations based upon these studies. As whole food-web occurring in a wetland ecosystem is based on the physico-chemical characteristics of water of that wetland, which also determines the survival of the aquatic organism inhabiting the water bodies.

It is found that minimum (around 30 mg/L) chloride concentration (chlorinity) has occurred typically at the beginning of three seasons, viz. monsoon (July), post-monsoon (Oct.) and summer (March). On the contrary, comparatively higher values (around 200- 275 mg /L) have been recorded in the end (September) of the monsoon season (200 mg/L) and at the end (January) of the midwinter season (275 mg/L). Over the monitoring period, chloride content increases twice and declined twice. Thus, it increased once from the beginning (July) to the end (September) of the monsoon and then from post monsoon to mid-winter. The value declines from monsoon-end to post-monsoon and then between mid-winter ending and summer beginning.

Dissolved Oxygen (DO) has been measured for the time-frame from beginning of monsoon to the beginning of winter during the year 1999. It was observed that concentration of DO has remained considerably high (over 10 mg/L) throughout the monitoring period. On the whole, its values have remained slightly higher after the monsoon (till winter beginning) in comparison with its values

---

during monsoon (1999). Note that the presence of Dissolved Oxygen (with the value above min. acceptable level) is essential to maintain the higher forms of biological life and to keep the proper balance of various populations, thus making the water body 'healthy'. The chemical and biochemical processes undergoing in a water body are also largely dependent upon the presence of Oxygen. It may be noted that the minimum acceptable level of DO is 5 mg/L and 10-15 mg/L is required for reproduction of desirable species of fish. If the DO of water body falls below 5 mg/L, fish may suffocate and cannot survive. Dissolve Oxygen less than 6-7 mg/L indicate possibility of pollution due to sewage or industrial waste.

It was reported that the DO of the freshwater body of Khijadiya during the monitoring period was high, indicating 'healthy' status of its water and provides clue to reason the high waterfowl diversity in general as waterfowl greatly depend on fish and aquatic invertebrates whose very survival is determined by DO.

The content of the free CO<sub>2</sub> at the freshwater lake in Khijadiya, found to be increase and decrease twice during the monitoring period. The first rise was observed between monsoon-end (Sept) and post-monsoon (October) and it was for a brief period of one month, but the second rise was for longer duration between winter beginning (Nov.) and summer beginning (March). As far as decline in CO<sub>2</sub> content is concerned it is observed for very brief period of monsoon (August to Sept) and between post monsoon and winter-beginning (Oct-Nov.). The time frames Sept-Oct and Oct-Nov are characterized by drastic fluctuation, the first being characterized by the drastic rise (from 0 to 30 mg/L) and the latter being characterized by the drastic fall (from 30 to 5mg/L). The fall in CO<sub>2</sub> value during monsoon and the rise in CO<sub>2</sub> content from November to March is comparatively gradual. It can be inferred that the period of Sept-Oct. and November-March can be the period of increased microbial activity and respiration by microbial organisms and during these months acidity may be increasing (low pH).

Hardness of the water in Khijadiya bird Sanctuary is mainly due to presence of calcium and magnesium ions in water. Thus, it is taken as measure of Ca and Mg ions' content in water. The hardness of the water may be temporary if it associates with carbonates and bicarbonates, but it is permanent if associated with sulphates and chlorides. The desirable level for drinking purpose is 200 mg/L. Since its value goes over 600 mg/L, it is not considered for drinking purpose. However, the hardness (as CaCO<sub>3</sub>) has remained extremely low (maximum 10 mg/L) and stable (2-3 mg/L) from monsoon 1999 to mid-winter 2000.

Salinity of salt water wetlands (viz. salt water marsh of Khijadiya & Mithadhori creek) has been found to be very high (min. 38 ppt in the creek to maximum 48/49 ppt in the salt water marsh). It may be noted that on the landward side of the Gulf of Kachchh, where salt water wetlands of Khijadiya receive sea water is highly saline and water salinity in the mangrove creeks have been reported to be as high as 37 to 44 ppt and even more in hyper-saline zones (Singh et al 2002). Salt marsh at Khijadiya

---

appears to be an example of hyper saline zone, where high rate of evaporation is one of the reasons to aggravate the salinity. It is found that the salinity of salt marsh of Khijadiya remains almost stable between any two consecutive months, especially during monsoon season and it indicates that unlike the salt marshes, the values of salinity of Mithadhari creek keep on fluctuating between any two consecutive months insignificantly by 2-4 ppt. The possible reason for small fluctuation in salinity value may be that unlike salt marsh, creek is a flowing water ecosystem. However, for both these wetlands, there is only little difference in values of minimum and maximum salinity during the study period. This is because; both the wetlands are continuously receiving seawater from the Gulf. The reason for existence of only *Avicennia* sp. as stunted mangroves in salt marsh can be justified on the basis of very high salinity prevailing therein.

The study of soil is important as it provides information whether it is suitable and penetrable for the plant growth. It was found that the soil texture of Khijadiya freshwater wetland was richer than that of Jambuda freshwater wetland. This is because, the former has higher amount of silt and clay which are responsible for the fertility of soil. This is the main reason for good vegetation towards Khijadiya freshwater wetland (Lake). The water holding capacity is totally depends on the soil-texture. The soil with higher amount of clay and silt can hold water at higher percentage. Jambuda freshwater body has lower water-holding capacity due to the presence of gravel and coarse sand in higher percentage. Therefore, vegetation is sparse towards Jambuda and it is dominated by the *Sueda fruticosa*.

Examining the water-holding capacity of the soil samples of both the freshwater wetlands is found that the capacity of the soils of Khijadiya Lake (41 %) is somewhat higher than that of Jambuda (30%). The possible reason for which is higher proportion of silt and clay at Khijadiya lake. However, fact that higher amount of silt & clay holds water for a longer duration.

Apart from this, no other regular monitoring of any physical parameters and vegetation changes etc. was carried out during the Management Plan period. No Field Research Station/Laboratory and a meteorological center as proposed were established during the tenure of the Management Plan. With regard to the monitoring of changes in wildlife population, the avifaunal counts had been carried out on regular basis involving the local communities, bird photographers and NGOs. A count of wetland birds at Khijadiya Bird Sanctuary conducted in January, 2012 revealed the presence of 257 species with cumulative population of about 87,500 birds whereas 130 bird species were reported in old Management Plan.

### **3.9 Wildlife conservation strategies and their evaluation.**

The Management Plan had proposed the following three zones for managing the sanctuary from 2002-11.

- 1) Intensive management zone
- 2) Administrative zone and
- 3) Tourist zone



---

In Intensive management zone, soil and moisture conservation works such as construction of pucca check dams across main rivulets at appropriate distance, providing water facilities during summer months, planting of trees like as Vad, Pipal, Umro, Rayan, Pillu, Neem, Amla and Bor etc., construction of watch towers at suitable sites were also proposed.

The administrative zone was proposed for about 2 ha and to be maintained for the construction of buildings for office, rest house, residence, hostel, nature education camps, library and interpretation center etc.

For tourist's zone, development of eco-tourism cum nature education center was proposed apart from tourist management in the area.

As per the Management Plan for the period from 2002-2011, the habitat improvement works for Khijadiya Bird Sanctuary were mainly concentrated on improving the water storage capacity and removal of unwanted growth of *Prosopis juliflora*.

The different works carried out in Khijadiya Bird Sanctuary under different schemes since 1992 have been summarized in Annexure - 19 and performance of the previous plan proposal from 2002-2011 is given in Annexure - 20 for ready reference.

The previous Management Plan for Khijadiya Bird Sanctuary was approved for the period of 2002 to 2011 and the following works were proposed in the Management Plan. The review of activities and their evaluation are discussed as follows.

- 1. Improvement of habitat by planting and sowing seeds of fruit tree:** A total of 200 ha of land were proposed to be planted by fruit trees in the MP. A total of 890 fruit trees were planted as per available budget. About 40% survivals of the fruit trees were observed in the Sanctuary. The planting of fruit tree provides food for the frugivorous bird species. Hence, it is proposed to include this activity in the next MP also.
- 2. Apiculture:** A total of 10 units of apiculture were proposed out of which 6 units were distributed. After initial implementation of this activity, it was found that installing apiculture in and around the sanctuary area does not provide any sustainable yield of honey. Hence, no more apiculture units were established. This activity may not be taken up in the new Management Plan as there are no one ready adopt of this activity.
- 3. Improvement of water storage capacity (100m X 100m ponds - 20 ha at Jambuda side and 20 ha at Dhunvav side):** It was proposed to take up this activity in 40 ha of area. However, 87,064 c.mt. of earth works have been taken up within available budget. This activity leads to increase in water storage capacity in terms of space and time. Hence, this activity is required to take up on regular basis and should also be included in next MP.
- 4. Digging of channel in Jambuda pond:** It was proposed to dig out 9000 c.mt. of soil in the form of a channel in Jambuda pond. This activity was not adopted as check-dams would be adopted in the past. This activity should not be included in the next MP.

- 
5. **Water harvesting structures - construction of pukka check-dams:** 7 pukka check-dams were proposed, of which 5 check-dams were constructed as per the available budgetary resources. It was observed that instead of constructing pukka check-dams, earthen bunds are better to serve the purpose of water harvesting in Khijadiya Bird Sanctuary
  6. **Repairs to reclamation bund:** Repairing of two old reclamation bunds, each in Dunvav beat and Jambuja beat were proposed in the old MP as during monsoon the reclamation, bund got damaged at various locations. In lieu of the earth work, 45,817 c.mt. were taken up considering the necessity of the activity and this should be included in the next MP.
  7. **Repair to Causeway:** 4 causeways were proposed for repairing, of which one causeway was repaired as per need and the availability of budget. The activity is required as there are 4 causeways in the Sanctuary which are required to be repaired, in the new MP, this activity may be continued.
  8. **Preparation of hides for tourist:** It was proposed to construct 10 hides for the tourists visiting the sanctuary. A total of 25 hides were constructed of which 24 hides were constructed during Global Bird Watchers' Conference. Since, there is no response for this activity; it is proposed to be dropped in the next MP.
  9. **Peddle boats for tourist:** 6 peddle boats were proposed to be purchased. However, it was observed that tourists are not allowed to sail in the wetlands as it adversely affects the nesting of a few species of birds. Hence, no boats have been purchased and this activity may not be taken up in the Sanctuary.
  10. **Boat stands:** Two boat stands were proposed. However, no boating is allowed in the wetland, this proposal was not executed. It is proposed not to take up this activity in the next MP.
  11. **Reception center at Khijadiya forest quarter:** One reception center was proposed to be established. However, because of budgetary constraints, this activity could not be taken up. The activity will be included in next MP.
  12. **Construction of Interpretation center:** One interpretation center was proposed and the same was constructed and established. In the next MP, upgradation of the existing interpretation center will be considered.
  13. **Equipment required - Binoculars and telescopes:** 10 binocular and 3 telescopes were proposed of which 15 binocular and 6 telescopes sets were purchased. In recent years tourist flow to the Sanctuary has increased, hence, few more binocular sets are required to be purchased in the next MP.
  14. **Barbed wire fencing:** It was proposed to fence 20 km of the boundary of sanctuary with barbed wire. A total of 4.8 km of boundary was covered under barbed wire fencing. It is proposed that the remaining boundary is to be secured by constructing earthen bund parallel to the

---

boundary demarcation in next MP. The earthen bund will aid into increase water storage capacity of the wetlands in the Sanctuary.

15. **Repairs to old barbed wire fencing:** Repairing of 17 km of barbed wire fencing was proposed for which 10 km of barbed wire fencing was repaired as per availability of budget. Remaining activity is to be proposed in next MP.
16. **Water holes:** 10 water holes were proposed for construction which could not be taken up due to lack of fund. However, this activity is required to be continued in next MP.
17. **Demarcation of boundary pillars (RCC):** 241 pillars were proposed to erect to demarcate boundary of the sanctuary. However, because of lack of budget this activity could not be carried out. This will be included in next MP.
- 18 - 22. **Construction of Forest quarter - 1, Guard quarter - 2, Wireless room - 1, Driver quarter - 1, Office building - 1:** All these quarters and office buildings were proposed but could not be constructed because of lack of budget. Some of these quarters and buildings will be included in next MP.
23. **Sign boards:** 20 sign boards of 5x3 feet size were proposed, of which 15 sign boards were prepared and erected. 10 sign boards of 6x4 feet could not be prepared due to insufficient budget. Remaining activity will be included in next MP.
24. **Wireless system and walky-talky sets:** 5 sets of walky-talkies were proposed to purchase. There are 1 wireless set and 2 walky-talky sets are available, no additional sets are required as mobile phones are available with the staff.
25. **Construction of tube well:** Two tube wells were proposed for construction. However, because of lack of budget, the tube wells were not constructed.
26. **Extension of sanctuary area:** No activity has been carried out in this regard. This will be covered under next MP.
27. **Nature Education Camps:** 50 nature education camps were proposed under old MP. A total of 273 camps were organized under the provision of different plans. This is a regular activity taken up by the sanctuary administration; hence, this activity will be included in next MP as well.
28. **NEC site development:** At present the facilities available at NEC site are sufficient. Additional expansion of facilities will be proposed in next MP.
29. **Removal of Unwanted growth:** There is huge invasion by *Prosopis juliflora* towards Dhunvav side of the Sanctuary area. During the period of old MP 150 ha (15 ha/year) of area was proposed to eradicate the invasion of *P. juliflora* of which a total of 65 ha area at Dunvav

---

and Jambuda sides have been completely cleaned. Since, this is providing cover to other wildlife like Blue bull, Feral pigs; Jackals etc., its complete eradication from the Sanctuary will not be desirable. At some places, *P. juliflora* is also providing roosting sites for some birds. Therefore, a cautious approach is required while deciding the removal of this species from the Sanctuary. *P. juliflora* can be removed from the areas where water gets collected towards the reclamation bund during monsoon and post monsoon period to attract birds in these areas. This activity needs to be continued in the next MP also.

30. **Nature Trails:** Nature Trails are constructed to facilitate nature education camps for taking students inside the Sanctuary area for studying the ecosystem properly. The soil removed from some places for preparing these trails and these places gets filled up with water during monsoon season. Such water depression provides habitat to the birds till the water get dries. However, trails should be constructed very cautiously as more of such trails may alter the habitat which may lead to adverse impact. Hence, only the existing trails should be maintained. During the period of old MP, 03 natural trails were prepared and are stretched for 1923 m length.
31. **Enriching of fish stock:** The Sanctuary is visited by many piscivorous birds like Pelicans, Darters and Cormorants' etc. Naturally available fish resource in this Sanctuary's wetlands may not be sufficient to sustain the large population of piscivorous birds. Therefore, enriching the fish stock activity has been carried out by releasing freshwater fingerlings during the period of old MP. A total of Rs. 21,000/- has been utilized for this activity from the allotted budget. This activity is found to be more useful and is also proposed to continue in the next MP.
32. **Staff:** Additional Staff comprising of 1 Forester, 2 Beat Guards, 1 Driver, 1 Clerk and 1 Computer Operator was proposed under the old MP of the Khijadiya Bird Sanctuary. The proposed posts were not filled during the period of the old MP. The revised staff requirement of the same will be proposed in the next MP.
33. **Vehicles - 1 Motor Cycle, 1 Jeep, 1 DCM Toyota with tanker:** None of the proposed vehicle could be purchased because of lack of budget. Revised requirement of vehicles will be proposed in the next MP.

However, activities like earthwork, earthen bund and Nature Education camps were also executed during the tenure of old Management Plan. The activities mentioned in the Management Plan were executed as per the need.

### 3.10 Administrative set up

In the last Management Plan of KBS, it was proposed to have 1 Range Forest Officer, 1 Forester, 2 Forest Guards and 1 Driver. However, these posts could not be provided during the period of

---

implementation of the last Management Plan. At present there is 1 Forester, 2 Forest Guards and 1 Mali who are looking after the sanctuary. The Range Forest Officer, Jamnagar MNP Range is currently taking care of the sanctuary.

During the execution of plan, all the required facilities and amenities for staff proposed in the last Management Plan could not be provided at Khijadiya Bird Sanctuary.

### **3.11 Threats:**

The following potential threats have been identified which need to be addressed.

1. Water withdrawal for irrigation.
2. Illegal Grazing.
3. Illegal cutting of trees.
4. Invasion of *Prosopis juliflora*, Reeds and water hyacinth.
5. Vehicle traffic due to salt works is a source of noise pollution.
6. High power electric lines passing over salt pans poses threat to the birds in flight.
7. Usage of pesticides on agricultural crops in surrounding areas.
8. Epidemics in birds like avian influenza because of migratory birds visiting the sanctuary.
9. Wandering feral dogs.



---

## Chapter 4

# The protected area and the interface land use situation

### 4.1. The existing situation in the zone of influence

#### 4.1.1 Location, extent, boundaries and natural attributes

The Sanctuary is located virtually on the Tropic of Cancer between 22°31'27" N latitude and 70°07'17" E longitude. This wetland area is located in semi-arid region of Jamnagar district, southern coast of the Gulf of Kachchh, Gujarat.

The area has been declared as sanctuary vides the gazette notification Nos. AKH-81-81-WLP -1081-102123/P2 dt. 27-5-1981 and AKH-209/82-WLP-1081/102123-V2 dt. 6-11-1982. According to the notifications the boundaries of the sanctuary are as follows.

North : Sea shore land and revenue areas of Jambuda village

East : Revenue areas of Jambuda and Khijadiya villages

South : Gauchar land and revenue areas of Dhunvav, Khijadiya and Jambuda villages

West : Sea shore land and revenue areas of Khijadiya, Dhunvav and Jambuda villages

The large areas around Khijadiya Bird Sanctuary are revenue waste lands and agricultural lands on the landward side and intertidal sea coast at the seaward side where it interfaces with marine sanctuary area and salt works.

Scrubby and herbaceous vegetation covers the wetland complex which is dominated by *Prosopis juliflora*. The surrounding agricultural land is principally used by villagers for cultivation of cotton, jowar, millet, cereals etc. The land towards the gulf is saline and comes under marine sanctuary. Khijadiya littoral zone consists mainly of sedimentary mudflats with scattered sandy/rocky shore habitats. It is declared as Marine Sanctuary and is fully protected. Around the periphery, the sanctuary is covered with mangroves. A medium sized creek passes through the mangrove area, which always remains flooded with sea water and supports the mangrove ecosystem.

#### 4.1.2 Human population in and around Khijadiya Bird Sanctuary

There is no human habitation in KBS. However, it is surrounded by four villages, viz., Khijadiya, Dhunvav, Jambuda and Vibhapar occupying an area of 31.9 sq. km. Distance from the Khijadiya Bird Sanctuary to these four villages is given in the Table - 5 below.

**Table - 5 : Statement showing the distance of surrounding villages from Khijadiya Bird Sanctuary**

Sr. No.	Name of Village	Distance (km)
1	Khijadiya	1.0
2	Jambuda	2.0
3	Dhunvav	2.0
4	Vibhapar	2.5

The cumulative human population of these villages based on the Census 2011, totals to 17,607 individuals (Fig. 33). The density of human population in surrounding village of sanctuary is about 429 Individuals per sq. km. Most of the local village community resides on the fringes of Khijadiya are mostly dependent on agriculture and cattle rearing where they graze their cattle in the grasslands surrounding the sanctuary. The farmers in different categories during 2011 are shown in Table - 6.

### Human population scenario

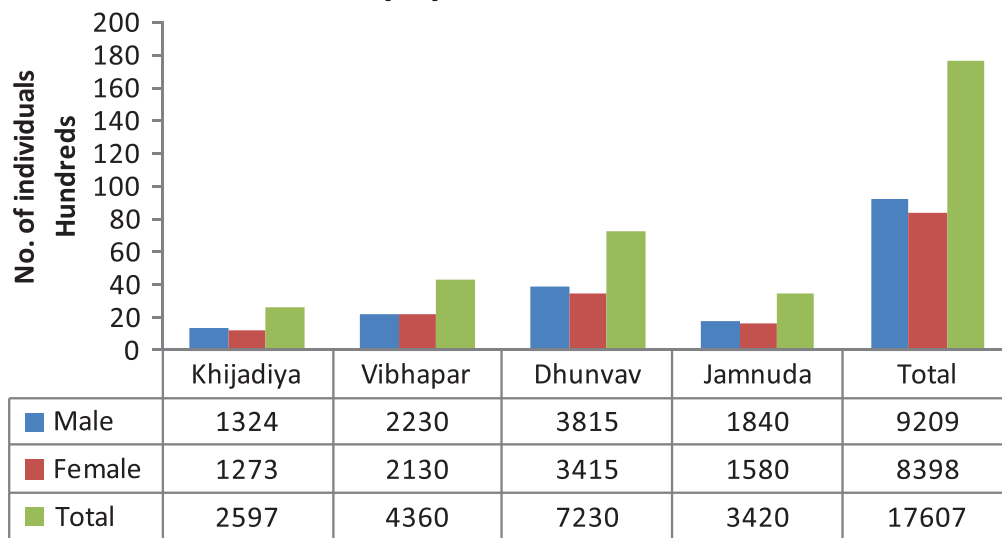


Fig. 35: Human census in surrounding villages of KBS.

(Source: Census, 2011)

**Table - 6 : Statement showing the number of farmers in different categories during 2011**

Sr. No.	Name of village	Large	Small	Marginal	Maldhari's/ Grazers
1.	Khijadiya	200	176	89	10
2.	Dhunvav	140	120	80	10
3.	Vibhapar	30	20	27	25
4.	Jambuda	340	455	106	-

#### 4.1.3 Livestock

Livestock rearing is the second most important livelihood activity for the villagers in the surroundings of KBS. The total population of livestock in all the four villages is 4,969 individuals (Annexure - 17). The cattle constitute the predominant population of the livestock in the region (Fig. 34).

### Live stock details of surrounding KBS

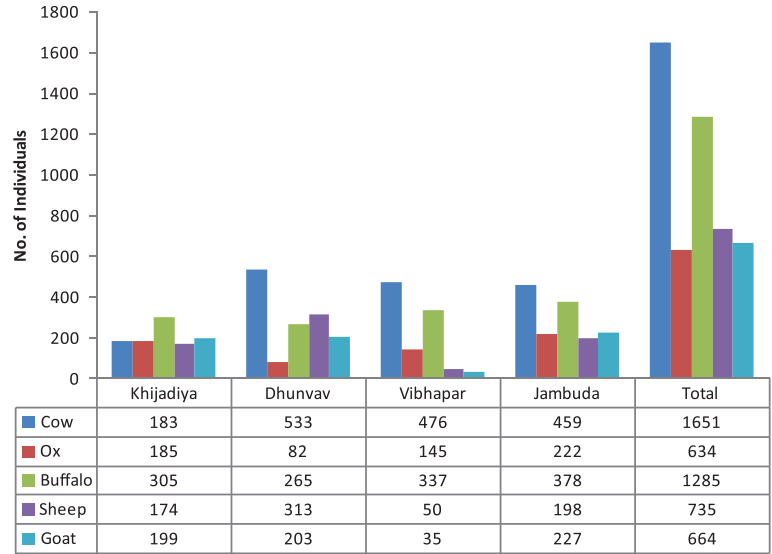


Fig.36: Live stock details of surrounding KBS.

(Source: Panchayat Office, Khijadiya)

#### 4.1.4 Land use pattern in surrounding areas of KBS

Khijadiya Bird Sanctuary is surrounded by four villages, viz., Khijadiya, Dhuvanv, Jambuda and Vibhapar. In all the four villages the main economic activity is agriculture as it is evident from the land use pattern of the surrounding villages. Village wise land use pattern is given in Annexure - 18. Following diagram gives an idea of cumulative land use pattern in surrounding areas of Khijadiya Bird Sanctuary (Fig. 35).

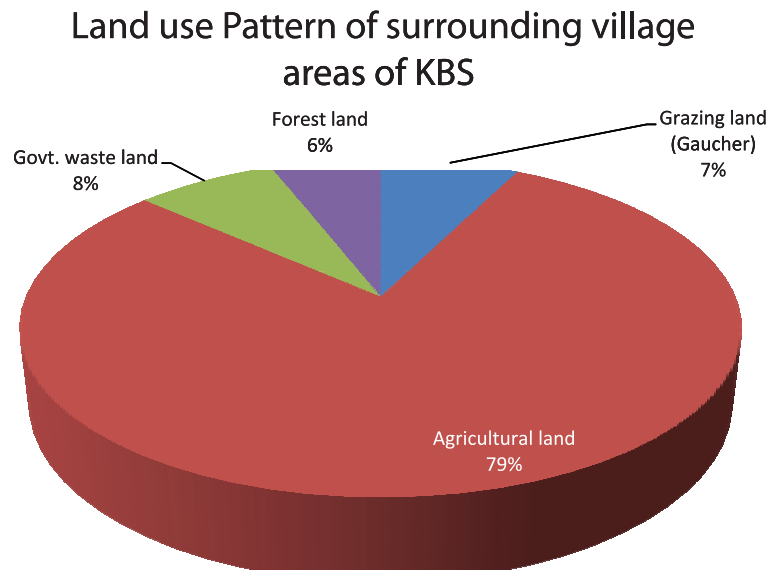


Fig. 37: Land use pattern of surrounding village areas of KBS.

(Source: Pandey and Teli, 2005)

---

## Part - II

---

## Chapter - 5

# Proposed Management

### 5.1 The vision

The complex system of wetlands in the Khijadiya Bird Sanctuary includes marine and brackish water bodies and its surrounding freshwater bodies existing at the adjacent side provides a huge number of unique micro habitats resulting into availability of unique avifaunal diversity in the sanctuary. Due to the uniqueness of the ecosystem, The Ministry of Environment and Forest, Govt. of India has already declared Khijadiya Sanctuary as one of the wetlands of National Importance. However, it should be considered for its inclusion in the list of the Ramsar Sites as it fulfils many criteria of the Ramsar sites. Freshwater wetland of the Khijadiya Bird Sanctuary also faces heavy pressure due to water withdrawal by surrounding farmer for irrigation purpose. The major portion of the sanctuary towards Dhunvav/Khijadiya side is under heavy invasion of *Prosopis juliflora*, reeds and water hyacinth. Due to erosion in the catchment area, the wetland also faces the problem of siltation every year. In order to ensure the long term conservation and sustenance of this ecosystem, the participation of local people in management of the sanctuary became mandatory. Keeping these facts in view, management of the sanctuary requires lot of scientific inputs and care. The following objectives are set forth for the management of the Khijadiya Bird Sanctuary.

