Wetlands in Gujarat

Versatile yet vulnerable

जहाँ है हरियाली ।
वहाँ है खुशहाली ।।

Wetlands of Gujarat

Huge congregation of flamingos at a wetland near Koddha in North Gujarat

Wetlands, the home of water animals, birds and amphibians, cover diverse and heterogeneous assemblage of habitats such as lakes (*Jheels)*, ponds, rivers, river flood plains, inter-tidal areas, estuaries, mangroves, coral reefs and other related ecosystems. The Ramsar Convention defines - “Wetlands are areas of marsh, fen, peat-land or water, whether natural or artificial, fresh, brackish or salty, including area of marine water, the depth of which at low tides does not exceed six meters”.

Wetlands constitute a vital link in the hydrological cycle. They provide a multitude of services such as purification and regulation of flows, fisheries, habitat provisioning to plants, animals and micro-organisms, providing opportunities for recreation and tourism etc. Inland wetlands are important water resources replenishing groundwater and sub-soil aquifers. Coastal wetlands, including mangroves, estuaries and coral reefs, are key habitats for marine life and often function as natural barriers against salt water intrusion, protecting coastal land and inland water habitats. The abundance and distribution of wildlife in a habitat depends on distribution and extent of water-bodies. They are thus a part of the global network of water-dependent, cross boundary resources, whose constituents cannot be managed in isolation.

Extent of wetlands

Variety of birds at Nava Talav in Little Rann of Kachchh

India harbours a substantial area of the global wetlands. *Jheels* (lakes), *Talav (*ponds), dams, seasonal water-bodies, paddy fields, streams, marsh lands, coastline, mangroves, coral reefs, estuaries and large stretches of mudflats etc. contribute significantly to enrich habitat diversity, resulting in rich wetland biota, including colourful bird life. Space Applications Centre (SAC), Ahmedabad (2011) has estimated about 1,50,174 sq. km (6.9% of the total geographical area of the country) of wetlands in the country, with highest share of Gujarat amongst all states in India. Of this, The extent of watery-lands in Gujarat is about 34,350 sq. km (17.6% of the state's geographical area and 22.9 % of the national wetlands). In other words, about one fourth of the India's fascinating wetlands are in Gujarat where millions of colourful water-birds decorate the landscapes.

Waterfowl concentration in Gujarat during the winter is one of the highest in the country as the area falls on the migratory route of birds. Migratory birds from eastern Europe and western Asia pass through the western part of the country on their way to the Indian plateau. Many stay in Gujarat for the entire winter season and some move to Deccan plateau. Again during their reverse migration in March and April, birds stay at wetlands for sometime before they depart to their breeding grounds. The two gulfs - Kachchh and Khambhat and the two Ranns - Great and Little, cover a vast area of coastal wetlands and mixed sea and fresh water wetlands, making this part of the land incomparable in the country.

Wetlands as Protected Areas

In Gujarat, the coastal and inland wetlands cover 35.8 % and 6.0 % of the total wetland area respectively in India. The state recognised the value of important wetlands related to geo-morphology, ecology, flora and fauna and constituted nine Protected Areas - one national park, seven sanctuaries and one conservation reserve to preserve a total area of 13,052 sq. km. Additionally, eight wetlands of national conservation significance have been identified and notified by the Ministry of Environment & Forests, Government of India for their conservation in partnership with the local communities.

Great White Pelican at Nalsarovar

Important wetlands as Protected Areas

(i) Great Rann Wildlife Sanctuary
(ii) Wild Ass Sanctuary in Little Rann
(iii) Marine National Park
(iv) Marine Sanctuary
(v) Nalsarovar Bird Sanctuary
(vi) Thol lake Bird Sanctuary
(vii) Porbandar Bird Sanctuary
(viii) Khijadia Bird Sanctuary
(ix) Chharidhund Conservation Reserve

Wetlands of national conservation significance

Under the National Wetland programme, following eight wetlands in Gujarat, of the list of wetlands in India, have been notified as wetlands of National Conservation Significance,.

(i) Greater Rann of Kachchh
(ii) Little Rann of Kachchh
(iii) Khijadia lake in Jamnagar
(iv) Pariej lake in Anand
(v) Vadhawan lake in Vadodara
(vi) Thol lake in Mehsana
(vii) Nalsarovar lake in Ahmedabad and Surendranagar
(viii) Nani-Kakarad in Navsari

Of the above eight national wetland sites, five are covered under Protected Areas.

