

FISH DIVERSITY, FISHING GEARS AND THEIR CATCH IN THE UPPER MATAMUHURY RIVER OF SOUTHEASTERN BANGLADESH

Arshad-ul-Alam, M.* and M. A. Azadi¹

Sunamganj Government College, Sunamganj-3000, Bangladesh; ¹*Department of Zoology, University of Chittagong, Chittagong-4331, Bangladesh*

*Corresponding author: arshadul001967@yahoo.com

Abstract

Finfish richness, their abundance, fishing gears and their catch in the upper Matamuhuri river were studied from January to December 2022 along the river course at hilly upstream of Bandarban Hill District. A total of 95 freshwater finfish species under 69 genera belonging to 36 families under 14 orders were recorded in this mountainous section of this river. Maximum number of species were recorded under the Family Cyprinidae (19 species) followed by Danionidae (11 species) and Bagridae (7 species). Amongst 95 finfish species 11 belonged to 'endangered' and 12 to 'vulnerable' category of threatened species and four were data deficient (*e.g. Barilius barila, Balitora brucei, Eleotris lutea* and *Oryzias dancena*) according to IUCN conservation status. *Neolissochilus* sp. and Golden Mahashol (*Tor puttitora*) are reported for the first time from the upstream of Matamuhuri River. A systematic list of recorded finfish with their English names, local names, abundance and conservation status is presented. Under eight categories, 16 types of fishing gears and their catch were documented of which two types of gears (Large push net - *Haddi Jal* and Bowl trap - *Bati Trap*) were new and not reported elsewhere earlier.

Key words: Matamuhuri river; Fish diversity; Fishing gears and traps; Fish catch.

INTRODUCTION

There is a surprising misconception about the Matamuhuri river that the river originates in Myanmar (Rudra and Alam 2023). The same misconception exists in the case of the Sangu river. This misconception has been created from various books and online sources including Wikipedia and Banglapedia (Wikipedia 2024, Banglapedia 2023). In fact, both of these rivers originate and terminate within the geographical limits of Bangladesh. In view of this, it can be said that the fish found in these two rivers are the resident fish of the country and they breed within the geographical limits of the country unlike trans-boundary rivers. This is also true for some hilly species, *viz.* golden mahashol and copper mahashol in these rivers.

The Bandarban Hill District is the southernmost part of Bangladesh bordering Myanmar. Thanchi and Alikadam upzilas are in the south of Bandarban Hill district. The Bangladesh-Myanmar international border line adjacent to these two upzilas is made up of a natural geographical barrier wall surrounded by high mountains. There are no rivers crossing this international border line in this region. The drainage/catchment area of these two rivers, Matamuhuri and Sangu, is formed on the northern side of this mountain, that is, within the geographical area of Bangladesh. The Matamuhuri river (148 Km long) originates from southern mountain of Alikadam and the Sangu river (295 Km long) originates near the southern tip of Thanchi (Banglapedia 2023). The tide enters the lower reaches of these two rivers up to about 65 km. These two rivers are not connected to each other. As they are not connected to any other river system like Meghna, Karnaphuli or Naf rivers, the fish diversity composition and genetic characteristics of these two rivers (Sangu and Matamuhuri) are expected to be different. As per earlier report, two species, namely *Neolissochilus hexagonolepis* and

Schismatorhynchos nukta of the Sangu river are not found elsewhere in the country (Azadi and Arshad-ul-Alam 2014, Hossain 2015, Arshad-ul-Alam and Azadi 2017). The fish diversity of the Matamuhuri river with the same geographic characteristics in the same region is considered to be unique for the same reason. The upstream of these two rivers flowing through Sangu-Matamuhuri Reserve Forest is extremely inaccessible and the fish diversity is unknown here.

IUCN (IUCN Bangladesh 2015) assessed and described 253 freshwater finfish species of Bangladesh, but there are a lot of data gaps in it. Recently (2016-2023), ten new freshwater indigenous fish species (e.g. *Garra mini*, *Schismatorhynchos nukta*, *Devario coxi*, *Laubuka tenella*, *Dario kajor*, *Badis pallidus*, *Badis rhabdotus*, *Ophiocara porocephala*, *Tor Barakae*, and *Spearta aorella*) have been discovered from different freshwater bodies of Bangladesh by different authors (Rahman *et al.* 2016, Arshad-ul-Alam and Azadi 2017, Kullander *et al.* 2017, 2018, 2019, Arshad-ul-Alam *et al.* 2021, Haque *et al.* 2023, Arshad-ul-Alam 2023). Thus, the total number of freshwater finfish species of Bangladesh stands at 263 instead of 253 as earlier listed by IUCN (2015). There is no actual information about the distribution, population etc. of a number of fishes in the country. Forty species are left as data deficient (DD) due to a lack of available literature (IUCN 2015). In the IUCN report, some species even some well-known and widely distributed species in the rivers of the Chattogram region (former Chittagong) (eg. *Sperata aor*, *S. seenghala*, *Wallago attu*, etc. Table 1) are not evaluated. This inadequacy can be overcome by conducting fish faunal survey in different regions of the country either individually or through large-scale initiatives. The present study was aimed to study the fish diversity, fishing gears and their catch from the unstudied area of the upstream of the Matamuhuri river, findings of which might help to some extent to achieve this goal, and also to supplement this inadequacy.