### 5.2 Objectives of Management

1. To protect and conserve the Khijadiya Bird Sanctuary and optimize its biological and ecological significance with special reference to endangered, vulnerable and threatened bird species found here.
2. To provide special care and protection for nesting, roosting and feeding areas of the birds.
3. To create and maintain scientific database through promotion, encouragement and support for research and monitoring on the various aspects of the ecology and biodiversity of the sanctuary for future reference and management interventions.
4. To create awareness and sensitize people in general towards conservation and protection of the bird life in the Khijadiya Bird Sanctuary.



- 
5. To ensure sustainable livelihood for communities residing in the surrounding villages of the Khijadiya Bird Sanctuary by undertaking Eco-development activities so as to reduce their dependence on the sanctuary resources.
  6. To promote sustainable eco-tourism with appropriate regulations.

### **5.3 Limitations in achieving the objectives**

#### **5.3.1 Anthropogenic issues**

Draining of excess water for irrigation by the farmers in the surrounding area of Khijadiya Bird Sanctuary affects the water bodies in the sanctuary. However, during rainy season this practice remains in control.

Further, the surrounding villagers exert negative impact on the Khijadiya Bird Sanctuary because of their dependence on fire wood and fodder.

Apart from above, grazing is also occasionally encountered in some areas of the sanctuary.

#### **5.3.2 Administrative issues**

1. Lack of adequate financial resources for implementing management plan.
2. Lack of cooperation from other departments working in the area.
3. Inadequate knowledge and skill about birds and wildlife among staff.

---

## Chapter - 6

# Strategies

### 6.1 Settlement, survey and demarcation

The Khijadiya Bird Sanctuary was declared as sanctuary vide Government of Gujarat Notifications Nos. AKH-81-81-WLP-1081-102123/P2 dated 27/5/1981 and AKH-209/82-WLP-1081/102123-V2 dated 6/11/1982 with an area of 182.90 ha. and 421.96 ha. respectively.

Settlement of Khijadiya Bird Sanctuary was completed by the Collector, Jamnagar recognizing old rights of the villagers to draw water from the tanks for the purpose of irrigation.

Khijadiya Bird Sanctuary has a periphery of 31.6 km and is fully demarcated. The table below gives details on village wise periphery of the sanctuary. Boundaries of the sanctuary are demarcated on the ground by trench fencing and R.C.C. pillars.

**Table-7: Village wise periphery of Khijadiya Bird Sanctuary**

Sr. No.	Village	Adjoining Survey No.	Periphery (km)
1	Jambuda	46 part	6.534
2	Khijadiya	50/1	4.594
3	Khijadiya	143 part	8.158
4	Dhunvav	212 part	5.782
5	Dhunvav	187	2.495
6	Dhunvav	161 part	4.039
		<b>Total</b>	<b>31.602</b>

Boundaries of the sanctuary have been demarcated on ground by boundary pillars. At some places trench fencing has also been carried out on the boundary of the sanctuary. Boundary pillars are damaged at some places and are missing at few places. It is proposed to replace the damaged boundary pillars with pre-cast R.C.C. pillars. The pillars will be 1.5 m long and will be erected at a distance of 100 m as done in the past along the periphery. On the mounds of trench, planting of *Euphorbia* and seed sowing of *Acacia* will be taken up to create a dense live hedge.

#### ***Ecological Boundaries***

Since the Khijadiya Bird Sanctuary, Marine Sanctuary and salt pans (Section 4 areas) exists side by side, there are certain areas of the freshwater wetland towards Dhunvav/Khijadiya and Jambuda

---

side that comes under the Marine Sanctuary, although they constitute the ecological boundary of Khijadiya Bird Sanctuary. From management point of view these areas are very vital as they harbor rich avian diversity including migratory birds during the season. Hence, the Management Plan of the Khijadiya Bird Sanctuary also addresses the concerns of these areas which are not part of the Khijadiya Bird Sanctuary in legal terms.

## 6.2 Zonation

The previous Management Plan of Khijadiya Bird Sanctuary proposed three distinct zones viz., 1) Intensive management zone, 2) Administrative zone and 3) Tourist zone. This zonation catered to the needs of effective conservation and protection of the sanctuary. Hence, this Management Plan proposes to retain these zones for effective management of the sanctuary.

In addition, it is proposed to constitute a buffer zone for the surrounding villages to address their concerns of development in environmentally sustainable manner by undertaking ecodevelopment activities. This zone extends upto 1 km. towards landward side from the boundary of the sanctuary and includes revenue areas of Khijadiya, Dhunvav, Vibhapur, Jambuda and Sachana villages.

### 6.2.1 Wilderness Zone

This zone covers the entire area of intensive management zone of earlier Management Plan and consists of mainly freshwater wetlands along with their expanse and spread (Fig. 9). It is the core zone of the sanctuary which harbors most of the avian fauna including migratory birds during the season. This zone will be totally undisturbed and even tourists will not be permitted so as to maintain the ecological sanctity of the area. Along the peripheral area in this zone, invasion of *Prosopis juliflora* is observed more whereas reeds and Water hyacinth are profusely occurring at few places in the deep water habitat. In order to maintain the utility of the habitat for bird life, the excess growth of *P. juliflora*, reeds and water hyacinth needs to be controlled and removal of unwanted growth of these species is essential for this zone. In order to promote nesting, roosting and perching of varied bird life, the surrounding of the freshwater tanks should be planted with tall plants like *Banyan*, *Muar*, *Ficus* and other native fruit species. Furthermore, construction of earthen bunds and maintenance of existing check-dams, desilting of water bodies to maintain optimum water depth etc. are also carried out in this zone to promote birds' life. At selected places earthen mounds will be constructed to facilitate roosting and perching for the water fowls. Additionally, to provide more roosting and perching sites, snags (cut down/dead/dried branched trunk of tree) will be erected in the water bodies at random places. Planting of trees with bigger crowns such as *Banyan*, *Acacia nilotica*, *Salvadora sp.* will be undertaken on the mounds. During dry season, manytimes the whole area becomes dry and there is no place for feeding, roosting and nesting of birds. To ameliorate the situation, the slopes or topography of the area will be modified wherever necessary to increase the area under water spread and water is retained for a longer time. Water holes will be constructed in this zone to provide drinking water to the mammals of the area during the dry/water scarcity period.

---

The water withdrawal from this zone will be regulated and controlled so that the water resource of the wetland will not deplete.

The old practice of peddle-boating in the freshwater bodies by the tourist has been stopped as it was adversely affecting the floating nests of birds and disturbing the water birds.

### 6.2.2 Administrative zone

This zone mainly consists of office buildings, residence quarters, Nature Education Camp site and interpretation center. The proposed Environmental Laboratory building and Animal and Bird care centre will also be established in this zone. Entry regulations to the sanctuary will be managed from this zone (Fig. 36).

### 6.2.3 Tourism Zone

This zone consists of reclamation bunds, watch towers, hides and nature trails towards Dhunvav/ Khijadiya side and reclamation bund, watch towers, hides and murrum road up to watch towers towards Jambuda side of the sanctuary (Fig. 36). These areas along with facilities are being used by tourists for bird watching as well as by the participants of Nature Education Camps to create awareness about conservation of nature and bird life. For nature education camps, a camp site has been developed by erecting 4 domes on raised platform. Near camp site, an Interpretation Center has been set up and being used by tourists and nature lovers to acquire scientific information on the avifauna and varied ecosystems of the sanctuary. The interpretation center is a great attraction among tourists.

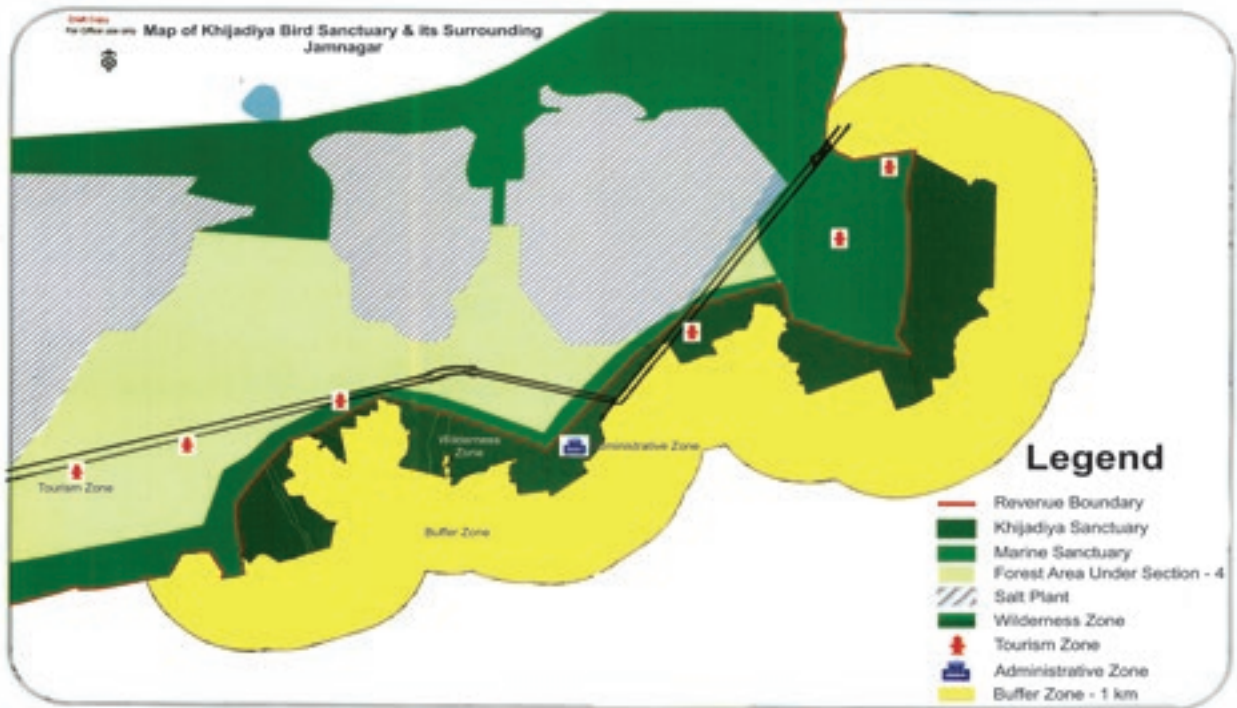


Fig. 38: Map of Khijadiya Bird Sanctuary showing different zonation. (Representative map)

---

At present 6 watch towers (three on Khijadiya-Dhuvanv side and other three on Jambuda side) and 25 hides are available for tourist to watch birds. There are 3 nature trails with a length of 1.92 km for tourist to get closer to nature and experience the wilderness.

Campsite for nature education camps has toilet blocks and drinking water facility for participants of the NEC and tourists.

#### **6.2.4 Buffer zone**

Buffer zones consist of the areas that fall outside the sanctuary and is created to enhance the protection and conservation of the sanctuary area by undertaking ecodevelopment activities in the surrounding villages' viz., Khijadiya, Dhunvav, Jambuda and vibhapur. As per the decision of the Hon'ble Supreme court, Ecosensitive zones are required to be created around the Protected Areas. Keeping in view of the same and as per guidelines issued by the Ministry of Environment and Forests, Govt. of India, proposal of ecosensitive zone around Khijadiya Bird Sanctuary has been submitted to the Forest & Environment Dept. of Govt. of Gujarat. As per the proposal, revenue area upto 1km radius around the sanctuary has been proposed to be declared as Ecosensitive zone. The ecosensitive zone comprises an area of 1661.1 ha falling in five villages, viz., Dhunvav, Khijadiya, Jambuda Sachana and Vibhapar. Certain activities like commercial mining, setting of saw mills, setting of industries causing pollution and establishment of major hydroelectric project are prohibited whereas other activities are either regulated or permitted.

### **6.3 Theme Plans**

#### **6.3.1 Habitat Management**

The wetlands of Khijadiya Bird Sanctuary are divided into two separate, non-interlinked manmade freshwater tanks where variations are largely dependent on the water level and vegetation of the area.

A study conducted by GEER Foundation, Gandhinagar, stated that the open water of the wetlands of KBS varies drastically during mid-winter season, as this is the prime season for the migratory waterfowl. During high rainfall (977 mm in 1997-98), open water area was recorded with 291.4 ha., out of this 149.73 ha. (51.4%) was towards Khijadiya side and 141.68 ha. (48.6%) towards Jambuda side. Further it was observed in the study that during 1997-98, post-monsoon during mid-winter season, the open water spread towards Khijadiya side of and this resulted in decrease of wetland to 41% within 3 months.

With change in season and water level there may be variation in the water quality of KBS freshwater tanks.

On the basis of water level and vegetation, seven types of habitat have been identified in Khijadiya Bird sanctuary and its environs. The details of different habitats occurring in and around the sanctuary and the theme plan for the management are discussed below.



---

### **6.3.2 Deep Open Water habitat (DOW)**

Intense care should be taken to restrain the excess growth of submerged and floating vegetation in this habitat. Earthen mounds should be created to provide nesting and roosting place for waterfowls. In order to maintain the utility of the habitat for bird life, the excess growth of reeds and water hyacinth needs to be contained. Consequently, prescription for removal of unwanted growth of these species is essential at this zone. Desilting of water bodies to maintain optimum water depth would be taken up. At some selected places, earthen mounds will be constructed to facilitate roosting and perching for the water fowls. However, care should be taken to create these mounds at spacing wider enough to provide enough open water space for water fowls. Further, to provide more roosting and perching sites, snags (cut down/dead/dried branched trunk of tree) will be erected in the water bodies at random places. In order to enrich the habitat, fingerlings and yearlings of native fishes may be released in the water so as to provide food to the piscivorous birds.

### **6.3.3 Shallow Open Water habitat (SOW)**

Care should be taken to contain the excess growth of submerged and floating vegetation as part of habitat improvement. In order to maintain the utility of the habitat for bird's life, the excess growth of reeds and water hyacinth needs to be controlled. Accordingly, prescription for removal of unwanted growth of these species is essential for this habitat. Desilting of water bodies to maintain optimum water depth will be carried out. In this habitat, snags will be preferred over earthen mounds to provide roosting and perching sites. In order to enrich the habitat, fingerlings and yearlings of native fishes may be released in the water so as to provide food to the piscivorous birds.

### **6.3.4 Emergent Aquatic Vegetation (EAV)**

From the management point of view, care should be taken to ensure the aquatic vegetation should not be increase beyond the existing level.

This habitat will be managed in a way that the excess growth of aquatic vegetation is protected so as to maintain the habitat utilization to its optimum extent. In this habitat, since water birds nest on the emergent vegetation, it must not be disturbed during the mating and nesting seasons. The invasive species like water hyacinth needs to eliminated as it grows very fast resulting into drying up of water body at an accelerated pace.

### **6.3.5 Coastal marsh land with mangrove**

This type of habitat occurs outside the legal boundaries of the sanctuary but still constitutes the ecological boundaries of Khijadiya Bird Sanctuary as it adjoins. This is a part of Marine Sanctuary and has a vast area of mudflats along with sparse to moderate growth of mangroves at seaward side along the reclamation bunds. This environment is very ideal habitat for the wading birds and no work has to be carried out in this place except protection.

---

### 6.3.6 Grassland habitat

The areas with grassland are mainly located toward the Jambuda side of the sanctuary. It is very special habitat for species like Larks, Sand grouse and Partridges. These patches of grass land should be protected completely and no works like excavation or improving storage capacity of water should be carried out in and around the grasslands of the Khijadiya Bird Sanctuary.

### 6.3.7 Woodland habitats

The area with woody vegetation is mostly on Dhunvav side of the Khijadiya Bird Sanctuary. The excess growth of *P. juliflora* in some areas is posing serious problem as water birds cannot use this habitat for long time which is very significant in extent. Therefore, removal of excess *P. juliflora* is required to make habitat suitable for water birds as well. The removal of excess *P. juliflora* will be carried out with utmost care so that it will not cause any negative impact on the avian and other wildlife in the sanctuary. Furthermore, this activity will be carried out during the season when the migratory birds are not affected due to these operations.

### 6.3.8 Shore land and small mounds

These are the areas which remain above water level for long duration in a year. They are located on the fringes of the wetlands in both the parts of the sanctuary. Mounds will be planted with trees which has bigger crown to provide nesting and roosting places to water fowls. It will be spaced in a manner that it would not adversely affect the bird life as well as the aesthetics of the area.

**The following measures will be undertaken for habitat management in the Sanctuary.**

- The slopes of landscape of the area whenever required will be modified so that the area under water is retained for longer time, as it becomes total dry during summer which leaves no place for feeding, roosting and nesting for the birds.
- Isles will be constructed in the middle of fresh water wetland, which serves as resting place for the birds.
- Continuous water supply will be provided to the animals in the sanctuary during summer.
- Protection against fire will be ensured during the fire season.

## 6.4 Development and management of peripheral areas including catchment area

The peripheral areas of the sanctuary that includes agricultural and gauchar lands towards land side and salt pans and mangroves towards seaward side. These areas are vital for the management of the sanctuary as they not only provide habitats for a diverse bird life but also exert influence on the quantity and quality of water in the wetlands received as runoff from nearby areas. The catchment area of the two rivers is mostly constituted by agricultural fields. The agricultural practices with regards to use of chemical fertilizers and pesticides/herbicides have dominant influence on the quality of runoff water from these areas which ultimately flows to the freshwater lakes of the sanctuary. The gradual accumulation of these organic compounds in the soil and water of the sanctuary area over

---

years has directed negative impacts on the birds and other wildlife of the sanctuary. Moreover, such slow deterioration of the habitats may lead to decline in population of birds found in the sanctuary in an unnoticeable manner. Therefore, certain measures are required to be put in place for addressing these concerns. The following measures are recommended for catchment and surrounding areas.

1. No check dams should be constructed in surroundings which adversely affects inflow of water in the sanctuary.
2. The existing land use pattern in Gauchar and Government wastelands should not be altered as these provide roosting and feeding places for certain birds.
3. No plastic and polluting industries will be allowed in eco-sensitive zone of the sanctuary.
4. The farmers would be motivated and encouraged to adopt organic cultivation discouraging the usage of chemical fertilizers and pesticides/herbicides. This may be achieved by imparting knowledge and skills of organic cultivation and demonstrating the harmful effects of chemicals by experts/extension specialist from agricultural Universities/local NGOs.
5. The mangroves, mainly *Avicennia marina*, provide heronries for roosting and nesting of birds. These mangroves will be protected and diversified by planting other mangrove species such as *Rhizophora sp.* and *Ceriops sp.* along the creeks.
6. Some water fowl like Little Tern and Black-winged Stilt use gypsum heaps in the salt pan areas for nesting and/or roosting. Therefore, some artificial mounds/islets may be constructed in the vicinity as they can serve as good nesting/roosting sites for the ground nesters.
7. The vehicular traffic due to the salt works is source of noise pollution, which should be checked.
8. The high power electric lines passing from nearby the sanctuary area are great threat to large sized birds visiting the sanctuary. Therefore, Pashchim Gujarat Vij Corporation Ltd. (PGVCL) will be approached and requested to underground such electric lines.

Since most of these areas are not under direct control of the sanctuary administration, the local Panchayati Raj Institutions, Salt works, NGOs and all other stakeholders will be extensively involved for implementing the above regulations/tasks. The local communities will be intensively consulted and motivated for adopting the ecofriendly lifestyle leading to positive impacts on the sanctuary.

#### **6.4.1 Extension of Khijadiya Sanctuary**

The previous Management Plan had proposed the extension of the Sanctuary by including the adjoining areas of Khijadiya village Survey No. 50/1 (71.32 ha), Survey No. 375 (100 ha) of Jamnagar waste land Survey No. 47 of Jambuda village (25 ha). No concrete results could be achieved in this regard. However, it is proposed to continue efforts for extending the sanctuary area by including the above areas during the proposed Management Plan also.

---

## 6.5 Protection

The area is largely free from poaching of birds due to vigilance of staff as well as local people who protect and do not hunt birds due to their religious sentiments against killing of wildlife. The stray incidences of grazing by cattle as well as to maintain the effective level of protection, measures are required to be set up. In order to properly implement sanctuary regulations with respect to entry, it is proposed to improve the network of communication as well as check-posts.

Check-posts are required to be manned by the Beat Guards and watchmen. At present there is no manned check-post in the sanctuary. Two unmanned check-posts, viz., opposite to Interpretation Center and towards Vibhapar side of reclamation bund, have been established.

To improve the utility of these check-posts, it is proposed to provide one Beat Guard along with two watchmen on these check-posts. An additional check-post is required to be established towards Sachana side of reclamation bund. These check-posts may be kept closed from sunset to sunrise so as to prevent entry of passersby. These reclamation bunds are also used as short cuts to Jamnagar city by local villagers of Sachana. They may be permitted to use these bunds as pathways as before.

In order to improve the mobility of the staff for patrolling the area, it is proposed to provide motorcycles to Beat Guards and Forester.

Communication facilities in terms of wireless and telephone already exist at the administrative complex which needs to be maintained.

To provide effective protection to the sanctuary, the staff should be provided with firearms i.e., 1 revolver to Range Forest Officer and 0.12 bore Guns to Forester and Beat Guards.

The following measures will be taken for effective protection of the birds and their habitat.

- The sanctuary will be fenced properly in order to avoid cattle grazing.
- Illicit wood cutting and over exploitation of fodder must be under control.
- Water withdrawal for farming and domestic purpose by the local people will be controlled and regulated in such a way to avoid water scarcity.
- Vehicle traffic will be regulated as it causes noise pollution, which affects the bird population.
- High electricity line will be made under ground as it disturbs the bird population
- Using music system, radio and Mobile phones will be strictly prohibited inside the sanctuary area as the radiation and noise disturb the bird population.
- Birds like Heronry and large water fowls prefer mangrove environment for their shelter. Therefore mangrove environment will be protected.

---

## Chapter - 7

# Eco-tourism, Interpretation and Conservation education

The Khijadiya Bird Sanctuary is an attractive destination for tourists due to its proximity to Jamnagar city and a mosaic of habitats occurring in small area giving rise to enormous and amazing diversity of birds. It is a paradise for birdwatchers, ornithologists, nature lovers, tourists and the valued winged visitors alike. The number of tourists visiting KBS is increasing every year. Keeping these facts in view, this Management Plan proposes to have a separate tourism zone as described earlier. In the previous Management Plan, the tourism zone had identified certain areas and discussed about the tourists management and development of ecotourism cum Interpretation Center. In the interregnum, certain developments have taken place in terms of formulation of Gujarat Eco-Tourism Policy by the State Government vide its resolution No. WLP-2005-1764-G.1 (1818) dt. 31/01/2007 and thrust on promotion of tourism in the state (Annexure - 23). The policy lays stress on promoting nature based, non-consumptive ecotourism to experience and appreciate the beauty, serenity and dynamic balance of nature leading to aware, informed and responsible citizen. The guiding principles for promoting ecotourism are to have respect for the site to ensure sustainability and integrity, concern for the local people and culture, their wellbeing and economic development, subordination of macro-economic concerns to site and people related concerns, convenience and facility to tourist with minimal external inputs, facilitate organization of local people to provide tourist services, wide and informative publicity of site, facilitate information dissemination and provide interpretation services and promotion of client group oriented tourism with focus on school and college going youth and senior citizens. As part of strategies to achieve its objectives, the policy identifies the following natural areas to be promoted as ecotourism sites.

1. Long coast line for identification of known and unknown beaches.
2. Sanctuaries and National Parks.
3. Pristine forests of eastern hilly terrain of Gujarat
4. Unique landscapes and ecological niches, e.g. Rann, back waters, wetlands.

The policy also emphasizes on drawing site specific management plans for development of infrastructural facilities, camping sites, interpretation centers, nature trails, walkways, signage's and



---

related activities ensuring participation of local communities in facilitation of catering and service, local transport, maintenance of camp sites, interpretation and guide services, exposure to local culture, providing local facilities etc.

In order to achieve these objectives of the policy the State Government has also resolved to constitute Eco-Tourism Development Society vide its resolution No. VPS-1108/692/W dt. 13/10/2008 to invoke people's participation in ecotourism for benefit of local communities surrounding such ecotourism sites (Annexure - 24).

In view of the facts stated above, the tourism in Khijadiya Bird Sanctuary has to be in consonance with provisions of the Wildlife (Protection) Act, 1972 as amended from time to time and the State Policy described above.

In order to keep irresponsible tourism in control, following steps will be implemented.

- I. Tourists will be required to pay entry fees and various charges for the facilities used by them as per Government resolutions issued from time to time.
- II. No vehicles will be allowed except on defined routes.
- III. Tourist will be allowed to visit the sanctuary from sunrise to sunset.
- IV. No person will be allowed to carry fire arms.
- V. Tourist will be allowed to move only in the defined tourism zone.
- VI. While visiting the sanctuary area, playing of radio, musical instrument will be strictly prohibited.
- VII. Visitors will not be permitted to play any game in the sanctuary area.
- VIII. Visitors will be encouraged to visit interpretation center before visiting the sanctuary.
- IX. Violating the regulations of the sanctuary will be viewed seriously and violators will be punished or fined as per the provisions of Wildlife Protection Act. 1972 (as amended from time to time) or any other acts that may be in force at that time.
- X. Tourist and public should be educated in the aspect of sustainable tourism, protection of nature and on eco-tourism.
- XI. People who visit the place should be directed to keep the place clean, not to litter the zone.
- XII. The salt pans present near the Sanctuary are foraging grounds for many birds. Therefore, the salt workers in co-operation with the authorities of Marine National Park and Sanctuary can initiate some conservation measures.
- XIII. Local folks should be made completely aware of the significance and conserving the habitat of the sanctuary and their role in protecting the sanctuary and also engage them in conservation programmes

---

### **Nature Education Camps**

Nature Education Camps are regularly conducted in Khijadiya Bird Sanctuary during winter season in which school children of 8<sup>th</sup> to 12<sup>th</sup> standard and college students participate. About 50 camps are organized every year benefitting 2500 students. The participants are briefed about the ecosystem of the KBS and taken to field visit for birding as well as nature education. This programme has proved to be very successful in bringing about the mass awareness on conservation issues helping the management in protection and development of the sanctuary. It is proposed to increase the scale of this activity by including other stakeholder including policy makers.

