

# Distribution of Mangroves along the Gulf of Kuchchh

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Distribution of mangroves in the Gulf of Kuchchh is reviewed in relation to various factors. The sea level rise as a result of coastal geological processes has been responsible for the inundation of vast areas in the Rann of Kuchchh by the seawater.

Secondly, climatological factors erratic and scanty rainfall and high temperature also influence the mangrove distribution. Coupled with strong winds and tidal fluctuations vast patches of land have high soil salinity. The tidal bore of 6 to 8 m height has a major role in the distribution, zonation and abundance of mangroves in the Gulf region.

Evergreen mangrove ecosystem of this semi desert region is represented by *Avicennia marina*, *A. officinalis*, *A. alba*, *Rhizophora mucronata*, *R. apiculata* and *Ceriops tagal*. There are several associated mangrove species. These mangroves are also rich in the faunal populations, particularly varieties of birds including Flemings.

As a result of non-availability of any other source for fuel and fodder, the mangrove trees are constantly cut for fodder, firewood, etc. During the famine conditions, some of the mangroves like *Avicennia* fruits, are also used for human consumption.

Recently mangrove conservation and afforestation programmes and establishment of a Nature Park at Pirotan Island has been initiated.

## INTRODUCTION

Mangroves of the westcoast of India cover about 114,000 hectares of area (Sidhu, 1963:129-136) out of which half are found along Gujarat and Saurashtra coast. Blatter (1908:756-777; 1909:151-176) was the first one to study the mangroves from Gulf of Kuchchh and his studies were mainly on their distribution. Subsequent studies on mangroves of Gulf of Kuchchh were made only after about a gap of fifty years by Kulkarni (1957:30-32), Blasco (1975:175), Anon (1978:1-11) and Untawale (1985:28). In the present paper, an attempt has been made to discuss a few aspects like the distribution of mangroves along the coast of Gulf of Kuchchh, including the offshore islands, present state of exploitation of mangroves, and the management as well as conservation strategies.

Gulf of Kuchchh lies between Latitudes 22°15' - 23°N and Longitude 69° - 70°35'E (Fig. 1). It is a shallow region with an average depth of 30 meters. The Gulf covers an area of about 2000 sq. km. and most of these shorelines are characterized by the presence of creeks and low lying marshy flats (Anon, 1961:393).

**Geomorphology** - The geomorphological changes caused by the sealevel changes, rapid accretion or erosion of the sediment have a great impact on natural mangrove vegetation of Gulf of Kuchchh. The low, marshy and alluvial islands along the coast of Gulf of Kuchchh show that submergence of this part is quite recent (Ahmad, 1972:222). The sealevel rise presumably at the rate of 1 to 1.3 cm per year as a result of holocene transgression of the sea (Millian and Emery, 1968:1121), affected the mangrove vegetation by way of increased sediment movement.

**Climatology** - The climate of Gulf of Kuchchh is dry and arid with a temperature ranging from a minimum of 7.8°C in January to a maximum of 44.8°C in May.

**Rainfall** - The Gulf of Kuchchh is influenced by both southwest and northwest monsoon. The average annual rainfall of

about 400 mm along the Gulf of Kuchchh, however, occurs mostly during southwest monsoon. Although the southwest monsoon lasts for three months, from July to September, the actual rainy days are only few.

**Tides** - Tides in the Gulf of Kuchchh waters are of mixed, predominantly semidiurnal type with a large diurnal inequality (Shrivastava and John, 1977:39-43). The mean spring tidal influx ranges from 2.1 at the mouth to 6.2 to the closed end of Gulf. A distinct correlation exists between the tidal range and the tidal current speed. The velocity of surface currents in the Gulf of Kuchchh ranges from 1.5 to 2.5 knots. Gulf of Kuchchh is characterized by the 'tidal bores', the exceptional high tides with a tidal amplitude of 6-7 meters influencing the mangrove growth in this area.

**Mangrove vegetation** - The coast of the Gulf of Kuchchh is a built up coast bordered with a patchy raised coral reefs. The dead coral reefs occupy the whole of the littoral region along the southern shore of Gulf of Kuchchh. Marshes, sand dunes and mangroves are the common features with butresses and islands (Anon, 1970:634). The mangrove coverage is in the form of a discontinuous and patchy vegetation. About 24832 ha. of northern coast and about 12800 ha of southern and western coast of Gulf of Kuchchh is covered with mangroves (Kulkarni, 1957:30-32).

