COMMUNICATION

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An overview of fishes of the Sundarbans, Bangladesh and their present conservation status

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Abstract: Sundarbans, the largest mangrove forest of the world is located in Bangladesh and India. Studies done on the diversity of fish fauna in the Sundarbans mangrove forest of Bangladesh are sparse and patchy. Here we take the opportunity to provide an updated checklist of the fishes of the Sundarbans, Bangladesh based on primary and secondary data. Field surveys were undertaken in the aquatic habitat of Sundarbans core area along with its adjacent marine habitat from June 2015 to July 2017. Based on published information and primary observations the updated list of fishes covers a total of 322 species belonging to 217 genera, 96 families, and 22 orders. Additionally, four species of fishes, are newly reported in Bangladesh waters, viz., Mustelus mosis Hemprich & Ehrenberg, 1899; Lagocephalus guentheri Miranda Ribeiro, 1915; Carangoides hedlandensis Whitley, 1934; Uranoscopus cognatus Cantor, 1849. The global IUCN Red List status of each species has been enlisted. The updated checklist will constitute the reference inventory of fish biodiversity for the Sundarbans, a natural world heritage site.

Keywords: Bangladesh, checklist, fish, mangroves, Sundarbans, World Natural Heritage Site.

Abbreviations: Dorsal fin D — 1st Dorsal fin | D 2 — 2nd Dorsal fin | P 1 — Pectoral fin | P 2 — Pelvic fin | A — Anal fin.
INTRODUCTION

Mangroves are intertidal forested wetlands confined to the tropical and subtropical regions (Tomlinson 1986). The total area of the mangroves in the globe is an estimated 18.1 million ha (Spalding et al. 1997). The Sundarbans, the single largest tract of mangrove forest in the world covers about 1 million hectares in the delta of the river Ganges, Brahmaputra, and Meghna. Among the total area 60% lies in Bangladesh and the rest in India. This transboundary ecosystem is extremely important both ecologically and economically as it provides a nursery and breeding area for key fishes including those of the Bay of Bengal. The Sundarbans in Bangladesh covers an area of 6,017 km² along its southwestern part sharing 4,143 km² of water bodies comprising of hundreds of creeks, canals, small and large rivers, and estuaries. This mangrove forest was declared a Ramsar site by the Convention of Wetlands of International Importance in 1992 and declared as a Natural World Heritage Site by UNESCO in 1997 (Figure 1). Despite continued degradation, the Sundarbans contributes 3% to the country’s gross domestic product out of 5% contribution of the country’s forestry sector (Roy & Alam 2012).

The fish diversity of the brackish water ecosystem of the Sundarbans is usually associated with tolerance to a wide range of salinity fluctuation and migration. The freshwater fish species having low salinity tolerance enter into upper estuarine zone mainly in the period of ebb tide, while marine fishes are usually confined to the lower zone. Though some species travel freely in the whole salinity area for a major part of the year, very few can be considered as ‘native’ (Mishra 2017). Basically, most of the fish species enter into the brackish waters of the Sundarbans and spend for a certain period of their life cycle there either for shelter and feeding or for spawning purposes. The major threat to fishes of the Sundarbans region are environmental changes, reduction of freshwater discharge during lean seasons, increased salinity, use of destructive fishing gear (e.g., set bag net, small mesh size gill net), over exploitation, extraction of resources, and pollution.

Information regarding the diversity of fish in the Sundarbans of Bangladesh is scattered. Fishes of the Sundarbans were first described in the study of Hamilton (1822). He described about 71 fish species in the Gangetic estuaries and 51 of them occurred from the Sundarbans. After the independence of Bangladesh in 1971, several researchers and authors published different scientific and conference papers, project reports, guides and books on fish faunal diversity especially since 1978. Only some of them can be considered as valid references on the species availability in the Sundarbans waters such as Seidensticker & Hai (1983), Rahman (1989), Acharya & Kamal (1994), Chantarasri (1994), Bernacsek (2001), Bernacsek & Haque (2001), Shah & Hossain (2006), and Rahman et al. (2009). The main objective of the present study is to assess the existing fish fauna of Sundarbans and accumulate all fish species from the valid records made so far. Additionally, we have reviewed the present fishing practices in the Sundarbans detrimental to fish biodiversity, and the national policies made for fisheries management and conserving fish diversity.

METHODS

We consulted the primary and previously published articles, records, and books on ichthyological studies in the Sundarbans to build this checklist. These collections are mainly taken for preparing the list of the fishes known to occur in the Sundarbans and their valid identification and confirmation. Unbiased and sincere efforts were made in accumulating such a valuable treasure.

In the present survey, specimens of fishes were sampled between June 2015 and July 2017 from the major rivers of the Sundarbans, viz., Baleswar, Shibsa, Passur, Shela, Kobadak, Kalindi, Kholpetua, and a few of the tidal estuaries, and adjacent marine habitat in the Sundarbans, with the help of local fishermen during fishing (Figure 1). The fishes were also collected from the fish markets inside or near the Sundarbans of Khulna, Bagherhat, and Satkhira districts. The spellings of scientific names and species validity were checked following Fishbase (Froese & Pauly 2018) and the California Academy of Sciences Catalog of Fishes (Eschmeyer et al. 2018). The arrangement of families and order are made according to Nelson (2006) and Laan et al. (2014). The identification was made by using FAO fish species catalogues which present detailed taxonomic accounts of all known species of individual families. As the checklist is intended to be a master reference for the Sundarbans habitat conservation and management, we consulted the latest global IUCN Red List status of each species (IUCN 2018). For habitat preference, we consulted previous data, our primary observation, reference website (Froese & Pauly 2018) and different reference books (Siddiqui et al. 2007; Rahman et al. 2009). DNA barcoding through mitochondrial COI gene sequencing was done for the newly recorded species during the present survey and the sequence was submitted to GenBank.
RESULTS

Based on the previously published information, specimens housed in the Aquatic Bioresource Research Lab., SAU and observations in the present study, the updated list of fishes of Sundarbans, Bangladesh provides information of 322 species belonging to 217 genera of 96 families and 22 orders (Table 1). In the present checklist, we have not considered any description. The column named as “present study” of Table 1, signifies our primary data collected between July 2015 and June 2017 and “previous literature” signifies the names which were enlisted in previous work on Sundarbans conducted by different scholars. Among the enlisted fish, Chondrichthyes (cartilaginous fish) contains 23 genera, 11 families and six orders whereas bony fish (Osteichthyes) covers 194 genera, 85 families and 16 orders. Maximum numbers of fishes (165 species, 50.24%) were recorded from order Perciformes in Sundarbans, Bangladesh. The number of fish species recorded under 22 orders is given at Figure 2.

In the present article, we report four new distributional records of fishes from the Sundarbans region of Bangladesh, viz., *Mustelus mosis* Hemprich & Ehrenberg, 1899; *Lagocephalus guentheri* Miranda Ribeiro, 1915; *Carangoides hedlandensis* Whitley, 1934; *Uranoscopus cognatus* Cantor, 1849 (Image 1).

Order Carcharhiniformes
Family Triakidae
Genus *Mustelus* Linck 1790

**Mustelus mosis** Hemprich & Ehrenberg, 1899

**Materials examined:** Specimens collected from Bangladesh: Sundarbans: Dubla: Alorkol; coordinate 21.71N, 89.59E (Image 1A); coll. Habib and Neogi, 03.ii.2016; one specimen (Specimen voucher F1602sb-73). GenBank accession number MF588562.

**Identification:** Body color reddish-grey above and dull white ventrally. Small sized shark, with an elongate and slender body; snout markedly pointed and long. Mouth triangular, with well-developed labial folds. Skin fairly smooth.
Order Tetraodontiformes
Family Tetraodontidae
Genus Lagocephalus Swainson, 1839
*Lagocephalus guentheri* Miranda Ribeiro, 1915

**Materials examined:** Specimens collected from Bangladesh: Sundarbans: Dubla: Alorkol; coordinate 21.71N, 89.59E (Image 1B); coll. K.A. Habib, 03.ii.2016; three specimens (Specimens voucher F1602sb-65-2, F1602sb-64, F1602sb-65-3). GenBank accession numbers MF588654, MF588655, MF588656.