### ***Bird education centre***

Bird education centre will be created for school, college students and interested public to educate on bird's habitat and its ecological importance, food and feeding habits, nesting, migration, dos and don'ts, effect of global warming on bird population and so on with various activities like field visit, presentation and movie clips. The participants will be given a diary in which they have to note down the birds which they identify by direct evidence, by their call, by their nest, foot prints etc. Those who identify more than 50 birds will be rewarded.

Training program on the same aspect will be organized for four consecutive Sundays from morning to noon with minimum charge where the participants will be exposed to various habitats, adaptation and importance of avifaunal diversity of Khijadiya Bird sanctuary. The participants will be provided with handouts and refreshments.

During the period of Management Plan, the existing interpretation center will be extended and upgraded to add more facilities and space for improving the contents and coverage of the interpretation for attracting tourist to the center. For this purpose, the services of professionals with adequate experience and background of creating such centers will be secured. The budget estimates is given in **Annexure - 27**.



---

## Chapter - 8

# Eco-Development

Khijadiya Bird Sanctuary is surrounded by four villages viz., Khijadiya, Dhunvav, Jambuda and Vibhapar. These villages have certain negative impacts on the sanctuary area in the form of grazing their cattle, illegal removal of firewood and fodder from the sanctuary, water withdrawal for irrigating their agricultural fields. Similarly the protected area (sanctuary) also exerts certain negative impacts on villagers as they cannot use the resources of fodder, fuel wood, as well as graze their cattle in the area. Additionally there are entry restrictions also. In order to neutralize these negative impacts of surrounding people on PA and *vice versa* as well as to solicit the co-operation of villagers for long term conservation and protection of the sanctuary, it becomes obligatory on the part of management to devise strategies and programmes addressing the concerns of conservation of wildlife and people.

The socio-economic and eco-development activities for these four surrounding villages have the potential to elicit the co-operation of people for conservation of wildlife and bird life in Khijadiya Bird Sanctuary by reinforcing mutual co-operation and strengthening the bonds between people and the management. Hence, it is proposed to undertake socio-economic and eco-development activities on large scale in these surrounding villages.

At present Khijadiya village is covered under Eco-developmental activities as the Khijadiya is the main village because most of the area declared as Khijadiya Bird Sanctuary was part of the revenue land of Khijadiya village. An Eco-development Committee (EDC) has been constituted and got registered in this village for implementing the eco-development activities. The following eco-developmental activities have been carried out in the village.

1. Construction of R.C.C. road and sewage network.
2. Provided solar cookers to 60 families followed by training to use it.
3. Conducted 3 sewing classes for stitching and embroidery work to empower women of the village.
4. Provided biogas plants to 25 families of the village.
5. Distribution of 700 seedlings of improved varieties of fruits plants free of cost to the villagers.
6. Planted 50 tall plants of Banyan, Neem, Pipal, Karanj and other species of trees with the tree guards in the village.

- 
7. Provided employment to 3 local youth through eco-tourism.
  8. Provided 1 improved crematorium in the village.
  9. Cattle camp for vaccination of cattle.

During the period of this Management Plan three more villages viz., Dhunvav, Jambuda and Vibhapar were also to be covered under Eco-development and socio-economic activities through duly registered Eco-development committees. However, due to lack of funds, no ecocodevelopment activities could be implemented in these villages. These villages are required to be covered in the proposed Management Plan. The following Eco-development activities are proposed to be carried out during the period of this Management Plan.

1. Sewage network for the villages.
2. Construction of toilets with public participation.
3. Providing solar cooker to the beneficiaries of the villages.
4. Providing solar lights and crematoria as wood saving devices.
5. Involving local youth in eco-tourism activities. The local unemployed but educated youth will be imparted training in eco-tourism to earn livelihood during the tourism season.
6. Providing bio-gas plants to the villagers.
7. Organizing cattle vaccination camps in the villages.
8. Providing training for self employment to the village youth.
9. Providing grafted varieties of fruit plants.
10. Planting of tall seedling of Banyan, Neem and other large crowned and long aged varieties trees in the community waste land and private land through participatory mode.
11. Promoting organic farming through use of bio-fertilizers, bio-pesticides by reducing the usage of chemical fertilizers, pesticides and herbicides in their agricultural fields.
12. Carrying out other developmental activities based upon the needs of the village to be decided through Participatory Rural Appraisal (PRA) in the villages.
13. Promotion of stall feeding and improved breeds of cattle to reduce cattle population in the villages.
14. Organizing medical camps for the people of the villages.

The eco-development activities in the surrounding villages will provide an opportunity to involve local communities in conservation and development of Khijadiya Bird Sanctuary and Marine Sanctuary in an effective manner ensuring the long term conservation of these ecosystems. The local communities will be empowered through eco-development activities especially by providing trainings to youth in suitable avocations and involving them in eco-tourism activities which will generate employment for their livelihood. The eco-development activities in surrounding areas would also address the issue of pollution due to use of pesticides/herbicides in agricultural areas benefiting the sanctuary. The budgetary requirements are mentioned in Annexure - 27.



---

## Chapter - 9

# Research, monitoring and Training

### 9.1 Research and ecological monitoring

Research and regular monitoring are prime requirements for effective conservation and management of any ecologically sensitive area/protected areas. Khijadiya Bird Sanctuary (KBS) is a unique coastal wetland, supporting vast number of resident and migratory bird species. This wetland is situated in proximity of human inhabitations and is fed by two rivers viz., Ruparel and Kalindi. Seasonal changes in water level have direct influence on the spread of the wetlands. Similarly the land use pattern and use of pesticides/herbicides in surrounding agricultural areas contribute to the dynamics of the wetland ecosystem. Therefore, it is important to monitor the water quality of Khijadiya Bird Sanctuary and take necessary measures to maintain ecological integrity in a manner so as to improve the flow of the migratory and other residential birds.

To meet the need of regular monitoring, a fully equipped Environment Laboratory (soil, water and meteorological lab), with facility to carry out research on avifaunal habitat, food and feeding, breeding, threats and disease outbreak with respect to climate change will be constructed at Khijadiya Bird Sanctuary camp site along with qualified staff and a Scientific researcher, Analyst and Lab Technician. To make this laboratory functional, the qualified staff on contractual basis will be engaged till the regular incumbents are available.

Following will be the scope of the proposed laboratory and technical staff.

1. Collection of water and sediment samples from catchment area, river bed and the Khijadiya Bird Sanctuary and surroundings.
2. Analysis of the collected water and sediment samples for the stipulated physico-chemical and biological parameters.
3. Collect and analyze data on noise level in sanctuary.
4. Monitoring of physical changes such as silt wash and siltation rates, water retention capacity and water table, air quality etc.
5. Maintain archives of all the scientific data on the biodiversity and ecosystem of the bird sanctuary.

### 9.2 Monitoring

Regular monitoring on the Physico-chemical and biological parameters will be carried out by the research team.

---

## **Physico-chemical parameters**

**Water:** Salinity, Alkalinity, BOD, Chlorides, Fluorides, pH, Total Hardness, CO<sub>2</sub>, Nitrates, Phosphates and other parameters as and when required.

**Sediments:** pH, water holding capacity, sediment texture, organic matter and other parameters as and when required.

**Biological parameters:** Plankton diversity and density (phytoplankton and zooplankton), productivity and microbial analysis.

Apart from above, the following aspects will also be monitored.

### **9.2.1 Monitoring Physical Changes**

#### **9.2.1.1 Silt wash and siltation rates**

The surface run-off is very high in this area as most of the rainfall is received in few days during monsoon thereby causing very heavy soil erosion in the area. The lakes receive fresh silts every year during monsoon. Analysis of siltation rates and silt wash including nutritive and organic value will be carried out

#### **9.2.1.2 Water retention, water quality and water table**

The soil porosity is very poor in this area and the water retention capacity of the soil is also poor. Due to poor soil porosity, the land is highly saline as the evaporation rate is also high during summer. Therefore, indepth study of water retention and water quality as well as water table in the sanctuary area and adjoining farm land including certain wells of farmers will be carried out.

#### **9.2.1.3 Air quality**

As the area is situated in the proximity of Jamnagar city, the air quality requires constant monitoring. There are many big petro-chemical, refineries, thermal power stations and fertilizer industries and certain brass part industries located in and around Jamnagar. The suspended Sulphur and other particles in the air requires to be monitored regularly. These works will be carried out during all season.

#### **9.2.1.4 Changes in Vegetation**

Succession stages (species composition, stand, structure, density, indicator species and life form)

#### **9.2.1.5 Succession Changes**

Various types of habitats and presence of all three types of aquatic zones bring the changes in the vegetation composition. The changes in indicator species and life form are required to be monitored. The succession in grass species because of certain biotic as well as environmental factor will be required to be monitored.

---

### **9.3 Monitoring Changes in wildlife population**

The sanctuary area falls in the migratory route of certain bird species. The area is located in the extreme west of the country. Variety of birds particularly Cranes visit this area during winter. The month wise arrival and departure of the different bird species will be recorded and the population of permanently residing bird species in the sanctuary will be monitored. Census will be carried out at two year interval to find out the change in population trend. Census of mammals will also be carried out annually with the help of local staff.

#### **9.3.1 Succession changes**

The water in the lakes dries up every year creating scarcity of water. The lakes are having shallow, moderately deep and deep area attracting various bird species. Certain waterfowls visit the area regularly and also breed here. Succession changes in birds and animals species if any will be recorded.

#### **9.3.2 Change in Number, Mortality, Population structure and Growth rate**

Mortality rate and growth rate of various animal and birds species will be recorded every year.

#### **9.3.3 Monitoring Wildlife health and disease**

The area is very close to the boundaries of all three villages. The grazing pressure is very high as the cattle graze here after monsoon thereby spreading certain foot and mouth disease in the cervids. Vaccination of village cattle will be carried out to prevent the spread of disease in the blue bull and other species.

### **9.4 Monitoring Health and Disease**

#### **9.4.1 Animal indicator approach**

If any vegetation, trees, animal and bird species serve as an indicator, the animal indicator will be studied.

#### **9.4.2 Examination of live animal and bird**

Examination of health of live animal and birds will be carried out

#### **9.4.3 Examination of dead animal and bird**

If any animal or bird species is found dead in the sanctuary, pre- examination will be carried out. Post-mortem of dead body will be carried out with the help of veterinarian to find out the exact cause of death. If any remedial measures are required to stop the spread of any disease or epidemic, that will be given utmost priority.

---

## 9.5 Data storage system

### 9.5.1 Field observation diary

All field staff working in the sanctuary will have to maintain a field observation diary and will submit their diary to their respective superiors with their own remarks and based on that a separate register will be maintained.

### 9.5.2 Computer

All records will be maintained in a computer and kept in Division Office and Sanctuary Office.

### 9.5.3 Research

A wide range of research scope is available in the area. The following research studies are proposed under this management plan.

1. Regular monthly/seasonal monitoring of birds on selected transects or habitats to find out their status in the area.
2. Use of wetland in relation to tidal effects/diurnal-nocturnal activities of birds with reference to new moon/full moon - movement of birds in the area.
3. Feeding behavior and availability of food for birds.
4. Nesting behavior and nesting activities in the area.
5. Migratory activities (bird ringing).
6. Inter and intraspecific interactions of birds - behavior of bird species.
7. Dynamics of people's participation and Nature Education Camps.
8. Vegetation utilization by various species of birds and other wildlife.
9. To study the climate change and salinity variation and its influence in bird population.

Post Graduate Departments of Universities, Research Institutions/Centers, individual researchers, reputed non Governmental Organizations having expertise and capacity in the field of ornithology/wildlife will be encouraged to take up research on diversified aspects of limnology, coastal ecology, forest ecology, ethnology, biodiversity, wildlife population dynamics, wildlife disease epidemics, ecotourism, ecodevelopment and socio-economic activities and agricultural ecology in and around the sanctuary area in addition to above mentioned topics. Researchers/Students will be encouraged and facilitated with required permissions to carry out research studies in the sanctuary.

## 9.6 Training

For development of human resources and capacity building, training plays a vital role. The staff of KBS will be exposed to training on various aspects of avifauna of the sanctuary. The staff would be sent to the bird sanctuaries of the state as well as out side the state to understand the management of those areas.

---

## Chapter - 10

# Organization and Administration

### 10.1 Structure and responsibilities

As per article 33B of Wildlife (Protection) Act, 1972, an advisory committee for each sanctuary has been mandated. However, this committee is yet to be constituted in respect of Khijadiya Bird Sanctuary. The advisory committee with following members will be constituted immediately as per requirement of the act.

1. Chief Conservator of Forests, Marine National Park, Jamnagar - Chairman
2. Member of Legislative Assembly (MLA), Jamnagar - Member
3. Taluka Pramukh Shri - Jamnagar Taluka - Member
4. Sarpanch of Khijadiya Village Panchayat - Member
5. \_\_\_\_\_ - Member
6. NGO \_\_\_\_\_ - Member
7. NGO \_\_\_\_\_ - Member
8. Individuals active in wildlife conservation - Member
9. Individuals active in wildlife conservation - Member
10. Individuals active in wildlife conservation - Member
11. Police Sub-Inspector, Jamnagar Taluka
12. Veterinary Doctor - Member
13. Honorary Wildlife Warden - Member
14. Deputy Conservator of Forests, Marine National Park - Member Secretary

This committee shall render advice on measures to be taken for better conservation and management of the sanctuary including participation of the people living around the sanctuary.

The organization has the following functions to perform.

- a) Protection and legal cases
- b) Land records demarcation and boundary maintenance
- c) Wildlife monitoring, studies, research and training



- 
- d) Protection, Management and Development of Protected Area
  - e) Ecodevelopment around the sanctuary
  - f) Interpretation, nature education and ecotourism
  - g) Regulation of resource uses
  - h) Conflict and crisis management

In order to perform above functions in an efficient manner, the current staff of 3 persons, i.e., 1 Forester and 2 Forest Guards are not enough. Therefore, the following additional staffs are proposed.

1. Assistant Conservator of Forests - 1
2. Range Forest Officer - 1
3. Round Forester - 1
4. Forest Guards - 4
5. Scientific Analyst - 1
6. Laboratory Technician - 1
7. Laboratory supporting staff cum field assistant - 1
8. Driver - 1
9. Data entry operator - 1
10. Mali - 1

The sanctioning of the posts proposed above may take time due to administrative reasons; arrangement may be made to fill the above vacancies by transferring staff from other divisions immediately in respect of technical staff of the Forest Department. In respect of Scientific Analyst, Laboratory Technician and supporting staff cum field assistant, till permanent arrangement is made, these positions may be filled up by contractual staff. Statement showing salaries of the proposed staff is given at **Annexure - 25**.

## **10.2 Staff amenities**

### **Office building and Laboratory**

As mentioned in previous chapter, an Environment Laboratory is proposed in this plan. Hence, an office building for RFO and a laboratory building is proposed to construct in this Plan as per below.

1. RFO office building - 1
2. Environment Laboratory building - 1
3. Animal and Bird care centre

### **Residential quarters**

Currently there are 2 residential quarters at Khijadiya complex occupied by 1 Forester and 2 Forest Guards. New quarters following categories are proposed to be constructed during the plan period.

- 
1. RFO quarter (Type C) - 1
  2. Scientific Analyst quarter (Type C) -1
  3. Forester quarter (Type B) - 2
  4. Laboratory Technician quarter (Type B) - 1
  5. Forest Guard quarter (Type A) - 8
  6. Laboratory supporting staff cum field assistant quarter (Type A) - 1
  7. Driver/Mali quarter (Type A) - 2

#### **Vehicles**

1. One multiutility van is required for the routine jobs of conducting patrolling in the sanctuary area, collection of samples from various locations, ecotourism etc. Till this facility of vehicle is provided, a suitable vehicle will be permitted to be hired.
2. Motorcycles for staff - 6

The budgetary estimate for the above mentioned amenities is given at **Annexure - 27**.

---

---

# Chapter - 11

## The Budget

### 11.1 The Plan Budget

Detailed budget requirement for the proposed Management Plan have prescribed with Annual physical and financial targets for various task as follows

1. Salary, allowances and amenities for the staff.
2. Infrastructure development and maintenance of the Sanctuary.
3. Habitat improvement works.
4. Campsite development works.
5. Eco-development and eco-tourism related activities.
6. Research and monitoring
7. Education and awareness and
8. Other operation and maintenance

The budget provision for proposed Management Plan for Khijadiya Bird Sanctuary will be worked out for ten years. Funds for this plan will be made available through state plan and Centrally Sponsored Scheme (CSS). The maintenance works will be carried out regularly as the sanctuary area is highly prone to degradation due to proximity to the sea leading to weathering effects.

Aggregate expenditure estimated for the entire plan period (10 years) is Rs. 3054.12 lakhs. Component wise details of the same are given in **Annexure 27**.

---

# References

Anonymous., 2000. Birds of Khijadiya Bird Sanctuary - A checklist compiled by Sanctuary Staff and NGO. Jamnagar.

Global Birdwatcher's Conference, Gujarat, India, <http://www.gbwc2010.org/>.

Islam Zafar-il., M, and Rahmani, A, R., 2004: Important Bird Areas in India: Priority Sites for Conservation. 1133 pages, tabs, photos. Oxford University Press.

Jani, S. P., Asari, R. J. and Patel, G. A., 2002-2011. Management Plan Khijadiya Bird Sanctuary. Pg 114.

Li, Z.W.D., Bloem, A., Delany S., Martakis G. and Quintero J. O. 2009 : Status of Waterbirds in Asia - Results of the Asian Waterbird Census: 1987-2007, Wetlands International, Kuala Lumpur, Malaysia.

Pandey, C.N. and Teli, J. 2005. Ecology and biodiversity of Khijadiya Bird Sanctuary and its environs - a comprehensive study of the wetland complex and the avifauna at Khijadiya. GEER Foundation, pp. 143 - 20.

Rodger, W. A., Panwar, H. S. and Mathur, V. B., 2002. Wildlife Protected Area Network in India: A review (Executive Summary), Wildlife Institute of India. Dehradun. pp 44.



---

## Annexures

## Annexure - 1

### AGRICULTURE, FORESTS AND CO-OPERATION DEPARTMENT

#### Notification

Sachivalaya, Gandhinagar, 27<sup>th</sup> May, 1981.

#### THE WILD LIFE (PROTECTION) ACT, 1972

No. AKH-81-81-WLP-1081-102123/P2-Whereas the Government of Gujarat considers that the areas, the limits of which are defined in the schedule annexed here to is of adequate, ecological faunal, floral, geomorphological natural or zoological significance for the purpose of protecting, propagating and developing Wild Life and its environment.

NOW, THEREFORE, in exercise of the powers conferred by Section-18 of the Wild Life (Protection) Act, 1972 (53 of 1972) the Government of Gujarat hereby declare the areas of Khijadiya village of Jamnagar Taluka of Jamnagar District specified in the schedule annexed here to as "Sanctuary".

Sr. No	Name of Taluka	Name of Village	Survey No.	Area in ha.	Boundaries
1	2	3	4	5	6
1	Jamnagar	Khijadiya	143 part	111-58	North: Seashore Land East: S.No. 27/1,27/2,27/6, 27/3, 50/1 South: S.No. 7/1, 8/1, 9/6, 9/1, 147, 148, 149, 150, 21, 22, 23, 24, 25, 26, 27/3, 27/2, 27/1, 27/6, and Road for Balachadi and Road for sea coast. West: Seashore Land.
			50/1	71-32	North: Seashore Land East: Seashore land Boundary of Jambuda. South: Gauchar and Boundary of Jambuda. West: S.No. 27/2, 27/3, 27/4, 27/5, 28/1, 28/2, 28/4, 28/5, 28/6, 28/7, 28/8, and 29/3.
			<b>Total :</b>	<b>182-90</b>	

#### SCHEDULE

By order and in the name of the Governor of Gujarat.

M. M. RANA

Under Secretary to Government

Extra No. 162

REGISTERED NO. G/GNR/2.



The Gujarat Government Gazette  
**EXTRAORDINARY**  
PUBLISHED BY AUTHORITY

Vol. XXIII] WEDNESDAY, NOVEMBER 10, 1982/KARTIKA 19, 1904

Separate paging is given to this Part in order that it  
may be filed as a separate compilation.

**PART IV-A**

Rules and Orders (other than those published in Parts I, I-A and I-J.)  
made by the Government of Gujarat under the Central Acts.

AGRICULTURE, FOREST AND CO-OP. DEPARTMENT

Notification

Sachivalaya, Gandhinagar, 6th November, 1982.

THE WILD LIFE (PROTECTION) ACT, 1972.

No. AKH-209/82-WLr/1081/102123-V2.—Whereas the Government of Gujarat considers that ~~the limits~~ the Limits of which are defined in the schedule annexed hereto is of adequate ecological faunal floral geomorphological natural or zoological significance for the purpose of protecting propagating and developing Wild Life and its environment.

162-1

IV-A-Extra-162-1

NOW THEREFORE, in exercise of the powers conferred by section 18 of the Wild Life (protection) Act, 1972 (53 of 1972), the Government of Gujarat hereby declare the areas of Khijadia Jambuda and Dhunvav Villages of Jamnagar Taluka of Jamnagar District specified in the schedule annexed hereto as "Sanctuary".

## SCHEDULE

Sr. No.	Name of Taluka	Name of Village	S. No.	Area in Hac.	Boundaries
1	2	3	4	5	6
1	Jamnagar	Khijadia	143 Part	97-00	N:-Seashore Land and part of S. No. 143. E:-S. NO. 147 and 139 and part of S. No.143 S:-Part of S.No. 143. W:-Village boundary of Dhunvav.
		Jambuda	46 Part	174-01	N:-Part of S.No. 46 & S.No. 45, 44, 47 & 41. E:-Part of S.No. 46 & S. No. 41, 306, 305, 304, 303, 302, 301 and 300. S:-S.No. 293, 300 & 301. W:-Seashore Land & Village boundary of Khijadia.
		Dhunvav	212 part	70-01	N:-Seashore Land. E:-Village boundary of Khijadia. S:-Part of S.No. 212 & S. No. 340, 341, 342 345, 346, 347 and 343

1

2

3

4

5

6

W:-S. No. 188, 189, 190,  
191, 192, 193.

161 Part

68-79

N:-Seashore Land.

E:-174/2, 173, 172, 171,  
166 and part of  
S. No. 161.

S:-Part of S. No. 161 &  
S. No. 159 and 160.

W:-Seashore Land &  
Village boundary of  
Jamnagar.

187

12-15

N:-Seashore Land.

E:-S. No. 188 & 189.

S:-S. No. 186, 184, 183,  
182, 178, and 176.

W:-S. No. 174/1, 176,  
& 178.

