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**Status Report
of Coastal and
Marine
Protected
Areas in
West Bengal**

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Summary

Marine Protected Areas (MPAs) are designed to preserve the enormous wealth of coastal and marine resources so that the local communities of the region will benefit from their various ecological services. MPAs also provide critical habitats for many species, including threatened species, preserve their genetic resources, protect the aesthetic beauty of areas and support the livelihoods of the people dependent on these natural resources. The state of West Bengal has five MPAs: Sundarban National Park, Sajnakhali Wildlife Sanctuary (both in the Sundarban Tiger Reserve), Lothian Island Sanctuary, Haliday Island Sanctuary and West Sundarban Wildlife Sanctuary. All the MPAs are located in the Sundarban Biosphere Reserve (SBR), in the most productive but vulnerable stretch of the Ganges-Brahmaputra delta, which extends for several kilometres along the southern coast of the state. The mangrove forests in these areas are part of the largest contiguous patch of mangroves in the world and serve as a habitat of a multitude of species including the Royal Bengal Tiger. An ever-increasing human population, directly or indirectly dependent on these forests for livelihood, lives on the fringes of these MPAs. This has become a serious threat to the existence of the natural flora and fauna. The forest management is taking effective steps in order to counter these threats, but further work is needed to secure and strengthen community participation in the management of the marine protected area network in the state.

Keywords: *Haliday; Lothian; marine protected area; mangroves; Sajnakhali; Sundarban; West Sundarban Wildlife Sanctuary.*

Introduction

The state of West Bengal lies between latitudes 20°31' N and 27°12' N and longitudes 85°50' E and 89°52' E. It is bounded in the north by Sikkim and Bhutan, in the east by Assam and Bangladesh, in the east by the Bay of Bengal and in the west by Orissa, Bihar and Nepal. It has a geographical area of 88,752 km², which represents about 2.7% of the total land area of the country, extending between the Himalaya, in the north, and the Bay of Bengal, in the south. Due to this great latitudinal extent, the climate in the state varies from cold temperate in the north to warm and humid in the south leading. As a result, there are diverse habitats for living organisms. The southern part of the state has a 210 km long coastline. The coastal area is spread over 0.82 million hectares in two districts, East Medinipur and South 24 Paraganas, and has varied coastal geo-morphological formations. The shoreline of East Medinipur is characterized by small sand dunes, strong currents, minor river discharges and the influence of seawater of low turbidity but high salinity. The cusped delta of the Subarnarekha and a neotectonic depression are in the west. The South 24-Paraganas coast, on the other hand, has an intricate coastline with a large cluster of deltas with interlinked channels, creeks and estuaries. The estuarine mouth of the Ganges and its distributaries extend over approximately 70 km along the eastern coast of West Bengal (Jingran & Chakrabarti 1990). The southeastern part of the estuary is in a marshy coastal area covered with a thick mangrove forest called the Sundarban, on the coast of the Bay of Bengal. This mangrove area is crisscrossed by numerous rivers and waterways. The Hooghly River is its main artery, and the area is a swampy tract characterized by extensive fluvial marine deposits. This is the largest contiguous block of mangrove forest in the world, creating a unique bio-climatic zone at the land-ocean boundary in the largest delta.

Five sites on the West Bengal coast have been designated as protected areas under various categories (Table 1). In 1974, about 2584 sq km of the Indian Sundarban was declared a tiger reserve under Project Tiger. The core area of 1330 km² was declared a national park in 1984. The national park has also been recognized as a World Heritage Site by UNESCO. It is situated within the SBR (9630 km²), created in 1989. Other protected areas include Sajnakhali Wildlife Sanctuary (362 km²), Lothian Wildlife Sanctuary (38 km²), Haliday Wildlife Sanctuary (6 km²) and the recently notified West Sundarban Wildlife Sanctuary (556.45 km²).



Table 1 : List of Marine Protected Areas in West Bengal, India

SI.no.	Name of PA	Category	IUCN category	Area (km ²)	Year of notification
1.	Sundarban	National Park	II	1330.1	1984
2.	Haliday Island	Sanctuary	IV	5.95	1976
3.	Sajnakhali	Sanctuary	IV	2091.12	1976
4.	Lothian Island	Sanctuary	IV	38	1976
5.	West Sundarban	Sanctuary	IV	556.45	2013

