

FISHES UNDER THE ORDER SILURIFORMES AVAILABLE IN THE INLAND WATER OF MYMENSINGH REGION, BANGLADESH

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ABSTRACT

A study was conducted to find out the threatened fishes under the Order Siluriformes available in the inland water of Bangladesh. This study was conducted from October 2010 to September 2011. Data were collected from greater Mymensingh region (Mymensingh and Netrokona districts). The study was based on frequent visits of different markets located in the selected area. Five markets of Mymensingh district were visited for 12 times each. Durgapur bazaar in Netrokona district was also visited for two times. According to the available literatures the number of available catfishes in Bangladesh was supposed to be around 59. However, 19 species under seven families were observed during the study period. There are 13 families under the Order Siluriformes but fishes under 7 families (Bagridae, Clariidae, Heteropneustidae, Pangasiidae, Schilbeidae, Siluridae and Sisoridae) were found from the study area. The highest number of catfish (7) was observed from the family Bagridae. No member was found from the family Amblycipitidae, Ariidae, Chacidae, Erethistidae, Olyridae and Plotosidae. According to IUCN Bangladesh National Categories, the study found 4 Critically endangered (CR), 5 Endangered (EN), 1 Vulnerable (VU) and 9 Not threatened (NO) catfish species. Present biodiversity status of the observed catfishes is slightly different from IUCN status. Among the 19 species found, 6 were considered as Not threatened (32%) and 13 as threatened (68%) of which 3 Endangered (16%) and 10 Vulnerable (52%). The less availability of some catfishes and at the same time non availability of some other catfishes are the alarming sign of loss of biodiversity in catfishes not only in the study area but also in the whole country.

Key words: Siluriformes, catfishes, biodiversity

INTRODUCTION

Threatened species are any species (including animals, plants, fungi, etc.) which are vulnerable to endangerment in the near future. The World Conservation Union (IUCN) is the foremost authority on threatened species and treats threatened species not as a single category but as a group of three categories, depending on the degree to which they are threatened (Vulnerable, Endangered and Critically endangered).

Species that are threatened are sometimes characterized by the population dynamics measure of *critical dispensation*, a mathematical measure of biomass related to population growth rate. This quantitative metric is one method of evaluating the degree of endangerment. Less than threatened categories are near threatened, least concern and the no longer assigned category of conservation dependent.

Species which have not been evaluated (NE), or do not have sufficient data (Data Deficient) also are not considered "threatened" by the IUCN. Although *threatened* and *vulnerable* may be used interchangeably when discussing IUCN categories, the term *threatened* is generally used to refer to the three categories (Critically endangered, Endangered and Vulnerable), while *vulnerable* is used to refer to the least at risk of those three categories. Threatened species are listed in the IUCN Red List of Threatened Species. However, the Red list of threatened fish species was published in 2000 in Bangladesh.

Aquatic biodiversity is under severe stress all over the world. Recent environmental modifications, water quality degradation and fishing pressure have increased the vulnerability of fish genetic resources in Bangladesh. As a result the availability of freshwater fish species has declined to a great extent over the years and many of them are either rare or at the verge of extinction. An estimated 39% of all freshwater species of the global aquatic ecosystem are Extinct, Endangered, or Vulnerable (IUCN 2000).

All of the fishes are classified into several Orders and Siluriformes is one of them. The diverse order Siluriformes is one of the largest orders of vertebrates and by far the largest order of freshwater fishes which comprises about 22% of freshwater fishes. Siluriformes belongs to the Superorder Ostariophysii. Members of the Order Siluriformes are generally known as catfishes because of the whiskerlike barbels that surround the mouths of these fishes. Catfishes are easy to identify by the presence of barbels on the upper jaw or in some cases on the lower jaw with naked body. Catfishes take on a variety of forms. Some resemble typical fish, some eels or snakes, and some are even worm-like, with a mature size range of less than 1 cm to over 3 m. Due to its unique geo-physical location Bangladesh is exceptionally characterized by a rich biological diversity (Hossain 2001; Barua *et al.* 2001; Nishat *et al.* 2002). At least 55 species of catfishes belonging to 35 genera have been recorded so far in Bangladesh (Rahman 2005).