Total : 421-96

By order and in the name of the Governor of Gujarat,

D. G. CHAUHAN,  
Under Secretary to Government.

---

## Annexure - 2

### Statement showing Annual Rainfall amount of nearby Jamnagar city

Sr. No.	Year	Total Rainfall (mm)	No. of rainy days
1	1991	275	18
2	1992	446	19
3	1993	194.5	15
4	1994	1046.5	56
5	1995	277	24
6	1996	418	18
7	1997	977	26
8	1998	463	36
9	1999	239	21
10	2000	252	18
11	2001	583	30
12	2002	433	14
13	2003	1429	34
14	2004	869	26
15	2005	977	34
16	2006	666	43
17	2007	1945	36
18	2008	825	21
19	2009	897	26
20	2010	2064	56
21	2011	973	38
22	2012	380	27
23	2013	1473	26

Source: Meteorological Department, Jamnagar



### Annexure - 3

#### Statement showing the list of Species of trees recorded at Khijadiya Bird Sanctuary

Sr. No.	Local Name	Species Name	Family
1	Bhuri Pras	<i>Tamarix dioica</i>	Tamaricaceae
2	Pras	<i>Tamarix sp.</i>	Tamaricaceae
3	Bili	<i>Aegle marmelos</i>	Rutaceae
4	Limbu	<i>Citrus limon</i>	Rutaceae
5	Moto Arduso	<i>Ailanthus excelsa</i>	Simaroubaceae
6	Limdo	<i>Azadirachta indica</i>	Meliaceae
7	Bor, Bordi	<i>Ziziphus mauritiana</i>	Rhmaceae
8	Aritha, Arithi	<i>Sapindus emarginatus</i>	Sapindaceae
9	Saragavo	<i>Moringa oleifera</i>	Moringaceae
10	Garmalo	<i>Cassia fistula</i>	Caesalpiniaceae
11	Kasid	<i>Cassia siamea</i>	Caesalpiniaceae
12	Gulmohor	<i>Delonix regia</i>	Caesalpiniaceae
13	Rambaval	<i>Parkinsonia aculeata</i>	Caesalpiniaceae
14	Amlı	<i>Tamarindus indica</i>	Caesalpiniaceae
15	Deshi Baval	<i>Acacia nilotica</i>	Mimosaceae
16	Subaval, Liso Baval	<i>Leucaena leucocephala</i>	Mimosaceae
17	Gorasamli	<i>Pithecellobium dulce</i>	Mimosaceae
18	Gando Baval	<i>Prosopis chilensis (Syn. Prosopis juliflora)</i>	Mimosaceae
19	Khijado, Khijadi, Shami	<i>Prosopis cineraria (Syn. Prosopis spicigera)</i>	Mimosaceae
20	Deshi Badam, Bengali Badam	<i>Terminalia catappa</i>	Combretaceae
21	Piludi	<i>Salvadora persica</i>	Salvadoraceae
22	Liar Gundi, Nani Gundi	<i>Cordia gharaf</i>	Ehrtiaceae
23	Patcherdi	<i>Avicennia marina</i>	Avicenniaceae
24	Vad	<i>Ficus benghalensis</i>	Moraceae
25	Umbaro	<i>Ficus racemosa</i>	Moraceae
26	Pipalo	<i>Ficus religiosa</i>	Moraceae
27	Khajuri	<i>Phoenix sylvestris</i>	Arecaceae

(Source: Pandey and Teli, 2005)

---

#### Annexure - 4

##### Statement showing the list of Shrubs recorded at Khijadiya Bird Sanctuary

Sr. No	Local Name	Species Name	Family
1	Teliyo Hemkand, Batakani	<i>Cadaba fruticosa</i>	Capparaceae
2	Kerdo	<i>Capparis deciduas</i>	Capparaceae
3	Hemkand, Dudhiyo Hemkand	<i>Maerua oblongifolia</i> (Syn. <i>Maerua ovalifolia</i> )	Capparaceae
4	Ingoriyo	<i>Balanites aegyptiaca</i>	Balanitaceae
5	Vikro, Viklo	<i>Maytenus emarginatus</i>	Capparaceae
6	Chanibor, Palia	<i>Zizyphus nummularia</i>	Rhamnaceae
7	Shevari, Jayanti	<i>Sesbania sesban</i>	Fabaceae
8	Aval	<i>Cassia auriculata</i>	Caesalpiniaceae
9	Karen	<i>Nerium indicum</i>	Apocynaceae
10	Akado	<i>Calotropis gigantea</i>	Asclepiadaceae
11	Naffatiyo, Besharam	<i>Ipomoea fistulosa</i>	Convolvulaceae
12	Bougainvel	<i>Bougainvillea spectabilis</i>	Nyctaginaceae
13	Kunvarpathu	<i>Aloe barbadensis</i>	Liliaceae

(Source: Pandey and Teli, 2005)

## Annexure - 5

### Statement showing the list of Herbs recorded at Khijadiya Bird Sanctuary

Sr. No.	Local Name	Species	Family
1	Kamal, Poyana	<i>Nymphaea stellata</i>	Nymphaeaceae
2	Darudi	<i>Argemone mexicana</i>	Papaveraceae
3	Ghandhatu, Dholi Talvani	<i>Cleome gyanandra</i>	Capparaceae
4	Pili Tilvan	<i>Cleome viscosa</i>	Capparaceae
5	Moti Luni, Lakha Luni	<i>Portulaca oleracea</i>	Portulacaceae
6	Zini Luni, Khati Luni	<i>Portulaca quadrifida</i>	Portulacaceae
7	Gandharo Okharad	<i>Bergia suffruticosa</i>	Elatinaceae
8	Khapat	<i>Abutilon glaucum</i>	Malvaceae
9		<i>Sida ovate</i>	Malvaceae
10	Chuncha Khapat	<i>Melochia chorchorifolia</i>	Sterculiaceae
11	Chunch	<i>Corchorus aestuans</i>	Tiliaceae
12	Boychhunch, Bahuphali	<i>Corchorus depressus</i>	Tiliaceae
13	Zipti, Gol Zipti	<i>Triumfetta rotundifolia</i>	Tiliaceae
14	Dhamaso	<i>Fagonia cretica</i>	Zygophyllaceae
15	Bethu GOkhru, Mithu Gokhru	<i>Tribulus terrestris</i>	Zygophyllaceae
16	Risamanu	<i>Biophytum sensitivum</i>	Oxalidaceae
17		<i>Aeschynomene indica</i>	Fabaceae
18		<i>Alysicarpus procumbens</i>	Fabaceae
19		<i>Alysicarpus vaginalis</i>	Fabaceae
20	Ranmethi	<i>Crotolaria medicaginea</i>	Fabaceae
21		<i>Desmodium triflorum</i>	Fabaceae
22	Godhadi	<i>Goniogyna hirta</i>	Fabaceae
23		<i>Indigofera astragalina</i>	Fabaceae
24	Bakho	<i>Indigofera cordifolia</i>	Fabaceae
25	Jethimadh	<i>Taverniera cuneifolia</i>	Fabaceae
26	Sarpankho	<i>Tephrosia purpurea</i>	Fabaceae
27		<i>Tephrosia strigosa</i>	Fabaceae
28	Sarpankho	<i>Tephrosia villosa</i>	Fabaceae
29	Bthi chimed, Chimediyo	<i>Cassia pumila</i>	Caesalpinaceae
30	Kuvandiyo	<i>Cassia tora</i>	Caesalpinaceae
31	Jal Agio, Lal Agio	<i>Ammania baccifera</i>	Lythraceae
32	Mitho Okharad	<i>Glinus lotoides</i>	Molluginaceae
33		<i>Mollugo pentaphylla</i>	Molluginaceae

Sr. No.	Local Name	Species	Family
34		<i>Sesuvium sesuvioides</i> (Syn. <i>Trianthema hydaspica</i> )	Aizoaceae
35	Satodo	<i>Trianthema portulacastrum</i> (Syn. <i>Trianthema monogyna</i> )	Aizoaceae
36		<i>Zaleya govindia</i> (Syn. <i>Trianthema pentandra</i> )	Aizoaceae
37	Ganthiyu	<i>Borreria stricta</i>	Rubiaceae
38	Parpat	<i>Oldenlandia sp.</i>	Rubiaceae
39		<i>Blumea sp.</i>	Asteraceae
40	Shulio, Utkanto	<i>Echinops echinatus</i>	Asteraceae
41	Bhangro	<i>Eclipta prostrate</i>	Asteraceae
42	Moti	<i>Launaea procumbens</i>	Asteraceae
43	Bhonpatri	<i>Launaea sarmentosa</i>	Asteraceae
44		<i>Parthenium hysterophorus</i>	Asteraceae
45	Gorakhmundi	<i>Sphaeranthus indicus</i>	Asteraceae
46	Pardesi Bhangro	<i>Tridax procumbens</i>	Asteraceae
47	Sahdevi, sadedi	<i>Vernonia cinerea</i>	Asteraceae
48	Gokhru	<i>Xanthium strumarium</i>	Asteraceae
49	Barmasi	<i>Catharanthus roseus</i>	Apocynaceae
50	Mamejvo, Kadavi Nai	<i>Enicostema hyssopifolium</i>	Gentianaceae
51	Okharad, Basario Okharad	<i>Coldenia procumbens</i>	Boraginaceae
52		<i>Heliotropium curassavicum</i>	Boraginaceae
53		<i>Heliotropium ovalifolium</i>	Boraginaceae
54	Shankhawali	<i>Convolvulus microphyllus</i>	Convolvulaceae
55	Rudanti, Khariyu	<i>Cressa cretica</i>	Convolvulaceae
56		<i>Evolvulus alsinoides</i>	Convolvulaceae
57		<i>Hewittia sublobata</i>	Convolvulaceae
58	Nada ni vel, Nali ni bhaji	<i>Ipomoea aquatic</i>	Convolvulaceae
59	Undardi, Undari	<i>Merremia gangetica</i>	Convolvulaceae
60	Marchi	<i>Capsicum annuum</i>	Solanaceae
61	Dhantura	<i>Datura innoxia</i>	Solanaceae
62	Tameta	<i>Lycopersicon lycopersicum</i>	Solanaceae
63	Popti	<i>Physalis minima</i>	Solanaceae
64	Bhoiringni	<i>Solanum xanthocarpum</i> (Syn. <i>Solanum surattense</i> )	Solanaceae
65		<i>Glossostigma diandrum</i>	Scrophulariaceae

Sr. No.	Local Name	Species	Family
66	Ubhu Gokharu	<i>Pedaliium murex</i>	Pedaliaceae
67	Harancharo, Paniru	<i>Lepidagathis trinervis</i>	Acanthaceae
68	Satodi	<i>Boerhavia diffusa</i>	Nyctaginaceae
69		<i>Boerhavia sp.</i>	Nyctaginaceae
70	Anghedi	<i>Achyranthes aspera</i>	Amaranthaceae
71	Gorakhganjo, Bur	<i>Aerva javanica</i>	Amaranthaceae
72	Gorakhganjo, Sani Bur	<i>Aerva lanata</i>	Amaranthaceae
73		<i>Amaranthus spinosus</i>	Amaranthaceae
74		<i>Amaranthus viridis</i>	Amaranthaceae
75	Lampdi, Lambdi	<i>Celosia argentea</i>	Amaranthaceae
76	Kanjro, Lolar	<i>Digera muricata</i>	Amaranthaceae
77		<i>Pupalia lappacea</i>	Amaranthaceae
78		<i>Salicornia brachiata</i>	Chenopodiaceae
79		<i>Salsola baryosma</i>	Chenopodiaceae
80	Khari Luni nin Bhaji	<i>Suaeda fruticosa</i>	Chenopodiaceae
81		<i>Suaeda nudiflora</i>	Chenopodiaceae
82		<i>Polygonum plebeium</i>	Polygonaceae
83	Kidamari	<i>Aristolochia bracteolate</i>	Aristolochiaceae
84	Runchalo Dadra	<i>Acalphya ciliate</i>	Euphorbiaceae
85	Dudheli	<i>Euphorbia hirta</i>	Euphorbiaceae
86		<i>Euphorbia orbiculata</i> (Syn. <i>Euphorbia microphylla</i> )	Euphorbiaceae
87		<i>Euphorbia thymifolia</i>	Euphorbiaceae
88	Kharsani	<i>Euphorbia tirucalli</i>	Euphorbiaceae
89	Bhoy Amli	<i>Phyllanthus fraternus</i> (Syn. <i>Phyllanthus niruri</i> )	Euphorbiaceae
90	Kharsad, Bhoy Amli	<i>Phyllanthus urinaria</i>	Euphorbiaceae
91		<i>Hydrilla verticillata</i>	Hydrocharitaceae
92		<i>Vallisneria spiralis</i>	Hydrocharitaceae
93		<i>Commelina benghalensis</i>	Commelinaceae
94		<i>Commelina diffusa</i> (Syn. <i>Commelina nudiflora</i> )	Commelinaceae
95		<i>Najas sp.</i>	Najadaceae
96		<i>Bulboschoenus maritimus</i>	Cyperaceae
97		<i>Bulbostylis barbata</i>	Cyperaceae
98		<i>Cyperus bulbosus</i>	Cyperaceae

Sr. No.	Local Name	Species	Family
99		<i>Cyperus compressus</i>	Cyperaceae
100		<i>Cyperus iria</i>	Cyperaceae
101		<i>Cyperus pangorei</i>	Cyperaceae
102		<i>Cyperus rotundus</i>	Cyperaceae
103		<i>Fimbristylis sp.</i>	Cyperaceae
104		<i>Scirpus grossus</i>	Cyperaceae
105		<i>Aeluropus lagopoides</i>	Poaceae
106	Dabholu	<i>Aristida adscensionis</i>	Poaceae
107	Zenzvo, Jinjvo	<i>Bothrichloa pertusa</i>	Poaceae
108	Dhamnu	<i>Cenchrus setigerus</i>	Poaceae
109	Mindadiu	<i>Chloris barbata</i>	Poaceae
110		<i>Chloris virgata</i>	Poaceae
111	Darbh	<i>Cynodon dactylon</i>	Poaceae
112		<i>Dactyloctenium aegyptium</i>	Poaceae
113		<i>Dichanthium annulatum</i>	Poaceae
114	Tarodiyu	<i>Digitaria adscendens</i>	Poaceae
115	Khariyu	<i>Dinebra retroflexa</i>	Poaceae
116	Samo, Jiriu	<i>Echinochloa colonum</i>	Poaceae
117		<i>Eragrostis pilosa</i>	Poaceae
118		<i>Melanocenchris jacquemontii</i>	Poaceae
119		<i>Oplismenus burmannii</i>	Poaceae
120		<i>Paspaladium geminatum</i>	Poaceae
121	Dabh, Kans	<i>Saccharum spontaneum</i>	Poaceae
122	Chiktu	<i>Setaria tomentosa</i>	Poaceae
123		<i>Sporobolus tremulus</i>	Poaceae
124		<i>Urochonda setulosa</i>	Poaceae

(Source: Pandey and Teli, 2005)



## Annexure - 6

### Statement showing the list of Climbers recorded at Khijadiya Bird Sanctuary

Sr. No	Local Name	Species	Family
1	Vevadi	<i>Cocculus hirsutus</i>	Menispermaceae
2	Valur, Parwatii	<i>Cocculus pendulus</i>	Menispermaceae
3	Galo	<i>Tinospora cordifolia</i>	Menispermaceae
4	Khat-Khatumbo	<i>Cayratia carnos</i>	Vitaceae
5	Kapalphodi	<i>Cardiospermum halicacabum</i>	Sapindaceae
6	Chanothi	<i>Abrus precatorius</i>	Fabaceae
7	Tarvardi	<i>Canavalia ensiformis</i>	Fabaceae
8	Nani Kamalvel	<i>Rhynchosia minima</i>	Fabaceae
9	Indravarna, kadvo INdravarna	<i>Citrullus colocynthis</i>	Cucurbitaceae
10	Ghilodi Kadvi Gholi	<i>Coccinia grandis</i>	Cucurbitaceae
11	Kothimdu, Gaivasukandan	<i>Cucumis callosus</i>	Cucurbitaceae
12	Chanakchibhdi	<i>Mukia maderaspatana</i> (Syn. <i>Melothria maderaspatama</i> Cogn.)	Cucurbitaceae
13	Jangali Parval	<i>Trichosanthes cucumerina</i>	Cucurbitaceae
14	Jal Dudhi, Dudhli	<i>Oxystelma secamone</i>	Asclepiadaceae
15	Singroti	<i>Pentatropis capensis</i>	Asclepiadaceae
16	Chamar Dudheli, Nagla Dudheli	<i>Pergularia daemia</i>	Asclepiadaceae
17	Dariya ni vel Maryad vel	<i>Ipomoea pes-caprae</i>	Convolvulaceae
18	Fang vel	<i>Rivea hypocrateriformis</i>	Convolvulaceae
19	Shatavari	<i>Asparagus racemosus</i>	Liliaceae

(Source: Pandey and Teli, 2005)

## Annexure - 7

### Statement showing list of vegetation other than angiosperms recorded at Khijadiya Bird Sanctuary

Sr. No.	Name of the Species	Habitat/ Niche	Microhabitat and Distribution
	<b>ALGAE CHILOROPHYCEAE</b>		
1.	<i>Chara sp.</i>	Aquatic	Jb (very common in shallow water)
2.	<i>Nitella sp.</i>	Aquatic	Jb (very common in shallow water)
3.	<i>Spirogyra sp.</i>	Aquatic	Kh & Jb (very common on the bank or stagnant water)
	<b>CYANOPHYCEAE</b>		
4.	<i>Ocillatoria sp.</i>	Aquatic	Kh & Jb (very common on the bank or stagnant water)
	<b>FUNGI AGARICACEAE</b>		
5.	<i>Agaricus sp.</i>	Terrestrial	Kh & Jb (on moist ground with litter)
	<b>PTERIDOPHYTA MARELIACEAE</b>		
6.	<i>Marselia sp.</i>	Aquatic	Kh & Jb (on mounts and bunds among emergents)

(Source: Pandey and Teli, 2005)

Note : Kh - Khijadiya, Jb - Jambuda

## Annexure - 8

### Statement showing the list of birds recorded at Khijadiya Bird Sanctuary.

Sr. No.	Common English Name	Scientific Name	Status
	<b>Podicipedidae</b>		
1	Black-necked Grebe	<i>Podiceps nigricollis</i>	M
2	Great Crested Grebe	<i>Podiceps cristatus</i>	RM
3	Little Grebe	<i>Tachybaptus ruficollis</i>	RM
	<b>Pelecanidae</b>		
4	Dalmatian Pelican	<i>Pelecanus crispus</i>	M
5	Great White Pelican	<i>Pelecanus onocrotalus</i>	M
	<b>Phalacrocoracidae</b>		
6	Great Cormorant	<i>Phalacrocorax carbo</i>	RM
7	Little Cormorant	<i>Phalacrocorax niger</i>	RM
8	Indian Shag	<i>Phalacrocorax fuscicollis</i>	RM
	<b>Anhingidae</b>		
9	Darter	<i>Anhinga melanogaster</i>	RM
	<b>Ardeidae</b>		
10	Cattle Egret	<i>Bubulcus ibis</i>	RM
11	Great Egret	<i>Camerodius albus</i>	RM
12	Intermediate Egret	<i>Mesophoyx intermedia</i>	RM
13	Little Egret	<i>Egretta garzetta</i>	RM
14	Western Reef Egret	<i>Egretta gularis</i>	RM
15	Black-Crowned Night Heron	<i>Nycticorax nycticorax</i>	RM
16	Grey Heron	<i>Ardea cinerea</i>	RM
17	Little Green Heron	<i>Butorides striatus</i>	RM
18	Indian Pond Heron	<i>Ardeola grayii</i>	RM
19	Purple Heron	<i>Ardea purpurea</i>	RM
20	Cinnamon Bittern	<i>Lxobrychus cinnamomeus</i>	O
21	Yellow Bittern	<i>Lxobrychus sinensis</i>	O
	<b>Ciconiidae</b>		
22	Asian Open Bill	<i>Anastomus oscitans</i>	R
23	Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	RM
24	Painted Stork	<i>Mycteria leucocephala</i>	RM
25	White Stork	<i>Ciconia ciconia</i>	O
	<b>Threskiornithidae</b>		
26	Black Ibis	<i>Pseudibis papillosa</i>	RM
27	Black-headed Ibis	<i>Threskiornis melancocephalus</i>	RM

Sr. No.	Common English Name	Scientific Name	Status
28	Glossy Ibis	<i>Plegadis falcinellus</i>	RM
29	Eurasian Spoonbill	<i>Platalea leucorodia</i>	RM
	<b>Phoenicopteridae</b>		
30	Greater Flamingo	<i>Phoenicopterus ruber</i>	R
31	Lesser Flamingo	<i>Phoenicopterus minor</i>	R
	<b>Anatidae</b>		
32	Comb Duck	<i>Sarkidiornis melanotos</i>	RM
33	Lesser whistling Duck	<i>Dendrocygna javanica</i>	RM
34	Spotbilled Duck	<i>Anas poecilorhyncha</i>	RM
35	Tufted Duck	<i>Aythya fuligula</i>	M
36	Common Pochard	<i>Aythya ferina</i>	M
37	Ferruginous Pochard	<i>Aythya nyroca</i>	M
38	Greylag Goose	<i>Anser anser</i>	V
39	Common Shelduck	<i>Tadorna tadorna</i>	V
40	Ruddy shelduck	<i>Tadorna ferruginea</i>	M
41	Common Teal	<i>Anas crecca</i>	M
42	Cotton Pygmy Goose	<i>Nettapus coromandelianus</i>	O
43	Eurasian Wigeon	<i>Anas penelop</i>	M
44	Gadwall	<i>Anas strepera</i>	M
45	Garganey	<i>Anas querquedula</i>	M
46	Mallard	<i>Anas platyrbynchos</i>	M
47	Northern Shoveler	<i>Anas clypeata</i>	M
48	Northern Pintail	<i>Anas acuta</i>	M
	<b>Accipitridae</b>		
49	Booted Eagle	<i>Hieraaetus pennatus</i>	M
50	Greater Spotted Eagle	<i>Aquila clanga</i>	M
51	Indian Spotted Eagle	<i>Aquila hastate</i>	V
52	Pallas's Fish Eagle	<i>Haliaeetus leucoryphus</i>	V
53	Short-toed Snake Eagle	<i>Circaetus gallicus</i>	R
54	Steppe Eagle	<i>Aquila nipalensis</i>	O
55	Peregrine Falcon	<i>Falco peregrinus</i>	M
56	Red-necked Falcon	<i>Falco chicquera</i>	R
57	Black Kite	<i>Milvus migrans</i>	RM
58	Black-Shouldered Kite	<i>Elanus caeruleus</i>	R
59	Brahminy Kite	<i>Haliastur Indus</i>	RM
60	Common Kestrel	<i>Falco tinnunculus</i>	M

Sr. No.	Common English Name	Scientific Name	Status
61	Eurasian Marsh Harrier	<i>Circus aeruginosus</i>	M
62	Eurasian Sparrow Hawk	<i>Accipiter nisus</i>	M
63	Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>	R
64	Osprey	<i>Pandion haliaetus</i>	M
65	Shikra	<i>Accipiter badius</i>	RM
	<b>Phasianidae</b>		
66	Barred Buttonquail	<i>Turnix suscitator</i>	R
67	Grey Francolin	<i>Francolinus pondicerianus</i>	RM
68	Indian Peafowl	<i>Pavo cristatus</i>	RM
69	Yellow-legged buttonquail	<i>Turnix tanki</i>	O
	<b>Gruidae</b>		
70	Common Crane	<i>Grus grus</i>	M
71	Demoiselle Crane	<i>Grus virgo</i>	M
72	Sarus Crane	<i>Grus antigone</i>	O
	<b>Rallidae</b>		
73	Bailon's Crake	<i>Porzana pusilla</i>	V
74	Brown Crake	<i>Amaurornis akool</i>	V
75	Common Coot	<i>Fulica atra</i>	RM
76	Common Moorhen	<i>Gallinula chloropus</i>	RM
77	Purple Swamphen	<i>Porphyrio porphyrio</i>	RM
78	Watercock	<i>Gallicrex cinerea</i>	O
79	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	RM
	<b>Jacanidae</b>		
80	Bronze-winged Jacana	<i>Metopidius indicus</i>	O
81	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	RM
	<b>Haematopodidae</b>		
82	Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	M
	<b>Charadriinae</b>		
83	Red-wattled Lapwing	<i>Vanellus indicus</i>	RM
84	White-tailed Lapwing	<i>Vanellus leucurus</i>	M
85	Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	RM
86	Common Ringed Plover	<i>Charadrius hiaticula</i>	M
87	Grey Plover	<i>Pluvialis squatarola</i>	M
88	Kentish Plover	<i>Charadrius alexandrinus</i>	RM
89	Laser Sand Plover	<i>Charadrius mongolus</i>	M
90	Little Ringed Plover	<i>Charadrius dubius</i>	RM

Sr. No.	Common English Name	Scientific Name	Status
91	Pacific Golden Plover	<i>Pluvialis fulva</i>	O
	<b>Scolopacnae</b>		
92	Bar-tailed Godwit	<i>Limosa lapponica</i>	M
93	Black-tailed Godwit	<i>Limosa limosa</i>	M
94	Common Greenshank	<i>Tringa nebularia</i>	M
95	Common Redshank	<i>Tringa totanus</i>	M
96	Spotted Redshank	<i>Tringa erythropus</i>	M
97	Broad-billed Sandpiper	<i>Limicola falcinellus</i>	O
98	Common Sandpiper	<i>Actitis hypoleucos</i>	M
99	Curlew Sandpiper	<i>Calidris ferruginea</i>	M
100	Green Sandpiper	<i>Tringa ochropus</i>	M
101	Marsh Sandpiper	<i>Tringa stagnatilis</i>	M
102	Terek Sandpiper	<i>Xenus cinereus</i>	M
103	Wood Sandpiper	<i>Tringa glareola</i>	M
104	Little Stint	<i>Calidris minuta</i>	M
105	Temminck's Stint	<i>Calidris temminckii</i>	M
106	Common Snipe	<i>Gallinago gallinago</i>	M
107	Jack Snipe	<i>Lymnocyptes minimus</i>	M
108	Dunlin	<i>Calidris alpina</i>	M
109	Eurasian Curlew	<i>Numenius arquata</i>	M
110	Great knot	<i>Calidris tenuirostris</i>	O
111	Ruddy Turnstone	<i>Arenaria interpres</i>	M
112	Ruff and Reeve	<i>Phlomachus pugnax</i>	M
113	Sanderling	<i>Calidris alba</i>	M
114	Whimbrel	<i>Numenius phaeopus</i>	M
	<b>Phalaropinae</b>		
115	Red-necked Phalarope	<i>Phalaropus lobatus</i>	O
	<b>Rostratulidae</b>		
116	Greater Painted Snipe	<i>Rostratula benghalensis</i>	RM
	<b>Recurvirostridae</b>		
117	Black-Winged Stilt	<i>Himantopus himantopus</i>	RM
118	Pied Avocet	<i>Recurvirostra avosetta</i>	M
	<b>Dromadidae</b>		
119	Crab Plover	<i>Dromas ardeola</i>	M
	<b>Burnhinidae</b>		
120	Eurasian Thick-knee	<i>Burhinus oedicephalus</i>	RM



