Pattern of Fish Biodiversity in Indian Sunderban

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Introduction

Sunderbans is the largest protruding delta on this planet covering about one million ha in the delta of the rivers Ganga, Brahmaputra and Meghna and shared between Bangladesh (~60 %) and India (~40 %). The Indian Sunderbans (Latitude 21° 32'-22°40'N, Longitude 88° 22'- 89°0'E) in the north east coast of India occupy 9630 km^2 and are bounded by river Hooghly in the west, river Raimangal in the east, Bay of Bengal in the south and Dampier Hodges line in the north. It consists of 102 islands of which 54 are put under two districts – North 24-Parganas and South 24-Parganas. It covers 6 Blocks of North 24-Parganas and 13 Blocks of South 24-Parganas with 44% of its total area under forest. The group of islands is interspersed by innumerable rivers, creeks, etc. which makes most of the area inaccessible and rest is reserved forest, falling under the Sunderbans Biosphere–a world heritage site. Categorized as "Reserved Forest" the Sunderbans is very important for being the source of forestry products and fish that enrich the local and national economy, as well as for being the protector from the heavy ravages of periodical cyclones and tidal surges originating from the sea.

The whole area of the Sunderbans encompasses about 0.6 million ha. of which 0.4 million ha. are forest areas and the remaining part includes water bodies comprising of hundreds of morasses, swamps, estuaries, large and small rivers, canals, and creeks interlaced almost in every direction. The area experiences a subtropical monsoonal climate with an annual rainfall of 1,600–1,800 mm and severe cyclonic storms. Typical occupations of the local people are fisheries, farming, labour, trade and services. However, the biodiversity in the region has become a major concern due to environmental changes, over exploitation of resources, habitat loss, uncontrolled developmental activities, over extraction of resources, pollution and high population density (Wafar *et al.* 2011) are serious constraints, which are major causes of species loss. In the present communication, pattern of biodiversity of fishes of the Sunderban island have been discussed and synthesized with reference to documentation, distribution, potential threats, important issues and challenges.

Mangroves of Sunderbans and fishing boat

Fin fish of Sunderbans

Shell fish of Sunderbans

Fish biodiversity

Fish as a group, apart from its economic value, from a biodiversity viewpoint, has the highest species diversity among all vertebrate taxa. It is believed that out of 61,259 species of vertebrates recognized world over 32,300 are fish species, of which 15,170 are fresh water while 16,764 are marine (William *et al.* 2010). Sunderbans is considered as gold mine of fishery. The

fisher folk community depends on fish catching, prawn seed collection, crab fishing etc. About 15-20% of the total fish requirement of Kolkata market is being supplied from Sunderban and adjacent Bhery Fishery. A total of 172 species of fishes, 20 species of prawn and 44 species of crabs including two edible crabs have been reported. A huge fish bio-diversity of both shell fish and fin fish are available in Indian Sunderbans. The species includes fresh water, brackish water and marine water. The most important and commonly available freshwater fin fish are *Mourala, Amblypha ryngodonmola; Koi, Anabas testudineus; Gagra, Arius gagora; Katla, Catla catla; Bele, Glossogo biusguiris; Chanda, Chanda ranga; Muktogachha, Etroplus suratensis; Parse, Liza parsia; Aor, Mystu saor; Chitol, Notopterus chitala; Pabda, Ompok pabda; Kat-Koi, Teraponja rbua; Cuche, Monopterus cuchia; Tepa, Tetraodon cutcutia; Boal, Wallago attu; Bam, Anguilla bengalensis; Techokha, Aplocheilus panchax; Mrigala, Cirrhinus mrigala; Dwarika, Esomus danricus; Bata, Labeo bata; Rohu, Labeo rohita; Tangra, Mystus tengara; Gule, Pseudapocryptes lanceolatus; Phasa, Setipinna phasa* and *Pangas, Pangasius pangasius.*

Among brackish water fin fish *Aar Tangra, Aorichthys seenghala; Rule, Butis butis; Milk fish, Chanos chanos; Gurjauli, Eleutherone matetradactylym; Amude,* Coiliadus sumieri; Bhetki, Lates calcarifer; Chanda koi, *Lutjanus johni; Parse, Mugilcephalus; Bhangon, Liza tade; Nona Tangra, Mystusgulio; Bak, Hemiramphus far; Ilish, Tenualosa ilisha; Paira Chanda, Scatophagus argus; Lal Bhola, Johnius coitor; Kankley, Xenentodon cancila; Kane Poka, Alepes djedaba; Med kanta, Arius dussumieri; Menu Machh, Boleopthalmus boddarti; Nona Bele, Brachygobius nunas; Pata, Brachiurus sp.; Patoka, Chelanodon patoca; Jat Amude, Coiliar amcarti; Rupoli Amude, Coiliareynaldi; Sal fish, Cynoglossus lingua; Surungi Bhola, Dasciaena albida; Gang Chuno, Gobiopterus chuno; Chhoto Chanda, Leognathus blochii; Gang Tangra, Mystus bleekeri; Surungi Bhola, Pannamicrodon; Sona Bam, Pisodonophis boro; Chota Bele, Platycephalus indicus; Kan Magur, Plotosus canius; Topse, Polymenus paradiseus; Madhu Bhola, Pterotolithus maculatus; Kharsula, Rhinomugil corsula; Kakle, Strongyluras trongylura* are important.

