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Status and current worries of fish diversity in the Payra river, Patuakhali, Bangladesh

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Abstract
The study was conducted for a period of one year from April 2013 to March 2014 in the Payra River, Patuakhali, Bangladesh. A total of 114 fish species under 12 orders and 36 families were recorded in the River. On the basis of availability, the recorded species were categorized into four statuses and obtained as available (43.86%), less available (29.82%), rare (18.42%) and very rare (7.89%). Result of the study identified nine species as very rare which may extinct near future resulting declination of the fish diversity. Overfishing, indiscriminate fishing of larvae and juveniles, siltation and pollution were identified as the major worries linked with the declination of fish diversity. Study suggested that the activities which have harmful impact on fisheries resources need to be decreased and should be restricted to save our valuable fish diversity in the Payra River.

Keywords: Coastal Rivers; Fish diversity; Conservation; Rules and regulations.

1. Introduction
Coastal rivers are valuable natural ecosystem of Bangladesh [1] specially Payra river which provides natural spawning grounds and nursery grounds for many commercially important species of aquatic biota specially Hilsa (*Tenualosa ilisha*) and a significant portion of the country's fisheries production is dependent on this coastal river. Fish composition in this river is very much dynamic both in temporal and spatial scale. But the fisheries and problems of this river are still unmanaged and unmonitored. Some scientific investigation have been made to asses fish diversity in different areas of Bangladesh namely: Mohsin and Haque [2] in the Mahananda river, Chakraborti and Mirza [3] in the Someswari river, Miah *et al*., [4] in the Shitalakshya river, Chowdhury *et al*., [5] in the Naaf river, Flowra *et al*., [6] in the Baral river, Rahman *et al*., [7] in the Padma distributary of the Ganges river, Hossain *et al*., [8] in the Meghna river, Hossain *et al*., [9] in the Jamuna river, Mondal *et al*., [10] in the Meghna river, Galib *et al*., [11] in the Choto jamuna river, Nabi *et al*., [12] in the Bakkhali river. But no scientific study has yet been conducted on biodiversity and fisheries in the Payra river whether to justify biodiversity and existing fisheries resource use patterns with potential impacts. This is due to its geographical remoteness, distance from the main centers of fish research institute in the country, and mainly in function of difficulties to sample and hard to reach several places. For conservation and maintenance of the fisheries resources, scientific management based studies on biodiversity and fisheries are the most important issues. Considering all the current issues, the study has been undertaken to present new data regarding to the clear understanding about the present status and current worries of fish diversity in the Payra river.

2. Materials and Methods
The present study was carried out in the Payra river of Patuakhali district. The river originated from the Tetulia river via the Karkhana river and finally falls into the Bay of Bengal by the name of Burishwar river. Its center lies at a latitude of 22º35' and longitude of 90º26' and it has an elevation of 1 meter above sea level. Payra river is also known as the Rajganj river. The total length of the river is approximately 45 kilometer and width is 1-1.5 kilometer. The study was conducted for a period of 1 year from April 2013 to March 2014.