Sr. No.	Common English Name	Scientific Name	Status
121	Great Thick-knee	<i>Esacus recurvirostris</i>	RM
	<b>Glareolidae</b>		
122	Indian Courser	<i>Cursorius coromandelicus</i>	O
123	Collared Pratincole	<i>Glareola pratincola</i>	O
124	Small Pratincole	<i>Glareola lactea</i>	O
	<b>Laridae</b>		
125	Black-headed Gull	<i>Larus ridibundus</i>	M
126	Brown-headed Gull	<i>Larus brunnicephalus</i>	M
127	Heuglin's Gull	<i>Larus heuglini</i>	M
128	Little Gull	<i>Larus minutus</i>	V
129	Pallas's Gull	<i>Larus ichthyaetus</i>	M
130	Slender billed Gull	<i>Larus genei</i>	M
131	Yellow-legged Gull	<i>Larus cachinnans</i>	M
132	Black-bellied Tern	<i>Sterna acuticauda</i>	V
133	Caspian tern	<i>Sterna caspia</i>	M
134	Common Tern	<i>Sterna hirundo</i>	V
135	Gull-billed Tern	<i>Gelochelidon nilotica</i>	M
136	Lesser-crested Tern	<i>Sterna bengalensis</i>	M
137	Little Tern	<i>Sterna albifrons</i>	RM
138	River Tern	<i>Sterna aurantia</i>	R
139	Saunders's Tern	<i>Sterna saundersi</i>	RM
140	Whiskered Tern	<i>Chlidonias hybridus</i>	M
	<b>Rynchopidae</b>		
141	Indian Skimmer	<i>Rynchops albicollis</i>	R
	<b>Pterociididae</b>		
142	Chestnut-bellied Sandgrouse	<i>Pterocles exustus</i>	R
	<b>Columbidae</b>		
143	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	RM
144	Laughing Dove	<i>Streptopelia senegalensis</i>	RM
145	Red Collared Dove	<i>Streptopelia tranquebarica</i>	R
146	Rock Pigeon	<i>Columba livia</i>	RM
	<b>Psittacidae</b>		
147	Rose-ringed Parakeet	<i>Psittacula krameri</i>	RM
	<b>Cuculidae</b>		
148	Banded-Bay Cuckoo	<i>Cacomantis sonneratii</i>	V
149	Common-Hawk Cuckoo	<i>Hierococyx varius</i>	M

Sr. No.	Common English Name	Scientific Name	Status
150	Eurasian Cuckoo	<i>Cuculus canorus</i>	M
151	Pied Cuckoo	<i>Clamator jacobinus</i>	M
152	Asian Koel	<i>Eudynamys scolopacea</i>	RM
153	Greater Coucal	<i>Centropus sinensis</i>	RM
154	Sirkeer Malkoha	<i>Phaenicophaeus leschenaultii</i>	O
	<b>Tytoninae</b>		
155	Barn owl	<i>Tyto alba</i>	O
	<b>Striginae</b>		
156	Short-eared Owl	<i>Asio flammeus</i>	M
157	Spotted Owlet	<i>Athene brama</i>	RM
	<b>Caprimulgidae</b>		
158	Indian Nightjar	<i>Caprimulgus asiaticus</i>	RM
	<b>Apodinae</b>		
159	House Swift	<i>Apus affinis</i>	RM
	<b>Alcedinidae</b>		
160	Black-capped Kingfisher	<i>Halcyon pileata</i>	O
161	Common Kingfisher	<i>Alcedo atthis</i>	RM
162	Pied Kingfisher	<i>Ceryle rudis</i>	RM
163	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	RM
	<b>Meropidae</b>		
164	Blue-cheeked Bee eater	<i>Merops persicus</i>	PM
165	Blue-tailed Bee-eater	<i>Merops philippinus</i>	V
166	Green Bee-eater	<i>Merops orientalis</i>	RM
	<b>Corraciidae</b>		
167	European Roller	<i>Coracias garrulus</i>	PM
168	Indian Roller	<i>Coracias benghalensis</i>	RM
	<b>Upupidae</b>		
169	Common Hoopoe	<i>Upupa epops</i>	R
	<b>Capitonidae</b>		
170	Coppersmith Barbet	<i>Megalaima haemacephala</i>	RM
	<b>Picidae</b>		
171	Eurasian Wryneck	<i>Jynx torquilla</i>	M
172	Yellow-crowned Woodpecker	<i>Dendrocopos mahrattensis</i>	R
	<b>Alaudidae</b>		
173	Ashy-crowned Sparrow Lark	<i>Eremopterix grisea</i>	RM
174	Crested Lark	<i>Galerida cristata</i>	RM

Sr. No.	Common English Name	Scientific Name	Status
175	Greater Short-toed Lark	<i>Calandrella brachydactyla</i>	M
176	Indian Bush Lark	<i>Mirafra erythroptera</i>	R
177	Rafous-tailed Lark	<i>Ammomanes phoenicurus</i>	R
178	Sand Lark	<i>Calandrella raytal</i>	R
179	Sykes's Crested Lark	<i>Galerida deva</i>	RM
180	Oriental Sky Lark	<i>Alauda gulgula</i>	RM
	<b>Hirundinidae</b>		
181	Dusky crag Martin	<i>Hirundo concolor</i>	RM
182	Plain Martin	<i>Riparia paludicola</i>	V
183	Sand Martin	<i>Riparia riparia</i>	V
184	Barn Swallow	<i>Hirundo rustica</i>	M
185	Red-rumped Swallow	<i>Hirundo daurica</i>	R
186	Wire-tailed Swallow	<i>Hirundo smithii</i>	RM
	<b>Laniidae</b>		
187	Bay-backed Shrike	<i>Lanius vittatus</i>	RM
188	Brown Shrike	<i>Lanius cristatus</i>	M
189	Long-tailed Shrike	<i>Lanius schach</i>	RM
190	Red-backed Shrike	<i>Lanius collurio</i>	PM
191	Rufous-tailed Shrike	<i>Lanius isabellinus</i>	M
192	Southern Grey Shrike	<i>Lanius meridionalis</i>	RM
	<b>Oriolidae</b>		
193	Eurasian Golden Oriole	<i>Oriolus oriolus</i>	R
	<b>Dicruridae</b>		
194	Ashy Drongo	<i>Dicrurus leucophaeus</i>	M
195	Black Drongo	<i>Dicrurus macrocercus</i>	RM
	<b>Sturnidae</b>		
196	Bank Myna	<i>Acridotheres ginginianus</i>	RM
197	Common Myna	<i>Acridotheres tristis</i>	RM
198	Brahminy Starling	<i>Sturnus pagodarum</i>	RM
199	Common Starling	<i>Sturnus vulgaris</i>	M
200	Rosy Starling	<i>Sturnus roseus</i>	M
	<b>Corvidae</b>		
201	House Crow	<i>Corvus splendens</i>	RM
202	Large billed crow	<i>Corvus macrorhynchos</i>	RM
203	Indian Treepie	<i>Dendrocitta vagabunda</i>	RM

Sr. No.	Common English Name	Scientific Name	Status
	<b>Campephagidae</b>		
204	Common Wood Shrike	<i>Tephrodornis pondicerianus</i>	R
	<b>Irenidae</b>		
205	Common Iora	<i>Aegithina tiphia</i>	RM
	<b>Pycnonotidae</b>		
206	Red-Vented Bulbul	<i>Pycnonotus cafer</i>	RM
207	White-eared Bulbul	<i>Pycnonotus leucotis</i>	R
	<b>Timaliinae</b>		
208	Common Babbler	<i>Turdoides caudatus</i>	RM
209	Jungle Babbler	<i>Turdoides striatus</i>	RM
210	Large Grey Babbler	<i>Turdoides malcolmi</i>	RM
	<b>Muscicapinae</b>		
211	Asian Brown Flycatcher	<i>Muscicapa dauurica</i>	M
212	Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>	M
213	Red-throated Flycatcher	<i>Ficedula parva</i>	M
214	Spotted Flycatcher	<i>Muscicapa striata</i>	PM
215	Tickell's Blue Flycatcher	<i>Cyornis ticklelliae</i>	M
	<b>Monarchinae</b>		
216	Asian Paradise Flycatcher	<i>Terpsiphone paradise</i>	R
217	Black-naped Monarch	<i>Hypothymis azurea</i>	M
	<b>Sylviinae</b>		
218	Ashy prinia	<i>Prinia socialis</i>	RM
219	Grey-breasted prinia	<i>Prinia hodgsonii</i>	R
220	Jungle-Prinia	<i>Prinia sylvatica</i>	O
221	Plain prinia	<i>Prinia inornata</i>	RM
222	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	M
223	Booted Warbler	<i>Hippolais caligata</i>	M
224	Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>	R
225	Greenish Warbler	<i>Phylloscopus trochiloides</i>	M
226	Orphean Warbler	<i>Sylvia hortensis</i>	M
227	Paddyfield Warbler	<i>Acrocephalus agricola</i>	M
228	Common Chiff Chaff	<i>Phylloscopus collybita</i>	M
229	Common Tailorbird	<i>Orthotomus sutorius</i>	RM
230	Lesser White throat	<i>Sylvia curruca</i>	M
231	Zitting Cisticola	<i>Cisticola juncidis</i>	RM
	<b>Turdinae</b>		
232	Common Stonechat	<i>Saxicola torquata</i>	M
233	Pied Bushchat	<i>Saxicola caprata</i>	M

Sr. No.	Common English Name	Scientific Name	Status
234	Indian Robin	<i>Saxicoloides fulicata cambaiensis</i>	RM
235	Oriental Magpie Robin	<i>Copsychus saularis</i>	M
236	Rufous-tailed Scrub Robin	<i>Cercotrichas galactotes</i>	V
237	Desert Wheatear	<i>Oenanthe deserti</i>	M
238	Isabelline Wheatear	<i>Oenanthe isabellina</i>	M
239	Variable Wheatear	<i>Oenanthe picata</i>	M
240	Black Redstart	<i>Phoenicurus ochruros</i>	M
241	Blue throat	<i>Luscinia svecica</i>	M
	<b>Motacillidae</b>		
242	Long-billed Pipit	<i>Anthus similis</i>	M
243	Paddyfield Pipit	<i>Anthus rufulus</i>	RM
244	Tawny Pipit	<i>Anthus campestris</i>	M
245	Citrine Wagtail	<i>Motacilla citreola</i>	M
246	Grey Wagtail	<i>Motacilla cinerea</i>	M
247	White-Wagtail	<i>Motacilla alba</i>	R
248	White Brownded Wagtail	<i>Motacilla maderaspatensis</i>	R
249	Yellow Wagtail	<i>Motacilla flava</i>	M
	<b>Nectariniidae</b>		
250	Purple Sunbird	<i>Nectarinia asiatica</i>	RM
	<b>Zosteropidae</b>		
251	Oriental White eye	<i>Zosterops palpebrosa</i>	R
	<b>Passerinae</b>		
252	Chestnut Shouldered Petronia	<i>Petronia xanthocollis</i>	R
253	House Sparrow	<i>Passer domesticus</i>	RM
	<b>Ploceinae</b>		
254	Baya Weaver	<i>Ploceus philippinus</i>	RM
	<b>Estrildinae</b>		
255	Indian Silverbill	<i>Lonchura malabarica</i>	RM
	<b>Emberizinae</b>		
256	Blackheaded Bunting	<i>Emberiza melanocephala</i>	M
257	Greynecked Bunting	<i>Emberiza buchanani</i>	M

(Source: office records)

Abbreviations: R: Resident; O: Occasional Sightings; B: Breeding; V: Vagrant or Accidental Records; M: Migratory; PM: Passage Migrant; RM: Resident Migratory

---

### Annexure - 9

#### Statement showing the list of Mammals recorded at Khijadiya Bird Sanctuary

Sr. No.	Common Name	Scientific Name
1	Bluebull	<i>Boselaphus tragocamelus</i>
2	Jackal	<i>Canis aureus</i>
3	Wolf	<i>Canis lupus</i>
4	Jungle cat	<i>Felis chaus</i>
5	5-Striped palm squirrel	<i>Funambulus pennantiae</i>
6	Common Mongoose	<i>Herpestes edwardsi</i>
7	Indian hare	<i>Lepus nigricollis</i>
8	Pig	<i>Sus scrofa</i>
9	Bat	
10	Fox	<i>Vulpes bengalensis</i>
11	Hedgehog	<i>Paraechinus misfopus</i> / <i>Hemiechinus auritus</i>
12	Porcupine	<i>Hystrix indica</i>

(Source: Pandey and Teli, 2005)



---

### Annexure - 10

Statement showing the list of Reptiles recorded at Khijadiya Bird Sanctuary.

Sr. No.	Common Name	Scientific Name
1	Common Garden Lizard	<i>Calotes versicolor</i>
2	Saw-scaled Viper	<i>Echis carinatus</i>
3	Common Skink	<i>Mabuya carinata</i>
4	Cobra	<i>Naja naja</i>
5	Common Rat Snake	<i>Ptyas mucosus</i>
6	Common Indian Monitor	<i>Varanus bengalensis</i>
7	Jon's Earth Boa	<i>Eryx johni</i>
8	Star tortoise	<i>Geochelone elegans</i>

(Source: Modified from Pandey and Teli, 2005)

---

## Annexure - 11

### Statement showing the Fishes recorded at Khijadiya Bird Sanctuary

Sr. No.	Common Name	Scientific Name
1.	Pupfish	<i>Cyprinodon dispar</i>
2.	Thread Fin	<i>Polynemus tetradactylus</i>
3.	Mud skipper	<i>Boleophthalmus dentatus</i>
4.	Mullet	<i>Mugil carinatus</i>
5.	Mullet	<i>Mugil oligolepis</i>

(Source: Pandey and Teli, 2005)

---

## Annexure - 12

### Statement showing the Prawns recorded at Khijadiya Bird Sanctuary

Sr. No.	Common Name	Scientific Name
1	Medium shrimp	<i>Metapenaeus affinis</i>
2	Kachchh shrimp	<i>M. kutchensis kutchensis</i>
3	Rainbow shrimp	<i>Parapenaopsis sculptilis</i>
4	Brine shrimp	<i>Artemia salina</i>

(Source: Pandey and Teli, 2005)

---

### Annexure - 13

#### Statement showing the list of Butterflies recorded at Khijadiya Bird Sanctuary

Sr. No.	Common Name	Scientific Name
1	The Plain Tiger	<i>Danaus chrysippus</i>
2	Peacock Pansy	<i>Precis almana</i>
3	African Emigrant	<i>Catopsilia florella</i>
4	Common Emigrant	<i>Catopsilia crocale</i>
5	Lemon Emigrant	<i>Catopsilia pomona</i>
6	Mottled Emigrant	<i>Catopsilia pyranthe</i>
7	Tawny coster	<i>Telchinia violae</i>
8	Crimson Tip	<i>Colotis danae</i>
9	Small Orange Tip	<i>Colotis etrida</i>
10	White Orange Tip	<i>Inias marianne</i>
11	Lemon Pansy	<i>Precis lemonias</i>
12	Pale Clouded Yellow	<i>Colias erate</i>
13	Lime Butterfly	<i>Papilio demoleus</i>
14	Common Pierrot	<i>Castalius rosimon</i>
15	Common Grass Dart	<i>Taractrocera maevius</i>
16	Blue Pansy	<i>Precis orthya</i>
17	Small Salmon Arab	<i>Colotis amata</i>
18	Small White Arab	<i>Colotis vestalis</i>
19	Common Mormon	<i>Papilio polytes</i>
20	Tailed Jay	<i>Graphium agamemnon</i>
21	Black Rajah	<i>Chanaxes fabius</i>

(Source: Pandey and Tei, 2005)

---

#### Annexure - 14

#### Statement showing the list of Zooplanktons recorded at Khijadiya Bird Sanctuary

Sr. No.	Scientific Name
1	<i>Amoeba sp.</i>
2	<i>Balantidium sp.</i>
3	<i>Opalina sp.</i>
4	<i>paramoecium sp.</i>
5	<i>Peranema sp.</i>
6	<i>Vorticella sp.</i>
7	<i>Dosilia sp.</i>
8	<i>Corvospongilla caunteri</i>
9	<i>Colpes hintus var minor</i>
10	<i>Hydra sp.</i>
11	<i>Cyclops sp.</i>
12	<i>Noctiluca sp.</i>
13	<i>Globigenila sp.</i>
14	<i>Sponges (spicules)</i>
15	<i>Obelia sp.</i>
16	<i>Cetopterus larvae</i>
17	<i>Doloraria larvae</i>
18	<i>Tornaria larvae</i>
19	<i>Pyrocypis sp.</i>
20	<i>Diacria sp.</i>
21	<i>Ceratium hirundinella</i>
22	<i>Euglena sp.</i>

(Source: Pandey and Teli, 2005)

---

## Annexure - 15

### Statement showing the list of globally threatened bird species recorded at Khijadiya Bird Sanctuary

Sr. No.	Common Name	Scientific Name	Global conservation status (IUCN 3.1)
<b>WATERFOWL</b>			
1	Dalmatian Pelican	<i>Pelecanus crispus</i>	Vulnerable
2	Darter	<i>Anhinga melanogaster</i>	Near Threatened
3	Painted Stork	<i>Mycteria leucocephala</i>	Near Threatened
4	Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	Near Threatened
5	Black-headed Ibis	<i>Threskiornis melanocephalus</i>	Near Threatened
6	Lesser Flamingo	<i>Phoenicopterus minor</i>	Near Threatened
7	Pallas's Fish Eagle	<i>Haliaeetus leucoryphus</i>	Vulnerable
8	Indian Skimmer	<i>Rynchops albicollis</i>	Vulnerable
<b>TERRESTRIAL BIRDS</b>			
9	Pallid Harrier	<i>Circus macrourus</i>	Near Threatened

(Source: Pandey and Teli, 2005)



**Annexure - 16**

**Statement showing the details of Land covers classes at  
Khijadiya Bird Sanctuary and its environs during different periods**

Sr. No.	Class	Area in ha.		
		Sanctuary	Environs	Total
Oct-1997				
1	Open water area	8.05	283.36	291.41
2	Dense Aquatic Vegetation	57.96	365.47	423.43
3	Sparse Aquatic Vegetation	62.79	159.39	222.18
4	Open Shore/Basin	45.08	83.72	128.80
5	Dense Scrub ( <i>Prosopis</i> )	188.37	386.40	574.77
6	Sparse Scrub ( <i>Prosopis</i> )	41.86	573.16	615.02
7	Salt Marsh	-	349.37	349.37
8	Dense Mangroves	-	579.60	579.60
9	Sparse Mangroves	-	297.85	279.85
10	Salt-pans	-	1735.58	1735.58
11	Creek	-	109.48	109.48
12	Mudflats (non-inundated)	-	727.72	727.72
13	Cropland	-	4089.40	4089.40
14	Fallow land	-	173.88	173.88
15	Salt affected wasteland	17.71	371.91	386.62
16	Settlement	-	429.87	429.87
17	Other water bodies	-	54.74	54.74
18	Non-interpretable area	-	214.13	214.13
	<b>Total area</b>	<b>421.82</b>	<b>10985.03</b>	<b>11406.85</b>
Jan-1998				
1	Open water area	19.32	346.15	365.47
2	Dense Aquatic Vegetation	53.13	284.97	338.10
3	Sparse Aquatic Vegetation	66.01	127.19	193.20
4	Open Shore/Basin	45.08	181.93	227.01
5	Dense Scrub ( <i>Prosopis</i> )	173.88	413.77	587.65
6	Sparse Scrub ( <i>Prosopis</i> )	53.13	521.64	574.77
7	Salt Marsh	-	-	0.00
8	Dense Mangroves	-	497.49	497.49
9	Sparse Mangroves	-	413.77	413.77
10	Salt - pans	-	1708.21	1708.21
11	Creek	-	59.57	59.57

Sr. No.	Class	Area in ha.		
		Sanctuary	Environs	Total
12.A	Mudflats (non-inundated)	-	747.04	747.04
12.B	Mudflats (inundated)	-	305.90	305.90
13	Cropland	-	3123.40	3123.40
14	Fallow land	-	265.65	265.65
15	Salt affected wasteland	11.27	428.26	439.53
16	Settlement	-	426.65	426.65
17	Other water bodies	-	394.45	394.45
18	Non-interpretable area	-	738.99	738.99
	<b>Total area</b>	<b>421.82</b>	<b>10985.03</b>	<b>11406.85</b>
Dec-2001				
1	Open water area	-	120.75	120.75
2	Dense Aquatic Vegetation	25.76	281.75	307.51
3	Sparse Aquatic Vegetation	43.43	133.63	177.06
4	Open Shore/Basin	6.44	167.44	173.88
5	Dense Scrub ( <i>Prosopis</i> )	170.66	471.73	642.39
6	Sparse Scrub ( <i>Prosopis</i> )	162.61	819.49	982.10
7	Salt Marsh	-	20.93	20.93
8	Dense Mangroves	-	558.67	558.67
9	Sparse Mangroves	-	344.54	344.54
10	Salt-pans	-	1785.49	1785.49
11	Creek	-	141.68	141.68
12.A	Mudflats (non-inundated)	-	341.32	341.32
12.B	Mudflats (inundated)	-	338.10	338.10
13	Cropland	-	4052.37	4052.37
14	Fallow land	-	167.44	167.44
15	Salt affected wasteland	12.88	350.98	363.86
16	Settlement	-	550.62	550.62
17	Other water bodies	-	338.10	338.10
18	Non-interpretable area	-	-	0.00
	<b>Total area</b>	<b>421.82</b>	<b>10985.03</b>	<b>11406.85</b>

(Source: Pandey and Teli, 2005)

Sr. No.	Class	Area in ha.		
		Sanctuary	Environs	Total
Nov-2012				
1	Dense Mangroves	0.00	571.23	571.23
2	Sparse Mangrove	0.00	730.84	730.84
3	Saltpan	0.00	1548.32	1548.32
4	Mudflat	21.17	1913.06	1934.23
5	Agriculture cropland	0.00	1724.11	1724.11
6	Agriculture followland	0.00	1974.43	1974.43
7	Salt affected area without vegetation	90.06	361.25	451.31
8	Salt affected area with vegetation	69.18	189.58	258.76
9	Scrub ( <i>Prosopis</i> ) Dense	34.37	205.62	239.99
10	Scrub ( <i>Prosopis</i> ) sparse	183.97	429.07	613.05
11	Open water	2.69	104.30	106.99
12	Marsh vegetation dense	0.00	41.97	41.97
13	Marsh vegetation sparse	20.38	171.19	191.56
14	Settlement	0.00	1020.05	1020.05
	<b>Total</b>	<b>421.82</b>	<b>10985.03</b>	<b>11406.85</b>

(Source: B. H. Patel, Dy. CF, Research, Gandhinagar)

---

### Annexure - 17

#### Statement showing the population of livestock in surrounding villages of Khijadiya Bird Sanctuary

Sr. No	Name of Village	Taluka	Cow	Ox	Buffalo	Sheep	Goat	Total
1	Khijadiya	Jamnagar	183	185	305	174	199	1046
2	Dhunvav	“	533	82	265	313	203	1396
3	Vibhapar	“	476	145	337	50	35	1043
4	Jambuda	“	459	222	378	198	227	1484
	<b>Total</b>		<b>1651</b>	<b>634</b>	<b>1285</b>	<b>735</b>	<b>664</b>	<b>4969</b>

Source: Jilla Panchayat, Jamnagar, 2012

---

### Annexure - 18

#### Statement showing Land use pattern of surrounding villages of Khijadiya Bird Sanctuary

Sr. No	Name of Village	Land use area in (Acre/Guntha/Are)				
		Grazing land (Gaucher )	Agricultural land	Govt. waste land	Forest land	Other land
1	Khijadiya	89.66	687.21	109.11	97.00	-
2	Dhunvav	260.20	2353.40	94.30	79.15	-
3	Vibhapar	42.61	597.13	21.67		
4	Jambuda	220.66	2356.84	13.87		
	<b>Total</b>	<b>220.66</b>	<b>2356.84</b>	<b>225.08</b>	<b>176.15</b>	

(Source: Pandey and Teli, 2005)

## Appendix - 19

### Statement showing year wise details of works carried out in Khijadiya Bird Sanctuary under various schemes

Year	Name of work	Location	Quantity	Amount Spent (Rs.)	Name of Scheme
1992-93					
1	Nature Education Camps	Khijadiya	78	231000	WEIT
2	Barbed wire fencing, Watch tower and other	Khijadiya		745000	Nal Sarovar
	<b>Total</b>			<b>976000</b>	
1993-94					
1	Nature Education Camps	Khijadiya	78	189000	WEIT
	<b>Total</b>			<b>189000</b>	
1994-95					
1	Nature Education Camps	Khijadiya	75	226000	WEIT
	<b>Total</b>			<b>226000</b>	
1995-96					
1	Nature Education Camps and Gas connection -3	Khijadiya	60	212000	WEIT
2	Barbed wire fencing	Khijadiya		416000	Nal Sarovar
3	Check dams	Khijadiya	2	220000	Eco.-Devlp.
	<b>Total</b>			<b>848000</b>	
1996-97					
1	Nature Education Camps	Khijadiya	25	152000	WEIT
2	Bunding	Khijadiya	11172 Cmt.	246866	
3	Development of camp site	Khijadiya		24650	WEIT
4	Nature Education Camps	Khijadiya		111000	WEIT
5	Video cassette	Khijadiya		50500	WEIT
6	Water facilities	Khijadiya		220000	Nal Sarovar
7	Removal of <i>Prosopis juliflora</i>	Khijadiya	0.6 ha (Approx)	35000	Nal Sarovar
8	Van talavdi	Khijadiya		132000	Nal Sarovar
9	Digging of pond	Khijadiya		59000	Nal Sarovar
	<b>Total</b>			<b>1031016</b>	
1997-98					
1	Patching	Khijadiya	-	7495	Nal Sarovar
2	Enriching fish stock		-	49476	Nal Sarovar



