

GUJARAT

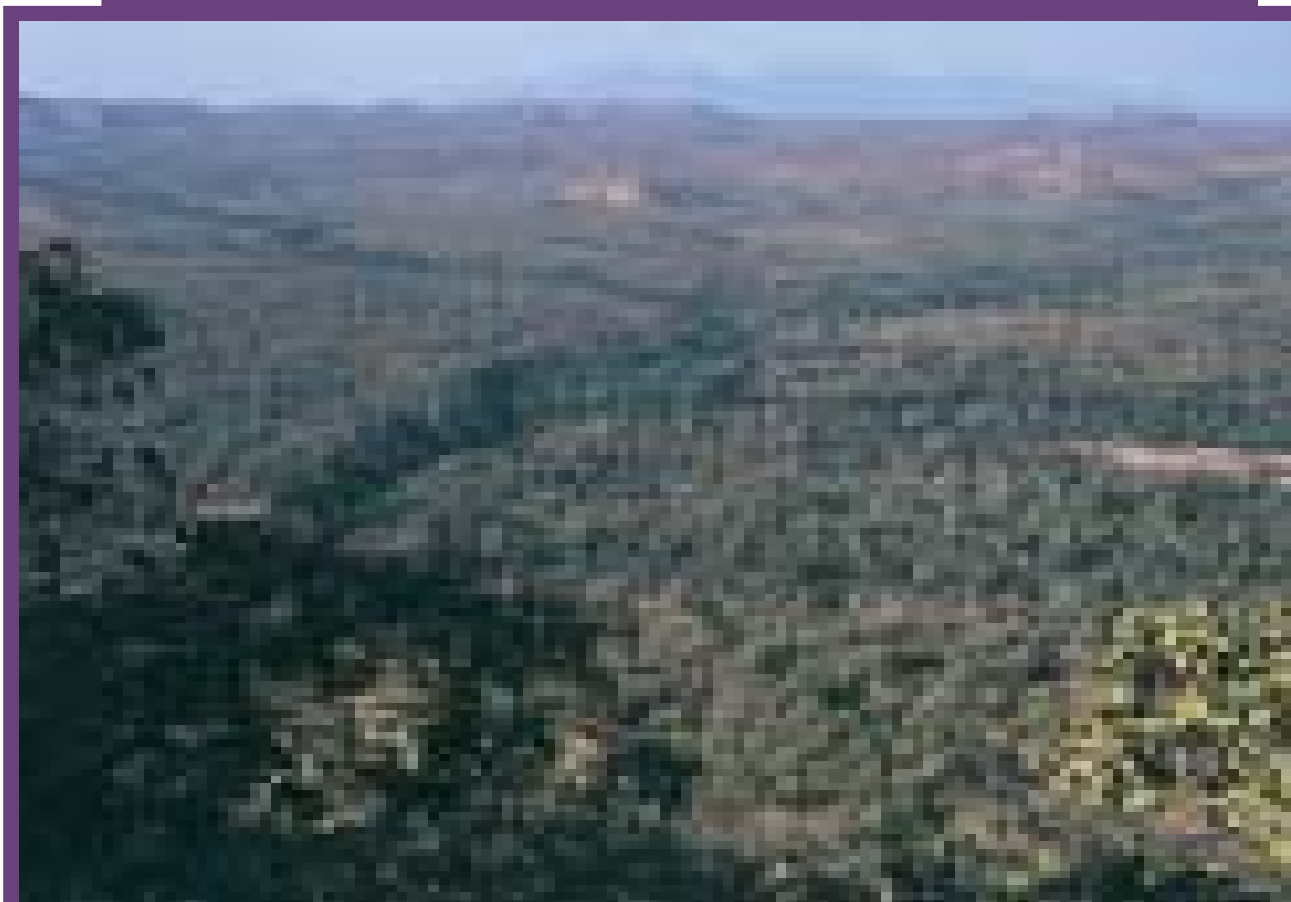


Photo: A. J. T. Johnsingh

The 1400 sq. km Gir is the largest tract of forest in Gujarat, protected mainly for the Asiatic Lion but it is a good habitat for many bird species.

Gujarat (20° 07' - 24° 43' North and 68° 10' - 74° 29' East) occupies the northern extremity of the western sea-board of India with the international border with Pakistan on the northwest. It comprises three geographical regions: (i) The peninsula, traditionally known as Saurashtra, is essentially a plateau sprinkled with low hills; (ii) Kutch on the northeast is dry and rocky and contains the famous Rann (desert) of Kutch, the Greater Rann in the north and the Little Rann in the east; and, (iii) the mainland extending from the Rann of Kutch and the Aravalli Hills to the River Damanganga is on the whole a level plain of alluvial soil. Gujarat has an area of 19.60 million ha, which constitutes 5.96% of the geographical area of the country (Mathew 2003). It is bounded by the Arabian Sea on the west, the Aravallis on the northeast, the Thar Desert on the north, the Vindhyas and the Satpura ranges on the east, and parts of the Western Ghats on the south. Its natural ecosystems range from the marine and wetlands to deserts, grasslands and moist deciduous forests. Its coastline (1650 km) with two gulfs is the longest among the Indian states and shelters diverse coastal ecosystems such as mangroves, coral reefs, estuaries and mudflats. The plains of Gujarat are watered by four major rivers, Sabarmati, Mahi, Narmada and Tapi. There are no major rivers in the Saurashtra and Kutch regions.

Gujarat is also well known for its historical heritage. About 50 Harappan sites have been found in northern Gujarat. Gujarat ranks first in India in the production of cotton and ground-nut and second in the production of tobacco. The chief food crops of the state are paddy, wheat and bajra. Valsad is the first integrated horticulture district in India which has the largest export of vegetables, fruits and flowers from the country. Gujarat is a major salt-producing State and its production forms as much as 60% of the country's output.

The human population of the State is 50.31 million (2001 census), with 65.51% living in rural areas. The population density is 211 persons per sq. km.

The average annual rainfall ranges between 400 to 1,000 mm and the mean temperature from 25° C to 27.5 °C. As the Tropic of Cancer passes through the northern border of Gujarat, the State has an intensely hot and cold climate. But the Arabian Sea and the Gulf of Cambay in the west and the forest-covered hills in the east soften the rigours of climatic extremes.

Vegetation

According to Forest Survey of India report of 1999, the forest cover of the State is 1.94 million ha which constitutes about 10% of the geographical area of the State. By legal status, Reserved Forest is 71.26%, Protected Forest 5.14% and Unclassed Forest 23.60%. The

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Forest Survey of India also states that based on satellite data of 1997, the forest cover is 12,965 sq. km which constitutes 6.61% of the geographical area. Dense forest, open forest and mangroves account for 6,430 sq. km, 5,504 sq. km and 1,031 sq. km, respectively. This discrepancy is mainly due to three reasons: land is under the State Forest Department, but there is no forest left, Unclassified forest and grasslands.

There are four forest types, namely, Tropical Moist Deciduous, Tropical Dry Deciduous, Tropical Thorn and Littoral and Swamp forests. The forests are mostly distributed in the southern part of the State, whereas the middle and eastern parts bear bamboo forests of inferior quality. The main forest formations in the State are of teak, bamboo and mangroves (Champion and Seth 1968).

IBAS AND PROTECTED AREA

There are four national parks and 21 wildlife sanctuaries covering an area of 47,967 ha 16,42,271 ha respectively, totalling 1.69 million ha. It constitutes 8.62% of the geographical area. Gir in Saurashtra is the abode of the world famous Asiatic lions. Nalsarovar is a wetland of national importance. It covers an area of 18,400 ha. (Rodgers *et al.* 2000). The maximum number of PAs are in the forest ecosystem (13), followed by wetland and grassland (4 each), desert and coastal ecosystem (2 each). Not all protected areas are recognized as IBAs.

IBAs and IBA criteria

A1= Threatened species; A2 = Restricted Range species; A3= Biome species; A4=Congregatory species

IBAs of Gujarat

IBA site codes	IBA site names	IBA criteria
IN-GJ-01	Banni Grassland and Chhari Dhand	A1, A4i, A4iii
IN-GJ-02	Bhal Area	A1
IN-GJ-03	Charakla Salt Pans	A1, A4i, A4iii
IN-GJ-04	Flamingo City	A1, A4i, A4iii
IN-GJ-05	Gir National Park and Wildlife Sanctuary	A1, A3
IN-GJ-06	Kaj Lake	A1, A4i
IN-GJ-07	Khijadia Wildlife Sanctuary	A1, A4i, A4iii
IN-GJ-08	Marine National Park and Wildlife Sanctuary	A1, A4i, A4iii, A4iv
IN-GJ-09	Nalsarovar Wildlife Sanctuary	A1, A4i, A4iii, A4iv
IN-GJ-10	Naliya Grassland (Lala Bustard Wildlife Sanctuary)	A1
IN-GJ-11	Rampura Grassland	A1
IN-GJ-12	Salt Pans of Bhavnagar	A1, A4iii
IN-GJ-13	Thol Lake Wildlife Sanctuary	A1, A4i, A4iii
IN-GJ-14	Velavadar National Park	A1, A4ii
IN-GJ-15	Wetlands Of Kheda	A1, A4ii
N-GJ-16	Wild Ass Wildlife Sanctuary	A1, A3, A4i, A4iii
IN-GJ-17	Bhaskarapra	A1, A4iii

AVIFAUNA

The bird life of Gujarat is very rich with more than 490 species identified till now, including some stray and unconfirmed records (Grimmitt and Inskipp 2003). For certain species, both common and rare, Gujarat is extremely important for conservation. The chief among them are the Greater Flamingo *Phoenicopterus ruber*, Lesser Flamingo *P. minor*, Dalmatian Pelican *Pelecanus crispus*, Great White Pelican *P. onocrotalus*, Common Crane *Grus grus*, Demoiselle Crane *G. virgo*, Sarus Crane *G. antigone*, Great Indian Bustard *Ardeotis nigriceps*, Lesser Florican *Sypheotides indica*, Sociable Lapwing *Vanellus gregarius*, Grey Hypocolius *Hypocolius ampelinus*, White-browed Bushchat or Stoliczka's Buschat *Saxicola macrorhyncha*, harriers (*Circus* spp.) and many other raptors. Gujarat is the only state in India where both the species of flamingos breed (Ali and Ripley 1987, Grimmett and Inskipp 2003, Ali 1974, Mundkur *et al.* 1989).

A large number of temporary wetlands are present in Gujarat.



Photo: Otto Pfisterer

The Great White Pelican, a winter visitor in north India, occasionally breeds in the Great Rann of Kutch (Ali and Ripley 1987, Grimmet *et al.* 1998). The Dalmatian Pelican can be seen in the Little Rann of Kutch (Zainabad), Wild Ass Sanctuary (Shah *et al.* 1995), Charri-Dhand (Tiwari 1997), Thol Lake Sanctuary, Nalsarovar Wildlife Sanctuary (up to 100 individual, Scott 1989), Kheda, Gulf of Kutch, and Khijadia Wildlife Sanctuary.

For the two migratory species of cranes, Common and Demoiselle, Gujarat can be considered as the number one State of India, both in numbers and in regularity and duration of the stay. The bulk of the population of the Common Crane winters in Gujarat, especially in the Banni region of Kutch where Tiwari and Rahmani (2002) estimate that up to 40,000. The total wintering population could be as high as 70,000 individuals. The Demoiselle Crane is mainly found in the Saurashtra region. It is difficult to

estimate the wintering population of the Demoiselle Cranes as they are found in a large area, with great local movement. But their number is more than the Common Crane by a factor of 3 or 4.

The grasslands of the Velavador National Park (IBA) and the surrounding areas host the largest known harrier roost in the world (Clarke 1993) with about 4,000 individuals of four species: Western Marsh *Circus aeruginosus*, Montagu's *C. pygargus*, Hen *C. cyaneus*, and Pallid *C. macrourus* harriers. Besides the Velavador grasslands, smaller harrier roosts are found in numerous grass *bheeds* scattered all over Saurashtra. Their total number is not known.

The Sociable Lapwing *Vanellus gregarius* is a globally threatened species that has undergone rapid population decline, for largely unknown reasons (BirdLife International 2001). In India, it is a winter visitor (Ali and Ripley 1987, Grimmett *et al.* 1998), mainly to the north and the west of the country. There are very few recent records (mainly from Rajasthan and Haryana: BirdLife International 2001). In the winter of 1998, after a gap of nearly 50 years, 39 birds were seen in the fallow fields and grasslands of Naliya-Vengaber, Banni, Mandvi and Lala in Kutch (J. Joshua *in litt.* 2003).

The population of Sociable Lapwing *Vanellus gregarius* has fallen drastically due to unknown reasons.



Photo: Tim Loebe / BirdLife International

The desert (*rann*) of Gujarat, represented by the Little and Great Rann is a unique ecosystem, not found elsewhere in India. It consists of vast, flat, sun-baked land, punctuated by raised rocky outcrops called *bets*. These *bets* have xerophytic vegetation, consisting of *Acacia*, *Zizyphus*, etc. Seasonal inundation by sea water and rain water, coupled with a high salt content of the soil provide a rare and unique type of ecosystem. When the right conditions are present, a very large number of flamingos breed in the Great Rann.

Most of the Little Rann is covered by invasive *Prosopis chilensis* (= *juliflora*). However, this provides good foraging and hiding places for migratory Macqueen's or Houbara Bustard *Chlamydotis macqueeni*. In the thorn forest of Banni, the Grey Hypocotilus is a regular winter visitor/passage migrant in small flocks, mainly feeding on the berries of *Salvadora persica* (Tiwari *et al.* 1996). The wetlands of Bhavnagar, Kheda, Mehsana and Ahmedabad are important breeding ground for the Sarus Crane. In Kheda district alone, Mukherjee *et al.* (2002) have estimated more than 950 individuals.

There are five sanctuaries created for bird protection—Nalsarovar, Thol, Porbandar, Lala and Khijidia. Except for Porbandar, all others fulfill IBA criteria. The Khajidia Bird Sanctuary in Jamnagar is unique in having freshwater and brackish waters side by side, divided by only a narrow bund. From one spot, one can see both the ecosystems with their own bird life. Nalsarovar (8000 ha) is one of the largest bird sanctuaries of the country, surpassed only by the Keoladeo National Park in Rajasthan and Chilika in Orissa in the number and diversity of birds. According to figures provided by the Forest Department, up to 146,000 birds were estimated in 1996 in Nalsarovar (Singh 1998). The 1,40,000 ha Gir National Park and Gir Wildlife Sanctuary is the largest compact forest block in Gujarat, and perhaps the largest Dry Deciduous and Thorn Forest left in northwest India. Besides its famous denizen, the Asiatic Lion *Panthera leo persica*, it has nearly 300 species of birds. The Indian Grey Hornbill *Ocyrceros birostris* has been exterminated from Gir, possibly due to hunting by the tribals. Despite good protection during the last 50 years or so, it has not come back so it is a good candidate for the reintroduction programme.

Beside the official bird and wildlife sanctuaries in Gujarat, there are a large number of wetlands, grasslands and private areas where any sort of hunting or shooting of birds is totally prohibited as most of the people are vegetarian. There are thriving colonies of the Painted Stork *Mycteria leucocephala*, Oriental White Ibis *Threskiornis melanocephalus*, egrets, etc inside Bhavnagar town, Pariehj and Shilaj village (a suburb of western Ahmedabad) (Tatu and Amita 1998). The private Charakla Salt Pans of the Tata Chemical Company near Dwarka have some of the highest concentrations of waders on the northwest coast of India. It is especially famous for its breeding population of the Great Crested Grebe *Podiceps cristatus* and migratory Black-necked Grebe *Podiceps nigricollis*. Up to 1400 Black-necked Grebe have been counted (A. Jadhav, B. M. Parasharya and B. Rughani *in litt.* 2003).



