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Ornamental Fish Diversity of Mridangabhanga River- A Distributaries of River Ganga

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ABSTRACT

The present study was conducted to assess the distribution of ornamental fishes of the Mridangabhanga River and investigated the core threats to the ichthyofaunal community to ensure conservational strategies to protect the River and its biota. The study was conducted in the pre-monsoon and post-monsoon seasons at five sites: S1. Kadamtala, S2. Purbo Dwarakapur, S3. Brojoballavpur, S4. Kedarpur, S5. Bolerhat during the study period. During the study a total of 49 fish species were identified as ornamental fishes belonging to 31 genera, 20 families and 6 orders. The maximum number of fish species was from Order Cypriniformes (35%). The Mridangabhanga River is home to these fish species; furthermore, the ovulating females among them serve as a valuable source that could contribute to the growth of their population in the river.

Keywords: *Ichthyofaunal Diversity; Indigenous; Mridangabhanga River; Ornamental Fishery*

Introduction

The anthropogenic activity has drastically changed the river ecosystem, which has created adverse effects on aquatic flora and fauna. The ichthyofaunal composition of all aquatic bodies is in stress due to this adversity. Moreover, unfavourable environmental effects like heavy storms and severe droughts were added adversity to the manmade lethal influences. This area during every monsoon season experiences a high tidal effect, and the embankment area always gets collapsed due to it (Chakraborty & Adhikary, 2014). The only way to protect the existing ichthyofaunal diversity of this river is to go through sustainable exploitation. Periodic assessment of the ichthyofaunal population is essential (Sheikh & Goswami, 2014). Siligato and Bohmer (2001), in their extensive study, depicted that fish as an indicator in the assessment of water quality was the best option due to easy availability and being economy friendly. Sarkar (2021) identified ninety fish species from Mridangabhanga River from three study sites, but the present study intended to identify the ornamental fishes which are native to this River. The Ornamental fishes are the most special fishes, which are gifted with beautiful colouration with spots on the body, tail, or fins. they are unique in behavior some had special feeding habits (Allison *et al*., 1998; Brooks *et al*., 2002; Chakraborty *et al*., 2021). Most of these fish species could be easily bred in captivity, and the population could be increased according to market value (Bhattacharjya, Sugunan & Choudhury, 2000). This research work intended to identify those species of ornamental fishes which are indigenous and easily available in this Mridangabhanga River (Table 1). The Fishermen

community as well as local people who exploit river wealth for their livelihood, might take the opportunity to manage and conserve these aquatic jewels for the betterment of their life status.

Table 1: List of Ornamental Fishes of Mridangabhanga Rivere water level in the U-tube just touches and wets the sintered glass at the beginning.