Year	Name of work	Location	Quantity	Amount Spent (Rs.)	Name of Scheme
3	Reclamation bund for Van Talavdi	Khijadiya	2033 Cmt.	59974	Nal Sarovar
4	Removal of <i>Prosopis juliflora</i>	Dhunvav	1.1 ha (Approx)	29700	Nal Sarovar
5	Reclamation bund	Khijadiya	676	19944	Nal Sarovar
6	Water facility reclamation bund	Khijadiya	1467 Cmt.	43277	Nal Sarovar
7	Preparation of Hut	Khijadiya	1 No	9980	Nal Sarovar
8	Display Board 6x4	Khijadiya	7 Nos.	29000	Nal Sarovar
9	Dredging through Dozer	Jambuda	82 Hours	36900	IFDP
	<b>Total</b>			<b>285746</b>	
1998-99					
1	Wire fencing	Khijadiya	-	39003	Nal Sarovar
2	Wire fencing	Jambuda	-	39035	Nal Sarovar
3	Reclamation bund	Khijadiya	4935 Cmt	145597	Nal Sarovar
4	Van talavdi	Khijadiya	5148 Cmt.	151286	Nal Sarovar
5	Painting on iron board	Khijadiya	15 Nos.	24888	Nal Sarovar
6	Watch tower	Khijadiya	1 Nos.	121123	Nal Sarovar
7	Checking naka	Khijadiya	1 Nos.	60025	Nal Sarovar
	<b>Total</b>			<b>580957</b>	
1999-2000					
1	Repairing of wire fencing	Jambuda	-	17064	Nal Sarovar
2	Repairing of wire fencing	Dhunvav	-	9385	Nal Sarovar
3	Dredging by Dozer	Khijadiya	2030 Cmt.	66990	IFDP
4	Removal of <i>Prosopis juliflora</i>	Khijadiya	12.31 ha (Approx)	600800	IFDP
5	Ploughing	Jambuda	73 Ha.	115200	IFDP
6	Ploughing	Dhunvav	27 Ha.	44800	IFDP
7	Wire fencing	Khijadiya	1000 Rmt.	179960	IFDP
8	Earthen mound	Jambuda	15691 Cmt.	509959	IFDP
9	Earthen mound	Dhunvav	2307 Cmt.	74978	IFDP
11	Earthen mound	Khijadiya	1230 Cmt.	39980	IFDP
	<b>Total</b>			<b>1659116</b>	
2000-2001					
1	Check dam	Jambuda	1	101459	Nal Sarovar
2	Van talavdi	Jambuda	1	33667	Nal Sarovar

Year	Name of work	Location	Quantity	Amount Spent (Rs.)	Name of Scheme
3	Watch tower-2	Jambuda	2250 Cmt.	53550	IFDP
4	Watch tower-1	Jambuda	2250 Cmt.	53550	IFDP
5	Saucer Kundi	Jambuda	3 Nos.	12504	IFDP
6	Saucer Kundi	Dhunvav	4 Nos.	16672	IFDP
7	Pucca Check dam	Jambuda	-	17360	IFDP
8	Van talavdi	Jambuda	1 Nos	43641	IFDP
	<b>Total</b>			<b>332403</b>	
2001-2002					
1	Nature Education Camps	Khijadiya	13	64274	NEC
	<b>Total</b>			<b>64274</b>	
2002-2003					
1	Nature Education Camps	Pirotan	10	57120	NEC
	<b>Total</b>			<b>57120</b>	
2003-2004					
1	Repairing of reclamation bund at Khijadiya Dhunvav	-	2816 Cmt.	242176	IFDP
2	Nature Education Camps	Khijadiya	13	65070	NEC
3	Repair of reclamation bund	Khijadiya	2756 Cmt.	154970	MSNP
	<b>Total</b>			<b>462216</b>	
2004-2005					
1	Nature Education Camps	Khijadiya	20	120000	NEC
2	Earthen Bund	Jambuda	213 Cmt.	11605	MSNP
3	Earthen Bund	Jambuda	344 Cmt.	12720	MSNP
5	Trail repairing	Jambuda	****	15341	MSNP
6	Entry gate	Khijadiya	1 No.	15777	MSNP
7	Removal of <i>Prosopis juliflora</i>	Khijadiya	0.4 ha (Approx)	16000	MSNP
8	Construction of Gates	Khijadiya	3 Nos.	24000	MSNP
9	Earthen bund	Jambuda	3831Cmt.	434790	MSNP
10	Trail repairing	Khijadiya	20 Hours	16000	MSNP
11	Deepening for bird watching	Khijadiya	24 Hours	19200	MSNP
	<b>Total</b>			<b>685433</b>	
2005-2006					
1	Nature Education Camps	Khijadiya	8	49950	NEC
2	Board painting	Khijadiya	3 Nos.	14810	KBS CSS

Year	Name of work	Location	Quantity	Amount Spent (Rs.)	Name of Scheme
3	Bricks for Nature trail	Khijadiya	20000 Nos.	34000	KBS CSS
4	Pruning	Dhunvav	1260 Man Days	111015	KBS CSS
5	Trail No.-4 (Earthen work)	Dhunvav	20 Hours	47684	KBS CSS
6	Trail No.-3 (Earthen work)	Dhunvav	20 Hours	42934	KBS CSS
7	Trail No.-1 (Earthen work)	Dhunvav	20 Hours	50319	KBS CSS
8	Murram leveling	Dhunvav	200 Trips	78500	KBS CSS
9	Earth work	Jambuda	392 Trip	78400	KBS CSS
10	Slope repairing through stone (Dhalio)	Khijadiya	-	18762	KBS CSS
11	Removal of <i>Prosopis juliflora</i>	Dhunvav	0.82 ha (Approx)	47500	KBS CSS
12	Honey box	Khijadiya	6 Nos.	9000	KBS CSS
	<b>Total</b>			<b>582874</b>	
2006-2007					
1	Nature Education Camps	Khijadiya	10 Nos.	75000	NEC (NP)
2	Nature Education Camps	Khijadiya	40 Nos.	318000	NEC
3	Tent platform	Khijadiya	-	44632	Forest Res.
4	Wire fencing	Khijadiya	1000 Rmt.	222285	Devlp. of NP&S
5	Removal of <i>Prosopis juliflora</i>	Dhunvav	1.2 ha (Approx)	69350	Devlp. of NP&S
6	Removal of <i>Prosopis juliflora</i>	Jambuda	1 ha (Approx)	66500	Devlp. of NP&S
7	Earthen bund for water storage	Jambuda	8076 Cmt.	428028	Devlp. of NP&S
8	Earthen bund for water storage	Dhunva	8470 Cmt.	448910	Devlp. of NP&S
9	Construction of pond	Jambuda	1528 Cmt.	80984	Devlp. of NP&S
10	Pond for water harvesting	Khijadiya	225 Hours	213750	Devlp. of NP&S
11	Construction of Platforms	Khijadiya	2	106958	Devlp. of NP&S

Year	Name of work	Location	Quantity	Amount Spent (Rs.)	Name of Scheme
12	Interpretation centre and other Infrastructural facilities	Khijadiya	-	4426619	Ecotourism
	<b>Total</b>			<b>6501016</b>	
2007-2008					
1	Nature Education Camps	Khijadiya	40	346500	NEC (P)
2	Earth work	Jambuda	8084 Cmt.	428452	MSNP
3	Earth work	Dhunvav	7896 Cmt.	418488	MSNP
4	Wire fencing	Khijadiya	1008 Rmt.	188982	MSNP (NP)
5	Earthen bund repairing	Dhunvav	*****	48642	MSNP (NP)
6	Earthen bund repairing	Dhunvav	4250 Cmt.	165750	MSNP (NP)
7	Removal of <i>Prosopis juliflora</i>	Dhunvav	4 ha (Approx)	21850	MSNP (NP)
8	Earth work	Dhunvav	2222 Cmt.	117766	MSNP (NP)
9	Leveling	Dhunvav	270 Smt.	44280	MSNP (NP)
10	Removal of <i>Prosopis juliflora</i>	Jambuda	3.2 ha (Approx)	19000	MSNP (NP)
12	Earth work	Jambuda	1587 Cmt.	84111	MSNP (NP)
13	Leveling	Jambuda	276 Smt.	45264	MSNP (NP)
14	Repairing of earthen bund	Jambuda	2251 Cmt.	119303	MSNP (NP)
15	Removal of <i>Prosopis juliflora</i>	Jambuda	1.5 ha (Approx)	82650	MSNP (NP)
16	Cross bund	Dhunvav	55 Hours	52250	MSNP (NP)
	<b>Total</b>			<b>2217552</b>	
2008-2009					
1	Nature Education Camps	Khijadiya	32	251450	NEC
2	Removal of <i>Prosopis juliflora</i>	Dhunvav	2.5 ha (Approx)	149150	MSNP
3	Barbed wire fencing	Khijadiya	1875 Rmt.	399946	MSNP
4	Earth work	Jambuda	15525 Cmt.	853875	MSNP
5	Removal of <i>Prosopis juliflora</i>	Dhunvav	3.5 ha (Approx)	199500	MSNP
6	Removal of <i>Prosopis juliflora</i>	Jambuda	0.87 ha (Approx)	50350	MSNP
7	Earth work	Dhunvav	3240 Cmt.	178200	MSNP
8	Board	Khijadiya	6 Nos.	52200	MSNP
	<b>Total</b>			<b>2134671</b>	

Year	Name of work	Location	Quantity	Amount Spent (Rs.)	Name of Scheme
2009-2010					
1	Nature Education Camps	Khijadiya	32	274255	MSNP
2	Tourist hide	Khijadiya	1	9500	MSNP
3	Wire fencing	Dhunvav	1000 Rmt.	210000	MSNP
4	Earthen bund	Jambuda	4680 Cmt.	257400	IDWH
5	Earthen bund	Dhunvav	5040 Cmt.	277200	IDWH
6	Checkdam 16 Mt.	Jambuda	1 No.	137942	MSNP (MNP)
7	Check dam 12.50 Mt.	Jambuda	1 No.	119757	MSNP (MNP)
8	Check dam 30 Mt.	Dhunvav	1 No.	107516	MSNP (MNP)
9	Check dam 10 Mt.	Dhunvav	1 No.	43489	MSNP (MNP)
10	Fencing repairing	Khijadiya	-	50000	MSNP (MNP)
11	Livelihood Shibirs	Khijadiya	3	21300	MSNP (MNP)
<b>Total</b>				<b>1508359</b>	
2010-2011					
1	Removal of <i>Prosopis juliflora</i>	Dhunvav	5.2 ha (Approx)	304000	Eco-tourism
2	Removal of <i>Prosopis juliflora</i>	Dhunvav	5.2 ha (Approx)	304000	APCMKW
3	Removal of <i>Prosopis juliflora</i>	Jambuda	2.1 ha (Approx)	123500	APCMKW
4	Spreading of murrum	Jambuda	1736 Cmt.	304544	APCMKW
5	Enriching fish stock	-	-	21000	APCMKW
6	Nature Education Camps	Khijadiya	68	519922	NEC
7	Removal of <i>Prosopis juliflora</i>	Dhunvav	6 ha (Approx)	351500	IDWH
8	Repairing of wire fencing	Jambuda	-	50000	IDWH
9	Water storage capacity	Jambuda	7272 Cmt.	399960	IDWH
10	Removal of <i>Prosopis juliflora</i>	Dhunvav	5.51 ha	319986	IDWH
11	Earthen bund	Jambuda	2727 Cmt.-	149985	IDWH

Year	Name of work	Location	Quantity	Amount Spent (Rs.)	Name of Scheme
12	Check dam	Jambuda	-	150002	IDWH
13	Sign board	Jambuda	-	20000	IDWH
14	Sitting benches	Jambuda	15 Nos.	30000	IDWH
15	Sign board	Khijadiya	3 Nos.	55000	IDWH
16	Water storage capacity	Jambuda	2545 Cmt.	139975	IDWH
17	Removal of <i>Prosopis juliflora</i>	Dhunvav	3.61 ha	209496	IDWH
18	Removal of <i>Prosopis juliflora</i>	Jambuda	3.80 ha	220487	IDWH
19	Pukka Causeway	Jambuda	1 No	400000	IDWH
20	Planting fruit tree	Khijadiya	625 Nos.	144500	Fruit tree plant.
21	Bird software	Khijadiya	-	162000	
22	T.V.	Khijadiya	1 Nos.	38500	
23	Global Birdwatchers' Conference	Khijadiya	-	8174250	Ecotourism
	<b>Total</b>			<b>12592607</b>	
2011-2012					
1	Construction of Check dam	Khijadiya	1	315000	IDWH
2	Construction of check post	Khijadiya	1	200000	IDWH
3	Nature trail	Khijadiya	500 Rmt	414540	IDWH
4	Nature Education Camp	Khijadiya	5 Nos	49928	IDWH
5	Improving water storage capacity and removal of reeds	Khijadiya	10000 Cmt	598500	IDWH
6	Uprooting <i>Prosopis Juliflora</i>	Khijadiya	30 ha	450000	IDWH
7	Vaccination of Cattle and veterinary camp	Khijadiya	1	50000	IDWH
8	Repairing old barbed wire fencing	Khijadiya	L.S.	100000	IDWH
9	Eco-development work	Khijadiya	L.S.	199989	APCMKW
10	Water harvesting structure	Khijadiya	1 Nos	399000	APCMKW
11	Removal of unwanted growth	Jambuda and Dhunvav	4 ha	600000	APCMKW
12	Nature education camp	Khijadiya	20 Nos	299520	APCMKW
13	Nature trail	Khijadiya	150 Rtm	226100	APCMKW
	<b>Total</b>			<b>3902577</b>	
2012-13					
1	Construction of earthen bund	Khijadiya	1	<b>304964</b>	IDWH
2	Creating trail at Dhunvav side	Khijadiya	500 Rmt	<b>299975</b>	IDWH



Year	Name of work	Location	Quantity	Amount Spent (Rs.)	Name of Scheme
3	Nature Education Camp	Khijadiya	10 Nos	76920	IDWH
4	Improving water storage capacity	Khijadiya	15000 Cmt	900026	IDWH
5	Improving water storage capacity by deepening all along the boundary at Jambuda side	Khijadiya	7500Cmt	441769	IDWH
6	Removal of unwanted growth/ Ganda babul at Dhunvav side	Khijadiya	10 Ha	495905	IDWH
7	Development of Camp site	Khijadiya	L.S	137000	IDWH
8	Repair of barbed wire fencing	Khijadiya	L.S	50000	IDWH
9	Conducting Bird census	Khijadiya	L.S	5000	IDWH
10	Repair of old boundary bund at of Jambuda side	Khijadiya	3000 Cmt	180000	APCMKW
11	Creating mound for habitat improvement	Khijadiya	4800 Cmt	288000	APCMKW
12	Removing of weeds for habitat of birds	Khijadiya	2.77 ha	500012	APCMKW
13	Training workshop for women in handicraft making	Khijadiya	3	30000	APCMKW
14	Creation of small ponds	Khijadiya	2250 Cmt	140400	APCMKW
15	Nature trail and its maintenance	Khijadiya	5400 Cmt	325000	APCMKW
16	Removal of unwanted growth/ Ganda baval of Jambuda and Dhunvan site	Khijadiya	20 Ha	1000000	APCMKW
17	Nature Education Camp	Khijadiya	20	294788	APCMKW
18	Community environmental awareness	Khijadiya	2	79800	APCMKW
	<b>Total</b>			<b>5549559</b>	

APCMKW	Action Plan for the Conservation and Management of Khijadiya Wetland
Devlp. of NP&S	Development of National Park and Sanctuary
Eco.- Devlp.	Eco-Development
Eco-tourism	Eco-tourism
Forest Res.	Forest Research, Training and Orientation
Fruit tree plant.	Fruit tree plantation
IDWH	Integrated Development of Wildlife Habitat

---

IFDP	Integrated Forest Development Project
KBS (CSS)	Khijadiya Bird Sanctuary (Centrally Sponsored Scheme)
MSNP	Management of Sanctuary and National Park
MSNP (MNP)	Management of Sanctuary and National Park
MSNP (NP)	Management of Sanctuary and National Park
MSNP (NP) (CSS)	Management of Sanctuary and National Park (CSS)
NEC	Nature Education Camp
NEC (NP)	Nature Education Camp (Non-Plan)
NEC (P)	Nature Education Camp (Plan)
WEIT	Wildlife Education, Interpretation and Training
Nal Sarovar	Development of Nal Sarovar

## Appendix - 20

### Statement showing achievement of the Management Plan proposals from 2002-2011

Sr. No.	Activity Proposed		Achievement
	Particulars	Qty. (Physical)	
1	Improvement of habitat by planting of fruit tree and sowing of seeds	200 ha	890 fruit trees planted
2	Apiculture	10 units	6 units
3	Improvement of water storage capacity (100m X 100m ponds - 20 ha at Jambuda side and 20 ha at Dhunvav side)	40 ha	87,064 cmt.
4	Digging of channel in Jambuda pond	9000 cmt.	0
5	Water harvesting structures - construction of pukka check-dams	7	5 check-dams
6	Repairs to reclamation bund	1	45,817 cmt.
7	Repair to Causeway	4 causeways	1
8	Preparation of hides for tourist	10	25
9	Paddle boats for tourist	6	0
10	Boat stands	2	0
11	Reception center at Khijadiya forest quarter	1	0
12	Construction of Interpretation center	1	1
13 a	Equipment required - Binoculars	10	30
13 b	Equipment required - Telescopes with stands	3	5
14	Barbed wire fencing	20 km	4.8 km
15	Repairs to old barbed wire fencing	17 km	10 km
16	Water holes	10	0
17	Demarcation of boundary pillars (RCC)	241 pillars	0
18	Forester quarters	1	0
19	Guard quarter	2	0
20	Wireless room	1	0
21	Driver quarter	1	0
22	Office building	1	0
23	Sign boards		

Sr. No.	Activity Proposed		Achievement
	Particulars	Qty. (Physical)	
	5 x 3 ft	20	15
	6 x 4 ft	10	0
24	Wireless system and walky-talky sets	5 sets	1 Wireless set and 2 walkie-talkies
25	Construction of tube well	2	0
26	Extension of sanctuary area	--	Not taken up
27	Nature Education Camps	50 camps	273 camps
28	NEC site development		
	Tent platforms	--	3
	Benches	--	15
	Bird Software	--	1
	Television set	--	1
29	Removal of Unwanted growth	--	65 ha
30	Nature Trails	--	3 Nature trails of total length of 1923 m
31	Enriching of fish stock	--	Rs. 21,000/-
32	Staff		
	Forester	1	0
	Beat Guards	2	0
	Driver	1	0
	Clerk	1	0
	Computer Operator	1	0
33	Vehicles		
	Motor Cycle	1	0
	Jeep	1	0
	DCM Toyota with tanker	1	0
34	Livelihood camps	--	3
35	Earth work/earthen bund	--	86,031 cmt.

**Annexure-21**  
**GR Notification regarding Entry Fee Structure**

Notification  
Forests and Environment Department  
Sachivalaya, Gandhinagar  
Dated 25/05/2006

Wildlife (Protection) Act. 1972

No. GVN/9/2006/WLP/1092/3056/G.1. In exercise of the powers conferred by section-64 read with section-28 of the Wildlife (Protection) Act, 1972 (53 of 1972), the Government of Gujarat hereby makes following rules further to amend the Gujarat Wildlife (Protection) Rules, 1990 namely;

1. These rules may be called the Gujarat Wildlife (Protection) Rules (First amendment) Rules, 2006.
2. In the Gujarat Wildlife (Protection) Rules, 1990 in Chapter IV, in rule 19, for sub-rule (2) the following shall be substituted namely :

“(2) the fees for entry, guide, photography, rest houses, lunch-dinner, camps in Sanctuaries and National Parks shall be at the following rates.

Sr. No.	Particulars	For Indian Nationals Rs.	For Foreigners US (Dollar)
(A)	Entry fee for Gir Sanctuary, Gir National Park & Devaliya Interpretation Park		
1.	Individual Persons Per Day/Person	50	10
2.	Entry Fees For Vehicles including visitors		
	1. LMV-Car, Jeep (Upto 6 persons)	400	40
3.	Fee for Devaliya interpretation Park	75	20
	In rare case if private Vehicle is allowed		
	1. LMV-Car, Jeep (Upto 6 persons)	400	40
	2. Metador, Station Wagon (Upto 15 persons)	1000	100
(B)	Entry fee for Sanctuaries and National Parks other than Gir Sanctuary & National Park		
1.	Individual Persons Per Day	20	5

Sr. No.	Particulars	For Indian Nationals Rs.	For Foreigners US (Dollar)
2.	Entry Fees For Vehicles including visitors		
	1. LMV-Car, Jeep (Upto 6 persons)	200	20
	2. Metador, Station Wagon (Upto 15 persons)	500	50
	3. Heavy Motor Vehicle-Bus (up to 60 persons)	1750	175
(C)	For all Sanctuaries and National Parks		
1.	Guide Fee:		
	i. For first four hours per vehicle/group	50	
	ii. For every additional hour per vehicle/group	20	
	(To be paid to the guide directly in rupees only irrespective of nationality)		
2.	Professional Photography (Per day/Camera)		
	Still photography	100 per day	10
	Documentary	5000 per day	500
	Feature film	25000 per day	1000
	No camera fee for amateur photography by visitors mentioned above in para (A) & (B) will be charges .		
	<u>Security Deposits</u>		
	1. Documentary	15000	1000
	2. Feature Film	50000	2000
3.	Boat license fee Rs. 100/- per Boat per annum for Nalsarovar	100	----
(D)	<b>Rates for Sinh Sadan, Sasan Gir</b>		
1.	<u>Rest houses rates for non-official visitors</u>		
	a. Air Conditioned Room	1500 per day	75
	b. Non-Air Conditioned Room	500 per day	50
	c. Dormitory (per person)	50 per day	10
	d. Tent (per cent)	200 per day	20
2.	<u>Lunch or dinner charges</u>		
	a. Vegetarian Lunch or Dinner	70	5
	b. Non-Vegetarian Lunch or Dinner	110	7
	c. Vegetarian breakfast	40	2
	d. Non-Vegetarian breakfast	50	3
	e. Tea or Coffee	7	1



---

Note:

- (1) In the Gir Sanctuary/National Park the entry fee rates will be charged 50% more than the regular rate during the period of Navratri (15 days). Dipawali (10 days) and during the Christmas festival First Saturday prior to Christmas day to the First Sunday after 4<sup>th</sup> January of the year. The specific period shall be notified by the Conservator of Forests, Wildlife, Junagadh in advance after considering calendar of holidays during the year.
- (2) 25% more rates on entry fee shall be levied on every Saturday-Sunday.
- (3) The fees levied shall be rounded up to nearest Rs. 5/-.
- (4) Concerned officer shall recover the said fees in Indian currency in case of foreigner at the exchange rate prevailing on the last working day of the previous month.
- (5) The Government servant or officer on duty and not on duty shall be charged fees at the rate prescribed for Government Circuit House/Rest House for lodging and boarding.
- (6) Scientists, Research fellows, Research Assistants of Government Institutions and Institutions recognized by the Government. Universities and Government Recognized Colleges, when permitted by the Chief wildlife warden, Gujarat state, Gandhinagar for carrying out research or study work shall be charged at fifty percent rate of the prescribed entry fee. However, when the research/study is sponsored by the State or the Chief Wildlife Warden no fee shall be charged.
- (7) Member of Youth Hostels of India, World Wide Fund for Nature and Nature Clubs recognized by the Chief Wildlife Warden of Gujarat and students on educational tour from recognized educational institutes for this purpose shall be eligible for fifty percent concession in prescribed fee for the sanctuary and National Parks during the camps organized by them and permitted by the Chief Wildlife Warden, Gujarat under Section-28 of the wildlife (Protection) Act, 1972.
- (8) Rates for filming photography for documentary purpose for Government organization such as Doordarshan, Central/State Information Department Education Media Research Centre shall be fifty percent of the prescribed rates. However, if these agencies engage the private companies for their production no concession shall be allowed. Production of documentary by the State Government agencies of official purpose shall be exempted from prescribed fee for film making.
- (9) Camping within Sanctuary and National Park shall not be permitted except to the officers and staff working in the sanctuary and the persons/researchers specially permitted. However, for Wildlife/Nature Education purpose, the Chief Wildlife Warden of Gujarat vide powers vested in him under Wildlife (Protection) Act, 1972 may permit such camps in Sanctuary and National Parks by the recognized Institutions or organization such as Youth Hostels of India, World Wide Fund for Nature and Nature and Nature Clubs recognized by Chief Wildlife Warden, Gujarat. When such camping is permitted within Sanctuary and/or National Park, the rates for camp site fee shall mentioned below:

Sr. No.	Camp category	Amount in Rs.
1.	Total strength of campers/participants including organizers, resource person etc. up to 35 for camp per day	1500/-
2.	Total strength of campers/participants including organizers, resource persons etc. up to 70 for camp/day	2500/-
3.	No camping shall be allowed for more than 70 participants	-

By order and in the name of the Governor of Gujarat

-sd-  
(P. M. Christian)  
Deputy Secretary  
Government of Gujarat  
Forest and Environment Department

Copy to

1. P. S. to Minister (Forests), Gujarat State, Gandhinagar
  2. P.S. to Minister of State (Forests), Gujarat State, Gandhinagar
  3. The Under Secretary to the Chief Secretary, Gujarat State, Gandhinagar
  4. The Principal Chief Conservator of Forest, Gujarat State, Gandhinagar
  5. The Additional Principal Chief Conservator of Forest, (Wildlife), Gujarat State, Gandhinagar
  6. The Accountant General, Ahmedabad/Rajkot.
  7. All Secretarial Department, Sachivalaya, Gandhinagar
  8. The Manager, Government Press, Gandhinagar
- With a request to published the notification in extra ordinary Government Gazette Park IV-A and send 100 copies to this department and 100 copies to Principal Chief Conservator of Forests, Gujarat State, Gandhinagar.
9. All branches of Forests & Environment Department, Sachivalaya, Gandhinagar.
  10. Select File.

