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## Status and causes destruction of fish diversity of “Ichnoi Beel” one of the floodplains of Bangladesh

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### ABSTRACT

The study was aimed to find out the status and decline causes of fish diversity of Ichnoi Beel of Bangladesh. A total of 62 fish species were identified under 10 orders of which 35.48% was identified as Cypriniformes, 25.81% as Siluriformes, 20.97% as Perciformes, 6.45% as Channiformes, 3.23% as Osteoglossiformes; and the rest the five orders viz. Anguilliformes, Cyprinodontiformes, Synbranchiformes, Beloniformes and Tetraodontiformes as 1.61% of the total catch. The availability status was remarked in four categories and obtained as available (46.77%), seasonal (8.06%), rare (6.45%) and extremely rare (38.71%). Decline causes like excessive use of fertilizer and pesticides, over fishing, climate change effects were observed as major threats for fish diversity. About 24 species were found inclined to extinct in near future that recorded as extremely rare in the study area. The present work recommends minimizing of all these impediments to save the fish diversity of Ichnoi Beel.

**Keywords:** Beel, Decline cause, Diversity, Fish, Fisheries

### 1. Introduction

Bangladesh is a low-lying riverine country located within the floodplains of three great rivers; the Ganges, Brahmaputra and Meghna and their tributaries. Bangladesh floodplains are one of the world's most important wetlands and home to hundreds of species of fish, plants, birds and other wildlife. Beels are formed by inundation of these floodplains where some water gets trapped even after flood waters recede back from it. Beels may also be formed by filling up of low lying areas during heavy rains in the monsoon <sup>[1]</sup>.

Once, thousands of Beels provided suitable habitat for all freshwater fish species of the country. But in recent years these resources are losing their suitability due to various natural and manmade hazards and the fishes are facing horrendous pressure for their existence. In Bangladesh there are 260 indigenous freshwater fish species <sup>[2]</sup>. Although this number differs on the basis of aquatic ecosystem of a specific area; and in recent years the number is decreasing day by day. There is no well recognized statistics of the fish species of Bangladesh which are almost extinct now. Despite, 54 species were declared as threatened by <sup>[3]</sup>.

According to <sup>[4]</sup> around 20 species of indigenous fish have become extinct over the last 10 years for use of current nets, insecticides and chemical fertilizers and depletion of habitats. If the trend continues, nearly 70 percent of the local fish varieties may suffer the same fate in the next few years. So, area basis study is required to assess the status and causes destruction of fish diversity in Bangladesh. Some efforts have been made to assess fish diversity in different water areas of Bangladesh by <sup>[5]</sup> in Mymensing and Tangail district, <sup>[6]</sup> in Karnaphuli reservoir <sup>[7]</sup>, in Padma river adjacent Rajshahi district, <sup>[8]</sup> in Rajshahi district, <sup>[9]</sup> in Pagla river, <sup>[10]</sup> in Padma river, <sup>[11]</sup> in Chalan beel, <sup>[12]</sup> in Bookbhara baor, <sup>[13]</sup> in Bangali river, <sup>[14]</sup> in Baral river, <sup>[15]</sup> in Choto Jamuna river. But the efforts are scanty to assess the present status of fish diversity of the country. The present study will add some new information about the status and causes destruction of fish diversity of Ichnoi Beel that will help to assess the present status of fish diversity of Bangladesh.

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## 2. Material and Methods

The study was conducted from October 2011 to October 2012 in the ‘‘Ichhanoi Beel’’ at Palashbari Upzila of Gaibandha district (between 25°30’ to 25°39’ North latitudes and between 89°12’ to 89°42’ east longitude). Random sampling was done to collect specimens at a regular interval of one week directly from the fishermen study area. The specimens were collected during daytime and precautions were taken to save from spoilage or any damage. After collection the specimens were washed well, confirmed to the species level using standard key according to [16] then tagged and preserved by date in plastic jars in 10% formalin with necessary information. Statuses of the species are assessed in four categories on the basis of present status and availability of fishes of last ten years of the Ichhanoi Beel as follows:

1. Available fish species (AFS): species available throughout the year
2. Seasonal fish species (SFS): species only found in certain period of the year
3. Rare fish species (RFS): species only found sporadically in the study area; and
4. Extremely rare fish species (EFS): species almost not found in the study area.

The natural and manmade decline causes of fish diversity were collected through direct observation.

## 3. Results and Discussion

The water sources of the Beel mainly are surface run off and river water. During the rainy season and over flooding the Beel is connected by different canals of nearby rivers and adjacent freshwater bodies and becomes the breeding and feeding ground of many cultured and wild fish species. However, Beel itself is also a source of these fishes. As a result gradually the abundance of fish is observed in the rainy season.

