

Seasonal Abundance of Fin Fishes in the Padma River at Rajshahi District, Bangladesh

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Abstract: The Padma River is one of the longest and major rivers in Bangladesh supporting a large number of aquatic species and livelihood for many fishermen living beside it where this study was conducted from July 2009 to June 2010. This study reveals the seasonal variation of fish fauna in the river. A total of 69 species were recorded belonging to 10 orders, 25 families and 47 genera. The most dominant fish order was Cypriniformes contributing 25 species in 15 genera. Cyprinidae was most dominant family contributing 22 species in 13 genera. Seven alien species were found. Maximum 67 species were recorded in the month of August, September and December of 2009 and in May and June of 2010; whereas the lowest number of fish species (65) was observed in April (2010). Twenty six species have been considered threatened by IUCN Bangladesh. These fishes were belonging to the following categories, Vulnerable (13.04%), Endangered (13.04%) and Critically Endangered (8.70%) of the total fish species. Comparing the results with the previous findings, it was revealed that the species abundance and diversity have declined in the Padma River over time. Considering all the findings it is concluded that the Padma River can be considered a refuge for conservation of threatened freshwater fishes of Bangladesh. The conservation efforts should ensure minimization of anthropogenic impacts, especially the fishing pressure and introduction of alien invasive species.

Key words: Padma River • Fish Fauna • Fish Biodiversity • Conservation • Alien Species • Threatened Species

INTRODUCTION

The fishes are the most diverse and most abundant vertebrate in world and about 40% of them live in freshwater [1]. Bangladesh is rich in her fish fauna supporting at least 265 freshwater fin fish species [2]. The Padma River is one of the longest and major freshwater rivers in Bangladesh and considered home to a large number of aquatic species and livelihood for many fishermen living beside it. This river believed to an important feeding and breeding ground for many riverine fishes of the country. A large amount of fishes along with other fisheries organisms (e.g. prawn) are harvested each year from this river reflecting the richness of water bodies of Bangladesh. But, at present time loss of aquatic biodiversity from natural water bodies is a crucial problem in Bangladesh [3-5].

Available research efforts have suggested that fish diversity of many large and renowned water bodies of the country including the mighty Padma is at stake [3-7]. Already a total of 54 species of fishes of Bangladesh have been declared threatened by IUCN Bangladesh [8]. But this became antiquated and there is need for updated list to understand the present status. Water body specific biodiversity research will be of great help in this aspect.

Though few research works have been conducted in river Padma and the researchers have listed available fish species in the river [7, 9-11]. All these efforts were made to make a list of available fish species and no statistical data were presented regarding recorded fish species. So it is quite impossible to understand the existing status of fishes in the river Padma. Moreover, in these researches, some controversial results were also presented. As for example, according to Rahman *et al.* [7] species like *Labeo*

nandina and *Batasio tengara* (locally called *Nandil* and *Tengra* respectively) were available in Padma in recent years, which are believed to be extinct in water bodies of Bangladesh [12]. So there is a need for in depth research rather than simple detection of species available. However, in our paper we tried to reveal existing fish species with amount of catch made by some specific fishing gears.

MATERIALS AND METHODS

Study Area and Duration: This study was conducted in the Padma River at Rajshahi city corporation area of Rajshahi district, Bangladesh. About three kilometers area of river, from Balu Ghat, Talaimary to Jahaj Ghat, Dharampur (approximately 24°20' N latitude; 88°30' E longitude) (Fig. 1), was surveyed for a period of one year (July 2009 to June 2010).

Sampling Framework: Weekly field survey was carried out with the help of professional fishermen in the study area. These fishermen harvested fish with different fishing gears and catch per unit effort (CPUE) was measured as the amount of harvest (in kg). A digital balance (up to 0.01 g) and pan balance was used to measure the amount of harvest of an individual species.

Four fishing nets and two fishing traps were employed for the sampling purpose. Fishing nets were *Ber jal* (seine net, mesh size 0.5-5.0 cm), *Fas jal* (gill net, mesh size 2-4 cm), *Khepla jal* (cast net, mesh size 2 cm) and *Thela jal* (push net, mesh size 0.5-1.5 cm). Fishing traps were locally called *Kholsun*, *Dohar*, *Taghi* and *Chipani*. In the evening, the *Fas jal* and fishing traps were fixed in the water for overnight. Early morning in the next day, the net and traps were taken out of the water. *Ber jal* was operated at late night for 3-4 hours with the help of professional fishermen. *Khepla jal* and *Thela jal* were operated during daylight and catch of 15 hauls were considered during each sampling.

Specimen Collection and Identification: Specimens of recorded fish were collected, preserved (rare species only) and identified based on the morphometric and meristics characters following [2, 13-14]. The specimens were preserved in 10% buffered formalin solution in leveled plastic jars. IUCN Red list status was based on IUCN Bangladesh [8].

