

# **Areas with special status in the coastal zone**

Working Paper  
WP030

Dhaka  
July 2004



**Program Development Office  
for  
Integrated Coastal Zone Management Plan  
(PDO-ICZMP)**

**Areas with Special Status in the Coastal Zone**

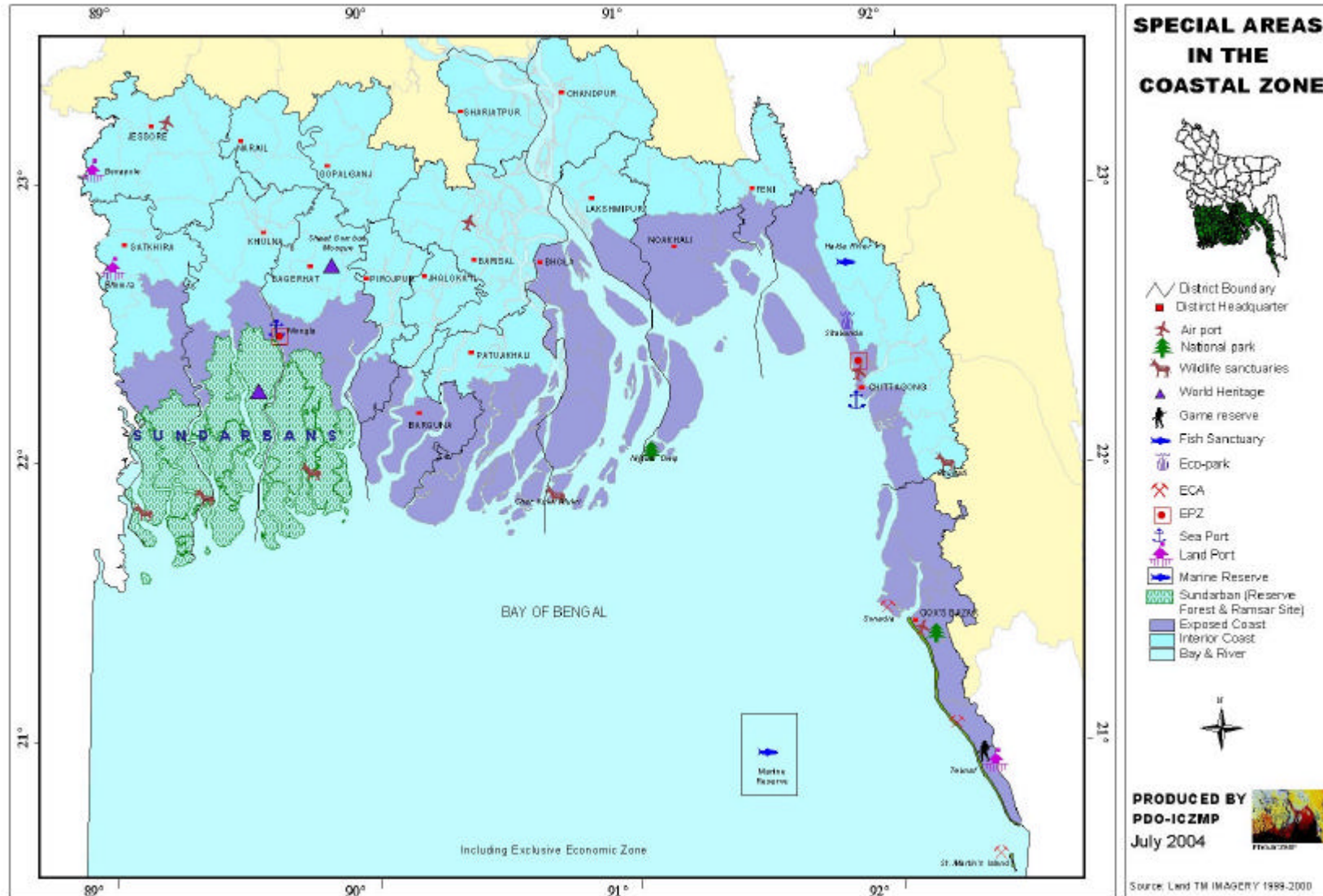
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Dhaka, July 2004

MAP : SPECIAL AREAS



## LIST OF SPECIAL AREAS IN THE COASTAL ZONE

Name	Ecosystem Type	Area (ha)	Location	Legal status
<b>ENVIRONMENTALLY IMPORTANT SPECIAL AREAS</b>				
<b>Reserved Forest</b>				
Sundarban	Forest	601,700	Bagerhat, Khulna, Satkhira	Declared under Forest Act, 1927
Coastal Circle		500,696	Barguna, Bhola, Chittagong, Cox's Bazar, Feni, Laxmipur, Noakhali, Patuakhali	
<b>Wildlife Sanctuaries</b>				
Sundarban East	Mangrove	31,227	Bagerhat	Gazette 1977, expended 1996
Sundarban South	Mangrove	36,970	Khulna	
Sundarban West	Mangrove	71,502	Satkhira	
Char Kukri Mukri	Island	2,017	Bhola	Gazette, 1981
Chunati	Forest	7,761	Chittagong	Gazette, 1986
<b>Game Reserve</b>				
Teknaf	Peninsula	11,615	Cox's Bazar	Gazette, 1983
<b>National Park</b>				
Himchari	Peninsula	1,729	Cox's Bazar	Gazette, 1980
Nijhum Dwip	Island	16,352	Noakhali	Gazette, 2001
<b>Ramsar Site</b>				
Sundarban	Mangrove	601,700	Bagerhat, Satkhira, Khulna	Declared 1992
<b>ECAs</b>				
Sonadia	Island	4,916	Cox's Bazar	Gazette, April 1999
Teknaf Beach	Peninsula	10,465	Cox's Bazar	
St. Martin Island	Island	590	Cox's Bazar	
<b>Eco-park</b>				
Sitakunda	Forest	808	Chittagong	
<b>Marine Reserve</b>				
	Marine	69,800	Bay of Bengal	Gazette, October 2000
<b>World Heritage Sites</b>				
Wildlife Sanctuaries of the Sundarban	Mangrove	139,699	Bagerhat, Satkhira, Khulna	1997
Shaat Gombuz Mosque	-		Bagerhat	1985
<b>ECONOMICALLY IMPORTANT SPECIAL AREAS</b>				
EEZ (Exclusive Economic Zone)	-	-	Bay of Bengal	Territorial Waters and Maritime Zones Act, 1974
Marine Fishing Zone	-	-	Bay of Bengal	
Sea Ports	-	-	Chittagong & Mongla	The Ports Act, 1908
Air Ports	-	-	Chittagong, Cox's Bazar, Jessore & Barisal	
Land Ports	-	-	Teknaf, Benapole & Bhomra	১৯৯৭ সালের জুলাই মাসে আইন ১৯৯৭, ২০০১
EPZ (Export Processing Zone)	-	255 182	Chittagong & Mongla	Section 10 of the Bangladesh Export Processing Zone Authority Act 1980

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## 1 INTRODUCTION

This report intends to include the status of special areas in the coastal zone under various acts/ ordinance and / or provisions including their position in terms of geographical locations, extent, characteristics and relevance as protected area. On the one hand, special area refers to environmentally distinctive, important and critical areas recognized by the government/ international authority and provided special attention and management regime through legislative support and obliging international agreements (Annex A). On the other, special areas in this report also refer to economically important areas that offers special services and maintain core socioeconomic functionality such as sea ports, land ports, air ports and export processing zones.

Ecosystems in the coastal zone are highly diverse and robust and include aquatic and terrestrial ecosystems encompassing saline water, brackish water and fresh water arena. Land area of the coastal zone has mud flat, sandy beach & sand dunes, flatlands and undulating terrain that houses different ecosystems with diverse and wide range of habitats. At least, 10 different agro ecological zones have been identified in the coastal zone and again contain various bio-ecological zones. These large number of ecosystems diversity also support wide range of flora and fauna including genetically rich varieties. Thus all level of biodiversity (genetic, species and ecosystem diversity) is very high in the coastal zone. The coastal zone of Bangladesh is inhabited by a large population and with diverse livelihood activities. Hence, interaction between human system and natural system is very high. Human actions to natural ecosystems are sometimes sympathetic and sometimes destructive. This destructive nature is often due to poverty, profit motivation, lack of awareness, and scattered knowledge on the natural system functionality and poor commitment for the future generation. The high level of exploitation and destruction of the habitats disrupt integrities of ecosystems in the coastal zone and fosters natural degradation often far below the threshold levels of regaining and thus resulting in to irreversible disintegration. Protection of the ecosystem, thus naturally becomes an essential component in any integrated management of the coastal zone.

*Recognizing the need for the protection of natural system*, Government of Bangladesh created and implemented laws and regulations to protect areas at different locations including in the coastal zone. These special areas have diverse characteristic features and often having potentials of regaining the original ecosystem functionality.

*Similarly, recognizing the need for economic importance*, some areas have been provided a special status to facilitate economic activities under various laws and regulations. These areas have wider forward and backward economic and management linkages. Strengthened supporting linkage to these special areas is also an essential component of the integrated management of the coastal zone.

This report has been structured with an introduction in this Chapter 1. Chapters 2 and 3 are devoted to description of environmentally important special areas; Chapters 4 and 5 to Project and other activities supporting the management of environmentally important special areas. Lastly, Chapter 6 is devoted to description of economically important special areas. References and description of international conventions are also included in this report.



## **ENVIRONMENTALLY IMPORTANT SPECIAL AREAS**

### **2 DEFINITIONS AND SPECIAL CONDITIONS**

A "protected area", as defined by the Convention on Biological Diversity is "a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives". Within this definition, the purposes for which protected areas are managed vary considerably and different classification systems apply in different countries. Different countries have different amount of land area protected, like, India (4.52%), Bhutan (21.40%), Pakistan (4.66%), Sri Lanka (13.25%), Canada (9.61%), Australia (13.61%), United Kingdom (20.42%) (Green and Paine, 1997) and in Bangladesh coastal zone, it is 34% for different purposes. In practice, protected areas are managed for a wide variety of purposes (Green and Paine, 1997), which may include:

- ◇ Scientific research
- ◇ Wilderness protection
- ◇ Preservation of species and ecosystems
- ◇ Maintenance of environmental services
- ◇ Protection of specific natural and cultural features
- ◇ Tourism and recreation
- ◇ Education
- ◇ Sustainable use of resources from natural ecosystems, and
- ◇ Maintenance of cultural and traditional attributes.

Recognizing the need and urgency of environmental and biodiversity conservation, Bangladesh Government has also declared different amount of land and water bodies as protected under different status.

#### **2.1 Reserved Forest**

The Forest Act, 1927 (Act No. XVI of 1927): An Act to consolidate the law relating to forests, the transit of forest-produce and the duty leviable on timber and other forest-produce

Clause 3 of The Forest Act provides the power to reserve forest. - The Government may constitute any forestland or wasteland or any land suitable for afforestation which is the property of Government, or over which the Government has proprietary rights, or the whole or any part of the forest-produce of which the Government is entitled, a reserved forest in the manner hereinafter provided.

Clause 26 of The Forest Act mentions prohibitions and allowed acts in the reserve forest as follows;

Acts prohibited in such forests.- (1) Any person who, in a reserved forest-

- (a) kindles, keeps or carries any fire except at such seasons as the Forest-officer may notify in this behalf;
- (b) trespasses or pastures cattle, or permits cattle to trespass;
- (c) causes any damage by negligence in felling any tree or cutting or dragging any timber;
- (d) quarries stone, burns lime or charcoal, or collects, subjects to any manufacturing process, or removes, any forest produce other than timber;

or who enters a reserved forest with fire arms without prior permission from the Divisional Forest-officer concerned, shall be punishable with imprisonment for a term which may extend to six months and shall also be liable to fine which may extend to two thousand taka, in addition to such compensation for damage done to the forest as the convicting Court may direct to be paid.

(IA) Any person who-

- (a) makes any fresh clearing prohibited by section 5; or
- (b) removes any timber from a reserved forest; or
- (c) sets fire to a reserved forest, or, in contravention of any rules made by the Government in this behalf, kindles any fire, or leaves any fire burning, in such manner as to endanger such a forest;

or who, in a reserved forest-

- (d) fells, girdles, lops, tops or bums any tree or strips off the bark or leaves from, or otherwise damages, the same;
- (e) clears or breaks up any land for cultivation or any other purpose;
- (f) in contravention of any rules made in this behalf by the Government, hunts, shoots, fishes, poisons water or sets traps or snares; or
- (g) establishes saw-pits or saw-benches or converts trees into timber without lawful authority;

shall be punishable with imprisonment for a term which may extend to five years and shall not be less than six months, and shall also be liable to fine which may extend to fifty thousand taka and shall not be less than five thousand taka, in addition to such compensation for damage done to the forest as the convicting Court may direct to be paid.

(2) Nothing in this section shall be deemed to prohibit-

- (a) any act done by permission in writing of the Forest-officer or under any rule made by the Government, or
- (b) the exercise of any right continued under clause (c) of sub-section (2) of section 15, or created by grant or contract in writing made by or on behalf of the Government under section 23.

3) Whenever fire is caused willfully or by gross negligence in a reserved forest, the Government may (notwithstanding that any penalty has been inflicted under this section) direct that in such forest or any portion thereof the existence of all rights of pasture or to forest-produce shall be suspended for such period as it thinks fit (PDO-ICZMP 2004).

## 2.2 Wildlife Sanctuary

Bangladesh Wildlife (Preservation) order, 1973 (P.O No. 23 of 1973) defines wild life sanctuaries under clause No. 2 (p) which states that 'wild life sanctuary means an area closed to hunting, shooting or trapping of wild animals and declared as such under Article 23 by the Government as undisturbed breeding ground primarily for the protection of wild life inclusive of all natural resources, such as vegetation, soil and water' (Mohiuddin and Rezwana, 1996).

