

## AN OVERVIEW OF THE STATUS AND DISTRIBUTION OF THE MANGROVE FORESTS AND THEIR WILDLIFE IN SINDH

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### ABSTRACT

Globally some of the largest mangrove forests are found in Asia. The shoreline of Pakistan is approximately 990 km long and 40-50 km wide. It is dominated by the Mangroves *Avicennia marina*. In Pakistan, eight species of mangroves was reported in the coastal areas, out of which, now only 4 species survive in the Indus Delta. Total area covered by mangroves in 32,000 ha, of which 129,000 ha lies in Indus Delta and approximately 3,000 ha on the coast of Balochistan including the areas of Miani Hor, Kalamat Khor and Gwatar Bay. In Sindh Province, major mangrove plantations and associated ecosystems have been found in Indus Delta, Karachi Coast and Keti Bunder areas. In this paper, we reviewed status and distribution of the mangrove forests and their important wildlife.

**Keywords:** Indus delta, mangroves, distribution, status.

### INTRODUCTION AND DISCUSSION

There is growing empirical and theoretical evidence that ecosystem functions and services are linked with biodiversity (Cardinale *et al.*, 2012; Hooper *et al.*, 2012; Tilman *et al.*, 2001). Coastal habitats such as mangroves, sea grass beds, salt marshes and shellfish reefs continue to decline in extent, threatening highly valuable ecosystem services including the removal of significant quantities of carbon dioxide from the atmosphere. Coastal ecosystems and near shore marine areas are among the most productive yet highly threatened systems in the world (Wilkinson, 2004). Globally, a 25% reduction in mangrove area has been observed since 1980, categorizing mangroves as one of the most threatened and vulnerable ecosystems of the world (Abbas *et al.*, 2013). Currently, Asia has the largest mangrove area of any region, and the mangroves are exceptional for their high biodiversity. Pakistan harbours the largest mangrove forest cover over the world in an arid climate. Historically, more than 160,000 ha of the Indus Delta were covered with mangroves which have now significantly reduced. The Indus Delta constitutes 97% of the total mangrove forests found in Pakistan. The survival of mangrove forests is largely associated with perennial freshwater supply from the River Indus that flows through the delta before reaching the Arabian Sea (WWF-Pakistan, 2006).

The mangroves provide a habitat and breeding ground for a variety of marine life (particularly fish, shrimps and crabs). They also provide suitable habitats for migratory birds, protect the coastline and the seaports from erosion, meet fuel wood and fodder requirements of the local

communities and support the livelihood of the coastal population of over 10 millions in Sindh (IFAP, 2008a,b).

In Pakistan, the total area covered by mangroves is 32,000 ha, of which 129,000 ha lies in Sindh (Indus Delta) and approximately 3,000 ha on the coast of Balochistan including the areas of Miani Hor, Kalamat Khor and Gwatar Bay (Memon, 2000). The Sindh coastline is characterized by mudflats, delta wetlands, estuary systems and a wide and almost flat continental shelf ([www.mangrovesforthefuture.org](http://www.mangrovesforthefuture.org)).

### Mangrove Species of Pakistan

Mangrove forests are highly-productive ecosystems in the inter-tidal zones of tropical and sub-tropical coastlines. In the coastal areas of Pakistan, eight species of mangroves have been reported (UNESCAP, 1996). Out of which, now only four species have survived in the Indus Delta (Table 1).

Table 1. Mangrove Species of Pakistan.

Family Rhizopharaceae

1. *Bruguiera conjugate*
2. *Ceriops tagal*\*
3. *Ceriops roxburghiana*
4. *Rhizophora apiculata*
5. *Rhizophora mucronata*\*

Family Myrcinaceae

6. *Aegiceras corniculata*\*

Family Avicenniaceae

7. *Avicennia marina*\*

Family Sonneratia

8. *Sonneratia caseolaris*

\*Species still surviving

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### Important Sites

The important sites in Sindh with mangrove plantations and associated ecosystems have been found in Indus Delta, Karachi Coast and Keti Bunder.