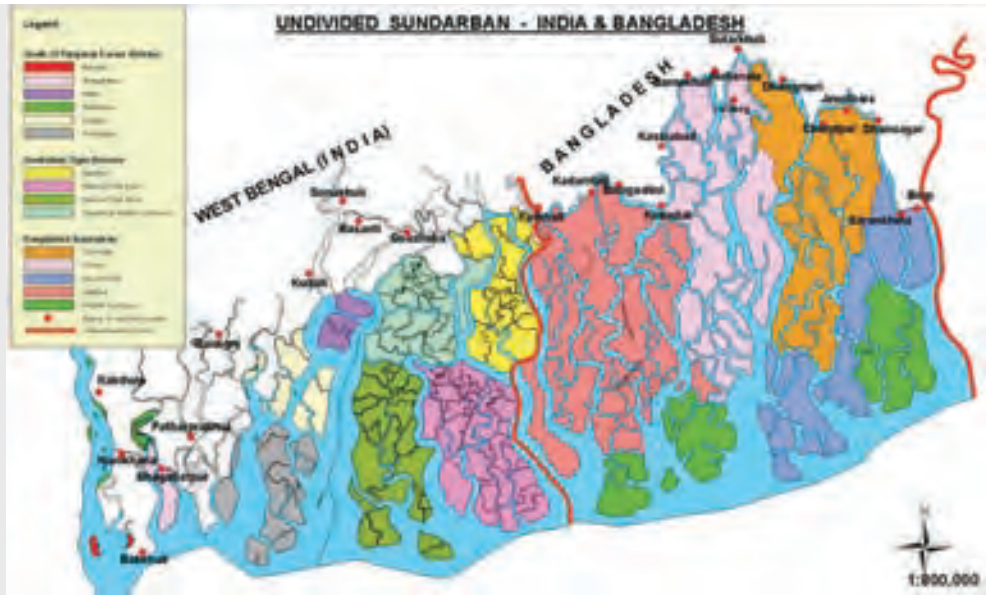
1. Sundarban National Park and Sajnakhali Wildlife Sanctuary

These two protected areas collectively fall within the Sundarban Tiger Reserve, a rich habitat for several rare and globally threatened species. The extent of the mangroves estimated by the Forest Survey of India to be about 2118 km², which includes 1014 km² of very dense mangroves, 873 km² of moderately dense mangroves and 231 km² of open mangroves (FSI 2011). The area under mangrove cover in the region has remained stable over several years despite being subjected to external influences, particularly in the deltaic regions of the Sundarban, where the population density exceeds 1000 inhabitants per km². The dominant mangrove species in the park include *Excoecaria agallocha*, *Avicennia marina*, *Bruguiera gymnorhiza*, *Ceriops decandra*, *Rhizophora sp.* and *Phoenix paludosa* (SAC 2012).

About 150 floral species have been recorded along this coastal region, including 30 species of exclusive mangroves and 54 associated and obligatory mangroves (Naskar & Bakshi 1987; Naskar & Mandal 1999). Gopal and Chauhan (2006) reported about 100 species of vascular flora from here, representing 34 families and 57 genera, comprising 30 tree species and 32 shrubs, with the rest being grasses, sedges, herbs and ferns. The mangrove species *Avicennia alba*, *A. marina* and *A. officinalis* are the dominant species in the islands near the coast. These and the rare *Heritiera fomes* (locally known as Sundari, from which the name Sundarban is derived) is found abundantly only in the islands of the eastern Sundarban region, where the influence of freshwater is felt.

Although the forest area has been under high pressure for timber, pulpwood and fuelwood, it continues to support a diverse fauna, including the only population of mangrove-inhabiting Tigers in the world. The highly productive estuarine ecosystem serves as nursery ground for many species of fish, crustacean and mollusc and higher vertebrates such as the Estuarine Crocodile (*Crocodylus porosus*) and Water Monitor (*Varanus salvator*). The coastal mudflats and estuaries act as important wintering areas for migratory shorebirds such as gulls, curlews, sandpipers and plovers, which visit these areas from far-off places in Siberia and central Asia. Over 175 wetland birds have been reported to visit the Sundarban

Fig 1. Undivided Sundarban - India & Bangladesh



mangrove forests for feeding and breeding. Heronries within Sajnakhali Wildlife Sanctuary have been reported. Many other breeding grounds spread around this area have also been reported (Chaudhuri and Choudhury 1994; Law 1959;

Mukherjee 1975; Naskar and Mandal 1999). The Goliath Heron (*Ardea goliath*), Lesser Adjutant Stork (*Leptoptilos javanicus*), Little Cormorant (*Phalacrocorax niger*), Asian Openbill (*Anastomus oscitans*), Common Pochard (*Aythya ferina*), White Stork (*Ciconia ciconia*) and Common Redshank (*Tringa totanus*) are important wetland birds observed in this region.

