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Coastal and marine biodiversity of Bangladesh (Bay of Bengal)

O. Quader

Space Research and Remote Sensing Organization (SPARRSO), Dhaka-1207, Bangladesh

Abstract - The coastal fauna of Bangladesh are a total 453 species of birds, 42 species of mammals, 35 reptiles and 8 amphibian species. A total of 301 species of mollusks and over 50 species of commercially important crustaceans and 76 species fish from estuarine have been recorded so far in the coastal zone. Among the endangered species are five mammals, 25 birds, 14 reptiles (one crocodile, eight turtles, four lizards and one snake) and two amphibians (frogs). The marine waters of Bangladesh are also having 442 species of fish, 36 species of marine shrimps. About 336 species of mollusks, covering 151 genera have been identified. In addition, 3 lobsters and 7 species of turtles and tortoises, 168 species of seaweeds, 3 sponges, 16 crabs, 3 lobsters, 10 frogs, 3 crocodiles, 24 snakes, 3 otters, 1 porcupine, 9 dolphins and 3 species of whale found in Bangladesh territorial water. Among the marine and migratory species of animals, 4 fishes, 5 reptiles, 6 birds, and 3 mammals are threatened.

INTRODUCTION

Bangladesh comprises a land area of 144,054 km², which is bounded by India on the west, north and northeast by Myanmar on the East and Southeast and the Bay of Bengal on the South. The Southern most part of Bangladesh is bordered by about 710 km long coast line of the Bay of Bengal, which has the continental shelf of up to 50 m depth with an area of about 37,000 km². The Exclusive Economic Zone (EEZ) of Bangladesh lies from the base line to 200 nautical miles seaward. (S&T 1993)

The management of coastal and marine biodiversity in Bangladesh is its responsibility and also an exclusive task of the whole neighbouring nations of Bay of Bengal and Indian Ocean rim countries. Realizing the need for closer link and cooperation for the sake of sustainable management of the biodiversity of the Bay of Bengal and its ecosystem, this paper is an effort to identify the status of coastal and marine biodiversity (known, unknown and unknowable) and their problems to solve through national, regional and international cooperation and participation. (MOEF 2002).

A humid monsoon climate with moderate rainfall 1638-3558 mm and high air temperatures 19-33°C prevail in the coastal belt. Surface water temperature varies from 22.8-32.9°C in the Bay of Bengal and the surface salinity varies from 10-29ppt. The salinity increases rapidly with depth in the upper 20-30m. The chlorophyll-a varies from 0.19 to 12.62 µg/l. The primary productivity of the Bay is very high during northeast monsoon, 0.15-1.45cm²/day. Tides are semi diurnal showing two high and two low waters during a lunar day. Wave height in the marine water of Bangladesh varies from 6.5 to 9.5m. It is prone to severe natural disaster, such as cyclones, storm surges, and floods. In combination with other natural and man made hazards, such as erosion, the high arsenic contents of ground water, water logging, water and soil salinity and various forms of pollution, these disasters have made

coastal dwellers very vulnerable and slowed down social and economic developments. (Maruf, H 2004)

COASTAL AND MARINE BIODIVERSITY

The coastal zone contains distinctive development opportunities that can be instrumental in reducing the vulnerability and poverty of coastal communities and can contribute significantly to the development of Bangladesh as a whole. Some of these are untapped, others have significant expansion potentials. The zone has a diversity of natural resources, including coastal fisheries and shrimp, forest, salt and minerals. In recent years, Bangladesh coastal areas received international attention due to its high potential for exploitation of both onshore and offshore natural gas. The coastal zone also contains several ecosystems that have important conservation values. The world's largest uninterrupted stretch of mangrove ecosystem, the Sunderban, has been declared World heritage site in 1997, whereas coral ecosystems are found around St. Martin Island. These ecosystems are not only biodiversity hotspots, but they also provide the ecological foundation for an important common property resource: the fisheries of Bay of Bengal. No systematic work on coastal and marine biodiversity of Bay of Bengal and its Bangladesh coast so far has been found. This paper has been prepared reviewing different literatures on flora and fauna of coastal and marine environment of Bay of Bengal of this region.