List of threatened birds with IBA site codes

Critically Endangered		
Oriental White-backed Vulture	<i>Gyps bengalensis</i>	IN-GJ-01, 03, 05, 11, 13, 16, 17
Long-billed Vulture	<i>Gyps indicus</i>	IN-GJ-01, 05, 11, 13, 16
Endangered		
Great Indian Bustard	<i>Ardeotis nigriceps</i>	IN-GJ-01, 10
Lesser Florican	<i>Sypheotides indica</i>	IN-GJ-01, 02, 05, 10, 11, 14
Vulnerable		
Spot-billed Pelican	<i>Pelecanus philippensis</i>	IN-GJ-05, 08, 16
Lesser Adjutant	<i>Leptoptilos javanicus</i>	IN-GJ-14
Marbled Teal	<i>Marmaronetta angustirostris</i>	IN-GJ-01
Baer's Pochard	<i>Aythya baeri</i>	IN-GJ-05, 07
Pallas's Fish-Eagle	<i>Haliaeetus leucoryphus</i>	IN-GJ-09
Greater Spotted Eagle	<i>Aquila clanga</i>	IN-GJ-01, 02, 04, 05, 06, 07, 08, 09, 13, 14, 16
Eastern Imperial Eagle	<i>Aquila heliaca</i>	IN-GJ-01, 02, 04, 05, 06, 09, 10, 14, 16
Lesser Kestrel	<i>Falco naumanni</i>	IN-GJ-02, 09, 16
Sarus Crane	<i>Grus antigone</i>	IN-GJ-01, 02, 05, 07, 09, 11, 13, 14, 15, 16, 17
Sociable Lapwing	<i>Vanellus gregarius</i>	IN-GJ-04, 10
Indian Skimmer	<i>Rynchops albicollis</i>	IN-GJ-01, 04, 05, 07, 08, 09, 13, 15, 16, 17
Stoliczka's Bushchat	<i>Saxicola macrorhyncha</i>	IN-GJ-02, 10, 14, 16
Pied Tit	<i>Parus nuchalis</i>	IN-GJ-01, 16
Conservation Dependant		
Dalmatian Pelican	<i>Pelecanus crispus</i>	IN-GJ-01, 04, 05, 06, 07, 08, 09, 12, 13, 16
Near Threatened		
Darter	<i>Anhinga melanogaster</i>	IN-GJ-01, 03, 07, 08, 09, 13, 16, 17
Painted Stork	<i>Mycteria leucocephala</i>	IN-GJ-01, 03, 06, 07, 08, 09, 11, 13, 16, 17
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	IN-GJ-01, 03, 06, 07, 08, 09, 13, 16, 17
Oriental White Ibis	<i>Threskiornis melanocephalus</i>	IN-GJ-01, 07, 08, 09, 13, 16, 17
Lesser Flamingo	<i>Phoenicopterus minor</i>	IN-GJ-01, 03, 06, 07, 08, 09, 13, 16, 17
Ferruginous Pochard	<i>Aythya nyroca</i>	IN-GJ-01, 07, 09, 13, 16
Cinereous Vulture	<i>Aegypius monachus</i>	IN-GJ-01, 09, 16
Red-headed Vulture	<i>Sarcogyps calvus</i>	IN-GJ-01, 07, 09, 16
Pallid Harrier	<i>Circus macrourus</i>	IN-GJ-06, 11
Macqueen's or Houbara Bustard	<i>Chlamydotis macqueeni</i>	IN-GJ-01, 16

Threatened species for which Gujarat is important

Great Indian Bustard *Ardeotis nigriceps* **Endangered**

The Great Indian Bustard was once widespread on the Kathiawar Peninsula (Saurashtra and Kutch). It was found in all areas except the Gir National Park, Girnar and Barda hills (Dharmakumarsinhji 1957). Now it is almost extinct in Saurashtra but 30-35 birds are found in the Naliya area in Kutch.

Lesser Florican *Sypheotides indicus* **Endangered**

It is difficult to estimate the breeding population of this Endangered species in Gujarat but perhaps half of the world's total population is found in Gujarat. There are numerous grasslands (*bheeds*), especially in Saurashtra where this bird is seen during the monsoon whence it comes for breeding (Sankaran and Rahmani 1990, Sankaran 2000). Two of the most important areas are the Velavador National Park in Bhavnagar and the Naliya grasslands in Kutch. Between 35-40 male Lesser Floricans were found in Velavadar and up to 100 males were seen in the Naliya grasslands in the monsoon of 2001 (R. Jadeja pers. comm. 2001).

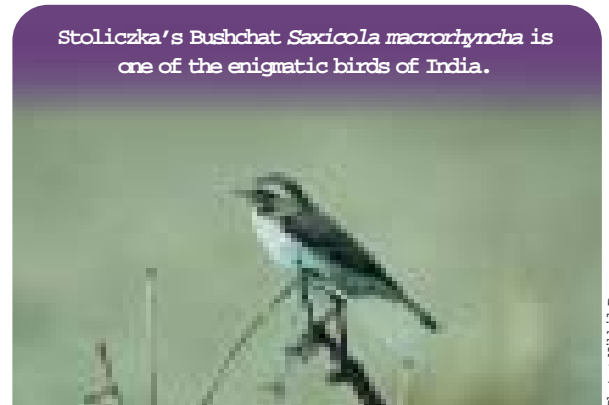
Sarus Crane *Grus antigone* **Vulnerable**

Gujarat is the third most important State as far as the global population of the Sarus crane is concerned – the first being Uttar Pradesh

and second Rajasthan. Ahmedabad, Anand, Baroda and Kheda are important districts for the Sarus Cranes. During the All-India Sarus Crane Count in the year 2000, almost 30% of the cranes counted were from Gujarat. The recruitment rate of the Sarus has fallen to nearly half as compared to 1999 (Choudhury *et al.* 1999, Gopi Sunder *et al.* 2000). In Gujarat, 16 districts and 43 sites revealed 660 adults and 94 juveniles. Hunting of the Sarus was reported from the Kaneval Pond in Anand and the Shala Pond in Kheda district. Pariehj wetland, an important habitat of the Sarus is threatened by development activities, principally the construction of the Saurashtra Pipeline. The majority of the Sarus Cranes in Gujarat are concentrated in three or four wetlands, and these are in urgent need of protection (Gopi Sunder *et al.* 2000).

Stoliczka's or White-browed Bushchat *Saxicola macrorhyncha* **Vulnerable**

This is a rare and local resident of the Indian subcontinent, and is listed as globally threatened. This is another bird of northwest India, with unknown numbers, surviving in the drier parts of Saurashtra and Kutch. The White-browed Bushchat, earlier called Stoliczka's Whinchat, was named after Ferdinand Stoliczka who first described it in 1872 from specimens collected at Rapar and Bhuj, in the Kutch district (Stoliczka 1872). Dharmakumarsinhji (1954) wrote that it was 'rarely met with except in the drier portions of Saurashtra'. Unfortunately, he does not mention where the species was seen, nor whether he saw it. Now, it has been recorded from three known sites (all IBAs): Velavadar NP (10 individuals in Bhavnagar district in 1993, Rahmani 1996), Naliya grasslands (few individuals, R. Jadeja *pers. comm.* 2002), and near Zainabad in the Little Rann of Kutch (Otto Pfister *in litt.* 2002).



Stoliczka's Bushchat *Saxicola macrorhyncha* is one of the enigmatic birds of India.

Photo: Nikhil Devasar

Pied Tit *Parus rufalis* **Vulnerable**

The Pied Tit or White-winged Black Tit is endemic to India and has a disjunct and restricted range: one in south India and another in northwest India (Ali and Ripley 1987, Grimmett *et al.* 1998). Hussain *et al.* (1992) have described its recent distribution, and Tiwari and Rahmani (1996) have described its current status and biology in Kutch. It is difficult to estimate the total population but everywhere it is uncommon, mainly due to the paucity of a suitable habitat. The extant Tropical Thorn Forests of Kutch, Surendranagar and Mehsana districts are very important for its survival.

Biomes

The following three biomes are found in Gujarat: Biome-10, Indian Peninsula Tropical Moist Forest; Biome-11, Indo-Malayan Tropical Dry Zone; and, Biome-13, Saharo-Sindian Desert. In the Dangs district, at the border of Gujarat and Maharashtra, the northernmost portion of Biome-10 (Western Ghats) is found. A closed canopy forest of trees of 30 m or more in height is found here. The dominant species here being mostly moist deciduous, though some evergreen dominants are also found (Singh 1998). A few evergreen trees are found in the lower storey, giving the forest as a whole an evergreen appearance for most of the year. The rainfall varies from 1250 to 1900 mm, with a 4-5 months dry season. BirdLife International (undated) has listed 15 species in Biome-10, out of which at least three species are found here, i.e. the Indian Scimitar Babbler *Pomatorhinus horsfieldii*, Malabar Whistling Thrush *Myiophonus horsfieldii* and Black-throated Munia *Lonchura kelaarti*. One of the Western Ghats Endemic, Small or Crimson-backed Sunbird *Nectarinia minima* is also found in northern Gujarat.

The major area of Gujarat is occupied by Biome-11 (Indo-Malayan Tropical Dry Zone). This consists of Dry Deciduous Forest, Dry Evergreen Forests, Thorn Forest, Semi-Desertic Scrub, Wooded Grasslands and abandoned crop fields. Many species of this Biome have adapted to man-modified habitats. BirdLife International (undated) has listed 59 Indian species in this biome, out of which 52 species have been reported from Gujarat.

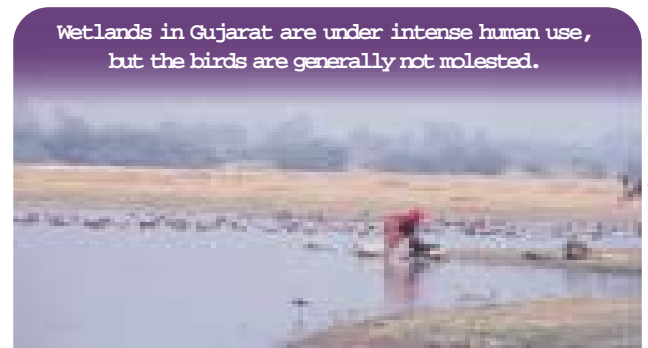
The third biome found in Gujarat is the Saharo-Sindian Desert (Biome-13), mainly located in the Kutch district (Great Rann), with some portions in Surendranagar, Banaskantha and Mehsana districts (Little Rann). Eleven species are identified as representatives of this biome (BirdLife International, undated). Ten have been identified in Gujarat, including such Indian rarities as Grey Hypocolius (Tiwari *et al.* 1996). The remaining species are the Great Indian Bustard, Spotted Sandgrouse *Pterocles senegallus*, Greater Hoopoe Lark *Alaemon alaudipes*, Desert Finch-Lark *Ammomanes deserti*, Trumpeter Finch *Rhodopechys githaginea*, Sykes's Nightjar *Caprimulgus mahrattensis*, White-eared Bulbul *Pycnonotus leucotis*, Stoliczka's Bushchat and Rock Martin or Pale Crag Martin *Hirundo fuligula*. The last species is reported as vagrant in this state.

Some species of Biome-5 (Eurasian High Montane), Biome-7 (Sino-Himalayan Temperate Forest) and Biome-12 (Indo-Gangetic Plains) have been reported, mainly as winter visitor.

The Sind Sparrow *Passer pyrrhonotus* mainly found in Pakistan and representing Secondary Area Indus Plains has been reported from Gujarat as uncommon winter visitor (Grimmett and Inskipp 2003).

THREATS AND CONSERVATION ISSUES

The most important threats to bird life and other life forms are from human and livestock population explosions, overgrazing, frequent droughts, water wars, rapid industrialization and pollution, spread of invasive species and threats of denotification of protected areas. Most of these threats are common in other states also and are too well known to need elaboration. Nevertheless, some of them are described in the context of the IBAs of Gujarat.



Wetlands in Gujarat are under intense human use, but the birds are generally not molested.

Photo: Asad R. Rahmani

Threats to IBAs



A=Agriculture intensification/expansion; B=Dams/Dykes; C=Disturbance to Birds; D=Firewood Collection;
E=Industrialisation/Urbanisation; F=Unsustainable exploitation; G=Others; H=Natural Events

Invasive species *Prosopis* in Banni: One of the greatest dangers to indigenous fauna is the spread of Mesquite *Prosopis chilensis*. It is now the main problem in the Wild Ass Sanctuary in the Little Rann and in the proposed Chhari-Dhand Waterfowl Sanctuary in Banni. The 3,847 sq. km Banni grassland is now invaded by this invasive species (Tiwari and Rahmani 1999). Though it has lost much of its greenery, the Banni still sustains a population of 30,000 milch cattle and 25,000 sheep and goats. The livestock avoid the leaves of *P. chilensis*, which seem to contain some toxic substance. Eating its seedpods can dislocate a cow's jaw, thus reducing grazing efficiency. As the tree has spread, the comparatively hardier buffaloes have replaced the once common and more productive cows of the Kankrej breed. The cows are more susceptible to wounds caused by the thorns of this weed. Traditional water storage systems are also threatened by this weed (Tiwari and Rahmani 1999). The spread of this weed is believed to be a significant factor contributing to the decline of many endangered grassland mammals such as the Wild Ass *Equus hemionus*, Desert Fox *Vulpes vulpes* and Chinkara *Gazella bennetti*. Prominent among the birds found in Kutch are the Houbara, the Lesser Florican, the King or Red-headed Vulture, the Red-headed Falcon, the Steppe Eagle *Aquila nipalensis*, Eastern Imperial Eagle, and the Short-toed Eagle *Circaetus gallicus*. Some of them find it difficult to hunt in the dense thickets of *Prosopis chilensis*. However, at the same time, the spread and growth of *Prosopis* has reduced the cutting pressure on native trees as its wood is good fuel. It is also used for charcoal making (Tiwari and Rahmani 1999).

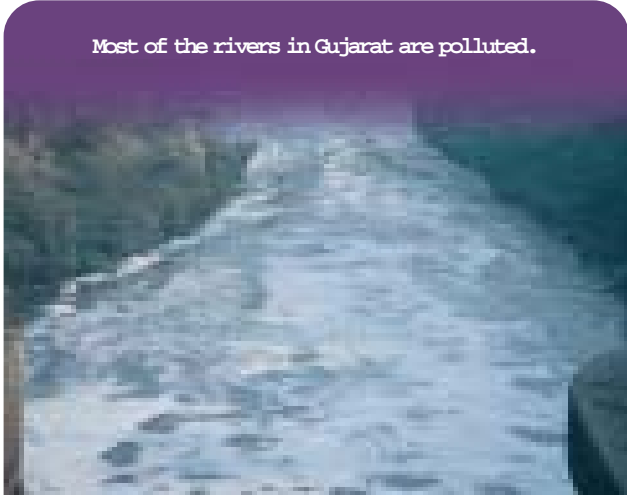


Photo: Asad R. Rahmani

Chemical industries and pollution: Gujarat is a highly industrialized State. As of 31 October 2000, it had 19,771 registered factories and 2,33,777 small-scale industries (Gujarat Ecology Commission 2001). According to the annual survey of industries for the year 1997-98, the chemical and chemical-products group constituted 37.28% of the industries. Most of the highly polluting industries in the list of 18 identified by the Central Pollution Control Board (CPCB) can be found in Gujarat. The Labour Commissioner, Gujarat has listed 46 highly inflammable, poisonous, lethally toxic and hazardous chemicals being produced in Gujarat. The production of some of them is either banned or agreed to be phased out in the developing countries (Gujarat Ecology Commission 2001). Most of these polluting industries are set up in what is known as the golden corridor, Ahmedabad, Surat, Bharuch, Valsad, Vadodra and Mehsana districts. This is the area where the major rivers of Gujarat, Sabarmati, Mahi, Narmada, Tapti and Damanganga, flow. Another industrial belt is the Jamnagar and Rajkot area where giant petrochemical industries have come up in recent years, threatening the existence of the Marine National Park.



Photo: Asad R. Rahmani

Water wars: Gujarat is a dry state, especially the Saurashtra and Kutch regions. Rainfall is inadequate and erratic with periodic drought years. Water is a limiting factor and the reason for many disputes among stakeholders. About 87% of the municipal towns depend entirely on ground water resources (Gujarat Ecology Commission 2001). In the industrial belts, most ground water is polluted and unfit for any use, either for irrigation or for drinking. Despite the development of the Narmada irrigation project, large parts of Saurashtra face water crises. In the coastal regions, due to excessive use of ground water, salinity ingress is becoming a major problem in the Bhavnagar-Una and Malia-Lakhpat stretches. It has affected an area of as much as 13,524 sq. km and reached 14 km



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inwards from the shore (Gujarat Ecology Commission 2001). In order to tap rainwater, Gujarat is dotted with small to medium size reservoirs, some more than 200 years old. These reservoirs attract a very large number of waterfowl, especially migratory cranes and ducks. One such large reservoir of 700 ha, established in 1912, near Thol village is now a bird sanctuary and an IBA. Most of the water of the lake is drawn for irrigation, leaving the water spread in less than 10 ha during midwinter. Local villagers carry out cultivation within the Sanctuary. Although the level of protection against poaching is good, there are difficulties in implementing the provision of the Wildlife (Protection) Act, 1972 because of historical use of water by local people as well as non-settlement of legal issues related to illegal cultivation, and withdrawal of water (Singh1998).

Mining: One of the biggest conservation problems of Gujarat is mining, in and outside protected areas. The Narayan Sarovar Chinkara Sanctuary in Kutch was reduced from about 90000 ha to 40000 ha to allow mining. Another irreversible problem is donitification of PAs to allow mining, laying of pipelines, industrialization, canal irrigation etc.