**Annexure - 22**  
**Statement showing details of offence cases registered in**  
**Khijadiya Bird Sanctuary**

Sr. No.	Year	Grazing	Cutting	Poaching	Fire	Other	Total
1	1991-92	7	4	-	01	01	13
2	1992-93	10	1	-	01	02	14
3	1993-94	03	-	-	-	01	4
4	1994-95	03	-	-	-	01	4
5	1995-96	09	-	-	-	01	10
6	1996-97	07	03	-	-	-	10
7	1997-98	05	01	-	-	02	8
8	1998-99	14	-	-	01	01	16
9	1999-00	08	-	-	-	-	8
10	2000-01	04	01	-	-	-	5
11	2001-02	-	0	-	-	2	2
12	2002-03	2	2	-	-	3	7
13	2003-04	2	2	-	-	-	4
14	2004-05	3	3	-	-	2	8
15	2005-06	-	-	-	-	-	
16	2006-07	1	1	-	-	-	2
17	2007-08	1	1	-	-	-	2
18	2008-09	3	3	-	-	-	6
19	2009-10	-	-	-	-	1	1
20	2010-11	5	2	-	-	2	9
21	2011-12	5	0	-	-	2	7
	<b>Total</b>	<b>92</b>	<b>24</b>	<b>0</b>	<b>3</b>	<b>21</b>	<b>140</b>

---

**Annexure-23**  
**Gujarat Eco-Tourism Policy**

*GOVERNMENT OF GUJARAT*  
*FOREST AND ENVIRONMENT DEPARTMENT*  
**No.WLP-2005-1764-G.1 (1818)**  
**Sachivalaya, Gandhinagar**  
Dated the, 02, JAN 2007

**RESOLUTION**

The Gujarat State is richly endowed with diverse landscapes and ecosystems. There are 4 National Parks, 22 Sanctuaries, 1600 Km. long coastline and 831 wetlands. The fauna diversity of the state includes 107 species of mammals, 479 species of birds, 107 species of reptiles and rich and diverse marine life. The diverse eco-system includes moist deciduous forests, dry deciduous forest, grass lands, wet lands, the unique Rann and Thorn forests. This offers opportunity for promotion of Eco-tourism in the state. The Government wishes to promote nature based non-consumptive tourism that provides unique experience to tourist, improves the economic well being of local people and raises awareness for conservation.

In keeping with above, after careful consideration the State Government is pleased to issue “The Gujarat Eco-Tourism Policy” as per the attached document.

By order and in the name of the Governor of Gujarat

-sd-

(P. M. Christian)

Deputy Secretary to the Govt. of Gujarat  
Forests & Environment Department

Copy to

1. The Secretary to Hon’ble Chief Minister, Sachivalaya, Gandhinagar
2. The P.S. to Hon’ble Minister, Forests & Environment, Sachivalaya, Gandhinagar
3. The P.S. to Hon’ble Minister of State (Forest) Sachivalaya, Gandhinagar
4. The P.S. to Chief Secretary, Gujarat State, Sachivalaya, Gandhinagar
5. The P.S. (Tourism) Industries & Mines Department, Sachivalaya, Gandhinagar

- 
6. The Addl. Chief Secretary, Finance Department, Sachivalaya, Gandhinagar
  7. The Principal Chief Conservator of Forests, Gujarat State, Gandhinagar
  8. The Principal Chief Conservator of Forests, (Wildlife), Gujarat State, Gandhinagar
  9. The Accountant General, Gujarat, Ahmedabad/Rajkot.
  10. All branches of Forests & Environment Department.
  11. The Select file.

As approved vide Government of Gujarat F&ED's G R No. WLP-2005-1764- V.I (1818) dated

## **Gujarat Eco-Tourism Policy**

### **I. Preamble**

Eco-tourism is responsible travel to natural areas that conserves the environment and improves the well-being of local people.

### **II. Introduction**

The state of Gujarat has a total land area of 1,96,024 km<sup>2</sup>, out of which forests account for 18,940 km<sup>2</sup>. The state is endowed with 4 National Parks and 22 Sanctuaries, 1,600 km of coastline and over 831 wetlands covering a total area of 27,175 km<sup>2</sup>.

The diverse landscape of the state provides for variety in ecology and rich bio-diversity including a number of unique ecological niches. The way of life, tradition and the culture too vary from tribal culture in the south and east, to migratory cattle rearing colorful Maldhari community in west and north, to culturally rich and exceptionally hospitable people inhabiting Saurashtra.

The bio-geographical variations lead to diversity of flora and fauna. The flora of the state includes 4,320 species of plants. of which 1,315 have medicinal value. The faunal diversity of the state is observed in 107 species of mammals, 479 species of birds, 107 species of reptiles, and varied marine fauna. Gujarat is on the migratory path of over 100 species of birds, large number of whom find congenial wintering ground in wetland and grasslands of Gujarat.

### **III. Goals of Eco-tourism**

- a. Promote nature based, non-consumptive tourism.
- b. Facilitate eco-tourism to experience and appreciate the beauty, serenity and dynamic balance of nature leading to an aware, informed and responsible citizen.
- c. Provide for participation and flow of economic benefits to local people.
- d. Pave way for multiplication of conscious and responsible stakeholders who actively participate both in conservation and economic activity that flow from eco-tourism.

### **IV. Guiding principles for promoting Eco-tourism**

- a) Respect for the site to ensure sustainability and integrity.

- 
- b) Respect and concern for the local people and culture, their well-being and economic development.
  - c) Subordination of macro-economic concerns to site and people related concerns.
  - d) Convenience and facility to tourists with minimal external inputs.
  - e) Proactively facilitate organization of local people to provide tourist services.
  - f) Wide and informative publicity of site.
  - g) Government agencies to facilitate information dissemination and provide interpretation services.
  - h) Promotion of client group oriented tourism with focus on:
    - a) Youth of school and college going age being more Inquisitive and having greater assimilation capacity.
    - b) Senior citizens with quality leisure time and willingness to communicate with variety of social groups.

## **V. Strategy**

### **a) Site identification**

The state is endowed with rich bio-diversity due to varying agro-climatic and ecological factors. To identify prospective eco-tourism sites following natural areas shall be considered and the sites to be promoted shall be listed.

- 1) Long coast line for identification of known and unknown beaches.
- 2) Sanctuaries and National Parks.
- 3) Pristine forests of eastern hilly terrain of Gujarat.
- 4) Unique landscapes and ecological niches, e.g. Rann, back waters, wetlands.

### **b) Information dissemination**

It is important that various target groups are made aware of the identified eco-tourism sites. This shall include site's significance regarding wildlife, bio-diversity, unique landscape, ecological significance and such other important information. This shall be pursued through:

- 1) Identification of theme/flagship species with the eco-tourism site.
- 2) Canvassing target oriented programs locally and globally using various means. It may include promoting the flagship species/theme and information about it.
- 3) Information on tourist circuits and promotion of travelogue.
- 4) Providing scientific and thematic information to students through textbooks. It shall include scientific information on ecological processes, sensitivity of ecological balance, lifecycle of animal, birds and insects.
- 5) Equipping educational institutions with teachers having scientific and cultural understanding of significance of ecology and eco-tourism. This may be efficiently linked with GEC program.



- 
- 6) Facilitating mass production and sale of souvenirs at the eco-tourism sites as also across sites.

### **c) Clustering of sites**

The immense opportunities for eco-tourism in Gujarat due to diversity of landscapes, agro-climate, and life forms offer eco-tourism sites in reasonable vicinity of each other. This provides opportunity for clustering such sites and developing facilitation centers from where such sites are easily accessible. It is a unique feature that may not be possible in other parts of the country. The presence of endemic animals like Lion, Wild Ass coupled with pristine natural beauty of estuaries of Narmada, Tapi and Ambika, and Rann of Kutch provides a rare rendezvous of diversity with rich culture and heritage. The Saurashtra region is known for large number of Princely States that took keen interest in conservation of nature, wild life, culture and traditions. Wherever feasible the eco-tourism sites shall be grouped in clusters to present opportunities for varied experience and for longer duration and also create craving for repeat visits.

### **d) Facilitation Centers**

Eco-tourism is essentially linked with nature and natural sites. Such sites often are located in the interior areas with few facilities for transport, medical care, essential supplies and little amenities for luxury. The dense network of tourism opportunities in the state offers opportunity for clustering of sites and development of facilitation centers. The facilitation centers may be so developed as to provide for following.

- 1) Facilities for stay to be developed in private sector to suit tourists with varying expectations and budget.
- 2) Facilities to book camping sites, guides, transport etc.
- 3) They should be equipped to provide detailed information for each of networked eco-tourism sites, e.g., site details, facilities, means to reach, information about guide and interpretation services and eco-tourism and adventure opportunities.
- 4) Links to the national and international travel network efficiently.

### **e) Opportunities for adventure**

Many eco-tourism sites provide opportunity for adventure activities like power trekking, rock climbing, swimming and water related sports, para sailing, etc. Adventure activities shall be carefully planned so as not to have any adverse effect on flora and fauna in the landscape, as also be disjointed to seclude tourists wishing solitude with nature.

### **f) Site specific management plans**

Each eco-tourism site is unique, and calls for a site-specific management plan. The diversity of site demands flexibility in approach and details, while adhering to principles of eco-tourism. The specific sites may have appeal for identifiable target groups. Client group orientation need be inbuilt into the management plan. The management plan shall address following aspects as relevant to the site.

- 
- 1) Plan for development of infrastructural facilities.
    - i. Delineation of tourism zone and facilities to travel
    - ii. Camping sites.
    - iii. Interpretation centers.
    - iv. Nature trails
    - v. Walk ways
    - vi. Signage's
    - vii. Site and details of adventure activities

- 2) Local partners in eco-tourism facilitation.

- i. Catering and service
- ii. Local transport
- iii. Upkeep and maintenance of camping sites
- iv. Interpretation and guide services.
- v. Facilitation for exposure to local culture
- vi. Manufacture and sale of souvenir
- vii. Local facilities
- viii. Organizing activities for tourist so as to enhance pleasure, site related experiences, extend information and cause attraction for tourist to visit site repeatedly. Local people should identify with the theme/flagship species. This would be addressed through use of appropriate architecture and dress.

- 3) Interpretation Centers

Interpretation centers are significant inputs to be provided by Government agencies. Interpretation centers shall be so designed as to generate curiosity and provide Information. They would go beyond providing Information on what is observable. The culture and tradition shall also find a place at Interpretation center. The Interpretation centre would relate to site characters and its conservation. Best practices in interpretation and guide facilities shall be adopted using variety of traditional and modern means.

- 4) Adventure activities

Infrastructure and facilitation for adventure shall be carefully planned to assure that it does not lead to any adverse affect on environment and ensure safety of tourists.

- 5) Linkage with regional facilitation center

Linkages with the facilitation center shall be documented and facilitated through the Management Plan. It will detail both formal and informal channels. Infrastructural needs for development of

---

viable linkages shall be provided, so that facilitation centers extend the needed support to both the eco-tourism operators locally and the tourists.

## **VI. Carrying capacity**

Eco-tourism sites are sensitive and can adversely be affected by overuse. The sustainable limits of tourism need to be distinctly appreciated. There are scientific methods of estimating carrying capacity that are being refined. As each site is different and the methods are still being evolved, the estimation of carrying capacity needs to be reviewed periodically. Carrying capacity estimation is not an exact science, but it is clear that when the carrying capacity of a site is exceeded then the negative impact created by tourist traffic outweighs the positive impact. In order to determine the balance between negative and positive impact, is crucial to determine Indicators for site health and develop measurement of visitors' impact on site. Three such indicators are listed below; other site specific indicators shall be defined in the management plan.

- a) Impact of tourism on site characteristics. Impact indicators may be identified and refined with experience for each site.
- b) Impact of tourism on local society and its culture.
- c) Quality and quantity of economic flows.

## **VII Monitoring System**

Every eco-tourism development project in a National Park/Sanctuary/natural site shall have a built-in monitoring system for each of the major listed parameters here.

- a) Impact on the natural environment.
- b) Resolving conflicts over resources.
- c) Implementation of master plans.
- d) Regional cooperation
- e) Supplying water and ensuring its quality.
- f) Impact and quality of construction activities.
- g) Control of pollution.

Protocol for monitoring each of the parameters identified shall be detailed in the management plan and reported upon at appropriate forum

## **VIII. Eco-tourism as a Forestry Activity**

Eco-tourism being the experiencing of natural areas while fostering environmental and cultural understanding and encouraging the preservation of wildlife and habitats, is a responsible form of tourism and tourism development, mainly in the forest areas. Therefore, the state shall endeavor to identify eco-tourism with forestry activities, so that necessary and meaningful development can take place within the sites for the benefit of the eco-tourist.

---

### IX. Eco-tourism Advisory Board

An Eco-tourism Advisory Board shall be set, up under the chairmanship of the Hon 'ble Minister for Forest and Environment of the state to steer the Eco-tourism programme. The Board may consist of the following members:

Hon'ble Minister for Forest and Environment	Chairman
Hon'ble Minister of State for Forest and Environment	Vice Chairman
Principal Secretary Forest and Environment Department	Member
Principal Secretary Tourism Department	Member
Principal Secretary Finance Department	Member
Managing Director TCGL	Member
Principal Chief Conservator of Forest	Member
Principal Chief Conservator of Forest Wildlife	Member
Chief Conservator of Forest Eco-tourism	Member Secretary

Two non-official members shall be co-opted. The Board may invite Subject Matter Specialists as Special invitees.

---

**Annexure-24**  
**GR- Eco-Tourism Development Society**

પરિસરીય પ્રવાસન વિકાસ મંડળ  
( Eco-Tourism Development Society )  
ની રચના કરવા બાબત.

ગુજરાત સરકાર  
વન અને પયા વરણ વિભાગ  
ઠરાવ ક્રમાંક : વપસ-૧૧૦૮/૬૯૨/૩૫૯૫  
સચિવાલય, ગાંધીનગર  
તારીખ : ૧૩/૧૦/૨૦૦૮

**વંચાણે લીધો :-**

અગ્ર મુખ્ય વન સંરક્ષકશ્રી (વન્યપ્રાણી), ગાંધીનગરનો પત્ર ક્રમાંક : પયા વરણીય  
પ્રવા/અ/પ-૭/૦૮-૦૯ તા.૧૪/૦૫/૨૦૦૮.

**આમુખ**

અભયારણ્ય/રાષ્ટ્રીય ઉદ્યાનો કે તેમને સંલગ્ન વિસ્તારો જેવા કે, જળ પ્લાવિત વિસ્તાર (વેટલેન્ડ) કે જ્યાં સ્થાનિક લોકો પ્રમાણમાં આવા વિસ્તારો પર સીધી રીતે ઓછા આધારિત છે તેમને પ્રવાસન વિકાસમાં જોડવાથી પરીસર સંરક્ષણ અને પ્રવાસન વિકાસ પ્રવૃત્તિ આજીવિકા મેળવી શકે તેમ છે. આમ કરવાથી તેમની કાય ક્ષમતા વધશે અને કૌશલ્ય વિકાસ (Skill upgradation) થી આજીવિકામાં નોંધપાત્ર વધારો થશે. આ રીતે લોકોની સીધી ભાગીદારીથી સરકારી મહેકમ માટેનું ભારણ ઘટશે અને લોકસહકારથી લોકાભિમુખ વ્યવસ્થા ઉભી થશે. આ પ્રવૃત્તિ ઉભી થયેલી અસ્કયામતો (Assets) ની જાળવણીની સાથે સાથે સ્થાનિક લોકસમુદાયની આવકમાં પણ વધારો થશે. આ તમામ બાબતોને ધ્યાનમાં રાખી અભયારણ્ય/રાષ્ટ્રીય ઉદ્યાનો અને બીજા વિસ્તારો જ્યાં પરિસરીય પ્રવાસન માટેની સુવિધાઓ ઉભી થયેલી છે તેવા વિસ્તારોમાં પરિસરીય પ્રવાસન વિકાસ મંડળ એટલે કે, ઈકોટુરીઝમ ડેવલપમેન્ટ સોસાયટીની રચના કરવાની વંચાણે લીધેલ અગ્ર મુખ્ય વન સંરક્ષકશ્રી (વન્યપ્રાણી), ગાંધીનગરના તા.૧૪/૦૫/૨૦૦૮ ના પત્રથી થયેલ દરખાસ્ત સરકારશ્રીની વિચારણા હેઠળ હતી.

**ઠરાવ**

કાળજીપૂર્વક કની વિચારણાને અંતે, અભયારણ્ય/રાષ્ટ્રીય ઉદ્યાનો અને બીજા વિસ્તારો જ્યાં પરિસરીય પ્રવાસન માટેની સુવિધાઓ ઉભી થયેલ છે તેવા વિસ્તારોમાં પરિસરીય પ્રવાસન વિકાસ મંડળ (ઈકો-ટુરીઝમ ડેવલપમેન્ટ સોસાયટી) ની રચના કરવાનું આથી ઠરાવવામાં આવે છે. આ માટે નીચે દર્શાવેલા મુજબની કાય વાહી કરવાની રહેશે.

(૧)

- ૧.૧ આ " પરિસરીય પ્રવાસન વિકાસ મંડળ" ધ સોસાયટીઝ રજિસ્ટ્રેશન એક્ટ, ૧૯૬૧ હેઠળ રજિસ્ટર કરાવવાનું રહેશે. આવી સોસાયટીનું કાય ક્ષેત્ર જે તે પરિસરનો વિસ્તાર અને તેના પર આધારિત સીધી કે આડકતરી રીતે આધારિત લોકસમુદાયના ગામનો વિસ્તાર રહેશે.
- ૧.૨ આ મંડળ જે તે પરિસરના પ્રવાસન મંડળ તરીકે ઓળખાશે જેમાં સંબંધિત ગામ સમુદાયના કુલ કુટુંબો પૈકી ઓછામાં ઓછા ૮૦ ટકા કુટુંબોમાંથી કુટુંબ દીઠ એક સભ્ય (પુરૂષ અને સ્ત્રી) આ મંડળમાં સભ્ય તરીકે જોડાશે.
- ૧.૩ આ મંડળ પ્રવાસન વિકાસ પ્રવ તિઓ જેવી કે, ગાઈડ, કાર્ફેટેરીયા / રહેવાની સુવિધાઓ, સારવાર વગેરેની સુવિધાઓ આપવા માટે એક "પરિસરીય પ્રવાસન વિકાસ સમિતિ" ની રચના કરશે.

આ સમિતિના સભ્યો નીચે મુજબ રહેશે.

		સંખ્યા
૧	પ્રમુખ	૧
૨	ગ્રામ સંગઠન સભ્યોમાંથી	૨
૩	ગ્રામ સંગઠન સ્ત્રી સભ્યોમાંથી	૧
૪	અનુ.જાતિ/અનુ.જનજાતિ અને સામાજીક અને શૈક્ષણિક રીતે પછાત વ્યક્તિઓના સભ્યોમાંથી	૨
૫	સ્વૈચ્છિક સંસ્થાના સભ્યોમાંથી	૧
૬	ગ્રામ પંચાયતના સભ્યોમાંથી	૧
૭	સભ્ય સચિવ વનપાલ/વનરક્ષક	૧
	કુલ	૯

- ૧.૪ પરિસરીય પ્રવાસન વિકાસ સમિતિના પ્રમુખ તરીકે પરિસરીય પ્રવાસન વિકાસ મંડળ/ગ્રામ સંગઠનના પ્રમુખ રહેશે. જ્યારે બાકીના સભ્યો પસંદગી/ચૂંટણીથી નિમવામાં આવશે.
- ૧.૫ ઉક્ત સમિતિની મુદત સામાન્ય રીતે ત્રણ વર્ષ ની રહેશે. નવી સમિતિની રચના કરવા નાયબ વન સંરક્ષકશ્રીએ નિષ્ણ ય કરવાનો રહેશે.
- ૧.૬ ખાસ સંજોગોમાં સંબંધિત – " વિભાગીય પ્રવાસન સમિતિ" પ્રક તિ પ્રવાસન વિકાસ સમિતિને વિખેરી નાખી શકશે તેવા સંજોગોમાં નવી સમિતિ રચવાની રહેશે.
- ૧.૭ પ્રક તિ પ્રવાસન વિકાસ સમિતિના કોઈપણ કામ માટે વાદ-વિવાદ ઉભો થાય ત્યારે ગ્રામ સંગઠનનો સામાન્ય સભાનો નિષ્ણ ય માન્ય રાખવાનો રહેશે.

(૨) પરિસરીય પ્રવાસન વિકાસ સમિતિના કાય / ફરજો

- ૨.૧ આ સમિતિ વન વિભાગના સંબંધિત અધિકારીઓના માગ દર્શ ન અને સૂચના મુજબ કાયો કરશે અને ગ્રામ્ય સંગઠનની પેટા સમિતિ તરીકે ગ્રામ સંગઠનના નેજા હેઠળ કાય કરશે.
- ૨.૨ આ સમિતિ આ વિસ્તારનું સંરક્ષણ, જતન અને જાળવણી માટે કાય કરશે. જેમાં—
  ૧. ચરિયાણ, અનઅધિક ત પ્રવેશ, ચોરી, શિકાર જેવી પ્રવ તિઓથી નુકશાન ન થાય તેની સતત તકેદારી રાખશે.

૨. રોગચાળો કે અન્ય આફતોના સમયે તમામ પ્રકારે સરકારશ્રીને મદદ કરશે.
૩. આ સમિતિએ તેના કાય ક્ષેત્રના પરિસરીય પ્રવાસન સંકુલ અને સંપત્તિનું રક્ષણ કરવાનું રહેશે.
૪. સમિતિએ વિવિધ પ્રવાસી સગવડો જેવી કે, રહેણાંક, કાફેટરીયા ઈન્ટરપ્રિટેશન, સાધનસામગ્રી તેમજ અન્ય આનુષાંગિક સગવડો પૈકી તેઓને સોપેલ મિલ્કતો અને બાબતોનું રોજબરોજનું સંચાલન કરવાનું રહેશે.

૨.૩ સમિતિએ તેમને સોપેલ વિવિધ પ્રવાસી સુવિધાઓ જેવી કે રૂમ સર્વિસ, કેટરીંગ, ગાઈડ સેવા, પ્રવેશ નિયમન, પાર્કિંગ, ટોઈલેટ સુવિધા તથા પ્રવાસન સ્થળની સાફસુફીની સંપૂર્ણ જવાબદારી ઉઠાવવાની રહેશે તેમજ વપરાશી વસ્તુઓ પૂરી પાડવાની સંપૂર્ણ જવાબદારી પણ સમિતિની રહેશે.

૨.૪ પરિસરીય પ્રવાસન વિકાસ સંબંધિત વિવિધ બાબતો જેવી કે રહેણાંક, કેટરીંગ, પ્રવેશ ફી, પાર્કિંગ, ગાઈડ ફી, પ્રવાસન પેકેજીસમાંથી મળતી આવકો પૈકી વિભાગીય પ્રવાસન સમિતિનો ફાળો / ભાગ નિદિષ્ટ સદરોમાં રાષ્ટ્રીયક તબેકની નજીકની શાખામાં તુરત જમા કરાવવાનો રહેશે.

- ૨.૫ (અ) સમિતિના હિસાબોના આંતરિક ઓડિટર તરીકે બે સભ્યોની નિમણૂક વાર્ષિક ધોરણે કરવાની રહેશે.
- (બ) પ્રકૃતિ પ્રવાસન મંડળના હિસાબો સંબંધિત કાયદાની જોગવાઈઓ મુજબ જિલ્લા રજિસ્ટ્રાર, કો-ઓપરેટીવ ધ્વારા કરવામાં આવશે જ્યારે જિલ્લા કક્ષાની સમિતિના હિસાબો સોસાયટી એક્ટ-૧૮૬૦ ની જોગવાઈઓ મુજબ ચાટ ડ એકાઉન્ટન્ટ ધ્વારા કરાવવાના રહેશે.

(૩) પરિસરીય પ્રવાસન વિકાસ સમિતિની સત્તાઓ નીચે પ્રમાણે રહેશે.

- ૩.૧ સમિતિ વિવિધ બાબતો માટે વખતો વખત નક્કી કરેલ દરે પ્રવાસીઓ પાસેથી રકમ/ફી વસૂલાત કરી શકાશે.
- ૩.૨ મેળવેલ વસૂલાત પૈકી વિભાગીય પ્રવાસન સમિતિના ફાળાની રકમ નિદિષ્ટ સદરમાં દર માસની અંતે જમા કરાવવાની રહેશે. બાકી રહેતી રકમ પરિસરીય પ્રવાસન વિકાસ સમિતિના ફાળાની રકમ તરીકે પ્રવાસી સુવિધાના રક્ષણ, જાળવણી અને સંચાલન માટે વાપરી શકાશે.
- ૩.૩ પરિસરીય પ્રવાસન વિકાસ મંડળ, પરિસરીય પ્રવાસન વિકાસ સમિતિ ધ્વારા વિવિધ પ્રવૃત્તિઓ હાથ ધરતા ઉત્પન્ન થતી આવકમાંથી ચોખ્ખી બચતની રકમની વિભાગીય પ્રવાસન સમિતિ તેમજ પરિસરીય વિકાસ સમિતિ વચ્ચે નીચે પ્રમાણે વહેંચણી કરવામાં આવશે.

ક્રમ	આવકનું સાધન/પ્રવૃત્તિ	વિભાગીય પ્રવાસન સમિતિના ફાળે	પરિસરીય પ્રવાસન સમિતિના ફાળે	રિમાક સ
૧	રહેઠાણ સુવિધા	૫૦ ટકા	૫૦ ટકા	
૨	કેટરીંગ	૧૦ ટકા	૯૦ ટકા	
૩	સોવેનીયર/સ્મૃતિ ચિન્હનું વેચાણ	૧૦ ટકા	૯૦ ટકા	
૪	ગાઈડ ચાર્જીસ	—	૧૦૦ ટકા	
૫	પ્રવેશ ફી	૫૦ ટકા	૫૦ ટકા	
૬	પ્રચાર, પ્રસાર, સાહિત્યનું વેચાણ જે વિભાગ ધ્વારા બનાવવામાં આવે તે	૭૫ ટકા	૨૫ ટકા	
૭	સમિતિ ધ્વારા તૈયાર કરેલ સાહિત્ય	—	૧૦૦ ટકા	
૮	સખાવત / અનુદાનની આવકો	—	૧૦૦ ટકા	



(૪) ઉપરોક્ત જોગવાઈઓ અનુસાર રચાયેલા અને કાય નિવિત પરિસરીય પ્રવાસન વિકાસ મંડળીઓની વહીવટ અને વ્યવસ્થામાં એકસુત્રતા જળવાય અને વિવાદ કે મુશ્કેલ પરિસ્થિતિમાં સહાયક થવા અને ન્યાયિક ઉકેલ લાવવા, સંકલન કરવા જિલ્લા કક્ષાએ એક વિભાગીય સમિતિની રચના કરવામાં આવશે. જે સોસાયટી એક્ટ / ચેરીટી ટ્રસ્ટ -૧૮૬૦ મુંબઈ હેઠળ રજિસ્ટર કરવાની રહેશે.