The coastal fauna of Bangladesh was especially studied in the framework of the various projects in Sunderban. Here, a total 453 faunal species of birds, 42 species of mammals, 35 reptiles and 8 amphibian species for the coastal zone as a whole. Mammals commonly attract most of the research attention, and a lot of data are available on the numbers and distribution of for example, the renowned Royal Bengal Tiger (*Panthera tigris*), for which the Sunderban is the largest remaining natural habitat, the Otter (*Lutra* species), Squirrels (*Collosciurus pygerythus*), *Funambalus pennati*, Wild Boar (*Sus scrofa*), and in rivers and the sea, a number of dolphin species

Not much inventory work has been carried of invertebrate fauna. Some species such as the Giant Honey bee, Mud crab and various shrimps are studied intensively, because with their relation with human activities. It is well known that the number of insect species is high, which holds probably for other groups as well. A total of 301 species of mollusks and over 50 species of commercially important crustaceans have been recorded so far in the coastal zone and the Bay of Bengal.

About 46 species of coastal wildlife are endangered with certainty and the actual number would be much more. Among the endangered species are five mammals, 25 birds, 14 reptiles (one crocodile, eight turtles, four lizards and one snake) and two amphibians (frogs).

Table I. Coastal and Marine Biodiversity

Category	Total number of species
<i>Flora</i>	
Algae/Seaweed	168
<i>Fauna</i>	
Sponges	3
Corals	66
Mollusks Marine	336
Shrimp/Prawns	56
Crabs (Marine + Freshwater)	16
Lobsters	3
Echinoderms	4
Fish	442
Amphibians	22
Reptiles	17
Birds	628
Mammals (Marine + Inland)	3

Source: Khan, 1991: Ahmed and Ali, 1996: IUCN, 2000

There are at least 36 species of marine shrimps. Among them Penaeide shrimps are commercially important About 336 species of mollusks; covering 151 genera have been identified. In addition, 3 lobsters and 31 species of turtles and tortoises of which 24 live in freshwater are found in Bangladesh. 168 seaweeds, 3 sponges, 15 crabs, 3 lobsters, 10 frogs, 3 crocodiles, 24 snakes, 3 otters, 1 porcupine, 9 dolphins and 3 species of whale are found in Bangladesh. There are numerous invertebrates in the country that are yet to be identified. There may be some faunal species are yet to be found in the coast.

The IUCN Bangladesh Red Data Book (2000) has listed 442 marine fishes, 22 amphibians, 17 marine reptiles, 388 resident birds, 240 migratory birds, and 3 species of marine mammals in Bangladesh. According to the Red list of IUCN, among the marine and migratory species of animals, 4 fishes, 5 reptiles, 6 birds, and 3 mammals are threatened.

MANGROVE BIODIVERSITY

The coastal region houses several mangrove ecosystems. Mangroves are available in the form of natural forests Sunderban and planted (in Barisal, Noakhali, Chittagong and Cox's Bazar Coastal Area) forests together covering about 50% of the forest area of Bangladesh. The forest contains a total of 10.6 Mm³ standing tree volumes, 64 percent of which is occupied by the most commercially important species sundry (*Heritiera fomes*). the most important non-wood forest product is *Nypa fruticans*.

The coastal mangrove forests constitute about 60% of the commercial productive forests including plantations, it covers 580 m². It extends along the coast in isolated groups with the exception of the Sunderban, which accounts for 74% of the reserve forest of the country. The Sunderban Mangrove forests and other parts of coastal area support a wide range of mammals, birds, amphibian, reptiles and crustacean.