**Identification:** Fin formula D 22-23; P₁ 14; P₂ 6; A 19-21. Color of dorsal side of the body is brown with several dark bands crossing over the back; a silver-white band running on the side of the body was found in the holotype. The dorsal fin dusky. The caudal fin dark brown or almost black with the dorsal and ventral white tips. The pectoral and anal fins pale. Body stout and small sized fishes, covered with small spinules on back, abdomen and throat; caudal fin rounded.

Order Perciformes
Family Carangidae
Genus Carangoides Bleeker, 1851
*Carangoides hedlandensis* Whitley, 1934

**Materials examined:** Specimens collected from Bangladesh: Sundarbans: Dubla: Alorkol; coordinate 21.71N, 89.59E (Image 1C); coll. Habib and Neogi, 16.xii.2016; two specimens (Specimens voucher F1612sb-69, F1612sb-66). GenBank accession numbers MF588553, MF614771.

**Identification:** Fin formula D₁ V₁; D₂ I/22 P₁ 19; P₁ 6; A II/I/17. Body color bluish-green above and silvery white below; dorsal fin dusky; filamentous soft rays black, soft dorsal fin yellow; pectoral and anal fins silvery; caudal fin yellowish green; pectoral fin dusky. A black opercular spot present. Body strongly compressed and very deep. Eye diameter about equal to or larger than snout length. Central rays of dorsal and anal fins elongated. Scales small; breast naked. Lateral line anteriorly with a moderate regular arch.

Order Perciformes
Family Uranoscopidae
Genus Uranoscopus Linnaeus, 1758
*Uranoscopus cognatus* Cantor, 1849

**Materials examined:** Specimens collected from Bangladesh: Sundarbans: Dubla: Alorkol; coordinate 21.71N; 89.59E (Image 1D); coll. Habib and Neogi, 21.ii.2017; three specimens (Specimens voucher F1702sb-29, F1702sb-30, F1702sb-31).

**Identification:** Fin formula D₁ IV; D₂ I/8; P₁ 14; P₁ I/5; A III/8. Body color grayish above and minute black dots on upper third body; sivery below; opercle golden. Body compresses; anterior moderately and posterior deeply.
Image 1. Four new country records from the Sundarbans, Bangladesh: A—*Mustelus mosis* Hemprich & Ehrenberg, 1899 | B—*Lagocephalus guentheri* Miranda Ribeiro, 1915 | C—*Carangoides hedlandensis* Whitley, 1934 | D—*Uranoscopus cognatus* Cantor, 1849.
Table 1. List of fish species from the Sundarbans including their order and family status, english name, local name, scientific name, Global IUCN Red List status, earlier literature record and their habitats (Abbreviations: EN—Endangered | VU—Vulnerable | NT—Near Threatened | LC—Least Concern | DD—Data Deficient | NE—Not Evaluated | F—Freshwater | B—Brackish | M—Marine).