MATERIAL AND METHODS

Present survey was done on monthly basis from January 2022 to December 2022 with the help of a motorized boat. The study area was 87 km long covering the area of Manikpur (21.751N, 92.147E) to Poamuhuri (21.457N, 92.453E) (Fig.1).



Fig. 1. Map showing the study area (red marked round spots) at upper Matamuhuri river.

During the study period a total of 245 catch samples were collected from the fishermen, which were harvested by different fishing gears (Table 2) from the river. Catch samples were collected from all types of fishing gears (16 types) in the study area. Approximately 1-30 fish were designated as small sample and are mostly caught by hook and line, traps and monofilament gill net. Small samples were analyzed instantly in the field. Approximately 30-100 fish were designated as medium size sample and were mostly caught by small lift net, hand picking, and small cast net. More than 100 fishes in a sample were designated as large size sample, which were mostly caught by large cast net, seine net, push net, and brush shelter. Medium and large size catches were collected by purchasing the whole sample or subsamples and were stored in ice boxes for further analysis in the laboratory. Gear information and images of various types of fishing methods were taken. Samples of each species of fish were photographed and preserved in the Museum of Department of Zoology, Govt City College, Chattogram. All the fish samples were identified following Rahman (2005) and Talwar and Jhingran (1991). The abundance of different species in this river was observed by studying the composition of the fish caught through different fishing gears and fishing methods.

RESULTS AND DISCUSSION

A total of ninety-five finfish species under 14 orders, 36 families and 69 genera were identified from the upper Matamuhuri river. Table 1 shows the taxonomic account of the identified species with their scientific names, common names, local names, conservation status, distribution and abundance.

Table 1. Finfish diversity in the upper Matamuhuri river.

Order and Family	Species name	Common name, Local name	Conservation status	Occurrence in Karnaphuli, Sangu & Matamuhuri rivers	Abundance (Matamuhuri river)
Anguilliformes					
Anguillidae	<i>Anguilla bengalensis</i> (Gray, 1831)	Indian mottled eel; Bamosh	VU	Yes	+
Osteoglossiformes					
Notopteridae	<i>Notopterus notopterus</i> (Pallas, 1769)	Bronze featherback; Foli	VU	Yes	+
Clupeiformes					
Clupeidae	<i>Corica soborna</i> (Hamilton, 1822)	Ganges river sprat; Kachki	LC	Yes	+++++
	<i>Gonialosa manmina</i> (Hamilton, 1822)	Ganges river gizzard shad; Chapila	LC	Yes	++
	<i>Gudusia chapra</i> (Hamilton, 1822)	Indian river shad; Chapila	VU	Yes	++++
	<i>Tenulosa ilisha</i> (Hamilton, 1822)	Hilsa shad; Ilish	LC	Yes	+
Engraulidae	<i>Setipinna phasa</i> (Hamilton, 1822)	Gangetic hairfin anchovy; Phaissha	LC	Yes	++
Cypriniformes					
Cyprinidae	<i>Gymnostomus ariza</i> (Hamilton, 1807)	Ariza labeo; Bata, Lasso	VU	No	+
	<i>Labeo calbasu</i> (Hamilton, 1822)	Orange fin labeo; Kalibaush, Kalighoni	LC	Yes	+
	<i>Labeo gonius</i> (Hamilton, 1822)	Kuria labeo; Shadaghoni	NT	Yes	++
	<i>Labeo pangusia</i> (Hamilton, 1822)	Pangusia labeo; Ghora muikha	EN	No	+
	<i>Labeo rohita</i> (Hamilton, 1822)	Roho labeo; Rui	LC	Yes	+
	<i>Neolissochilus</i> sp.	Copper mahashol/Mohaseer; Porogmaal	-	Yes	+++
	<i>Tor putitora</i> (Hamilton, 1822)	Golden mahashol/Mahseer; sonali mahashol	EN	No	++
	<i>Gibelion catla</i> (Hamilton, 1822)	Catla; Catla	LC	Yes	+
	<i>Cirrhinus mrigala</i> (Hamilton, 1822)	Mrigal; Mrigal	NT	Yes	+
	<i>Cirrhinus reba</i> (Hamilton, 1822)	Reba carp; Raik, Laacho	NT	Yes	+
	<i>Garra gotyla</i> (Gray, 1830)	Sucker head; Ghorpuia	EN	No	+
	<i>Crossocheilus latius</i> (Hamilton, 1822)	Stone roller; Kala bata	EN	No	++
	<i>Osteobrama cotio</i> (Hamilton, 1822)	Cotio; Dhela, Nak kata	NT	Yes	+