(i).Sundarban Mangroves

The Sunderban is the largest single continuous productive mangrove forest of the world, spreading over the southern part of Bangladesh and west Bengal State of India. The Surdarban is a unique ecosystem and have great interest in a number of ways. Global mangroves are

calculated to be just over 1, 80,000 km², a small area compared to other forests. Bangladesh is the 8th country in the world, which possess a vast mangrove forest. This is the place where the mainland Bangladesh meets the Bay of Bengal, making the area a globally unique ecological niche. Out of the global total true mangrove species numbering 35, Sunderban has 12-13 sp. The Sunderban mangrove forests provide timber; pulp wood, fuel-wood, raw materials for industries. The major commercial timber/wood species of Sunderbans are Sundri (*Heritiera fomes*), Gewa (*Excoecaria agallocha*), Keora (*Sonneratia apetala*), Goran (*Ceriops roxburghiana*). It is mentionable here that the world heritage convention (WHC) declared "Sundarban as natural and cultural site of outstanding universal value. It is also included for selection of 7 wonders of the world.

A total of 334 species of (Spermatophytes and Pteridophytes) belonging to 245 genera were identified from the sundarban forest and the adjoining areas. Of these no fewer than 123 occur in the present reserve forest of the Bangladesh Sunderban. The forest is rich in biotic diversity comprise 400spp. of fishes, 53 spp. of reptiles, over 315 spp. of bird and 50 spp. of mammals.

There are 283 species of finfish in Indian Sunderban and 222 species of finfish in Bangladesh Sunderban, 100 species of shellfish community, 15species of shrimp, 8 species of prawn, 1 species of lobster, 5 species of crabs, 3 species of snails, 22species of mussels and shells, 4 species of cuttle fish and squids. (MOEF 2002)

MARINE FISH SPECIES

Bangladesh is very rich in fish and shrimp species biodiversity. A total of, 442 marine and 76 species fish from estuarine waters were recorded by IUCN Bangladesh (2000). The marine list, however, contains 73 species whose distribution includes estuaries as well. MOEF (2002) surveys made 87 new records from the St. Martin's Island. Thus the present total would be 529 (442+87) marine and 149 (76+73) estuarine fish species. However, many of them are not of commercial importance. (Amin & Kawsar 2003). There are about 100 commercial species of which 20 fish families are highly commercial, contributing about 82-87% of the total demersal exploitation. In addition abundance of pelagic fishes, e.g. seven species of tuna and skipjack. four species of mackerel, fourteen species of sharks and rays were also found.

SEAWEEDS

Only in St. Martin's Island have favourable substrata of the growth of seaweeds. A preliminary survey of this Island and of the sunderbans area revealed the occurrence of nearly 200 species of seaweeds. There are also 160 taxa of marine phytoplankton in the Bay of Bengal.

SHELLFISH

In addition to fin fish Bangladesh also has a rich diversity of shellfish, especially of Caridean shrimps, several of which are of commercial interest and export value. About 36 species of shrimps have been recorded from the marine water of Bangladesh. With a recent record a total of 63 shrimp and prawn from inland and marine

water of Bangladesh. The brown shrimp *M. monoceros* contributed about 56% of the total shrimp catch, though *P. monodon* is the targeted species because of its export value.

Peneaus monodon, *P. indicus*, *P. semisulcatus*, *Metapeneaus monoceros*, *M. brevocornis* are important penaeids. The shrimp and prawn culture sector of Bangladesh is seen as having become very important in economic terms contributing significantly to foreign exchange earnings and employment generation in rural areas. About 600,000 coastal people are directly employed in this industry.

In addition to the finfish and shrimps, more than 300 molluscan species are recorded from Bangladesh. Two species of *Trochus* are recorded from the St. Martin's Island, which are depleted worldwide. Octopus and Cuttlefish (*Sepia*) occur in deep waters of the Bay and are exportable commodities.

ST. MARTIN'S ISLAND

A total of 234 species of fish have been identified from the St Martin Island. Of which, 98 species are coral associated. The total number of recorded mollusk species from the St. Martin's Island stands at 187 species. 7 species of crabs were recorded from the island. A total of 66 coral species were recorded, of which 19 are fossil coral. 36 living coral and the rest are under 6 families of sub class octocorallia. A total of 14 species of algae and 3 species of lobsters were recorded from the St. Martin's Island.