| Order/ Family | English name | Scientific name | Red List status | Present study | Previous literature | Habitat |
|---------------|--------------|----------------|----------------|---------------|---------------------|---------|
| Orectolobiformes | Grey Bamboo Shark | Chiloscyllium griseum | NT √ | M,B |
| Carcharhiniformes | Dog Shark | Scyliorhinus laticaudus | NT √ | M,B |
| Carcharhiniformes | Shark | Glyphis glyphis | EN | Bernacsek 2001a | M,F,B |
| | Scoliodon walchehmi | Rhizoprionodon acutus | NE √ | M,F,B |
| | Blacktip Reef Shark | Carcharhinus melanopterus | NT | Bernacsek 2001a | M,B |
| Carcharhiniformes | Scalloped Hammerhead Shark | Sphyra lewini | EN √ | M,B |
| Carcharhiniformes | Hammerhead Shark | Sphyra lewini | EN | Bernacsek 2001a | M,B |
| Torpediniformes | Electric Ray | Narcine timlei | DD √ | M,B |
| Torpediniformes | Spotted Sleeper Ray | Narkine dipherngia | DD √ | M,B |
| Rajiformes | Gulter Fish | Rhynchobatus djiddensis | VU | Bernacsek 2001a | M,B |
| Myliobatiformes | Scaly Whipray | Brevitrygon imbricata | DD √ | M,F,B |
| | Dwarf Whipray | Brevitrygon wolga | NT √ | M,B |
| Myliobatiformes | Leopard Stingray, Reticulate Whipray, Honeycomb Stingray | Himantura undulata | VU | Bernacsek 2001a | M,B |
| Myliobatiformes | Cowtail Stingray | Pastinachus sephen | NE | Bernacsek 2001a | M,F,B |
| Myliobatiformes | Bleeker’s Whipray | Pterobatis urinacoides | VU | Bernacsek 2001a | M,B |
| | White Spotted Stingray | Macropristus gerrardi | VU | Bernacsek 2001a | M,B |
| Elopiformes | Cowtail Stingray | Pastinachus sephen | NT | Bernacsek 2001a | M,B |
| Myliobatiformes | Sharp Snout Stingray | Telatrygon zugei | NT √ | M,B |
| Anguilliformes | Longtail Butterfly Ray, Butterfly Ray | Gymnura poeciliura | NT √ | M,B |
| Anguilliformes | Tenpounder,Tarpon | Elaps machnata | LC | Bernacsek 2001a | M,F,B |
| Anguilliformes | Indo-Pacific Tarpon | Megalops cyprinoides | DD √ | M,F,B |
| | Red Sea White-Spotted Moray | Gymnothorax punctatus | NE √ | M,B |
| | Moray Eel | Gymnothorax fimbriatus | NE √ | M,F,B |
| | Moray Eel | Gymnothorax sp. | NE √ | M,B |
| | Slender Giant Moray | Strophidon zethete | NE √ | M,B |
| Anguilliformes | Yellow Pike Conger | Congresox talabonoides | NE | Huda et al. 2003 | M,B |
| Anguilliformes | Eel | Congresox talabonoides | NE | Bernacsek 2001a | M,B |
| Anguilliformes | Dagertoof Pike Conger | Muraenidae cyanea | NE | Bernacsek 2001a | M,F,B |
| Anguilliformes | Boro Snake Eel | Pisodonophis boro | LC √ | M,F,B |
| Order/ Family                | English name                      | Scientific name        | Red List status | Present study | Previous literature | Habitat |
|-----------------------------|-----------------------------------|------------------------|-----------------|---------------|---------------------|---------|
| Anguilliformes              | Purple Spaghetti Eel              | Moringua raitaborua    | NE              | √             |                     | F,B     |
| Anguillidae                 | Giant Mottled Eel                 | Aquilia bengalensis    | NT              | √             | M,F,B               |         |
| Clupeiformes                | Chacunda Gizzard Shad, Shortnose Gizzard Shad | Anodontostoma chacunda | NE              | √             | M,F,B               |         |
| Clupeidae                   | Indian River Shad                 | Gudusia chapra         | LC              | √             | F,B                 |         |
| Clupeiformes               | Blacktip Sardinella               | Sardinella melanura    | NE              | √             | M                   |         |
| Clupeidae                   | White Sardine                     | Escualosa thoracata    | NE              | √             | M,F,B               |         |
| Clupeiformes               | Gold Stripe Sardine               | Sardinella gibbosa     | NE              | √             | Bernacsek 2001a     | M       |
| Clupeidae                   | Sardine                           | Sardinella fimbriata   | NE              | √             | M,B                 |         |
| Clupeiformes               | Indian Oil Sardine                | Sardinella longiceps   | NE              | √             | M                   |         |
| Clupeidae                   | Blacktip Sardinella               | Sardinella melanura    | NE              | √             | M                   |         |
| Clupeiformes               | Indian River Shad                 | Tenualosa ilisha       | LC              | √             | M,F,B               |         |
| Clupeidae                   | Tolip Shad, Hilsa Shad            | Tenualosa toli         | NE              | √             | M,F,B               |         |
| Clupeiformes Engraulidae   | Goldspotted Grenadier Anchovy     | Coilia dussumieri      | NE              | √             | M,F,B               |         |
| Clupeidae                   | Neglected Grenadier Anchovy       | Coilia neglecta        | LC              | √             | M,B                 |         |
| Clupeiformes               | Ramcarat Grenadier Anchovy        | Coilia ramcarat        | NE              | √             | M,B                 |         |
| Clupeidae                   | Gangetic Hairfin Anchovy          | Setipinna phasa        | NE              | Bernacsek 2001a | F,B                 |         |
| Clupeiformes               | Scaly Hairfin Anchovy             | Setipinna taty         | NE              | √             | M,B                 |         |
| Clupeidae                   | Indian Anchovy                    | Stolephorus indicus    | NE              | √             | M,B                 |         |
| Clupeiformes               | Common Hairfin Anchovy            | Setipinna tenuifilis   | NE              | √             | M,B                 |         |
| Clupeidae                   | Spined Anchovy                    | Stolephorus tri        | NE              | √             | M,B                 |         |
| Clupeiformes               | Anchovy                           | Thryssa dussumieri     | LC              | Bernacsek 2001a | M,B                 |         |
| Clupeidae                   | Hamilton's Thryssa                | Thryssa hamiltonii     | NE              | √             | M,B                 |         |
| Clupeidae                   | Oblique Jaw Thryssa, Gangetic Anchovy | Thryssa pura           | NE              | √             | M,B                 |         |
| Clupeiformes Chirocentridae | Wolf Herring                      | Chirocentrus nudus     | LC              | Bernacsek 2001a | M                   |         |
| Clupeidae                   | Dorab Wolf-Herring                | Chirocentrus dorab     | NE              | √             | M,B                 |         |
| Dussumieridae              | Rainbow Sardine                   | Dussumieria acuta      | LC              | Bernacsek 2001a | M,F,B               |         |
| Clupeiformes               | Smooth Back Herring               | Raconda russeliana     | NE              | Bernacsek 2001a | M,B                 |         |
| Pristigasteridae           | Indian Pellona Herring            | Pellona ditchela       | LC              | Bernacsek 2001a | M,F,B               |         |
| Clupeiformes               | Indian Ilisha                     | ilisha melastoma       | LC              | Bernacsek 2001a | M,B                 |         |
| Clupeidae                   | Bigeye Herring                    | ilisha megaloptera     | LC              | Bernacsek 2001a | M,F,B               |         |
| Clupeiformes               | Coromandal Ilisha                 | ilisha filigera        | DD              | Huda & Haque 2003 | M,F,B               |         |
| Cypriniformes              | Long Finned Herring               | Opisthopoterus tardoore | NE              | √             | M,B                 |         |
| Cobitidae                  | Guntea Loach                      | Lepidocephalichthys guntea | LC          | √             | F,B                 |         |
| Cypriniformes              | Swamp Barb                        | Puntius chola          | LC              | √             | F                   |         |
| Cyprinidae                 | Barb                              | Puntius terio          | LC              | Bernacsek 2001a | F                   |         |
| Cypriniformes              | Gangetic Scissortail Rasbora      | Rasbora rasbora        | LC              | √             | F,B                 |         |
| Order/ Family               | English name                      | Scientific name             | Red List status | Present study | Previous literature | Habitat |
|----------------------------|-----------------------------------|----------------------------|-----------------|---------------|---------------------|---------|
| 71 Siluriformes             | Canine Catfish Eel                | Platostus canius           | NE              | ✓             |                     | M,F,B   |
| 72                         | Striped Eel Tail Catfish          | Platostus lineatus         | NE              | ✓             | Bernacsek 2001a     | M,B     |
| 73 Siluriformes             | Gagra                              | Clupisoma garua            | LC              | ✓             |                     | F,B     |
| 74                         | Gangetic Ailia                     | Ailia coila                | NT              | ✓             |                     | F,B     |
| 75                         | Silond Catfish, Silondia Vacha     | Silonia silondia           | LC              | ✓             |                     | F,B     |
| 76                         | Fatty Catfish                      | Pangasius pangeros         | LC              |               | Bernacsek 2001a     | F,B     |
| 77                         | Tengara Catfish                    | Mystus tengara             | LC              | ✓             |                     | F,B     |
| 78                         | Catfish                            | Mystus bleekeri            | LC              |               | Bernacsek 2001a     | F,B     |
| 79                         | Long-Whiskered Catfish             | Mystus gulo                | LC              |               |                     | F,B     |
| 80                         | Walking Catfish                    | Clarias batrachus          | LC              | ✓             |                     | F,B     |
| 81 Siluriformes             | Gangetic Goonch, Devil Catfish     | Bagarius bagarius          | LC              | ✓             |                     | F,B     |
| 82                         | Gagra Catfish                      | Arius gagora               | NT              | ✓             | M,F,B               |         |
| 83                         | Spotted Catfish, Sea Catfish       | Arius maculatus            | NE              | ✓             | M,F,B               |         |
| 84                         | Yellow Sea Catfish, Marine Catfish | Arius venosus              | NE              | ✓             | M,B                 |         |
| 85                         | Threadfin Sea Catfish              | Arius arius                | LC              | ✓             |                     | M,B     |