Sundarban Tiger Reserve, spread over about 2585 km² and established for conserving Tigers, supports the single largest coastal population of Tigers in the world. A recent survey by the National Tiger Conservation Authority and Wildlife Institute of India estimated the density of tigers in the area to be 4.3 ± 0.3 per 100 km² (Jhala et al 2011). Tiger prey species such as the Spotted Deer (*Axis axis*) and Wild Boar (*Sus scrofa*), small carnivores such as the Fishing Cat (*Felis viverrina*), Leopard Cat (*Prionailurus bengalensis*) and Golden Jackal (*Canis aureus*) and a primate, the Rhesus Macaque (*Macaca mulatta*), inhabit the mangroves and estuarine regions. Other than terrestrial species, marine mammals such as the Indo-Pacific Humpback Dolphin (*Sousa chinensis*), Irrawaddy dolphin (*Orcaella brevirostris*), Indo-Pacific Finless Porpoise (*Neophocaena phocaenoides*) and the Gangetic Dolphin (*Platanista gangetica*) are known to occur in the estuarine zone.

Fig 2 : Salt water Crocodile in Sundarbans

 Anant Pande



Fig 3 : Royal Bengal Tiger Sundarbans

 Anant Pande



The site also contains significant populations of threatened reptiles including the King Cobra (*Ophiophagus hannah*) and the Four-Toed Terrapin or River Terrapin (*Batagur baska*), once believed to be extinct. Two species of highly primitive



horseshoe crab (*Tachypleus gigas* and *Carcinoscorpius rotundicauda*) are also found here. The region provides nesting grounds for marine turtles including the Olive Ridley, Green and Hawksbill turtles. The SBR is listed as an Important Bird Area (IBA) due to the diversity of its avifauna and its significance as a site for migratory birds (Islam & Rahmani 2004).

2. Lothian and Haliday Island Wildlife Sanctuaries

Lothian Island has an area of 38 km². The wildlife sanctuary on it was established in 1976. Haliday Island, which is smaller, with an area of 5.95 km², was also declared a wildlife sanctuary in the same year and has been identified as an area that supports a rich mangrove biodiversity. These islands have formed as a result of silt deposition by the tidal action at the estuary mouth. The deposited silt steadily accumulates because the flow of water is blocked and gradually forms small islands.

Lothian Island is located where the Saptamukhi River meets the Bay of Bengal, in the southern part of the delta. The ground level is very high except for the northern parts, which get inundated during high tides. Mangroves such as *A. alba*, *A. marina*, *E. agallocha* and *H. fomes* are thinly distributed, while *C. decandra* is found scattered all over the island (Mukhopadhyaya et al 2001). The vegetation structure of the Lothian Island mangroves is dominated by *A. marina* and *Acanthus illicifolius*, which are found distributed at all the sites irrespective of the distance from the coast and soil salinity gradient. A crocodile project was started at Bhagabatpur, near Lothian Island, for conserving crocodiles through captive rearing to supplement wild populations, which became very popular among tourists.

Fig 4. Mangrove forests

 Yashaswi Singh



3. West Sundarban Wildlife Sanctuary

The West Sundarban Wildlife Sanctuary (WLS) was declared under the Wildlife (Protection) Act, 1972 through notification no. 1828, dated 11.09.2013. The West Sundarban WLS is situated in South 24 Parganas District, in a forested

area. It has an extent of 556.45 km² and comprises Dulibhasani-1,2,3,4,5,6,7(part),8 and Chulkati-1,2,3,4,5,6,7,8 The West Sundarban WLS is the 15th wildlife sanctuary in West Bengal and the 5th MPA in the state. It is a vast tract of rich mangrove forests harbouring highly threatened fauna including the Tiger, Spotted Deer, Wild Pig, Estuarine Crocodile, Water Monitor Lizard and King Cobra apart from a rich coastal biodiversity.

Potential Threats

Vyas (2012) identified human-wildlife conflicts as the biggest threat to the Sundarban, followed by climate change, salinity changes and prawn seed collection, pressure on natural resources to support the livelihoods of local people and finally environmental pollution. The state forest department is trying to minimize these threats through stakeholder consultations with local communities, researchers and NGOs. The hostile attitude of local communities arising from man-animal conflicts may lead to degradation of the mangrove ecosystem beyond restoration limits.

Gradual clearance of the mangroves continues in the region due to the increased need for fuelwood, construction activities, etc. with the increase in the human population on the fringes. This has exposed the inner areas to storm surges, which occur during the southwest monsoon and the early post-monsoon period, causing severe erosion. Further, the salinity of the water is affected by climate change and the freshwater inflow from upstream rivers, which in turn affects the growth, distribution and diversity of mangroves.