**North coast of Gulf of Kuchchh** - The northern coast of Gulf of Kuchchh is generally flat and broken by creeks. Mundra creek, Kandla creek and Navlakhi show scrubby and stunted mangroves. The common mangrove species noticed are *Avicennia marina* along with *Salvadora persica* and *Salicornia brachiata*. Hanstal creek near Kandla, shows very poor mangrove vegetation comprising of species like *Sesuvium portulacastrum*, *Atriplex stocksii* and *Logopoides* spp. *Avicennia marina* exceeding hardly 0.5 meters in height occurs rarely in the area. *Salvadora* is noticed in the bushy form.

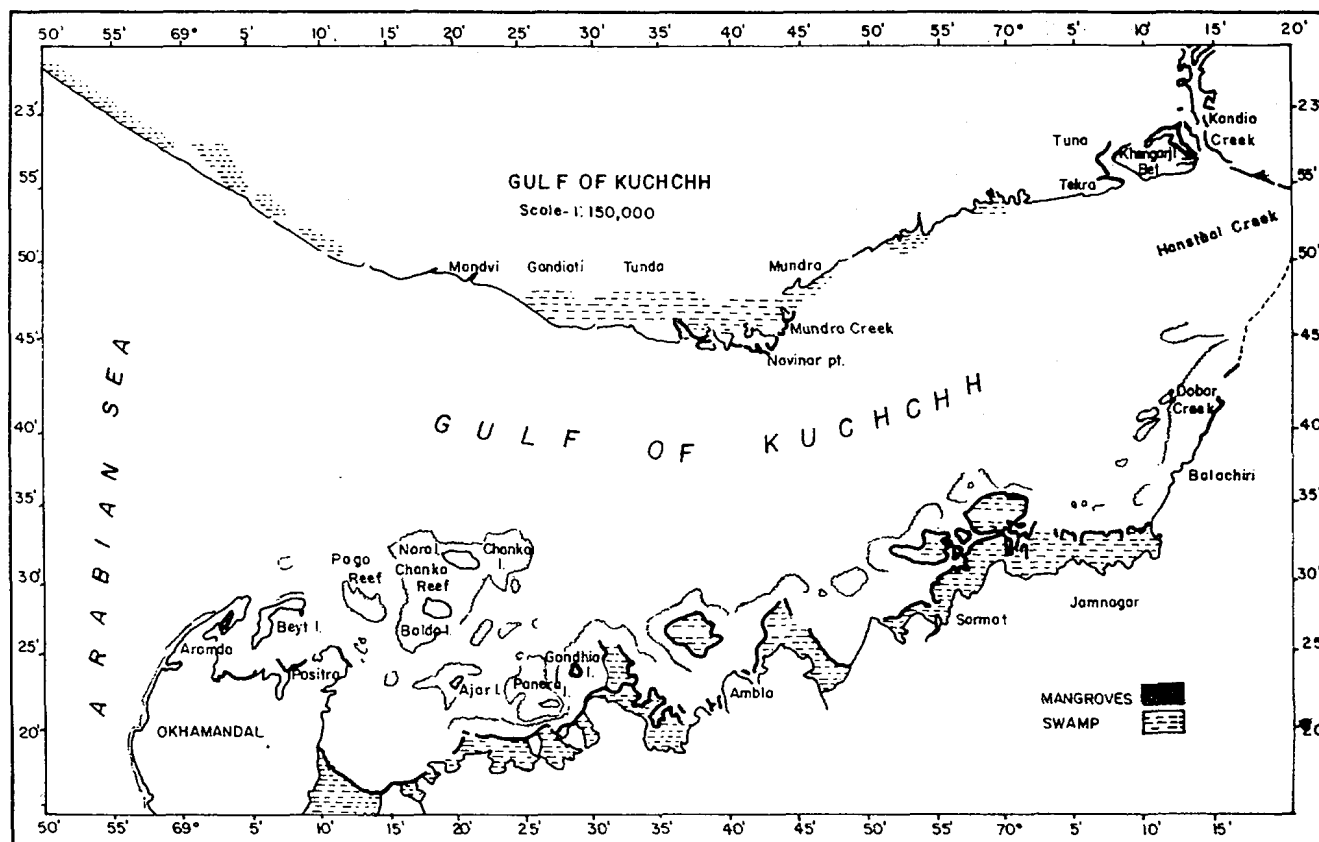


Fig. 1 Distribution of Mangroves along Gulf of Kutch

**Distribution of mangroves along the southern coast of Gulf of Kutch.**

The complete southern coast including a chain of 34 coral islands is fringed with dead coral reefs. All the islands of Gulf of Kutch are intersected by creeks fringed with mangroves (Fig. 1). The coast between Okhamandal and Dhani has continuous mangrove vegetation. Islands like Nova, Baida, Chank, Gandhia and Dhani are characterized by healthy mangrove vegetation. The mangrove species noticed along this coast and in the above mentioned islands comprise of *Avicennia officinalis*, *Rhizophora mucronata*, *R. conjugata* and *Ceriops* spp. Further from Dhani onwards, Pirotan Island, Pirotan swamp, Cheja and Ambla creek also show the good mangrove vegetation. The dominant species found along the Pirotan Island and Pirotan swamp are *A. marina*, *A. officinalis*, *B. parviflora*, *B. gymnorhiza*, *R. mucronata*, *R. apiculata*, *Aegiceros corniculatum* and *Sonneratia apetala*. The coast from Jamnagar onwards upto Jodiya, is muddy with coral reefs and marshy swamps covered with patchy fringing mangroves. Local people of Gulf of Kutch utilize the mangroves in different ways.