SL.NO.	CLASS	ORDER	FAMILY	SUB FAMILY	NAME OF THE FISH	STATUS
1	Actinopterygii	Kurtiformes	Kurtidae		*Kurtus indicus*	NE
2	Actinopterygii	Perciformes	Ambessidae		*Ambassis kopsii*	NE
3	Actinopterygii	Perciformes	Ambessidae		*Chanda nama*	LC
4	Actinopterygii	Perciformes	Ambessidae		*Parambassis baculis*	LC
5	Actinopterygii	Perciformes	Ambessidae		*Parambassis ranga*	LC
6	Actinopterygii	Anabantiformes	Badidae		*Badis badis*	LC
7	Actinopterygii	Anabantiformes	Nandidae		*Nandus nandus*	LC
8	Actinopterygii	Anabantiformes	Osphronemidae		*Trichogaster fasciata*	LC
9	Actinopterygii	Anabantiformes	Osphronemidae		*Trichogaster lalius*	LC
10	Actinopterygii	Anabantiformes	Osphronemidae		*Trichogaster chuna*	LC
11	Actinopterygii	Anabantiformes	Channidae		*Channa orientalis*	VU
12	Actinopterygii	Anabantiformes	Channidae		*Channa punctate*	LC
13	Actinopterygii	Anabantiformes	Channidae		*Channa striata*	LC
14	Actinopterygii	Beloniformes	Belonidae		*Xenentodon cancila*	LC
15	Actinopterygii	Clupeiformes	Clupeidae		*Corica soborna*	LC
16	Actinopterygii	Clupeiformes	Clupeidae		*Nematalosa galatheae*	LC
17	Actinopterygii	Clupeiformes	Engraulidae		*Setipinna tenuifilis*	DD
18	Actinopterygii	Cypriniformes	Danionidae		*Parluciosoma daniconius*	LC
19	Actinopterygii	Cypriniformes	Cyprinidae		*Amblypharyngodon mola*	LC
20	Actinopterygii	Cypriniformes	Cyprinidae		*Esumusdanricus*	LC
21	Actinopterygii	Cypriniformes	Cyprinidae		*Laubuka fasciata*	NT
22	Actinopterygii	Cypriniformes	Cyprinidae		*Labeo angara*	LC
23	Actinopterygii	Cypriniformes	Cyprinidae		*Puntius chola*	LC
24	Actinopterygii	Cypriniformes	Cyprinidae		*Puntius conchonius*	LC
25	Actinopterygii	Cypriniformes	Cyprinidae		*Puntius amphibious*	DD
26	Actinopterygii	Cypriniformes	Cyprinidae		*Puntius binotatus*	LC
27	Actinopterygii	Cypriniformes	Cyprinidae		*Puntius puntio*	NE
28	Actinopterygii	Cypriniformes	Cyprinidae		*Puntius phutunio*	LC
29	Actinopterygii	Cypriniformes	Cyprinidae		*Puntius sophore*	LC
30	Actinopterygii	Cypriniformes	Cyprinidae		*Puntius terio*	LC
31	Actinopterygii	Cypriniformes	Cyprinidae		*Puntius ticto*	LC
32	Actinopterygii	Cypriniformes	Cyprinidae	Danionidae	*Rasbora daniconius*	LC
33	Actinopterygii	Cypriniformes	Cyprinidae	Danionidae	*Danio rerio*	LC
34	Actinopterygii	Cypriniformes	Cyprinidae	Danionidae	*Danio aequipinnatus*	LC
35	Actinopterygii	Cypriniformes	Cyprinidae	Barbinae	*Pethiacon chonius*	LC
36	Actinopterygii	Cypriniformes	Cobitidae		*Lepidocephalichthys guntea*	LC
37	Actinopterygii	Siluriformes	Siluridae		*Wallago attu*	VU
38	Actinopterygii	Siluriformes	Bagridae		*Mystus bleekeri*	LC

39	Actinopterygii	Siluriformes	Bagridae		*Mystus cavasius*	LC
40	Actinopterygii	Siluriformes	Bagridae		*Mystus gulio*	LC
41	Actinopterygii	Siluriformes	Bagridae		*Mystus vittatus*	LC
42	Actinopterygii	Siluriformes	Bagridae		*Silonia silondia*	LC
43	Actinopterygii	Siluriformes	Pangasilidae		*Pangasius pangasius*	LC
44	Actinopterygii	Siluriformes	Clariidae		*Clarias batrachus*	LC
45	Actinopterygii	Mugiliformes	Mugilidae		*Rhinomugil corsula*	LC
46	Actinopterygii	Gobiliformes	Oxudercidae		*Glossogobius giuris*	LC
47	Actinopterygii	Synbranchiformes	Mastacembelidae		*Macrognathus pancalus*	LC
48	Actinopterygii	Synbranchiformes	Mastacembelidae		*Mastacembelus armatus*	LC
49	Actinopterygii	Osteoglossiformes	Notopteridae		*Notopterus notopterus*	LC

LC: Least concerned category; NT: Nearly Threatened; NE: Not Evaluated ; VC: vulnerable category; DD : Data deficit; ED: Endangered species