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GJ-01

BANNI GRASSLAND AND CHHARI DHAND



IBA Site code	: IN-GJ-01
State	: Gujarat
District	: Kutch
Coordinates	: 23° 41' 60" N, 69° 24' 00" E
Ownership	: State
Area	: 3,84,700 ha
Altitude	: 2 - 5 m
Rainfall	: 400 mm
Temperature	: 6 °C to 47 °C
Biogeographic Zone	: Desert
Habitat	: Tropical Grassland, Freshwater Swamp, Tropical Secondary Scrub

IBA CRITERIA: A1 (Threatened Species), A4i ($\geq 1\%$ biogeographic population), A4iii ($\geq 20,000$ waterbirds)
PROTECTION STATUS: Not officially protected

GENERAL DESCRIPTION

The Banni area, as the name signifies, is a “*Bani hui*” (made up) land formed by the detritus brought down and deposited predominantly by the Indus River, which was reported to flow through the Great Rann in the past. Banni is a low-lying alluvial plain. The local Sindhis call the grassland of Banni *peera jo paat* or the land of saints.

Banni falls under the Revenue Department and extends over two *talukas*, Nakhatrana and Bhuj. A small part of the Banni grassland also falls in Lakhpat and Bhachau *talukas*. The state highway running from Bhuj to Khavda divides the Banni into eastern Banni (also called locally as Ugamni Banni or Nadhi Banni) and the main Banni.

About 38% of the total area of the Banni used to be covered by superior grassland with 40 different varieties of grasses (Anon. 1992). A huge freshwater lake (c. 8,000 ha in good rains) locally known as Chhari-Dhand (*dhand* = a shallow lake) is a prominent feature of the Banni grassland. There are a number of waterbodies in the Banni grassland (namely Servo Dhand, Vakeria Dhand, Kheerjog Dhand, Abdha Jheel, Mokar Jheel, Luna Jheel), which are seasonal, filling up during years of heavy precipitation and with spillovers from the nearby irrigation reservoirs, namely Bhukhi, Mathal, Nara, and Gajansar. The water gradually turns saline due to excessive evapotranspiration and the high contents of dissolved salts in the soil. A huge concentration of waterfowl is hosted by these *dhands* during the autumn migration and in winter.

Vegetation includes around 40 different species of grasses and sedges. *Prosopis chilensis*, which was introduced about 80 years ago in this grassland, is the only dominant tree species. It now covers huge tracts of the grassland, and forms impenetrable thickets in some places.

AVIFAUNA

The number of bird species reported from this site is about 270 (Tiwari and Rahmani 1997). During the years of good rainfall, Banni becomes the wintering ground for about 40,000 Common Cranes *Grus grus* (Tiwari and Rahmani 1997, 2002). The 1% threshold of Common Crane population wintering in India is 700 (Wetlands International 2002). Tiwari and Rahmani (1997, 2002) also estimate that about 70,000 Common Cranes winter in the

whole of Kutch district, especially after a normal monsoon. The total population of the Common Crane in West Siberia and Kazakhstan is about 70,000 (Wetlands International 2002). This is the population that comes to India, Afghanistan and Iran. Therefore, Kutch district, particularly Banni grasslands and Chhari Dhand receive most of this population.

Another globally threatened species is the Pied Tit or White-winged Black Tit *Parus nuchalis* (BirdLife International 2001). It is found in the scrub forests at the edge of the Banni (Tiwari and Rahmani 1996). Grey Hypocolius *Hypocolius ampelinus* is found in winter, almost every year, but its number fluctuates.

Earlier, the Great Indian Bustard *Ardeotis nigriceps* was regularly found in the Banni grasslands (Himmatsinhji 1983 *pers. comm.*) but now it is extremely rare. The only recent record is a male seen between Chhari Dhand and Khera Dungar, at the edge of Banni in 1991 (Mehboob Alam *pers. comm.* 1991).

The Indian Skimmer *Rynchops albicollis* is also listed as threatened by BirdLife International (2001) due to the small, rapidly declining population as a result of widespread degradation and disturbance of lowland rivers and lakes. It has been described as resident, nomadic and also a local migrant, depending upon water conditions (Ali and Ripley 1987). The Indian Skimmer was not seen by Salim Ali during his bird surveys in Kutch in 1943-44 (Ali 1945). Interestingly, during BNHS bird migration studies in Kutch in 1990-91, this species was observed at various wetlands, including one bird seen in Chhari-Dhand on May 19, 1990 (Tiwari and Rahmani 1997).

The Marbled Teal *Marmaronetta angustirostris* is listed as Vulnerable by BirdLife International (2001) due to its rapid decline in its core wintering areas as a result of widespread and extensive habitat destruction. It is basically a European bird and in India, it is uncommon to rare. According to Wetlands International (2002), the non-breeding population numbers about 5,000 in South Asia. Akhtar *et al.* (1992) saw about 200 in February 1990. This would be about 4% of the South Asian population.

The Banni Grasslands and Chhari-Dhand form one of the most important bird areas in the desert ecosystems of India. With the presence of 11 globally threatened species, and nine Near Threatened species, it easily fits A4 criteria. With its huge numbers of ducks, waders and cranes, many far exceeding their 1%

population threshold numbers, it also qualifies A4i and A4iii criteria. Besides this, the site also fits in A3 criteria (Biome-restricted assemblages). The site falls in Biome-13 (Saharo-Sindian Desert) but many species of Biome-11 are also found here. BirdLife International (undated) has listed 59 birds in the Biome-11 found in India. At this site, 24 have been seen, and many more are likely to occur. Most of them are quite common and widespread.

Critically Endangered	
Oriental White-backed Vulture	<i>Gyps bengalensis</i>
Long-billed Vulture	<i>Gyps indicus</i>
Endangered	
Great Indian Bustard	<i>Ardeotis nigriceps</i>
Lesser Florican	<i>Sypheotides indica</i>
Vulnerable	
Marbled Teal	<i>Marmaronetta angustirostris</i>
Greater Spotted Eagle	<i>Aquila clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>
Pied Tit	<i>Parus nuchalis</i>
Conservation Dependant	
Dalmatian Pelican	<i>Pelecanus crispus</i>
Near Threatened	
Darter	<i>Anhinga malanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Oriental White Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoenicopterus minor</i>
Ferruginous Pochard	<i>Aythya nyroca</i>
Cinereous Vulture	<i>Aegypius monachus</i>
Red-headed Vulture	<i>Sarcogyps calvus</i>
Maqueen's Bustard	<i>Chlamydotis macqueeni</i>

OTHER KEY FAUNA

The density of wild mammals is very low; mainly Wolf *Canis lupus*, Hyena *Hyaena hyaena* and Chinkara *Gazella bennettii* are seen. Bluebul *Boselaphus tragocamelus* is seen at the fringes and is increasing in number. Spiny-tailed Lizard *Uromastyx hardwickii* is one of the commonest reptiles of the Banni.

LAND USE

- q Agriculture
- q Fishing
- q Irrigation
- q Human habitation
- q Nature conservation and research

THREATS AND CONSERVATION ISSUES

- q Siltation
- q Overgrazing
- q Invasion of exotic plant *Prosopis chilensis*
- q Damming of rivulets
- q Overspilling of seawater on to the land

The Rann to the north of Banni has been slowly encroaching on to the Banni area. In ten years, three villages named Udhma, Laiwara and Mota-Bhitara have been abandoned for this reason. During the high tide, seawater from the Rann often spills into the Banni Basin and cannot drain back, as the grassland slopes

southward. It stagnates and evaporates, leaving behind a salt layer. By this process the Rann has been encroaching into the grassland. Moreover, damming of north flowing rivers, which used to empty in the Banni region, before merging into the Great Rann of Kutch, has also impacted the ecology of Banni. Numerous dams have come up in recent decades, which have altered the water drainage of Banni completely. They prevent leaching of saline soil, resulting in further increase in salinity, which adversely affects the growth of grasses (Tiwari and Rahmani 1997).

Considering the importance of Chhari-Dhand, the Government of Gujarat is planning to declare it as a bird sanctuary. As Banni and Chhari-Dhand are used by local villagers, once the sanctuary is declared, the management plan should be prepared in such a way that it does not unnecessarily impinge the traditional rights of the locals.

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J. K. Tiwari and Asad R. Rahmani

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Photo: Yogen Khatri

GJ-02

BHAL AREA



IBA Site Code	: IN-GJ-02
State	: Gujarat
District	: Bhavnagar and Ahmedabad
Coordinates	: 22° 19' 59" N, 72° 00' 00" E
Ownership	: State
Area	: 2,59,000 ha
Altitude	: Sea level
Rainfall	: 450 mm
Temperature	: 1 °C to 44 °C
Biogeographic Zone	: Coasts
Habitats	: Tropical Grassland, Tropical Moist Scrub

IBA CRITERIA: A1 (Threatened Species)
PROTECTION STATUS: Not officially protected

GENERAL DESCRIPTION

The Bhal (literally meaning the forehead) is a flat alluvial plain, made up of a mosaic of croplands, saline wastelands, grasslands, pasture land and marshes (Dharmakumarsinhji 1978). It is bordered on the south by the Kalubar river, extends north to Dholka and Dhandhuka, and northwest to Limbdi. The Bhal region is believed to have emerged from the sea during the late Tertiary and early Quaternary, much later than the rest of Saurashtra which appeared during the Cretaceous period (Dharmakumarsinhji 1978, Raychaudhari *et al.* 1963).

The Bhal region is prone to droughts and floods. Cyclones occasionally strike the coast of Saurashtra. During such times, the Bhal becomes a large swamp. This attracts a very large number of waders and other waterbirds.

The Bhal area was an open treeless habitat as recently as 50 years ago (Dharmakumarsinhji 1978, Mungall *et al.* 1981). *Prosopis chilensis* was planted in the Bhal area about 60 years ago near Mithapur, to provide fuel wood. It has since spread rampantly and converted much of the grasslands into savanna and thorn-forest habitat (Jhala 1991).

Nearly forty species of grasses have been identified from the area. The dominant grass species are *Dicanthium annulatum*, *Sporobolus virginicus*, *S. coromandelianus* and *S. maderspatensis*. *Prosopis chilensis* is the dominant species of shrub.



Photo: Nikhil Devasar

AVIFAUNA

No detailed study of the avifauna has been conducted, except for notes by Dharmakumarsinhji and others. However, the scattered patches of grasslands were perhaps the most important breeding areas for the Lesser Florican, and even now they could become important if protected during monsoon. Velavadar (another IBA), also in Bhal region, has well-protected grassland and between 40-45 male floricans are seen there.

Bhal region is an important habitat of Stoliczka's Bushchat *Saxicola macrorhyncha* (Gadhvi and Rathod 2003). It is seen in and around Velavadar NP but is likely to occur in more areas in the Bhal.

Wherever water remains for a couple of months, Sarus Crane *Grus antigone* breeds. No population estimate has been done, but after Kheda region in north Gujarat, the Bhal could be the most important habitat for this bird in Gujarat.

In winter, Houbara or Macqueen's bustard *Chlamydotis macqueeni* is found, albeit in small numbers. The Bhal region is also very important for raptors. Scattered grasslands and crop fields host a huge population of harriers. According to Asad Akhtar (*pers. comm.* 2001), between 3-4 thousand harriers roost in Velavadar NP. During the daytime, most of these harriers spread out in the Bhal region for foraging. Therefore, small grassland patches are extremely important for the survival of harriers.

Endangered	
Lesser Florican	<i>Sypheotides indica</i>
Vulnerable	
Greater Spotted Eagle	<i>Aquila clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Lesser Kestrel	<i>Falco naumanni</i>
Sarus Crane	<i>Grus antigone</i>
Stoliczka's Bushchat	<i>Saxicola macrorhyncha</i>

OTHER KEY FAUNA

Nilgai *Boselaphus tragocamelus* is very common, despite it being a crop pest, as the local populace does not harm it. Chinkara *Gazella bennettii* is also seen, but only in undulating areas. Scattered herds of Blackbuck *Antelope cervicapra* are also found, the majority of

them occurring in Velavadar NP. The Grey Wolf *Canis lupus* is the largest wild predator of the region (Jhala 1991). The Indian Fox *Vulpes bengalensis* and Golden Jackal *Canis aureus* are smaller Canids of this area. Nearly 100 years ago, the vast flat grasslands of the Bhal used to have Cheetah *Acinonyx jubatus*. Once Cheetah became extinct here (and extremely rare in the rest of India), African Cheetahs were used for sport hunting. The Bhal is perhaps the last area in India where, up to the mid 1940s, tame African Cheetahs were used for hunting Blackbuck (Craighead and Craighead 2001).

LAND USE

- ☐ Human habitation
- ☐ Grazing land
- ☐ Saltpan industries
- ☐ Traffic / transportation
- ☐ Agriculture

THREATS AND CONSERVATION ISSUES

- ☐ Destruction of grassland habitat due to increasing number of saltpans and industries
- ☐ Infestation by *Prosopis chilensis*
- ☐ Proposed Narmada Canal network
- ☐ Traffic
- ☐ Livestock grazing
- ☐ Industrial development and pollution

The increasing number of saltpans in Bhal poses a threat to the natural habitat of the avifauna. Beside this, industrial development in the coastal areas also disturbs the birds due to the resultant heavy traffic. Conversion of natural grassland into agricultural land is yet another threat that needs to be checked. Moreover, the spread of *Prosopis chilensis* is reducing the open foraging ground for Houbara and Stoliczka's Bushchat. The proposed Narmada Canal network will cause changes in land-use pattern and water logging, which will affect the wildlife of the area.

KEY CONTRIBUTORS

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Macqueen's bustard *Chlamydotis macqueeni* is often seen in the Bhal area.



Photo: Otto Flister

GT-02

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CHARAKLA SALTWORKS



IBA Site Code	: IN-GJ-03
State	: Gujarat
District	: Jamnagar
Area	: Not available
Altitude	: 0 msl
Rainfall	: Not available
Temperature	: Not Available
Ownership	: Tata Chemicals Ltd.
Biogeographic Zone	: Coasts
Habitats	: Aquatic (Salt Pan, Tidal Mudflat, Mangrove)

IBA CRITERIA: A1 (Threatened Species), A4i ($\geq 1\%$ biogeographic population), A4iii ($\geq 20,000$ waterbirds)

PROTECTION STATUS: Not officially protected

GENERAL DESCRIPTION

Charakla Saltworks is located near Okhamandal in Jamnagar district. The area is bound by the Gulf of Kutch coast on the north and spreads to the Arabian sea coast down south. Sea water is pumped in from the Gulf of Kutch and allowed to flow through a series of shallow ponds to enable the process of evaporation for the production of salt. These salt pans attract tens of thousands of waterbirds.

The area features four types of habitats: the salt pans, mangroves, thorny scrub in the surrounding area, and saline wastelands.

AVIFAUNA

About 120 species of birds have been identified in this IBA (Vivek Talwar and Satish H. Trivedi *pers. comm.* 2003). There are reports of more than 300 Black-necked Grebe *Podiceps nigricollis* seen in some winters, perhaps the largest known population in India. The Great Crested Grebe *Podiceps cristatus* is known to breed in the area - another confirmed site where this bird breeds is Khijadiya Bird Sanctuary in the same district.

Sometimes large flocks consisting of up to 300 to 400 individuals of Rosy Pelican *Pelecanus onocrotalus*, and Dalmatian Pelican *P. crispus* are seen. Both species of flamingos - the Greater *Phoenicopterus ruber* and the Lesser *P. minor* - are seen in thousands. Despite the presence of these large spectacular birds, the site is famous for its multitude of smaller waders such as stints, sandpipers, plovers, curlews and godwits. Some species occur in much greater numbers than their 1% population threshold determined by Wetlands International (2002). Thirty species of small waders are reported from this area - the list is too long to include here.

Among gulls, Herring *Larus argentatus*, Lesser Black-backed *L. fuscus*, Great Black-headed *L. ichthyaetus*, Brown-headed *L. brunnicephalus*, Black-headed *L. ridibundus* and Slender-billed *L. genei* are found. Terns are represented by Sandwich *Sterna sandvicensis*, Large Crested *S. bergii*, Little *S. albifrons*, Black-shafted *Sterna saundersi*, Gull-billed *Gelochelidon nilotica* and Caspian *Hydroprogne caspia*. The Caspian Tern breeds in this area (Sudershan Rodriguez *pers. comm.* 2004).

This site is selected on the basis of A1 (Threatened Species), A4i ($\geq 1\%$ of biogeographic populations of many species) and A4iii (presence of $\geq 20,000$ waterbirds).

Critically Endangered

Oriental White-backed Vulture *Gyps bengalensis*

Near Threatened

Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Lesser Flamingo	<i>Phoenicopterus minor</i>

OTHER KEY FAUNA

Not available

LAND USE

☐ Salt production

Bulk of the area is under saltworks operations for production of salt. Land on the flanks of the salt pans has been kept fallow to facilitate drainage of storm water during the monsoon season.

THREATS AND CONSERVATION ISSUES

- ☐ Fishing by local community in the area
- ☐ Stray incidents of poaching
- ☐ Mortality of flamingos due to collision with the power lines.

The Okhamandal region is one of the most drought prone regions of our country. Almost every alternate year is a drought year resulting in fodder scarcity. The locals indulge in collection of mangrove foliage for feeding their cattle. Camel grazing in the mangrove zone is also rampant. These anthropogenic pressures including collection of fuel wood have resulted in the degradation of the mangrove vegetation and added to the pressures on the nesting of the local birds.