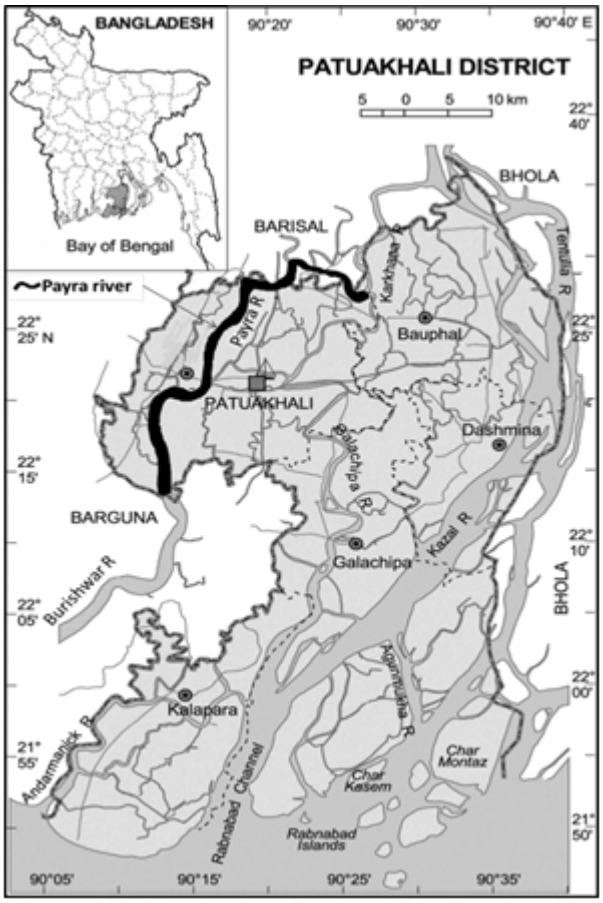

Fig 1: The Payra River

Freshly caught unsorted samples of different gears were collected monthly during daytime. All samples were preserved with crushed ice in fish box and brought to the laboratory as soon as possible. In the laboratory, ice preserved samples were washed with running tap water for removing dirt and then adhered water on the fish skin was absorbed by the tissue paper. For complete drying, fishes were finally placed in the room temperature for half an hour. Fish samples were sorted out and identified up to the species level based on morphometric and meristic characteristics according to Talwar and Jhingran [13] and Rahman [14]. The species were categorized into 4 groups on the basis of catch records as follows- Available (A): species observed widely available throughout the year; Less Available (LA): species observed infrequently available; Rare (R): species observed periodically available; and Very Rare (VR): species observed fortuitously available. Necessary data and information regarding to fish diversity were collected from fishers, experienced person related to fisheries sectors and available literatures.

3. Result and Discussion

A total of 114 fish species of 12 orders and 36 families were recorded in the Payra river (Table 1). The order basis percentage analysis of the fish species showed the highest occurrence belongs to the order Perciformes (27.19%), which is followed by Siluriformes (24.56%), Cypriniformes (22.81%), Clupeiformes (4.39%), Synbranchiformes (4.39%), Beloniformes (3.51%), Mugiliformes (3.51%) and Pleuronectiformes (3.51%). Three orders *viz*., Anguilliformes, Osteoglossiformes and Tetraodontiformes were found in the same percentage (1.75%) of the total number species. On the other hand, Cyprinodontiformes was the least numerous order constituting only 0.88% of the total species (Figure 2).

The status of fishes in the coastal river (Payra river) is very much appreciable than the other studied rivers in the different parts of Bangladesh, viz., Mohsin and Haque [2] reported 56 fish species in the Mahananda river, Chakraborti and Mirza [3] reported 66 fish species in the Someswari river, Miah *et al*., [4] reported 20 fish species during pre-monsoon period in the Shitalakshya river, Chowdhury *et al*., [5] reported 98 fish species in the Naaf river, Rahman *et al*., [7] reported 80 species of fish in the Padma distributary of the Ganges river, Hossain *et al*., [8] reported 53 species of fish in the Meghna river, Galib *et al*., [11] reported 63 species of fish in the Choto jamuna river, Nabi *et al*., [12] reported 35 species of fish in the Bakkhali river. In comparison with the mentioned river in Bangladesh, the Payra river (114 fish species) is very rich in fish diversity.

The present finding represent the rich status of fishes of the Payra river, however, this is almost representing the declining trends of riverine fishes of Bangladesh. Among the total species found during the present study, 50 species were available (43.86%), 34 species were less available (29.82%), 21 species were rare (18.42%) and 9 species were very rare (7.89%) (Figure 3). According to the local people and fishermen's opinion, very rare species as Along (*Megarasbora elanga*), Kalibaus (*Labeo calbasu*), Shorpunti (*Puntius sarana*), Gozar (*Channa marulius*), Pangas (*Pangasius pangasius*), Muribacha (*Clupisoma garua*), Baghair (*Bagarius bagarius*), Gang tengra (*Gagata cenia*) and Baim (*Mastacembelus armatus*) were available for at least 15-20 years ago. But now these species are facing an extremely high risk of extinction day by day. They also mentioned that this negative trend is due to overfishing, indiscriminate fishing of larvae and juveniles, siltation and pollution. The findings clearly represent the declining trends of fish diversity in the study area which warning the gradual declination of fish diversity of Bangladesh.