Various marine fin fish species also contributed significantly in commercial catch. The important fish species are *Hangor, Rhinobatos* spp.; Samudrik Aar, *Arius sona*; Samudrik Chanda, *Drepanepunctatus*; Khayra, *Gudusiachapra; Lutia, Harpodonnehereus; Koratmach, Pristis* spp.; Moon fish, *Mene maculate*; Helicopter, *Triacanthu sbiacculeatus*; White Pomfret, *Pampus argenteus*; Pomfret, *Pampus chinensis*; Pata Machh, *Paraplagus iabilineata*; Shark, *Scoliodon laticaudus*; Samudrik Bele, *Sellagos ihama*; Shankar Mach, *Sphyrna* spp.; Kajli Ilish, *Tenualosa toil*; Omlet, *Megalops cyprinoids*; Nona Bam, *Monodactylus argenteus*; Black Pomfret, *Panastirometeus niger*; Daku Macch, *Periophthalmus weberi*. Rupabati, *Trichiurus savala* and Medh, *Osteogeiosus militaris.*

Various economically important shell fishes are also available in this region. The important prawns and shrimps are Ghuso Chingri, *Acetes indicus*; Goda Chingri, *Macrobrachium rude*; Galda Chingri, *Macrobrachium rosenbergii*; Honne Chingri,*Metapenaeus monoceros*; Chamne Chingri, *Metapenaeus brevicornis*; *Brown shrimp, Metapenaeus dobsoni*; Hende Bagda Chingri, *Panaeus semisulcatus*; Nona Chingri, *Parapenaeopsis sculptilis*; Chapda Chingri, *Penaeus indicus*; Bagda Chingri, *Penaeus monodon.*

Commonly available fresh water, brackish water and marine water crabs are Nona Kankra, *Scylla serrate*; Blue Manna Crab, *Portunus pelagicus*; Flower moon crab, *Matuta planipes*; *Crufix crab, Charybdis feriata*; *Calappapustulosa*; Tele Kankra, *Sartorianas pinigera*; *Charybdis rostrata*; Chiti Kankra, *Varuna litterata*; Shame-faced crab, *Calap palophos*; *Matut alunaris*; *Portunus sanguinolentus.*

Important molluscs of this region are *Edible oyster, Crassostrea madrasensis; Edible oyster, Saccostrea cucullata; Venus clam, Meretrix meretrix; Pearl oyster, Pinctada fucata;* Squid, *Loligo* spp. Blood Clam, *Anadara* spp.; Shamuk, *Pilag lobosa*; Gugli, *Bellamya bengalensis*; Jhinuk, *Lamellidens marginalis*; Cuttle fish, *Sepia aculeate*; Common Octopus, *Octopus vulgarls.*

Threats to biodiversity

India's island biodiversity is under threat by several factors. The threats to the Sunderbans mangrove eco-system are arising partly due to biotic pressure from the surrounding environment and partly due to human induced or natural changes in the upper catchments. These can be outlined as below:

- High salinity, low water table and acidity problem, loss of soil fertility, coastal erosion and a steep fall in fishery resources.

- Reduction in the periodicity and quantity of freshwater reaching the mangrove environment due to diversion of freshwater in the upstream areas (especially due to Farakka Barrage constructed by India) and change in course of main rivers.
- Conversion of mangrove tracts for aquaculture and agriculture.
- Uncontrolled collection of prawn seedlings.
- Uncontrolled fishing in the water of Reserve Forests.
- Continuous trampling of river/creek banks by fishermen and prawn seed collectors.
- Pollution from both the landward and seaward sides through marine paints &hydrocarbons, usage of excessive pesticides & chemicals for agricultures & industries, exploitation of mineral gas and oil etc.

The changes in freshwater flushing are visibly caused by gradual eastward shift of the flow of the Ganges River. Most of the tributaries of the River Ganga on the Indian side have already silted up and do not carry. Thus, increased levels of salinity, particularly during the dry season (low flow period) affect biodiversity, with the salinity-tolerant species gradually overtaking species dependent upon regular freshwater inputs.

Further threats to biodiversity are because of pollution by the agrochemicals (fertilizers and pesticides) used extensively in the catchments of the Ganga and Brahmaputra rivers and their numerous tributaries. Moreover, toxic products and urban wastes enter the system due to upstream pollution in the huge Ganges catchments. From the seaward side, major pollution occurs through oil spills that cause great damage, especially to the aquatic fauna and seabirds. Growing industrialisation of the area around Calcutta and Haldia, contribute significantly to the pollution load and degradation.