૪.૧ આ સમિતિના સભ્યો નીચે મુજબ રહેશે.

(૧)	સંબંધિત વન વિભાગના નાયબ વન સંરક્ષકશ્રી	અધ્યક્ષ
(૨)	સંબંધિત વન વિભાગના સહાયક વન સંરક્ષક	ઉપાધ્યક્ષ
(૩)	સંબંધિત પરીસરના તમામ પરીક્ષેત્ર વન અધિકારીઓ	સભ્ય
(૪)	પરીસર પ્રવાસન સહકારી મંડળીના પ્રમુખો / સભ્ય સચિવો	સભ્ય
(૫)	અધ્યક્ષ ધ્વારા નામાંકિત એક પરીક્ષેત્ર વન અધિકારી	સભ્ય સચિવ

(૫) વિભાગીય પ્રવાસન સમિતિની ફરજો નીચે મુજબ રહેશે.

- (અ) પરીસરીય પ્રવાસન વિકાસ મંડળીઓની ત્રિમાસિક પ્રગતિની સમીક્ષા કરશે અને બંધારણની જોગવાઈઓનું નિયમન કરશે.
- (બ) પરિસરીય પ્રવાસન વિકાસ મંડળીની અંદરના અને એકબીજી મંડળીઓ વચ્ચેના વિવાદ/ મુશ્કેલીઓ સાંભળશે અને ઉકેલ લાવશે.
- (ક) ઉપર જણાવેલ ફંડ વહેંચણી હેઠળની મળેલ રકમ રાષ્ટ્રીયક ત ભેંકમાં સમિતિના નામે જમા રાખશે અને અધ્યક્ષ અને સભ્ય સચિવશ્રીની સંયુક્ત સહિથી લેવડ-દેવડ કરશે.

(૬) વિભાગીય પ્રવાસન સમિતિની સત્તાઓ :-

- (અ) આ સમિતિ પરીસર પ્રવાસન વિકાસ મંડળીઓની કામગીરી પર દેખરેખ અને નિયંત્રણ રાખશે.
- (બ) વિભાગીય પ્રવાસન સમિતિ તેના ખાતે જમા થયેલ ફંડમાંથી સમિતિની બેઠકો, અધ્યક્ષ કે સભ્યોના પ્રવાસ વગેરે સંબંધી આકસ્મિક ખચ કરી શકશે અથવા ખચ ના ધોરણો નક્કી કરી શકશે.
- (ક) વિભાગીય પ્રવાસન સમિતિ પરિસરમાં દાખલ થવાના તેમજ રહેવા માટેના ચાજી સ સિવાયના અન્ય ચાજી સ જેમ કે, કેટરીંગ, ગાઈડ ચાજી સ, પાકી ગ ફી વગેરે પરીસર માટે નક્કી કરી શકશે.

(૭) રાજ્ય કક્ષાનું વિકાસ બોડ :-

- (૧) રાજ્યમાં આવેલ પરીસર પ્રવાસન મંડળો અને વિભાગીય પ્રવાસન સમિતિઓના સંકલન, વિકાસ અને નિયંત્રણ માટે રાજ્ય કક્ષાએ અગ્ર મુખ્ય વન સંરક્ષકશ્રી, વન્ય પ્રાણીની અધ્યક્ષતામાં એક બોડ ની રચના થશે. વિભાગીય સમિતિઓના વાષિ ક અહેવાલ મેળવશે અને સંકલિત વાષિ ક અહેવાલ રાજ્ય સરકારશ્રીને સુપરત કરશે.
- (૨) રાજ્ય સરકારશ્રીમાં આયોજન અંગે મધ્યસ્થી કરશે.
- (૩) આ બોડ ની બેઠકો, કચેરી ખચ , પ્રવાસ ભથ્થા કે અન્ય ખચ સંબંધિત કચેરીના આયોજનમાં સમાવિષ્ટ થતા અલગથી જોગવાઈ કરવાની થશે નહિ કે અન્ય રીતે મળવા પાત્ર થશે નહિ.

આમ આ ત્રિસ્તરીય વ્યવસ્થા કે જેમાં પ્રથમ તબક્કે પરિસરીય પ્રવાસન વિકાસ મંડળ, બીજા તબક્કે વિભાગીય પ્રવાસન સમિતિ અને ત્રીજા સ્તરે રાજ્ય કક્ષાનું બોડ Eco-Tourism ને વેગ આપશે અને લોકાભિમુખ વિકાસ વ્યવસ્થા ઉભી થશે.

(૮) આ ઠરાવની જોગવાઈઓ ગીર અભ્યારણ્ય તેમજ રાષ્ટ્રીય ઉદ્યાન માટે લાગુ પડશે. નહિ.

આ હુકમો વિભાગની સરખા ક્રમાંકની ફાઈલ પર મળેલ નાણા વિભાગની તા.૨૯/૮/૦૮ ની નોંધથી મળેલ અનુમતી અન્વયે બહાર પાડવામાં આવે છે.

ગુજરાતના રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે

—સહી—  
(વિક્ટર મેકવાન)  
ઉપ સચિવ  
વન અને પયા વરણ વિભાગ

પ્રતિ,

- માનનીય મુખ્ય મંત્રીના અગ્ર સચિવશ્રી, સચિવાલય, ગાંધીનગર
- માનનીય મંત્રીશ્રી (વન અને પયા વરણ) ના અંગત સચિવશ્રી, સચિવાલય, ગાંધીનગર
- માનનીય મંત્રીશ્રી (પ્રવાસન) ના અંગત સચિવશ્રી, સચિવાલય, ગાંધીનગર
- માનનીય રાજ્યકક્ષાના મંત્રીશ્રી (વન અને પયા વરણ) ના અંગત સચિવશ્રી, સચિવાલય, ગાંધીનગર
- અગ્ર સચિવશ્રી (વન) ના રહસ્ય સચિવશ્રી, વન અને પયા વરણ વિભાગ
- સચિવશ્રી (પ્રવાસન) ઉદ્યોગ અને ખાણ વિભાગ, સચિવાલય, ગાંધીનગર
- અગ્ર મુખ્ય વન સંરક્ષકશ્રી, ગુજરાત રાજ્ય, ગાંધીનગર
- અગ્ર મુખ્ય વન સંરક્ષકશ્રી (વન્યપ્રાણી), ગુજરાત રાજ્ય, ગાંધીનગર
- મુખ્ય વન સંરક્ષકશ્રી (પ્રવાસન), અગ્ર મુખ્ય વન સંરક્ષકશ્રીની કચેરી, ગાંધીનગર
- એકાઉન્ટન્ટ જનરલશ્રી અમદાવાદ / રાજકોટ
- નાણા વિભાગ, સચિવાલય, ગાંધીનગર
- નાણા સલાહકારશ્રી (વન) બ્લોક-૧૧, ૬ ઠા માળ, સચિવાલય, ગાંધીનગર
- ટુરિઝમ કોર્પો રેશન ઓફ ગુજરાત લીમિટેડ, ઉદ્યોગ ભવન, ગાંધીનગર
- વિભાગના સવે અધિકારીશ્રીઓ, વન અને પયા વરણ વિભાગ
- સવે શાખાઓ, વન અને પયા વરણ વિભાગ, સચિવાલય, ગાંધીનગર
- નાયબ સેક્શન અધિકારી સિલેક્ટ ફાઈલ
- સિલેક્ટ ફાઈલ
- સીસ્ટમ મેનેજર— વન અને પયા વરણ વિભાગ, IWDMS પર મૂકવા માટે.

## Annexure 25

### Statement showing requirement for salary of the staffs of Khijadiya

Sr. No.	Designation	No of posts	Pay Scale	Total Pay (For 12 Months)	Exp. For 10 Yrs. In lacs
1	Assistant Conservator of Forests	1	15600-39100 (PB3) Grad Pay-5400	630000	7560000
2	Range Forest Officer	1	9300-34800 (PB1) Grad Pay- 4200	350000	4200000
3	Round Forester	1	5200-20200 (PB1) Grad Pay- 2400	210000	2520000
4	Forest Guards	4	5200-20200 (PB1) Grad Pay- 1800	744000	8928000
5	Scientific Analyst	1	Fixed - Rs.27500	27500	330000
6	Laboratory Technician	1	Fixed - Rs.16500	16500	198000
7	Driver	1	5200-20200 (PB1) Grad Pay- 1900	188000	2256000
8	Data entry Operator	1	Fixed- Rs.8000	8000	96000
9	Mali	1	4440-7440 (1S) Grad Pay- 1300	145000	1740000
<b>Total</b>				<b>27828000</b>	<b>27828000</b>

---

## Annexure - 26

### Statement showing Fruit tree Plantation Scheme

Sr. No.	Item of works	Qty.	Labour (in Rs.)	Material (in Rs.)	Total
1	Purchasing saplings of fruit trees of good quality from market	50	835	4735	5570
	Alignment/site cleaning	50	2228	0	2228
	Digging out soil	50	345	0	345
	Filling up with fertilizer	50	445	445	890
	Transportation of saplings	50	110	0	110
	Plantation of saplings	50	557	0	557
	Purchasing of Tree guard	50	0	60000	60000
	Miscellaneous	50	700	700	1400
			<b>5220</b>	<b>65880</b>	<b>71100</b>
2	First year maintenance	50	2230	2230	4460
	Second year maintenance	50	2230	2230	4460
			<b>4460</b>	<b>4460</b>	<b>8920</b>
	<b>Total</b>		<b>9680</b>	<b>70340</b>	<b>80020</b>

Rate of Daily Wage: Rs. 213.20/-

Annexure - 27

The statement showing sector wise budget requirement for the Khijadiya Bird Sanctuary during the period of this plan proposal

Sr. No.	Name of Sector	Year (Rs. In Lakhs)																								Total Fin (Lakhs)
		I <sup>st</sup> Year		II <sup>nd</sup> Year		III <sup>rd</sup> Year		IV <sup>th</sup> Year		V <sup>th</sup> Year		VI <sup>th</sup> Year		VII <sup>th</sup> Year		VIII <sup>th</sup> Year		IX <sup>th</sup> Year		X <sup>th</sup> Year						
		Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
<b>A</b>	<b>Organization and Staff</b>																									
1	Assistant Conservator of Forests	-	-	6.30	6.30	6.93	6.93	7.62	7.62	8.38	8.38	9.22	9.22	10.14	10.14	11.15	11.15	12.26	12.26	13.48	13.48	85.48				
2	Range Forest Officer-1	-	-	3.50	3.50	3.85	3.85	4.24	4.24	4.66	4.66	5.12	5.12	5.64	5.64	6.20	6.20	6.82	6.82	7.50	7.50	47.53				
3	Forester-1	-	-	2.10	2.10	2.31	2.31	2.54	2.54	2.79	2.79	3.70	3.70	4.00	4.00	4.40	4.40	4.84	4.84	5.32	5.32	32.00				
4	Forest Guard (Beat Guard 2 and Checking Naka Guard-2) (4)	-	-	7.44	7.44	8.18	8.18	9.00	9.00	9.90	9.90	10.89	10.89	11.98	11.98	13.17	13.17	14.48	14.48	15.92	15.92	100.96				
5	Scientific Analyst - 1	-	-	3.30	3.30	3.63	3.63	3.99	3.99	4.39	4.39	4.83	4.83	5.31	5.31	5.85	5.85	6.43	6.43	7.07	7.07	44.80				
6	Laboratory Technician - 1	-	-	1.98	1.98	2.18	2.18	2.40	2.40	2.64	2.64	2.90	2.90	3.19	3.19	3.51	3.51	3.86	3.86	4.24	4.24	26.90				
7	Field Assistant - 1	-	-	1.32	1.32	1.45	1.45	1.60	1.60	1.76	1.76	1.93	1.93	2.13	2.13	2.34	2.34	2.57	2.57	2.83	2.83	17.93				
8	Data Entry Operator-1	-	-	1.06	1.06	1.17	1.17	1.28	1.28	1.41	1.41	1.55	1.55	1.71	1.71	1.88	1.88	2.07	2.07	2.27	2.27	14.40				
9	Driver - 1	-	-	1.88	1.88	2.07	2.07	2.27	2.27	2.50	2.50	2.75	2.75	3.03	3.03	3.33	3.33	3.66	3.66	4.03	4.03	25.52				
10	Mali - 1	-	-	1.44	1.44	1.58	1.58	1.74	1.74	1.92	1.92	2.11	2.11	2.32	2.32	2.55	2.55	2.81	2.81	3.09	3.09	19.56				
		-	-	30.32	30.32	33.35	33.35	36.68	36.68	40.35	40.35	45.00	45.00	49.45	49.45	54.38	54.38	59.80	59.80	65.75	65.75	415.08				
<b>B</b>	<b>Infrastructural Development</b>																									
1	RFO Office Building - 1	-	-	1.00	12.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.00				
2	Environment Laboratory building - 1	-	-	-	-	1.00	30.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30.00				
3	Animal and Bird care center - 1	-	-	-	-	1.00	10.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.00				

Sr. No.	Name of Sector	Year (Rs. In Lakhs)																								Total Fin (Lakhs)
		I <sup>st</sup> Year		II <sup>nd</sup> Year		III <sup>rd</sup> Year		IV <sup>th</sup> Year		V <sup>th</sup> Year		VI <sup>th</sup> Year		VII <sup>th</sup> Year		VIII <sup>th</sup> Year		IX <sup>th</sup> Year		X <sup>th</sup> Year						
		Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
4	Residential quarter (type C) - 2	-	-	1.00	10.00	1.00	11.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.00			
5	Residential quarter (type B) - 3	-	-	1.00	9.00	2.00	19.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28.80			
6	Residential quarter (type A1)	-	-	2.00	12.00	2.00	13.20	2.00	14.52	2.00	15.97	2.00	17.57	1.00	9.66	-	-	-	-	-	-	-	82.92			
7	Construction of entry gate at National Highway	-	-	-	-	-	-	1.00	5.00	-	-	-	-	-	-	-	-	-	-	-	-	5.00				
	<b>C Protection</b>	-	-	-	43.00	-	84.00	-	19.52	-	15.97	-	17.57	-	9.66	-	0.00	-	0.00	-	-	0.00	189.72			
1	Revolver - 1	-	-	-	-	1.00	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00				
2	0.12 Guns - 3	-	-	1.00	1.00	1.00	1.20	1.00	1.30	-	-	-	-	-	-	-	-	-	-	-	-	3.50				
3	Multi Utility Van -1	-	-	1.00	7.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.00				
4	Motorcycle - 6	-	-	3.00	2.00	3.00	2.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.50				
	<b>Habitat improvement works</b>	-	-	-	10.00	-	4.70	-	1.30	-	-	-	-	-	-	-	-	-	-	-	-	16.00				
1	Improvement of water storage capacity	31000 cmt	15.00	31000 cmt	16.50	31000 cmt	18.15	31000 cmt	19.97	31000 cmt	21.96	31000 cmt	24.16	31000 cmt	26.57	31000 cmt	29.23	31000 cmt	32.15	31000 cmt	35.37	239.06				
2	Removal of unwanted growth including <i>Prosopis juliflora</i>	30 ha	21.00	30 ha	22.00	30 ha	23.00	30 ha	24.00	30 ha	25.00	30 ha	26.00	30 ha	27.00	30 ha	28.00	30 ha	29.00	30 ha	30.0	255.00				
3	Plantation of tall plants useful for birds with tree guards.	50 plants	0.80	50 plants	0.90	50 plants	1.00	50 plants	1.10	50 plants	1.25	50 plants	1.40	50 plants	1.60	50 plants	1.80	50 plants	2.00	50 plants	2.25	14.10				
4	Enrichment with fish culture	LS	2.00	LS	2.20	LS	2.42	LS	2.66	LS	2.93	LS	3.22	LS	3.54	LS	3.90	LS	4.29	LS	4.72	31.88				
5	Creation of mounds	LS	5.00	LS	5.50	LS	6.05	LS	6.66	-	7.32	-	8.05	-	8.86	-	9.74	-	10.72	-	11.79	79.69				
6	Erection of snags	LS	0.30	LS	0.33	LS	0.36	LS	0.40	-	0.44	-	0.48	-	0.53	-	0.58	-	0.64	-	0.71	4.77				
			44.10		47.43		50.98		54.79		58.90		63.31		68.10		73.25		78.80		84.84	624.50				

Sr. No.	Name of Sector	Year (Rs. In Lakhs)																								Total Fin (Lakhs)
		I <sup>st</sup> Year		II <sup>nd</sup> Year		III <sup>rd</sup> Year		IV <sup>th</sup> Year		V <sup>th</sup> Year		VI <sup>th</sup> Year		VII <sup>th</sup> Year		VIII <sup>th</sup> Year		IX <sup>th</sup> Year		X <sup>th</sup> Year						
		Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
3	Campsite Development Works	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1	Construction of toilet blocks & Bathrooms	-	-	4.00	2.00	4.00	2.20	4.00	2.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.62		
4	Eco-tourism	-	-	-	2.00	-	2.20	-	2.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.62		
1	Expansion and up-gradation of the Interpretation center	-	-	LS	20.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.00		
2	Printing of brochures, pamphlets, signage and other literature	LS	5.00	LS	5.50	LS	6.05	LS	6.66	LS	7.32	LS	8.05	LS	8.86	LS	9.74	LS	10.72	LS	11.79	LS	11.79	79.69		
5	Research and Monitoring	-	5.00	-	25.50	-	6.05	-	6.66	-	7.32	-	8.05	-	8.86	-	9.74	-	10.72	-	11.79	-	11.79	99.69		
1	Research Projects expenditure	2.00	20.00	2.00	20.00	2.00	25.00	2.00	30.00	2.00	35.00	2.00	40.00	2.00	45.00	2.00	50.00	2.00	55.00	2.00	60.00	2.00	60.00	380.00		
2	Purchase of lab equipments, glassware and chemicals	LS	10.00	LS	10.00	LS	5.00	LS	5.00	LS	5.00	LS	5.00	LS	5.00	LS	5.00	LS	5.00	LS	5.00	LS	5.00	60.00		
6	Eco-Development	-	30.00	-	30.00	-	30.00	-	35.00	-	40.00	-	45.00	-	50.00	-	55.00	-	60.00	-	65.00	-	65.00	440.00		
1	Entry point activities in four surrounding villages (two villages/year)	LS	30.00	LS	30.00	LS	30.00	LS	30.00	LS	20.00	LS	20.00	LS	20.00	LS	40.00	LS	40.00	LS	40.00	LS	40.00	300.00		
7	Education and Awareness	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1	Awareness campaign by organizing meetings at each village	LS	5.00	LS	5.00	LS	5.50	LS	6.05	LS	6.66	LS	7.32	LS	8.05	LS	8.86	LS	9.74	LS	10.72	LS	10.72	72.90		
2	Bird awareness centre	-	20.00	-	20.00	-	20.00	-	20.00	-	20.00	-	20.00	-	20.00	-	20.00	-	20.00	-	20.00	-	20.00	200.00		
3	Nature Education Camps	100	15.00	100	16.50	100	18.15	100	19.97	100	21.96	100	24.16	100	26.57	100	29.23	100	32.15	100	35.37	100	35.37	239.06		



Sr. No.	Name of Sector	Year (Rs. In Lakhs)																								Total Fin (Lakhs)
		I <sup>st</sup> Year		II <sup>nd</sup> Year		III <sup>rd</sup> Year		IV <sup>th</sup> Year		V <sup>th</sup> Year		VI <sup>th</sup> Year		VII <sup>th</sup> Year		VIII <sup>th</sup> Year		IX <sup>th</sup> Year		X <sup>th</sup> Year						
		Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
4	Purchase of LCD Projector for audio-visual show	-	-	1.00	1.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.50			
5	Awareness films, C.Ds and books	LS	5.00	LS	3.00	LS	3.50	LS	4.00	LS	4.50	LS	5.00	LS	5.50	LS	6.00	LS	6.50	LS	7.00	LS	50.00			
			25.00		26.00		27.15		30.02		33.12		36.48		40.13		44.09		48.40		53.09		563.46			
8	Operations and Maintenance	-																								
1	Interpretation center	LS	5.00	LS	5.50	LS	6.05	LS	6.66	LS	7.32	LS	8.05	LS	8.86	LS	9.74	LS	10.72	LS	11.79	LS	79.69			
2	Campsite maintenance	LS	2.00	LS	2.20	LS	2.42	LS	2.66	LS	2.93	LS	3.22	LS	3.54	LS	3.90	LS	4.29	LS	4.72	LS	31.87			
3	Sanitary works	LS	1.00	LS	1.10	LS	1.21	LS	1.33	LS	1.46	LS	1.61	LS	1.77	LS	1.95	LS	2.14	LS	2.36	LS	15.94			
4	Electricity and water supply	LS	0.50	LS	0.55	LS	0.61	LS	0.67	LS	0.73	LS	0.81	LS	0.89	LS	0.97	LS	1.07	LS	1.18	LS	7.97			
5	Communication, wireless, telephone and mobiles	LS	1.00	LS	1.10	LS	1.21	LS	1.33	LS	1.46	LS	1.61	LS	1.77	LS	1.95	LS	2.14	LS	2.36	LS	15.94			
6	Maintenance of earthen bunds and mounds	LS	1.00	LS	1.10	LS	1.21	LS	1.33	LS	1.46	LS	1.61	LS	1.77	LS	1.95	LS	2.14	LS	2.36	LS	15.94			
7	All buildings other than Interpretation center	LS	2.00	LS	2.20	LS	2.42	LS	2.66	LS	2.93	LS	3.22	LS	3.54	LS	3.90	LS	4.29	LS	4.72	LS	31.87			
8	Old plantations maintenance and protection	LS	0.00	LS	0.60	LS	0.70	LS	0.80	LS	0.90	LS	1.00	LS	1.10	LS	1.20	LS	1.30	LS	1.40	LS	9.00			
9	Vehicles	LS	1.00	LS	1.10	LS	1.21	LS	1.33	LS	1.46	LS	1.61	LS	1.77	LS	1.95	LS	2.14	LS	2.36	LS	15.94			
10	Nature trails	LS	5.00	LS	5.50	LS	6.05	LS	6.66	LS	7.32	LS	8.05	LS	8.86	LS	9.74	LS	10.72	LS	11.79	LS	79.69			
11	Boundary and fencing	LS	1.00	LS	1.10	LS	1.21	LS	1.33	LS	1.46	LS	1.61	LS	1.77	LS	1.95	LS	2.14	LS	2.36	LS	15.94			
12	Other miscellaneous works	LS	2.00	LS	2.20	LS	2.42	LS	2.66	LS	2.93	LS	3.22	LS	3.54	LS	3.90	LS	4.29	LS	4.72	LS	31.87			
13	Removal of plastics and other hazardous materials	LS	1.00	LS	1.10	LS	1.21	LS	1.33	LS	1.46	LS	1.61	LS	1.77	LS	1.95	LS	2.14	LS	2.36	LS	15.94			
14	Protection labourers	LS	2.00	LS	2.20	LS	2.42	LS	2.66	LS	2.93	LS	3.22	LS	3.54	LS	3.90	LS	4.29	LS	4.72	LS	31.87			
			24.50		27.55		30.35		33.41		36.77		40.46		44.50		48.94		53.82		59.17		399.47			
																							3054.12			
																							Grand Total			

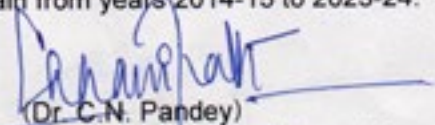
758-61

No. WLP/ / / /2014-15  
Office of the  
Principal Chief Conservator of Forests,  
Gujarat State, Aranya Bhavan, Block No.  
B/1, Near CH-3 Circle, Sector 10-A,  
Gandhinagar  
Email: [cwlgui@gmail.com](mailto:cwlgui@gmail.com)  
Phone: +91-79-23254125  
Date: 24-4-14

**Sub: Approval of the Management Plan of "Khijadiya Bird Sanctuary"**

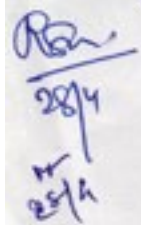
**Ref:** Proceeding of the meeting held on 18<sup>th</sup> and 19<sup>th</sup> February 2014 for considering the Draft Management Plan

1. The draft management plan for Khijadiya Bird Sanctuary written by Shri M.M.Bhalodi, proposed period of plan is for year 2014-15 to 2023-24 under guidance of Shri R.D.Kamboj was presented By Shri M.M.Bhalodi, Deputy Conservator of Forests, MNP Divison, Jamnagar. The Committee accepted the draft plan in principal and recommended its approval with inclusion of suggestions made.
2. The revised plan incorporating the suggestion has been submitted by Shri R.D.Kamboj, CCF, MNP Circle, Jamnagar, Vide latter no.A/WLP/T-5/KBS/Plan/89/2014-15, dated 15.04.2014. The same has been reviewed by the undersigned.
3. Therefore, under the authority vested in him under section 33 of Wildlife (Protection) Act, 1972, the undersigned accords approval to the the management Plan for "Khijadiya Bird Sanctuary." The plan period will remain from years 2014-15 to 2023-24.

  
(Dr. C.N. Pandey)

Principal Chief Conservator of Forests &  
Chief Wildlife Warden, Gujarat State,  
Gandhinagar

Go for printing of the  
plan.

  
28/4  
25/4

- To,
- Chief Conservator of Forests,  
MNP Circle, Jamnagar.
  - Dy. Conservator of Forests,  
MNP Division, Jamnagar.

Copy submitted to: Add. Chief Secretary, F&E Sachivalaya, Gandhinagar for information.

Copy with compliments to: Add. Principal Chief Conservator of Forests, Research, Gujarat State, Gandhinagar for information and necessary action.