| 86                         | Blacktip Sea Catfish               | Plicofollis dussumieri     | LC              |               | Bernacsek 2001a     | M,F,B   |
| 87                         | Flatmouth Sea Catfish              | Plicofollis platystomus    | LC              |               | Bernacsek 2001a     | M,B     |
| 88                         | Dusky Catfish, Sona Sea Catfish    | Sciaedes sona              | NE              | ✓             | M,B                 |         |
| 89                         | Engraved Catfish                   | Nemapteryx nenga           | NE              | ✓             |                     | M,B     |
| 90                         | Engraved Catfish                   | Nemapteryx caelata         | NE              |               | Huda & Haque 2003   | M,B     |
| 91                         | Giant Sea Catfish                  | Netuma thalassina          | NE              |               | Bernacsek 2001a     | M,F,B   |
| 92                         | Bronze Catfish                     | Netuma bilineata           | NE              | ✓             |                     | M,F,B   |
| 93 Siluriformes             | Stinging catfish                   | Heteropneustes fossilis    | LC              | ✓             |                     | M,B     |
| 94                         | Bombay Duck                        | Harpador neheurus          | NE              | ✓             | M,B                 |         |
| 95                         | Greater Lizard Fish                | Saurida tubil              | LC              | ✓             |                     | M       |
| 96                         | Unicorn Cod                        | Bregrmaceras mcclellandi   | NE              | ✓             |                     | M,B     |
| 97                         | Lophiiformes                       | Shaggy Angler, Zebra Frogfish | Antennarius hispidus | NE | ✓ | M |
| 98 Beloniformes             | Banded Needle Fish, Square Tail Alligator Gar | Strongylura leiuara | NE | ✓ | M,B |
| 99                         | Spottail Needle Fish               | Strongylura strongylura    | NE              |               | Bernacsek 2001a     | M,B     |
| 100                        | Needle Fish                        | Tylosurus crocodilus       | NE              |               | Bernacsek 2001a     | M,B     |
| 101                        | Silver Needle Fish                 | Xenentodon cancila         | LC              | ✓             |                     | M,F,B   |
| 102 Beloniformes            | Congunuri Halfbeak                 | Hyperhamphus limbatus      | LC              |               | Bernacsek 2001a     | M,F,B   |
| 103                        | Georges Halfbeak, Longbilled Halfbeak | Rhyechorhamphus georphii  | NE              | ✓             |                     | M,F,B   |
| 104 Beloniformes            | Buffon's Halfbeak, Buffon's Garfish | Zenarchopterus buffonius  | NE              | ✓             |                     | M,B     |
| 105                        | Ectuntio Halfbeak                  | Zenarchopterus ectuntio    | NE              | ✓             |                     | F,B     |
| Order/ Family       | English name                                      | Scientific name              | Red List status | Present study | Previous literature | Habitat |
|---------------------|--------------------------------------------------|------------------------------|-----------------|---------------|---------------------|---------|
| 106 Beloniformes    | Tropical Two-Winged Flying Fish                  | Exocoetus volitans           | LC              | v             | M                   |
| 107 Syngnathiformes| Red Cornetfish, Flute-Mouth                      | Fistularia petimba           | LC              | v             | M,B                 |
| 108 Syngnathiformes| Sea Horse, Smooth Seahorse                       | Hippocampus kuda              | VU              |               | M                   |
| 109 Synbranchiformes| Cucha, Ganicet Mud Eel                           | Monopterus cuchia             | LC              | v             | F,B                 |
| 110 Synbranchiformes| Lesser Spiny Eel                                 | Macrognathus aculeatus       | NE              | v             | F,B                 |
| 111 Synbranchiformes| Striped Spiny Eel                                | Macrognathus pcanonical      | LC              | v             | F,B                 |
| 112 Scorpaeniformes| Plantail Turkeyfish, Russel’s Firefish           | Pterois russelli             | NE              | v             | M                   |
| 113 Scorpaeniformes| Miles Lion Fish                                  | Pterois miles                | NE              |               | Bernacsek 2001a     | M       |
| 114 Scorpaeniformes| Grey Stingfish                                    | Minous monodactylus          | NE              | v             | M                   |
| 115 Scorpaeniformes| Painted Stringer                                 | Minous pictus                | NE              | v             | M                   |
| 116 Scorpaeniformes| Rough Flathead                                    | Grammopilutes scaber         | NE              | v             | M,B                 |
| 117 Scorpaeniformes| Flathead                                         | Cociella punctata            | LC              | Bernacsek 2001a | M                   |
| 118 Scorpaeniformes| Spiny Flathead                                    | Kumacoccius rodericensis     | NE              | v             | M                   |
| 119 Scorpaeniformes| Spotted Flathead                                  | Cociella crocodilus          | NE              | Bernacsek 2001a | M,B                 |
| 120 Scorpaeniformes| Thorny Flathead                                   | Rogadius asper               | LC              | Bernacsek 2001a | M                   |
| 121 Scorpaeniformes| Flathead                                         | Rogadius pristiger           | LC              | Bernacsek 2001a | M                   |
| 122 Scorpaeniformes| Bartail Flathead                                  | Platycephalus indicus        | NE              | v             | M,B                 |
| 123 Perciformes     | Cloudy Grouper, Cloudy Rock Cod                  | Epinephelus erythrusus       | VU              | v             | M,B                 |
| 124 Perciformes     | Orangespotted Grouper                            | Epinephelus coioides         | NT              | v             | M,B                 |
| 125 Perciformes     | Blacktip Grouper                                 | Epinephelus fasciatus        | LC              | Bernacsek 2001a | M,B                 |
| 126 Perciformes     | Grouper                                          | Epinephelus taurus           | DD              | Bernacsek 2001a | M                   |
| 127 Perciformes     | Vermillion Grouper                               | Cephalopholis miniata        | LC              | Bernacsek 2001a | M                   |
| 128 Perciformes     | Gaint Grouper                                    | Epinephelus lanceolatus      | VU              | v             | M,B                 |
| 129 Perciformes     | Terapon Perch, Three-striped Tiger Fish           | Terapon jarbua               | LC              | v             | M,F,B               |
| 130 Perciformes     | Big Eye                                          | Terapon theraps              | LC              | v             | M,F,B               |
| 131 Perciformes     | Moontail Bulls Eye                               | Priaacanthus hamrur          | LC              | v             | M                   |
| 132 Perciformes     | Purple Spotted Big Eye                           | Priaacanthus tayenus         | LC              |               | M                   |
| 133 Perciformes     | Broad-banded Cardinalfish                        | Ostorhinus fasciatus         | NE              | v             | M                   |
| 134 Perciformes     | Three Striped Cardinalfish                       | Apagon septemstriatius       | NE              | v             | M                   |
| 135 Perciformes     | Gangetic Sillago                                 | Sillaginopsis panius         | NE              | v             | M,F,B               |
| 136 Perciformes     | Silver Sillago                                   | Sillago sihama               | LC              | v             | M,B                 |
| 137 Perciformes     | Asiatic Snakehead                                | Channa orientalis            | NE              | Bernacsek 2001a | F,B                 |
| 138 Perciformes     | Striped Snakehead                                | Channa striata               | NE              | Bernacsek 2001a | F,B                 |
| 139 Perciformes     | Spotted Snakehead                                | Channa punctata              | LC              | Bernacsek 2001a | F,B                 |
| 140 Perciformes     | Cobia, Black King Fish                           | Rachycentron canadum         | LC              | v             | M,B                 |
| 141 Perciformes     | Common Remora                                    | Remora remora                | LC              | v             | M                   |
| Order/ Family | English name | Scientific name | Red List status | Present study | Previous literature | Habitat |
|---------------|--------------|-----------------|----------------|---------------|---------------------|---------|
| Perciformes   | Razorbelly Scad | Alepes kleinii | LC v           |               | Bernacsek 2001a     | M       |
| Perciformes   | Shrimped Scad | Alepes djedaba  | LC v           |               | Bernacsek 2001a     | M       |
| Perciformes   | Black-Fin Scad | Alepes melanoptera | LC v         |               | Bernacsek 2001a     | M,B     |
| Perciformes   | Threadfin Trevally | Alectis indica | LC v           |               | Huda & Haque 2003   | M,B     |
| Perciformes   | Threadfin Trevally | Alectis ciliaris | LC v           |               | Bernacsek 2001a     | M       |
| Perciformes   | Black-Fin Jack | Atropus atropus | LC v           |               | Bernacsek 2001a     | M       |
| Perciformes   | Oxeye Scad | Selar boops   | LC v           |               | Bernacsek 2001a     | M       |
| Perciformes   | Eighteye Scad | Selar crumenophthalmus | NE v      |               | Bernacsek 2001a     | M       |
| Perciformes   | Longfin Trevally | Carangoides armatus | NE v         |               | Bernacsek 2001a     | M,B     |
| Perciformes   | Bigeye Trepvally | Caranx sexfasciatus | LC v         |               | M,B                 |
| Perciformes   | Bumpnose Trevally | Carangoides hedlandensis | NE v     |               | M,B                 |
| Perciformes   | Trevally | Carangoides malabaricus | LC v         |               | Bernacsek 2001a     | M       |
| Perciformes   | Giant Trevally, Giant Kingfish | Caranx ignobilis | LC v         |               | M,B                 |
| Perciformes   | Red Tailed Mackrel Scad | Desocopterus kuruoides | NT v       |               | M,B                 |
| Perciformes   | Torpedo Scad | Megalaspis cordyla | LC v         |               | M,B                 |
| Perciformes   | Black Promfet | Parastromateus niger | NE v       |               | M,B                 |