During the study period man made activities were found as dominant decline causes of fish species in the Payra river. Indiscriminate fishing by using different nonselective fishing gears mainly *badha jal* and *behundi jal* was observed as major threat for the diversity of fishes. It was also observed that a number of drains have fallen into the river from both the banks. As a result various chemical wastages from agro-industrial sources fall through the drainage and polluted the water quality consequently destroying the spawning and nursing grounds of many commercially important fish species of the Payra river. The construction of diversion canal and sluice gates causes heavy siltation in the river bed. Due to siltation, two big islands are developed in the river; one in the joining point of Karkhana river and Payra river and another in the middle portion of the river near Pangasia union. This siltation problem greatly influences the water flow consequently affecting the entire ecosystem of the river.

Stoddard *et al.,* [15] observed similar decline causes of fish diversity of inland water bodies of Bangladesh and recommended to solve them as conservation measures. According to the red list of IUCN-Bangladesh [16], a total of 54 species are threatened in the country of which 14 species are vulnerable, 28 species are endangered and 12 species are critically endangered. Among the threatened species, 26 species were found as rare and very rare species in the Payra river (Table 1) which may extinct in the near future due lack of proper conservation measures.

Table 1: Fish diversity in the Payra river, Patuakhali, Bangladesh

Family	Local name	Common name	Scientific name	Status
Anguilliformes (2 species)				
Anguillidae	Banehara	Indian mottled eel	*Anguilla bengalensis*	R
Moringuidae	Rata boura	Purple spaghetti eel	*Moringua raitaborua*	LA
Beloniformes (4 species)				
Adrianichthyidae	Bechi	Spotted ricefish	*Oryzias carnaticus*	LA
Adrianichthyidae	Bechi	Ricefish	*Oryzias dancena*	LA
Belonidae	Kakila	Freshwater garfish	*Xenentodon cancila*	A
Hemiramphidae	Ek thota	Wrestling halfbeak	*Dermogenys pusilla*	R
Clupeiformes (5 species)				
Engraulidae	Phasa	Gangetic hairfin anchovy	*Setipinna phasa*	A
Clupeidae	Chapila	Indian river shad	*Gudusia chapra*	A
Clupeidae	Kachki	Ganges river sprat	*Corica soborna*	A
Clupeidae	Ilish	Hilsa shad	*Tenualosa ilisha*	A
Clupeidae	Chandan ilish	Toli shad	*Tenualosa toli*	A
Cypriniformes (26 species)				
Cobitidae	Gutum	Guntea loach	*Lepidocephalichthys guntea*	A