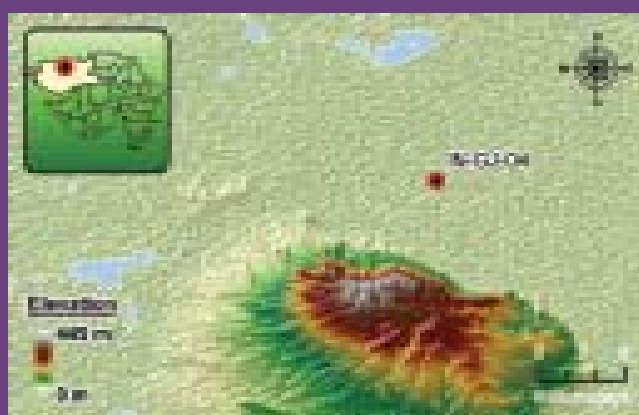
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FLAMINGO CITY



IBA Site Code	: IN-GJ-04
State	: Gujarat
District	: Kutch
Coordinates	: 24° 00' 00" N, 69° 52' 00" E
Ownership	: State
Area	: 7,50,722 ha
Altitude	: 15 - 438 m
Rainfall	: 400 mm
Temperature	: 1 °C to 48 °C
Biogeographic Zone	: Desert
Habitat	: Aquatic (Seasonal Wetland)

IBA CRITERIA: A1 (Threatened Species), A4i (≥1% biogeographic population), A4iii (≥ 20,000 waterbirds)

PROTECTION STATUS: Not officially protected

GENERAL DESCRIPTION

Flamingo City lies in the Rann of Kutch, 10 km northeast of Nir at the tip of Pachchham Island south of Solanki Bet. The area is famous for the nesting of Greater Flamingo *Phoenicopterus ruber*. Maharao Khengarji was the first to confirm the breeding of Greater Flamingos in India (Shivraj Kumar *et al.* 1960) and later confirmed that they breed in large numbers, in the so-called Flamingo City (Rao 1909). Later, Ali (1945) estimated a total population in the order of half a million birds in 1945.

The Flamingo City is now a part of the Kutch Desert Wildlife Sanctuary (7,50,622 ha). The habitat of the Sanctuary is true saline desert in low-lying flats, with an average altitude of 15 cm above msl (Singh 1998). Kala-Dungar is the highest point (438 m) within the Sanctuary. The flat sterile land (called *Rann*) becomes submerged during the rainy season. Flamingos nest only when the water level is optimum (both due to good rainfall and ingress of sea water).

Other habitats of this sprawling Sanctuary include the *bets* or islands supporting vegetation, seasonal waterbodies, saline-alkaline scrub, *Prosopis* scrubland, desert thorn scrub forest in the hilly region Kala-Dungar, and marsh vegetation (Singh 1998).

If the conditions are suitable, thousands of flamingos breed in the Rann.

Photo: Otto Pfister



Plant diversity is poor in this area. *Salvadora persica*, *S. oleoides*, *Capparis aphylla*, *C. decidua*, *Commiphora wightii*, *Zizyphus* sp., *Acacia senegal*, *Balanites* sp., *Euphorbia* sp., *Prosopis spicigera*, *P. chilensis*, *Aeluropus logopoides*, *Suaeda* sp. and *Cressa cretica* are the main species on *bets* and uplands (Singh 1998). The *Rann* is more or less devoid of vegetation. Interestingly, a small patch of mangroves is found, about 100 km inland, due to the saline water (Ranjitsinh 1985).

AVIFAUNA

This site (Flamingo City) has been selected as an IBA based on its importance as a breeding ground of the Greater Flamingo in India. Over 70,000 birds nest in an area of about 100 ha (H. S. Singh *pers. comm.* 2001). Besides the flamingoes, some globally threatened species are also reported.

This is the only known site in India where the Rosy Pelican *Pelecanus onocrotalus* has been found breeding (Ali 1960).

Vulnerable

Greater Spotted Eagle	<i>Aquila clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Sociable Lapwing	<i>Vanellus gregarius</i>
Indian Skimmer	<i>Rynchops albicollis</i>

Conservation Dependant

Dalmatian Pelican	<i>Pelecanus crispus</i>
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OTHER KEY FAUNA

The most famous mammal is the Indian Wild Ass *Equus onager* found mainly at the junction the Little Rann of Kutch. Other species include Chinkara *Gazella bennettii*, Grey Wolf *Canis lupus*, and Caracal *Caracal caracal* (Singh 1998). Bluebul *Boselaphus tragocamelus*, Wild Boar *Sus scrofa*, Striped hyena *Hyaena hyaena*, Desert Fox *Vulpes vulpes*, Civet Cat *Paradoxurus hermaphroditus*, Black-naped Hare *Lepus nigricollis*, Common Mongoose *Herpestes edwardsi* and Porcupine *Hystrix indica* are also found in suitable habitats.

LAND USE

- q Nature conservation and research
- q Human habitation
- q Army

GJ-04

THREATS AND CONSERVATION ISSUES

- Unregulated tourism
- Army movement

Flamingo City is a part of the large Desert Wildlife Sanctuary. Most of the desert area is not used by people and appears to be protected, yet there is disturbance due to the movement of the Indian Army.

Army activities cause serious disturbance to the site. As Flamingo City has become quite popular amongst the Army, any visiting dignitary is taken there, sometimes at the peak of the breeding season. Aerial sorties, to have a closer look, disturb the breeding birds. This could be easily avoided with greater sensitization and involvement of the Army personnel. Otherwise, there appears to be no danger to this remote area.

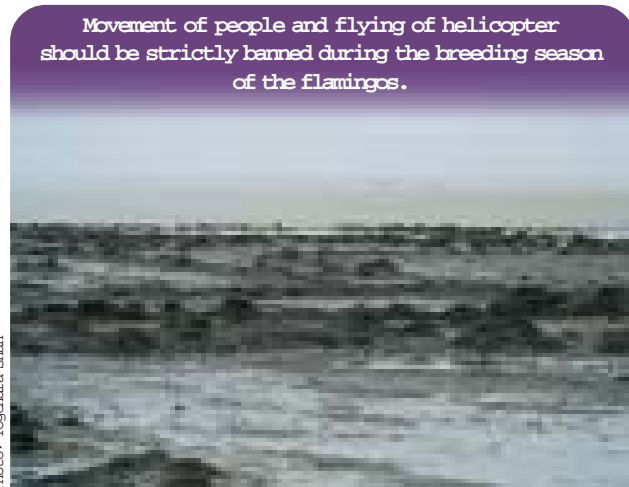


Photo: Yogendra Shah

Movement of people and flying of helicopter should be strictly banned during the breeding season of the flamingos.

As the final notification of the Sanctuary has not been done, there is a looming threat to totally dismantle this Sanctuary.

Frequent drought and scarcity of water are the limiting factors on biodiversity. Being a part of a large desert area, it is difficult to demarcate and manage it properly. Final notification of the Kutch Desert Wildlife Sanctuary is still pending, mainly due to objection by the Army. As the Sanctuary is close to the Indo-Pakistan border, it is of strategic importance to the Army. Therefore, involvement of the Army is absolutely essential for the protection of Flamingo City and the fragile desert ecosystem.

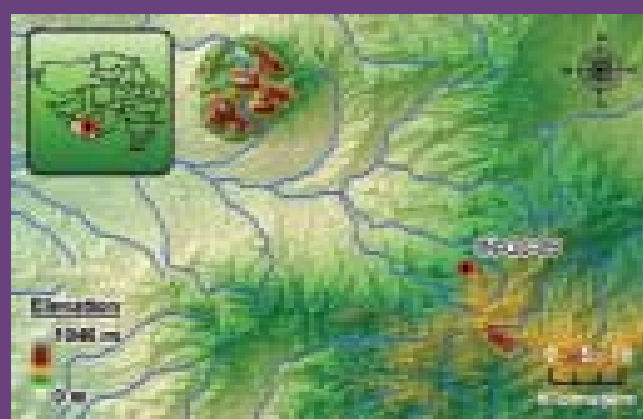
KEY CONTRIBUTOR

H. S. Singh

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GIR NATIONAL PARK AND SANCTUARY



IBA Site code	: IN-GJ-05
State	: Gujarat
District	: Junagadh and Amreli
Coordinates	: 21° 17' 30" N, 70° 48' 45" E
Ownership	: State
Area	: 1,41,213 ha
Altitude	: 150 - 642 m
Rainfall	: 980 mm
Temperature	: 8 °C to 41°C
Biogeographic Zone	: Semi-Arid

IBA CRITERIA: A1 (Threatened Species), A3 (Biome-11: Indo-Malayan Tropical Dry Forests)
PROTECTION STATUS: National Park, established in May 1975

GENERAL DESCRIPTION

Gir National Park and Sanctuary is one of the oldest sanctuaries of India and is famed for being the remaining habitat of the Asiatic Lion *Panthera leo persica*. Gir forest has become a very stable ecosystem with tremendous regenerating, self-supporting and self-sustaining capacity, due to its compactness and richness of biodiversity. It is one of the largest biologically intact continuous tracts of land in India reserved primarily for the conservation of its native wild fauna (Singh 1998, 2001). The site has an undulating, low, hilly terrain. The protected area is surrounded by flat agricultural land.

The total area is 141,213 ha, comprising of the Wildlife Sanctuary (115,342 ha) which encircles the National Park (25,871 ha). This area enjoys protection of the highest order. A 380 km long stone wall borders the entire National Park. The area forms the catchment for seven major and two minor rivers. There are four dams and seven perennial rivers within the protected area.

In all, 448 species of flowering plants and 96 tree species have been recorded in the area, including *Tectona grandis*, *Acacia catachu*, *Boswellia serrata*, dhak *Butea monosperma*, *Lannea coromandelica*, *Anogeissus latifolia* and *Diospyros melanoxylon*, *Ficus glomerata* and *Syzygium cumini* (Singh 1998).

AVIFAUNA

About 300 species of birds have been recorded from Gir (Singh 1998). Globally threatened species include Dalmatian Pelican *Pelecanus crispus*, Greater Spotted Eagle *Aquila clanga*, Indian Skimmer *Rynchops albicollis*, Oriental White-backed Vulture *Gyps bengalensis* and Long-billed Vulture *Gyps indicus*. The wetlands in Gir support several waterfowl species, especially in Kamaleshwar Dam. The area has always been and continues to be popular with birdwatchers (Raol 1969).

Out of the 9 species of vultures in India, Gir has six. Two *Gyps* species have now become very rare. During a visit in 2001, not a single bird of these species was seen in two days (A. R. Rahmani *pers. observ.* 2003). The Lesser Florican *Sypheotides indica* is mainly seen in the surrounding grassland, very rarely inside Gir. Similarly, Sarus Crane *Grus antigone* is also found mainly in the surrounding areas.

In the whole of Saurashtra region, Gir is the largest tract of natural forests, and represents the best example of the original flora and fauna. Except for the Grey Hornbill *Ocyrceros birostris*, which has become extinct due to persecution by tribals, most of the birds of the Indo-Malayan Tropical Dry Forests (Biome-11) are found in Gir.

Gir was selected as an IBA based on A1 (Threatened Species) and A3 (Biome-11: Indo-Malayan Tropical Dry Forests). The bird list of biome species is too long to be included here.

Around 300 species of birds are reported from Gir.



Photo: A. J. T. Jhansingh

Critically Endangered	
Oriental White-backed Vulture	<i>Gyps bengalensis</i>
Long-billed Vulture	<i>Gyps indicus</i>
Endangered	
Lesser Florican	<i>Sypheotides indica</i>
Vulnerable	
Spot-billed Pelican	<i>Pelecanus philippensis</i>
Baer's Pochard	<i>Aythya baeri</i>
Greater Spotted Eagle	<i>Aquila clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>
Conservation Dependant	
Dalmatian Pelican	<i>Pelecanus crispus</i>

GJ-05

Cattle camps, called *ness*, have been re-located outside Gir, but many still remains.



Photo: Asad R. Rahmani

OTHER KEY FAUNA

About 36 species of mammals, 300 species of birds, 33 of reptiles, 6 of amphibians, and 2,000 of invertebrates have been reported from the area (Singh 1998). Besides the famous lions, Gir also supports a large population of the leopard *Panthera pardus*. Important prey species comprise Spotted Deer *Axis axis*, Wild Boar *Sus scrofa*, Bluebull *Boselaphus tragocamelus* and Sambar *Cervus unicolor*, as well as domestic cattle. Other mammals include Four-horned antelope *Tetracerus quadricornis*, Chinkara *Gazella bennettii*, Striped hyaena *Hyaena hyaena*, Golden Jackal *Canis aureus*, Common Langur *Semnopithecus entellus*, Porcupine *Hystrix indica* and Black-naped Hare *Lepus nigricollis*.

LAND USE

- q Nature conservation and research
- q Tourism and recreation
- q Urban transport

THREATS AND CONSERVATION ISSUES

- q Livestock grazing
- q Roadways
- q Railway track
- q Mining
- q Tribal settlements

Mining of limestone outside the forest is causing habitat destruction on an unprecedented scale. Traffic on a road passing through the area disturbs the wildlife. There are 14 forest settlements of *Maldharis*, livestock owning communities that live in the Sanctuary. Their increasing population and that of the cattle, and additional cattle that migrate from peripheral villages, exert tremendous grazing pressure on the Sanctuary (Singh 2001).

Three rapidly expanding major pilgrimage sites attract thousands of visitors throughout the year causing immense damage to the area.

KEY CONTRIBUTOR

H. S. Singh

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KAJ LAKE (PIPALAVA BANDHARO)



IBA Site Code	: IN-GJ-06
State	: Gujarat
District	: Junagadh
Coordinates	: 20° 48' 38" N, 70° 48' 21" E
Ownership	: State
Area	: c. 400 ha.
Altitude	: 1 - 1.5m
Rainfall	: 800 mm
Temperature	: 10 °C to 38 °C
Biogeographic Zone	: Semi-Arid
Habitat	: Aquatic (Reservoir)

IBA CRITERIA: A1 (Threatened Species), A4i (> 1% biogeographic population)

PROTECTION STATUS: Not officially protected

GENERAL DESCRIPTION

Kaj Lake is situated 10 km eastward of Kodinar town in Junagadh district. It is a tidal regulatory dam constructed by the Irrigation Department, Government of Gujarat in 1995. The name of the site on government record is 'Pipalava Bandharo' (*Bandharo* = earthen dams erected to harvest rainwater).

The lake is bordered by three villages: Nanavada, Pipalava and Chikhli. Maximum depth of the lake is 2 m. During the high tide, particularly on full moon and no moon days, tidal water from the Arabian Sea touches the dam. Thus, one side of the dam is a large, shallow freshwater lake with moderate vegetation and on the other side the tidal mudflat attracts thousands of waterfowl in winter. The maximum water is seen during July and August and minimum during March when the lake is totally dry. As the farmers of surrounding villages drain the water to irrigate their crops from October onwards, the lake almost dries out by the end of February or March. The farmers use diesel engine or submersible water pumps to draw the water. The village Kaj is about 8 km from the lake which is also known as *Kaj Nu Talav*. The main occupation of the villagers is agriculture. Cotton, groundnut, sugarcane, sorghum, maize and millet are cultivated.

Typha and *Cyperus* are the common emergent vegetation. The vegetation cover is moderate. The surrounding area has sparse stands of *Prosopis chilensis*. Sedges and grasses are found on the islands and margins of the lake. Scattered shrubs of *Zizyphus* and *Capparis* are also seen in the surrounding area.

AVIFAUNA

About 40 species of birds were observed by Indira Gadhvi (*pers. comm.* 2003) The wetland regularly harbours more than 20,000 birds during winter, thus it fulfills A4iii criteria. At least two globally threatened species are seen here every winter, so it also qualifies A1 criteria. Besides this, four Near Threatened species have been seen till now, and more are likely to occur.

Wetlands International (2002) has recently published new waterbird population estimates. The A4i criteria of BirdLife International (undated) states that any site which has $\geq 1\%$ of the biogeographic population of a congregatory waterbird species could be considered as an IBA. The Kaj Lake easily qualifies this criteria as it has more than 1% population of five species. The Common Crane *Grus grus* can be mentioned here, although with a maximum number of 675 seen in January 2003, it does not strictly hold 1% population threshold (Wetlands International estimates 1% population threshold as 700).

A large number of Common *Grus grus* and Demoiselle cranes *Grus virgo* are found in this IBA every winter. The picture shows a small part of a large flock of Demoiselle cranes.