Siluriformes is a diverse group of freshwater fishes and the species of this Order are distributed in the world. Size and physical characteristics of catfishes vary from

one region to another and also species to species. There are about 436 genera and more than 30 families of recognized catfishes till now. Although most catfishes are of small to moderate size (5-20 cm), some smallest vertebrates are available in the world such as aspredinids and trichomycterids may reach sexual maturity at less than 10 mm in total length. On the other hand, *Silurus glanis* (European wels), reaches to 5 m in body length and 330 kg in weight, (the largest catfish), *Pangasianodon gigas* (giant Mekong catfish, reaches to 3 m in body length and 300 kg in body weight), and *Brachyplatostoma filamentosum* (Amazonian goliath catfish, reaches to 3+ m in body length and 200 kg in body weight) are among the largest freshwater fishes in the world.

MATERIALS AND METHODS

The research activities were carried out for twelve months in some areas of Bangladesh. The study was based on fish market visit and data collection from the fish traders. The investigation was carried out during October 2010 to September 2011.

Selection of study area

Five markets of Mymensingh district were visited for 12 times each and the Durgapur bazaar in Netrokona district were visited for two times. The names of the visited markets are Vabokhali bazaar, Notun bazaar, Shomvuganj bazaar, Machua bazaar and Pourosova bazaar.

Market visit of the selected area

Visual observation on the abundance of the catfish species were carried out on the spots. Relevant data such as local name of the found catfishes, source, distribution and availability of the species, price and demand of the catfishes etc. were collected from the study sites.

Method of determining catfish biodiversity

The weight of the available catfishes was recorded in separate data sheet for each market. Then the raw data were tabulated in spread sheet using MS Excel. The average weight of the found catfishes in each market was determined. After that the average weight of all the fishes found in six markets were calculated using the previous value. Finally, species richness and species biodiversity index were measured by using the following two formulas. Biodiversity status of the found catfishes was measured by using species richness and biodiversity index. Biodiversity index is the more reliable measure to determine the biodiversity status. A species is considered under the categories of threat if its biodiversity index is more than 4. The status is considered as Critically Endangered (CR), Endangered

(EN) and Vulnerable (VU) when the species biodiversity index are 10 - <13, 7 - <10 and 4 - <7 respectively.

Species Richness

This particular measure of species richness is indicated as D, the Meahinick's index (Roy 2010) -

$$D = \frac{S_w}{\sqrt{N}}$$

Where S_w equals the weight of individual species represented in the sample and N equals the total weight of species in the sample.

Species Biodiversity Index

As a measure of species biodiversity index, the Shannon index, H (Sayeed 2010) was used -

$$H = -\sum(P_i) \ln P_i$$

P_i = the proportion of the total weight of species in the population.

RESULTS

Fishes observed under the Order Siluriformes

A total of nineteen freshwater catfish species under seven families were found during the study period (Table 1).

In the present study, the highest number (7) fish species were found under the family Bagridae followed by the family Schilbeidae with 5 species (Figure 1). Three species were found under the family Siluridae. Sisoridae is the largest catfish family in Bangladesh and it comprises about 17 species. However, only 1 species under this family was observed during the study. Three catfish families Clariidae, Heteropneustidae and Pangasiidae were observed each with only one species. The total number of documented catfishes in Bangladesh is 59 and the observed and not observed catfishes are shown in Figure 2.