	<i>Barbonymus gonionotus</i> (Bleeker, 1849)	Silver barb; Thai sarpunti	Exotic		++
	<i>Puntius chola</i> (Hamilton, 1822)	Swamp barb; Chola puti	LC	Yes	+
	<i>Puntius sophore</i> (Hamilton, 1822)	Pool barb; Jati puti	LC	Yes	++
	<i>Pethia ticto</i> (Hamilton, 1822)	Ticto barb; Tit puti	VU	Yes	+++
	<i>Pethia gelius</i> (Hamilton, 1822)	Golden barb; Jeli puti	NT	Yes	+
	<i>Pethia conchonius</i> (Hamilton, 1822)	Rosy barb; Kanchon puti	LC	Yes	+
Xenocyprididae	<i>Hypophthalmichthys nobilis</i> (Richardson, 1845)	Bighead carp; Bighead	Exotic		+
	<i>Hypophthalmichthys molitrix</i> (Valenciennes, 1848)	Silver carp; Silver carp; River	Exotic		+
Danionidae	<i>Amblypharyngodon mola</i> (Hamilton, 1822)	Mola carplet; Mola	LC	Yes	+++
	<i>Barilius barila</i> (Hamilton, 1822)	Barred barila; Barila	DD	No	++
	<i>Barilius vagra</i> (Hamilton, 1822)	Hill trout; Koksa	EN	Yes	+
	<i>Opsarius barna</i> (Hamilton, 1822)	Barna baril; Bani koksa	EN	Yes	++++
	<i>Opsarius bendelisis</i> (Hamilton, 1822)	Hill trout; Koksa	EN	Yes	++++
	<i>Laubuka laubuca</i> (Hamilton, 1822)	Indian glass barb; Chep chela	LC	Yes	+
	<i>Chela cachius</i> (Hamilton, 1822)	Silver hatchet barb, Chep chela	VU	Yes	+
	<i>Rasbora rasbora</i> (Hamilton, 1822)	Gangetic scissortail rasbora; Darkina	NT	Yes	+
	<i>Salmostoma bacaila</i> (Hamilton, 1822)	Large razorbelly minnow; Chela	LC	Yes	+++
	<i>Salmostoma phulo</i> (Hamilton, 1822)	Fine-scale razorbelly minnow; Chela	NT	No	+++
	<i>Securicula gora</i> (Hamilton, 1822)	Ghora chela; Dhak chela	NT	No	+
Balitoridae	<i>Balitora brucei</i> (Gray, 1830)	Stone loach, Balitora	DD	No	+
Cobitidae	<i>Lepidocephalichthys guntea</i> (Hamilton, 1822)	Guntea loach; Gutum	LC	Yes	++
	<i>Lepidocephalichthys annandalei</i> (Chaudhuri, 1922)	Annaldale loach	VU	No	++
	<i>Pangio pangia</i> (Hamilton, 1822)	Cinnamon loach; Panga	LC	Yes	+
Nemacheilidae	<i>Paracanthocobitis zonalternans</i> (Blyth, 1860)	Creek loach; Puiya	LC	Yes	++
Psilorhynchidae	<i>Psilorhynchus sucatio</i> (Hamilton, 1822)	River stone carp; Titari	NT	Yes	++
Siluriformes					
Ailiidae	<i>Ailia coila</i> (Hamilton, 1822)	Gangetic ailia; Banshpata; River	LC	Yes	+
	<i>Clupisoma garua</i> (Hamilton, 1822)	Garua bachcha; Gharua; River	EN	No	+
Bagridae	<i>Mystus cavasius</i> (Hamilton, 1822)	Gangetic mystus; Tengra	NT	Yes	+
	<i>Mystus gulio</i> (Hamilton, 1822)	Whiskered catfish; Nuna Tengra	NT	Yes	+
	<i>Mystus vittatus</i> (Bloch, 1794)	Striped dwarf catfish; Guilla	LC	Yes	+
	<i>Mystus bleekeri</i> (Day, 1877)	Bleeker's catfish; Tengra	LC	Yes	+
	<i>Sperata aor</i> (Hamilton, 1822)	Long-whiskered catfish; Ayre	VU	No	+
	<i>Sperata seenghala</i> (Sykes, 1839)	Gaint river catfish; Ayre, Guijja Ayre	VU	No	+
	<i>Batasio batasio</i> (Hamilton, 1822)	Tista Batasio, Tengra, Batasi	NT	No	+
Clariidae	<i>Clarias magur</i> (Hamilton, 1822)	Magur catfish; Magur	LC	Yes	+
Heteropneustidae	<i>Heteropneustes fossilis</i> (Bloch, 1794)	Stinging catfish; Shingi	LC	Yes	+
Schilbeidae	<i>Eutropiichthys murius</i> (Hamilton, 1822)	Murius vacha; Muri bacha	LC	No	+
	<i>Eutropiichthys vacha</i> (Hamilton, 1822)	Batchwa vacha; Bacha	LC	Yes	+
	<i>Pachypterus atherinoides</i> (Bloch, 1794)	Indian potasi; Fultengra	LC	Yes	+
Siluridae	<i>Ompok bimaculatus</i> (Bloch, 1797)	Pabda catfish; Boali pabda	EN	Yes	+
	<i>Ompok pabda</i> (Hamilton, 1822)	Pabda catfish; Pabda	EN	No	+
	<i>Wallago attu</i> (Bloch and Schneider, 1801)	Wallago, Freshwater shark; Boal	VU	No	+
Sisoridae	<i>Gagata youssoufi</i> (Rahman, 1976)	Karnaphuli gagata; Gang Tengra	NT	Yes	++
Eupercaria / misc					
Sciaenidae	<i>Johnius coitor</i> (Hamilton, 1822)	Coitor croaker; Poa	LC	Yes	++
Gobiformes					
Butidae	<i>Butis butis</i> (Hamilton, 1822)	Duckbill sleeper; Byla	LC	No	+
Eleotridae	<i>Eleotris fusca</i> (Forster, 1801)	Dusky sleeper; Byla	LC	No	+
	<i>Eleotris lutea</i> (Day, 1878)	Lutea sleeper; Bhot byla	DD	Yes	+