Photo: V. I. Theyal / BHS Library

Species with high populations

Species	Population in Jan. 2003	1 % Biogeographic Population
Great White Pelican <i>Pelecanus onocrotalus</i>	300	230
Demoiselle Crane <i>Grus virgo</i>	27,120	1,000
Spoonbill <i>Platalea leucorodia</i>	500	230
Ruff <i>Philomachus pugnax</i>	1000	1000
Black-tailed Godwit <i>Limosa limosa</i>	7000	1,000

1% population estimates based on Wetlands International (2002)

Vulnerable

Greater Spotted Eagle <i>Aquila clanga</i>
Eastern Imperial Eagle <i>Aquila heliaca</i>

Conservation Dependant

Dalmatian Pelican <i>Pelecanus crispus</i>

Near Threatened

Painted Stork <i>Mycteria leucocephala</i>
Black-necked Stork <i>Ephippiorhynchus asiaticus</i>
Lesser Flamingo <i>Phoenicopterus minor</i>
Pallid Harrier <i>Circus macrourus</i>

OTHER KEY FAUNA

There is no mammal of great conservation concern. Golden Jackal *Canis aureus*, Jungle Cat *Felis chaus*, and Nilgai *Boselaphus tragocamelus* are the commonly seen in the area.

LAND USE

- ☐ Irrigation
- ☐ Agriculture and grazing

THREATS AND CONSERVATION ISSUES

- ☐ Draining of water in peak migratory season
- ☐ Invasion by *Prosopis chilensis*
- ☐ Grazing
- ☐ Poaching

This wetland suffers from the litany of problems that beset other wetlands in India - overgrazing in the catchment area resulting in siltation, spread of invasive species and drainage of water when bird populations are at their peak in winter. As this is an irrigation reservoir, and the villagers have the right to use water for irrigation, not much can be done. As Saurashtra regularly suffers from drought, it becomes difficult to stop draining of whatever water is collected for irrigation. The welfare of birds always comes second. The only way by which villagers could be persuaded to keep some water is through conservation education and bird related tourism. If the villagers see great benefit accrued through tourism, they would be willing to save some water for the birds.

KEY CONTRIBUTOR

I. R. Gadhvi

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KHIJADIYA LAKE AND BIRD SANCTUARY



IBA Site Code	: IN-GJ-07
State	: Gujarat
District	: Jamnagar
Coordinates	: 22° 31' 60" N, 70° 09' 00" E
Ownership	: State
Area	: 605 ha (Sanctuary)
Altitude	: 0 - 2 m
Rainfall	: 550 mm
Temperature	: 7 °C to 40 °C
Biogeographic Zone	: Semi-Arid, Coasts
Habitats	: Freshwater Swamp, Marsh

IBA CRITERIA: A1 (Threatened Species), A4i (≥ 1% biogeographic population), A4iii (≥ 20,000 waterbirds)

PROTECTION STATUS: Wildlife Sanctuary, established in May 1981

GENERAL DESCRIPTION

The IBA site consists of a group of three shallow, freshwater lakes and extensive marshes adjacent to a large area of salt pans and salt marshes. It lies on the south shore of the Gulf of Kutch, about 10 km from Jamnagar. Part of the Sanctuary was the intertidal zone of the Gulf of Kutch before the construction of reclamation *bunds* across two creeks to control salinity and to recharge ground water.

It has a dry tropical monsoon climate, with rainfall mainly concentrated in July and August. Habitats in this seasonal inland wetland include freshwater shallow marshes, intertidal mudflats, creeks, salt pans, saline land and mangroves (Singh 1998). The freshwater marshes dry up in summer, and at high tide, the water of the marsh becomes saline. The wetlands are partly owned by the Forest Department and Revenue Department, and partly under private ownership.

Khijadiya Sanctuary has both freshwater marshes and intertidal mudflats and marshes (divided by a 5,996 m earthen reclamation bund). The freshwater marsh is covered by thick stands of *Typha angustata* and *Saccharum spontaneum*, while on the long bund, *Prosopis chilensis*, *Acacia nilotica* and *Salvadora* sp. are seen (Singh 1998).



Pheasant-tailed Jacana *Hydrophasianus chirurgus* regularly breeds in Khijadiya.

Photo: Satpal Gandhi

AVIFAUNA

Over 200 species of birds have been recorded from the area (Singh 2001), which is a unique combination of seasonal freshwater wetland and coastal wetland ecosystems. It supports over 90 species of waterfowl and waders, some of which like Great Crested Grebe *Podiceps cristatus* breed here (Singh 2001).

The Sanctuary is located in the extreme western part of the country and is an important stopover site and wintering ground for migratory birds. Threatened birds include Dalmatian Pelican *Pelecanus crispus*, Baer's Pochard *Aythya baeri* and Indian Skimmer *Rynchops albicollis*.

This site has been designated as an IBA mainly based on the congregatory criteria (A4i, iii). During good rainfall years, when the expanse of the freshwater lake is maximum, more than 20,000 ducks and waders are found in this Sanctuary. The saline marshes attract thousands of waders such as stints, sandpipers and plovers. A few threatened species have also been found in Khijadiya. Over all it makes for an excellent IBA.

Although recent information on species-wise population is not available, based on old information (Scott 1989), Great White Pelican *Pelecanus onocrotalus*, Painted Stork *Mycteria leucocephala*, Black-tailed Godwit *Limosa limosa*, Ruff *Philomachus pugnax*, Common Crane *Grus grus*, and Ferruginous Duck *Aythya nyroca* occur above their 1% biogeographic population thresholds as determined recently by Wetlands International (2002). There is a record of sighting of 190 Indian Skimmer *Rynchops albicollis* (Scott 1989) and 76 in March 2000 (BirdLife International 2001).

The Near Threatened Black-necked Stork *Ephippiorhynchus asiaticus* is regularly seen in Khijadiya. Probably, it breeds nearby but no nest has been located.

Several species of waterbirds breed in the area, including Little Grebe *Tachybaptus ruficollis*, Purple Swampphen or Moorhen *Porphyrio porphyrio*, Coot *Fulica atra*, Pheasant-tailed Jacana *Hydrophasianus chirurgus*, and Black-winged Stilt *Himantopus himantopus*. At least four pairs of Great Crested Grebe *Podiceps cristatus* bred in 1984, and since then they have been regularly seen breeding.

GJ-07

Vulnerable	
Baer's Pochard	<i>Aythya baeri</i>
Greater Spotted Eagle	<i>Aquila clanga</i>
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>
Conservation Dependant	
Dalmatian Pelican	<i>Pelecanus crispus</i>
Near Threatened	
Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Oriental White Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoenicopterus minor</i>
Ferruginous Pochard	<i>Aythya nyroca</i>
Red-headed Vulture	<i>Sarcogyps calvus</i>

OTHER KEY FAUNA

The wild mammals of the site include Jungle Cat *Felis chaus*, Indain Fox *Vulpes bengalensis*, Bluebul or Nilgai *Boselaphus tragocamelus* and Common Mongoose *Herpestes edwardsi*. Freshwater turtles are quite common in some parts of the Sanctuary.

LAND USE

- ☐ Nature conservation and research
- ☐ Water management
- ☐ Grazing

THREATS AND CONSERVATION ISSUES

- ☐ Recurring drought
- ☐ Overgrazing
- ☐ Increase in salinity
- ☐ Disturbance to birds by ship breaking industries
- ☐ Infestation of *Prosopis chilensis*
- ☐ Overuse of water of wetland by farmers
- ☐ Poaching

As the Sanctuary lies close to Jamnagar town, disturbance is very high. However, at the same time, there is a great opportunity to sensitize visitors about the importance of wildlife. Khijadiya is also an interesting place to learn about the difference in the flora and fauna of freshwater and saline ecosystems. The exotic invasive shrub *Prosopis chilensis* has colonized most part of the terrestrial habitat. In some areas, thickets are so dense that the wetland is not visible. These could easily be thinned to allow sighting of birds.

The biggest danger to this small Sanctuary is from the unauthorized drawing of water for irrigation that reduces water levels during the peak winter season. Livestock over-grazing is a curse as in most of the sanctuaries of Gujarat, but in the case of Khijadiya limited grazing is beneficial to the freshwater wetland as it removes the biomass, which otherwise would accumulate excessively. A study on the carrying capacity of the wetland for aquatic vegetation would allow us to know how much grazing should be allowed.

Jamnagar is a fast growing town, due to rapid industrialization (at the cost of the Marine National Park, another IBA). Khijadiya, due to its easy accessibility could become a major tourist attraction. An interpretation centre on wetlands and waterfowl could be developed at the entrance of the Sanctuary. Khijadiya could also be an ideal Sanctuary for nature education camps and research.

KEY CONTRIBUTORS

H. S. Singh and the IBA Team

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MARINE NATIONAL PARK AND WILDLIFE SANCTUARY



IBA Site Code	: IN-GJ-08
State	: Gujarat
District	: Jamnagar
Coordinates	: 22° 38' 47" N, 70° 00' 53" E
Ownership	: State
Area	: 45,792 ha
Altitude	: 0 - 21 m
Rainfall	: 450 mm
Temperature	: 6 °C to 40 °C
Biogeographic Zone	: Coasts
Habitats	: Littoral Forest, Riverine Vegetation, Tropical Arid Zone, Coasts

IBA CRITERIA: A1 (Threatened Species), A4i, ($\geq 1\%$ biogeographic population), A4iii ($\geq 20,000$ waterbirds), A4iv (exceeds threshold of bottleneck sites)

PROTECTION STATUS: National Park, established in August 1980

GENERAL DESCRIPTION

The Marine National Park (16,289 ha) and Sanctuary (29,503 ha) is located in the inter-tidal zone, extending over 170 km along the coast of Jamnagar in the Gulf of Kutch, and includes 42 islands. This is the first protected marine area in India (Singh 2001).

The protected area includes 14,928 ha of islands and 30,864 ha of the coastal zone. A total of 1,071 ha area of the National Park and 111 ha area of Sanctuary have been notified as reserved forests, whereas 12,238 ha of the National Park and 22,552 ha of the Sanctuary is notified under Sec-4 of Indian Forest Act, 1927. Areas of 2,980 ha of the National Park and 6,840 ha of the Sanctuary have non-forest status, being categorized as territorial waters of India. 39,840 ha overlapping area of the Park and Sanctuary was also notified under the Port Act before 1980 for maritime activities (Singh 2001).

Flora includes seven species of mangroves, namely *Avicennia officinalis*, *A. marina*, *A. alba*, *Rhizophora mucronata*, *Ceriops candolleana*, *Aegiceros conicalum*, 120 species of algae and several species of grasses, shrubs and herbs. Some other important plant species include *Cyperus* sp., *Suaeda* sp., *Commiphora wightii*, *Salvadora* sp., *Aeluropus logopoides*, *Sporobolus*, *Cressa cretica* and *Capparis* sp. (Singh 2001).

AVIFAUNA

A total of 86 waterbirds was recorded in the salt works, and 80 species on the islands and coasts along the Gulf (Naik *et al.* 1991). With its long coastline, broad intertidal mudflats, coral reefs, sand and rock beaches, the Marine NP offers a great diversity of habitats for birds. Immense numbers of migratory birds pass through the Park and others parts of the Gulf of Kutch, and a small population of most of the species, mainly juveniles and non-breeding adults, spend the summer here (Naik *et al.* 1991). Marine NP is an important region as it borders the Little and Great Ranns (both IBAs) that hold the only breeding populations of Greater *Phoenicopterus ruber* and Lesser *P. minor* Flamingos, White Pelican *Pelecanus onocrotalus* and Avocet *Recurvirostra avosetta* in the country, and a very large number of both species of flamingos spend most of the year along its coast.

There are 42 islands in the Marine National Park, with Pirotan as the star attraction. Some of these islands have colonies of breeding birds such as the Painted Stork *Mycteria leucocephala*, Grey Heron

Ardea cinerea, Great Egret *Casmerodius albus*, Black-crowned Night Heron *Nycticorax nycticorax*, Little Heron *Butorides striatus*, Oriental White Ibis *Threskiornis melanocephalus* and Spoonbill *Platalea leucorodia* (Naik *et al.* 1991).

Globally threatened species include the Dalmatian Pelican *Pelecanus crispus*, Spot-billed Pelican *Pelecanus philippensis*, Greater Spotted Eagle *Aquila clanga*, and Indian Skimmer *Rynchops albicollis*. Much more than 20,000 waterbirds congregate here regularly so the site fulfils A4iii criteria.

The Marine National Park is perhaps one of the few sites which also fulfils A4iv criteria of BirdLife International (undated), i.e. the site is known or thought to exceed thresholds set for migratory species at bottleneck sites. A very large number of birds pass through this site, on way to their onward migration.

Vulnerable	
Spot-billed Pelican	<i>Pelecanus philippensis</i>
Greater Spotted Eagle	<i>Aquila clanga</i>
Indian Skimmer	<i>Rynchops albicollis</i>
Conservation Dependant	
Dalmatian Pelican	<i>Pelecanus crispus</i>
Near Threatened	
Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Oriental White Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoenicopterus minor</i>

OTHER KEY FAUNA

Of the 42 islands, 33 have coral reefs and these with the mangroves along the coast and the intertidal areas, support several species of marine biota. Studies carried out by various institutions record 70 species of sponges, 56 species of hard and soft corals, 180 species of fishes, 27 species of prawns, 30 species of crabs, more than 200 species of molluscs, over 12 species of echinoderms, 5 species of annelids, many species of reptiles including three species of endangered sea turtles and more than three species of sea mammals, namely Dugong *Dugong dugon*, Common Dolphin *Delphinus delphis* and Whale *Physeter catodon* (Singh 1998).

GJ-08

Marine National Park in Jamnagar is one of the few marine protected areas in India. It has very high biodiversity, but it is coming under pressure due to rapid industrialization.



Photo: S. L. Meera

LAND USE

- q Nature conservation and research
- q Maritime activities

THREATS AND CONSERVATION ISSUES

- q Industrialisation
- q Urbanisation
- q Extraction of oil and natural gas
- q Grazing
- q Unsustainable exploitation of resources

Pollutants from ship breaking yards, ships, offshore oil terminals, discharge from industries and thermal power plants, and other pollutants brought in by rivers accumulate in the intertidal area of the Sanctuary and National Park. People from the 56 surrounding villages and other areas fish and collect oysters, snails, and algae from the area. Offshore oil terminals and refineries have been constructed despite opposition from the Forest Department and environmentalists. The Government of Gujarat plans to allow more industries along the coasts, after denotifying parts of the national

park. This is the biggest long-term threat to this IBA.

KEY CONTRIBUTOR

H. S. Singh

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NAL SAROVAR WILDLIFE SANCTUARY



IBA Site code	: IN-GJ-09
State	: Gujarat
District	: Ahmedabad, Surendranagar
Coordinates	: 22° 47' 00" N, 72° 02' 00" E
Ownership	: State/ Private
Area	: 12,082 ha
Altitude	: 10 - 15 m
Rainfall	: 650 mm
Temperature	: 6 °C to 43 °C
Biogeographic Zone	: Semi-Arid
Habitats	: Aquatic, Seasonal Marsh

IBA CRITERIA: A1 (Threatened Species), A4i ($\geq 1\%$ biogeographic population), A4iii ($\geq 20,000$ waterbirds), A4iv (Exceeds threshold set for migratory species at bottleneck sites)
PROTECTION STATUS: Wildlife Sanctuary, established in April 1969

GENERAL DESCRIPTION

Nalsarovar Bird Sanctuary is spread over an area of 12,082 ha and is one of the largest shallow freshwater lakes in India. It has been proposed as a Ramsar Site. The Sanctuary lies in the semi-arid districts of Ahmedabad and Surendranagar in north Gujarat. The Lake has an elliptical basin with a gentle slope. It is very shallow, with a maximum depth of 3 m and has about 360 islands scattered in it. The shoreline of the lake is barren and is surrounded by dry land and some crop fields (Singh 2001). Nalsarovar is also a very popular site for tourists and birdwatchers.

Nalsarovar is a typical temporary shallow wetland, generally seen in dry areas. About 50 species of algae and over 72 species of aquatic plants including *Vallisneria*, *Ceratophyllum* and *Chara* have been recorded from the area (Singh 1998). This vast shallow wetland does not have much emergent vegetation. In drought years, it remains dry for most part of the year.

AVIFAUNA

About 250 species of birds have been recorded of which 158 species are waterbirds. Over 2,24,000 birds were recorded in 1992 and over 1,41,000 birds in 1996 in censuses conducted by the Forest Department (Singh 2001). Threatened bird species include



Hundreds of thousands of birds stop over in Nal Sarovar before spreading out.

Photo: Hira Punjabi

the Dalmatian Pelican *Pelecanus crispus*, Pallas's Fish-eagle *Haliaeetus leucoryphus*, Indian Skimmer *Rynchops albicollis* and others. Some common species of birds are the Coot *Fulica atra*, Northern Shoveller *Anas clypeata*, Northern Pintail *Anas acuta*, Wigeon *Anas penelope*, Greater Flamingo *Phoenicopterus ruber* and Painted Stork *Mycteria leucocephala*.

This site has been selected mainly on the basis of congregatory criteria (A4) as more than 20,000 waterfowl are found when rainfall is normal. As the area is vast, so species-wise population estimates are not easy. Nevertheless, many ducks and waders are found in much larger numbers than their 1% biogeographic population threshold estimated by Wetlands International (2002).