Under Section 23 of (1) & (2) of Bangladesh Wildlife (Preservation) order, 1973 (P.O No. 23 of 1973) acts are indicated accordingly,

(1) The Government may, by notification in the official Gazette, declare any area to be wild life sanctuary

**(2) No person shall –**

- Enter or reside in any wild life sanctuary; or
- Cultivate any land in any wild life sanctuary; or
- Damage or destroy any vegetation in any wild life sanctuary; or
- Hunt, kill or capture any wild animal in any wild life sanctuary; or within one mile from the boundaries of wild life sanctuary; or
- Introduce any exotic species of animal into a wild life sanctuary; or
- Introduce any domestic animal or allow any domestic animal to stray into a wild life sanctuary; or
- Cause any fire in a wild life sanctuary; or
- Pollute water flowing in through a wild life sanctuary.
- Provided that Government may, for scientific purposes or for aesthetic enjoyment or betterment of scenery, relax all or any of the prohibitions specified above.

**2.3 Game Reserve**

Bangladesh Wildlife (Preservation) order, 1973 (P.O No. 23 of 1973) under clause No.2(c), Game Reserve means area declared by the Government as such for the protection of wildlife and increase in the population of important species wherein capturing of wild animals shall be unlawful. (Mohiuddin and Rezwana, 1996).

Under Section 6 of clause (1) and (2) of Bangladesh Wildlife (Preservation) order, 1973 (P.O No. 23 of 1973) as otherwise expressly provided in this Order.

**6. (1) No person shall-**

- (a) (i) hunt any wild animal by means of a set-gun, drop spear, deadfall gun trap, an explosive projectile bomb, grenade, electrical contrivances, a baited hook or any other trap whatsoever;
- (ii) hunt any game animal by means of an automatic weapon of a caliber used by the Bangladesh Army, Bangladesh Rifle or Police Force, a shot gun, rifle of 22 caliber or less, or a projectile containing any drug or chemical substance having the property of anaesthetizing, paralyzing, stupefying or rendering a wild animal crippled whether partly or totally;
- (b) (i) use any motor vehicle, motor driven vessel, watercraft of any type or aircraft or any other manually or mechanically propelled vehicle of any type to pursue any game animal, or to drive or stampede game animals for any purpose what so ever;
- (ii) use or have in his possession any poison or like injurious substance for the purpose of hunting a game animal;
- (iii) shoot any game animal from any aircraft, motor vehicle, rail trolley cart, boats or any kind of water craft or any other conveyance;
- (iv) hunt with the help of live decoys, call birds or any other artificial contrivances;
- (c) construct or use or have in his possession any pitfall, game pit, trench or similar excavation or any fence or enclosure, or fire to any vegetation or any other contrivance for the purpose of hunting any game animal.

(2) It shall not be an offence to use a motor vehicle or aircraft to drive any wild animal away from an aerodrome or airstrip when such action is necessary to ensure the safety of aircraft using that aerodrome.

The Government may declare any area to be a game reserve and allow hunting and shooting of wild animals under a special permit wherein the maximum number of the wild animals to be killed and the area and the duration for which such permit shall remain valid shall be specified.

## 2.4 National Park

Bangladesh Wildlife (Preservation) order, 1973 (P.O No. 23 of 1973) under clause No. 2(h), National park means comparatively large areas of outstanding scenic and natural beauty with the primary objectives of protection and preservation of scenery, flora and fauna in the natural state to which access for public recreation and education and research may be allowed. (Mohiuddin and Rezwana, 1996).

Under Section 23 of clause (3) Bangladesh Wildlife (Preservation) order, 1973 (P.O No. 23 of 1973) The Government may, declare any area to be a national park where the following acts shall not be allowed, namely-

- Hunting, killing or capturing any wild animal in a national park and within the radius of one mile outside its boundary;
- Firing any gun or doing any other act which may disturb any wild animal or doing any act which may interfere with the breeding places of any wild animal;
- Feeling, tapping, burning or in any way damaging or destroying, taking, collecting or removing any plant or tree there from;
- Clearing or breaking up any land for cultivation, mining or for any other purpose;
- Polluting water flowing in and through the national park:

Provided that the Government may, for scientific purposes or for betterment of the national park or for aesthetic enjoyment of scenery or for any other exceptional reasons, relax all or any of the prohibition specified above.

## 2.5 RAMSAR site

*"Wetlands should be selected for the List [of Wetlands of International Importance] on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology" and indicates that "in the first instance, wetlands of international importance to waterfowl at any season should be included".*

To facilitate the implementation of this provision, the Conference of the Parties has developed criteria to assist in the identification of wetlands of international importance. The latest version of the Criteria was adopted by the 7<sup>th</sup> meeting of the Conference of the Contracting Parties in 1999.

**Group A of the Criteria.** Sites containing representative, rare or unique wetland types

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

**Group B of the Criteria.** Sites of international importance for conserving biological diversity

Criteria based on species and ecological communities

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

Specific criteria based on water birds

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more water birds.

Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of water bird.

Specific criteria based on fish

Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend (WIRD, 2003)

## 2.6 Ecologically Critical Areas (ECAs)

The Government of Bangladesh has become convinced that the ecosystems of certain areas of the country are under threat and if not taken appropriate measure might lose the integrity and the natural system could be in danger. In order to conserve the nature, enhance the environment, control and mitigate pollution and for sustainable environmental management, the Government of Bangladesh under the provision of the Environment Conservation Act 1995, declared a total of seven sites of the country as Ecologically Critical Areas (ECAs) on April 19, 1999. However, A corrective gazette notification on 3 May 1999 removed the ECA status from the Sundarban Reserve Forest and the reserve forests at the Cox's Bazar-Teknaf beach and Sonadia.

Following activities are banned in the ECAs:

- Natural forest and trees felling and harvesting
- Wild life killing or game
- Catching or collection of corals, bivalves, turtles and other wild life
- Destruction or creation of habitats for flora and fauna
- Any activities that relate to destruction of natural characteristics of land and water
- Establishment of industries that might pollute the land, water, air and make sound pollution
- Any activity that might harm fish and other aquatic lives

## 2.7 Eco Park

Eco park is a park developed and managed in an eco friendly way. Preservation of genetic pool of different varieties of plants, gardening and management of different varieties of bamboo, cane and herbal plants and collection and preservation of valuable plants and bio-diversity are the main objectives of the Eco park concept that shall attract tourists.

## 2.8 Marine Reserve

Bangladesh Government has declared an area of 204 sq nautical mile of the fishing ground of the south patches and the middle ground as marine reserve under the Section – 28 of Part – 8 of Marine Fisheries Ordinance / 1983 (Ordinance Number 35, 1983) by S.R.O. No. 327 in 29/10/2000 to provide safe breeding ground for fisheries and shrimps inside Bangladesh territory to conserve and develop marine fisheries resources.

## 2.9 World Heritage Sites

Area consisting of one or more specific natural or natural/cultural feature, which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance, *UNESCO declares the area/site as world heritage site for protection and management for conservation of specific natural feature.*

## 2.10 Fish Sanctuary

Fish stocks are depleting due to various reasons making the resource vulnerable of exhaustion, due to cumulative impacts of various causes. One of the main reasons of depletion is scarcity of brood stock, which repopulates the resource bases. Because of the degradation of the fish habitat (siltation, loss of connectivity, pollution, higher catch ability followed by over fishing and drying up etc.) mother broods are becoming continuously scarce. In order to facilitate the brood stock to be developed and maintain to repopulate the fisheries habitats, fish sanctuaries are established and maintained. The national Fisheries policy (1998) proposed that sanctuaries be established in suitable water bodies. Besides the reservation of areas for fish sanctuary as special areas there are also provisions of declaring certain critical fish habitat areas as special areas and maintained a closure for certain fish breeding seasons of the area. Such an area is the Halda river of the Chittagong district. The legislative support provides the Halda river and associated channel such attention;

The Fisheries Branch of Department of Agriculture, Cooperation and Relief of the then Government of East Bengal issued a notification, no. 12889 Fish-27<sup>th</sup> December 1951, in exercise of the powers conferred by section 3 of the East Bengal Protection and Conservation of Fish Act, 1950 (East Bengal Act XVIII of 1950). The governor is pleased to make the following rule:---

No person shall catch or cause to be caught carp fisheries (*i.e.*, Ruhu, Katla, Mrigal, Kalbaus and Ghunia) during the period from 15<sup>th</sup> March to 30<sup>th</sup> June in any year in places mentioned in the schedule below-

Schedule (1), River Halda from its mouth in the river Karnafully near Kalurghat bridge up to Sadarghat ferry, police stations Panchlaish, Hathazari and Raozan, district Chittagong.

The under noted channels flowing from the river Halda within the jurisdiction of Hathazari and Raozan police stations, district Chittagong-

Krishnakhali, Khondakia Khal, Katakhal, Madari Khal, Kumira Khal, Fragabali Khal, Fatikka Khal, Khandarali Khal, Chengkhali Khal, Baizzakhali Khal, Daccakhali Khal, Mogdair Khal, Kagutia Khal and Sonai Khal.



### 3 DESCRIPTION OF AREAS

The coastal zone contains approximately 34% of protected areas. The marine reserve occupies portion of the south patch and middle ground in the bay. Table 1 provides a list of ecologically distinctive, important and critical areas recognized by the government/ international authority.

**Table 1: List of environmentally important special areas in the coastal zone**

Name	Ecosystem Type	Area (ha)	Location	Legal status
<b>Reserved Forest</b>				
Sunderban	Forest	601,700	Bagerhat, Khulna, Satkhira	Declared under Forest Act, 1927
Coastal Circle		283,343	Barguna, Bhola, Chittagong, Cox's Bazar, Feni, Laxmipur, Noakhali, Patuakhali	
<b>Wildlife Sanctuaries</b>				
Sundarban East	Mangrove	31,227	Bagerhat	Gazette 1977, expended 1996
Sundarban South	Mangrove	36,970	Khulna	
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<b>National Park</b>				
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<b>Ramsar Site</b>				
Sundarban	Mangrove	601,700	Bagerhat, Satkhira, Khulna	Declared 1992
<b>ECAs</b>				
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Teknaf Beach	Peninsula	10,465	Cox's Bazar	
St. Martin Island	Island	590	Cox's Bazar	
<b>Eco-park</b>				
Sitakunda	Forest	808	Chittagong	
<b>Marine Reserve</b>				
	Marine	69,800	Bay of Bengal	Gazette, October 2000
<b>World Heritage Sites</b>				
Wildlife Sanctuaries of the Sundarban	Mangrove	139,699	Bagerhat, Satkhira, Khulna	1997
Shaat Gombuz Mosque	-		Bagerhat	1985

Source: FAO, 1998; BBS, 1999; Data layer (Forest land District 64 in 1998) stored in NWRD

#### 3.1 Reserved Forest

A total of 885,043 hectares of forest land spread over Bagerhat, Barguna, Bhola, Chittagong, Cox's Bazar, Feni, Khulna, Lakshmipur, Noakhali, Patuakhali, Satkhira districts has been declared reserved forest. Reserved forest includes mangrove forest and other forests in the coastal zone. Entire Sundarban is a reserved forest.

### 3.1.1 Sundarban

The Sundarban is the largest single tract of mangrove ecosystem in the world (For details see Hussain and Acharya, 1994; IUCN 2001, Siddiqi, 2001). It is located in the southwest corner of Bangladesh, between latitudes 21°30' and 22° 30' N and longitudes 89° 00' E and 89° 55' E, within

#### SUNDARBAN

- Location: 21°37'-22°30' N and 89°02'-89°53'
- Admn. Hq: Khulna, Bagerhat, Satkhira,
- Legal status: Reserve Forest, Wildlife sanctuaries, RAMSAR site, World Heritage Site
- Area: 6017 sq.km.
- Physiography: Ganges tidal floodplain
- Soil: Non calcareous gray floodplain soils and acid sulphate
- Rainfall: annual total in 2001 2915 mm)
- Temperature: Max 31.1 ° C, Min 22.6 ° C, (2001)
- Relative humidity: Humidity 81% (an. avg.2001)
- Flooding depth: MH
- Ecosystem: Natural mangrove forest

the Khulna administrative division and extended over parts of Khulna, Satkhira and Bagerhat districts. At present, the Sundarban covers 6,017 km<sup>2</sup>.

It is a part of the world's largest delta, which has been formed from sediments deposited by the Great Rivers Ganges and Brahmaputra that converge on the Bengal basin. The western part of the forest lies in India and the rest (about 60%) in Bangladesh. River channels and tidal creeks, varying in width from just a few meters to 5 kilometers in some places, cover about one third of the total area of this forest. All parts of the Sundarban forest are subject to tidal inundation

during spring tides. The Bangladesh part of the forest is dominated by a high mangrove forest cover. The Sundarban mangrove forest is situated in the southwest of Bangladesh, and extends from the international boundary with India along the Harinbanga-Raimangal-Kalindi river system in the west and Baleswar River in the east. This mangrove tract constitutes 44% of the total forest area in Bangladesh and contributes about 50% of the total revenue derived from the forestry sector. But the most important value of the Sundarban stems from the protection it affords to millions of people against the ravages of cyclonic storms and tidal waves, which frequent the area from the Bay of Bengal. The climate is mainly tropical maritime with heavy monsoon rain (May - October) accompanied with hot and humid atmosphere, while winter (October – February) is mild and dry. During January temperatures can fall as low as 4°C.