Area (in sq. km) of wetlands

Categories	India	Gujarat
Inland wetland	1,05,649	6,679
Coastal wetland	41,401	28,071
Total	1,47,050	34,653
Wetlands <2.25ha	5,556	97
Grand total	1,52,606	34,750

Gujarat contributes 23.1 % of total wetlands of the country

Categories and areas of wetlands in Gujarat

Inland	Area (sq. km)	Coastal	Area (sq. km)
Natural lake	154	Mangroves	1,031
Water logged	289	Coral reefs	130
Reservoirs	1,394	Mudflat	21,954
Tanks/ponds	198	Salt pans	460
Others	57	Others	1,587
Total	**2,092**	**Total**	**25,162**

Number and area under wetlands in Gujarat

Inland wetlands	**11,433**
Coastal wetlands	**2,750**
Small wetlands <2.25 ha	**9,708**
Total	**23,891**

Note: Small wetlands are mainly tanks/small ponds

Categories of wetlands

Normally, wetlands are classified in two categories-inland wetlands and coastal wetlands. A vast area of the saline desert, extending over two million hectares has a unique character and stands in a different category - a combination of both, and can be categorised in a third category - the Rann. Thus, Gujarat's wetlands can be categorized in three types: (i) Inland wetlands, (ii) Coastal wetlands, and (iii) The Rann.

Inland Wetlands

Inland wetlands in the State include freshwater lakes, village ponds/tanks, *Sim Talav*, reservoirs (*Talav / Sinchai Talav*), marshes, paddy fields, dams, canals, rivers and streams. Nearly four hundreds such wetlands, having fairly good sizes, cover an area of 209,210 ha.

Ponds, most abundant amongst the various wetland types, dominate the rural landscape of Gujarat. Many of the numerous natural, semi-natural and man-made water-bodies of varied shapes, sizes and depth are seasonal, but they play an important role of providing habitat to numerous resident and migratory waterfowls. The growth of trees at ponds provides roosting and nesting sites to the resident waterfowls such as egrets, herons, cormorants, storks, ibises, Indian sarus and spoonbills. Many ponds are rich in socio-economically important aquatic plants such as *Typha* ('Ghabajariyun'), *Nymphaea ('*Kamal Kakdi'), *Nelumbo* ('Kamal'/'Gheetela') and *Trapha* ('Shingoda'). Ponds have strong economical and cultural linkage in India. In the past, no settlement was possible in any area without the creation of ponds or maintenance of natural lakes.

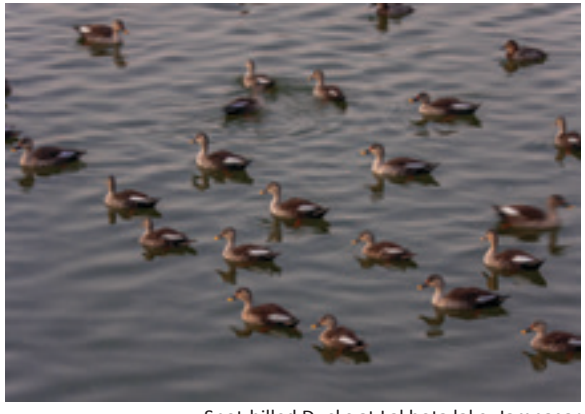
Lakes (*Jheels)* are nature's most beautiful habitats and these habitats have been a key component of the earth to connect man with nature. A few **natural lakes and artificial lakes** in the State have a total area of 23,550 ha. Nal Sarovar, one of the largest lakes of the country in Viramgam taluka (North Gujarat), is a treasure trove of waterfowl and aquatic plants. The lake is the life supporting system for a large number of local people. Some lakes like Chandola and Goblej near Ahmedabad supported high waterfowl diversity in the past.

Apart from the ponds and lakes, the State harbours a large number of **reservoirs,** which are primarily meant for irrigation. Pariej and Kanewal in Kheda (Central Gujarat), Thol in Mehsana (N. Gujarat) and Wadhavan in Vadodara are known for their high diversity and population of waterfowl. They are very large ponds having characters similar to the lakes. Total area of tanks, ponds and reservoirs in the State is about 3,22,900 ha.

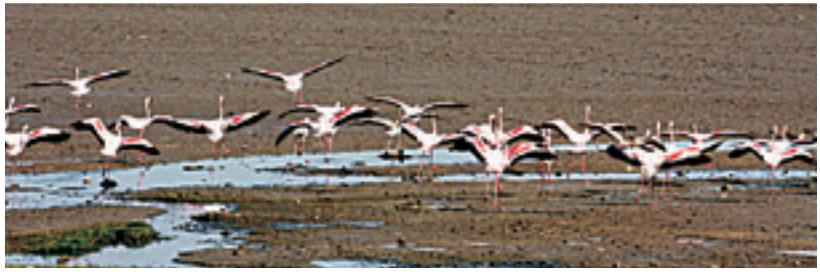
Water logged area (34,600 ha) and salt pan (1300 ha), **marshes** are also important wetland ecosystems. There are few large marshes such as the one near Sitapur and Nayakpura villages in Viramgam taluka.