1. Tall mangrove trees available in sufficient deeper waters are retained and are used as 'signal trees' during creek navigation.
2. From the barks of *Rhizophora* members like *R. mucronata*, *Ceriops candollena* tannin is extracted by local fishermen,

and used for tanning the fishing nets.

3. Stakes required by fishermen are made of mangrove wood.
4. Mangroves are also used in manufacture of toys and in match box industries.
5. Mangroves provide a major source of fodder for cattles, goats and camels and it also provides a cheaper fuel to the local people, particularly during famine.
6. Mangroves provide the suitable nursery grounds for juvenile fish and shrimps in fishery.

**Overexploitation and destruction of mangroves**

Mangroves of Gulf of Kutch are under constant pressure since long. Being an arid zone with scanty rainfall, it is devoid of any extensive vegetation to be used as firewood or fodder for cattle and camels. As a result, the entire pressure comes on mangroves (Kulkarni, 1957:30-32). It was estimated that over 111,000 tonnes of mangrove trees were cut from the year 1948 to 1978 (Anon, 1978:1-11). Blasco (1975:175) has estimated that in Salaya, Navlakhi, Kandla, Mundra, Mandli, etc. more than about 2,00,000 persons depend on mangroves for firewood. This over-exploitation has resulted in patchy, bushy, stunted mangrove vegetation all along the Gulf of Kutch. The reclamation of mangrove forests for agriculture in Gulf of Kutch is almost nil as the leaching of salt from soil is impossible due to scanty rainfall (Untawale, 1985:28).