#### Faunal diversity

Mammals: Bengal tiger (*Panthera tigris*), Spotted deer (*Cervus axis*), Irrawaddy dolphin (*Orcaella brevirostris*), Common tree shrew (*Tupaia glis*), Rhesus macaque (*Macaca mulatta*)

Birds: White-bellied sea eagle (*Haliaeetus leucogaster*), Mangrove whistler (*Pachycephala grisola*), Lesser adjutant (*Leptoptilos javanicus*), Masked finfoot (*Heliopais personata*), Mangrove pitta (*Pitta megarhyncha*)

Reptiles: Estuarine crocodile (*Crocodylus porosus*), River terrapin (*Batagur baska*), King cobra (*Ophiophagus hannah*), Bibron's softshell turtle (*Pelochelys bibroni*), White-bellied mangrove snake (*Fordonia leucobalia*), Spot-tailed pit viper (*Trimeresurus erythrurus*), Glossy marsh snake (*Gerardia prevostianus*)

Amphibians: Green frog (*Euphlyctis hexadactylus*), Ornate microhylid (*Microhyla ornata*), Boulenger's frog (*Rana alticola*), Common toad (*Bufo melanostictus*).

The mangrove of the Sundarban is unique compared to the non- deltaic coastal mangrove forests. For instance, unlike in the cases of the latter, the Rhizophoraceae is of only minor importance and the dominant species are the Sundri (*Heritiera fomes*) of the Sterculiaceae, family, from which the Sundarban takes its name, and the Gewa (*Excoecaria agallocha*) of the Euphorbiaceae family. Other dominant plant species include: the Passur (*Xylocarpus mekongensis*), Dhundal (*Xylocarpus granatum*), Kankra (*Bruguiera gymnorrhiza*), Keora (*Sonneratia apetala*), Baen (*Avicennia* spp.), Golpatta (*Nypa fruticans*) and Goran (*Ceriops decandra*). According to Prain (1903), the Bangladesh Sundarban houses a total of 334 plant species, representing 245 genera; however, these include principally woody and herbaceous species.

There are small patches of brackish marshes on emerging islands and riverbanks, and sandy areas with grass and low shrubs on some of the outer islands. Sundarban is home to many different species of birds, mammals, insects, reptiles and fishes.

A total of 453 faunal species was officially listed (SBCP, 2001). Other sources report over 120 species of fishes, 290 species of birds, 42 species of mammals, 35 reptiles and 8 amphibian species for the Sundarban, representing 36-37% of the birds, 28-30% of the reptiles and 33-34% of the mammals of the country. The Sundarban is the largest remaining habitat of the renowned Bengal Tiger (*Panthera tigris tigris*) (Hussain and Karim, 1994). The forest also provides habitat to the Otter (*Lutra sp.*), Squirrels (*Callosciurus pygerythus*, *Funambalus pennati*), the Rhesus Macaque (*Macaca mulatta*), Spotted Deer (*Axis axis*), Barking Deer (*Muntiacus muntiak*), Wild Boar (*Sus scrofa*), and, in rivers and sea, a number of Dolphin species.

**Floral diversity**

**Tree:** Sundri (*Heritiera fames*), Gewa (*Excoecaria agallocha*), Keora (*Sonneratia apetala*), Sada baen (*Avicennia alba*)

**Palms:** Golpata (*Nypa fruticans*), Hental (*Phoenix paludosa*)

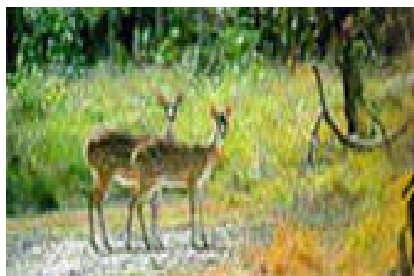
**Fern:** Tiger fem / Hoda (*Achrostichum aureum*)



Aerial Photograph of Sundarban



Golpata-Renowned Plant of Sundarban.



Spotted deer of Sundarban



Royal Bengal Tiger of Sundarban

**Figure 1: At a glance pictorial of Sundarban**

Despite the combination of high tidal flow velocity, heavy silt load and low light penetration, a remarkable diversity of finfish and shellfish exists inside the Sundarban forest and in the adjacent marine zone of the northern Bay of Bengal (Bernacsek, 2001a, 2001b). These are mainly of marine origin, but several freshwater species have been able to take advantage of low salinity and freshwater conditions in the northern part of the forest (Nishat *et al*, 2002).

*Crisis of the Sundarban*

Integrated Forest Management Plan for the Sundarban Reserved Forest (IFMP-SRF) 1998 identified following main problems/issues and their probable causes.

Problems/issues

- Increasing incidence of sundri top-dying

- Excessive extraction of timber and non-timber forest products
- Inadequate ecological and environmental parameters and variables employed in the research
- Poor regeneration capacity of two commercially important species. viz; *Heritiera fomes* (Sundri) and *Excoecaria agallocha* (Gewa).

#### Causes

- Factors associated with Sundri top dying are mostly environmental and inferences are mostly theoretical and without scientific basis.
- Inadequate information on the biometrics, such as growth, yield and volume tables of gewa and sundri
- Insufficient basic information on the growth pattern of golpata and goran.
- Inadequate permanent sample plots to cover three salinity zone
- Insufficient scientific basis on the current extraction system imposed by the GoB on Goran and Golpata
- Poor instrumentation facilities to quantify ecological and environmental parameters
- Severe browsing and trampling of wildlife
- Heavy siltation and sedimentation
- Variable salinity levels, tidal fluctuations and hydro dynamic attributes
- Decreased genetic integrity due to attack of bee hole borer in *Excoecaria agallocha* standing stock
- Insufficient canopy opening retained after timber
- Insufficient biomass on the forest flora
- Insufficient information on the vegetative and coppicing ability of gewa and sundri.

### 3.1.2 Coastal Circle

From 1964, the Forest Department started afforestation in the coastal areas. Plantation was carried out to increase the mangrove shelterbelt, in order to save lives and properties from cyclones, tidal surges, and wave actions. Coastal plantations are administered under coastal circle through four coastal afforestation divisions (Table 2).

**Table 2: Coastal afforestation divisions and ranges under the Coastal Circle**

Divisions	Ranges				
Patuakhali	Galachipa Char Montaz	Mohipur	Dashmina	Amtali	Patharghata
Chittagong	Sandwip Urir Char Mirsarai	Sitakunda Moheshkhali Charandwip	Chanua Kutubdia	Gorokghata Teknaf	Banshkhali Head quarter
Bhola	Kukri Mukri	Daulatkhan	Manpura	Char fesson	
Noakhali	Char Bata Char Alauddin	Companiganj Nalchira	Habibia Jahajmara	Sagoria Ch. Alexander	Noakhali Sonagazi

Administrative districts covering the coastal circle are Barguna, Bhola, Chittagong, Cox's Bazar, Feni, Laxmipur, Noakhali and Patuakhali. The total area declared as reserve forest under the coastal circle is 500,696 ha.

The main species of the plantation are Keora (*Sonneratia apetala*), Baen (*Avicennia officinalis*) and other species.

## 3.2 Wildlife Sanctuaries

There are five wildlife sanctuaries in the coastal zone of which three in the Sundarban, one in Char Kukrimukri (Bhola) and one in Chunati (Chittagong).

### 3.2.1 Three Sanctuaries within Sundarban

There are three wildlife sanctuaries in the east, west and south of the Sundarban. All three wildlife sanctuaries were established in 1977 under the Bangladesh Wildlife (Preservation) (Amendment) Act, 1974, having first been gazetted as forest reserves in 1878.

The sanctuaries, intersected by a complex network of tidal waterways, mud flats and small islands having population of salt-tolerant mangrove forests, present an excellent example of on-going ecological processes, displaying the effects of monsoon rains, delta formation, tidal influence and plant colonization. The area is known for its wide range of fauna including bird species, the Royal Bengal tiger and other threatened species, such as the estuarine crocodile and the Indian Python. These three sites within the Sundarban are declared as the World Heritage Site.

### 3.2.2 Char Kukrimukri

The Government has declared the reserve forest of the Char Kukrimukri in Bhola district as a wild life sanctuary through gazette notification in 1981. Following are the basic information on the sanctuary.

Area:	2,017 ha
Legal status:	Gazetted in 1981.
Management:	Forest Department
Rainfall:	Annual total 2,538 mm (2001)
Relative humidity:	84% (an. avg.2001)
Cyclone risk:	Cyclone prone area
Ecosystem:	Planted Mangrove Island

#### *Species Diversity*

**Flora:** Keora (*Sonneratia apatala*), Tiyan baen (*Avicennia officinalis*), Sada Koroi (*Albizia procera*), Sheora (*Streblus asper*), Gab (*Diospyros peregrina*), Babla (*Acacia nilotica*), Kadam (*Anthocephalus chinensis*), Jam (*Syzygium spp*), Mandar (*Erythrina orientalis*).

**Fauna:** 108,000 Waterfowl of 49 species, 5,500 unidentified ducks, 56,500 unidentified shorebirds, lizard (*Calotes versicolor*), Common Shink (*Mabuya carinata*), Bengal monitor (*Varanus bengalensis*), Yellow Monitor (*V. flavescens*).

**Major constraints/threats:** Grazing, fishing, riverbank erosion, cyclones.

### 3.2.3 Chunati

Location:	Chittagong
Area :	7,761 Ha
Legal status:	Gazetted in 1986
Management:	Forest department with NGO participation
Temperature:	Max 30.9 ° C, Min 21.4 ° C (annual average 2001)
Rainfall:	Annual total 3,503 mm (2001)
Relative humidity:	77% (annual average 2001)
Cyclone risk:	None
Ecosystem:	Forest

**Major constraints/threats:** Forest cover loss, introduction of exotic species, poaching, encroachment by agriculture, grazing.

### 3.3 Game Reserve

There is only one game reserve in the coastal zone at Teknaf peninsula, Cox's bazaar.

Location:	Cox's bazaar
Area :	11,615 Ha
Legal status:	Gazetted in 1983
Management:	Forest Department
Temperature:	Max 30.5 ° C, Min 22.2 ° C, (an. avg. 2001)
Rainfall:	Annual total 4595 mm (2001)
Relative humidity:	Humidity 82% (an. avg.2001)
Cyclone risk:	Cyclone prone area
Eco system:	Forest

**Major Constraints/Threats:** Habitat destruction, introduction of exotic species, poaching, grazing, illegal tree felling, hill cutting.

### 3.4 National Park

There are two national parks in the coastal zone: Himchari in Cox's Bazar district and Nijhum Dwip.

#### 3.4.1 Himchari

Location:	Cox's Bazar Sadar Thana, Cox's Bazar.
Area :	1,729 Ha
Legal status:	Reserve Forest, Gazetted in 1980.
Management:	Forest Department.
Temperature:	Max 31.4 ° C, Min 22.1 ° C, (an. avg. 2001)
Rainfall:	Annual total 2538 mm (2001)
Relative humidity:	82% (an. avg.2001)
Cyclone risk:	Cyclone prone area.
Eco system:	Forest.

**Major Constraints/Threats:** Road construction, reduction of stream flow, hill cutting, land slide and habitat destruction.

#### 3.4.2 Nijhum Dwip

Location:	Hatia, Noakhali.
Area :	16,352 ha.
Legal status:	Gazette in 2001.
Temperature:	Max 29.9 ° C, Min 21.6 ° C, (an. avg. 2001)
Rainfall:	Annual total 4,431 mm (2001)
Relative Humidity:	82% (an. avg.2001)
Cyclone risk:	Cyclone prone area.
Eco system:	Planted Mangrove Island.

**Major Constraints/Threats:** Tree felling, encroachment by agriculture, grazing, fishing.

Nijhum Dwip has extensive mud and sand flats at the land and water interface around the island and is crisscrossed by tidal creeks.

The island is at the crossroad of two international flyways viz. *the East-Asia Australasian Flyways and central Asian flyways*. It is the southern most staging ground of more than 98 species of migratory birds. A dozen of them are globally critically endangered. This site supports more than 200,000 migratory birds either as their wintering ground or as staging ground during winter. This is mainly because of its pristine habitat and a huge foraging and roosting ground. A total of about 98 species of shorebirds has so far been recorded at sites like Nijhum Dwip, Char Bahauddin, Dhal Char, Char Jonak, Char Nogila, Patar Char and Kalkeniy Char. The most common birds visiting the central coasts are waders (50,000), gulls, terns and egrets (80,000) and ducks and geese (50,000) (Anisuzzaman, 2004).

### 3.5 RAMSAR site

Sundarban Mangrove forest has been declared as RAMSAR Site during 1992. Description of Sundarban has been provided in section 3.1.1

### 3.6 Ecologically Critical Areas (ECAs)

The Government of Bangladesh, under the provision of the Environment conservation Act 1995, declared a total of seven sites of the country as Ecologically Critical Areas (ECAs) in 1999. However, A corrective gazette notification on 3 May 1999 removed the ECA status from the Sundarban and the reserve forests part of the Cox's Bazar-Teknaf beach and Sonadia. There are three ECAs in the coastal zone: Cox's Bazar-Teknaf beach, St.Martins and Sonadia. Descriptions of all 3 sites are contributions from the Coastal & Wetland Biodiversity Management Project.

#### 3.6.1 Teknaf Peninsula

The Teknaf Peninsula is a long, narrow and forested peninsula rising to 300 meters above sea level and separating the Bay of Bengal from the lower reaches and estuary of the Naaf River. The western shore of the peninsula is a sandy beach extending for over 75 km in a single stretch, and averaging about 160m in width at high tide. Sand flats up to 2 km in width and patches of dead coral and boulders are exposed at low tide.

The beach extends from Cox's Bazar to Badar Mokam at Teknaf region and is sometimes interrupted by the shallow estuaries of streams and rivers coming out of the hills behind it. A number of rivers and streams exit from the watershed areas of the hills in the background and drain into the sea. In several areas, water rolls through dissected rocky valleys to the sea forming waterfalls. Exposed boulders consisting of even bedded siltstones and shales embedded to shallow marine beds. All the rivers and streams falling into the Bay of Bengal are tidal up to a considerable length inland. Teknaf may represent the longest continuous uninterrupted beach in the world with tropical rain forest in the background. Along with this rich tropical forest diversity, the area acts as a corridor between the terrestrial and marine biodiversity.