Indian Sarus at Thol Wildlife Sanctuary

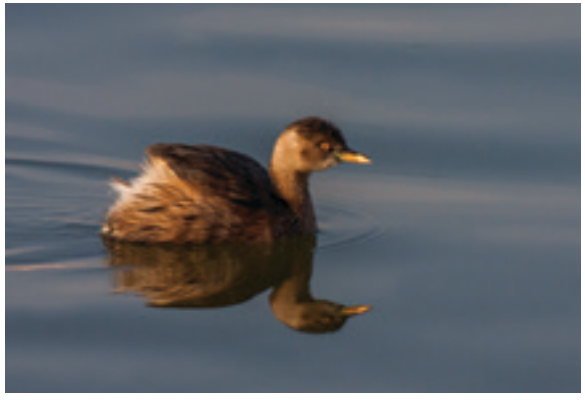
Greater Flamingos and Godwits at Nalsarovar



Spot-billed Ducks at Lakhota lake, Jamnagar



Flamingos in water logged area



Little Grebe in one of the village ponds

Oriental Darter and Cormorant at Khijadia Bird Sanctuary

Egret waiting for a catch on overflowing Kamleshwar Dam, Gir

Rivers and dams turn important habitats in the state in winters and summers. Expansion of dams during the last five decades has had a positive impact on several species like resident birds, crocodiles, python and also several mammals such as leopards. A large proportion of a number of **rivers and streams** in the State retain water for only a brief period in a year. During the brief period from post-monsoon to winter, these water-courses provide resting/roosting and/or feeding sites to the water-birds such as ducks, waders, herons, egrets, cranes, terns etc. Two major rivers- the Narmada and the Tapti play important roles in nurturing the biodiversity throughout the year. Release of Narmada waters in Sabarmati and Saraswati rivers in summer during the recent years, has made a significant contribution to conservation of resident birds. Five medium, 25 minor and 5 desert rivers also maintain the biodiversity in the State. During the post-monsoon season water spread is 2,760 sq. km in these dams and rivers, which gets reduced to only one third during the summer or the pre-monsoon season. In short, it may be stated that waterfowl and man are the most visible components of the biodiversity, which the inland wetlands of Gujarat support. In actuality, these wetlands support a great array of plants, invertebrates, reptiles, amphibians and mammals.

Diversity of flora and fauna is high in the wetlands of Gujarat. A total of 3,23 species of wetlands of India are endemic or globally threatened, and at least 30 of them are from Gujarat. Of 114 endemic wetland plants of India, 11 are found in the wetlands of Gujarat.

Common Cranes in flight

Greater Flamingo with young ones

Large congregation of Great White Pelican and other wetland birds at Nada bet

T**he potential candidate** sites, which are neither a part of Protected Area nor declared as national wetland site, but qualify for the wetlands of national conservation significance are as follow

Amipur dam in Porbandar district

Dardasagar dam in Porbandar district

Kajwetland near Kodinar in Junagadh

Navatalav/Sadwa lake in Surendranagar

Bhaskar marshland in Surendranagar

Charkhala saltpan near Dwarka, Jamnagar district

Kumbharwada saltpan near Bhavnagar district

Ajidam in Rajkot district

Falzar in Rajkot district

Muli in Surendranagar district

Sukhbhadar in Bhavnagar district

Bhimasar in Kachchh district

Dewisar in Kachchh district

Ninghal in Kachchh district

Ajwadam in Vadodara district

Servodhandh in Banni, Kachchh

Lunadhandh in Banni, Kachchh (good number of nesting colonies of waterbirds)

Pragsar, Kachchh (good population of crocodiles)

A large water body between Nada bet in the Great Rann and Pakistan border

Pied Avocet in Coastal Area

Western Reef Egret near Jamnagar coast

Red-necked Grebe near Jakhau, Kachchh

Coastal Wetlands

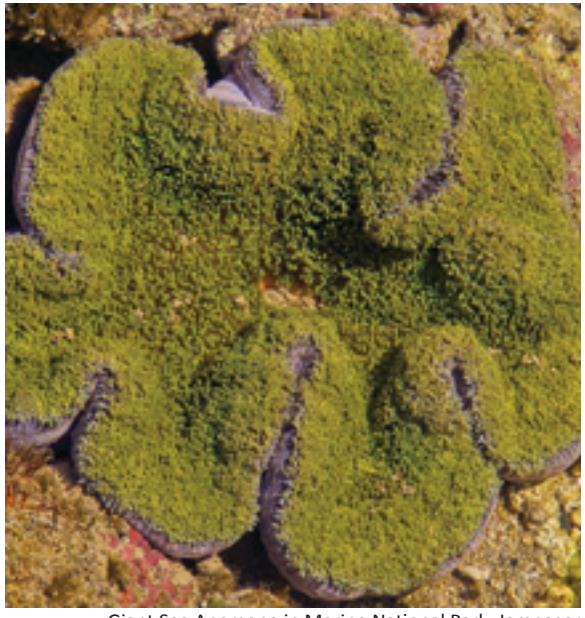
Gujarat has the longest coast line (about 1650 km) amongst all the maritime states in India. Out of the three gulfs in the country, the state has two coastal region is spread from high rainfall area (about 2,500 mm in south Gujarat) to low rains area (only 250 mm in the north-west of Kachchh). These are the main reasons for extensive and diverse marine eco-systems in India. Temperature, salinity and depth are the chief barriers against free movement of marine organisms. Many kinds of waves, tides, cyclone and currents etc. in the sea influence the physical and biological conditions of the marine ecosystems. Richness increases with productivity, geological and climatic stability and decreasing latitude.

