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Research Article

Fish Diversity Assessment of the Haor Region in Kishoreganj District, Bangladesh

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Abstract

Background and Objective: Fisheries sector play important role in the economy. Diversity status is needed to conserve the fish resources of the haor region. The present study was conducted to assess fish diversity of the Kalai beel and Naoli beel of Karimganj Upazila in Kishoreganj district, Bangladesh. **Materials and Methods:** Fish samples were collected from the fishermen and local fish market for taxonomic study from December, 2014-November, 2015. Morphometric and meristic characteristics were identified through direct observation and further identification was done following different books. **Results:** A total of 46 fish species were identified during the study under 17 families. Among 46 fish species, 15 were found belong to *Cyprinidae* family followed by *Bagaridae* (4), *Channidae* (4), *Schilbeidae* (3), *Mastacembelidae* (3), *Centropomidae* (3), *Siluridae* (2), *Anabantidae* (2), *Palaemonidae* (2) and others (8). During the study period, 22 fish species were marked as abundant species, 15 species were marked as rare and 9 species were found as common species. **Conclusion:** Ecologically, economically and socially haors are playing essential role with its diversified fish resources. Haor fisheries have great impact on the livelihood of the fishermen and provide nutrition to general people. However, the fish diversity is being threatened by anthropogenic activities. Present study emphasized on the conservation of the fish as it is undergone gradual decrease.

Key words: Fish diversity, assessment, morphometric and meristic, identification, anthropogenic activities, haor

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

A haor is a wetland ecosystem in the North Eastern part of Bangladesh which physically is a bowl or saucer shaped shallow depression, also known as a back swamp. The word haor was erupted from the Bengali word sagor (meaning sea) in regional dialect¹. The haor basin of North-East region of Bangladesh encompasses the floodplains of the Meghna tributaries and is characterized by the presence of numerous large deeply flooded depressions known as haors between the rivers. The basin bounded to the North by the hill ranges of Meghalaya, to the South by the hills of Tripura and Mizoram and to the East by highlands of Monipur².

The water bodies of the country consider as home of fish³. Fisheries sector play vital role in the economy, food and livelihood security⁴ of the country through the incessant supply of nutritious food⁵. In the year of 2007-2008, the total fish production was 25.63 lac metric t. Fisheries sector contributes 5% of the gross domestic production (GDP) and 4.04% of the foreign exchange earnings⁶. Bangladesh earned 3720 corer taka by exporting fish and fishery products in 2006-2007⁶. About 12 million people are associated with the fisheries sectors, of which 1.4 million people rely exclusively on fisheries related activities. An estimated 9.5 million people (73%) are involved in subsistence fisheries on the country's flood plains, the number of fishermen increases dramatically to 11 million between June-October each year. There are 3.08 fish farmers, 1.28 million inland fishermen and 0.45 million fry collectors (fish and shrimp) in Bangladesh and it is estimated that fisheries and related activities support more than 7% of our country's population⁷.

Though fisheries sector has important role in the economy of the country but this sector is being faced threat to extinction⁸⁻¹³. Now it has become hot cake question in the country^{14,15}. Degradation of riverine ecosystem, overexploitation, pollution and injudicious intrusion of human are regarded as the main culprit for the fisheries decrease^{13,16}. Besides, lack of awareness about the river water or open water fishes convert the poor situation to worst¹⁷.

To conserve the fisheries sector it is obvious to find out the present diversity status of the open water fisheries. In Bangladesh, very limited or no mentionable research found and further research required for the protection of this fisheries resources¹⁴⁻²⁵. Throughout the world several research have been carried out to assess the diversity of fishes^{26,27,28}.

The haor region in Kishoreganj district is playing important role in the economy of the country with its water and biological resources. Nevertheless, this resources is gradually being depleted that make the living condition of

fishermen worst²⁹. Regrettably, no scientific research is found so far to assess the diversity of fish. In the present study, a preliminary research was conducted to assess the present fish variety of the haor Region.

MATERIALS AND METHODS

Study site: The present study was conducted at Kalai beel (24.4583°N and 90.9355°E) and Naoli beel (24.4078°N and 90.9361°E) of Karimganj Upazila (24.4583°N and 90.8833°E) in Kishoreganj district, Bangladesh (Fig. 1). The experiment was conducted from December, 2014-November, 2015.