Distribution of the found catfishes

Catfishes of Bangladesh are distributed in the various waterbodies. Almost all the catfish are found in the rivers and beels. *Pangasius hypophthalmus* is an exotic species and it is cultured fish in our country that's why it was reported from ponds. *Rita rita* and *Silonia silondia* are estuarine fish and they are mainly reported from large rivers. Not all the catfishes were reported to be distributed in all the waterbodies. The other exclusively riverine catfishes were *Eutropiichthys vacha*, *Clupisoma garua* and *Bagarius bagarius*. Species like *Mystus tengara*, *M. vittatus*, *M. bleekeri*, *Sperata aor*, *Ompok pabda*, *O. bimaculatus*, *Wallago attu*, *Clarias batrachus*, *Heteropneustes fossilis* etc. are distributed in most of the water bodies.

Table 1. List of freshwater catfish species reported during the study

Family	Species	Local name	Abundance
Bagridae	<i>Hemibagrus menoda</i>	Ghagla	Common
	<i>Mystus bleekeri</i>	Gulsa tengra	Less Abundant
	<i>M. tengara</i>	Kalo buzuri	Common
	<i>M. vittatus</i>	Tengra	Less Abundant
	<i>Rita rita</i>	Rita	Common
	<i>Sperata aor</i>	Air	Less Common
	<i>S. seenghala</i>	Guizza Air	Very Common
Clariidae	<i>Clarias batrachus</i>	Magur	Less Abundant
Heteropneustidae	<i>Heteropneustes fossilis</i>	Shing	Abundant
Pangasiidae	<i>Pangasius hypophthalmus</i>	Pangas	Highly Abundant
Schilbeidae	<i>Ailia coila</i>	Kajuli	Common
	<i>Clupisoma garua</i>	Garua	Very Common
	<i>Eutropiichthys vacha</i>	Bacha	Less Common
	<i>Neotropius atherinoides</i>	Batasi	Very Common
	<i>Silonia silondia</i>	Shillong	Rare
Siluridae	<i>Ompok pabda</i>	Madhu pabda	Rare
	<i>O. bimaculatus</i>	Boali Pabda	Common
	<i>Wallago attu</i>	Boal	Abundant
Sisoridae	<i>Bagarius bagarius</i>	Baghair	Rare