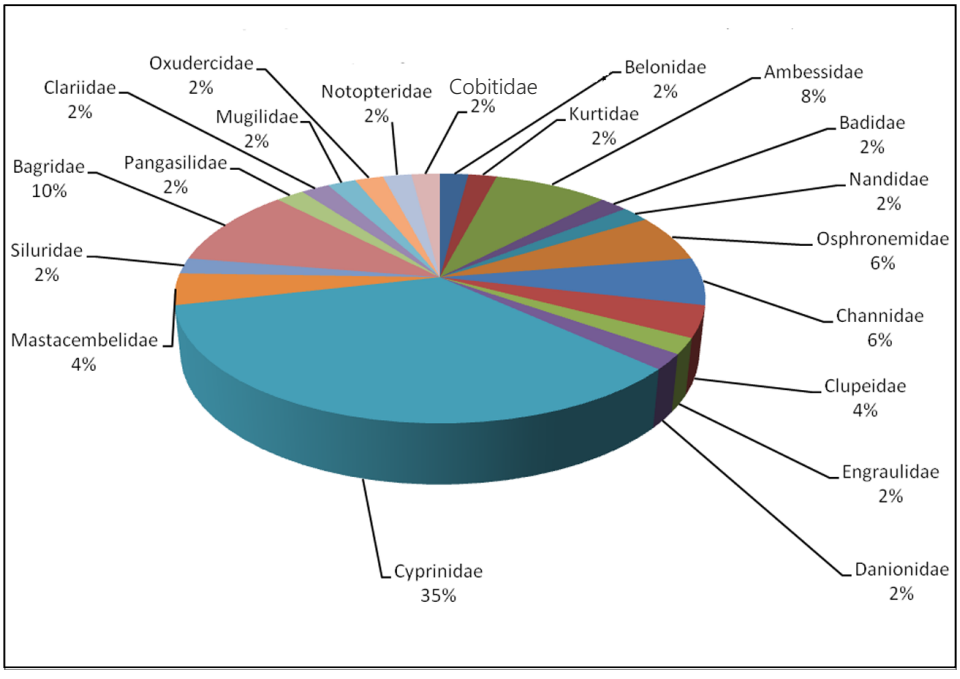

Figure 1: Ornamental Fish Diversity of Mridangabhanga River According to Orders

Methodology

All through three consecutive years (2022, 2023 and 2024) study of ornamental fishes of the Mridangabhanga River was done in three seasons: premonsoon, monsoon, and postmonsoon. The study was conducted in the pre-monsoon and post-monsoon seasons at five sites: S1. Kadamtala, S2. Purbo Dwarakapur, S3. Brojoballavpur, S4. Kedarpur, S5. Bolerhat (Figure 1). Two among the five study sites (S3. Brojoballavpur, S4. Kedarpur) were selected on the basis of presence of fish farms on the river bank, and the fifth (S5. Bolerhat) was selected as it has a large fish landing station the first

and second study sites (S1. Kadamtala, S2. Purbo Dwarakapur), are undisturbed and have less human infiltration. The fish farms on the river bank at S2. Purbo Dwarakapur, S3. Brojoballavpur for their culture solely depended on the fish seed collected from the Mridangabhanga River. Different fishing gears and crafts were engaged, and also fishermen were engaged in all collection sites for the stipulated time in three seasons. Identification up upto Species level was done following Day (1888), Talwar and Jhingran (1991) and Jayaram (1999).

Figure 2: Map Showing Study Sites at Mridanga Bhanga River

During the study fish sampling was done throughout the day (7 a.m. to 6 p.m.) using Kheplajal mesh size (1.5 cm ×1.5 cm and 2 cm ×2 cm). For extensive fish catch, most of the local fishermen were engaged at all the study sites for fishing. The sites that were within one kilometre were included during netting. Initial identification was done in the field, keeping all the catch in a large, water-filled tub kept on the catch site then oozing female and juveniles were released immediately in river water at the catch site. Further detailed identification was done in the laboratory for those fishes which were preserved in 20% formalin solution (Sarkar & Banerjee, 2010). The hydrological parameters analyzed-alkalinity, pH, temperature, dissolved oxygen, transparency, and salinity-were measured using standard procedures outlined by the American Public Health Association (1999).