Habitat diversity: The coastal zone and the near shore areas of Teknaf Peninsula beach, consist of diverse habitats in their natural condition, i.e., beaches, dunes, and estuaries.

Plant diversity: The coastal vegetation along the peninsular beach is represented by sand dune vegetation. The succession sequence of strand vegetation of the tropical coast is discernable in some areas. But, in most cases the seral communities are deflected due to intense human disturbance. The vegetation of the dunes consists of 35 species of Angiosperm, including 26 dicots and 9 monocots. *Ipomoea pes-capre* (Chagal-kuri) *Ipomoea sp.* *Leucas aspera* (Shetodron) *Clerodendrum viscosum* (Budding) *Argyrea nervosa* (Bijtarak) are the common creeping plants that act as sand binders in the primary dunes.

The grasses in these dunes include *Cynodon dactylon* (Durba) *Cynodon sp.* (Narichha) *Paspalum scrobiculatum* (Goicha), *Paspalum vaginatum*. The mature inland dunes consist of trees and shrubs. The common plants found are *Phyllanthus reticulatus* (Panseuli), *Cassia tora* ( ) *Clerodendrum inure* (Bhat), *Vitex trifolia* (Nil-nishinda), *Ziziphus mauritania* (Baroi), *Casuarina equisetifolia* (Jhao), *Streblus aspera* (Sheora) *Vitex pubescens* (Goda) and *Pandanus odoratissimus* (Kea).

**Faunal diversity:** The area is important for a wide variety of waterfowl and shorebirds. The project's wildlife specialist reports more than 200 species of birds which are common residents, including *Amaurornis phoenicurus* White-breasted Waterhen, *Anhinga melanogaster* Darter/ Snake bird, *Ardea cinerea* Grey heron, *Dendrocygna javanica* Lesser Whistling Teal, *Egretta alba* Large Egret, *Egretta gularis*, *Gallicrex cinerea* Water Cock, *Gelochelidon nilotica* Gull-billed Tern, *Ixobrychus flavicollis* Black Bittern, *Glareola maldivarum* Small Indian Pratincole, *Himantopus himantopus* Black-winged stilt, *Ixobrychus cinnamomeus* Chestnut Bittern , *Metopidius indicus* Bronze-winged Jacana, *Nettapus coromandelianus* Cotton Teal, *Phalacrocorax niger* Little Cormorant, *Porphyrio porphyrio* Moorhen, *Porzana fusca* Ruddy Crane, *Rallus aquaticus* Water Rail, *Sterna albifrons* Little Tern, *Sterna aurantia* Indian River Tern, *Tachybaptus ruficollis*, Little Grebe, *Vanellus malabaricus*, Yellow-wattled Lapwing, *Vanellus indicus* Red-wattled Lapwing, *Vanellus spinosus* Spur-winged Lapwing. Several pairs of the *Leptoptilos javanicus* (Lesser Adjutant) also been recorded from the area.

Common migrants and winter visitors include *Anas acuta* Pintail, *Pluvialis dominica* Eastern Golden Plover, *Charadrius dubius* Little-Ringed Plover, *Charadrius alexandrinus* Kentish Plover, *Charadrius hiaticula* Ringed Plover, *Charadrius mongolus* Mongolian Plover, *Numenius phaeopus* Whimbrel, *Numenius arquata* Curlew, *Tringa totanus* Common Redshank, *Tringa nebularia* Greenshank, *Gallinago stenura* Pintail Snipe, *Gallinago gallinago* Common Snipe, *Calidris alba* Sanderling, *Chlidonias hybrida* Whiskered Tern, *Larus ridibundus* Black-headed Gull, *Philomachus pugnax* Ruff / Reeve and *Sterna hirundo* Common Tern. Large numbers of Open-bill Storks *Anastomus oscitans* occur on migration, and flocks of up to several hundred birds have been recorded. Other migrants and winter visitors recorded in small numbers include *Threskiornis melanocephalus* White Ibis, *Pseudibis papillosa*, *Anser indicus* Bar-headed Goose, *Anser anser* Grey-Lag Goose, *Haematopus ostralegus* Oyster Catcher, *Tringa stagnatilis* Marsh Sandpiper, *Calidris tenuirostris* Eastern Knot, *Larus ichthyaetus* Great Black-headed Gull, *Larus brunicephalus* Brown-headed Gull and *Larus cachinnans* Yellow-legged Gull, *Limnodromus semipalmatus* Asian Dowitcher, and *Tringa guttifer* Nordmann's Greenshank. Birds of Prey include *Haliaeetus leucogaster* White-bellied Sea-Eagle.

The coastal beach is an important nesting site for at least four species of marine turtles. These are *Caretta caretta* Loggerhead, *Chelonia mydas* Green Turtle, *Eretmochelys imbricata* Hawksbill Turtle, *Lepidochelys olivacea* Olive Ridley. Important terrestrial mammal species include Asian or Golden Jackal *Canis aureus*; *Vulpes bengalensis* Bengal Fox; *Neofelis nebulosa* Clouded leopard; *Felis chaus* Jungle Cat, *Leopard Cat* *Prionailurus bengalensis*. All occur in the contiguous hills and prey on animals on the beach. *Prionailurus viverrinus* Fishing Cat, *Aonyx cinerea* Oriental Small Clawed Otter, *Lutra perspicillata* Smooth-coated Otter are found in the hill streams and their estuaries.

**Global Biodiversity Significance:** As noted above, the coastal beach area is an important nesting site for at least four species of marine turtles listed as globally threatened by IUCN. These are *Chelonia mydas* Green Turtle, *Eretmochelys imbricata* Hawksbill Turtle, *Lepidochelys olivacea* Olive Ridley; and *Dermochelys coraicea* Leatherback turtle. Presence of *Caretta caretta* Loggerhead is doubtful. Besides the area is used as corridor for movement by a number of terrestrial mammals of the tropical evergreen forest. The important species include *Vulpes bengalensis* Bengal Fox, *Catopuma temmincki* Asiatic Golden Cat, *Neofelis nebulosa* Clouded Leopard, *Prionailurus viverrinus* Fishing Cat, *Aonyx cinerea* Oriental Small-clawed Otter, *Lutra perspicillata* Smooth-coated Otter. Capped



Langur *Trachypithecus pileata*, Rhesus Macaque *Macaca mulatta*, Large Indian Civet *Viverra zibetha*, Himalayan Palm Civet *Paguma larvata*, Binturong *Arctictis binturong*, etc.

The sandy tidal flats and lagoons also support a number of globally threatened shorebirds that include *Limnodromus semiplamatus* Asian Dowitcher, *Tringa guttifer* Nordmann's Greenshank, and *Leptoptilos javanicus* Lesser Adjutant. All are listed as globally threatened species.

### 3.6.2 Sonadia Island

The island is located to the south of Maheshkhali Island and north west of Cox's Bazar town. It is about 7 km<sup>2</sup> in area. Geomorphologically, it is a barrier island. It has been formed as natural sandy breakwaters that face parallel to the flat coastlines of Maheshkhali Island. Consisting of gently sloping low-lying coast unprotected from the sea by cliffs facing the ocean, it is the ideal site for such barrier island formation. In the east, a small channel a few meters wide separates Sonadia from Maheshkhali Island, while to the west shallow bays separate it by a few kilometers from the mainland. A sandy ridge extends along the island's length from north west to south east. Winds and waves are the major forces determining the features of the dunes. Two dune ridges are recognized, one known as "Barchar" and the other, "Maghchar", covering a relatively smaller area.

**Habitat Diversity:** Sonadia Island provides diverse habitat that supports three different vegetation types—sand dunes, salt marshes and mangroves. Unspoiled sandy beaches and extensive shallow sand bars provide important feeding, roosting and nesting ground for a number of resident and migratory shorebirds.

**Plant diversity:** The vegetation of the sand dune consists of 35 species of angiosperm, in particular *Ipomea pescapre*, *Vitex trifolia*, *Ziziphus mauritania* *Clerodendrum inerme*, Bhat *Pandanus odoratissimus* and *Calotropis gigantia*. The salt marsh vegetation consists of *Porteresia coarctata* and *Myristichia wighthenia*. The mangrove vegetation consists of 27 species. Common among them are *Avicennia officinalis*, *Avicennia marina*, *Avicennia alba*, *Sonneratia apetala*, *Aegicerus corniculatum*, *Ceriops decandra* and *Aegialitis rotundifolia*.

The mangrove vegetation consists of plants with higher salt tolerance than any other mangrove species occurring in other parts of the country, including the Sundarban. Unlike mangroves of the Sundarban, *Nypa fruticans*, *Heritiera fomes* are completely absent in Sonadia. *Sonneratia griffithii*, which was once common in the Chakaria Sundarban, including Sonadia Island, can no longer be seen in any other mangrove areas in Bangladesh.

**Faunal Diversity:** Although the island is small in size, due to high  $\beta$  diversity, species richness of the island is high. About 70 species of waterbirds come there for resting, roosting, feeding, wintering and to use the island as a staging ground during their migration.

The island is also very rich in mollusks and echinoderms. Three marine turtles—Olive Ridley turtle, Loggerhead, and green turtle—nest on the island's unspoiled beach area.

**Global Conservation Significance:** Bangladesh is bestowed with one of the largest compact patches of mangrove forest in the world, known as the Sundarban. This forest is situated in the southwest region of the country. However, compared with the Sundarban, the dominant plants in Sonadia's mangrove forest are different. While the Sundarban and the Chakaria Sundarban have developed in a deltaic formation, the mangroves of Sonadia Island have developed in a lagoonal coastal setting. Sonadia's mangroves are thus more tolerant to salinity than their Sundarban counterparts. Distinctiveness of the dominant plants of this forest has been attributed to the extreme ecological factors—high contents of salt in the soil and water, etc.

Mangroves once occupied the entire coast of Chittagong and Cox's Bazar. Chakaria Sundarban, one of the oldest mangroves, developed in the delta of the Matamuhuri river. These forests, along with

the forest in other parts of the coast, have been converted to agricultural land, shrimp culture, salt ponds and for human settlements. The process is still ongoing. Mangroves in Sonadia Island are the only natural mangrove left in the south-eastern portion of the country.

Rice cultivation in the coastal areas is becoming increasingly difficult due to rising levels of salinity. The causes include global sea level rise and reduced supply of fresh water. In order to utilize the coastal area for rice cultivation and attain food security, production of salt-tolerant varieties of rice has become necessary. *Porteresia coarctata* (Roxb) Tateoka, formerly classified as *Oryza coarctata*, a wild relative of rice, is native to the coastal saline areas of Bangladesh and eastern India.

More recently, the species has gained considerable attention among the international scientific community due to its high level of tolerance for salinity. It could therefore be a source of genes for salt tolerance to transfer into cultivated rice. Scientists of the IRRI, UK, India and Bangladesh are engaged in research to develop salt-tolerant varieties of rice utilizing the genetic potential of the species. Due to high genetic variability in different ecological conditions, Swaminathan Institute has expressed concern to preserve different land races of the species before they become extinct. The plant population of *Porteresia* at Sonadia represents the land race of the species, which is more tolerant of high salinity than any other land races along the central and western coast of Bangladesh.

Finally, the mangroves and shallow shoals formed surrounding the island provide an excellent wintering area for migratory waterfowl and shore birds, including three birds and three marine turtles that are listed as globally threatened.

### 3.6.3 St. Martin's Island

St. Martin's Island is a small offshore island in the Bay of Bengal some 50 km to the south of Teknaf peninsula. The island is roughly dumb-bell shaped, approximately 7 km long and 500 m wide at its broadest point. The island had until recently been considered by the scientific and conservation community as the only "coral island" of the country. However, recent studies have concluded that the island itself is a sedimentary island, consisting of continental base rocks which coral communities have colonized due to favorable ecological conditions.

Plant Diversity: The island is a good example of co-occurrence of corals, sea grasses and mangroves. Sandy beaches also support sand dune vegetation. A recent survey under NCSIP-1 recorded a total of 151 species of benthic and drifted algae, 18 species of bryophytes and 157 species of angiosperms.

The mangrove formation here is quite different from any other mangroves in the country in that it is a pure *Lumnitzera racemosa* formation. Associated species are *Acanthus ilicifolius*, *Aegialitis rotundifolia*, *Hibiscus tiliceous*, *Excoecaria agallocha* and *Clerodendrum inerme*. *Pandanus odoratissimus* and *Ipomea pescaprae*, in association with grasses *Panicum repens*, *Passpalum vaginatum* and sedges *Cyperus* spp. and *Fimbristylis* spp., constitute the vegetation of the sand dunes. *Streblus asper* and *Vitex trifoliata* are also found among the crevices formed by the rocks. Common algal plants include *Hypnea*, *Ceramium*, *Acanthophora*, *Polysiphonia* among Rhodophyceae; *Sargassum* spp. *Dictyota* spp. *Sphacelaria* spp. *Padina* among Phaeophyceae; *Enteromorpha*, *Chaetomorpha*, *Cladophora*, *Caulerpa*, *Helimeda* and *Ulva*, which belong to Chlorophyceae; *Ocillatoria* spp. *Lyngbya* spp. *Calothrix* and *Nostoc* are members of Cyanophyceae.

Faunal Diversity: The rocky subtidal habitat from the seaward margin to about 1000 m offshore support a diverse coral community which can be classified as a veneering coral community, represented by approximately 22 genera and 66 species. Of this, 39 species have been identified as living corals and 14 species soft coral grows up to a depth of 7 m. The living corals include *Porites*, *Favites*, *Goniopora*, *Cyphastrea* and *Goniastrea* species are the most abundant. The soft corals include *Sinularia* sp., *Lobophyton* sp., *Anthelia*, *Dendronephthya*, *Palythoa*, *Nemanthus*, *Telemectius*

and *Discosorna* sp. The taxonomy of a good portion of corals occurring around the island is not yet known.