It is now clear that slowly but far-reaching changes are taking place pervasively in the Sunderbans. These arise from direct and indirect impacts of human influence in the area causing widespread quantitative and qualitative degradation of the resource base throughout the Sundarbans eco-system.

Management measures

The core area is free from all human disturbances like collection of wood, honey, fishing and other forest produces. However, in the buffer area fishing, honey collection and wood cutting are permitted in limited form. There exist a Memorandum of Understanding between the Government of the Republic of India and the Government of the People's Republic of Bangladesh on conservation of the Sundarbans. Considering that both the Governments are parties to the Convention on Biological Diversity 1992 and are contracting parties to the Ramsar Convention on Wetlands 1971. Recognizing that the Sunderbans of India and Bangladesh represent a single ecosystem divided between the two countries, acknowledging that the wildlife sanctuaries of the Sundarbans located in both countries is recognized as UNESCO World Heritage Site and in Bangladesh as Ramsar site.

In India however, the strategy for Sunderbens conservation involves the setting aside of areas where the entirelife-cycle needs of a community can be met and the ecological needs of wildlife can be linked into the overall management of the system for the Sunderbans. Furthermore, in so doing, the ecological processes upon which wildlife depend become integral values in the management matrix. The wildlife protection has improved significantly in the last decades, illegal hunting is still occurring on an incidental basis and fishery is having an adverse impact on the remaining turtle and crocodile populations as these animals are frequently caught up in fishing nets. Therefore, a collective effort to determine the priorities and to concentrate the available genetic resources on these is highly essential for the better sustainable management of the ecosystem.

References/Further readings

Mandal, B., Mukherjee, A., Sarkar S., and Banerjee,S.(2012): Study on the Ornamental Fin Fish of Indian Sunderbans withSpecial Reference to Few Floral Sources for Carotenoid Pigmentation.

Bangladesh Bureau of Statistics (BBS)(2001): Statistical Year Book, Dhaka.

Gopal, B., and Chauhan,M. (2006): Biodiversity and its conservation in the Sunderban.

Chaudhuri, A. B. and Choudhury,A. (1994): Mangroves of the Sundarbans.Volume 1: India. World Conservation Union, Gland,247 pp.

Chandra, G.&Sagar,R. L.: Fisheries in Sundarbans: Problems and Prospects; Electronic copy available at: http://ssrn.com/abstract=2084014.

IUCN(1997):SundarbanWildslifeSanctuaries (Bangladesh): World Heritage Nomination – IUCN Technical Evaluation. http://whc.unesco.org/archive/advisory_body_evaluation/798.12pp.

Mondal, A. K. & Ghosh, R. K. (1989):Sundarban, A socio bio-ecological study.

Mahapatra, B.K., Chatterjee, P., Saha, D. and Datta, N.C. (1999): Declining trend in the abundance of seeds of tiger shrimp, *Panaeusmonodon* (fabricus) in the Sundarbans withsuggestions for its restoration. In Guhabakshi, D.N., Sanyal,P. and Naskar, K.R. ed.

Mangrove Ecosystem.

Payne, A., Sinha, R., Singh, H.R. and S. Huq.(2004): A review of the Ganga basin: Its fish and fisheries. In: R.J. Welcome and T. Petr.(eds.). Proceedings of the secondInternational Symposium on theManagement of Large Rivers for fisheries,Vol. – I. RAP publication 2004/1-1, 229 –251, FAO Regional Office for Asia and thePacific, Bangkok, Thailand.

Khan, M. M. H. (2004): Ecology and Conservation of The Bengal Tiger in the Sundarbans Mangrove Forest of Bangladesh.

National Agricultural Technology Project, ICAR (2005): Mangrove Ecosystem, A manual for the assessment of biodiversity, CMFRI special publication No. 83.

Seidensticker, J., KurinR.and Townsend,A. K. (eds.) (1991): The Commons in South Asia: Societal Pressures and Environmental Integrity in the Sunderbans.The International Center, SmithsonianInstitution, Washington, D.C.

UNESCO(1973): International Classification and Mapping of Vegetation.UNESCO, Paris.

Wafar, Mohideen, K. Venkataraman, Baban Ingole, S.A. Khan, P. Lokabharti. 2011. State of knowledge of coastal and marine biodiversity of Indian Ocean countries. PLoS one.6 (1): 1-12.

William, N. Eschmeyear, R. Fricke, J.D. Frog and R. A. Pollack. 2010. Marine fish diversity: History of knowledge and discovery (Pisces). Zootaxa.2525: 19-50.

WWF-I (Worldwide Fund for Nature-India) (2001):India's RamsarSites – Fact Sheet onBhitarkanika Mangroves. WWF-India,and Ministry of Environment and Forests, New Delhi, 2 pp.

Palau Islands