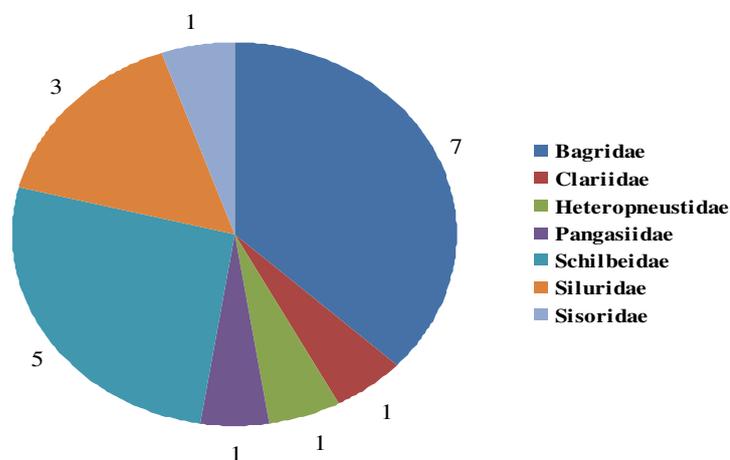


Figure 1. Number of catfish species found under different families

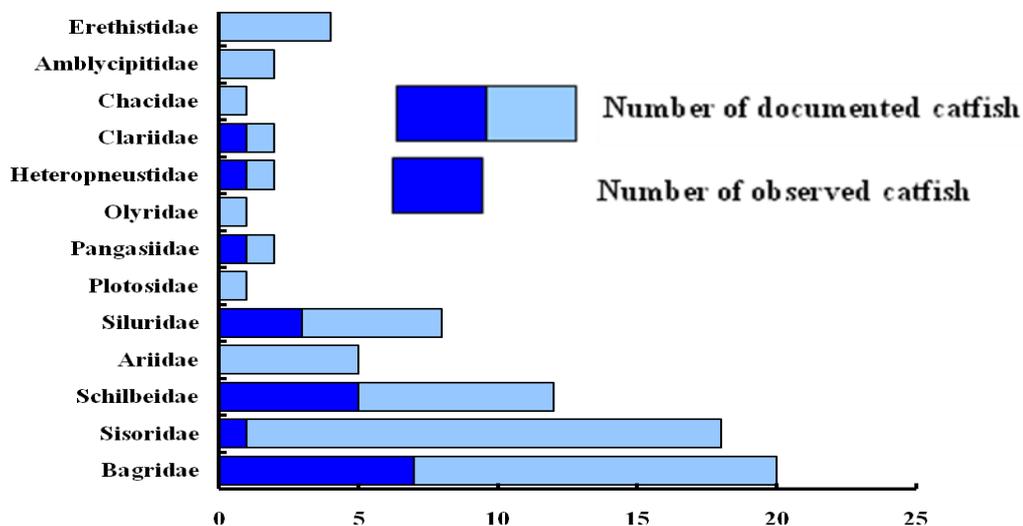


Figure 2. The documented catfish species under different families

Sources of collection

Variation in the availability of some of the catfish was observed based on the collection sites (markets). Some of the common catfish were observed in most of the study sites. *Pangasius hypophthalmus*, *Wallago attu*, *Sperata seenghala*, *Clarias batrachus*, *Ompok bimaculatus*, *Heteropneustes fossilis* and *Mystus vittatus* were found in every studied markets. The rare species *Silonia silondia* was collected only from Shomvuganj and Durgapur bazaar. The highest number of catfishes were found in Machua bazaar and Shomvuganj bazaar and the least number of catfishes in Durgapur bazaar.

All the catfishes were found in Machua bazaar and Shomvuganj bazaar except *Silonia silondia* and *Sperata*

aor. respectively. The number of observed catfishes was 18, 17, 17, 18, 15 and 10 in the Machua bazaar, Notun bazaar, Pourosova bazaar, Shomvuganj bazaar, Vabokhali bazaar and Durgapur bazaar, respectively.

Biodiversity index and species richness

The biodiversity index was the highest in *Silonia silondia* but the richness was the highest in *Pangasius hypophthalmus* and the values were 8.43 and 13.86, respectively. The lowest species richness was 0.004 in *Silonia silondia*. The biodiversity index and species richness of the observed catfishes are shown in the Table 2.

Table 2. Biodiversity index and species richness of observed catfishes

Species	Biodiversity index (H)	Species richness (D)
<i>Ailia coila</i>	5.07	0.10
<i>Bagarius bagarius</i>	8.03	0.01
<i>Clarias batrachus</i>	3.47	0.60
<i>Clupisoma garua</i>	4.56	0.19
<i>Eutropiichthys vacha</i>	6.84	0.03
<i>Hemibagrus menoda</i>	5.26	0.08
<i>Heteropneustes fossilis</i>	2.96	0.87
<i>Mystus bleekeri</i>	3.87	0.42
<i>M. tengara</i>	5.26	0.08
<i>M. vittatus</i>	3.19	0.66
<i>Neotropius atherinoides</i>	4.56	0.24
<i>Ompok bimaculatus</i>	5.26	0.08
<i>O. pabda</i>	8.03	0.01
<i>Pangasius hypophthalmus</i>	0.27	13.86
<i>Rita rita</i>	5.26	0.09
<i>Silonia silondia</i>	8.43	0.004
<i>Sperata aor</i>	6.84	0.02
<i>S. seenghala</i>	4.56	0.22
<i>Wallago attu</i>	3.47	0.58