Cyprinidae	Along	Bengala barb	*Megarasbora elanga*	VR
Cyprinidae	Bata	Bata	*Labeo bata*	R
Cyprinidae	Chebli	Giant danio	*Devario aequipinnatus*	LA
Cyprinidae	Darkina	Flying barb	*Esomus danricus*	R
Cyprinidae	Darkina	Striped flying barb	*Esomus lineatus*	LA
Cyprinidae	Darkina	Gangetic scissortail rasbora	*Rasbora rasbora*	A
Cyprinidae	Dhela	Cotio	*Osteobrama cotio*	R
Cyprinidae	Katol	Catla	*Catla catla*	LA
Cyprinidae	Mrigal	Mrigal carp	*Cirrhinus cirrhosus*	LA
Cyprinidae	Rui	Roho labeo	*Labeo rohita*	A
Cyprinidae	Kalibaus	Orangefin labeo	*Labeo calbasu*	VR
Cyprinidae	Mola	Indian carplet	*Amblypharyngodon microlepis*	A
Cyprinidae	Chep chela	Silver hatchet barb	*Chela cachius*	A
Cyprinidae	Chep chela	Indian glass barb	*Laubuca laubuca*	R
Cyprinidae	Mola	Mola carplet	*Amblypharyngodon mola*	A
Cyprinidae	Punti	Swamp barb	*Puntius chola*	A
Cyprinidae	Kanchan punti	Rosy barb	*Puntius conchonius*	A
Cyprinidae	Punti	Puntio barb	*Puntius puntio*	LA
Cyprinidae	Shorpunti	Olive barb	*Puntius sarana*	VR
Cyprinidae	Bhadi punti	Pool barb	*Puntius sophore*	A
Cyprinidae	Tit punti	Ticto barb	*Puntius ticto*	R
Cyprinidae	Chela	Silver razorbelly minnow	*Salmophasia acinaces*	A
Cyprinidae	Chela	Large razorbelly minnow	*Salmophasia bacaila*	A
Cyprinidae	Chela	Finescale razorbelly minnow	*Salmophasia phulo*	A
Psilorhynchidae	Titari	River stone carp	*Psilorhynchus sucatio*	LA
Cyprinodontiformes (1 species)				
Aplocheilidae	Kanpona	Blue panchax	*Aplocheilus panchax*	LA
Mugiliformes (4 species)				
Mugilidae	Khorsula	Corsula mullet	*Rhinomugil corsula*	LA
Mugilidae	Bata	Greenback mullet	*Chelon subviridis*	A
Mugilidae	Bata	Broad-mouthed mullet	*Paramugil parmatus*	A
Mugilidae	Parse	Goldspot mullet	*Chelon parsia*	LA
Osteoglossiformes (2 species)				
Notopteridae	Chital	Clown knifefish	*Chitala chitala*	R
Notopteridae	Foli	Bronze featherback	*Notopterus notopterus*	R
Perciformes (31 species)				
Ambassidae	Ranga chanda	Indian glassy fish	*Parambassis ranga*	LA
Ambassidae	Lomba chanda	Elongate glass-perchlet	*Chanda nama*	R
Ambassidae	Nalua chanda	Scalloped perchlet	*Ambassis nalua*	A
Ambassidae	Phopa chanda	Himalayan glassy perchlet	*Pseudambassis baculis*	A
Anabantidae	Koi	Climbing perch	*Anabas testudineus*	LA
Channidae	Cheng	Dwarf snakehead	*Channa gachua*	A
Channidae	Gozar	Great snakehead	*Channa marulius*	VR
Channidae	Ranga	Walking snakehead	*Channa orientalis*	R
Channidae	Taki	Spotted snakehead	*Channa punctata*	A
Channidae	Shol	Striped snakehead	*Channa striata*	A