Gobiidae	<i>Glossogobius giuris</i> (Hamilton, 1822)	Tank goby; Byla	LC	Yes	++++
	<i>Awaous grammepomus</i> (Bleeker, 1849)	Scribbled goby; Shil baila	VU	Yes	++
	<i>Awaous guamensis</i> (Valenciennes 1842)	Scribbled goby; Shil baila	LC	Yes	++
	<i>Brachygobius nunus</i> (Hamilton, 1822)	Bumblebee goby; Byla gura	LC	No	+
Oxudercidae	<i>Apocryptes bato</i> (Hamilton, 1822)	Estuarine goby; Fhul chring	LC	Yes	++
Anabantiformes					
Anabantidae	<i>Anabas testudineus</i> (Bloch, 1792)	Climbing perch; Koi	LC	Yes	+
Badidae	<i>Badis badis</i> (Hamilton, 1822)	Napit mach	NT	Yes	+
Channidae	<i>Channa orientalis</i> (Bloch and Schneider, 1801)	Walking snakehead; Cheng mach	LC	Yes	+
	<i>Channa punctata</i> (Bloch, 1793)	Spotted snakehead; Taki	LC	Yes	+
	<i>Channa striata</i> (Bloch, 1793)	Striped snakehead; Shol	LC	Yes	+
Osphronemidae	<i>Trichopsis vittata</i> (Cuvier, 1831)	Croaking gourami; Kholisha	LC	Yes	+
	<i>Trichogaster fasciatus</i> Bloch and Schneider, 1801	Banded gourami; Kholisa	LC	Yes	+
	<i>Trichogaster chuna</i> (Hamilton, 1822)	Honey gourami; Chota kholisa	LC	No	+
Mugiliformes					
Mugilidae	<i>Rhinomugil corsula</i> (Hamilton, 1822)	Corsula mullet; Bada	LC	Yes	+
	<i>Minimugil cascasia</i> (Hamilton, 1822)	Yellow tail mullet; Bada	VU	No	++
Ovalentaria / misc					
Ambassidae	<i>Chanda nama</i> (Hamilton, 1822)	Elongate glass-perchlet; Lomba chanda	LC	Yes	++
	<i>Parambassis baculis</i> (Hamilton, 1822)	Himalayan glassy perchlet; Kata chanda	NT	Yes	+++
	<i>Parambassis ranga</i> (Hamilton, 1822)	Indian glassy fish; Lal chanda	LC	Yes	+
Cichliformes					
Cichlidae	<i>Oreochromis niloticus</i> (Linnaeus, 1758)	Nile tilapia; Nilotika	Exotic		+
	<i>Oreochromis mosambicus</i> (Peters, 1852)	Mozambique tilapia	Exotic		+
Synbranchiformes					
Mastacembelidae	<i>Mastacembelus armatus</i> (Lacepede, 1800)	Zig-zag eel; Kata baim	EN	Yes	++
	<i>Macrogathus aculeatus</i> (Bloch, 1786)	Lesser spiny eel; Tara baim	NT	Yes	++
	<i>Macrogathus punctatus</i> (Hamilton, 1822)	Barred spiny eel; Guchi baim	LC	Yes	++
Cyprinodontiformes					
Aplocheilidae	<i>Aplocheilus panchax</i> (Hamilton, 1822)	Blue panchax; Chukkuni	LC	Yes	+
Beloniformes					
Adrianichthyidae	<i>Oryzias dancena</i> (Hamilton, 1822)	River rice fish; Kagoji gura	DD	Yes	+
Belonidae	<i>Xenentodon cancila</i> (Hamilton, 1822)	Freshwater garfish; Kakila	LC	Yes	+
Hemiramphidae	<i>Hyporhamphus limbatus</i> (Valenciennes, 1847)	Congaturi halfbeak; Thuitta	LC	Yes	+
Zenarchopteridae	<i>Dermogenys pusilla</i> (Kuhl & van Hasselt, 1823)	Wrestling halfbeak; Ekthuitta	LC	Yes	+

Order, Family, Species name, Common name, Local name, Conservation status (as per Red List of Bangladesh 2015), distribution /occurrence according to IUCN 2015 in nearby two big rivers and relative abundance in the studied river are shown in this Table. Conservation status (IUCN 2015) mentioned as: EN–Endangered, VU–Vulnerable, NT–Near Threatened, LC–Least Concern, DD–Data Deficient. More availability is denoted by more plus (+) signs.

Species density (species richness) under different orders and families

Fig. 2 shows the species richness under 14 orders. Highest finfish species richness (FSR) was recorded under the Order Cypriniformes (38 species), which was 40% of the total FSR. Order Siluriformes had 18 species with 19% FSR. Order Gobiformes and Anabantiformes held the 3rd position in FSR with eight species and 9% FSR. Fig. 3 shows the species richness under 36 families.

Maximum number of species was recorded under the family Cyprinidae (19 species), followed by Danionidae (11 species) and Bagridae (7 species).