Gulfs in the tropical zone are considered to be important areas for the diversity and reproduction of marine life and they have a remarkable feature of the extreme diversity of ecosystems i.e. coastal sands, estuaries, bays, muddy and rocky areas, coral reefs and mangroves. Gulf of Kachchh, covering an area of 7,350 sq. km. with its shallow intertidal zone and chain of islands, has one of the richest marine habitats in this subcontinent. The entire southern coast of the Gulf in Jamnagar district is ringed by a cluster of 42 islands, many of them are fringed by coral reefs and bear mangrove vegetation. The second largest area under mangroves in India has been recorded in the Gulf of Kachchh.

The ecosystems in the intertidal zone and coasts in Gujarat State can be classified into (i) Coral reefs; (ii) Mangroves: (a) Dense mangroves and (b) Scrub mangroves; (iii) Mudflats:

(a) High tidal; (b) Inter tidal and (c) Low tidal; (iv) Algal bed; (v) Marsh vegetation; (vi) Creeks; (vii) Salt encrustation; (viii) Estuaries; (ix) Salt pan; (x) Sandy beach /coasts; (xi) Rocky beach; (xii) True saline desert; (xiii) *Bets*; (xiv) Island systems in the Gulf (*bets*); (xv) Gulf water - Gulfs of Kachchh and Khambhat and (xvi) Open sea water.

A flock of Crab Plovers & terns at Pirotan, Gulf of Kachchh



Giant Sea Anemone in Marine National Park, Jamnagar

Corals in Marine National Park, Jamnagar

Coral reef

Coral reefs in the Gulf of Kachchh, one of the northern most corals in the Indian Ocean, are geographically isolated. Most of the 33 of 42 islands in the Gulf support fringing reefs. A total of 56 species (52 identified and four unidentified) of corals (44 hard and 12 soft) have been documented from this area. Species diversity and high biological productivity make coral reefs unique, supplying food for fish, crabs, prawns and other marine life.

Vast areas of dead reefs with live patches at fringes of islands is an indication that the coral cover loss is recent. Majority of the reef areas in the Gulf are under mud and sand. At present, dead and live coral reefs have been estimated about 335 sq. km. Abundant food on reefs is enjoyed in Gujarat by birds and some mammals such as jackals. Reefs are also recognised as breeding and nursery ground for marine life, including fish. Winter birds congregate on beaches and coral reefs to harvest abundant food.

Bonelia sp. - rare and endemic to Gulf of Kachchh

Inter-tidal mudflats

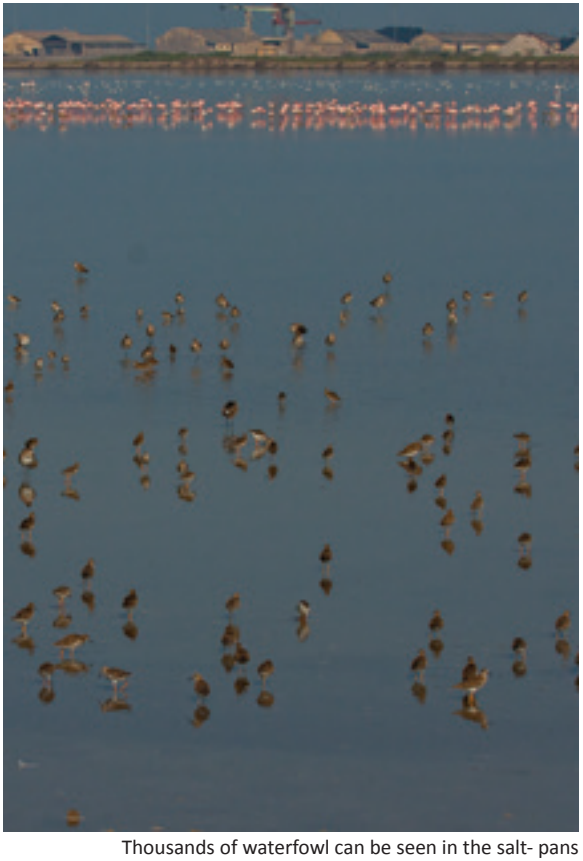
Tidal amplitude in the two gulfs in Gujarat is very high. It is exceptionally high in the Gulf of Khambhat, reaching nearly 10 m. This is the reason for large areas of about 22,604 sq. km. under tidal mudflats in Gujarat, and they are categorised as high tidal mudflats, inter-tidal mudflats and the low tidal mudflat, depending upon their proximity to the sea and consequently the intensity of tidal energy by which they are influenced. Inter-tidal and low tidal mudflats are excellent habitats for the growth of sea algae. Marine birds and other creatures derive their food from these areas. Mudflats are unique habitats in the marine environment and play an equally important role for marine flora and fauna.