A total of 61 species of mollusks have been recorded from the island. Of these, 44 species are gastropods and the rest are bivalves. Some important gastropods, like *Conus striatus*, *C.textile*, *c.geogrphes* are abundant. Two economically important gastropod, *Trochus niloticus* and *Turbo marmoratus*, are present at the island. These two species are heavily depleted worldwide.

The coral community also supports associated fish and invertebrate fauna. A total of 240 species of fish have been identified, 86 of which are coral-associated fish species. A total of seven species of crabs have been identified from the island.

The island is particularly important as a wintering area for a wide variety of migratory shorebirds, gulls and terns, and as a nesting area for marine turtles. A total of 120 species of birds has been recorded from the island, of which 67 species are resident and 53 are migratory. A total of 18 species of mammals have been recorded from the island. All five species of marine turtle known to occur in Bangladesh have been reported in the area, namely *Chelonia mydas*, *Caretta caretta*, *Lepidochelys olivacea*, *Eretmochelys imbricata* and *Dermochelys coriacea*. Three species are known to nest: *L. olivacea*, *C. mydas* and *E. imbricata* (Rashid, 1986). A conservation estimate shows that at least 80-120 turtles breed in the area during the nesting season. Other reptiles include *Varanus salvator* and the sea-snakes *Laticauda laticauda*, *L. colubrina* and *Enhydrina schistosa*. Altogether, the island supports a total of 27 reptile species and four amphibians.

Global biodiversity significance: Global biodiversity significance of St. Martin's Island stems from a number of considerations i.e., biogeographic importance, ecological importance, socioeconomic importance, scientific importance, international and national significance.

While there have been considerable changes on land, the marine environment remains relatively intact along much of the coastline, especially along the southern part of the island. The sub-tidal habitat that supports coral resources is in a relatively undisturbed state throughout a significant part of the sub-tidal area.

Extensive algal and seagrass beds in the coastal waters may be important as spawning and/or nursery grounds for a number of economically important fish and shellfish species. The island supports a variety of habitats and a number of rare molluscs (e.g. Cone Shells). Two marine mammals from the areas surrounding the island Indo-Pacific Humpback Dolphin *Sousa chinensis*, and Black Finless Porpoise *Neomeris phocaenoides*. These are listed as globally threatened in the IUCN Red Data Book.

The island is also an important nesting ground for two marine turtle species considered as globally endangered by IUCN, i.e., *Lepidochelys olivacea* and *Chelonia mydas*. It is the only continental island in Bangladesh with coral communities and associated flora and fauna, which are found on true coral reefs throughout the Indo-Pacific. There are only a few example worldwide where coral communities dominate rock reefs; St. Martin's Island provides a unique set of environmental conditions (biotic and abiotic) not found anywhere else in Bangladesh and perhaps not in the world.

Finally, St. Martin's Island contains unique geological features. The current controversy over the geology and the origin of unique geomorphologic features on the island clearly demonstrates the high scientific value of St. Martin's Island. Co-occurrence of corals, seagrasses and mangroves in the island represents little known succession sequence of corals in the tropical areas and is of considerable scientific interest.

The island also contains some of the most unique, but thus far not studied, benthic communities in Bangladesh, one not found elsewhere in the South Asian Region. Studies on the competitive

interaction between corals and algae offer exciting research opportunities for scientists from Bangladesh and international universities and scientific institutions.

#### *Crisis of the ECAs*

Two categories of threats are being faced in the Cox's Bazar ECAs (Cox's Bazar-Teknaf beach, Sonadia Islands and St. Martin Islands). Not all threats apply to each of the component areas (Table 4). The first category of threats is related to *erosion of the biological resource base due to over harvesting*, and in some cases inefficient harvesting, of resources. It includes:

- Excessive cutting of mangrove and sand dune vegetation for fuel wood;
- Illegal harvesting of threatened turtles and turtle eggs;
- Removal of corals for sale as curios;
- Large-scale marine invertebrate (shell) collection for sale as curios and as chicken feed;
- Destructive fishing methods, including (i) fishing for shrimp fry; (ii) high levels of 'trash fish' and turtle by-catch; (iii) use of gill nets;
- Hunting of shorebirds.

A second group of threats involves *degradation and loss of habitats*, some of which arise from the above-described resource over-harvesting. It includes the following specific threats:

- Beach compaction by vehicles;
- Degradation of mangrove and sand dune habitats due to unregulated livestock grazing;
- Conversion of critical habitats to alternative land uses, e.g., aquaculture, agriculture, salt pans, tourism infrastructure, small-scale industrial enterprises;
- Pollution and land degradation from agro-chemicals, boat operational discharges, tourism, small industries;
- Coastal erosion and coral damage due to shell and boulder removal, and;
- Destruction of sand dunes (turtle nesting habitat) by human activities (construction of temporary shelters by fishermen, vehicle traffic and boat docking).

The following have been identified as key **causes** of biodiversity loss at the Cox's Bazar sites:

- No legally instituted protection measures for ecologically critical areas
- No effective management authority at field-level
- Limited participation by local communities in resource use decision-making
- Inadequate information on status and functioning of critical ecosystems
- No management planning for ecologically critical areas
- Limited opportunities for alternative sustainable livelihoods
- Lack of alternative sources of fuel wood and fodder
- No integrated coastal zone management
- Limited public awareness of environmental issues
- Lack of technical knowledge, capacities

**Table 3: Threats in the ECAs in the Cox's Bazar area**

Threat	Teknaf Peninsula	St.Martin's Island	Sonadia Island
Over harvesting			
Excessive cutting of mangrove			
Excessive cutting of sand dune vegetation			
Illegal harvesting of turtles and turtle eggs			
Removal of corals			
Large-scale marine invertebrate (shell) collection			
Destructive fishing methods			
Hunting of shorebirds			
Degradation and loss of habitats			
Beach compaction by vehicles			
Degradation of mangrove habitats due to grazing			
Degradation of sand dune habitats due to grazing			
Conversion of habitats to aquaculture			
Conversion of habitats to agriculture			
Conversion of habitats to salt pans tourism and small-scale industry			
Pollution and land degradation from agro-chemicals			
Pollution and land degradation boat discharges			
Pollution and land degradation from tourism and small industries			
Coastal erosion and coral damage due to shell and boulder removal			
Destruction of sand dunes			

Source: UNDP 1999

### 3.7 Ecopark

Ecopark a recreational park established in any natural habitat that does not disturb or affect biodiversity or the community of that area. The concept of ecopark is of recent origin. The objective of establishment of an ecopark is for the recreation of visiting people from home and abroad, as well as creating a centre for the dissemination of knowledge to people of all age groups about the habits and habitats of the plant and animal populations living there, and at the same time creating awareness about the need of conservation of biodiversity..

Recently, Bangladesh Government has taken initiative to establish ecoparks at different places of the country. The first Ecopark & Botanical Garden has been inaugurated at Chandranath Hill and surrounding areas, located in Sitakunda upazila of Chittagong. The place is rich with tropical evergreen and semi-evergreen forest flora and herbs, shrubs, creepers and climbers of diversified habits. Some threatened plant species have been reported from this place and surrounding area. Of these, three natural Gymnospermous tree species, namely, *Podocarpous nerifolia*, and species of *Gnetum* and *Cycas* grow in the hills and nearby hilly streams. In the vicinity of the Chandranath hill is the famous temple of the Hindu Community. There are two water falls, namely *Sahasradhara* and *Suptadhara* within the park. From the hilltop, part of the coast of the Bay of Bengal can be seen.

Brief description of the Project:

**Location:** Bariadhala Range of Chittagong Forest Division, Shitakunda P.S.

**Area:** 405 ha (Eco Park) and 403 ha (Botanical Garden)

**Implementing Agency:** Ministry of Environment & Forests (MoEF);

**Executing Organization:** Department of Forest (FD)

**General Objective:** To produce, preserve and develop the Genetic pool of various indigenous & exotic species through intensive management.

### Specific Objectives

- ◇ To Conserve & develop valuable & rare species through collection & raising plantation.
- ◇ To undertake bio-diversity conservation & development of related activities like plantation, improvement of wildlife habitat & conservation of endangered wildlife.
- ◇ To construct different infrastructure for the promotion of eco-tourism.
- ◇ To create research & education facilities for the relevant institutions like Institute of Forestry, BFRI, Forest Academy, Chittagong and so on.
- ◇ To raise plantation of different species of bamboo, cane, murta, herbs & medicinal plants including their maintenance.

### 3.8 Marine reserve

Bangladesh Government has declared an area of 204 sq nautical mile (698 sq km) of the fishing ground of the south patches and the middle ground as marine reserve. Table 4 provides the boundaries, distance from the coastline and the total area of the marine reserve.

**Table 4: Marine Reserve (Sanctuary) in the Bay of Bengal**

Location	Distance of proposed area from the coast	Remarks
Boundary mark – 1 21°08' N - 91°32' E	At 55.5 km (30 nautical mile) distance from the coastline (21°10.5' N - 92°03.5'E) along the Elephant Point	698 sq km (204 sq nautical mile) Depth 20 – 75 meter
Boundary mark – 2 21°08' N - 91°20' E	At 75.85 km (41 nautical mile) west from the coastline along the Elephant Point	
Boundary mark – 3 21°51' N - 91°32' E	At 66.60 km (36 nautical mile) south west from the coastline along Elephant Point	
Boundary mark – 4 21°51' N - 91°20' E	At 84.18 km (45 nautical mile) south west from the coastline along Elephant Point	

### 3.9 World Heritage Sites

There are two world heritage sites located in the coastal zone; one for its environmental significance (Sundarban) and the other for cultural and architectural significance (Shaah Gombuz Mosque).

#### *Sundarban*

The three wildlife sanctuaries of the Sundarbans have been declared as World Heritage Sites in 1997 under the Natural World Heritage Site Criteria ii and iv. All three wildlife sanctuaries were established in 1977 under the Bangladesh Wildlife (Preservation) (Amendment) Act, 1974, having first been gazetted as forest reserves in 1878. The total area of wildlife sanctuaries is 139,699 ha.

#### *Shaah-Gombuz Mosque, Bagerhat*



The Mosque-City of Bagerhat, known historically as Khalifatabad, was built by the Turkish saint-general Ulugh Khan Jahan in the early 15<sup>th</sup> century. In this locality of 50 square kilometers along the Bhairab (Brahmaputra) River, 360 mosques, public buildings, mausoleums, bridges, roads, water tanks and other public buildings were built in baked bricks. Shaah Gombuz Mosque and Khan

Jahan's Mausoleum are just two examples of these historic buildings. The city's construction shows considerable technical achievement.

In 1985, this mosque was inscribed on the World Heritage list.

### 3.10 Fish sanctuary

There is only one fish sanctuary declared, in the Halda river system of Chittagong district, under a notification, no. 12889 Fish-27<sup>th</sup> December 1951, in exercise of the powers conferred by section 3 of the East Bengal Protection and Conservation of Fish Act, 1950 (East Bengal Act XVIII of 1950). Places mentioned in the schedule are-

Schedule (1), River Halda from its mouth in the river Karnafully near Kalurghat bridge up to Sadarghat ferry, police stations Panchlaish, Hathazari and Raozan, district Chittagong.

The under noted channels flowing from the river Halda within the jurisdiction of Hathazari and Raozan police stations, district Chittagong-

Krishnakhali, Khondakia Khal, Katakhal, Madari Khal, Kumira Khal, Fragabali Khal, Fatikka Khal, Khandarali Khal, Chengkhali Khal, Baizzakhali Khal, Daccakhali Khal, Mogdair Khal, Kagutia Khal and Sonai Khal.

Besides, the Department of fisheries under its Fourth Fisheries project initiated maintaining, a total of 17 sanctuaries covering an area of 15,614 ha (Table 5), in different districts of the coastal zone. The maintenance of these sanctuaries is still a project activity.

**Table 5: List of the proposed fish sanctuaries by DOF in the coastal zone**

District	Upazilla	Water bodies	Area in ha
Barisal	Mehendiganj	Mehendiganj Tetulia Nadi	560
	Muladi	Muladi Patar Char	46
	Sadar	Barisal Nadi	300
Bagerhat	Fakirhat	Kaliganga & attached	200
	Mollarhat	Kendua Beel	1,600
	Morelganj	Goper Khal	150
Bhola	Borhanuddin	Tetulia River	2,000
Patuakhali	Kalapara	Andarmanik River	3,000
Feni	Sadar	Kalidas Paharia Nadi	110
Lakshmipur	Raipur	Dakatia Nadi	189
Jessore	Keshabpur	Beel Khukshia	850
	Manirampur	Beel Kapalia	225
Khulna	Dumuria	Bhadra Nadi	100
	4 Upazillas	BSKB	6,000
Narail	Lohagara	Nabaganga River-Narail	235
		Shatra Khal	9
	Sadar	Chitra River	40
<b>CZ</b>			<b>15,614</b>

Source: FFP, 1999





## 4 PROJECTS AND INITIATIVES FOR BIODIVERSITY MANAGEMENT

The Government of Bangladesh, with support from UNDP and GEF, undertook during October 2002 to March 2004, the task of developing a National Biodiversity Strategy and Action Plan (NBSAP) for Bangladesh. This process was jointly implemented by the Ministry of Environment and Forests (MoEF) and IUCN-Bangladesh. Meantime, the Government has initiated a number of projects. Some of the key projects are:

### 4.1 Coastal and Wetland Biodiversity Management Project

The overall objective of the Coastal and Wetland Biodiversity Management Project (CWBMP) is to establish and demonstrate an innovative system for management of Ecologically Critical Areas (ECA) that will have a significant and positive impact on the long-term viability of the country's important biodiversity resources. The project will support DoE efforts to operationalize the ECA concept at two main sites: one site (which includes three ECAs) within the country's long and biodiversity-rich coastal zone and the second one at the largest and most important inland freshwater wetlands. CWBMP is a globally significant project.