Data Analyses: Collected data were analyzed by computer software Microsoft Excel 2007.

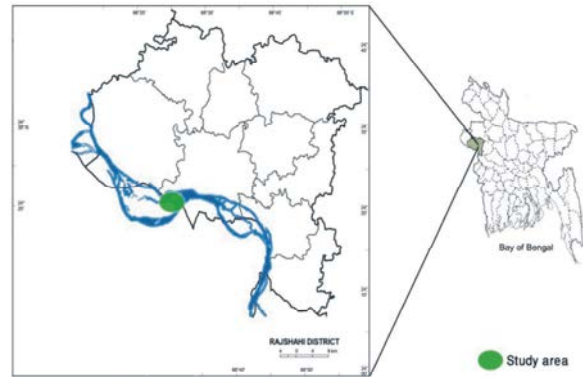


Fig. 1: Map of the Padma River in Rajshahi district showing sampling area

RESULTS

Diversity of Fish Species: Sixty nine fish species were recorded in the present study belonging to 10 orders, 25 families and 47 genera. The most dominant fish order was Cypriniformes contributing 25 species in 15 genera followed by Siluriformes contributing 16 species in 12 genera and so on (Table 1). Cyprinidae was most dominant family contributing 22 species in 13 genera. Of the available species, 7 were exotic and all were popular aquaculture species in Bangladesh.

Month-Wise Availability of Fish Species: Figure 2 represents the month-wise availability of fish species in the Padma River. No major variation was observed in species availability in relation to months. Maximum 67 fish species were recorded in the month of August, September and December of 2009 and in May and June of 2010; whereas the lowest number of fish species (65) was observed in April (2010) (Fig. 2).

Amount of Catch: Month-wise variation in catches is shown in figure 3. In all the months, except for November and December of 2009, Cypriniformes was the dominant group in terms of catch amount. Catfish order Siluriformes dominated in those two months. A considerable amount of catch was also formed by order Perciformes and Clupeiformes (Fig. 3). Considering the amount (weight) of catch, *Bagarius bagarius* contributed maximum 3.95% of total harvest followed by *Channa punctata* (3.56%) and so on; whereas the lowest contribution came from *Synaptura orientalis* contributing only 0.10% of total catch.

Table 1: Fin fishes of the Padma River focusing seasonal availability and local conservation status