Salt pans and other areas

Though salt pans are the man-made habitats, they are valuable for many resident and migratory birds. Thousands of waterfowls can be seen in the salt- pans from October to March. These include flamingos, godwits, sandpipers, plovers, stilts, terns and so forth.

Estuaries, lagoon, sand beach, salt marshes, marsh vegetation, rocky cliffs and salt pans are the other ecosystems along the coasts of Jamnagar. Estuaries in the gulf region are inactive, but become active during the rainy season. Estuaries receive enough water only during high rains. Scrub forests, rocks and cliffs on islands provide shelter to the terrestrial birds. Estuaries in south Gujarat are active and support diverse and rich mangroves.

Crab Plovers at Marine National Park, Jamnagar

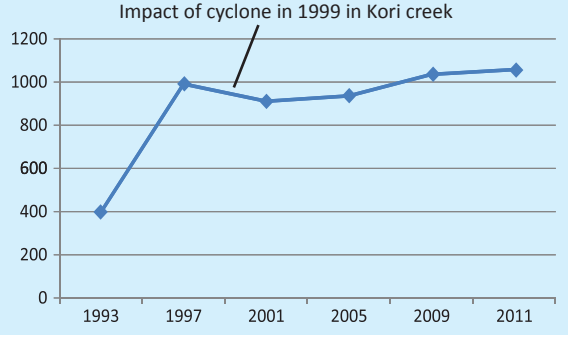


Thousands of waterfowl can be seen in the salt- pans

Avicennia marina in Marine National Park, Jamnagar

Expanding mangrove cover in Gujarat

Year	Mangrove cover (Km²)
1993	397
1997	991
2001	911
2005	936
2009	1036
2011	1058



Mangroves

Mangrove cover in the inter-tidal area of Gujarat depleted to its lowest level in the late 1970s. But the trend was reversed after the beginning of intensive conservation in 1980s. Marine Sanctuary was created in 1980. Subsequently, ecologically rich area along with mangroves in Jamnagar was declared as the first marine national park of India. Mangrove restoration and conservation started in 1983 with plantation of *Avicennia marina* on a small scale by the Forest Department. It was subsequently scaled up to cover an area of over 55,000 ha area of inter-tidal mudflats in the last three decades. Extensive meetings in coastal villages and nature education activities were conducted to enlist support of the people. When mangrove restoration started in Gujarat, extent of its cover was very low in small patches, but it started improving after withdrawal of destructive activities by the people. For the years before 1990, the assessment of mangrove cover is not available. As per the reports of the Forest Survey of India, Dehradun, published every two years, the mangrove cover improved consistently. Although major area of mangroves of Gujarat is in semi-arid environment, the cover tuned extensive after the massive recovery during the last two decades. At present, Gujarat supports about one fifth of total mangrove cover in India.

The Gujarat Forest Department is the major player in mangrove conservation, but other institutions such as Gujarat Ecology Commission, and industries also made some contribution. People's support in restoration and protection of tidal forests continued over the period. Of the total plantations carried out in the inter-tidal mudflats, over ninety percent of it were done by the Forest Department and the rest were carried out by other institutions and industries. At present, mangroves occur in the eleven coastal districts in Gujarat but the major portion of it is in the Gulf of Kachchh in Jamnagar and Kachchh districts. At present, the extent of mangrove cover in Gujarat is the second highest in India after Sundarbans in West Bengal. Also, the extent of successful restoration-increase of mangrove cover by two and half folds in about two decades, is commendable and may be listed amongst the best restoration stories in the world.