DISTRIBUTION OF MANGROVES ALONG THE GULF OF KUCHCHH

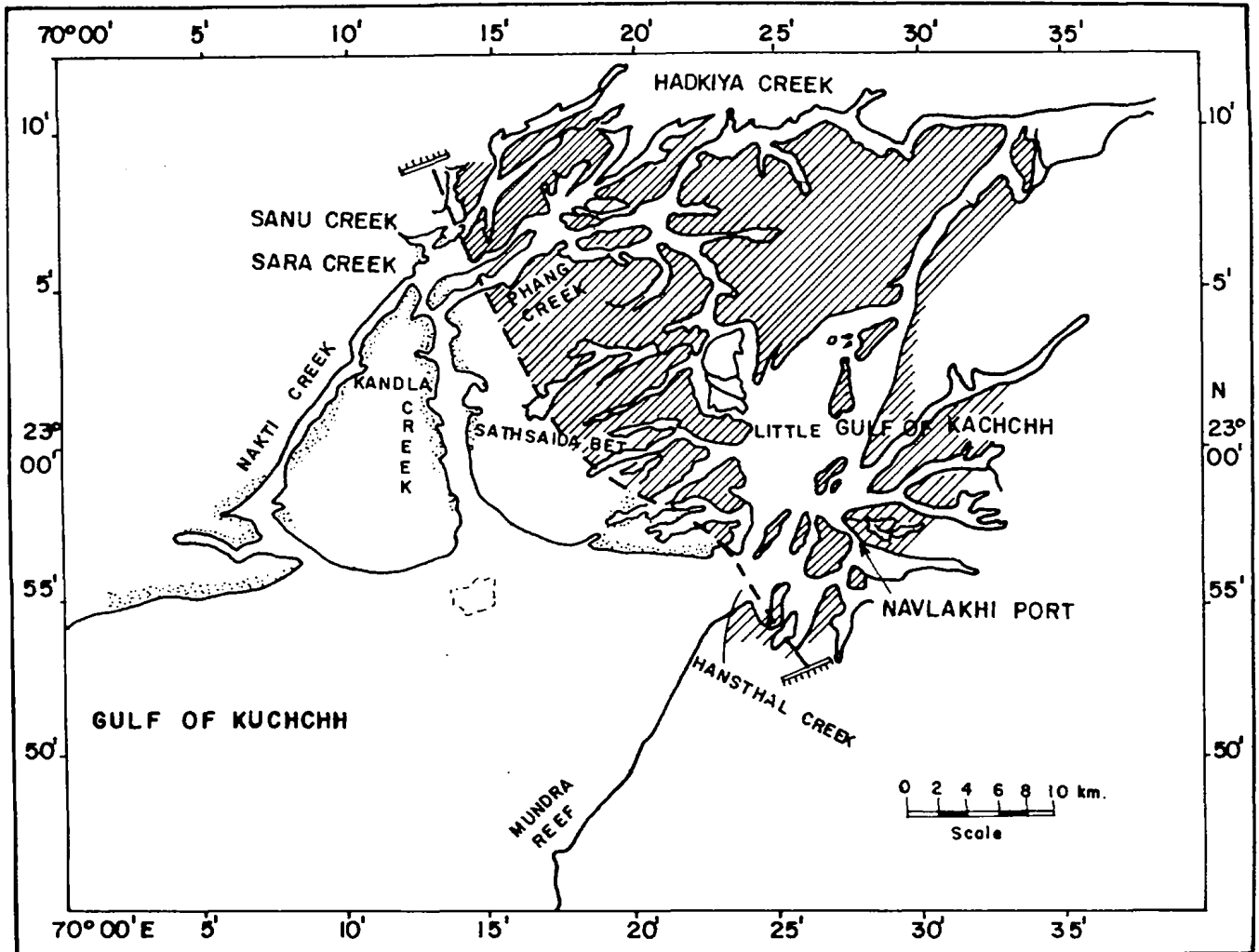


Fig. 2 Sites for Mangrove afforestation

Mangrove vegetation from Pirotan and Dera Islands is subjected to indiscriminate cutting for fuel and fodder. Coral reefs from these islands are being extensively dredged, to provide calcareous coral sand for a cement factory. This results in heavy mortality of corals and thus erosion rate has positively increased. Due to deforestation and deposition of sediment layers, the grasslands are converted into mudflats. This has finally resulted in the loss of intertidal vegetation and ultimately disturbance of ecological balance.

The salt industries have occupied a considerable area of mangrove forests along Gujarat coast. Construction of salt pan itself needs complete clearing of mangrove vegetation from the particular area. At present there are more than 30 salt works between Okha and Navlakhi and applications for more than 50 salt works between Sachana and Hanshtal are kept pending (Chavan, 1985).

Creation of harbours, new ports, ship-breaking yard at Sachana have created more severe impact on the mangroves. The tanks of the steamers carrying the chemicals to Kandla port area are usually cleaned in the Gulf of Kutch waters. This pollution positively affects the mangroves of that particular area, depend-

ing on the concentration and toxicity of the pollutants.

**Management and Conservation of Mangroves**

In order to put a stop to the excessive deforestation and to regularize the exploitation of mangrove vegetation different management precautions are being taken.

Since the first five year plan, schemes for improvement of mangrove forests have been initiated with a view to protect the harbours and ports against siltation by planting mangroves. During the first three five year plans, in Kutch, an area of 1,498 hectares was covered at the total cost of Rs.109,558 (Anon, 1971:623).

Central Electricity Authority Board is planning to build a tidal power plant near Kandla, which requires a main barriers wall of 3 kms length across Hanshtal creek and three small barriers of 1 km length across Sara, Phan and Sanu creek at Kandla. To prevent the possible siltation near the sluice gates, mangrove plants can be used. The mangrove forests of this region are already been exploited for fuel, agriculture and industrial developments, leading to the siltation in the basin. To avoid the further siltation in the catchment area of this project a large scale afforestation in the

catchment area and along the creeks can be very effective (Fig. 2). This would also improve the ecology.

Gujarat Government has declared the vast coral and mangrove area of 455.92 km from Okha to Jodiya as a "Marine Sanctuary" out of which, 162.89 km area was notified as Marine National Park for the conservation of the ecosystem. The Marine Park of Gulf of Kutch happens to be the first in India.

All these different types of mangrove areas if properly managed, can improve the ecology, biology and general productivity of the region.

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