Table 3. Biodiversity status of the found catfishes

Family	Species	IUCN, 2000	Present status
Bagridae	S ₁ <i>Hemibagrus menoda</i>	NO	VU
	S ₂ <i>Mystus bleekeri</i>	NO	NO
	S ₃ <i>M. tengara</i>	NO	VU
	S ₄ <i>M. vittatus</i>	NO	NO
	S ₅ <i>Rita rita</i>	CR	VU
	S ₆ <i>Sperata aor</i>	VU	VU
	S ₇ <i>S. seenghala</i>	EN	VU
Clariidae	S ₁ <i>Clarias batrachus</i>	NO	NO
Heteropneustidae	S ₁ <i>Heteropneustes fossilis</i>	NO	NO
Pangasiidae	S ₁ <i>Pangasius hypophthalmus</i>	EN	NO
Schilbeidae	S ₁ <i>Ailia coila</i>	NO	VU
	S ₂ <i>Clupisoma garua</i>	CR	VU
	S ₃ <i>Eutropiichthys vacha</i>	CR	VU
	S ₄ <i>Neotropius atherinoides</i>	NO	VU
	S ₅ <i>Silonia silondia</i>	EN	EN
Siluridae	S ₁ <i>Ompok pabda</i>	EN	EN
	S ₂ <i>O. bimaculatus</i>	EN	VU
	S ₃ <i>Wallago attu</i>	NO	NO
Sisoridae	S ₁ <i>Bagarius bagarius</i>	CR	EN

NO – Not threatened; VU – Vulnerable; EN – Endangered; CR – Critically Endangered; S – Species.

Biodiversity status of the catfishes

Biodiversity status of the observed catfishes was determined using the value of biodiversity index and species richness. The present biodiversity status of the found catfishes was considered between two broad categories (Threatened and Not threatened). Among the 19 found catfishes 6 species were Not threatened (NO) and 13 species were considered as threatened categories. Among the 13 threatened species, 3 were Endangered (*Silonia silondia*, *Ompok pabda* and *Bagarius bagarius*) and rest 10 were Vulnerable catfish species. *Wallago attu*, *Mystus bleekeri*, *Clarias batrachus*, *Pangasius hypophthalmus*, *Heteropneustes fossilis* and *M. vittatus* were considered as Not threatened categories (Table 3).

A comparison of the present biodiversity status (percentage of threatened categories) with the status of IUCN, 2000 has been presented in Figure 3. Among the found catfishes 32% were Not threatened (NO) categories and rest 68% were threatened categories of which 52% were Vulnerable (VU) and 16% were Endangered species. There was no critically endangered (CR) species among the catfishes found in the present study.

DISCUSSION

In fact, how many catfishes we have in Bangladesh is a controversial issue. Actually no countrywide survey has been conducted ever before and there is no proper collection of preserved catfishes anywhere in Bangladesh. That is why no proper taxonomic identification of all the freshwater catfishes has been made. Rahman (2005) described 55 species of freshwater catfishes under 13 families in his book "Freshwater Fishes of Bangladesh". However, according to IUCN (2000), 54 species of fishes belong to the Order Siluriformes which is called catfish Order. Sylhet-Mymensingh basin fish stock assessment (2002) recorded a total of 21 catfishes. While Ali et al. (2004) reported 12 species were catfish in fish landing centers of Khulna district. During the study period 19 species of catfishes under 7 families were found.

From the literatures it can be said that about 59 species of freshwater catfishes are available in Bangladesh under 13 families. In the present study the number of found catfishes was 7, 5, 3 and 1 under the family Bagridae, Schilbeidae, Siluridae and Sisoridae, respectively. There are 13, 7, 5 and 17 species of the family Bagridae, Schilbeidae, Siluridae and Sisoridae, respectively in Bangladesh. Sarker et al. (2008) found 11, 6, 4 and 10 species of the above respective families. The number of found catfishes in the present study under these families is lower than the previous studies. It might be due to conducting the survey in limited areas over a limited period of time.