#### 4.1.1 Project Data

**Location:** Teknaf Peninsula, St. Marin's Island and Sonadia Island (Cox's Bazar) and Hakaluki Haor (Moulavi Bazaar and Sylhet districts).

**Implementing Agency:** DoE.

**Executing Organization:** Ministry of Environment and Forests (MoEF)

**Funding Agency:** UNDP - GEF and GoB,

**Start Date:** November 2002, **Completion Date (Expected):** January 2010

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#### 4.1.2 Project Outline, as indicated in the Logical Framework

The **overall objective** of the Coastal and Wetland Biodiversity Management Project (CWBMP) is to establish and demonstrate an innovative system for management of Ecologically Critical Areas (ECA) that will have a significant and positive impact on the long-term viability of the country's important biodiversity resources. The project will support the Department of Environment (DoE) efforts to operationalize the ECA concept at two main sites: one site (which includes three ECAs) within the country's long and biodiversity-rich coastal zone and the second one at the largest and most important inland freshwater wetlands. The CWBMP is funded by the Global Environment Facility (GEF) and addresses conservation and sustainable use of globally significant biodiversity in Bangladesh.

The **specific objectives** (or immediate objectives) of the project are:

Objective 1: to ensure the conservation and sustainable use of globally significant coastal biodiversity at the Cox's Bazar sites through their management as ECAs.

Objective 2: to ensure the conservation and sustainable use of significant wetland biodiversity at the Hakaluki Haor site through its management as an ECA.

Objective 3: to support efforts by the DoE to institutionalize the concept of ECA management using the experience gained through the above demonstration site.

#### 4.1.3 Expected outputs

- Output 1.1 Utilizing existing legal mechanisms, legal protection is established for Cox's Bazar ECAs.
- Output 1.2 DoE operates and maintains an effective field-level management system for Cox's Bazar ECAs.
- Output 1.3 Village Conservation Groups and a Local ECA Committee are established to ensure local participation and inter-sectoral coordination for conservation in Cox's Bazar ECAs.
- Output 1.4 Ecological information concerning critical ecosystems of Cox's Bazar ECAs is available to and used by regional and national-level managers.
- Output 1.5 A management plan covering conservation and sustainable use of Cox's Bazar ECA is developed and implemented
- Output 1.6 Alternative sustainable livelihood and sustainable use strategies are developed and implemented in Cox's Bazar ECAs.
- Output 1.7 An integrated pest management program is implemented in Cox's Bazar ECAs. A duplicate set of the above stated outputs relevant for Hakaluki Haor ECA guide the concurrent activities that will take place there.

The institutional support and capacity building component (Imm. Obj. 3) of the CWBMP has its own set of identified outputs:

- Output 3.1 Ensuring that legal mechanisms at national level are able to support operationalization of ECA concept
- Output 3.2 Policy formulation and analysis concerning ECAs is based on an appropriate integration of economic and social factors
- Output 3.3 Strengthening capacity for management of ECAs
- Output 3.4 Awareness

#### 4.1.4 Accomplishments

The project has started its activities as follows, with consideration to time limitations for field activities.

1. ECA site boundary demarcation process.
2. Community mobilization and process of PAPD (Participatory Action Plan Development) started through community level consultative meetings.
3. Completion of recruitment of the technical staffs and setting up of field level offices to initiate fauna and flora surveys.
4. Close interaction with the projects 'Empowerment of Coastal Fishing Communities', and 'St. Martin's Biodiversity and Ecotourism Development' which have activities in the CWBMP sites.

## 4.2 Conservation of Biodiversity, Marine Park Establishment & Eco-tourism Development Project at Saint Martin's Island

Locally known as Narikel Jinjira, St.Martin Island is the only coral rich island of Bangladesh, separated from the Shaparir Dwip, the last of the main land, by an approximately eight-kilometer channel. The Island is oblong from south to north, covering an area about 8 sq.km. With the present population of over 5000 people, the island was initially settled as back as 100-125 years. The island has numerous species of corals, algae, mollusks and boulders even with its limited area. Its unique natural beauty attracts researchers and tourists from all over the world. But the island is under threat from biodiversity destruction. So, the project has been taken by the Ministry of Environment and Forest with the following objectives:

- Conserve and enhance the molluscan and coral resources around the Island - the only place in Bangladesh where this important biological resource is available.
- Conserve the ecologically important molluscan resources and coral bearing Island of the country-Narikel Jinjira through measure with the local peoples participation.
- Conservation of other flora and fauna of the Island.
- Conservation and Development of Marine Turtle Breeding Ground.
- Develop viable eco-tourism in the Island.
- Designate, develop and manage the Island as a marine park in the subsequent stage.
- Improve the socio-economic status of people of the Island.
- Establish a marine laboratory to facilitate research on molluses, coral, flora, fauna and marine ecosystem.
- Establish necessary institutional set-up in place.

### 4.2.1 Project Data

**Implementing agency:** Ministry of Environment and Forest

**Project period:** 2000-2001 to 2004-2005

**Project coverage:** Saint Martin's Island of Cox's Bazaar district

#### **Contact Person with detailed address, telephone & others**

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Website: [www.stmartinsbd.org](http://www.stmartinsbd.org)

### 4.2.2 Project component

#### **I. Conservation of Biodiversity**

- Establishment of hatchery for turtle breeding.
- Establishment of research laboratory.
- Encourage tourists to buy models of sea animals instead of living items.
- Establishment of sea going M.V. Banani vessel for both eco-tourism & research purpose
- Establishment of dormitory on research people

#### **II. Establishment of Marine Park**

- Land acquire of Cheradip

### III. Development of Eco-tourism

- Construction of Motel & Central Plaza
- Establishment of Jetty

#### 4.2.3 Accomplishments

- Establishment of 2 turtle-breeding hatchery.
- Conserved 274 Olive Ridley & 50 Green Turtle nests through hatchery and 13546 hatchings both species released into the sea.
- Monitoring of environmental parameters throughout the year.
- One research laboratory has been established.
- 276 marine species have been preserved in marine museum.
- Awareness program for local people & tourists.
- Local peoples training on handicraft production like coconut, shell craft & Plaster of Paris.
- Community people has been trained to make models of sea animal with coconut shell/wood/plaster of Paris, to encourage people/ tourist to buy model items instead of living coral & shell.
- 10 reports and 11 dissemination materials have been prepared and widely circulated.
- Construction of motel for eco-tourism.
- Establishment of sea going ship M.V. Banani tourists & research purpose.
- 5500 coconut sapling production & distribution to plant in the island.
- Socio-economic survey of the island.
- Training & distribution of energy saving stove for the Island to prevent deforestation.

### 4.3 Sundarban Biodiversity Conservation Project

During late 1990s the Sundarban Biodiversity Conservation Project (SBCP) was conceived and funding, amounting to around US \$77 million, was secured from the Asian Development Bank, Global Environment Facility and the Government of the Netherlands. The objective of the 6-year project is to secure the ecological integrity of the natural environment and its resources in the Sundarban through the sustainable utilization and management of all natural resources in the SRF. The project is being implemented by the Forest Department. During halfway of the project in 2003, activities of the SBCP were suspended to reformulation the project. In June 2004, the project is being reformulated.

#### 4.3.1 Project Data

**Implementing agency:** Forest Department under the Ministry of Environment & Forest

**Project Area:** The Sundarban Mangrove Reserved Forest in the southwest coastal belt of Bangladesh, an Impact Zone about habitat around the forest, and a marine zone extending 20 km into the Bay of Bengal

**Project Objective:** To develop a system for the sustainable management and biodiversity conservation of all SRF natural resources on the basis of environmentally rational plans involving the participation of all key stakeholders.

**Partner organization:** Local Government Engineering Department (LGED), Palli Karma Sahayak Foundation (PKSF), Surface Water Modeling Centre (SWMC), Bangladesh Parjatan Corporation (BPC), World Conservation Union (IUCN), Khulna University and other research organization, Number of NGOs in the impact zone.

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**4.3.2 Accomplishments**

The project has accomplished following activities, before revision procedure came into effect:

Civil works: The FD has constructed two Range offices, 2 timber Depots, 2 Pontoons with gangways, 2 wildlife drinking ponds temporary camps-18, Fuel Jettys-2, Jetty-8.

Plantation: The FD has enriched plantation in the area of 1309 ha. It assisted in regeneration of natural forest in 3602 ha and Golpata plantation of 438 ha. One mangrove arboretum has been raised. The project sold seedling for homestead plantation and supported social forestry in boundary canals and roadside embankment plantation maintenance. Continuous forest inventory has been started in 120 PSP.

Other activities: A total of targeted 30% of Local NGO services regarding community mobilization and opportunities for alternative livelihoods has already achieved.

**4.3.3 Revision of the Project**

The focus of the revised SBCP is attention to institutional issues i.e. to help the FD in developing its (management) capacity so that it would be able to deal better in future (when the TAG have finished) with additional tasks in a changing (natural and man made) environment.

To achieve the revised focus of the project, the following five components are being considered:

1. Institutional strengthening
2. The SRF Management
3. Biodiversity conservation and sustainable resource management.
4. Tourism and Public Awareness
5. Sustainable extraction system through community development activities.

The revised SBCP is expected to start in January 2005.



## 5 OTHER INITIATIVES FOR THE CONSERVATION OF BIODIVERSITY

Several bodies including research groups formed by the academicians, NGOs and networks of NGOs play important roles in research, awareness raising on biodiversity conservation, management of the protected areas, etc in the coastal zone. Some of the initiatives are described below:

### 5.1 Coastal Environment Research Unit (CERU)

CERU has been initiated by some faculties of the Department of Geography of Chittagong University, under the leadership of Dr. M. Shahidul Islam to conduct research works on various coastal issues of Bangladesh. The unit primarily focuses on: sea level changes, coastal land use change, coastal environment, coastal pollution, coastal urban activities and coastal tourism. Under this unit, a core of faculty members, research students is now devoted to concentrate their investigations on different coastal aspects, particularly along Chittagong coast. The unit is also working in close collaboration with some faculties of the Institute of Marine Sciences at Chittagong University. Moreover, the group has good contact with many coastal scientists worldwide, particularly UK, USA, Japan and India. During the last couple of years following research works have been done;

- Sea Level Changes in Bangladesh: Last Ten Thousands Years
- Environmental profile of Chakoria Sundarban
- The land use changing practices and their socio-environmental consequence of the Moheskhali Island
- Land use characteristics of the Chittagong City
- The geological evolution and geomorphologic characteristics of St. Martin Islands
- Use of local wisdom in disaster mitigation and management issues of the coastal belt
- The Quaternary Geomorphic Evolution of the St. Martins island
- Impact of River Closure due to Muhuri Irrigation Project on Coastal Morphology

### 5.2 Coastal Development Partnership

The Coastal Development Partnership (CDP) was originally conceived as a coordinating secretariat for a network of NGOs to relieve the sufferings of the people of the waterlogged areas under the Coastal Embankment Project (CEP). The objectives of CDP are:

- to collect and disseminate necessary information on environment, local resources and social issues to NGOs, NGO networks, alliances, etc;
- to organize alliances and networks with local grassroots NGOs to develop an appropriate development perspective for the southwest coastal region of Bangladesh;
- to organize issue-based citizens' forums.

Subsequently, the CDP has developed and/or housed some other networks.

- PADMA Network was founded in 2000 by 30 NGOs with its secretariat in CDP. It is a forum of NGOs in the *Ganges* Dependent Area (GDA) in South-west Bangladesh. Its main objectives are:
  - ◇ to fulfill information needs of environment and development activists, researchers, journalists and general people in respect of the proposed *Ganges Barrage* project and the *Ganges* river;
  - ◇ to establish a resource center to collect and disseminate pertinent information in respect of the *Ganges* river and the proposed *Ganges Barrage*;

- ◇ to enhance the awareness of the people inhabiting the GDA in respect of water resource management and the environment; and
- ◇ to ensure participation of the people in all long-term water resource development projects.

Sundarban Bio-diversity Conservation Project Watch group is another network with its secretariat at CDP. Since the inception of the Sundarban Bio-diversity Conservation Project (SBCP), concerned NGOs and citizens' groups began to doubt about the ability of the project to solve the problem of the degradation of *Sundarban* resources and they wished to have a management structure that would ensure its sustainable development. The SBCP watch group was formed in this backdrop. It has a five-member core group consisting of Uttaran (Satkhira), JJS (Khulna), Loko (Dhaka), Action Aid Bangladesh (Dhaka) and CDP (Khulna).

### 5.3 Coastal Fisher Folk Community Network

Coastal Fisherfolk Community Network (COFCON) is a network of NGOs with activities targeted to the fisher community in the coastal zone. It was founded in 1996 to increase the capacity and affectivity of COFCON members to reduce poverty amongst the poor coastal fisher folk community through providing supports. It has 26 members. Some of these are based in coastal districts and some have operational headquarters in Dhaka. Main objectives of COFCON are to:

- study government policies on fishery and fishing community and disseminate the required information and knowledge to the member organizations and the target group;
- hold advocacy and campaign at to incorporate the interest and establish rights of the fishers;
- build institution at different levels to assist the fishers.

### 5.4 Center for Natural Resource Studies

Center for Natural Resource Studies (CNRS) is non-Government, non-political development organization focuses on ecological management and working with partners for sustainable co management of natural resources.

CNRS initiated sea turtle conservation activities in St. Martin's Island and in the Teknaf Peninsula since October 1998 to conserve sustainable population of sea turtles in the territorial waters of Bangladesh. Besides releasing over 35,000 hatchlings through in situ (protecting sea turtle eggs and hatchlings in natural nests) and ex situ (collecting eggs and incubating in hatchery to hatch and subsequently released to the sea) hatching massive awareness campaign has been conducted in the southeast coastline. CNRS prepared and distributed various awareness materials including leaf lets, posters, caps, T-shirts on sea turtles and placed awareness billboards and signboards at different public places in this regard.