Eleotridae	Kuli	Duckbill sleeper	*Butis butis*	A
Eleotridae	Bhut bele	Dusky sleeper	*Eleotris fusca*	A
Gobiidae	Dali cheua		*Apocryptes bato*	A
Gobiidae	Bele	Scribbled goby	*Awaous grammepomus*	LA
Gobiidae	Bele	Tank goby	*Glossogobius giuris*	A
Gobiidae	Bailla	Pacific river goby	*Awaous guamensis*	LA
Gobiidae	Chewa	Pointed-tailed goby	*Pseudapocryptes elongatus*	A
Gobiidae	Chuno bele	Glass goby	*Gobiopterus chuno*	LA
Gobiidae	Dogri	Burrowing goby	*Trypauchen vagina*	A
Gobiidae	Dahuk	Boddarts goggle-eyed goby	*Boleophthalmus boddarti*	A
Gobiidae	Dahuk	Giant mudskipper	*Periophthalmodon schlosseri*	LA
Gobiidae	Dahuk	Walking goby	*Scartelaos histophorus*	A
Gobiidae	Nuna bailla	Bumblebee goby	*Brachygobius nunus*	LA
Latidae	Bhetki	Barramundi	*Lates calcarifer*	R
Nandidae	Veda	Gangetic leaffish	*Nandus nandus*	R
Osphronemidae	Chuna	Honey gourami	*Trichogaster chuna*	LA
Osphronemidae	Khailsha	Banded gourami	*Colisa fasciata*	A
Osphronemidae	Lal kholisha	Dwarf gourami	*Trichogaster lalius*	A
Polynemidae	Taposi	Paradise threadfin	*Polynemus paradiseus*	A
Sciaenidae	Poa	Pama croaker	*Otolithoides pama*	A
Sillaginidae	Tular dandi	Flathead sillago	*Sillaginopsis panijus*	A
Pleuronectiformes (4 species)				
Soleidae	Kathal pata	Pan sole	*Brachirus pan*	A
Cynoglossidae	Kukur jib	Largescale tonguesole	*Cynoglossus arel*	LA
Cynoglossidae	Kukur jib	Long tongue sole	*Cynoglossus lingua*	LA
Cynoglossidae	Kukur jib	Bengal tongue sole	*Cynoglossus cynoglossus*	A
Siluriformes (28 species)				
Ariidae	Gagla	Gagora catfish	*Arius gagora*	A
Bagridae	Bajari tengra	Pyjama catfish	*Mystus tengara*	R
Bagridae	Gulsa tengra	Day's mystus	*Mystus bleekeri*	LA
Bagridae	Kabasi tengra	Gangetic mystus	*Mystus cavasius*	A
Bagridae	Nuna tengra	Long whiskers catfish	*Mystus gulio*	A
Bagridae	Tengra	Kerala mystus	*Mystus armatus*	A
Bagridae	Tengra	Stripped dwarf catfish	*Mystus vittatus*	A
Bagridae	Rita	Whale catfish	*Rita rita*	R
Bagridae	Air	Long-whiskered catfish	*Mystus aor*	LA
Bagridae	Guijja air	Giant river-catfish	*Sperata seenghala*	R
Clariidae	Magur	Walking catfish	*Clarias batrachus*	LA
Heteropneustidae	Shingi	Stinging catfish	*Heteropneustes fossilis*	LA
Pangasiidae	Pangas	Yellowtail catfish	*Pangasius pangasius*	VR
Schilbeidae	Bacha	Batchwa vacha	*Eutropiichthys vacha*	LA
Schilbeidae	Batasi	Indian potasi	*Pseudeutropius atherinoides*	A
Schilbeidae	Kajuli	Gangetic ailia	*Ailia coila*	A
Schilbeidae	Kajuli	Jamuna ailia	*Ailia punctata*	LA
Schilbeidae	Muribacha	Garua Bachcha	*Clupisoma garua*	VR
Schilbeidae	Shillong	Silond catfish	*Silonia silondia*	LA
Siluridae	Kani pabda	Butter catfish	*Ompok bimaculatus*	R
Siluridae	Madhu pabda	Pabdah catfish	*Ompok pabda*	LA
Siluridae	Pabda	Pabo catfish	*Ompok pabo*	R
Siluridae	Boal	Freshwater shark	*Wallago attu*	LA
Sisoridae	Baghair	Dwarf goonch	*Bagarius bagarius*	VR
Sisoridae	Gang tengra	Clown catfish	*Gagata cenia*	VR
Sisoridae	Gang tengra	Yellow spotted trevally	*Gagata gagata*	R
Sisoridae	Gang tengra	Indian gagata	*Gagata youssoufi*	R
Sisoridae	Gang tengra	Huddah nangra	*Gogangra viridescens*	LA
Synbranchiformes (5 species)				
Mastacembelidae	Baim	Zig-zag eel	*Mastacembelus armatus*	VR
Mastacembelidae	Guchi	Barred spiny eel	*Macrognathus pancalus*	A
Mastacembelidae	Tara baim	Lesser spiny eel	*Macrognathus aculeatus*	LA
Synbranchidae	Bamosh	Bengal eel	*Ophisternon bengalense*	A
Synbranchidae	Kuchia	Mud eel	*Monopterus cuchia*	R
Tetraodontiformes (2 species)				
Tetraodontidae	Potka	Green pufferfish	*Tetraodon fluviatilis*	A
Tetraodontidae	Tepa	Ocellated pufferfish	*Tetraodon cutcutia*	LA