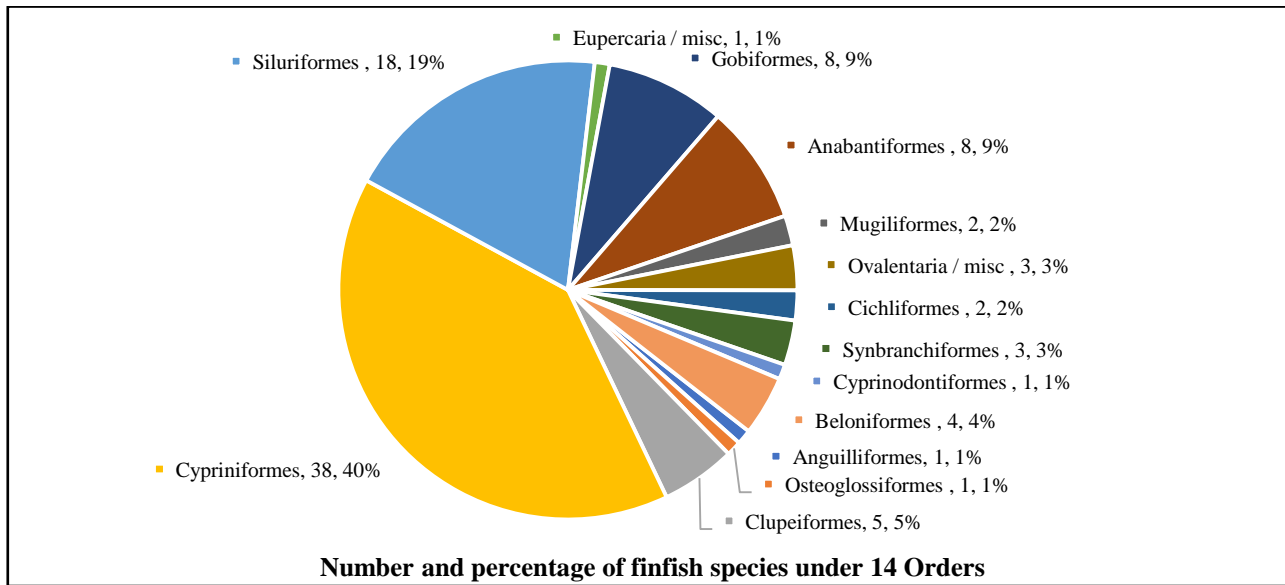


Fig. 2. Richness of finfish species under 14 Orders.

According to abundance, top five species were *Corica soborna*, *Gudusia chapra*, *Opsarius barna*, *Opsarius bendelisis* and *Glossogobius giuris* (Table 1). Next to the top five species, six species (*Neolissochilus* sp., *Pethia ticto*, *Amblypharyngodon mola*, *Salmostoma bacaila*, *Salmostoma phulo* and *Parambassis baculis*) were rich in population (Table 1).

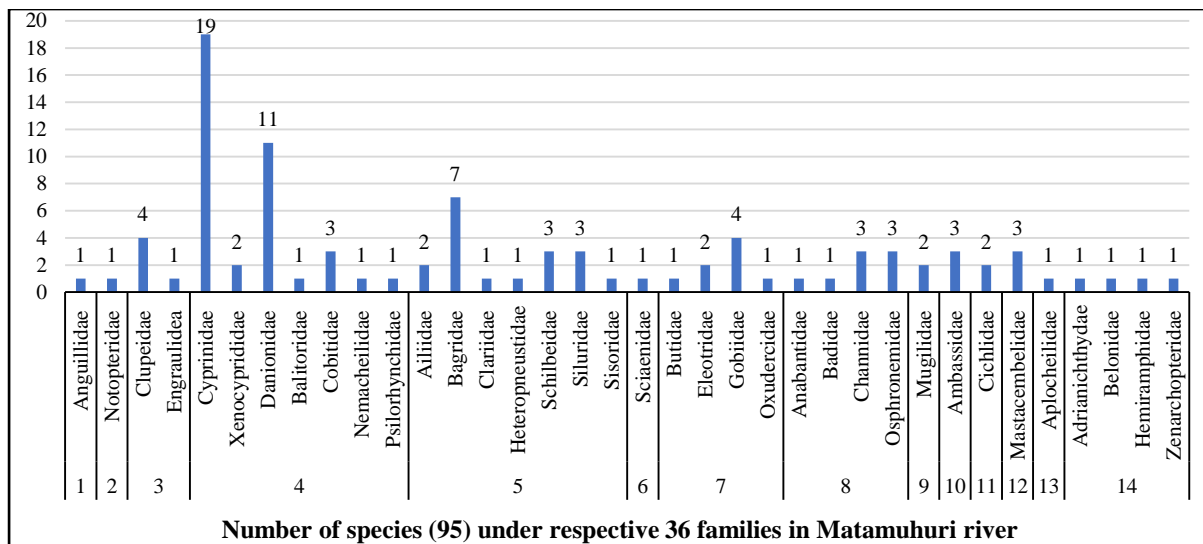


Fig. 3. Number of freshwater finfish (95) species (at top of the bar) under 36 families (under 1 to 14 orders) in Matamuhuri river. (Order 1. Anguilliformes, 2. Osteoglossiformes, 3. Clupeiformes, 4. Cypriniformes, 5. Siluriformes, 6. Eupercaria / misc., 7. Gobiformes, 8. Anabantiformes, 9. Mugiliformes, 10. Ovalentaria/misc., 11. Cichliformes, 12. Synbranchiformes, 13. Cyprinodontiformes, 14. Beloniformes).

Fishing practice

Fishing is relatively very scarce. Under eight categories 16 types of fishing gears with their catch compositions are documented in Table 2. Two types of gears- large Push net, *Haddi Jal* (Fig. 4) and Bowl trap, *Bati Trap* (Fig. 5) are new and not reported earlier.