| Perciformes   | Double Spotted Queenfish | Scomberoides commersonnianus | LC v   |               | M,B                 |
| Perciformes   | Queen Fish | Scomberoides tolos | NE v        |               | M,B                 |
| Perciformes   | Black Banded Trevally | Serolino nigrofasciata | LC v       |               | M,B                 |
| Perciformes   | Longrakered Trevally | Uliula mentalis | LC v         |               | M,B                 |
| Perciformes   | Moon Fish | Mene maculata  | NE v           |               | M,B                 |
| Perciformes   | Orangefin Ponyfish | Photopectoralis bindus | NE v       |               | M,B                 |
| Perciformes   | Shortnose Ponyfish | Leiognathus brevirostris | NE v       |               | M,B                 |
| Perciformes   | Striped Ponyfish | Leiognathus fasciatus | LC v       |               | Bernacsek 2001a     | M,B     |
| Perciformes   | Common Ponyfish | Leiognathus equulus | NE v        |               | M,F,B               |
| Perciformes   | Deep Pugnose Pony Fish | Secutor ruconius | NE v        |               | Bernacsek 2001a     | M,F,B   |
| Perciformes   | Pugnose Pony Fish | Secutor insidiator | NE v        |               | M,B                 |
| Perciformes   | Tooth Pony | Gazza minuta  | NE v           |               | M,B                 |
| Perciformes   | False Trevally | Lectarius lactarius | NE v       |               | Bernacsek 2001a     | M,B     |
| Perciformes   | John’s Snapper, Red Snapper | Lutjanus johnii | LC v        |               | Bernacsek 2001a     | M,B     |
| Perciformes   | Malabar Red Snapper | Lutjanus malabaricus | NE v       |               | Huda & Haque 2003   | M,B     |
| Perciformes   | Pinjalo Snapper | Pinjalo pinjalo | LC v           |               | Bernacsek 2001a     | M       |
| Perciformes   | Blood Snapper | Lutjanus sanguineus | NE v        |               | Bernacsek 2001a     | M       |
| Perciformes   | Stargazer | Astroscopus guttatus | LC v        |               | Bernacsek 2001a     | M       |
| Perciformes   | Doll fus’ Stargazer | Uranosocopus guttatus | NE v      |               | Huda & Haque 2003   | M       |
| Perciformes   | Stargazer | Ichthyosocopus inermis | NE v      |               | Bernacsek 2001a     | M       |
| Perciformes   | Stargazer | Ichthyosocopus lebeck | NE v      |               | Bernacsek 2001a     | M       |
| Perciformes   | Four Barred Tigerfish | Datnioidea polota | NE v        | F,B           |                     |         |
| Order/ Family       | English name       | Scientific name                  | Red List status | Present study | Previous literature | Habitat |
|---------------------|-------------------|----------------------------------|-----------------|---------------|---------------------|---------|
| Perciformes         |                   |                                  |                 |               |                     |         |
| Gerreidae           |                   |                                  |                 |               |                     |         |
| 180                 | Remora             | Remora sp.                       | NE              | v             | M,B                 |         |
| 181                 | Whiptail Silverbiddy | Gerres filamentosus            | LC              | v             | M,F,B               |         |
| 182                 | Silverbiddy       | Gerres sp.                       | NE              | v             | M                  |         |
| 183                 | Blotch Grunt       | Pomadasys maculatus             | LC              | v             | M,B                 |         |
| Haemulidae          |                   |                                  |                 |               |                     |         |
| 184                 | Ong spine Seabream | Argyrops spinifer               | NE              | Bernacsek 2001a | M                  |         |
| 185                 | Yellow Seabream    | Acanthopagrus latus             | DD              | Bernacsek 2001a | M,F,B               |         |
| 186                 | River Bream        | Acanthopagrus berda             | LC              | v             | M,F,B               |         |
| Sparidae            |                   |                                  |                 |               |                     |         |
| 187                 | Double Whip Threadin Bream | Nemipterus nematophorus        | NE              | Bernacsek 2001a | M                  |         |
| Nemipteridae        |                   |                                  |                 |               |                     |         |
| 188                 | Pink Perch         | Nemipterus japonicus            | NE              | Bernacsek 2001a | M                  |         |
| Sciaenidae          |                   |                                  |                 |               |                     |         |
| 189                 | Goatee Croaker     | Dendrophysa russellii           | NE              | Bernacsek 2001a | M,F,B               |         |
| 190                 | Croaker            | Chrysocir aureus                | NE              | Bernacsek 2001a | M                  |         |
| 191                 | Blackmouth Croaker | Atrobuca nibe                  | NE              | Bernacsek 2001a | M                  |         |
| 192                 | Sharpnose Hammer Croaker | Johnius borneensis          | NE              | v             | M,F,B               |         |
| 193                 | Silver Croaker     | Pennahia argentina              | NE              | v             | M                  |         |
| 194                 | Large-Eye Croaker  | Johnius plagiotoma              | NE              | v             | M,F,B               |         |
| 195                 | Coitor, Crocker    | Johnius coitor                  | LC              | v             | M,F,B               |         |
| 196                 | Large Fined Croaker | Johnius macropterus            | NE              | v             | M,F,B               |         |
| Mullidae            |                   |                                  |                 |               |                     |         |
| 197                 | Black Croaker      | Johnius dussumieri              | NE              | Bernacsek 2001a | M                  |         |
| 198                 | Gangetic Bola, Croaker | Johnius gangeticus         | NE              | Bernacsek 2001a | M                  |         |
| 199                 | Kathala Croaker    | Kathala axillaris               | NE              | v             | F,B                 |         |
| 200                 | Cuja Croaker       | Macrospinosa cuja               | NE              | v             | M                  |         |
| Polynemidae         |                   |                                  |                 |               |                     |         |
| 201                 | Pama Croaker       | Otolithes parna                 | NE              | Bernacsek 2001a | M,F,B               |         |
| 202                 | Lesser Tiger Toothed Croaker | Otolithes cuvier         | NE              | Bernacsek 2001a | M                  |         |
| 203                 | Tiger Toothed Croaker | Otolithes ruber              | NE              | v             | M                  |         |
| 204                 | Pama Croaker       | Otolithoides pama               | NE              | v             | M,F,B               |         |
| 205                 | Bronze Croaker     | Otolithoides biouritus          | NE              | v             | M                   |         |
| 206                 | Panna Croaker      | Panna microdon                 | NE              | v             | M,F,B               |         |
| 207                 | Donkey Croaker     | Pennahia anea                  | NE              | v             | M                   |         |
| Polyenidae          |                   |                                  |                 |               |                     |         |
| 208                 | Spindle Croaker    | Pseudothilichthys elongatus     | LC              | Bernacsek 2001a | M                  |         |
| 209                 | Spotted Croaker    | Protonibea discaudus            | NE              | v             | M,F,B               |         |
| 210                 | Blotchted Tiger-Toothed Croaker | Pterotothilus maculatus    | LC              | v             | M,F,B               |         |
| Fourfinididae        |                   |                                  |                 |               |                     |         |
| 211                 | Fourfinger Threadfin | Eleutheronema tetradactylum     | NE              | v             | M,B                 |         |
| 212                 | Indian Threadfin   | Leptomelanosoma indicum         | NE              | v             | M,F,B               |         |
| 213                 | Blackspot Threadfin | Polydactylus sexfedius         | NE              | v             | M,F,B               |         |
| 214                 | Golden Threadfin   | Polydactylus sexfilis           | NE              | Bernacsek 2001a | M                   |         |
| 215                 | Paradise Threadfin | Polygnemus paradiseus          | NE              | v             | M,F,B               |         |
| Mullidae            |                   |                                  |                 |               |                     |         |
| 216                 | Red Sea Goatfish   | Parupeneus forsskalli           | NE              | v             | M,F,B               |         |
| 217                 | Goatfish           | Parupeneus heptacanthus         | LC              | Bernacsek 2001a | M,B                 |         |
| 218                 | Goldband Goatfish  | Upenesia malacensis             | LC              | v             | M                   |         |
| 219                 | Sulphur Goatfish   | Upenesia sulphureus             | LC              | v             | M,B                 |         |
| 220                 | Finstripe Goatfish | Upenesia tenuipinnus            | LC              | v             | M                   |         |
| Order/ Family    | English name              | Scientific name            | Red List status | Present study | Previous literature | Habitat |
|------------------|---------------------------|----------------------------|-----------------|---------------|---------------------|---------|
| Perciformes      |                           |                            |                 |               |                     |         |
| Toxotidae        | Largescale Archerfish     | Toxotes chatareus          | NE              | √             | M,B                 |         |
|                  | Banded Archerfish         | Toxotes jaculatrix         | LC              | √             | Bernacsek 2001a     | f,B     |
| Drepanidae       | Spotted Sickle Fish       | Drepane punctato           | NE              |               | Bernacsek 2001a     | f,B     |