Order	Family	Species	Abundance		Red list status**	% of catch***
			Peak	Lean		
Beloniformes	Belonidae	<i>Xenotodon cancila</i>	Dec	Mar	NO	1.20
Clupeiformes	Clupeidae	<i>Corica soborna</i>	Oct	Aug	NO	1.43
		<i>Gonialosa manmina</i>	Jun	Jul	NO	0.75
		<i>Gadusia chapra</i>	Jun	Mar, Jul	NO	1.14
		<i>Tenualosa ilisha</i>	Sep	Dec	NO	2.69
	Engraulidae	<i>Setipinna phasa</i>	Jun	Apr	NO	1.96
		<i>Setipinna taty</i>	Dec	Apr	NO	2.13
Cypriniformes	Cyprinidae	<i>Amblypharyngodon mola</i>	Jun	Aug	NO	1.41
		<i>Aspidoparia jaya</i>	Jun	Apr	DD	1.19
		<i>Aspidoparia morar</i>	Jun, Dec	Apr	DD	1.43
		<i>Catla catla</i>	Sep	Oct, Nov	NO	1.94
		<i>Labeo bata</i>	Nov	Apr	EN	2.39
		<i>Labeo calbasu</i>	Jun	Jul, Aug	EN	3.02
		<i>Labeo rohita</i>	Sep	Oct	NO	1.60
		<i>Aristichthys nobilis*</i>	Jun	Apr	NO	1.16
		<i>Cyprinus carpio communis*</i>	Jun, Oct	Feb	NO	0.25
		<i>Cyprinus carpio specularis*</i>	Oct	Mar	NO	0.79
		<i>Cirrhinus reba</i>	Oct	Apr	VU	1.57
		<i>Cirrhinus cirrhosus</i>	Jun	Oct, Nov	NO	1.58
		<i>Ctenopharyngodon idella*</i>	Dec	Apr	NO	2.58
		<i>Esomus danricus</i>	Jun	Apr	DD	3.15
		<i>Hypophthalmichthys molitrix*</i>	Jun	Feb	NO	2.35
		<i>Osteobrama cotio</i>	Jun	Apr	EN	0.99
		<i>Puntius gonionotus*</i>	Jun	Feb	NO	0.92
		<i>Puntius sarana</i>	Dec	Apr	CR	1.24
		<i>Puntius sophore</i>	Jun	Mar	NO	1.16
		<i>Puntius ticto</i>	Jun	Feb	VU	0.78
	Cobitidae	<i>Salmostoma bacaila</i>	Jun	Mar	NO	1.72
		<i>Salmostoma phulo</i>	Nov	Apr	NO	1.97
		<i>Botia dario</i>	Jun	Sep	EN	0.33
		<i>Botia lohachata</i>	Jun	Oct	EN	0.27
		<i>Lepidocephalus guntea</i>	Jun	Sep	NO	0.34
Perciformes	Ambassidae	<i>Chanda nama</i>	Jun, Dec	Sep	VU	0.41
		<i>Chanda ranga</i>	Dec	Mar	VU	0.26
	Anabantidae	<i>Anabas testudineus</i>	Jun	Feb	NO	0.53
	Channidae	<i>Channa punctata</i>	Jun	Jul	NO	3.56
		<i>Channa orientalis</i>	Jun	Jan	VU	1.61
		<i>Channa striata</i>	Jun	Feb	NO	2.24
	Gobiidae	<i>Glossogobius giuris</i>	Nov	May	NO	1.40
	Osphronemidae	<i>Colisa fasciata</i>	Nov	Jul	NO	0.53
		<i>Colisa lalia</i>	Nov	Jul	NO	0.41
	Sciaenidae	<i>Otolithoides pama</i>	Dec	Mar	NO	1.15
	Cichlidae	<i>Oreochromis mossambicus*</i>	Dec	Apr	NO	2.36
	Nandidae	<i>Nandus nandus</i>	Jun	Mar	VU	0.94
		<i>Badis badis</i>	Nov	Jul, Aug	EN	0.32
Mugiliformes	Mugilidae	<i>Rhinomugil corsula</i>	Jun	Feb	NO	1.22
Siluriformes	Bagridae	<i>Mystus aor</i>	Dec	Mar	VU	1.47
		<i>Mystus seenghala</i>	Dec	Feb	EN	2.33
		<i>Mystus tengara</i>	Nov	Apr	NO	2.52
		<i>Mystus vittatus</i>	Nov	Apr	NO	2.06
		<i>Rita rita</i>	Jun	Apr	CR	1.06
		<i>Clarias batrachus</i>	Aug	Mar	NO	1.76
	Heteropneustidae	<i>Heteropneustes fossilis</i>	Jun	Mar	NO	1.55
	Pangasiidae	<i>Pangasius pangasius</i>	Nov	Jan	CR	3.03
	Schilbeidae	<i>Ailia coila</i>	Dec	Apr	NO	0.90
		<i>Clupisoma garua</i>	Dec	May	CR	2.29
		<i>Eutropiichthys vacha</i>	Jun	Mar	CR	0.88
		<i>Pseudeutropius atherinoides</i>	Oct	Mar	NO	1.23

Table 1: Continue

Order	Family	Species	Abundance		Red list status**	% of catch***
			Peak	Lean		
	Siluridae	<i>Ompok bimaculatus</i>	Dec	Feb, Mar	EN	1.21
		<i>Ompok pabda</i>	Dec	Feb	EN	0.85
		<i>Wallago attu</i>	Dec	Apr	NO	1.99
		<i>Bagarius bagarius</i>	Oct	Mar	CR	3.95
Synbranchiformes	Mastacembelidae	<i>Mastacembelus armatus</i>	Jun	May	EN	1.02
		<i>Mastacembelus pancalus</i>	Dec	Apr	NO	0.82
		<i>Macrognathus aculeatus</i>	Dec	Jun-Sep	VU	0.53
Osteoglossiformes	Notopteridae	<i>Notopterus chitala</i>	Jun	Jan, Feb	EN	1.58
		<i>Notopterus notopterus</i>	Jun	Feb, Mar	VU	1.47
Pleuronectiformes	Soleidae	<i>Synaptura orientalis</i>	Jul	Sep	NO	0.10
Myliobatiformes	Dasyatidae (Trygonidae)	<i>Trygon</i>	Sep	Except Sep	NO	1.03

* Exotic fish species **Based on IUCN Bangladesh [8]; CR=Critically Endangered, VU = Vulnerable, EN=Endangered, DD = Data Deficient, NO = Not Threatened *** Percentage of fish species by total amount (weight) caught