A total of 62 fish species comprising 10 orders and 23 families were observed in Ichhanoi Beel. The observed species were categorized in four statuses and obtained as available (46.77%; n=29), seasonal (8.06%; n=5), rare (6.45%; n=4) and extremely rare (38.71%; n=24) presented in Figure 1 and Table 1. The Order based percentage analysis of the existing fish species showed highest occurrence under the order Cypriniformes (35.48%) and then followed by Siluriformes (25.81%), Perciformes (20.97%), Channiformes (6.45%) and Osteoglossiformes (3.23%). The percentage occurrence was found same (1.61%) for the orders *viz.* Anguilliformes, Cyprinodontiformes, Synbranchiformes, Beloniformes and Tetraodontiformes on the basis of the total catch (Fig. 2). The present findings focusing the status of fish diversity of Ichhanoi Beel; a specific floodplain area of Bangladesh which represent the declining trends of floodplain fish diversity of the country. Fish diversity of inland waters was much appreciable before twentieth century that focused in the report of [5] (106 species from Mymensingh and Tangail district) and [7] (110 species from the river Padma near Rajshahi). But researchers after twentieth century reported 33 species from Chitra and Fatki rivers [17], 75 species from Pagla river [9], 73 species from

Padma river near Rajshahi [10], 81 species from Chalan beel, the largest beel of Bangladesh [11], 38 species from Bookbhara baor, Jessore [12], 59 species from Bangali river, Bogra [13], 60 species from Baral river, Natore [14], 63 species from Choto Jamuna river [15] and 69 species from Padma river, Rajshahi [18]. All the reports after twentieth century including the present study (62 species) clearly focusing the declining trends of fish diversity of the relevant study area which alerting the gradual declination of fish diversity of Bangladesh as a whole.

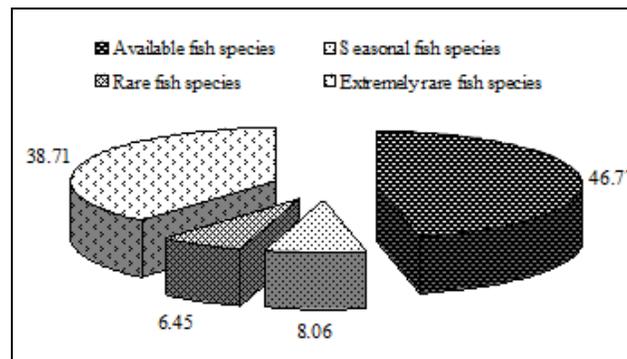


Fig 1: Status of species availability of Ichhanoi Beel.

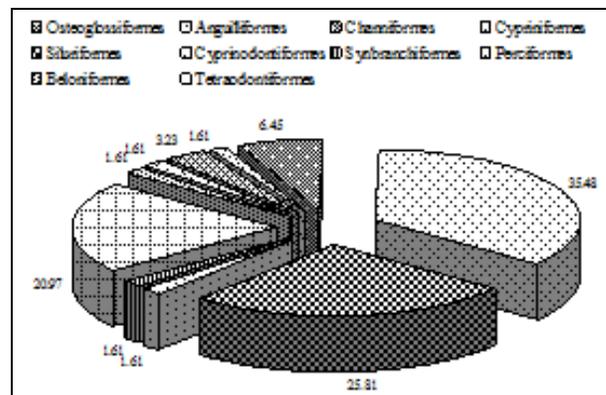


Fig 2: Percentage distribution of existing fish orders in Ichhanoi Beel.

The declination of different fish species has possibly been attributed due to both manmade and natural causes. Climate change effects (drought, flood, siltation etc), water pollution due to excessive use of fertilizer and pesticides, over fishing (both young and broods) are found as major declination causes of fish diversity of the study area. Combined effect of these hazards destroys the nursery, feeding and breeding ground of fishes and finally causes depletion and or extinction of the existing fish species. [14] and [15] reported same declination causes in Baral and Choto Jamuna river. [19] observed similar decline causes of fish diversity of inland water bodies of Bangladesh and recommended to solve them for the existence of fish population.