|                  | Spadefish                 | Ephippus orbis             | NE              |               | Bernacsek 2001a     | M,F,B   |
|                  | Banded Drepane            | Drepane longimana          | NE              | √             | M,B                 |         |
| Perciformes      | Longarm Mullet            | Osteomugil cunnesius       | NE              | √             | M,B                 |         |
| Mugilidae        | Striped Mullet            | Mugil cephalus             | LC              | √             | M,F,B               |         |
|                  | Greenback Mullet          | Planiliza subviridis       | NE              | √             | M,F,B               |         |
|                  | Corsula Mullet            | Rhinomugil corsula         | LC              | √             | M,F,B               |         |
|                  | Mullet                    | Valamugil speigleri        | NE              |               | Bernacsek 2001a     | f,B     |
|                  | Yellowtail Mullet         | Sicamugil cascasia         | LC              | √             | M,F,B               |         |
|                  | Goldspot Mullet           | Liza parsia               | NE              |               | Bernacsek 2001a     | f         |
|                  | Tade Grey Mullet          | Chelon planiceps           | NE              |               | Bernacsek 2001a     | M,F,B   |
|                  | Goldspot Mullet           | Chelon parsia             | NE              | √             | M,F,B               |         |
|                  | Stargazer                 | Uranoscopus guttatus       | NE              |               | Huda & Haque 2003   | M,F,B   |
| Uranoscopidae    | Stargazer                 | Ichthyscopus lebeck        | NE              |               | Huda & Haque 2003   | M         |
|                  | Two Spined Yellowtail Stargazer | Uranoscopus cognatus | NE              | √             | M         |
| Eleotridae       | Duckbill Sleeper          | Butis butis               | LC              | √             | M         |
|                  | Black Spot Sleeper Goby   | Butis humeralis           | NE              | √             | M,F,B               |         |
|                  | Sleeper Goby              | Butis melanostigma        | NE              |               | Huda & Haque 2003   | M,F,B   |
|                  | Dusky Sleeper             | Eleotris fusca            | LC              | √             | M,F,B               |         |
| Gobiidae         | Mudskipper                | Boleophthalmus baddarti   | LC              | √             | M,F,B               |         |
|                  | Tank Goby                 | Glassogobius giuris        | NE              | √             | M,F,B               |         |
|                  | Goby                      | Apocryptes bato           | NE              |               | Bernacsek 2001a     | M,B     |
|                  | Bearded Worm Goby         | Taenioides cirratus       | DD              |               | Rahman 1989         | M,F,B   |
|                  | Bumblebee Goby            | Brachygobius nunus        | NE              |               | Bernacsek 2001a     | M,F,B   |
|                  | Goby                      | Zappa confuentus          | NE              |               | Bernacsek 2001a     | f,B     |
|                  | Goby                      | Pogonogobioid planiformes | NE              |               | Huda & Haque 2003   | M,F,B   |
|                  | Mudskipper                | Periophthalmodon schlosseri | NE             |               | Bernacsek 2001a     | M,B     |
| Callionymidae    | Mudskipper                | Periophthalimus barbatus   | LC              |               | Bernacsek 2001a     | M,F,B   |
|                  | Rubicundus Eelgoby        | Odontamblyopus rubicundus | NE              | √             | M,F,B               |         |
|                  | Pointed-Tailed Goby       | Pseudapocryptes elongatus | LC              | √             | M,F,B               |         |
|                  | Walking Goby              | Scartelaos histophoratus  | NE              | √             | f,B                 |         |
|                  | Knight Goby               | Stigmatogobioid sadanandio | NE             | √             | M,B                 |         |
|                  | Eel Goby                  | Taenioides buchonani       | NE              |               | Bernacsek 2001a     | f,B     |
|                  | Burrowing Goby            | Trypauchen vagina          | NE              | √             | M,B                 |         |
| Ephippidae       | Arrow Dragonet            | Callionymus sagitta       | NE              | √             | M,B                 |         |
|                  | Spadefish                 | Ephippus orbis            | NE              | √             | M         |
| Order/Family                  | English name                           | Scientific name       | Red List status | Present study | Previous literature | Habitat |
|------------------------------|----------------------------------------|-----------------------|-----------------|---------------|---------------------|---------|
| Perciformes Ambassidae       | Elongate Glassy Perchlet Chanda nama   | LC                    | v               |               |                     | M       |
| Perciformes Ambassidae       | Himalayan Glassy Perchlet Parambassis baculis | LC                   |                 | Bernacsek 2001a | f,B                 |         |
| Perciformes Ambassidae       | Glassy Fish Parambassis ranga          | LC                    | v               |               |                     | F       |
| Perciformes Scatophagidae    | Spotted Scat, Spotted Butterfish Scatophagus argus | LC                   | v               | Bernacsek 2001a | f,B                 |         |
| Perciformes Siganiidae       | Streaked Rabbitfish Siganus javus      | LC                    |                 |              | Huda & Haque 2003   | M,B     |
| Perciformes Siganiidae       | White-Spotted Spinefoot Siganus canaliculatus | LC                   | v               |               |                     | M,B     |
| Perciformes Scombridae       | Bigeye Barracuda Sphyraena forsteri    | NE                    | v               |               |                     | M,B     |
| Perciformes Scombridae       | Barracuda Sphyraena barracuda          | LC                    |                 | Bernacsek 2001a | M                   |         |
| Perciformes Scombridae       | Yellowstripe Barracuda Sphyraena chrysotaenia | NE                   | v               |               |                     | M       |
| Perciformes Scombridae       | Banded Or Indian Barracuda Sphyraena jello | NE                   | v               |               |                     | M,B     |
| Perciformes Trichiuridae     | Smallhead Ribbon Fish Eupleurogrammus muticus | NE                   | v               |               |                     | M,B     |
| Perciformes Trichiuridae     | Large Head Ribbon Fish Trichiusus lepturus | NE                   |                 | Bernacsek 2001a | M,B                 |         |
| Perciformes Trichiuridae     | Savalani Ribbon Fish Leptura canthus savala | NE                   | v               |               |                     | M,B     |
| Perciformes Lethiniidae      | Mackerel Tuna Euthynus affinis         | LC                    | v               | M,B           |                     |         |
| Perciformes Lethiniidae      | Island Mackerel Rastrelliger faughi    | DD                    | v               | M             |                     |         |
| Perciformes Lethiniidae      | Indian Mackerel Rastrelliger kanagurta | LC                    | v               | M             |                     |         |
| Perciformes Lethiniidae      | Indian Mackerel Rastrelliger brachysoma | DD                   |                 | Bernacsek 2001a | M                   |         |
| Perciformes Lethiniidae      | Striped Bonito Sarda orientalis        | LC                    |                 | Bernacsek 2001a | M,B                 |         |
| Perciformes Lethiniidae      | Buulet Tuna Auxis rochei               | NE                    |                 | Huda & Haque 2003 | M                   |         |
| Perciformes Lethiniidae      | Seer Fish Scamboromorus lineolatus     | LC                    |                 | Bernacsek 2001a | M,B                 |         |
| Perciformes Lethiniidae      | Barred Mackerel Scamboromorus commerson | NT                   | v               | M             |                     |         |
| Perciformes Lethiniidae      | Indo-Pacific King Mackerel Scamboromorus guttatus | DD | v | M | | |
| Perciformes Lethiniidae      | Silver Pomfret Pampus argenteus        | NE                    | v               | M             |                     | M,B     |
| Perciformes Lethiniidae      | Chinese Pomfret Pampus chinensis       | NE                    | v               |               |                     | M       |
| Perciformes Lethiniidae      | Ornate Emperor Lethinus ornatus        | LC                    |                 | Bernacsek 2001a | M,B                 |         |
| Perciformes Lobotidae        | Tripletail Lobotes surinamensis        | LC                    |                 | Bernacsek 2001a | M                   |         |
| Perciformes Kurtidae         | Indian Lamphead Kurtus indicus         | NE                    |                 | Bernacsek 2001a | M,B                 |         |
| Perciformes Latidae          | Barramundi Lates calcarifer            | NE                    | v               | M,F,B         |                     |         |
| Perciformes Anabantidae      | Climbing perch Anabas testudineus      | DD                    | v               | F,B           |                     |         |
| Perciformes Soleidae         | Javanese Flounder Pseudohambus javanicus | NE                   | v               | M,F,B         |                     |         |
| Perciformes Soleidae         | Commerson’s Sole Synaptura commersonii | NE                    | v               | M             |                     | M       |
| Perciformes Soleidae         | Zebra Sole Zebras alpintiis            | NE                    |                 | Bernacsek 2001a | M,B                 |         |
| Perciformes Soleidae         | Oriental Sole Brachirus orientalis     | NE                    | v               | M,F,B         |                     |         |
| Perciformes Soleidae         | Sole Brachirus pan                     | LC                    |                 | Bernacsek 2001a | M,B                 |         |
| Perciformes Soleidae         | Malayflounder Pseudohambus malayanus   | NE                    |                 | Bernacsek 2001a | M,B                 |         |
| Perciformes Soleidae         | Large Tooth Flounder Pseudohambus arsii | NE                   |                 | Bernacsek 2001a | M                   |         |
| Perciformes Soleidae         | Deep Flounder Pseudohambus elevatus    | NE                    |                 | Bernacsek 2001a | M,B                 |         |
### Head flat above. Caudal fin slightly emarginated. Lateral line absent. Scales ctenoid.