### 5.5 Bangladesh Centre for Advanced Studies

Bangladesh Centre for Advanced Studies (BCAS) is an independent, non-profit, non-government, policy, research, and implementation institute working on sustainable development (SD) at local, national, regional and global levels. BCAS addresses sustainable development through four interactive themes: (a) environment-development integration, (b) good governance and people's participation, (c) poverty alleviation and sustainable livelihoods, and (d) economic growth and public-private partnership. It was established in 1985, and over the years has grown to become a leading institute in the non-government sector in Bangladesh and South Asia.



In the coastal zone, at present BCAS is working in the conservation of the Chanda beel areas in Gopalganj where they provide environmental education to non-formal schools. BCAS has also carried out several national level studies of which climate change issues including sea level rise and vulnerability assessment are highly relevant for the coastal zone.

## 5.6 IUCN-The World Conservation Union, Bangladesh

IUCN-The World Conservation Union is one of very few international organizations where both governments and non-governmental bodies can join (over 800 Members in 126 countries). Taking advantage of this unusual structure, the emphasis of IUCN's work is partnership.

IUCN's true working association with Bangladesh began in the mid eighties with participation in important government effort to prepare conservation strategy in phases. However Bangladesh joined the Union as a State Member in 1972 and endorsed the World Conservation Strategy in principle. IUCN was invited by the Government of Bangladesh to provide technical assistance in formulating the National Conservation Strategy (NCS). The NCS for Bangladesh was in principle endorsed by the Government in 1991.

Taking advantage of IUCN's structure, the emphasis of IUCN Bangladesh's work is on networking and partnership. IUCN Bangladesh provides a neutral forum where organizations from different sectors can meet, exchange views and plan actions together. IUCN catalyses the participation of different sectors in conservation initiatives addressing the policy, legislative, scientific, socioeconomic and community involvement aspects. The work is mostly done by and through local institutions and national experts.

Through its different existing and developing program areas IUCN Bangladesh collaborates with different Ministries and government agencies, including Ministry of Environment and Forest, as well a number of local NGOs and international organizations operating in Bangladesh. So far NORAD has been the principal supporter of IUCN's Bangladesh program, while UNDP, CIDA, BMZ are supporting some of the program element. New supporters are emerging for IUCN's Bangladesh Program, which is a very positive indication.

IUCN has developed and is involved in projects on:

- Bio diversity Conservation
- Ecosystems Management (e.g. Wetlands Management)
- Environmental education and awareness
- Environmental law
- Environmental Assessment
- Coastal and marine resources- management
- Environmental monitoring and
- People's participation in environmental management and planning



## **ECONOMICALLY IMPORTANT SPECIAL AREAS**

### **6 ECONOMICALLY IMPORTANT SPECIAL AREAS**

As already introduced in chapter 1, there are areas in the coastal zone with special socio economical importance and also being designated by Government for performing specialized functionality that offers services to boost economical activities and thus leverage social development. These include, EEZ, marine fishing zone, seaports, airports, land ports and export processing zones.

#### **6.1 Exclusive Economic Zone (EEZ)**

In accord with the specifications of the Law of the Sea (UN, 1997), the Bangladesh Government has defined the base line and consequently the territorial waters and the Exclusive Economic Zone (EEZ) in Proclamation No. LT-I/3/74 of 13 April 1974.

As defined in the Territorial Waters and Maritime Zones Act, 1974, Section 2, there are 5 different kinds of zones that have different management perspectives.

- *Territorial waters.*
- *Contiguous zone.*
- *Economic zone.*
- *Conservation zone.*
- *Continental shelf.*

In exercise of the powers conferred by sub-section (1) of section 5 of the Territorial Waters and Maritime Zones Act, 1974 (Act No. XXVI of 1974), the Government declared the Zone of the high seas extending to 200 nautical miles measured from the baselines shall be the economic zone of Bangladesh.

It is in this zone that the interests in all living and non-living resources is vested in Bangladesh. Based on the above definitions, the EEZ has been included in the coastal zone.

#### **6.2 Marine Fishing Zones of Bangladesh**

Marine fishing zones have been demarcated through a Bangladesh Gazette Extra dated September 12, 1983 as described:

“15. Area for fishing:--(1) Area for fishing with the set bag net is earmarked up to 40 meters depth of marine water at the highest tide.

(2) Area for fishing using hooks and lines are earmarked up to 40 meters depth of marine water at the highest tide.

#### ***Law of the Sea (UN, 1997)***

##### ***PART V: EXCLUSIVE ECONOMIC ZONE***

*Article 56. Rights, jurisdiction and duties of the coastal State in the exclusive economic zone*

1. In the exclusive economic zone, the coastal State has:
  - (a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds;
  - (b) jurisdiction as provided for in the relevant provisions of this Convention with regard to:
    - (i) the establishment and use of artificial islands, installations and structures;
    - (ii) marine scientific research;
    - (iii) the protection and preservation of the marine environment;
  - (c) other rights and duties provided for in this Convention.
2. In exercising its rights and performing its duties under this Convention in the exclusive economic zone, the coastal State shall have due regard to the rights and duties of other States and shall act in a manner compatible with the provisions of this Convention.

*Article 57. Breadth of the exclusive economic zone*

The exclusive economic zone shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured.

- (3) Area for fishing with drift net (Bhasajal) for fishing Ilish (Hilsha) and like fishes are earmarked up to 40 meters depth of marine water at the highest tide.
- (4) Area for fishing with drift net (Bhasajal-Lakhyajal) are earmarked up to 40 meters depth of marine water at the highest tide.
- (5) Area for fishing with trawlers are earmarked for operation beyond 40 meters of marine water at the highest tide.”

However, the present situation is that the fishing grounds and shrimp grounds are scattered in the vast marine areas. The fishing ground of the bay depending on the on going fishing practice and fishing possibilities could be demarcated in to 5 patches of which the nearest two patches are fished at present and the remaining 3 patches have the potentials. Starting from coastline, depth 0 up to a depth of 40 m and extends up to 120 km (+/- 10 km) from the coastline is reserved for the artisanal fishers (Figure 2). The next patch of fishing zone extends from 40 m depth (from 120 km (+/- 10km) line) to 80 m depth (170 km (+/- 10km) line) are trawling. All other patches are either inactive or no fishing at present.

### 6.3 Sea Ports

Seaports in Bangladesh were established through the Ports Act, 1908. There are two seaports in Bangladesh: Chittagong & Mongla ports. Chittagong port came under special management jurisdiction through establishing a Chittagong Port Authority (CPA) in 1976, under a Government Ordinance to manage Chittagong Port, which is the main seaport of Bangladesh and handles about 80 percent of overseas trade. The functions of CPA include (a) management, maintenance and development of Chittagong Port; (b) regulation and control of the berthing and movement of vessels and navigation within the port; and (c) provision and maintenance and efficient services in the port. CPA's services navigational aids and pilotage. The Authority has a board consisting of a chairman and not more than three other Members appointed by the Government who are full time officers. Chairman is the chief executive. Similarly, Mongla port is managed by provision of the Mongla Port Authority Ordinance, 1976 with similar mandates, responsibilities and administrative arrangements. However, both the Chittagong Port Authority Ordinance, 1976 and the Mongla Port Authority Ordinance, 1976 was amended by gazette notifications dated 16th September, 1995 Act No.19 of 1995 and Act No. 20 of 1995 respectively.

The **Port of Chittagong** is the principal port of Bangladesh. It is situated on the right bank of the river Karnaphuli at a distance of about 9 nautical miles from the shoreline of the Bay of Bengal. The seaward limit of the port extends from the Patenga beach center making an arc of 5.5 nautical miles and intercepting the coast line at positions: - Lat 22°18'45" N. Long. 91°46'30"E in the North and Lat 22°08'13"N.Long 91°50'00"E in the South, the area enclosed within the extremities if the arc will from the Seaward limit of the Port of Chittagong. And the upper limits of the river water are formed by two straight lines, one drawn across the Karnafuli River in the North by joining two pillars located at:- Lat : 22°24'33"N Long : 91°54'30E and Lat : 22°24'56"N Long : 91°54'11"E and the other by joining the two pillars located at:-Lat : 22°25'07"NLong : 91°53'18"E and Lat : 22°25'07"N Long : 91°53'10"E These limits include so much of the sea and of the River Karnafuli and the River Halda and the area that lie within 137.162 Metre, of high water Mark at ordinary spring tide and the docks, wharves, quays, stages, jetties, piers, warehouse, sheds, railway line and yards within the limits of the bounded area and such other area outside it as included in the Schedule iii of the Chittagong Port Act. The seaward approach to the Port of Chittagong may be considered to be northwards of the 10-fathom contour in latitude.

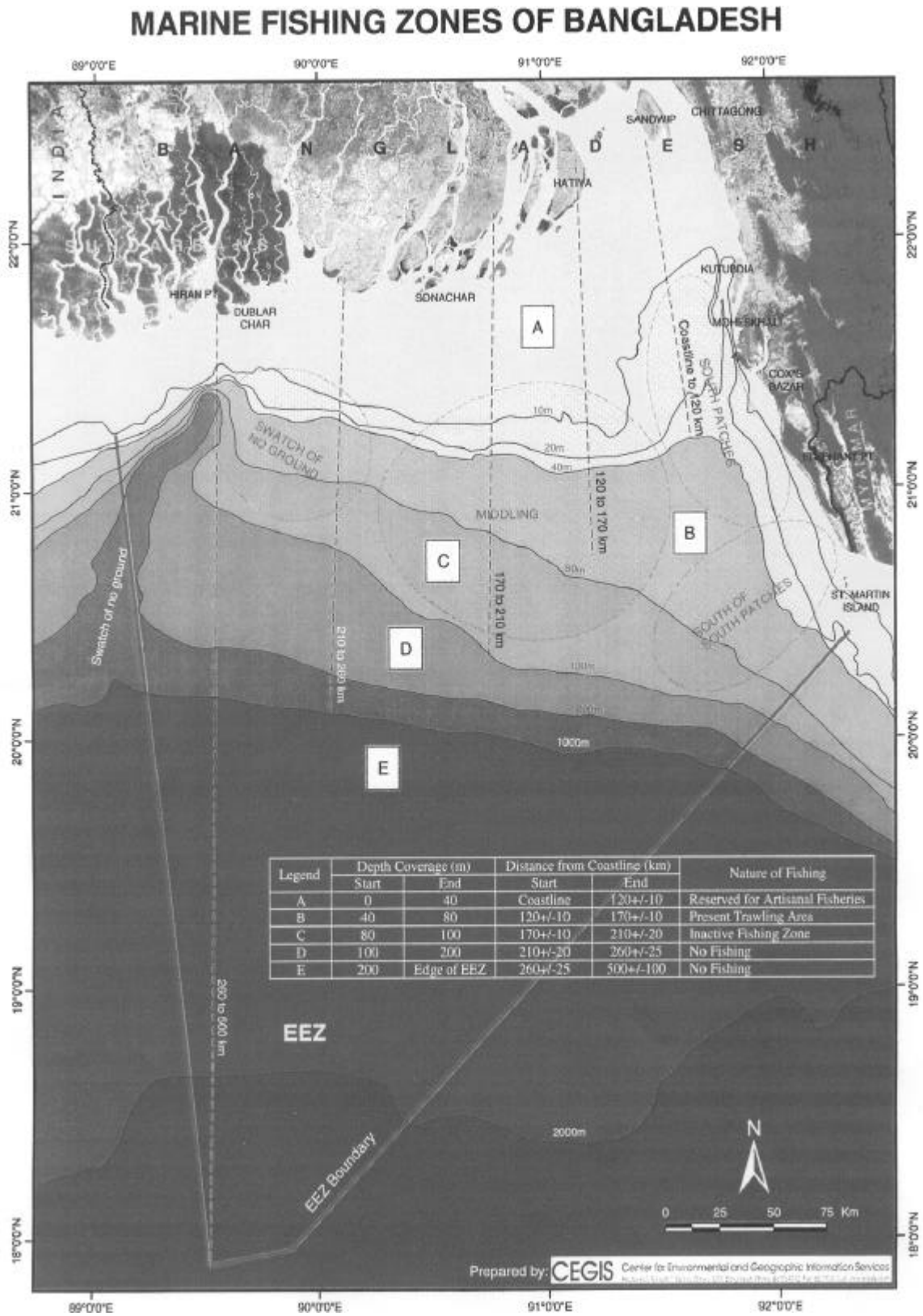


Figure 2: Map showing coastal zone fishing ground

**Mongla Port** is situated at the East Bank of Pussur River near the confluence of Pussur River and Mongla Nulla at a distance of 65 Nautical miles from the Fairway Bouy situated (Lat. 21°26.9'N Long. 89°34.4'E) in the Bay of Bengal. The geographical position of the port Jetties is in position Lat. 22°26.9'N Long. 89°35.57'E. The port is limited to the north (Lat. 22°20'E Long. 89°40'E to Lat. 22°38'N. Long. 89°40'E.), south (Lat. 21°27'N. Long. 89°20'E to Lat. 21°27'N. Long. 89°40'E.), East (Lat. 22°38'N long. 89°40'E. to Lat. 21°27'N. Long. 89°40'E.) and West (Lat. 22°38.00'N Long. 89°40'E. to Lat. 21°27'N. Long. 89°20'E.)

Mongla port consists of shore based facilities and a sheltered anchorage in the Pussur River. Depth of water available at the anchorage is max. 8.0 M. of LLWD. Distance from Mongla fairway buoy to Mongla port Jetty is 65 Nautical miles. Entrance to the Pussur river is about 2 miles wide at the mouth and has a bar about 5 nautical miles from the Fairway Buoy where minimum depth is 6 m. Ships drawing upto 7 M. can cross the bar in all seasons. During S.W Monsoons vessels up to 8.0 M. can cross the outer bar in spring tide.