Sample collection and preservation: A total of 60 fish samples were collected during each sampling from the fishermen on the spot. Fish caught by cast nets, ber jal, thella jal, uttar jal, current jal, fishing traps and also collected from the local fish market close to the study area. Most of the collected fish species were identified on the spot with the help of related books. Some fishes those appeared hard to identify on the spot were preserved with 10% formalin and brought to the laboratory of Institute of Marine Sciences and Fisheries, University of Chittagong in plastic jars for further identification.

Identification: The fish specimens were identified based on the morphometric and meristic characteristics according to Rahman³, Bhuiyan³⁰, Quddus and Shafi³¹, Quddus *et al.*³², Rahman³³, Talwar and Jhingran³⁴, Roy *et al.*³⁵, Ahmed *et al.*³⁶. After identification, fishes were classified by following Nelson³⁷. Scientific names and authorities followed according to those of Froese and Pauly³⁸ and Thompson *et al.*³⁹.

RESULTS

A total of 46 fish species were identified during the study under 17 families, as shown in Fig. 2.

Fisheries diversity

Carp: During the period of present investigation 7 species of carps were recorded (Table 1). Among them Calibaas, Carpio and Goinna were abundant and Mrigal, Rui were rare in catch whereas Silver carp and Catla were common in most case.

Snakehead, perch and eel: During the study period a huge number of snakehead, perch and eel were found. Among them 4 species of snakehead (Table 2), 4 species of perch (Table 3) were found in the *Kalai beel* but including Lal