### Indus Delta

The Indus delta mangrove forests are unique in being the largest area of arid climate mangroves in the world. The Indus Delta is a vast complex of tidal river channels and creeks, low-lying sandy islands, mangrove swamps and inter tidal mudflats stretching from near Korangi Creek in the north east to Sir Creek on the Indian Border. There are 17 major creeks in the original Indus Delta. These include: Korangi Creek, Gharo / Phitti Creek System, Chann Waddo Creek, Khuddi Creek, Khai Creek, Patiani Creek, Dabbo Creek, Sisa Creek, Bhuri Creek, Hajamro Creek, Tursian Creek, Khobar Creek, Qalandri Creek, Kahr Creek, Wari Creek, Kajhar Creek and Sir Creek. Due to reduced flows from Kotri only the area between the Hajamro Creek and Kharak Creek now receives water from the Indus, and there is only one main outlet to the Sea the Khobar Creek.

The mangroves forest of Indus delta is found only in estuaries between mean sea level and high water spring tides. Mangroves covering an area of about 600,000 hectares, constitute an important ecosystem in the coastal deltaic region formed by the River Indus (Saifullah, 1997). Presently, there are four mangrove species in the Indus delta with areas covered in brackets: *Avicennia marina* (90%), *Rhizophora mucronata* (8%), *Aegiceras corniculatum* (1.5%) and *Ceriops tagal* (0.5%) (Sindh Forest Department, 2014; <http://sindhforests.gov.pk/mangroves>).

Currently, *Avicennia marina* is dominant and occurs as an almost monotypic stand throughout the delta. The Indus Delta was designated a Ramsar Site on 5 November 2002.

The area is rich in wildlife and hence it has been declared as a Wildlife Sanctuary, mainly for water birds. The migratory birds include Pelicans, Herons and Egrets, Waders and Raptors. Among Mammals, Wild Boar, Indian Jackal and Cetaceans (Humpback Dolphin and Bottlenosed Dolphin) have been recorded, while Indian Cobra, Vipers, and Sea Snakes are recorded as common reptiles.

### Karachi Coast

It forms a complex of tidal areas and marshes with extensive mangrove swamps and inter tidal mudflats, near the southeastern outskirts of Karachi. This is an important site for water birds. Due to its important biological features, it has been included in Global 200 Ecoregions (North Arabian Sea). It contains the following two important sites:

### *The Sandspit Backwaters Area*

It is located 18 km southwest of Karachi, stretching about 20 km along the Arabian Sea Coast with extensive intertidal mudflats and 1640 ha of mangrove swamps behind the beach (Fig. 1).

### *Karachi Harbour Backwaters*

It includes Chinna Creek and the Boat Basin Area. It has a wide enclosed wetland area with mangroves. It is a good area for gulls and terns. It is potentially a very good area for recreational development.

### Keti Bunder

Keti Bunder lies about 200 km southeast of Karachi, constituting part of the Indus Delta (Fig. 2). The settlements are built on the mudflats between the channels/ creeks. The location of Keti Bunder has changed thrice during the past 70 years due to intrusion of the sea. The Keti Bunder reduced natural resource, most notably a decline in freshwater flows due to anthropogenic activities, so that the community is almost totally reliant on fishing in the surrounding sea and creeks and poverty remains high despite some infrastructure development (Asian Development Bank, 2008). The mangrove forests along Keti Bunder have suffered due to diversion of Indus River water for agriculture and hydropower generation through construction of dams and barrages over it. The area is rich in wildlife and hence it has been declared as a Wildlife Sanctuary, mainly for water birds.

In 2008 WWF Pakistan reported that 69 bird species including 25 resident and 44 migratory species. 21 species of reptiles, 2 species of amphibians, 63 species of finfish and 24 species of shellfish were observed. The migratory birds include Pelicans, Herons and Egrets, Waders and Raptors. Among Mammals, Wild Boar, Indian Jackal and Cetaceans (Humpback Dolphin and Bottlenosed Dolphin) have been recorded, while Indian Cobra, Vipers, and Sea Snakes are recorded as common reptiles (Hasnain, 2005).