**Table 1:** Fish diversity of Ichanoi Beel and their status based on last ten years.

Order	Family Name	Scientific Name and Status
Osteoglossiformes	Notopteridae	<sup>EFS</sup> <i>Notopterus notopterus</i> , <sup>EFS</sup> <i>Notopterus chitala</i>
Anguilliformes	Ophichthidae	<sup>EFS</sup> <i>Pisodonophis cancrivorus</i>
Channiformes	Channidae	<sup>AFS</sup> <i>Channa punctatus</i> , <sup>EFS</sup> <i>Channa marulius</i> , <sup>SFS</sup> <i>Channa orientalis</i> , <sup>RFS</sup> <i>Channa striatus</i>
Cypriniformes	Cyprinidae	<sup>AFS</sup> <i>Amblypharyngodon mola</i> , <sup>EFS</sup> <i>Aspidoparia morar</i> , <sup>AFS</sup> <i>Catla catla</i> , <sup>AFS</sup> <i>Cirrhinus mrigala</i> , <sup>AFS</sup> <i>Cyprinus carpio</i> var. <i>communis</i> , <sup>AFS</sup> <i>Cyprinus carpio</i> var. <i>specularis</i> , <sup>AFS</sup> <i>Esomus danricus</i> , <sup>AFS</sup> <i>Labeo</i> <i>bata</i> , <sup>AFS</sup> <i>Labeo calbasu</i> , <sup>AFS</sup> <i>Labeo rohita</i> , <sup>EFS</sup> <i>Osteobrama cotio</i> , <sup>EFS</sup> <i>Puntius conchoniis</i> , <sup>AFS</sup> <i>Puntius sarana</i> , <sup>AFS</sup> <i>Puntius sophore</i> , <sup>AFS</sup> <i>Puntius ticto</i> , <sup>EFS</sup> <i>Salmostoma bacaila</i> , <sup>AFS</sup> <i>Aristichthys nobilis</i> <sup>AFS</sup> <i>Hypophthalmichthys molitrix</i> , <sup>AFS</sup> <i>Ctenopharyngodon idellus</i> , <sup>AFS</sup> <i>Barbonymus gonionotus</i>
	Cobitidae	<sup>EFS</sup> <i>Botia dario</i> , <sup>AFS</sup> <i>Lepidocephalus guntea</i>
Siluriformes	Bagridae	<sup>AFS</sup> <i>Mystus cavasius</i> , <sup>AFS</sup> <i>Mystus vittatus</i> , <sup>EFS</sup> <i>Rita rita</i> , <sup>EFS</sup> <i>Sperata aor</i> , <sup>EFS</sup> <i>Sperata seenghala</i>
	Claridae	<sup>AFS</sup> <i>Clarius batrachus</i>
	Heteropneustidae	<sup>AFS</sup> <i>Heteropneustes fossilis</i>
	Pangasiidae	<sup>EFS</sup> <i>Pangasius pangasius</i>
	Schilbeidae	<sup>EFS</sup> <i>Ailia coila</i> , <sup>EFS</sup> <i>Clupisoma garua</i> , <sup>EFS</sup> <i>Eutropiichthys vacha</i> , <sup>EFS</sup> <i>Pseudeutropius atherinoides</i>
	Siluridae	<sup>EFS</sup> <i>Ompok bimaculatus</i> , <sup>EFS</sup> <i>Ompok pabda</i> , <sup>SFS</sup> <i>Wallago attu</i>
	Sisoridae	<sup>EFS</sup> <i>Bagarius bagarius</i>
Cyprinodontiformes	Aplocheilidae	<sup>AFS</sup> <i>Aplocheilus panchax</i>
Synbranchiformes	Synbranchidae	<sup>RFS</sup> <i>Monopterus couchia</i>
Perciformes	Ambassidae	<sup>AFS</sup> <i>Chanda nama</i> , <sup>EFS</sup> <i>Pseudambassis ranga</i> , <sup>EFS</sup> <i>Pseudambassis lala</i>
	Anabantidae	<sup>AFS</sup> <i>Anabas testudineus</i>
	Pristolepididae	<sup>EFS</sup> <i>Badis badis</i>
	Gobiidae	<sup>SFS</sup> <i>Glossogobius guiris</i>
	Mastacembelidae	<sup>SFS</sup> <i>Macrogathus aculeatus</i> , <sup>RFS</sup> <i>Mastacembelus armatus</i> , <sup>AFS</sup> <i>Mastacembelus pancalus</i>
	Nandidae	<sup>EFS</sup> <i>Nundus nundus</i>
	Osphronemidae	<sup>AFS</sup> <i>Colisa fasciata</i> , <sup>AFS</sup> <i>Colisa lalius</i> , <sup>AFS</sup> <i>Trichogaster chuna</i>
Beloniformes	Belonidae	<sup>SFS</sup> <i>Xenentodon cancila</i>
Tetraodontiformes	Tetraodontidae	<sup>RFS</sup> <i>Tetraodon cutcutia</i>

Note: AFS=Available Fish Species; SFS= Seasonal fish species; RFS= Rare fish species; EFS= Extremely rare fish species

#### 4. Conclusion

The study is a preliminary attempt to assess the open water fish diversity and its decline causes in Bangladesh. Results of the survey may not be the actual status of the open water fish diversity as a whole. However, some recommendations like preventing water pollution, ensuring nursery, feeding and breeding ground of fish, fishermen's awareness, and declaration of fish sanctuary have been coming out to save the fish diversity of the study area. Besides, counter and random survey are recommended to assess the fish diversity status for proper management and conservation of this potential natural resource of Bangladesh.

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