Mangrove in Marine National Park, Jamnagar

Mangroves provide ideal nesting site to egrets and herons

Notified mangrove areas as forest in Gujarat

(Area in sq. km)

District	Area
Jamnagar	665.93
Rajkot	77.70
Sub-total for Saurashtra	**743.63**
Kutch	581.80
Grand total	**1324.43**

District-wise mangrove cover (FSI 2009)[5]

District	Area in sq. km.	District	Area in sq. km.
Valsad	2	Navsari	1
Surat	20	Bharuch	43
Vadodara	2	Ahmedabad	30
Bhavnagar	19	Amreli	1
Jungadh/ Porbandar	1	Jamnagar	159
Rajkot	2	Kachchh	778
		Total	**1,058**

Although 1324.4 sq. km area of mangroves in Kachchh, Jamnagar and Rajkot has been declared as forests in the State, all of them do not have mangrove cover. There are large blanks or hyper-saline mudflats within the blocks of forests; some of them are now not suitable for development of mangroves. Also, mangrove patches in other nine districts - Navsari, Valsad, Surat, Bharuch, Ahmedabad, Bhavnagar, Junagadh, Amreli and Porbandar do not have legal status of forest. Mangroves near Kandla Port, Jangi to Surajbari, near Mundra Port and some in Kori creek are yet to be declared as forest under the IFA, 1927. These mangroves are still managed by port trusts and the revenue department. In the absence of legal protection, the industrial development in these areas have already caused some damage to mangroves in the past.

The FSI Dehradun has reported mangroves in 12 districts whereas GEER Foundation and Gujarat Ecology Commission have recorded them in 13 districts. Gujarat Ecology Commission estimated 14 sq. km. mangrove cover in Navsari but FSI Dehradun found only one sq. km. and missed mapping major mangroves lined along small rivers.

There had been great changes in the environment of this region due to change in climate, gradual rise of mudflats, restricted flow of rivers as a result of construction of dams and destruction of original setting of mangroves. With increased protection during the recent past, *Avicennia sp.* has started colonizing suitable mudflats. In this process, the succession has started in majority of sites, including on islands *(Bets)* in the

Gulf. Some of the mudflats, which supported mangroves in the past, are no longer suitable for growth of vegetation as areas changed into hyper-saline lands. But on the other side, some seaward mudflats provide ideal conditions for regeneration- a process of primary succession. Unlike high rainfall area in the tropical region, mangroves in Gujarat are shrubby and they are distributed in discontinuous patches with blanks and marsh vegetation within them. But the patches of mangroves in south Gujarat are luxuriant and diverse.

The Climatic factors such as temperature fluctuation, humidity, precipitation, number of rainy days, air, moisture, radiation and fresh water flow in the region, act as the most significant factors for natural growth, development and succession of mangroves. These factors also govern the salinity of the mudflats, which support tidal vegetation. Distribution of mangroves is mainly restricted to the tropical region, but some species have adapted to grow in sub-tropical and semi-arid region. Normally, evapo-transpiration and precipitation govern the mangrove's climate in an area.

Mangrove flora of Gujarat

Mangroves in Gujarat are called *'cher'* and '*cheradi*', which is normally always addressed to the species of *Avicennia*, constituting over 95% of the total mangrove vegetation. Except *Avicennia*, other species have a restricted distribution with low population and poor regeneration capability and hence they can be categorised as locally threatened. Fifteen species of mangroves are found in the west coast of India and all of them now survive in Gujarat.

Avicennia marina - extensive occurrence.

Avicennia alba - poor occurrence in the state. *Avicennia officinalis*-Occurrence in south Gujarat. *Ceriopstagal*-Occurs in patches on island in the Gulf of Kachchh and also in Kori Creek. *R. mucronata*- Karod occur in patches on islands in the gulf in Jamnagar.

R. apiculata exterminated but introduced recently. *Aegiceras corniculatum* (Chawario) - sporadic occurrence on islands in the Gulf of Kachchh. *Sonneratia apetala* - occurrence in estuaries in south Gujarat.

Excoecaria agallocha-recently recorded in south Gujarat.

Bruguiera gymnorrhiza (Chitleri) - exterminated but introduced recently.

Kandelia candel - was not recorded in Gujarat but has been introduced in 2003 by bringing propagules from Maharashtra.

Acanthus ilicifolius is found in South Gujarat. *Bruguiera cylindrica* recorded in the past but not found at present

Bruguiera gymnorrhiza - recorded in the past. *Salvadora persica* and Suaeda sp. - an associate of mangroves

White Rann

Flock of flamingos at Nada bet in North Gujarat

Indian Wild Ass in the background of Sun setting in Little Rann of Kachchh

The Rann

The components of this vast & wonderful fascinating land which covers over 20,000 km^2 area in Kachchh district, has rocky hills amidst the saline desert, a buried city of the Hadappan civilization, which was recently excavated, innumerable fossils and a breeding ground of the Greater Flamingo ('Flamingo City'). In addition to this, it also comprises of groups of wild asses crossing fringe area to *bet* though the flat Rann, herds of Indian gazelles sprinting on the mudflats at the edge of an island and numerous water bodies in winter. The entire area, leaving dotted uplands, submerges under a sheet of fresh water in the monsoon and gradually changes to saline dry mudflat in winter, dotted with numerous water-bodies and then a part of it changes to white Rann in the late winter and summer. The Rann, the unique wetland during monsoon and a typical flat landmass for the rest of year, is a land of wild ass, chinkara, flamingo, water birds, raptors, several threatened mammals and *agarias* - a tribe who prepare salt there.