Fig. 4. Pictorial presentation of fishing gears: **a.** Fishing by *Haddi Jal* and **b.** *Haddi Jal*'s operation team.

New fishing gears

Haddi Jal: *Haddi Jal* is a large sized push net operated against the current by a team of three to four fishermen. The main material of the net is made of multifilament of 2-10 mm mesh with a cod end fixed in a triangular bamboo frame. A heavy and thick rope made of waste cloth is pulled by two fishermen from opposite sides of the net to drive away the fish. The structure of their head turban is extraordinary; it contains mobiles, wallets and other essentials. Many species of fish are caught in this nonselective net. Using a wooden boat or without boat, the net is operated (Fig. 4).

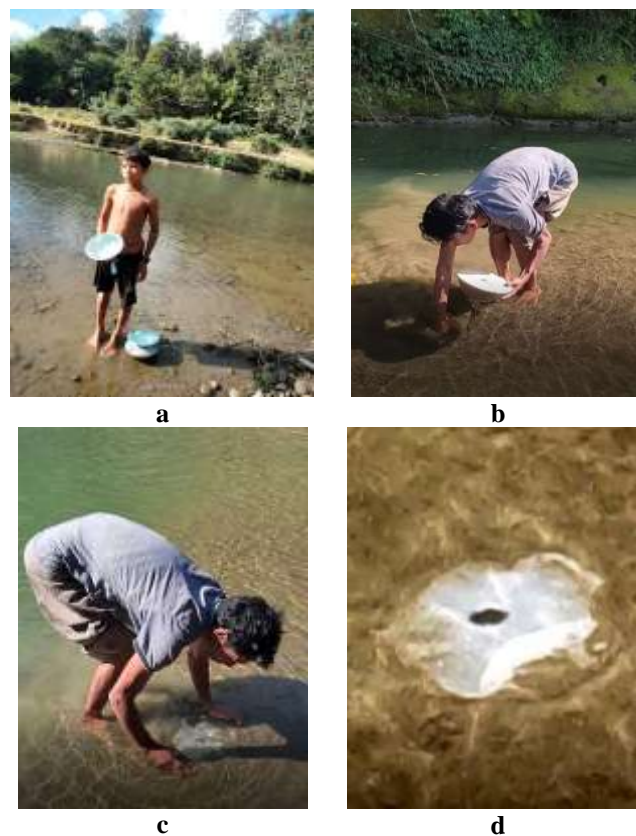


Fig. 5. Fishing trap: **a.** Bati Trap in hand, **b.** Setting of *Bati Trap*, **c.** *Bati Trap* set and **d.** *Bati Trap* in set position.

Bati Trap: Small steel bowl covered with a fine cotton made cloth with holes in the center are used as small fishing traps for small fish. Fermented rice is used inside the bowl as bait to attract fish. Small fish smell the bait and enter through the holes in the cloth and get trapped in the bowl trap. The bowls are placed at a distance in the clear shallow water in the gentle current of the river as observed. Fish are collected as they enter the bowl (Fig. 5).

Table 2. Fishing gears categories, their local names, types and their main catch in Matamuhuri river.

Category of fishing gear /method	Local name	Type	Mesh size (mm)	Main catch
Cast net	Jhaki Jal	Small mesh cast net	8-20	<i>Glossogobius giuris</i> , <i>Crossocheilus latius</i> , <i>Puntius</i> and <i>Pethia</i> spp. <i>Amblypharyngodon mola</i> , <i>Salmostoma phulo</i> , <i>Gagata youssoufi</i> .
	Shotki Jal	Large mesh cast net	20-30	<i>Neolissochilus</i> sp., <i>Labeo bata</i> , <i>Labeo gonius</i> , <i>Cirrhinus reba</i> , <i>Barbonymus gonionotus</i> .
	Bara Jhaki Jal	Boat operated small mesh large cast net	10-22	<i>Glossogobius giuris</i> , <i>Awaous</i> spp., <i>Puntius</i> and <i>Pethia</i> spp., <i>Apocryptes bato</i> , <i>Opsarius barna</i> , <i>Opsarius bendelisis</i> .
Seine net	Ber Jal	Small mesh (Mosquito screen) net	2-4	<i>Corica soborna</i> , <i>Opsarius barna</i> , <i>Barilius barila</i> , <i>Salmostoma bacaila</i> , <i>Salmostoma phulo</i> , <i>Gudusia chapra</i> , <i>Laubuka laubuca</i> , <i>Labeo gonius</i> , <i>Cirrhinus mrigala</i> .
Gill net	Fash Jal	Monofilament gill net (Current jal)	40-80	<i>Opsarius bendelisis</i> , <i>Glossogobius giuris</i> , <i>Apocryptes bato</i> .
	Choto Phora Vhasa Jal	Multifilament small mesh gill net	10-18	<i>Glossogobius giuris</i> , <i>Apocryptes bato</i> , <i>Parambassis baculis</i> , <i>Garra gotyla</i> .
	Bara Phora Vhasa Jal	Multifilament medium mesh gill net	40-100	<i>Opsarius bendelisis</i> , <i>Neolissochilus</i> sp., <i>Barbonymus gonionotus</i> , <i>Tor putitora</i> , <i>Cirrhinus reba</i> .
Push net	Choto Thela Jal	Small fishing gear mounted on a triangular bamboo frame made of thin bamboo slats	-	<i>Glossogobius giuris</i> , <i>Apocryptes bato</i> , <i>Puntius</i> and <i>Pethia</i> spp., <i>Amblypharyngodon mola</i> , small prawn.
	Bara Thela Jal	Triangular lift net made of mosquito screen	2-4	<i>Glossogobius giuris</i> , <i>Apocryptes bato</i> , <i>Puntius</i> and <i>Pethia</i> spp., <i>Amblypharyngodon mola</i> , small prawn
	Haddi Jal*	Large boat operated lift net made of mosquito screen	2-4	<i>Opsarius barna</i> , <i>Opsarius bendelisis</i> , <i>Barilius barila</i> , <i>Salmostoma bacaila</i> , <i>Salmostoma phulo</i> .
Hook and Line	Borshi	Paddle boat operated Rod and line	-	<i>Mystus cavasius</i> , <i>Mastacembelus armatus</i> , <i>Anguilla bengalensis</i> , <i>Neolissochilus</i> sp., <i>Glossogobius giuris</i>
Trap	Bati*	Bowl traps with bait	-	<i>Opsarius barna</i> , and <i>Barilius barila</i> .
Brush shelter	Kata	Fish aggregating device (Jag / Kata)	-	<i>Glossogobius giuris</i> , <i>Apocryptes bato</i> , <i>Mystus cavasius</i> , <i>Opsarius barna</i> , <i>Opsarius bendelisis</i> , <i>Neolissochilus</i> sp., <i>Barbonymus gonionotus</i> , <i>Labeo gonius</i> .
Minor Gear	Choto Kapor Jal / Tana Jal	Small Lift net Hand picking	-	<i>Amblypharyngodon mola</i> , <i>Pethia ticto</i> , <i>Pethia gelius</i> , <i>Psilorhynchus sucatio</i> , <i>Opsarius barna</i> , <i>Salmostoma phulo</i> , <i>Oryzias dancena</i> , small prawn