Discussion

The study of ornamental fishes of the Mridangabhanga river reveals a rich diversity of freshwater, estuarine and marine fishes. During the study a total of 49 Fish species were identified as ornamental fishes belonging to 6 Orders, a list of fishes indicating

their systematics was shown in Table 2. The study reveals that Cyprinidae was the most dominant family, consisting of 35% of the total fish population, followed by the Bagridae (10%), Ambessidae (8%), Osphronemidae and Channidae 6%, Mastacembelidae and Clupeidae (4%), the other 13 families Belonidae; Kurtidae; Badidae; Nandidae; Engraulidae; Danionidae; Siluridae; Pangasilidae, Clariidae; Mugilidae; Oxudercidae; Notopteridae; Cobitidae contributes only (1%) represents of the diversity of fish fauna Figure depicts the pie chart that indicated the family-wise percentage data of the total fish catch.

Table 2: Shows the fish species diversity of Mridangabhanga at S1. Kadamtala, S2. Purbo Dwarakapur, S3. Brojoballavpur, S4. Kedarpur, S5. Bolerhat Bolerhat during the study period

		January 2021 to December 2021	January 2022 to December 2022	January 2023 to December 2023	January 2024 to December 2024
S1	Species Richness	49	49	49	49
	Margalef Index	11.15254	5.601416	5.698451	8.69789
	Shannon Wiener Index	4.085332	4.087129	4.094669	4.125793
S2	Species Richness	49	49	49	49
	Margalef Index	11.01297	11.30274	10.45873	8.21579
	Shannon Wiener Index	4.065523	4.069573	4.02587	4.01238
S3	Species Richness	49	49	49	49
	Margalef Index	11.06163	10.89804	11.87250	11.23490
	Shannon Wiener Index	4.010821	4.122512	3.928690	4.028791
S4	Species Richness	49	49	49	49
	Margalef Index	11.06163	10.89804	11.024578	11.002359
	Shannon Wiener Index	4.010821	4.122512	4.027396	4.28364
S5	Species Richness	49	49	49	49
	Margalef Index	11.06163	10.89804	10.702546	11.42568
	Shannon Wiener Index	4.010821	4.122512	4.026053	4.702863

According to the study, Order Kurtiformes represented one genus, one species; Perciformes with three genera, four species; Order Anabantiformes represented four genera, eight species; Order Beloniformes shows one genus, one species; Order Clupeiformes with three genera, three species; Order Cypriniformes carries nine genera, nineteen species; Order Siluriformes represented six genera, eight species; Order Mugiliformes included one genus, one species; Order Gobiiformes with one genus, one species; Order Synbranchiformes two genera, two species; and Order Osteoglossiformes showed one genus, one species. The study of hydrological parameters during the study showed there were not many variations in all five study sites and might not have affected the ichthyofaunal diversity. The main damage that is evident in the Mridangabhanga river valley is the soil erosion and riverbank collapse every year; high rainfall destroys manmade earthen embankments during the monsoon, which