Approximately 5-10% of the surface area of the sub-tidal zone of the St. Martin's Island is covered with corals. Coral collection at the present rate is detrimental for their survival. Although the St. Martin's Island is referred to as a "coral Island" no indication of coral reef formation was found in the Island. The earlier reports of "coral reefs" are in fact "boulder reefs". (Tomascik, T. 1997)

IMAJOR THREATS TO BIODIVERSITY

Cause of decline of fishery resources

Fishery resources have declined sharply due to environmental degradation and numerous anthropogenic activities: such as over-fishing of inshore fisheries, indiscriminate catching of juveniles, construction of barrages and dams. siltation, extensive use of pesticides, pollution etc. However, increase in the human population and consequent increases in the demand for fish, fishing pressure is intensifying every year. This is believed to have caused over fishing of all stocks and populations of fishes and prawns by the use of even banned gears and methods.

PL collection of shrimp and colossal loss of bio-diversity

Post larvae, juveniles and pre-adults of shrimps and fin fishes are extensively exploited and even over-exploited. For example, in the coastal Sundarban area estimation provides that 97% of the shrimp fry and finfish larvae are destroyed or thrown on the land during of collection of only 3% seed of tiger prawn for shrimp culture. Thus during wild collection of I million *P. monodon*, an estimated annual loss of 75.75 million non- target fin and shellfish larvae occurs.

Coastal and Marine Pollution:

Municipal Waters, Industrial Pollution, Oil Pollution, Ship Breaking, Impact of coastal Aquaculture on Environment, Natural Disasters, Sea Level Rise, Persistent Organic Pollutants (POPs) –a transboundary problem. These are creating harmful to coastal and marine biodiversity. (Maruf, H 2004)

CONCLUSION

Some scanty work has been done on marine fauna and flora of the Bay of Bengal for its exploration and exploitation. No systematic work on coastal and marine biodiversity of Bay of Bengal and its Bangladesh coast so far has been done. This paper has been prepared reviewing different literatures on flora and fauna of this area. Result of this study shows that, The coastal fauna of Bangladesh are a total 453 faunal species of birds, 42 species of mammals, 35 reptiles and 8 amphibian species for the coastal zone as a whole. The renowned Royal Bengal Tiger (*Panthera tigris*), for which the Sunderban is the largest habitat and the Otter (*Lutra species*), Squirrels (*Collosciurus pygerythus*, *Funambalus pennati*, Wild Boar (*Sus scrofa*), and in rivers and sea, a number of dolphin species. Not much inventory work has been carried of invertebrate fauna on both coastal and marine environment. A total of 301 species of mollusks and over 50 species of commercially important crustaceans have been recorded so far in the coastal zone and the Bay of Bengal. About 46 species of coastal wildlife are endangered with certainty and the actual number would be much more. Among the endangered species are five mammals, 25 birds, 14 reptiles (one crocodile, eight turtles, four lizards and one snake) and two amphibians (frogs). The marine waters of Bangladesh are also remarkable for being a habitat to 442 species of fish. There are at least 36 species of marine shrimps. About 336 species of mollusks, covering 151 genera have been identified. In addition, 3 lobsters and 31 species of turtles and tortoises of which 24 live in freshwater are found in Bangladesh. A species list of 168 seaweeds, 3 sponges, 15 crabs, 3 lobsters, 10 frogs, 3 crocodiles, 24 snakes, 3 otters, 1 porcupine, 9 dolphins and 3 species of whale are found in Bangladesh. According to the Red list of IUCN, among the marine and migratory species of animals, 4 fishes, 5 reptiles, 6 birds, and 3 mammals are threatened. In the faunal study some of the fishes and shrimps are available in both the coast and the Bay. Some of them could not separate due to lack of specific literatures. Major threats to biodiversity are detected as: Post larvae collection of shrimp and colossal loss of bio-diversity, Coastal and Marine Pollution, Ship breaking in the beaches, Impact of coastal Aquaculture on Environment, Natural disasters, Sea level rise, Persistent Organic Pollutants etc. Due to constrain of literatures it is very difficult to focus unknown and unknowable biodiversity of this region. Intensive study is needed for invertebrate fauna and others There may be more unknown but unknowable is difficult to focus. Many papers, books, reports, specialist's opinions and other literatures have been consulted for this paper. Only main references are given.

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