Conservation status

Tables 1 and 3 show the conservation status of the studied fish. No species under critically endangered (CR) category was found in the Matamuhuri river. Eleven endangered (EN) and twelve vulnerable (VU) finfish species were observed in combined catch composition. The eleven endangered (EN) species were *Labeo pangusia*, *Tor putitora*, *Garra gotyla*, *Crossocheilus latius*, *Barilius vagra*, *Opsarius barna*, *Opsarius bendelisis*, *Clupisoma garua*, *Ompok bimaculatus*, *Ompok pabda* and *Mastacembelus armatus*, and twelve vulnerable (VU) species were: *Anguilla bengalensis*, *Notopterus notopterus*, *Gudusia chapra*, *Gymnostomus ariza*, *Pethia ticto*, *Chela cachius*,

Lepidocephalichthys annandalei, *Sperata aor*, *Sperata seenghala*, *Wallago attu*, *Awaous grammepomus* and *Minimugil cascasia*.

Table 3. Conservation status and number of fish species under different orders as per Red List of Bangladesh (IUCN 2015) in the Matamuhuri river. Number of exotic fish species are also shown.

Order	EN	VU	LC	NT	DD	Exotic	Unidentified	All
Anguilliformes	-	1	-	-	-			1
Osteoglossiformes		1						1
Clupeiformes		1	4					5
Cypriniformes	7	4	12	9	2	3	1	38
Siluriformes	3	3	8	4				18
Eupercaria / misc			1					1
Gobiformes		1	6		1			8
Anabantiformes			7	1				8
Mugiliformes		1	1					2
Ovalentaria / misc			2	1				3
Cichliformes						2		2
Synbranchiformes	1		1	1				3
Cyprinodontiformes			1					1
Beloniformes			3		1			4
Total 95 Species	11	12	46	16	4	5	1	95

EN–Endangered, VU–Vulnerable, LC–Least Concern, NT–Near Threatened, DD–Data Deficient.

Table 4 shows the availability of endangered, vulnerable, data deficient, exotic and unidentified fish species. In most of the fishing gears, three species, namely *Opsarius barna*, *Opsarius bendelisis* and *Gudusia chapra* were common in daily catch. *Neolissochilus* sp. was seen daily in the catch of monofilament gill nets. *Pethia ticto* was a daily catch in small push net.

Exotic species

Five exotic fish species were recorded from the Matamuhuri river, which were: *Barbonymus gonionotus*, *Hypophthalmichthys nobilis*, *H. molitrix*, *Oreochromis niloticus* and *O. mosambicus*. Thai Sarpunti (*Barbonymus gonionotus*) was officially stocked by DoF. Other species are believed to be of cultivated origin (from pond during flood) and are very few in number.

The upper part of Matamuhuri river is enriched with 95 finfish species and can be remarked as a biodiversity rich area in comparison with the fish richness in most of the other rivers of Bangladesh. This upper part of Matamuhuri river is situated in the Sangu-Matamuhuri Reserve Forest zone. No research work has been done on fish biodiversity in the downstream, upstream or mountain headwaters of the Matamuhuri river, including this area near the origin of the river. Detailed research on the fisheries biodiversity of this forest-rich region was not conducted earlier due to inaccessible area, inadequacy of navigation, very sparse population, low fishing and other activities, spatial distance, restrictions imposed by authorities on access to hill areas, insecurity, problems in storage, transportation of fish samples and lack of logistical support. At the time of last sampling tour in December 2022, there was no restriction on travel, as the road construction work had almost been completed, and thus it was possible to visit the remote sampling site, Poamuhuri by motor vehicle.