As Nalsarovar falls in the migratory route, hundreds of thousands of birds stop over before spreading out in the rest of Gujarat (and other parts of India). Therefore, we have included it under A4iv criteria also, i.e. the site is known or thought to exceed thresholds set for migratory species at bottleneck sites.

Vulnerable	
Pallas's Fish-Eagle	<i>Haliaeetus leucoryphus</i>
Greater Spotted Eagle	<i>Aquila clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Lesser Kestrel	<i>Falco naumanni</i>
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>
Conservation Dependant	
Dalmatian Pelican	<i>Pelecanus crispus</i>
Near Threatened	
Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Oriental White Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoenicopterus minor</i>
Ferruginous Pochard	<i>Aythya nyroca</i>
Cinereous Vulture	<i>Aegypius monachus</i>
Red-headed Vulture	<i>Sarcogyps calvus</i>

GJ-09

Nal Sarovar is the largest bird sanctuary of Gujarat, where millions of birds are found.



Photo: V. I. Thayil / ENFS Library

OTHER KEY FAUNA

The Sanctuary also supports a herd of Wild Ass *Equus onager* during summer. Wolf *Canis lupus*, Hyena *Hyaena hyaena*, Golden Jackal *Canis aureus*, Indian Fox *Vulpes bengalensis* and Jungle Cat *Felis chaus* are also recorded in the area. About 20 species of fish have been recorded from the area (Singh 2001).

LAND USE

- ☐ Irrigation
- ☐ Waterways
- ☐ Fishing
- ☐ Tourism and recreation
- ☐ Nature conservation and research

THREATS AND CONSERVATION ISSUES

- ☐ Fishing
- ☐ Trapping and poaching of birds
- ☐ Grazing of aquatic grass and algae
- ☐ Pumping of water for irrigation
- ☐ Tourist pressure and consequent disturbance to birds

About 34,000 people live in and around Nalsarovar. All of them depend on the wetland for their livelihood and use it for fishing, livestock grazing, fodder harvesting, cultivation and tourism-based activities. Some local tribal communities trap and poach the

waterbirds. Local farmers draw water from the wetland.

Due to its proximity to Ahmedabad and other towns, tourist pressure is very high. At the same time this is an opportunity to sensitize them about conservation, especially the importance of wetlands. Most of the tourists come for picnics. A good interpretation centre, educational material in the local language, and presence of knowledgeable guides would help in imparting knowledge on conservation. Guides should be selected from the local villages to provide income to them. Once the villagers know that they can make money by showing birds to visitors, the incidence of poaching may also be reduced.

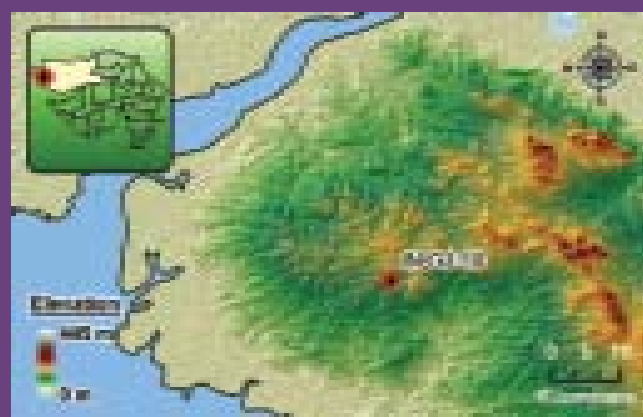
KEY CONTRIBUTORS

H. S. Singh and the IBA team

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NALIYA GRASSLAND (LALA BUSTARD WILDLIFE SANCTUARY)



IBA Site Code	: IN-GJ-10
State	: Gujarat
District	: Kutch
Coordinates	: 23° 30' 00" N, 68° 45' 00" E
Ownership	: State
Area	: 50,000 ha
Altitude	: 15 m
Rainfall	: 400 mm
Temperature	: 6 °C to 45 °C
Biogeographic Zone	: Desert
Habitat	: Tropical Grassland

IBA CRITERIA: A1 (Threatened Species)

PROTECTION STATUS: Wildlife Sanctuary, established in July 1992

GENERAL DESCRIPTION

More than 50,000 ha area in Abdasa and Mundra talukas constitute one of the finest dry grasslands left in Gujarat. In 1992, a small portion (203 ha) was declared as a sanctuary for the Great Indian Bustard *Ardeotis nigriceps*. The site gets high conservation value, not only due to the presence of this bustard but also species such as the Lesser Florican *Sypheotides indica*. The entire Sanctuary is dominated by a single habitat, i.e. grassland vegetation with sparse vegetation of bushy *Zizyphus*. However, in 1990-91, the Forest Department planted nearly 50 ha with *Prosopis chilensis* ostensibly to improve the bustard habitat. Thus almost 25% of the grassland habitat was destroyed.

Beside the 209 ha Lala Bustard Sanctuary, the entire belt along the coast line is covered with grasslands and marginal crop fields, ideal for the Great Indian Bustard, Lesser Florican and other grassland species. Amongst the most important grassland sites are the Naliya-Vengaber-Parjau *don* (*don*=grassland) and the Konathia-Kalatalao-Bachunda *don*.

The only viable population of the Great Indian Bustard *Ardeotis nigriceps* in Gujarat is found in Naliya.



Photo: Asad R. Rahmani

AVIFAUNA

This IBA is perhaps the only site in India where three species of bustards (Great Indian, Macqueen's Bustard and Lesser Florican) are found, sometimes at the same time (late September). This site has the largest known Great Indian Bustard population in Gujarat - not less than 40 birds are found here. During the monsoon of 2001, 12 males were found displaying (R. D. Jadeja *pers. comm.* 2001). The largest known aggregation of endangered Lesser Florican breed here during the monsoon, and over 60 displaying males have been counted (Sankaran 2000a). In the next year, when the monsoon was very good in this area and inadequate in other parts of Gujarat, about 120 Lesser Floricans were counted in this IBA (R. D. Jadeja *pers. comm.* 2001).

Macqueen's Bustard *Chlamydotis macqueeni* is also seen in winter. Sometimes early arrivals can be seen in the area while the Lesser Florican is still around. The Great Indian Bustard is resident so it is seen throughout the year.

The Sociable Lapwing *Vanellus gregarius* is listed as Vulnerable by BirdLife International (2001) as it has a small population that has undergone a rapid reduction, for largely unknown reasons. It breeds just outside the Asian region, in the west-central Asian steppes, winters in northeast Africa, the Middle East and northern India. There are very few recent records from India. Two birds were seen in a ploughed field close to Lala Bustard Sanctuary in December 1999.

Another threatened species found in this IBA is Stoliczka's Bushchat *Saxicola macrorhyncha* (R. D. Jadeja *pers. comm.* 2002).

Endangered	
Great Indian Bustard	<i>Ardeotis nigriceps</i>
Lesser Florican	<i>Sypheotides indica</i>
Vulnerable	
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Sociable Lapwing	<i>Vanellus gregarius</i>
Stoliczka's Bushchat	<i>Saxicola macrorhyncha</i>

OTHER KEY FAUNA

The grasslands of Naliya and Lala Bustard Sanctuary have good populations of Chinkara *Gazella bennettii*. In some portions with good tree cover, Bluebull *Boselaphus tragocamelus* is found.

GJ-10

A large number of nomadic graziers seasonally invades the grasslands of Naliya region. This should be regulated during the breeding season of the bustard and florican.



Photo: Asad R. Rahmani

Golden Jackal *Canis aureus*, Indian Fox *Vulpes bengalensis* and Wolf *Canis lupus* are often seen. Hyena *Hyaena hyaena* is reported to be present in undulating areas, especially in the nearby Narayan Sarovar Chinkara Sanctuary.

LAND USE

- q Human settlements
- q Tourism and recreation
- q Nature conservation and research

THREATS AND CONSERVATION ISSUES

- q Human settlements
- q Livestock grazing
- q Invasion of *Prosopis chilensis*

While Lala Bustard Sanctuary is too small to support any significant numbers of the Great Indian Bustard, the adjoining grasslands and crop fields are ideal habitats for the bustard and florican (Sankaran 2000b). A proposal for adding another 400 ha to increase the area of the Sanctuary is under consideration.

Sankaran (2000b) has given proposal for the optimal management of two sites, Naliya-Vengaber-Parjau *don* and the Konathia-Kalatalao-Bachunda *don*. Good protection and grasslands

management would greatly benefit agriculturalists and pastoralists. The habitat should be protected from invasion of *Prosopis chilensis* and from grazing of livestock. The Forest Department has cultivated a small part of the Sanctuary and carried out ploughing for grass development. These activities are not advisable in such grasslands, which have very high conservation value.

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Asad R. Rahmani, Ravi Sankaran, Duleep Kathau, Justus Joshua and R. D. Jadeja

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RAMPURA GRASSLAND



IBA Site code	: IN-GJ-11
State	: Gujarat
District	: Panchmahals
Coordinates	: 22° 52' 60" N, 74° 19' 00" E
Ownership	: State
Area	: 2,000 ha
Altitude	: 484 m
Rainfall	: 720 mm
Temperature	: 13 °C to 42 °C
Biogeographic Zone	: Semi-Arid
Habitat	: Tropical Grassland

IBA CRITERIA: A1 (Threatened Species)
 PROTECTION STATUS: Not officially protected

GENERAL DESCRIPTION

Rampura grassland is situated near Dahod in Panchmahals district, Gujarat. It lies on the left of the Dahod-Godhra highway, and includes three protected grasslands, namely Kalithalai (859 ha), Muvalia (750 ha) and Rozam (378 ha). It has also been known as Kalithalai-Muvalia-Rozam grasslands (Natarajan and Rahmani 1997). It is protected by the Forest Department for production of hay. The site falls in the Malwa plateau, an undulating region with valleys and seasonal rainwater streams.

This complex of grasslands provides ideal habitats for the Endangered Lesser Florican *Sypheotides indica*, locally known as *Turrkukde*.

Historically, the whole area, except for some rocky plateau, was covered with thick teak forests (*Tectona grandis*), the remnants of which are still seen in some valleys. The grasslands came up when these forests were cut over years. Important species of the site are *Echinochloa colonum*, *Setaria* sp., *Digitaria ciliaris*, *Brachiaria ramosa* and *Urochloa panicoides* which blooms at the onset of the monsoon (Natarajan and Rahmani 1997). These species are succeeded by *Themeda quadrivalvis*, *Heteropogon contortus*,

Sehima nervosum and *Chrysopogon fulvus*. Beside grasslands, plantations of *Acacia nilotica*, *A. tortilis*, *Terminalia crenulata*, *Tectona grandis*, *Bauhinia racemosa*, *Gmelina arborea* and *Butea monosperma* are also present.

AVIFAUNA

About 140 species of the birds are reported from this site (Natarajan and Rahmani 1997). According to Sankaran (1991), 15-20 male Lesser Floricans are found in Rampura grasslands.

Bird community structure in different types of habitat was studied in Rampura (Natarajan and Rahmani 2002). Altogether, 68 species were recorded from the four study sites. The maximum number of species was recorded in plantation (54), followed by grassland (49) and least in grazing land (33). The Lesser Florican was seen only in the grassland. Four species of harriers (*Circus* spp.) are also found and use the grassland for foraging and roosting.

BirdLife International (undated) has listed 59 species in Biome-11. In Rampura grassland, we were able to find 18 of these biome species. Most of the species are widespread and common.

Upto 20 male Lesser Florican *Sypheotides indica* have been sighted in Rampura grassland.



Photo: Aasad R., Rahmani

Critically Endangered	
Oriental White-backed Vulture	<i>Gyps bengalensis</i>
Long-billed Vulture	<i>Gyps indicus</i>
Endangered	
Lesser Florican	<i>Sypheotides indica</i>
Vulnerable	
Sarus Crane	<i>Grus antigone</i>
Near Threatened	
Painted Stork	<i>Mycteria leucocephala</i>
Pallid Harrier	<i>Circus macrourus</i>

OTHER KEY FAUNA

There is no large wild mammal of conservation concern but the grassland supports significant populations of smaller mammals such as Indian Fox *Vulpes bengalensis*, Rufous-tailed Hare *Lepus nigricollis ruficaudatus* and Golden Jackal *Canis aureus*. Among reptiles, the Fan-throated Lizard *Sitana ponticeriana* and Short-tailed Agama *Laudakia (=Agama) minor* are common. Indian Monitor *Varanus bengalensis* and five or six species of snakes have been identified.

Rampura grassland has proved that commercial production of grass is highly beneficial to the Lesser Florican *Sypheotides indica*.



Photo: M. Zafar-ul-Islam

LAND USE

- ☐ Hay production

THREATS AND CONSERVATION ISSUES

- ☐ Frequent drought
- ☐ Plantations

Rampura grassland shows how hay production could be one of the major land uses of an area where the soil is unfit for other cultivation. There is a full-fledged Range of the State Forest Department in Dahod which protects this grassland and manages harvest of grass at the right time, storage in godowns and finally transport to places where hay is required. The Forest Department strictly protects the grassland during the monsoon when the grass is growing. This is the time when the Lesser Florican breeds, thus it also benefits from the protection.

As the grassland is harvested and the Forest Department has commercial interest in the protection of grasses, Rampura is of vital importance for the long-term survival of the Lesser Florican. During the last 18 years monitoring, we have seen neither deterioration of the grassland, nor fall in the number of Lesser Floricans. This is a fine example of the importance of habitat protection for the survival of endangered species. If we want to assure the long-term survival of the Lesser Florican, the Rampura grassland initiative replicated manifold in other areas is the hope.

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V. Natarajan and Asad R. Rahmani

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SALT PANS OF BHAVNAGAR



IBA Site Code	: IN-GJ-12
State	: Gujarat
District	: Bhavnagar
Coordinates	: 21° 40' 13" N, 72° 15' 20" E
Ownership	: State
Area	: 3,57,540 ha
Altitude	: 0 m
Rainfall	: 800 mm
Temperature	: 2 °C to 48 °C
Biogeographic Zone	: Coasts
Habitats	: Aquatic

IBA CRITERIA: A1 (Threatened Species), A4iii (≥ 20,000 waterbirds)
PROTECTION STATUS: Not officially protected

GENERAL DESCRIPTION

The district of Bhavnagar lies to the west of the Gulf of Cambay in the Kathiawad peninsula in the State of Gujarat. The district used to hold numerous village tanks, estuaries and streams which were the main habitat for waterfowl, but many such natural habitats have been destroyed or have deteriorated in quality. However, their role is now taken over by salt pans. The saltworks have created an important habitat for wetland birds and are now being used by a great variety of species as a wintering area, which were once used by few waterfowl (Dharmakumarsinhji 1973). This new habitat serves as an important staging ground for migrant waterbirds moving along the coast.

AVIFAUNA

According to Dharmakumarsinhji (1973), Ruddy Shelduck *Tadorna ferruginea*, Common Shelduck *Tadorna tadorna*,

Northern Shoveller *Anas clypeata*, Northern Pintail *A. acuta*, Common Teal *A. crecca*, Garganey *A. querquedula*, Spot-billed Duck *A. poecilorhyncha*, Wigeon *A. penelope* and Gadwall *A. strepera* were common in the salt reservoirs of Bhavnagar.

This site has been selected as an IBA based on A1 and A4iii criteria. The salt pans attract hundreds of thousands of small waders, especially species belonging to *Calidris*, *Tringa*, *Limosa* and *Numenius*. Painted Stork *Mycteria leucocephala*, Oriental White Ibis *Threskiornis melanocephalus*, various egrets and two species of flamingos also forage in these salt pans and coastal lagoons. The only globally threatened species is the Dalmatian Pelican *Pelecanus crispus*. Sometimes up to 200 individuals are seen here.

Conservation Dependant

Dalmatian Pelican	<i>Pelecanus crispus</i>
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OTHER KEY FAUNA

These salt pans do not have any significant population of mammals or reptiles.

LAND USE

q Saltworks

THREATS AND CONSERVATION ISSUES

Not much is known.