**DISCUSSION**

In Bangladesh, Acharya & Kamal (1994) first made a list of fishes from a portion of the Sundarbans where 53 species of pelagic and 124 species of demersal fishes were included. Afterward, another list of finfishes has been compiled by Bernacsek & Haque (2001) where the fishes were basically gathered from the baseline study of Chantarasri (1994) under a project of Food and Agriculture Organization (FAO) and this study contained a list of 196 species reported from the Sundarbans of Bangladesh. This baseline survey on the fishes of the Sundarbans reproduced many subsequent reports on fish biodiversity in the 1980s. After that no significant study on fish diversity has been conducted on the Sundarbans region of Bangladesh. Further, no conservation status was assessed by IUCN locally in Bangladesh for Sundarbans'
marine and brackish water fishes. In the present study, we have categorized all of the compiled fishes according to the Global IUCN status, which is given in the Table 1.

About 54.35% species of enlisted fishes belongs to the category of “Not Evaluated” and only 4.04% of fishes are in “Data Deficient” (Figure 3). Around 33.23% of species are categorized as “Least concern”, some of which are exploited for commercial purposes such as *Elops machnata* Forsskal, 1775; *Gudusia chapra* Hamilton, 1822; *Coilia* sp., *Thryssa* sp., *Ilisha* sp., *Arius arius* Hamilton, 1822; *Sillago sihama* Forsskal, 1775; *Alepes* sp. Among the fishes of the Sundarbans of Bangladesh enlisted in the present study 4.04% (13 species) of the species are “Near Threatened” and 10 species (3.11%) species are “Vulnerable” viz. *Rynchobatus djiddensis* Forsskal, 1775, *Glaucostegus granulatus* Cuvier, 1829, *Himantura undulata* Bleecker, 1852, *Himantura uarnak* Gmelin, 1789, *Pateobatis uarnacoideis* Bleecker, 1852, *Maculobatis gerrardi* Gray, 1851, *Hippocampus kuda* Bleecker, 1852, *Epinephelus erythrus* Valenciennes, 1828, *Epinephelus lanceolatus* Bloch, 1790 and *Carinotetraodon travancorius* Hora & K.K. Nair, 1941. Four (1.24%) species viz. *Glyphis gilphis* Müller & Henle, 1839, *Sphyra lewini* Griffith & Smith, 1834, *Eusphyra blochii* Cuvier, 1816, and *Anoxyzpristis cuspidata* Latham, 1794 are listed as “Endangered” based on the global Red List status. Based on our observations, *Himantura uarnak*, *Glyphis gilphis*, *Sphyra lewini* and *Eusphyra blochii* that are frequently found in the Sundarbans though the Red List mentions these as threatened globally.

Most of the shark, skates, and rays (Elasmobranchs) are usually over-exploited for their fins and skins. Dried fins are used for the shark fin trade and other parts of the shark body are used for other purposes. Sharks are sold through an open bidding system. Before selling, the fishes are graded species-wise and sometimes lengthwise. We recorded a good number of *Chiloscyllium griseum* Muller & Henle, 1838 of the order Orectolobiformes which was previously overlooked in the Elasmobranchs checklist of the Sundarbans. A total of 10 species of rays under the order Myliobatiformes are enlisted here, among them *Brevitrygon imbricata* Bloch & Schneider, 1801 and *Telatrygon zugei* Müller & Henle, 1841 are new reports from the Sundarbans area of Bangladesh.

Eels are usually a less studied group in Bangladesh. *Anguilla bengalensis* Gray, 1831 which is locally named as Bamosh, is a known commercially valuable species. In this present checklist, we list 10 species of the order Anguilliformes. Among them *Gymnothorax punctatus* Bloch & Schneider, 1801, *Gymnothorax tile* Hamilton, 1822, and *Moringua raitaborua* Hamilton, 1822 are newly reported from the Sundarbans area.

Recent taxonomic studies of the family Leiognathidae (Pony fishes) suggest several changes; however, a total of seven species have been recorded in this family from the Sundarbans. Among them we found four species where *Leiognathus brevirostris* Valenciennes, 1835 was newly recorded in the Sundarbans. Pony fishes are small fishes and commercially not valuable. Those species are usually exploited for dried fish.

Puffer fishes belong to the family Tetraodontidae. A total of 13 species of puffer fish has been listed in this checklist from previous literature and the present study whereas Shamsuzzaman et al. (2015) recorded nine marine puffer fish species from Cox’s Bazar located on the eastern coast. Among 13 species of puffer fish reported in the Sundarbans until now, we documented four new records of which three species, viz., *Triacanthus biaculeatus* Bloch, 1786; *Diodon hystrix* Linnaeus, 1758, and *Ostracion cubicus* Linnaeus, 1758 are locally new and the species *Loganephalus guentheri* Miranda Ribeiro, 1915 is the first record in the country. This study also added a new described species, *Chelonodontops bengalensis* Habib et al., 2018 from the same family.

The Sundarbans is where mainland Bangladesh meets the Bay of Bengal, making the area a globally unique ecological niche. In the Indian part, 34 elasmobranchs under 10 families and 271 bony fishes belonging to 61 families are known from the Sundarbans (Pal et al. 2014). In the present checklist, 36% species have been found as the habitants of both marine and brackish water followed by 26% as exclusively marine, 25% as marine, freshwater & brackish, 11% freshwater and brackish, and 2% exclusively as freshwater fish (Figure 4).

Among the bony fishes a few rare species of fishes are also reported from the Sundarbans of Bangladesh in this updated check list, viz., *Rhizoprionodon acutus*, *Himantura uarnak*, *Gymnura poecilura*, *Epinephelus coioides* Linnaeus, 1758, *Müller & Henle*, 1841, *Bregmaceros mcclellandii* Thompson, 1840, *Ostracion cubicus* Linnaeus, 1758, *Allenbatrachus grunniens* Linnaeus, 1758, and *Chelonodontops bengalensis* (Image 2). After the previous report by Hussain (1969), we report *Antennarius hispidus* from the Bay of Bengal coast of Bangladesh.

To the best of our knowledge, no recent scientific work has been performed to assess diversity and breeding status of fish exclusively for three protected wildlife sanctuaries in the Sundarbans. In this present study, we have tried to cover the sanctuaries to assess its existing species composition of fishes; however, detailed and year-round study is necessary. One of the major limitations in a year-round
survey is the lack of a vessel suitable to go downstream of rivers and canals during the monsoon season due to the strong current of the heavy downwards water flow.

Kobadak, Kholpetua, Rupsa, Shibsa, Pashur, Baleshwar, Raimangal, Arpangasia, Sakbaria are the main rivers passing through the Sundarbans which constitute about 2,000km² of waterways (Khan 2011), in addition to numerous small rivers, canals and creeks. The Sundarbans in Bangladesh has been divided into northeastern freshwater, middle to southern moderately saline and western saline zones (Chaffey et al. 1985). Therefore, it has brackish water as well as fresh water fish available in the labyrinth of water bodies. The government made some regulations and passed acts to protect and maintain sustainable production of fish in the Sundarbans area which are executed and enforced by the Bangladesh Forest Department (BFD). For example, 18 ‘khals’ (canals) in the buffer zone of the Sundarbans have been permanently closed for fishing to ensure natural breeding of fish under Khal Closure Regulation (1989). Further, canals of less than 25 feet width have been banned for fishing throughout the Sundarbans. Entire fish of these small canals can be caught easily using poison and trapping fish setting net from two ends. Fishing is prohibited in three wildlife sanctuaries of Sundarbans by Wildlife Sanctuary Regulations (1999). Close Season Regulation (2000) banned catching of three finfish species, viz., Pangasius pangasius, Plotosus canius, Lates calcarifer, from 1 May to 30 June every year inside the Sundarbans to ensure natural breeding. BFD also implements the banning of Hilsa fishing each year imposed by Bangladesh Government’s Department of Fisheries during peak breeding season during a certain time of the month between September and October every year (e.g., 9–30 October in 2019).