affects the ecology of river water as well as the aquatic faunal composition. Dhara and Paul (2016) extensively studied the topography of Patharpratima block , the rivers embankments, as well as the livelihood of local people in this block. Their research outcome indicated that the area showed a meshwork of distributaries of the River Ganga, including Mridanga-Bhanga, Baratala, Hoogly, Saptamukhi, Thakuran, Matla, Gosaba, bidya, Hatania-Duania, and Herobhanga. The rivers were filled by sea tides diurnally at high tide. Chakraborty *et al.* (2021) and Chakraborty and Adhikary (2014) explained the increased salinity during hightide damages cultivation and compels the local people to shift their livelihood more towards fishing. This study referred to the high salinity (Table 3) during high tide in the river water as well as blind channels that corroborate the research data of Dhara and Paul (2016). Brooks *et al*. (2002) indicated that transparency of river water is one of the essential factors for ornamental fishes to survive; this study's results indicated a better value of transparency throughout the study period (Table 3). Allison and Kepple (2001) and Sarkar (2024) indicated the pollution effect caused by the toxic metals in the lower stretch of the Damodar River which might have influenced the ichthyofaunal diversity in the lower stretch of the river. But the recent study indicated that there are some undisturbed areas in the Mridangabhanga river that provided shelter to the fishes. The blind channels originating from mainstream shows a good number of oozing females of *Macrognathus pancalus, Mastacembelus armatus, Rasbora daniconius; Lepidocephalichthys guntea; Notopterus notopterus; Wallago attu (VU); Channa orientalis (VU); Laubuka fasciatus (VU).* Among these fishes, *Wallago attu* and *Channa orientalis, Laubuka fasciatus* were marked as vulnerable fish species in the IUCN Red List 2025-1(International Union for Conservation of Nature, n.d.). The Mridangabhanga River houses these fish species; moreover, the oozing females of those were the good source that might enhance the species population in this river.

Table 3: Hydrology (Min and Max) of in Five Study Sites of Mridangabhanga River

Month	Temperature of Water		pH		Salinity(PSU)		DO(mg/l)		Transperency (cm)		Alkalinity(%)	
	Min	Max	Min	Max								
August	24.8	29.94	8.8	8.99	6.9	80.96	6.12	7.16	11	12.2	13.8	14.88
September	19.2	24.68	6.5	7.6	14.2	29.4	6.4	7.5	14	18.6	16	25.2
October	18.8	18.96	6.9	7	16.5	44.76	6.20	8.9	10	12.6	28.10	2.92
November	12.64	14	6.5	6.8	10	56.52	2.56	7.58	10	13.4	1.59	19
December	11	1294	7.01	7.9	11.2	15.90	6.23	8	10.8	1.42	13.2	16.6
January	12.2	12.66	6.2	6.8	14.8	89.26	7.9	8.2	12.0	12.2	1.58	13.88
February	11.4	11.88	8.8	7	22.3	74.56	8.5	8.9	16.8	16.82	21	22.3
March	13.64	14.08	4.9	5.9	14.10	84.02	6	8.5	12	14.2	18.27	19.6
April	17.9	17.99	6.0	6.2	24.8	58.88	8.3	8.7	15	1.52	14	15.8
May	31.28	31.58	6.8	8	10.6	28.82	5.9	6	12.9	13.6	20	20.88
June	30.70	32.12	7	7.2	14.5	79.0	7	8.4	7	8.01	12	19
July	30.62	33.67	4.5	5.6	11.8	66.9	6.9	7.5	9.6	12.6	27	28.9

Conclusion

The study reveals that the Mridangabhanga river houses a good number of food fishes and keeps a remarkable influence on the daily earnings for the local people. During this study, all the fish landing stations based on the fishes of the Mridangabhanga river, were surveyed; recorded data reveals that a daily constant supply of seven to ten metric

tonnes of fishes to the Kolkata fish markets was done.

The blind channels originating from the mainstream of the Mridangabhanga river show diverse ichthyofaunal composition in the post- and pre-monsoon seasons. The notable fact is that these river channels are least affected by draught effects during midsummer, Lepidocephalichthysguntea, Rasbora daniconius, Danio rerio, Danio aequipinnatus, Chanda nama, these fishes were recorded during premonsoon from these channels. Conservation of this river biota is of utmost necessity to protect the river as well as its unique ornamental fish species population. The fish farms at the riverbank should take care during seed collection to prevent overexploitation. Sustainable use of natural resources will definitely enhance the resource; on the other hand, it will increase the scope of economic opportunities, ensuring long-term resource availability. The farms should take care of the captive breeding of indigenous fish fauna and the farming of ornamental fishes. Mridangabhanga river ornamental fishes are a good alternate livelihood, which is more promising for the local people.

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