KEY CONTRIBUTOR

IBA Team

KEY REFERENCE

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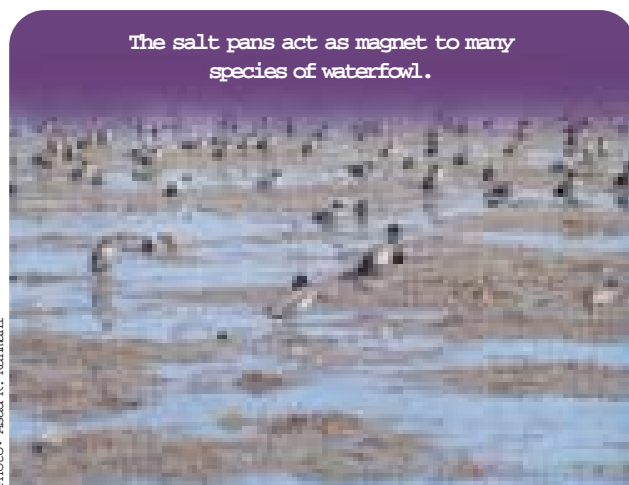


Photo: Asad R. Rahmani

GJ-13

THOL LAKE BIRD SANCTUARY



IBA Site Code	: IN-GJ-13
State	: Gujarat
District	: Mehsana
Coordinates	: 23° 22' 30" N, 72° 37' 30" E
Ownership	: State
Area	: 700 ha
Altitude	: 20 m
Rainfall	: 600 mm
Temperature	: 6 °C to 43 °C
Biogeographic Zone	: Semi-Arid
Habitat	: Aquatic (Reservoir)

IBA CRITERIA: A1 (Threatened Species), A4i (≥ 1% biogeographic population), A4iii (≥ 20,000 waterbirds)

PROTECTION STATUS: Wildlife Sanctuary, established in November 1988

GENERAL DESCRIPTION

Thol is an irrigation tank with water storage capacity of about 84 million cubic metres. It was constructed in 1912 during the Gaekwad regime to supply irrigation water to villagers, thus they have the traditional right to use water.

Thol is predominantly an open sheet of shallow water of about 1,450 ha command area, surrounded by cropland. The catchment area is nearly 15,500 ha (Pandit 2001). In 1988, this wetland was declared as Thol Bird Sanctuary. Kadi, the *taluka* headquarters of the district, is just 22 km away from the Sanctuary, 25 km northwest of Ahmedabad.

The final settlement of the Sanctuary is still pending. At present, it is under two departments - Forest and Irrigation, which creates problems in management.

Thol is an important inland wetland in North Gujarat, and provides excellent habitat to the waterfowl during post-monsoon to winter season. More than 20,000 waterfowl can be seen at the site in winter. The vast open sheet of shallow water and the surrounding crop fields, where the birds are mostly left unmolested, have created a very conducive habitat for birds.

There are emergent and floating aquatic plants, mainly in the vicinity of the wetland. *Acacia nilotica*, *A. leucoploea*, *Zizyphus*

sp., *Azadirachta indica*, *Ficus* sp., *Salvadora* sp., *Prosopis chilensis*, *Capparis* sp. are the important tree species in and around the pond. Some peripheral area has been afforested during recent years (Singh 1998, 2001).

AVIFAUNA

Over 150 species of birds are reported from the Sanctuary, of which around 90 species are waterbirds. The site is important for pre-breeding congregation and nesting of Sarus Crane *Grus antigone*. Gopi Sunder *et al.* (2000) have seen 35 cranes in May 1998. Thol also supports one of the biggest congregations of Ruff *Philomachus pugnax*. Sometimes 5-6 thousand Flamingos congregate in the Thol lake. Thakker (1983) found 70-80 nests of flamingo, presumably Greater Flamingo *Phoenicopterus ruber*, although he does not mention the species. It is also not proved whether the flamingo bred there or just made the nests and abandoned them, as they do in many other wetlands.

Thol is a very important wintering area for waterfowl. For example, approximately 62,000 birds were estimated in December 2000 (Singh 2001).



The drastic declined in the number of Sarus needs to be reversed.

Photo: Tim Loseby / BirdLife International

Critically Endangered	
Oriental White-backed Vulture	<i>Gyps bengalensis</i>
Long-billed Vulture	<i>Gyps indicus</i>
Vulnerable	
Greater Spotted Eagle	<i>Aquila clanga</i>
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>
Conservation Dependant	
Dalmatian Pelican	<i>Pelecanus crispus</i>
Near Threatened	
Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus Asiaticus</i>
Oriental White Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoenicopterus minor</i>
Ferruginous Pochard	<i>Aythya nyroca</i>

Abandoned nest mounds of flamingos have been seen in Thol but successful nesting has not been confirmed.



GJ-13

Photo: Asad R. Rahmani

OTHER KEY FAUNA

In the fields surrounding the Sanctuary, Bluebull *Boselaphus tragocamelus*, Striped Hyena *Hyaena hyaena*, Wolf *Canis lupus*, Golden Jackal *Canis aureus* and Blackbuck *Antelope cervicapra* are found. In some parts of Mehsana district, Blackbuck has become a major menace to crops but as the people are generally vegetarian, they do not molest these animals. Nilgai is also common and spreading.

LAND USE

- Irrigation
- Industrial
- Tourism and recreation
- Nature conservation and research

THREATS AND CONSERVATION ISSUES

- Withdrawal of water for irrigation
- Illegal cultivation
- Excessive use of pesticides in the surrounding paddy croplands may be toxic to the birds feeding on them

Most of the water of the lake is drawn for irrigation, leaving the waterspread in less than 10 ha during midwinter. Local villagers carry out cultivation within the Sanctuary. Although the level of protection against poaching is good, there are difficulties in implementing the provision of the Wildlife (Protection) Act, 1972,

because of historical use of the water by local people as well as non-settlement of legal issues related to illegal cultivation and withdrawal of water (Singh 1998).

There are seven crude oil wells in the Sanctuary for pumping crude oil and supplying it through the pipeline. Oil spills around the well cause pollution.

KEY CONTRIBUTORS

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GJ-14

VELAVADAR BLACKBUCK NATIONAL PARK



IBA Site Code	: IN-GJ-14
State	: Gujarat
District	: Bhavnagar
Coordinates	: 21° 53' 29" N, 71° 59' 56" E
Ownership	: State
Area	: 3,408 ha
Altitude	: 1 - 6 m
Rainfall	: 550 mm
Temperature	: 1 °C to 41 °C
Biogeographic Zone	: Semi-Arid
Habitats	: Tropical Grassland

IBA CRITERIA: A1 (Threatened Species), A4ii ($\geq 1\%$ of global population of terrestrial species)
PROTECTION STATUS: National Park, established in 1973

GENERAL DESCRIPTION

A tropical grassland, internationally known for the largest concentration of Blackbuck *Antelope cervicapra*, is now famous for the largest population of harriers *Circus* spp. in the world during winter, and also for one of the largest breeding populations of the Lesser Florican *Sypheotides indica* in monsoon. The existence of a large, regular winter roost of harriers *Circus* spp. has been known since the mid-1980s, and assessments of the number of birds present at the peak period have ranged up to 2,000 (Clarke 1993). Velavadar National Park is just above sea level, located 18 km from the Gulf of Cambay and 35 km north of the city of Bhavnagar. Velavadar is at a lower elevation than its surroundings and therefore remains submerged for a longer duration when cyclones strike the coast (Dharmakumarsinhji 1978).

The present area of the Park was a private *vidi* (grassland) of the erstwhile princely State of Bhavnagar (Jhala 1991). This IBA falls under Semi-arid Gujarat-Rajwada Biotic Province of the Semi-Arid Biogeographical Zone as per the classification of Rodgers *et al.* (2000). The high tidal zone of the Gulf of Khambat constitutes

the boundary to the south of the Park, while wastelands and agricultural fields surround the other sides.

Thirty-nine species of grasses and 46 species of sedges, shrubs and trees represent the diversity of flora. *Sporobolus virginicus*, *S. coromandelianus*, *S. maderaspatenus*, and *Dicanthium annulatum* are the dominant grasses. *Prosopis chilensis* shrubs cover large areas of the Park. Among the medium sized trees and shrubs, *Salvadora*, *Acacia nilotica*, *Zizyphus*, *Capparis* and *Suaeda* are common.

AVIFAUNA

Over 185 species of birds have been recorded from this area (Akhtar 1998). The area has been reported as the largest roosting ground in the world for four species of harriers, which migrate to the Park: Western Marsh *Circus aeruginosus*, Montagu's *C. pygargus*, Hen *C. cyaneus*, and Pallid *C. macrourus* harriers. It also has the largest concentration of Lesser Florican during the monsoon. Up to 40 territorial male floricans have been found in and around Velavadar (Anon. undated). Another threatened bird is White-browed Bushchat or Stoliczka's Bushchat *Saxicola macrorhyncha* which has been recently confirmed from this site. During winter, Macqueen's Bustard *Chlamydotis macqueeni* (Near Threatened) is also found in this area in small numbers.

Velavadar has been selected on the basis of A1 criteria (presence of significant numbers of the highly endangered Lesser Florican) and A4ii criteria (very high concentration of harriers).

Upto 40 territorial male Floricans have been found in and around Velavadar.



Photo: Asad R. Rahmani

Endangered	
Lesser Florican	<i>Sypheotides indica</i>
Vulnerable	
Lesser Adjutant	<i>Leptoptilos javanicus</i>
Greater Spotted Eagle	<i>Aquila clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Sarus Crane	<i>Grus antigone</i>
Stoliczka's Bushchat	<i>Saxicola macrorhyncha</i>

OTHER KEY FAUNA

Over 15 species (excluding rodents and bats) of mammals, 9 species of reptiles and several species of insects have been recorded in the Park (Dharmakumarsinhji 1978, Natarajan and Rahmani 1997, Singh 2001), which has one of the largest populations of Blackbuck in India. More than 1,300 were counted in 1988-89 (Jhala 1991).

Invasion of grassland by *Prosopis chilensis* is a constant problem in Velavadar.



Photo: Asad R. Rahmani

Wolf *Canis lupus* is the top carnivore in the area. Other animals include Bluebul *Boselaphus tragocamelus*, Golden Jackal *Canis aureus*, Hyena *Hyaena hyaena*, Jungle Cat *Felis chaus* and Indian Fox *Vulpes bengalensis*.

LAND USE

- ☐ Nature conservation and research
- ☐ Agricultural practices

THREATS AND CONSERVATION ISSUES

- ☐ Livestock grazing
- ☐ Invasion of exotic *Prosopis chilensis*
- ☐ Expansion of coastal zone
- ☐ Use of pesticide

The growth of *Prosopis chilensis* may attain problematic proportions, if it remains unchecked. Eradication of *Prosopis* in the Park is a regular management practice. Blackbuck and Bluebull feed on *Prosopis* pods in winter and disperse seeds in the Park through their droppings. This results in the germination of seedlings, which are removed annually once they become visible in the extensive grass cover. During 1995-2000, *Prosopis* was eradicated from about 300 ha. Now the grass cover has been extended to over 1,200 ha.

Poaching is not a very big problem, especially of birds, but use of pesticide in the surrounding agricultural fields is unregulated and could be having negative impacts on the harrier and floricans, as both feed on insects. This aspect needs to be studied and monitored.

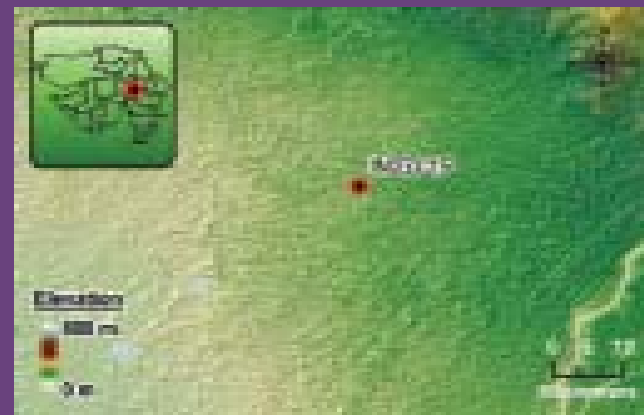
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WETLANDS OF KHEDA



IBA Site Code	: IN-GJ-15
State	: Gujarat
District	: Kheda
Coordinates	: 22° 40' 30" N, 72° 49' 00" E
Ownership	: State, Private, Community
Area	: Undefined (Total area of Kheda 719,400 ha)
Altitude	: Not available
Rainfall	: 800 mm
Temperature	: 7 °C to 46 °C
Biogeographic Zone	: Semi-Arid
Habitats	: Aquatic, Seasonal Marsh

IBA CRITERIA: A1 (Threatened Species), A4ii (> 1% of global population of terrestrial species)
 PROTECTION STATUS: National Park, established in 1973

GENERAL DESCRIPTION

Kheda district of central Gujarat, situated in western India, occupies 719,400 ha area, and is located between two major rivers: Mahisagar on the eastern side and Vatrak, a tributary of River Sabarmati on the western side. The southern side is attached to the Gulf of Khambhat. Major area of the district comprises of plain land, almost at sea level, except for a small area of Kapadvanj and Balasinor tehsil which are hilly (Parasharya *et al.* 2000). The major area of the district has canal irrigation facility and therefore irrigated farming is practised. Paddy is extensively cultivated in Kheda district. As paddy fields are temporary wetlands, they provide an alternative to the natural marshland habitat of the Sarus Crane *Grus antigone*. Daloli, Gobrapura, Narda and Machhial were found to be important roosting areas for these birds (Mukherjee *et al.* 2002).

AVIFAUNA

This site is selected as an IBA mainly because it has good, breeding population of the globally threatened Sarus Crane in India. Sarus population of these reservoirs was estimated as follows: 1989 (556 individuals); 1998 (618 individuals); 2002 (959 individuals) (Mukherjee *et al.* 2002).

Vulnerable	
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>



Photo: P. M. Lad

OTHER KEY FAUNA

As this site is basically an agricultural area, no large wild mammal is found here.

LAND USE

- ☐ Agriculture

THREATS AND CONSERVATION ISSUES

- ☐ Agricultural practices
- ☐ Industrialisation and urbanisation
- ☐ Alteration of habitat
- ☐ Disturbance to the birds by farming activities

Most of the natural wetlands of Kheda districts have been converted in to paddy fields, but at the same time, thanks to canal irrigation, paddy cultivation has increased to those areas where there was no paddy cultivation earlier. Parasharya *et al.* (2000) found significant positive correlation between percentage of land under paddy crop and Sarus Crane density. Although, Sarus Crane prefers to breed in non-cultivated agricultural marshland in the paddy crop agroecosystem (Borad *et al.* 2001), non-availability of marshlands compels them to breed in paddy crop fields, leading to conflict between cranes and farmers. To conserve the crane in agricultural landscapes, uniform distribution of such non-cultivable marshland and their maintenance would provide a near-natural habitat for the cranes. This would ensure successful breeding of the cranes and reduce conflict with farmers (Borad *et al.* 2001).

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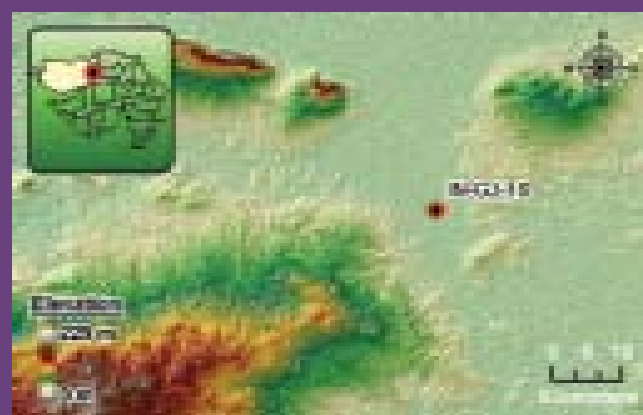
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WILD ASS WILDLIFE SANCTUARY & NANDA ISLAND



IBA Site Code	: IN-GJ-16
State	: Gujarat
District	: Kutch, Rajkot, Mehsana, Banaskantha, Surendranagar
Coordinates	: 3° 42' 31" N, 71° 01' 05" E
Ownership	: State
Area	: 495,371 ha
Altitude	: 3 - 75 m
Rainfall	: 400 mm
Temperature	: 2 °C to 48 °C
Biogeographic Zone	: Desert
Habitats	: Tropical Thorn Forest, Tropical Arid Zone, Seasonal Marsh

IBA CRITERIA: A1 (Threatened Species), A3 (Biome-13: Saharo-Sindian Desert), A4i ($\geq 1\%$ biogeographic population), A4iii ($\geq 20,000$ waterbirds)
PROTECTION STATUS: Wildlife Sanctuary, established in January 1973

GENERAL DESCRIPTION

The Wild Ass Sanctuary encompasses the Little Rann of Kutch and its peripheral areas in Surendranagar, Rajkot, Mehsana, Banaskantha and Kutch districts. Of the total area of the Sanctuary, 356,900 ha fall in the Little Rann, whereas 138,400 ha of wasteland fall in 107 villages of five districts.

The Sanctuary area is characterized by vast, salt-impregnated, sun-baked mudflats, which are dotted with small patches of uplands, locally called *bets* (meaning islands). There are thirty *bets* of varying sizes, the five best known ones around the edge of the Little Rann are the Pung-bet, Dhut-bet, Nanda-bet, Vachab-bet and Jhilandan-bet. There are transition zones, or *Kala-lana* areas, with lower content of salt. The mudflats remain submerged for about 4 - 5 months of the year under fresh water received from a few rivers and saline water from the Arabian Sea. Water depth varies from 0.5 m to 1.5 m. The area has scanty, xerophytic vegetation cover and the fauna has adapted to the water scarcity and saline habitat conditions.