The Rann is divided into two parts-the Great Rann and the Little Rann. The Great Rann is about three times the size of the Little Rann.

The Little Rann is a part of Wild Ass Sanctuary, which is considered as the only home of the Indian wild ass in the world. The Sanctuary area is characterised by vast, salt-impregnated, sun-baked mudflats, which are dotted with small patches of uplands (locally called '*bets*', meaning islands). The mud-flats remain submerged for about five months of a 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 fauna have adapted to the water scarcity and saline habitat conditions. The Little Rann of Kachchh was connected with the Great Rann of Kachchh and Gulf of Kachchh, which got silted and separated around first millennium B.C or later.

The major part of the Great Rann is part of Great Rann Sanctuary which also possesses several large bets and nature's wonder- The Flamingo city, a breeding site of Flamingo. The Rann is a unique true saline desert-cum-wetland habitat. It was a part of the Arabian Sea in the historical time. Fossil deposits indicate the growth of corals, mangroves and marine life before the rise of the sea bed and deposition of mud.

Flamingo City - breeding centre of Flamingo - a nature's wonder

Nesting of Flamingos in hundred thousands was recorded hundred years ago by ex-ruler of Kachchh in the Great Rann. This was later described as Flamingo city by Dr Salim Ali after his visit. The communal nesting colony of the birds was observed by the naturalists but all such nestings were not recorded because people encountered difficulties in visiting this area. A team of naturalists have to travel a long distance in shallow water and muds to see nature's wonders.

Booted Eagle

Nesting site of flamingos

Indian Sarus

Greater Flamingos

Water-birds

Regular water fowl counting reveals that each of the sites- Nalsarovar in Ahmedabad; Thol lake in Mehsana; Janan and Chharidhundh in Kachchh; Bardasagar, Dhonivira, Amipur in Porbandar; Aji dam, Sani dam, Sarmat Bhandhara dam and Khijadia lake in Jamnagar; Dhanasara dam and Korddha Moti Sander in Patan; Patangadi in Dahod, Nani-Kakrad in Navsari, Kanewal in Kheda supported more than 20,000 water birds.

Indian Sarus (locally called 'Sarus'), and two species of the migratory cranes viz. Common Crane ('Kunj') and Demoiselle Crane ('Karkara') are three cranes in Gujarat. Indian sarus, an endangered species has a global population of about 8,000-10,000 birds, all in India. There are about 1,400 to 1,600 Sarus in Gujarat. Over 80 % of the Indian sarus population of Gujarat is found in Ahmedabad, Anand and Kheda districts.

Gujarat supports a good population of migratory cranes. During the last two decades population of Common Crane was estimated between 50,000 to 80,000 whereas number of Demoiselle Crane remained high between 300,000 to 400,000 in Gujarat, mainly Saurashtra, Kachchh and part of north Gujarat.

Flamingos: These beautiful lanky birds, locally called 'Hanj', 'Surkhab' or 'Lakhana Janaiyya', with their whitish to bright pink plumage offer a fascinating sight to an eco-tourist. Greater and Lesser Flamingos can be seen in varying numbers at many wetlands of Gujarat. Gujarat is proud of having breeding grounds of both the flamingos in the Ranns of Kachchh. Lesser Flamingo is a near threatened species as per IUCN criteria.

The 'Flamingo City' had been first reported in 1886 by Maharao Khengarji, but it was Dr. Salim Ali's work that forms the first major account of this amazing phenomenon. The traditional Flamingo City lies some 10 kilometer north-east of Nir (at the tip of Pachchham Island) where Dr. Salim Ali estimated total population in order of half a million bird in 1945[10]. This area offers a wonderful nesting site for Flamingo, although nesting is recorded in the Little Rann also. Uday Vora, a forest officer and bird expert counted about 200,000 flamingo in inter-tidal-mudflats near mouth of Mahi River. In Gujarat, the population of the two species of Flamingo is certainly estimated to be over half million during the peak winter.

Pelicans: Pelicans are the other most abundant large waterfowls**.** This strange-looking, heavy waterfowl is called 'Pen' in Gujarat. Rosy Pelican or Great White pelican *(Pelecanus ornocrotralus)* is regularly seen in large numbers in the Ranns, lakes and even village ponds. In 2003, a total of 8,240 Rosy Pelicans were counted in Gujarat but this number was over

Great White Pelican

Water fowl's estimate

Waterfowl counting was done thrice in all districts at important wetlands. A total of 1.5 million water-birds in 2005 and about 1.62 million in 2006 were counted. The increase might be due to increase in awareness of bird countings. All wetlands, except some minors, and some coastal wetlands, were covered in these counting. In February 2008, total 1.95 million water-birds belonging to 160 species were counted in 2,355 ponds, reservoirs, village tanks and few coastal wetlands.