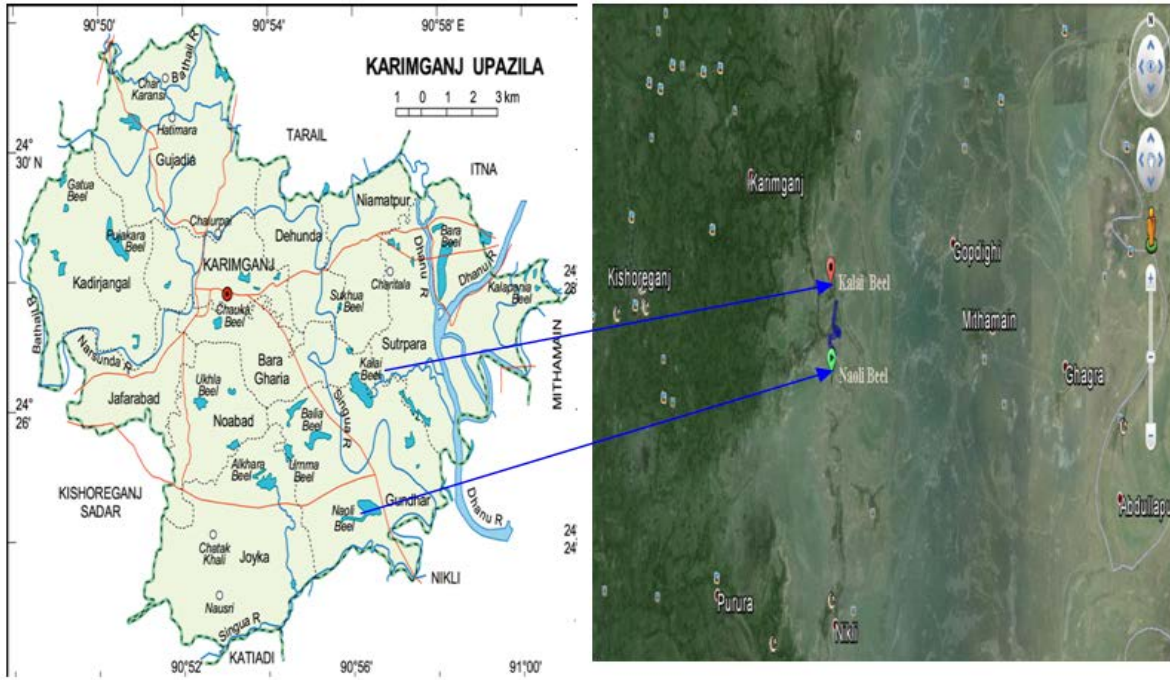


Fig. 1: Map showing the sampling sites of the study area

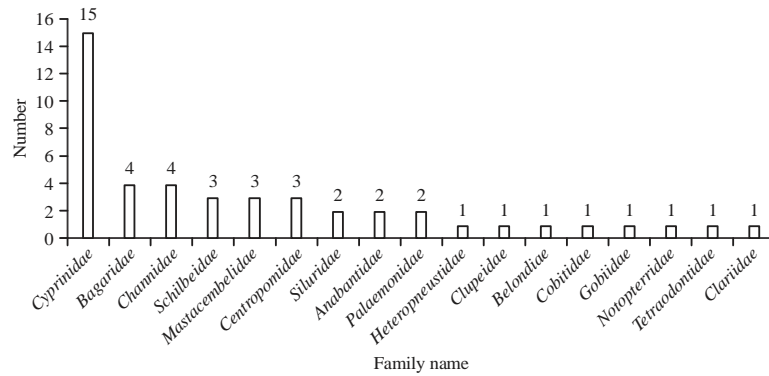


Fig. 2: Number of fish species with respective family

Table 1: A list of carp species found in the study area

Family	Local name	Common name	Scientific name	Remarks
Cyprinidae	Mrigal	Indian major carp	<i>Cirrhinus cirrhosus</i>	Rare
Cyprinidae	Carpio	Common crap	<i>Cyprinus carpio</i>	Abundant
Cyprinidae	Calibaas	Black rohu	<i>Labeo calbasu</i>	Abundant
Cyprinidae	Rui	Rohu	<i>Labeo rohita</i>	Rare
Cyprinidae	Goinna	Kuria labeo	<i>Labeo gonius</i>	Abundant
Cyprinidae	Silver carp	Silver carp	<i>Hypophthalmichthys molitrix</i>	Common
Cyprinidae	Catla	Indian major carp	<i>Catla catla</i>	Common

Source: Field work, 2014-2015

Table 2: Snakeheads recorded from the study area

Family	Local name	Common name	Scientific name	Remarks
Channidae	Shol	Snakehead murrel	<i>Channa stiiatus</i>	Abundant
Channidae	Taki	Spotted snakehead	<i>Channa punctatus</i>	Abundant
Channidae	Chang	Asiatic sanakehed	<i>Channa orientalis</i>	Rare
Channidae	Gajar	Giant sanakehead	<i>Channa marulius</i>	Rare

Source: Field work, 2014-2015

Table 3: Perch recorded from the study area

Family	Local name	Common name	Scientific name	Remarks
<i>Anabantidae</i>	Khalisha	Striped gourami	<i>Colisa fasciatus</i>	Rare
<i>Anabantidae</i>	Koi	Climbing perch	<i>Anabas testudineus</i>	Common
<i>Centropomidae</i>	Kata chanda	Round glass perchlet	<i>Chanda baculis</i>	Abundant
<i>Centropomidae</i>	Lal chanda	Indian glass perch	<i>Chanda ranga</i>	Rare
<i>Centropomidae</i>	Nama chanda	Elongated glass perchlet	<i>Chanda nama</i>	Abundant

Source: Field work, 2014-2015

Table 4: Eel recorded from the study area

Family	Local name	Common name	Scientific name	Remarks
<i>Mastacembelidae</i>	Guchi baim	Striped spiny eel	<i>Mastacembelus pancalus</i>	Abundant
<i>Mastacembelidae</i>	Tara Baim	One striped spiny eel	<i>Macrogathus aculeatus</i>	Abundant
<i>Mastacembelidae</i>	Lal baim	Tire track spiny eel	<i>Mastacembelus armatus</i>	Abundant

Source: Field work, 2014-2015

Table 5: Catfish recorded from the study area

Family	Local name	Common name	Scientific name	Remarks
<i>Bagaridae</i>	Gulsha	Long whiskered	<i>Mystus gulio</i>	Common
<i>Bagaridae</i>	Bujuri	Long bled catfish	<i>Mystus tengra</i>	Abundant
<i>Bagaridae</i>	Tengra	Striped dwarf catfish	<i>Mystus vittatus</i>	Abundant
<i>Bagaridae</i>	Air	Long whiskered catfish	<i>Mystus aor</i>	Abundant
<i>Clariidae</i>	Magur	Walking catfish	<i>Clarius batrachus</i>	Abundant
<i>Heteropneustidae</i>	Shing	Stinging catfish	<i>Heteropneustes fossilis</i>	Abundant
<i>Schilbeidae</i>	Batashi	River catfish	<i>Pseudotropius atherinoides</i>	Common
<i>Schilbeidae</i>	Bashpata	Gangetic ailia	<i>Ailia coila</i>	Common
<i>Schilbeidae</i>	Bacha	River catfish	<i>Eutropiichthys</i>	Rare
<i>Siluridae</i>	Modhu pabda	Butter catfish	<i>Ompok pabda</i>	Common
<i>Siluridae</i>	Boal	Fresh water shark	<i>Wallago attu</i>	Abundant