Available, A; Less Available, LA; Rare, R; Very Rare, VR.

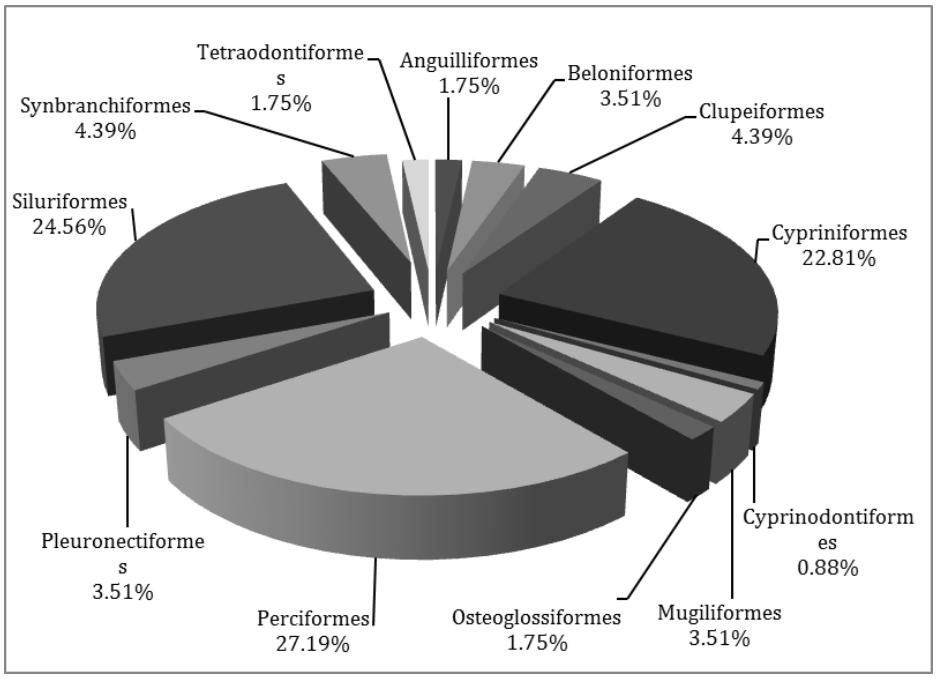

Fig 2: Percentage composition of total fish species under different orders in the Payra river

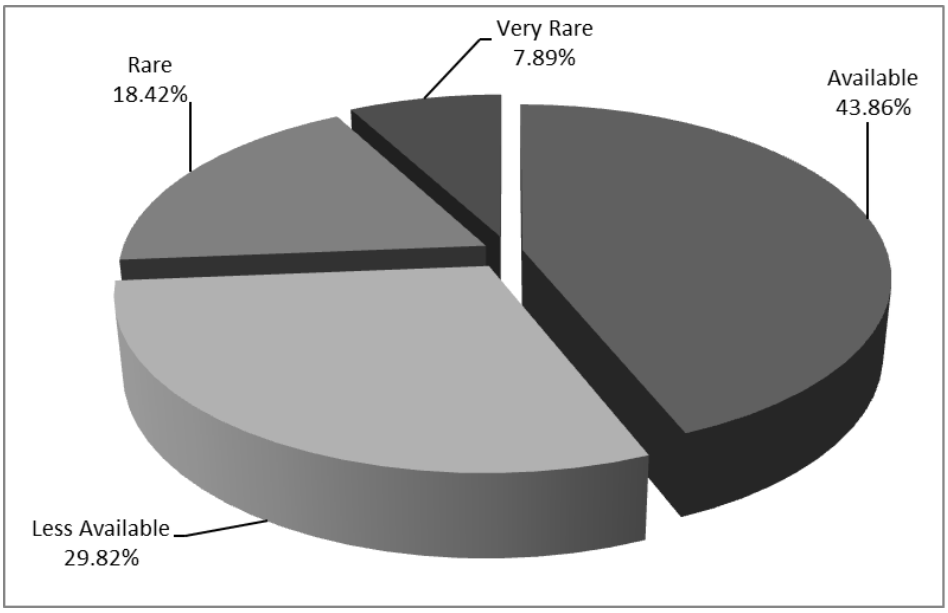

Fig 3: Percentage composition of total fish species under different status in the Payra river

4. Conclusion

The study is a preliminary attempt to understand the status and current worries of fish diversity of a major coastal river, Payra river, Bangladesh. Loss of many commercially important fish species is the current alarming issue and its conservation is the only solution for this problem. Though many rules and regulations for this river have been declared as conservation but due to the lack of proper scientific data-base, it is becoming more difficult to select proper management and conservation strategy. However, present study has revealed some recommendations like preventing water pollution, ensuring water flow, developing fishermen's awareness, preventing indiscriminate fishing of larvae and juveniles, effective implementation of existing fisheries laws and declaration of fish sanctuary to save fish diversity of the Payra river. Extensive research is required to prepare better data-base information on biodiversity and fisheries with abundance problems aiming to develop practical rules and regulations.

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