The smallest among the catfish families are Clariidae and Heteropneustidae. Each of the two families has only

one species in Bangladesh and both were identified in the present study. This finding is similar to the result of Sarker et al. (2008). However, the highest number of catfish species (7) was found from the family Bagridae. The families of which no member was found during the present study were Amblycipitidae, Ariidae, Chacidae, Erethistidae, Olyridae and Plotosidae. According to Patra (2011) Bagridae was the dominant family with two representatives, whereas Amblycipitidae, Chacidae, Olyridae, Sisoridae and Siluridae were each represented by single species in West Bengal.

In the present study, out of 19 collected species 10 species can be categorized under small indigenous species. All the catfishes found are used as food fish.

Abundance and distribution of the catfishes

All the documented catfish species were not available in all the times and all the study sites over the study period. Some species were more available in summer but not in winter whereas others were more available in winter but not in summer. Ahmad (1997) observed that seasonal fluctuation in the fish species is a normal phenomenon.

In the present study, the exotic and now intensively cultured *Pangasius hypophthalmus* was highly abundant species whereas *Heteropneustes fossilis* and *Wallago attu* were abundant and *Mystus bleekeri*, *M. vittatus* and *Clarias batrachus* were less abundant species. *Silonia silondia*, *Ompok pabda* and *Bagarius bagarius* were the rare catfish among the 19 found catfishes. The author also found *Hemibagrus menoda*, *Rita rita*, *Eutropiichthys vacha* and *Bagarius bagarius* as rare and *Silonia silondia* as very rare catfish.

Catfishes of Bangladesh are distributed in the various waterbodies. The freshwater catfish belonging to the family Siluridae is found in the beels, haors, baors, floodplains, ponds, stream and rivers of Bangladesh. (Siddiqua et al., 2000).

Threatened catfishes

According to IUCN (2000), there are 54 species of catfishes in Bangladesh and among them 17 species are threatened. Among the total number of species found during the study, 10 species were threatened based on IUCN (2000) Red List of Threatened Fishes of Bangladesh. According to IUCN Bangladesh National Categories, this study found 4 critically endangered (CR), 5 Endangered (EN), 1 Vulnerable (VU) and 9 Not threatened (NO) catfish species. The highest number of catfish species was found from the threatened categories. The present biodiversity status of the found catfishes is something different from the IUCN (2000) status. Among the 19 found catfishes 6 species were not threatened (NO) and 13 species were considered as threatened categories.

In the present study 32% catfish were not threatened and 68% species were threatened catfish. Among the

threatened fishes 16% species were considered as Endangered and 52% species were considered as Vulnerable. There was no species under the status of critically endangered in the present study. According to IUCN (2000), the study found 21% critically endangered, 26% Endangered, 5% Vulnerable and 48% Not threatened species of catfish. Ali et al. (2004) stated 7 species of catfish (*Ompok pabda*, *Sperata aor*, *Rita rita*, *Eutropiichthys vacha*, *Wallago attu*, *Pangasius hypophthalmus* and *Bagarius bagarius*) as Endangered.

CONCLUSION

The social and economic importance of catfishes is high. Catfishes are considered as valuable freshwater fishes because of its medicinal value. A number of the catfishes in Bangladesh are considered as Small Indigenous Species (SIS) which have not only high protein value but also aesthetic importance as these are used as ornamental fishes. However, catfishes are becoming threatened due to its high demand but low supply. These valuable catfishes will be extinct in near future if effective conservation measures are not taken from now. To protect the valuable catfishes of Bangladesh it is essential to improve the fish habitat. For this purposes, the authority of the country should strengthen and enforce the fishing law properly. As these fishes are economically important, qualitative and quantitative study on the availability of catfishes throughout the country is needed. Hence, a long term investigation of the catfishes is essential not only for the protecting biodiversity but also supporting the poor people for their sustainable livelihood. Therefore, the Government, NGOs, national and international organizations should take necessary measures to protect and conserve these valuable catfishes.

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