Source: Field work, 2014-2015

Table 6: Barbs recorded from the study area

Family	Local name	Common name	Scientific name	Remarks
<i>Cyprinidae</i>	Phul chela	Barb	<i>Chela phulo</i>	Rare
<i>Cyprinidae</i>	Lamba chela	Barb	<i>Chela bacaila</i>	Rare
<i>Cyprinidae</i>	Mola	Barb	<i>Amblypharyngodon mola</i>	Common
<i>Cyprinidae</i>	Dhela	Barb	<i>Rohitee cotio</i>	Rare
<i>Cyprinidae</i>	Jatputi	Spot fin swamp barb	<i>Puntius sophore</i>	Abundant
<i>Cyprinidae</i>	Titputi	Fire fin barb	<i>Puntius ticto</i>	Abundant

Source: Field work, 2014-2015

chanda almost 5 species of perch were found in the Naoli beel area respectively and 3 species of eel (Table 4) were identified in both of the beels. Shol and Taki were abundant among snakehead. In case of perch nama chanda and kata chanda were abundant and khalisha were rare whereas all of eel species were abundant.

Catfishes: Including bacha almost 11 species of catfishes (Table 5) were recorded in the Naoli beel during the study period but in the Kalai beel, bacha were not found. Among the different types of catfishes, bujuri, tangra, shing, magur, air and boal were abundant. On the other hand, bacha were rare.

Barbs, minnows and clupeids found in the beels: During study period a huge number of barbs and minnows were found. Among them, 6 species of barbs (including phul chela)

(Table 6) and 2 species of minnows and 1 species of clupeid were identified in the Nali beel but phul chela were not found in the Kalai beel. Jatputi and titputi were abundant among the barbs and mola was common in the study area. In case of culpeid fishes chapila was abundant.

Other miscellaneous fish fauna recorded from both of the beels: Seven others miscellaneous fish species (including golda chingri) were recorded from Naoli beel during the study period (Table 7). Among them *Lepidocephalus guntea*, *Xenentodon carcila*, *Teraodon cutcutia*, *Macrobrachium malcomsonii* were easily caught in large number in the study area (Table 7). Although *Macrobrachium rossenbergii*, *Notopterus chitala* were rare in the Naoli beel but *Macrobrachium rossenbergii* were not found in the Kalai beel.

Table 7: Miscellaneous fish species recorded from the study area

Family	Local name	Common name	Scientific name	Remarks
<i>Belontiidae</i>	Kakila	Fresh water gar fish	<i>Xenentodon cancila</i>	Abundant
<i>Cobitidae</i>	Gutum	Guntea loach	<i>Lepidocephalus guntea</i>	Rare
<i>Gobiidae</i>	Billa	Bar-eyed goby	<i>Glossogobius giuris</i>	Common
<i>Notopteridae</i>	Chitol	Humped feather back	<i>Notopterus chitala</i>	Rare
<i>Palaemonidae</i>	Golda	River prawn	<i>Macrobrachium rosenbergii</i>	Rare
<i>Palaemonidae</i>	Gura chingri	Monsoon river prawn	<i>Macrobrachium malcomsonii</i>	Abundant
<i>Tetraodontidae</i>	Choto tepa	Ocellated puffer fish	<i>Tetraodon cutcutia</i>	Abundant

Source: Field work, 2014-2015

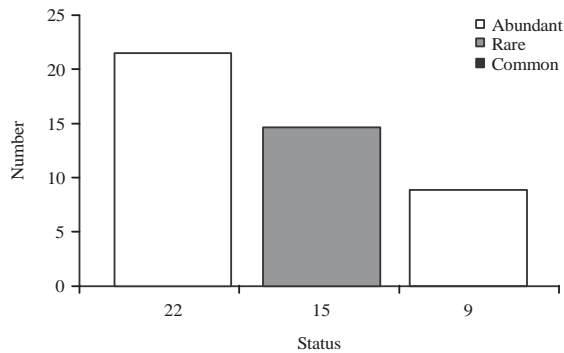


Fig. 3: Present status of fishes in the haor region

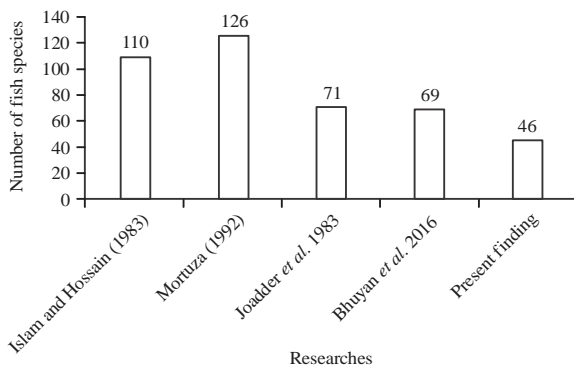


Fig. 4: Comparison of present status of fishes with past status in the study area