Chittagong and Mongla ports apart from their role in importing and exporting items for and from coastal industry, they also handle the bulk of export and imports to and from other areas of the country, including essential food items and equipment. The handled tonnage from 1990-91 to 1999-2000 is presented in following table.

**Table 6: Export & Import tonnage at Chittagong & Mongla ports in 1990-2000 (in mt)**

Year	Chittagong Port			Mongla Port		
	Export	Import	Total	Export	Import	Total
1990-1991	919	6,282	7,201	557	1,905	2,462
1991-1992	770	6,268	7,038	995	2,055	3,050
1992-1993	1,120	6,496	7,616	621	1,758	2,379
1993-1994	1,169	6,728	7,897	468	1,463	1,931
1994-1995	1,354	8,925	10,279	706	2,120	2,826
1995-1996	1,450	8,851	10,301	396	2,443	2,839
1996-1997	1,437	9,117	10,554	521	2,171	2,692
1997-1998	1,527	9,560	11,087	528	2,339	2,867
1998-1999	1,697	12,206	13,903	369	2,952	3,321
1999-2000	1,753	13,388	15,141	309	2,968	3,277

Source : BBS, 2002.

In view of the problems of ships reaching Chittagong port, a proposal for development of a deep-sea port is under consideration.

#### 6.4 Land Ports

Land ports have been established to facilitate trade and commerce between bordering countries of Bangladesh: India and Myanmar. These ports are administered through Bangladesh Land Port Authority (BLPA) Act of 2001.

Of the 13 land ports, three are in the coastal zone:

- Teknaf land port at Cox's bazar to Myanmar;
- Benapole land port at Jessore to India;
- Bhomra land port at Shatkhira to India.

All 12 land ports, except Benapole, will be handed to the private sector for development and cargo operations to improve efficiency. The land port at Teknaf has already been transferred to the private sector for development. As per the liberalization plan, private operators will play royalties to the

Bangladesh Land Port Authority (BLPA) for cargo operations and transfer all assets to the government after 25 years. The government will, however, have regulatory authority over all land ports.

## 6.5 Air Ports

The Airports are managed under the Ministry of Civil Aviation. There are four functional airports in the coastal zone.

**Table 7: Details of existing airports in the coastal zone**

Town	Airport name	Usage	Customs	Runway	Rwy length
Barisal	Barisal	Civil	No	Paved	5000 ft
Chittagong	Shah Amanat Intl	Civil	Yes	Paved	10000 ft
Cox's Bazar	Cox's Bazar	Civil	No	Paved	6700 ft
Jessore	Jessore	Civil	No	Paved	7900 ft

Among new/proposed airports, preparatory construction is going on for a Khulna/Mongla Airport. The Government has declared initiation of another airport near Kuakata sea beach to support tourism.

## 6.6 Export Processing Zone (EPZ)

The Export Processing Zones (EPZ) is being established through the power given in section 10 of the Bangladesh Export Processing Zones Authority (BEPZA) Act, 1980. The Bangladesh Export Processing Zones Authority (BEPZA) is the official organ of the government to promote, attract and facilitate foreign investment in the Export Processing Zones.

The primary objective of an EPZ is to provide special areas where potential investors would find a congenial investment climate, free from cumbersome procedures. There are two EPZ in the coastal zone: one at Chittagong and another at Mongla. Investment is convertible foreign currencies by foreign investors. Option to establish public/private Ltd companies or sole proprietorship/partnership concerns. Foreign Private Investment (Promotion and Projection) Act 1980 secures all foreign investment in Bangladesh. OPIC's (Overseas Private Investment Corporation, USA) insurance and finance programs operable. Security and safeguards are available under Multi-national Investment Guarantee Agency (MIGA) of which Bangladesh is a member. Arbitration facility of the International Center for the Settlement of Investment Dispute is (ICSID) available. Telex, Fax and International Dialing Services connected through satellite system available. Adequate sea, rail, road and air communications services available. Basic information of Chittagong export processing zone and Mongla export processing zone are provided below;

### *Chittagong Export Processing Zone*

**Location:**

2.40 kms from Chittagong Sea Port

5.63 kms from the main business center and

7.24 kms from the Chittagong International Airport

**Area:**

255 hectares (630 acres)

**Utility Services:**

Water supply: gets water from its own water supply system

Tariff: Tk. 13.56 per M<sup>3</sup>

Power Supply: 11 kV, 3 phase, 50 cycles  
Tariff: Tk. 2.70 per kWh (Industrial use)  
Gas supply: gets gas from the Titas Gas Field  
Tariff: Tk 3.64 per M<sup>3</sup> (Industrial use).

*Mongla Export Processing Zone*

**Location:**

Within the Mongla Port premises  
105 kms from Jessore Air Port  
42 kms from Khulna city  
397 kms from Dhaka and is well connected by road.

**Area:**

182 hectares (450 acres)

**Land:**

Total number of plots (planned): 152  
Size of each plot: 200 m<sup>2</sup>  
Tariff: US\$ 1.00/m<sup>2</sup>/year

**Utility Services:**

Water Supply: Mongla EPZ gets water from DPHE  
Tariff: Tk. 17.71 per m<sup>3</sup>  
Power Supply: 11 kV, 3 phase, 50 cycles/second  
Tariff: Tk. 4.18 per kWh (Industrial use)  
Gas Supply: Mongla EPZ has no gas supply connection.



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## ANNEX A. INTERNATIONAL CONVENTIONS

For management of coastal resources, a growing number of internationally accepted instruments are available. These range from non-binding programs of action (such as the Global Programme of Action on Land-Based Activities - GPA) to treaties, which are legally binding to the Governments of the countries that signed them. For coastal zone management in Bangladesh the following major treaties (in order of their age) are relevant:

- **International Conference for the Protection of Birds, Paris 1950.** Signed by Bangladesh. The responsibilities accepted by signatories include protection of coastal birds and migratory routes. Both are highly relevant in the southwestern coastal stretch.
- **International Plant Protection Convention, Rome 1951.** Ratified by Bangladesh in 1978. Highly relevant in the Sundarban region, where various wild species are threatened with extinction by poaching (orchid species, such as the *Dendrobium pierardii* and *Oberonia grammiei*) or mismanagement (e.g. overgrazing by too large populations of spotted deer).
- **International Convention for the Prevention of Pollution of the sea by Oil; 1954.** Ratified by Bangladesh in 1981. Under this Convention, permitted discharge amounts from ships are specified.
- **Plant Protection Agreement for the South East Asia and Pacific Region, Rome 1956.** Ratified by Bangladesh in 1974. Directed towards protection of the endemic species of the region.
- **Convention on the Continental Shelf, Geneva 1958.** Signed by Bangladesh. The Convention sets advices on exploration and exploitation of the continental shelf in a manner that natural resources are not damaged and that all other users may remain sustainable.
- **Convention on Wetlands of International Importance, especially as Waterfowl Habitat (RAMSAR Convention); Ramsar 1971.** Ratified by Bangladesh in 1992. The Ramsar Convention aims to stop the progressive encroachment on, and loss of wetlands. Although focusing on waterfowl habitats, the Convention recognizes the overall values of wetlands, including their fundamental ecological functions and their economic, scientific and recreational values. Signatory states accept the responsibility to maintain these functions and values. The Ramsar convention defines wetlands broadly to include freshwater, brackish and saltwater marshes, mangrove areas, and marine waters up to 6 meters deep at low tide, and any deeper marine waters contained within the wetland area, as well as adjacent islands and coastal areas. The Sundarban and part of the haor basin (Tanguar Haor) are such sites in Bangladesh.
- **International Convention on the Establishment of an International Fund for Compensation of Pollution Damage, Brussels 1971.** Signed by Bangladesh.
- **Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters, London-Mexico City-Moscow, 1972.** Signed by Bangladesh. The main objective of the Convention is to prevent indiscriminate disposal at sea of wastes liable to create hazards to human health, to harm living resources and marine life, to damage amenities, or to interfere with other legitimate uses of the sea. Signatory parties accept adopting national legislation to prevent pollution (permit systems), and to enforce this legislation.
- **Convention concerning the Protection of the World Cultural and Natural Heritage, Paris 1972.** Ratified by Bangladesh in 1983. The *Sundarban* is a declared world heritage

- site. Signatory states took the responsibility to keep World Heritage sites in the best possible state.
- **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).** Washington 1973. Ratified by Bangladesh in 1982. The Convention aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The trade is diverse, ranging from live animals and plants to a vast array of wildlife products derived from them, including food products, exotic leather goods (in Bangladesh the leather from monitor lizards), wooden musical instruments, timber, tourist curios and medicines. CITES was drafted as the result of a resolution adopted in 1963 at a meeting of members of IUCN (the World Conservation Union). CITES entered in force in 1975. States adhere voluntarily, but once signed the Convention is legally binding: States have to implement the Convention, and adopt their legal framework, e.g. by introduction of a system of import/export permits.
  - **International Convention for the Prevention of Pollution from Ships (MARPOL), London 1973, and Protocol relating to this Convention, London 1978.** Both signed by Bangladesh. The Convention sets rules for sewage discharge into seas, garbage disposal at or close to seas, and cargo handling on ships and provides guidelines for declaration of certain marine areas as sensitive areas.
  - **Convention on the Conservation of Migratory Species of Wild Animals, Bonn 1979.** Signed by Bangladesh. The Convention parties took responsibilities to do all they can to protect migratory animals to be hampered in their migration and migration purposes. For the coastal zone of Bangladesh this is a very relevant convention, since the migratory *Hilsa ilisha* is severely exploited by fisher during its migration into rivers as well on its way back to the sea. So far Bangladesh authorities did not develop the measures they are obliged to take according to this convention. A second group of animals for which the convention is relevant because of the direct threat to their survival are various species of dolphins and sea turtles; the present marine fisheries with small mesh-size nets is highly destructive for these species.
  - **United Nations Convention on the Law of the Seas (UNCLOS); Montego Bay, 1982.** Ratified by Bangladesh in 1982, signed in 2002. UNCLOS provides the legal basis upon which to pursue the protection and sustainable development of the marine environment and its coastal resources. Signatory states have exclusive jurisdiction over designated zones of the oceans and seas along their coasts, including coastal zones. The seaward jurisdiction usually extends up to 200 nautical miles from the coastline. Signatory states have accepted the responsibility to conserve and manage the living marine resources under their jurisdiction.
  - **International Convention on Oil Pollution Preparedness, Response and Cooperation; London 1990.** Signed by Bangladesh. The objective of the Convention is to prevent marine pollution by oil through precautionary measures, and it arranges cooperation between states in case of oil spills.
  - **United Nations Conference on Environment and Development (UNCED); Rio de Janeiro 1992.** Signed by Bangladesh. During this “Rio Conference”, all participating states negotiated and adopted “Agenda 21”, a blueprint for sustainable development. Chapter 17 of Agenda 21 addresses “Protection of the Oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas, and the protection, rational use and development of their living resources”. The Chapter calls for establishment and management of protected areas along the coast. While Chapter 21 is not binding, it is worldwide recognized as the

guideline for developed and developing states aiming to achieve sustainable development. Its level of detail allows states to referring to practical recommendations for concrete management steps.

- **United Nations Framework Convention on Climate Change, New York 1992, and the Kyoto Protocol, Kyoto 1997.** Convention ratified by Bangladesh in 1994; Protocol accepted in 2001. Sets regulations for emissions in order to decrease global warming as main reason for sea level rise.
- **Convention on Biological Diversity (CBD); Rio de Janeiro 1992.** Ratified by Bangladesh in 1994. The objectives of CBD are the conservation of biodiversity, the sustainable use of biodiversity's components, and the equitable sharing of benefits derived from genetic resources. State parties are required to take measures to ensure the conservation and sustainable use of biodiversity, monitor biodiversity in their territories, identify and regulate destructive activities, and integrate consideration of biodiversity into national decision making. In 1995, the parties to the Convention adopted the so-called "Jakarta Mandate", which outlined a programme of action for implementing the Convention with respect to marine and coastal biodiversity. The Jakarta Mandate identifies 5 areas in which the signatory states can take steps: (1) implementing Integrated Coastal Zone Management, (2) ensuring the sustainable use of coastal and marine resources, (3) implementing environmentally sustainable mariculture practices, (4) preventing the introduction of alien species, and (5) establishing marine and coastal protected areas.
- **Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention); 1994.** The Convention aims to create international support for the protection and maintenance of sites demonstrating cultural and natural heritage of outstanding value. The Sundarban protected area, the World Heritage Site in Bangladesh, and is one of the rather few natural heritage sites in the global list. Protection of identified sites proceeds under international law; the party states accepted the obligation to conserve those sites and to transfer them to future generations.
- **Global Programme of Action on the Protection of the Marine Environment from Land-Based Activities (GPA); 1995.** The GPA is a non-binding instrument that specifies measures that can and should be taken at the national, regional and global levels. The GPA recognizes that the main threat to coastal human health and to coastal and marine productivity and biodiversity result from human activities on land, both coastal and inland. It also highlights the facts that the most productive areas of the marine environment, such as the Bay of Bengal, are threatened by physical alterations on land, including destruction of habitats of vital importance for ecosystem health.
- **FAO Code of Conduct for Responsible Fisheries; 1995.** The Code places heavy emphasis on the link between fisheries management and Integrated Coastal Zone Management, especially in relation to protection of key breeding and spawning grounds. The Code is not (yet) legally binding; it provides states a sort of road map for coastal and marine management actions that positively address the growing global fisheries crisis.
- **Principles for a Code of Conduct for the Management and Sustainable Use of Mangrove Ecosystems (draft); 2004.** This Code is designed to assist as a tool for mangrove management. The Code provides principles, guidelines and recommended practices applicable to the conservation and management of all mangrove ecosystems. It covers the integration of mangrove management within coastal zone and river basin management.