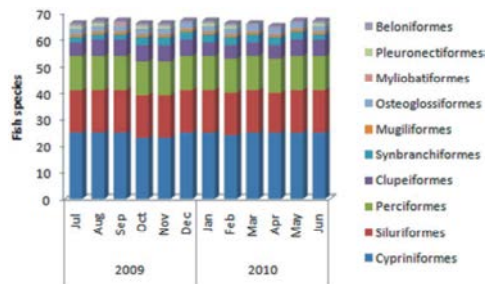


Fig. 2: Month-wise fish species availability in the Padma River

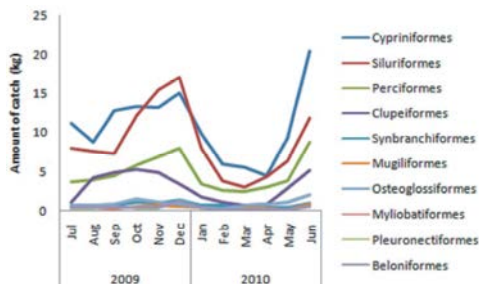


Fig. 3: Month-wise variation in catches (kg) of various fish orders

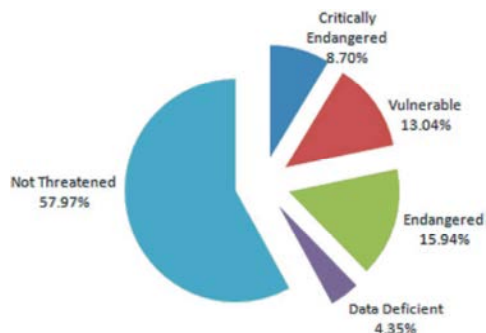


Fig. 4: Status of fish species in the list of threatened fishes of Bangladesh, based on IUCN Bangladesh [8]

Local Conservation Status: A total of 26 fish species have been recorded from the present study considered threatened by Bangladesh IUCN Bangladesh [8]. These fishes were belonging to following categories, Vulnerable, Endangered and Critically Endangered contributing 13.04%, 15.94% and 8.70% respectively of the total fish species recorded (Fig. 4). No management for the conservation of threatened fish species in the river was found.

DISCUSSION

Marked decline in number of available fish species was revealed from the present study. Islam and Hossain [9] recorded 110 fish species whereas only 69 species are recorded in the present study. This reduction in the number of fish species reflects the current scenario of water bodies of Bangladesh. Reduction in number and abundance of fish species is mainly due to anthropogenic impacts, especially the fishing pressure, destruction of natural habitats by constructing roads and so on. Bhuiyan *et al.* [11] reported 73 species of fish which also indicates that number of fish species decreasing in course of time in the Padma River.

Still rich and diversified fish species are found in the Padma River than that of many water bodies outside Bangladesh, especially the neighbor country India [15-23]. However maximum number of recorded fish species was also found lower than that of Rahman *et al.* [7] who mentioned that 80 fin fish species were available in the Padma River. They reported existence of *Labeo nandina* and *Batasio tengara* in river but these two species were not found in the present study. This variation in results might be due to variation in sampling procedure followed in the study, as Rahman *et al.* [7] surveyed various fish

landing centers adjacent to the Padma River where fishes from many other sources are landed. Furthermore, it is not a reliable method to study biodiversity by studying fish landing centers or markets.

Total number of threatened fish species found (26) in the present study was almost half of the total threatened fish species (54) of Bangladesh [8]. A large portion of fish species (37.68%) were belonging threatened categories indicates degradation in fish abundance and its diversity in the Padma River. The present status in the Padma River is similar to others water bodies of Bangladesh [3-5]. No implementation of conservation method was also observed indicates less or no attention by the appropriate authority *i.e.* government organizations. However, this type of ignorance by the authority was also noticed by Mohsin *et al.* [24] while working in Bookbhara Baor in Jessore district of the country. This river might serve as an appropriate place for natural conservation of threatened indigenous fish species if proper management like establishment of sanctuary could be implemented.

Presence of alien fish species obviously poses threat to native species. This is because of that the alien species are responsible for undermining the production of native species [25]. Alien fish like tilapia can multiply rapidly and takes less time to establish itself in a body of water. This species was also reported from other natural water bodies of the country during rainy seasons only [3, 5] but it is found round the year in the Padma River. Regular monitoring of impacts of non-native species to the indigenous fish species is essential otherwise their population could multiply at the expense of native species. However, it is the most desirable to prevent the introduction of alien species [5, 26].

There is no previous study showing the catch statistics of fishes in the Padma River. Therefore it is not possible to compare the present findings with the previous one. This problem is not a rare one in Bangladesh and also reported by Galib *et al.* [4] while working on fish biodiversity study in the Choto Jamuna River.

CONCLUSION

In conclusion, still there was a rich diversity of fishes in the Padma River, though anthropogenic effects were much higher especially fishing pressure and presence of alien species. Immediate management is essential regarding presence of exotic species. A major part of the total fishes were considered threatened species in

Bangladesh. Thus, the Padma River can be considered a refuge for conservation of threatened freshwater fishes of Bangladesh. The conservation efforts should ensure that the current status of fish fauna is maintained by minimizing anthropogenic impacts, especially the fishing pressure and introduction of alien invasive species.

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