Fishers of the Sundarbans use different kinds of harmful nets and gear for catching fish which cause damage to aquatic lives, such as monofilament gill nets (called current Jal) are responsible for the killing of different aquatic animals and small sized fishes. Fine-meshed set bag nets (locally called Behundi Jal), pull and push nets (Thela Jal), fine-mesh mosquito nets (Chingri Pona Jal), long shore nets (Khuti Jal) have been identified as the most destructive among all the fishing gears in the Sundarbans. Catch mortality is very high for these nets. Set bag nets used for collecting shrimp fry in the estuary and rivers of the Sundarbans also catch eggs, spawn, and larvae of all species along with adult fish. It is highly detrimental for declining fish diversity. Local fishers also use pull nets to catch post larvae (PL) of shrimps which also hampers fishery growth. In such cases they dispose unwanted larvae onto land rather than being freed into water, resulting in wastage. Thus, these larvae do not get the opportunity to mature into fish. It has been observed that about 99 fin fish and fry of other shrimp species are discarded for collecting a single shrimp post larva (Rashid 2000; Azad et al. 2017). Considering such a detrimental effect, the Government of Bangladesh declared a regulation in 2000 where it was stated that “no person shall catch or cause to be caught fry or post larvae of fish, shrimp and prawns of any kind in any form and in any way in the estuary and coastal waters of Bangladesh” (MoFL 2000). Unfortunately, thousands of people still catch post larvae of fish, shrimps and prawns and market their catch.

Poison fishing is another ecosystem threatening practice of the locals. It is very alarming that some fishermen are illegally using lethal poison to catch fish including crabs and shrimps in the Sundarbans canals. They release poison into the water and collect the dying fish. The poison is so deadly that a few drops of it are sufficient to kill a large amount of fish. It also contaminates the water, planktons, and mangrove tree roots. As toxic water flows into the large rivers from canals, it is not only the fish species that are being destroyed, but the entire
Image 2. Pictures of some rare species recorded during the present study: A— *Rhizoprionodon acutus* Ruppell, 1837 | B— *Himantura uarnak* Gmelin, 1789 | C— *Gymnura poecilura* Shaw, 1804 | D. *Epinephelus coioides* Hamilton, 1822 | E— *Glaucostegus granulatus* Cuvier, 1829 | F— *Antennarius hispidus* Bloch & Schneider, 1801 | G— *Bregmaceros mcclellandi* Thompson, 1840 | H— *Ostracion cubicus* Linnaeus, 1758 | I— *Allenbatrachus grunniens* Linnaeus, 1758 | J— *Chelonodontops bengalensis* Habib, Neogi, Oh, Lee & Kim, 2018.
aquatic ecosystem is also under threat. Such dangerous practices cause a great risk to the flora and fauna of the Sundarbans and may create long-term negative effects on its ecology. This illegal practice needs a close watch to stop it. Increased and regular patrolling inside the forests and, motivation and engaging fishers against this is under way to stop this practice.

Mangrove forest is the breeding and nursery ground of many fish species. In a prohibitive order, the BFD had banned fishing in all of the canals (around 450) in the Sundarbans for the two months of July and August in 2019 for ensuring safe breeding and for conservation. It has been also observed that the intensity of poison fishing is higher in these two months; however, more studies need to be carried out to accurately identify the canals and creeks where breeding of fish occurs and which fish breed especially in the downstream with their specific breeding seasons. Netting of fish was also banned in the beels (e.g., Andaria beel) and chatals of the Sundarbans from February to March in 2019 for smooth breeding as proposed in IRMP (2010). The beels and chatals are lake-like wetlands with static water but chatals are relatively smaller. Further, a chatal gets totally dried out in the late winter but a beel does not. Some chatals are located between Chandpai and Sharankhola range of the Sundarbans. Both of the wetlands are reservoirs of freshwater. Both waterbodies are the source of many small indigenous freshwater fish species such as Anabas testudineus, Clarias batrachus, Heteropneustes fossilis, Channa sp. etc. The actions taken by the Government of Bangladesh to protect the availability and diversity of fish in Sundarbans have been shown in Table 2. This table has been prepared based on UNESCO (2016) along with different acts and regulations made by Bangladesh Government. Besides, to prevent over fishing, the number of boat license certificates (BLC) provided by BFD to allow fishermen for catching fish inside Sundarbans were limited. The maximum number of annual BLC issuance has been 12,000. The first priority in issuing BLC is given to those boat owners who live within 5km area around the Sundarbans. The maximum limit of permits for a month is given for three times and 5–7 days fishing is allowed under one permit (UNESCO 2016).

This article is primarily aimed to compile the information generated by authors and previous workers on the occurrence of total fish species from the past to the present in the core and adjacent marine areas of the Sundarbans, Bangladesh. This checklist should be considered as a working document and several additions of records of fish species for Sundarbans are added with survey work, particularly in the unique aquatic ecosystem.

| Measures taken                                                                 | Implementation periods (month) |
|--------------------------------------------------------------------------------|--------------------------------|
| Fishing ban in waterbodies of wildlife sanctuaries.                           | J  | F  | M  | A  | M  | J  | J  | A  | S  | O  | N  | D  |
| Fishing ban in specific 18 declared canals in the buffer zone.               |    |    |    |    |    |    |    |    |    |    |    |    |
| Fishing ban canals less than 25 feet wide throughout the Sundarbans.         |    |    |    |    |    |    |    |    |    |    |    |    |
| Fishing ban in all canals                                                    |    |    |    |    |    |    |    |    |    |    |    |    |
| Fishing ban in beels and chatals                                             |    |    |    |    |    |    |    |    |    |    |    |    |
| Complete ban of using monofilament gill net (current jal), set bag net (behundi jal), push net (thela jal), channel stake net (khalpata jal) |    |    |    |    |    |    |    |    |    |    |    |    |
| No fishing by poison, insecticide and de-watering                            |    |    |    |    |    |    |    |    |    |    |    |    |
| No fishing by the net with mesh size more than 01 inch or 15 mm (knot to knot at stretch condition). |    |    |    |    |    |    |    |    |    |    |    |    |
| Fishing ban three fish species viz. Pangas (Pangasius pangasius), Sea bass (Lates calcarifer) and Kain magur (Plocoosus cunius) |    |    |    |    |    |    |    |    |    |    |    |    |
| Ban on Hilsa (Tenualosa ilsha) fishing for 22 days (a total of 4 days before and 17 days after the full moon in October i.e. the month of Ashwin in Bangla calendar) |    |    |    |    |    |    |    |    |    |    |    |    |
| Catching of Hilsa (Tenualosa ilsha) and Pangus (Pangasius pangasius) below 23 cm |    |    |    |    |    |    |    |    |    |    |    |    |
| Boal (Wallago attu) lower than 12 inch.                                       |    |    |    |    |    |    |    |    |    |    |    |    |
| Ban on fishing of the species Shilon (Silonia silondia), Vola (Johnius argentatus) and Air (Bagarius bagarius) lower than 12 inch. |    |    |    |    |    |    |    |    |    |    |    |    |
| Ban on fingerling and fish fry collection                                      |    |    |    |    |    |    |    |    |    |    |    |    |
More studies should be conducted on the Sundarbans fishes to know the total scenario of this unique ecological niche. Based on the study further management measures can be taken with the forest department to protect fisheries. Lastly, awareness campaigns need to be carried out on a larger scale for fish conservation.

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