The Sanctuary represents a unique true saline desert-cum-wetland habitat. Historically, it has been a part of the Arabian Sea. The Little Rann of Kutch, in which the Sanctuary is largely located, was connected with the Great Rann of Kutch and Gulf of Kutch, which got silted and separated around 400 BC or later. Fossil deposits indicate the growth of corals, mangroves and marine life before the rise of the seabed and deposition of mud.

Such scenes of Oriental White-backed Vulture *Gyps bengalensis* are now very rare.



Photo: Ashwin Ponal

The Government of India has identified the Little Rann of Kutch (LRK) as an important site for establishing a Biosphere Reserve. It is a unique habitat, which provides the last abode of the Indian Wild Ass *Equus hemionus khur*, one of the six geographical varieties or subspecies of wild ass surviving on the earth.

AVIFAUNA

More than 150 species of birds are reported from the site (Shah *et al.* 1995). The site lies in Biome-13 (Saharo-Sindian Desert). BirdLife International (undated) has listed 11 species in this biome, four have been identified till now from this site. As this biome merges with Biome-11 (Indo-Malayan Tropical Dry Zone), 15 species of Biome-11 are also seen. Most of them are widespread and common and thus of not much conservation concern.

Although the Wild Ass Sanctuary is basically a vast, flat desert, during monsoon many areas get filled up and attract waterbirds of numerous varieties. During good rainfall years, in many low-lying areas, water remains till winter. Vast flocks of ducks and waders are found in these temporary wetlands for brief periods. Their numbers would run in tens of thousands. Important waterbodies are Bajana, Nava Talav, Nanda, Shedwa-bet and Surajbari mudflats.

Bajana is located on the eastern fringe of the Wild Ass Sanctuary. It is a monsoon-fed waterbody with riverine discharges from Banas, Saraswati and Rupen rivers during the monsoon. Bajana is shallow on the western side so that side dries up earlier, whereas the eastern and northeastern sides are deeper. It is inhabited by two species of flamingoes (*Phoenicopterus ruber* and *P. minor*), Coot *Fulica atra*, ducks and waders. Huge flocks of Black-tailed Godwit *Limosa limosa*, Avocet *Recurvirostra avosetta* and Kentish Plover *Charadrius alexandrinus* are found here.

Another waterbody worth noting is Nava Talav. Although it has a natural source of water, this reservoir should be considered a man-made or man-modified wetland (Singh *et al.* 1999). This is because constructing bunds and in turn trapping the rainwater run-off have created the wetland. It is owned by Hindustan Salt Works. Huge numbers of waterbirds are found here.

Surajbari mudflats are situated in the western region of the Little Rann of Kutch. The tidal water comes through a creek called

Hadakiya Creek from the Gulf of Kutch, and flows through anastomosing channels extending 3-4 km into the Rann (Singh *et al.* 1999). Driven by strong winds, the water spreads far inside where it evaporates, leaving salt encrustations. A large expanse of the tidal mudflat has been converted into salt pans. In recent years, the Lesser Flamingo *Phoenicopterus minor* has been found breeding here.

As part of a comprehensive ecological study of the Wild Ass Sanctuary, birds were fortnightly monitored between November 1997 and March 1998. The waterbodies of this Sanctuary supported a total of 80,000 waterbirds (Singh *et al.* 1999). The most dominant species was Northern Shoveler *Anas clypeata* (16.30%), followed by Lesser Flamingo (14%), Pintail *Anas acuta* (8.42%), Coot (7.5%) and Greater Flamingo (7%). The Sanctuary has great potential of being a wetland site of international importance (Ramsar site) (Singh *et al.* 1999).

The BirdLife International (2001) has listed the Lesser Flamingo as Near Threatened. Though the global population is about 5,000,000, including about 1,50,000 in Asia, declines have been suggested in much of Africa due to various development projects envisaged in its huge compact breeding colonies. In India, its number was always less than the Greater Flamingo. In the Wild Ass Sanctuary, Singh *et al.* (1999) estimated a population of about 11,000. Earlier, it was known to nest only in the Greater Rann of Kutch (an IBA) by Ali (1974) but in 1989. Mundkur *et al.* (1989), reported its nesting in Little Rann also. According to Wetlands International (2002), the 1% threshold of South Asian population of Lesser Flamingo is 1,500. With its population of 11,000, this site has almost 9% of the Lesser Flamingos of South Asia. Therefore, this site also qualifies A4ii criteria.

Like Lesser Flamingo, the following species also fulfil A4i criteria (1% threshold vis-a-vis total seen in this site): Great White Pelican *Pelecanus onocrotalus* (250:1,902), Painted Stork *Mycteria leucocephala* (100:194), Spoonbill *Platalea leucorodia* (230:2,561), Greater Flamingo (2,900:5,613), Common Crane *Grus grus* (700:747), Northern Shoveler *Anas clypeata* (10,000:13,000), Pied Avocet *Recurvirostris avosetta* (1,000:4873), and Black-tailed Godwit *Limosa limosa* (1,000:1,100). Information on the 1% population thresholds is taken from Wetlands International (2002), and on the species population in the Wild Ass Sanctuary from Singh *et al.* (1999).

Globally threatened Sarus Crane *Grus antigone* is also found in this site, but mostly on the fringes. Shah *et al.* (1995) have seen it in Surendranagar districts, and Gopi Sunder *et al.* (2000) saw 10 Sarus at Tundi Talab in May 1998.

Some of the *bets* (islands in the vast flat area) for terrestrial birds are Pung-bet, Dhut-bet, Wasraj Solanki-bet, Mardak-bet and Nanda-bet. Among all the Bets, Pung-bet is the largest. Macqueen's Bustard *Chlamydotis macqueeni*, Cream-coloured Courser *Cursorius cursor*, White-eared Bulbul *Pycnonotus leucotis*, Hoopoe or Bifasciated Lark *Alaemon alaudipes*, Variable or Pied Wheatear *Oenanthe picata*, and other desert birds are found in these *bets*.

The Little Rann of Kutch is a regular wintering site for the Near Threatened Macqueen's Bustard *Chlamydotis macqueeni*. As no detailed study has been conducted, we do not know the population density and total number wintering in this IBA. Another threatened species recently added from this site is the Stoliczka's Bushchat or White-browed Bushchat *Saxicola macrorhyncha* (Otto Pfister *pers. comm.* 2003).

OTHER KEY FAUNA

About 28 species of mammals, 18 species of snakes, 16 species of lizards, 5 species of amphibians, and 2 species of turtles are reported from the Sanctuary. Besides the Wild Ass *Equus onager*, the Sanctuary harbours other large mammals such as Chinkara *Gazella bennettii*, Grey Wolf *Canis lupus*, Blackbuck *Antelope cervicapra* (on the fringes), Hyena *Hyaena hyaena*, Nilgai *Boselaphus tragocamelus*, Caracal *Caracal caracal* and Desert Cat *Felis silvestris*.

Critically Endangered	
Oriental White-backed Vulture	<i>Gyps bengalensis</i>
Long-billed Vulture	<i>Gyps indicus</i>
Vulnerable	
Spot-billed Pelican	<i>Pelecanus philippensis</i>
Greater Spotted Eagle	<i>Aquila clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Lesser Kestrel	<i>Falco naumanni</i>
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>
Stoliczka's Bushchat	<i>Saxicola macrorhyncha</i>
Pied Tit	<i>Parus nuchalis</i>
Conservation Dependant	
Dalmatian Pelican	<i>Pelecanus crispus</i>
Near Threatened	
Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Oriental White Ibis	<i>Threskiornis melanocephala</i>
Lesser Flamingo	<i>Phoenicopterus minor</i>
Ferruginous Pochard	<i>Aythya nyroca</i>
Cinereous Vulture	<i>Aegyptius monachus</i>
Red-headed Vulture	<i>Sarcogyps calvus</i>
Macqueen's Houbara	<i>Chlamydotis macqueeni</i>
Biome-13: Saharo-Sindian Desert	
Spotted Sandgrouse	<i>Pterocles senegallus</i>
Greater Hoopoe-Lark	<i>Alaemon alaudipes</i>
White-eared Bulbul	<i>Pycnonotus leucotis</i>
Grey Hypocolius	<i>Hypocolius ampelinus</i>

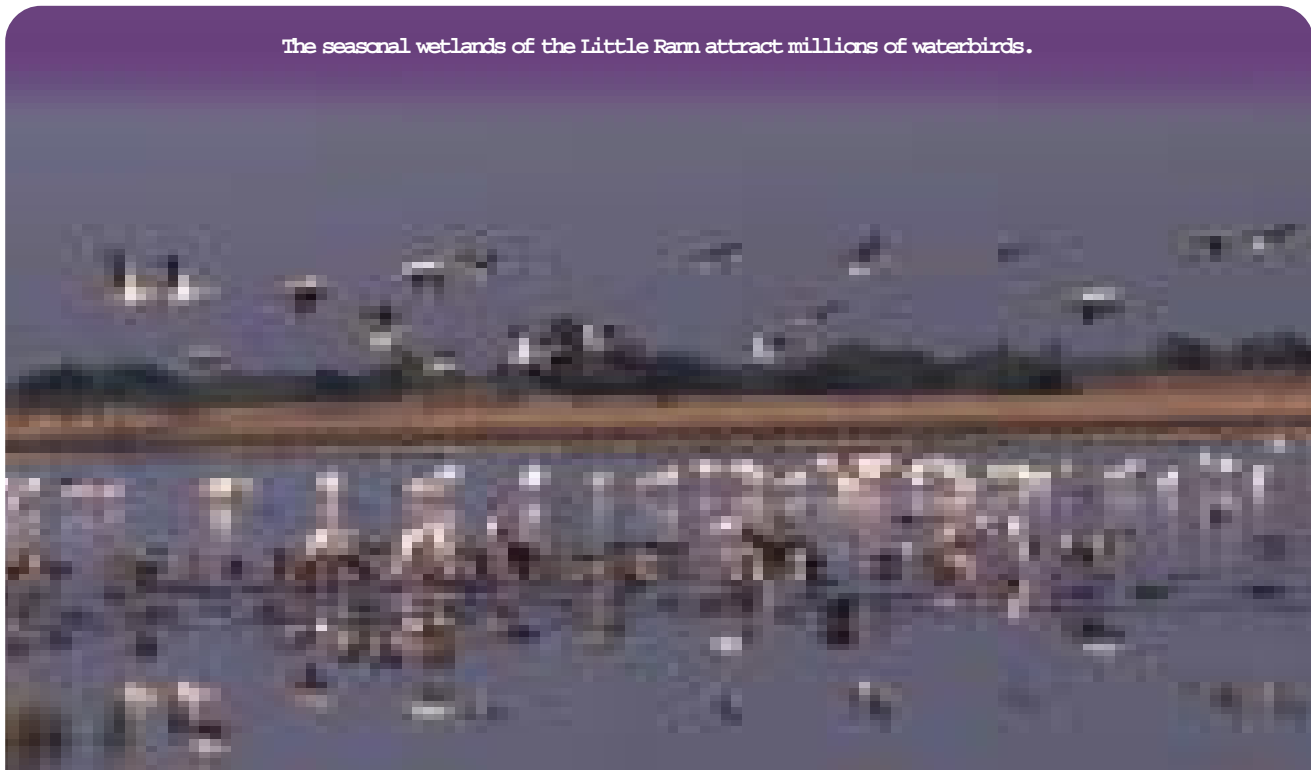


Habitat deterioration due to severe livestock grazing is becoming a major threat to the Wild Ass.

Photo: Otto Pfister

LAND USE

- ☐ Agriculture
- ☐ Nature conservation and research
- ☐ Industrial use (salt production)
- ☐ Transportation



The seasonal wetlands of the Little Rann attract millions of waterbirds.

Photo: Otto Pfister

THREATS AND CONSERVATION ISSUES

- Ingress of salinity
- Invasion of *Prosopis chilensis*
- Grazing
- Heavy vehicular movement
- Denotification

The Little Rann of Kutch has been identified by the Government of India as an important site for a Biosphere Reserve. The Biosphere Reserve (638,500 ha) proposed for consideration includes 495,300 ha area of the Sanctuary and 143,200 ha of 47 peripheral villages.

Farmers from Bhuravandh and Adesar near the Chovisa lake inside the Sanctuary have been illegally pumping out water for their cumin crops. This adversely impact a large number of birds like egrets and cormorants that regularly nest here. Excessive pumping in 2001-02, eventually left the lake completely dry, leading to the death of thousands of birds and their young ones.

In the last two decades, salt traders and extractors have enveloped and encroached the sanctuary area with salt-pans. Fishermen exploit the area during the monsoon and thousands of domestic cattle enter the Rann daily to graze illegally, depriving the local wildlife of fodder and spreading diseases. With drastic deterioration in the habitat of the Wild Ass, its future is severely threatened.

The adjacent area of the Wild Ass Sanctuary is reported to have 107 villages. These, and additional villages from further away, are dependent on the Sanctuary for salt manufacture, grazing and fishing. Roughly 20% of the salt produced in India is reported to come from this region. An estimated 40,000 people and large numbers of vehicles associated with the salt manufacturing industry are reported to operate inside the Sanctuary.

The Sanctuary is being threatened with denotification of 589 sq. km for the development of the salt industry, which has fortunately

not yet materialised. A petition to this effect has been filed in the Gujarat High Court, seeking clarification on some of the issues concerning the Sanctuary, and suggesting a participatory planning and management process for defining an appropriate land use plan for the area.

Indiscriminate expansion of salt manufacturing and a possible move to denotify the Sanctuary under pressure from the salt industry, needs to be urgently countered.

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GJ-17

BHASHKARPARA



IBA Site code	: IN-GJ-17
State	: Gujarat
District	: Surendranagar
Coordinates	: 22° 55' 33" N, 72° 03' 14" E
Ownership	: State
Area	: c. 200 ha
Altitude	: Not available
Rainfall	: 500 mm
Temperature	: 5 °C to 48 °C
Biogeographic Zone	: Coasts
Habitats	: Aquatic

IBA CRITERIA: A1 (Threatened Species), A4iii (≥ 20,000 waterbirds)

PROTECTION STATUS: Not officially protected

GENERAL DESCRIPTION

Bhashkarpara wetland, near Narmada Canal, is situated near Vitthalgadh, Surendranagar district, about 20 km from Viramgam and 45 km from Surendranagar. The size of this wetlands is c. 200 ha area. It attracts thousands of waterfowl during winter.

The wetlands is surrounded by agriculture fields and some natural vegetation. As the site is located near Nalsarovar, there is regular exchange of birds between these two IBAs.

AVIFAUNA

Not much is known about the bird life of this IBA, except that it attracts thousands of ducks, cranes, geese and waders. The Near Threatened Black-necked Stork *Ephippiorhynchus asiaticus* is also seen here. A few pairs of Sarus Crane *Grus antigone* are sometimes seen. Globally threatened Indian Skimmer *Rynchops albicollis* is also seen occasionally.

We have selected this site on the basis of the presence of threatened species (A1 criteria) and presence of more than 20,000 waterfowl (A4iii criteria).

Critically Endangered	
Oriental White-backed Vulture	<i>Gyps bengalensis</i>
Vulnerable	
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>
Near Threatened	
Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Oriental White Ibis	<i>Threskiornis aethiopicus</i>
Lesser Flamingo	<i>Phoenicopterus minor</i>

OTHER KEY FAUNA

The Indian Wild Ass *Equus onager* is sometimes seen in the area. The other large mammal is Nilgai *Boselaphus tragocamelus* - a species considered crop pest.

LAND USE

☐ Irrigation

THREATS AND CONSERVATION ISSUES

☐ Fishing

☐ Hunting

As the water is used for irrigation, the wetland dries up in summer. Poaching is not a major problem but there should be more control on fishing activity, especially during winter when a large number of migratory birds are present. This can be done with the cooperation of local people who generally have a benign attitude towards wildlife.

KEY CONTRIBUTORS

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KEY REFERENCE

None

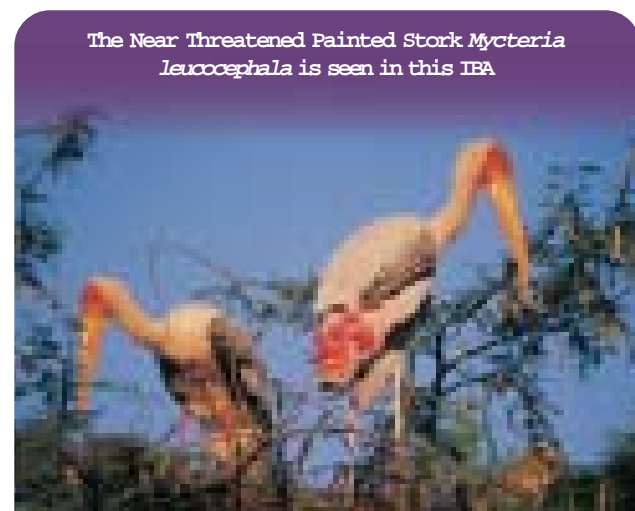


Photo: Asad R. Rahmani