### Fauna of the Mangrove Forests

The mangrove forests provide important habitat for invertebrates and vertebrate species and serve as critically important spawning grounds and nurseries for fishes and aquatic crustaceans. The wildlife of the mangroves of Sindh comprises of the following important mammals, birds and reptiles (Ahmed *et al.*, 1989).

The mammalian species recorded from the mangrove areas include Humpbacked Dolphin (*Sousa plumbea*), Bottlenosed Dolphin (*Tursiops truncatus*), Finless Porpoise (*Neophocaena phocaenoides*), Indian Jackal (*Canis aureus*), Fishing Cat (*Prionailurus viverrinus*), Wild Boar (*Sus scrofa*) and Small Indian Mongoose (*Herpestes javanicus*).



Fig. 1. Mangroves Forest at Sandspit Backwaters Area, Karachi.



Fig. 2. A view of Mangroves Forest at Keti Bunder.

Among the birds, a wide variety of birds has been recorded, comprising of waterbirds, birds of prey, passerines and others. As many as 78 species have been recorded. The key/widespread species include: Kentish Plover (*Charadrius alexandrinus*), Terek Sandpiper (*Tringa terek*), Common Sandpiper (*Tringa hypoleucos*), Grey Heron (*Ardea cinerea*), Bartailed Godwit (*Limosa lapponica*), Little Stint (*Calidris minutus*), Dunlin

(*Calidris alpina*), Herring Gull (*Larus argentatus*), Slenderbilled Gull (*Larus genei*), Blackheaded Gull (*Larus ridibundus*), Caspian Tern (*Hydroprogne caspia*), Sandwich Tern (*Sterna sandvicensis*), Brahminy Kite (*Haliastur indus*), Common Kite (*Milvus migrans*), Cinereous Vulture (*Aegypius monachus*), Common Crow (*Corvus splendens*) and White – eye (*Zosterops palpebrosa*).

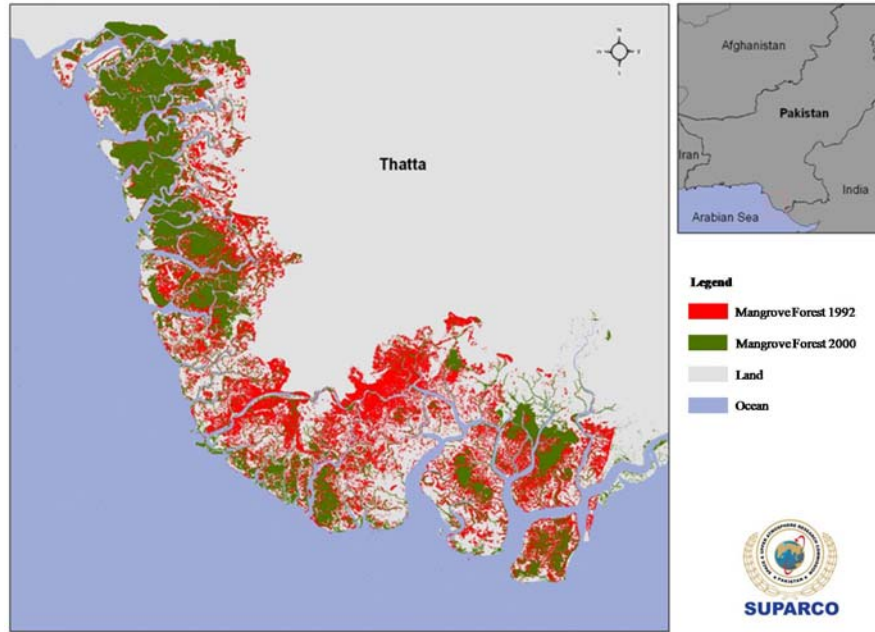


Fig. 3. Mangrove Forest Cover along Indus Delta Thatta, Sindh – 1992 and 2000 (Source: SUPARCO).