A large number of people, including women and children, are involved in collecting Tiger Prawn (*Penaeus monodon*) larvae for prawn farms because there is an acute scarcity of full-time employment in the region adjoining the Sundarban. This has resulted in extensive damage to the mangroves on the river banks as the drag-nets used for collection of larvae destroy all the mangrove recruits, apart from destroying the biodiversity of the Sundarban and creating numerous socio-economic problems.

Increased industrialization of the areas around Kolkata contributes significantly to the pollution load in the estuaries and causes degradation of the Sundarban mangroves (Gopal & Chauhan 2006). Agricultural pollutants such as organochlorine pesticides and nutrient-rich inorganic fertilizers have deteriorated the geochemistry of the estuarine waters (Sarkar et al 2004). The estuary also receives about 400 tons of untreated municipal sewage and domestic waste from the Kolkata municipal areas and Howrah every year. Further, the population residing around the Sundarban disposes of waste in an unregulated manner (Saha et al 2006). The effects of this pollution have started to manifest themselves in the organisms inhabiting the estuaries. Chromium accumulation was reported from bivalves, along with increased selenium and zinc in fishes (Saha et al 2006). Oil exploration off the coast of the Sundarban is also regarded as a threat to the Sundarban ecosystem (Saha et al 2005).



Fig 5 : Beautiful Sundarban

Pradeep Vyas



Fig 6 : Fishing in Matla river

Anant Pande



Climate change-driven sea level rises are expected to inundate over 2000 km² of coastal wetlands along the West Bengal coast. Lothian Island is also expected to experience over 50% inundation from a less-than-1 m sea level rise (Islam et al 2013). Already the changes in the coastal environment have become explicitly visible due to the lack of proper freshwater supply in the region. An excessive inflow of tourists in the Sundarban and adjoining areas also exerts pressure on the natural resources of this fragile ecosystem.

The Way Forward

The SBR management has adopted a two-pronged strategy for conservation and restoration of mangroves in the Indian Sundarban. Prevention of degradation of the mangroves protects existing mangrove patches (preventive management), whereas ameliorative management restores degraded mangroves by planting and bringing newly emerged mudflats under mangrove afforestation before any encroachment takes place. Several mangrove nurseries provide quality propagules for an afforestation programme in different parts of the Sundarban, which is being monitored through an independent mechanism to evaluate its success (Vyas & Sengupta 2012).

The mangrove afforestation programme has been undertaken to protect the coast from natural catastrophes and to conserve rare and endangered floral species such as *H. fomes*. Since 1989, the year of establishment of the SBR, mangrove planting has been taken up on 17,000 ha of mudflats, degraded mangrove forests and river embankments. The species that have been most extensively planted under this programme are *Xylocarpus granatum* (dhundul), *Sonneratia apetala* (keora), *Heritiera minor* (sundari), *Rhizophora apiculata* (garjan), *Brugeria gymnorhiza* (kankra) and *Nypa fruticans* (golpata), as naked propagules, and *Avicennia spp.* (baen), *Excoecaria agallocha* (genwa), *Ceriops spp.* (goran), as seeds. Continuous monitoring of plantation sites has been ensured through a team of dedicated watchers who protect the plantation sites from Tiger Prawn seed collectors. Trenches that get damaged due to wave action are repaired immediately by the watchers. As the seedlings enter their second year, the watchers guard the plantations against illicit felling, damage, etc. This on-site monitoring of mangrove plantations is discontinued after two years. An independent monitoring wing of the Forest Directorate, Government of West Bengal undertakes assessment of the status of the planted sites every year. Additionally, the GIS Cell of the Forest Department examines the changes in the mudflats and erosion patterns over the years using satellite imagery.

Coastal shelter-belt planting of non-mangrove species has been carried out to stabilize the bunds in the SBR. Planting was also carried out on a few islands of the Sundarban, especially on some sand heads and sea-facing islands, where there are natural beach formations. Acacia and Casuarina were also planted along the bunds to stabilize the access ways and to protect the aqua farms and crop lands by involving self-help groups.

Conclusion

The MPAs in West Bengal conserve a vast and unique mangrove ecosystem that is important not only for the existence of varied floral and faunal resources but also for thousands of people dependent on them for their livelihood. The long-term management of these MPAs requires sustainable practices involving the local communities and provision of scientific inputs to address the current threats. The anthropogenic pressure on this ecosystem has become a serious threat to the existence of mangroves, and heavy degradation of mangroves has taken place. The current efforts made by the forest management to restore and protect these areas are effective but inadequate in the face of the existing challenges. Issues such as human-wildlife conflicts, impacts of climate change, and increasing salinity need to be addressed through management-oriented research and alternate livelihood programmes.

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