Wetland Bird Counting – Winter 2008

No.	Group of birds	Population
1.	Grebes	78,470
2.	Pelicans	24,450
3.	Cormorants and darters	63,650
4.	Herons and egrets	226,500
5.	Storks	36,000
6.	Ibises and spoonbills	67,610
7.	Flamingos	132,690
8.	Geese and ducks	363,160
9.	Eagles, vultures and harriers	3,430
10.	Cranes	356,400
11.	Rails, crakes, gallinules and coots	358,640
12.	Jacanas	2,260
13.	Waders	1 64,600
14.	Gulls, terns and skimmers	46,800
15.	Kingfishers	6,930
16.	Swallows, warblers, pipits & wagtails	15,930
	Total	**1,947,510**

Marsh crocodile

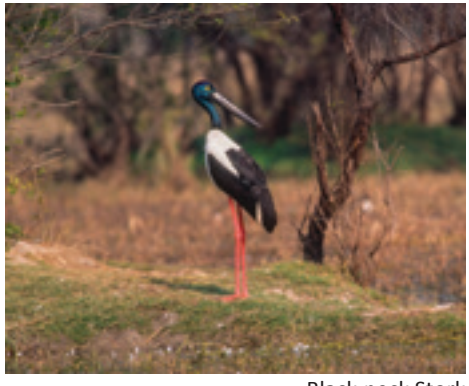
Python

20,000 in February 2008. Rosy Pelican had bred once in the Great Rann of Kachchh (Flamingo City) in the past. Dalmatian Pelican - *Pelecanus crispus,* a globally threatened species is also seen during winter every year at large water-bodies and the Ranns. The Spotted Pelican *(Pelicanus philippensis)* had been recorded in Gujarat by the naturalists in a good numbers.

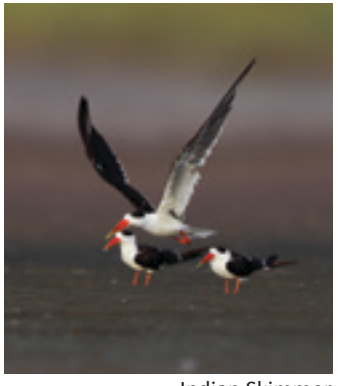
Herons and Egrets: This group of birds is most common in the country as well as in Gujarat. Most of these are resident birds. Number of this group may exceed 250,000 in the state as a total of 227,000 birds were counted at wetland sites, although they are common in village sites in fields and on trees.

Crocodile: Marsh crocodile, a water dependent reptile, is found in the water bodies in dams and rivers in Gir, Girnar, Barda, in ponds in Kachchh, Kheda, Anand and Panchamahal districts. They are also found in Narmada and Kadana dams. The concentration is high in Ajwa dam and Vishwamitri river and neighbouring ponds in Vadodara. The creation of dams has helped this species. About a decade ago, a survey in 1990s reported about 1500 crocodiles in Gujarat but this number is higher at present.

Pythons were common in the forest in south Gujarat but their number declined due to destruction of habitat. Sighting of this large snake again increased due to expansion of dams and irrigation systems. The good monsoon during the last decade also contributed to reproduction success. During the monsoons, they are encountered in almost all districts in Gujarat and their capturing rate in villages has increased during the recent years.



Black-neck Stork



Indian Skimmer

Green Sea Turtle

Marsh Crocodile

Wetland dependent rare and threatened fauna in Gujarat

A large number of birds, amphibians and other fauna are dependent on the health of wetlands. A good number of them are threatened due to the loss of habitat or their poaching, and some of them are on the verge of extinction. The threatened wetland fauna in Gujarat are as follow.

Birds

- Indian sarus
- Pink-headed Duck
- Morbled Teal
- Baikal Teal
- Spot-billed Pelican
- Lesser Adjutant
- Black necked Stork
- Black Stork
- Baer's Pochard
- Over half dozen raptors like
- White-bellied Sea Eagle
- Indian skimmer

Reptiles and amphibians

- Green Sea Turtle
- Olive Ridley Turtle
- Leather-backed Turtle
- Marsh Crocodile
- Indian Flap-shelled Turtle
- Indian Soft shelled Turtle
- Indian Python

Marine life - Sea Horse and corals

Few communities like salt pan workers and fishermen are dependent on wetlands

Content : Dr. H. S. Singh, IFS, Chairman, Gujarat Biodiversity Board

Photographs : Dr. H. S. Singh, IFS, Manoj Dholakia, Asvin Trivedi, Yogendra Shah, Arpit Deomurari, Ankur Patel, Dhanraj Malik, Rohit Vyas, Chandresh Dave