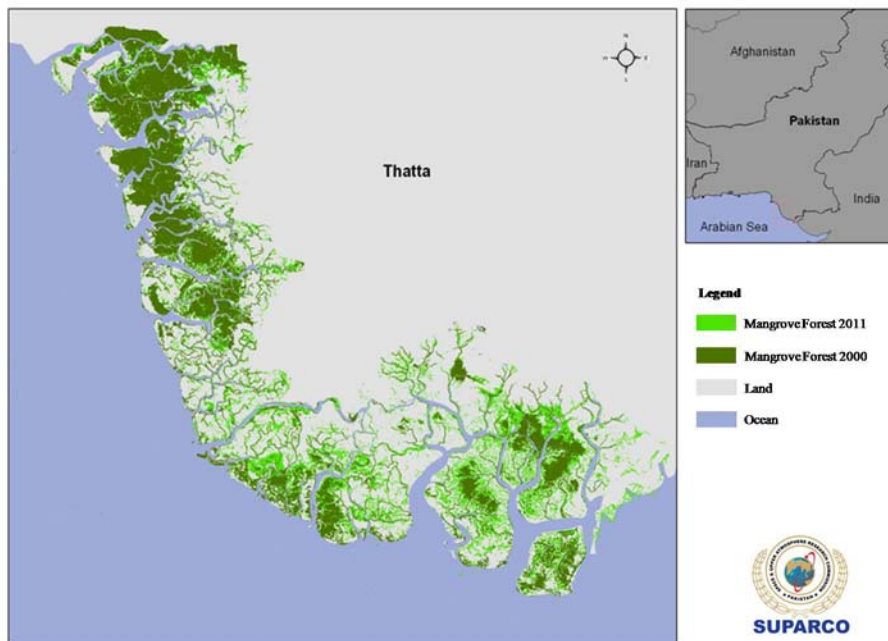


Fig. 4. Mangrove Forest Cover along Indus Delta Thatta, Sindh – 2000 and 2011 (Source: SUPARCO).

Among the reptiles, Beaked Sea Snake, (*Enhydrina schistose*), Annulated Sea Snake, (*Hydrophis cyanocinctus*), Yellow Sea Snake (*Hydrophis spiralis*), Blue-green Sea Snake (*Hydrophis caeruleascens*), Small-headed Sea Snake (*Hydrophis fasciatus*) and Pelagic Sea Snake (*Pelamis platurus*) have been recorded.

### Threats

The main threats to the mangrove ecosystem on the Sindh Coast include habitat destruction, land reclamation for housing schemes, coastal and industry development, wood cutting for fuel wood, overgrazing by camels, salt water intrusion, lack of freshwater in the Indus,

construction of various dams, Canals and barrages and Pollution. Currently due to human interventions climate change and environmental degradation the mangrove forests of the Indus Delta region are under stress.

The analysis of satellite images and measurements of the spatial extents made by Pakistan Space and Upper Atmosphere Research Commission (SUPARCO) have estimated that the mangrove forest cover has changed from 1992 to 2000 with loss of approx. 50000 ha forest cover and for years 2000 to 2011 (see Figs. 3 and 4)

Due to several threats, as a result, there has been a marked degradation in the mangrove forest cover in Pakistan, as given in table 2 (IUCN, 2005).

Table 2. Coverage of Mangrove Forests along the Coast of Pakistan (Source: IUCN, 2005).

Mangrove Categories	Year	Area in Hectares
Dense, normal and sparse	1932	604,870
	1986	440,000
Mangrove vegetation	1996	160,000
	2005	86,000

### Conservation

A lot of afforestation initiatives have been taken to plant *Avicennia* and *Rhizophora* species in the Indian Delta particularly at Korangi / Phitti / Kadero Creeks (Karachi Coast) and at Shahbander (Thatta District) by IUCN and the Sindh Forest Department. In 1990 a collaboration between the Government of Pakistan and the World Conservation Union (IUCN) facilitated the rehabilitation of 19 000 ha of *Avicennia marina* and *Rhizophora mucronata*.

Recently, the Provincial Forest Department set a new Guinness Book of World Records on June 23<sup>rd</sup> of 2013 by planting 750,000 mangrove saplings at Kharochhan, district Thatta, in just over 12 hours. This is the highest number of saplings planted within a day (Rafiu Haq, Pers. Comm).

In 2009, the Sindh Forest Department had set a record by planting 541,176 saplings at Keti Bunder. The record was toppled later that year by India.

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