Present status of identified fishes are presented in Fig. 3. Moreover, some exotic fishes were recorded from the haor region during the study. Because of low price and high nutritional value these types of fish are very popular culture species in Bangladesh. During heavy flood, getting escaped from the culture pond, these fish species enter into the river systems and haor area. These exotic species can cause great threat for the native fish species⁴⁰. If these alien species once get established, it will difficult to eliminate them⁴¹. They will compete with the native species for food and space. Furthermore, they will carry different types of diseases.

For maintaining ecological, nutritional and socio-economic equilibrium the present findings on fish diversity may be beneficial for the successful

management of fisheries resources in this haor region and it will provide baseline information.

DISCUSSION

Fisheries sector play significant role in the economy of the country. Diversity of fishes is the key to meet nutritional requirement and ecosystem balance. In the present study, a total of 46 fish species were identified under 17 families and most of the fish species belong to *Cyprinidae* family (15 species). This finding was quite similar with the results reported by Galib *et al.*¹⁴, Imteazzaman and Galib¹⁵, Hossain *et al.*¹⁷, Mohsin *et al.*²¹ and Ahmed *et al.*²³.

Bhuyan *et al.*⁴² recorded 26 species from *Cyprinidae* family followed by *Bagaridae* (5), *Schilbeidae* (4), *Channidae* (4), *Ambassidae* (3), *Belontiidae* (3), *Siluridae* (2), *Notopteridae* (2), *Mastacembelidae* (2), *Dasytidae* (1), *Bothidae* (1), *Sybranchidae* (1), *Tetraodontidae* (1), *Belonidae* (1), *Cobitidae* (1), *Clariidae* (1), *Heteropneustidae* (1), *Chacidae* (1), *Pangasiidae* (1), *Clupeidae* (1), *Mugilidae* (1), *Anabantidae* (1), *Gobiidae* (1), *Nandidae* (1), *Pristolepidae* (1), *Cichlidae* (1) and *Sciaenidae* (1) in the Meghna river.

Comparison of present research findings with previous one is not possible since no previous records of fisheries of this haor region was found. This is the preliminary study on the diversity of fish in this region. Mortuza⁴³ documented 126 fish species from the Barnai project area near Padma river. Islam and Hossain⁴⁴, Mohsin *et al.*¹¹ and Joadder *et al.*⁹ recorded 110, 69 and 69 fish species in Padma river while Samad *et al.*⁴⁵ found 57 small indigenous fish species. Bhuyan *et al.*⁴² found 69 fish species from the Meghna river, Narsingdi. In the present study, a total of 46 fish species have been recorded from the Kalai beel and Naoli beel in Kishoreganj district.

The present research findings indicate that there is visible decline of fish species during the last decade (Fig. 4). In fact, the findings of the present research was 2 times lower than researches conducted on other rivers of Bangladesh by Bhuyan *et al.*⁴⁶ and Rahman *et al.*¹⁸. However, more or less similar results were found by Galib *et al.*¹³ and Mohsin and Haque²⁰.

CONCLUSION

Comparing present research findings with the past research findings, it can be concluded that the fisheries diversity of Bangladesh undergoing critical stage than earlier time. Minimizing pollution threats from the industries and agrochemical inputs, use of destructive nets, indiscriminate fishing, impacts of invasive species on the native ones and maintaining data base of fish diversity will be the effective step to achieve conservation goal. High attention should be given on the conservation and management of riverine/open water fisheries diversity for the sustainable development of the country.

SIGNIFICANCE STATEMENT

This study discovers the existing diversity status of the haor region in Kishoreganj District, Bangladesh. This fish record will help the researchers, academicians and policy makers to conserve the fish of the haor that many researchers were not able to explore in Kishoreganj District. Thus a new theory on fish diversity assessment may be arrived at.

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