The present survey did not find the existence of *Chitala chitala* in this upper part of Matamuhuri river. Several groups of fishermen from Alikadam who stayed upstream for a week or more to harvest fish, informed that *Chitala chitala* is always associated with deeper parts of the upstream (Khum). One of these 'Khums' is known as 'Machkhum'. This situation is also found to be justified for Karnaphuli and Sangu rivers. Although, in general, Karnaphuli river has no *Chitala chitala* yet Kaptai lake has good population of this fish (Azadi *et al.* 1994, Ahmed *et al.* 2003, Azadi and

Arshad-ul-Alam 2020). In the long-term survey we did not find *Chitala chitala* in the Sangu river up to Bara-Madhu (Bara Modak), however fishermen reported that *Chitala chitala* are present in further upstream of Sangu river.

Table 4. Conservation status in vivo for threatened, data deficient, exotic and unidentified fishes.

	Endangered	Vulnerable	Data deficient	Exotic	Unidentified up to Species level
Most common (++++)	----	----	----	----	----
Common (+++)	<i>Opsarius barna</i> , <i>Opsarius bendelisis</i>	<i>Gudusia chapra</i>	----	----	
Less common (++)	----	<i>Pethia ticto</i>	----	----	<i>Neolissochilus</i> sp.
Few (+)	<i>Tor putitora</i> , <i>Crossocheilus latius</i> , <i>Mastacembelus armatus</i>	<i>Lepidocephalichthys annandalei</i> , <i>Awaous grammepomus</i> , <i>Minimugil cascasia</i>	<i>Barilius barila</i>	<i>Barbonymus gonionotus</i>	
Scarce (+)	<i>Labeo pangusia</i> , <i>Garra gotyla</i> , <i>Barilius vagra</i> , <i>Clupisoma garua</i> , <i>Ompok bimaculatus</i> , <i>O. pabda</i>	<i>Anguilla bengalensis</i> , <i>Notopterus notopterus</i> , <i>Gymnostomus ariza</i> , <i>Chela cachi</i> , <i>Sperata aor</i> , <i>S. seenghala</i> , <i>Wallago attu</i>	<i>Balitora brucei</i> , <i>Eleotris lutea</i> , <i>Oryzias dancena</i>	<i>Hypophthalmichthys nobilis</i> , <i>H. olitrix</i> , <i>Oreochromis niloticus</i> , <i>O. mosambicus</i>	
Total	11	12	4	5	1

A good number of *Neolissochilus* sp. (copper mohashol) and *Tor putitora* (golden mohashol) was recorded (Figs. 6a and b) from upper Matamuhuri river. A congeneric species of *Neolissochilus*, the *Neolissochilus hexagonolepis* (copper mohashol) has previously been recorded only from the Sangu River in Bangladesh (Azadi and Arshad-ul-Alam 2014). There is no report on the occurrence of *Neolissochilus* sp. in any other rivers of Bangladesh except that of Sangu river (Hossain 2015, Arshad-ul-Alam 2020). There is also no report of resident *Tor putitora* in Bangladesh except in the Sangu river (Arshad-ul-Alam 2020).



Fig. 6. Pictorial presentation of recorded mohashol: **a.** Copper mohashol, *Neolissochilus* sp. and **b.** Golden mohashol, *Tor putitora*.

In the Red List of Bangladesh (IUCN 2015), distribution of 22 fin fish species in the rivers of Chittagong are not mentioned. These species are: *Balitora brucei*, *Lepidocephalichthys annandalei*, *Gymnostomus ariza*, *Labeo pangusia*, *Tor putitora*, *Garra gotyla*, *Crossocheilus latius*, *Barilius barila*, *Salmostoma phulo*, *Securicula gora*, *Clupisoma garua*, *Sperata aor*, *Sperata seenghala*, *Batasio batasio*, *Eutropiichthys murius*, *Ompok pabda*, *Wallago attu*, *Butis butis*, *Eleotris fusca*,

Brachygobius nunus, *Trichogaster chuna*, and *Minimugil cascasia*. Although *Salmostoma phulo* is abundant in Matamuhuri river and widely distributed in other major rivers of Chittagong (Azadi and Arshad-ul-Alam 2011, 2013, 2014, 2020) yet it is not found in the IUCN (2015) Red List. Five species e.g. *Lepidocephalichthys annandalei*, *Tor putitora*, *Crossocheilus latius*, *Barilius barila* and *Minimugil cascasia* are found fairly well in Matamuhuri river but these are not shown in Red List distribution (IUCN 2015). *Balitora brucei*, *Gymnostomus ariza*, *Labeo pangusia*, *Garra gotyla*, *Securicula gora*, *Batasio batasio*, *Ompok pabda*, *Clupisoma garua*, *Sperata aor*, *Sperata seenghala*, *Eutropiichthys murius*, *Wallago attu*, *Butis butis*, *Eleotris fusca*, *Brachygobius nunus* and *Trichogaster chuna* found in very lesser number in Matamuhuri river are not found in the Red List of Bangladesh (IUCN 2015).

Adjacent to the UN-declared Indo-Burma hotspot, although the studied region is rich in biodiversity yet it is not considered as a hotspot due to inaccessibility and lack of proper initiatives. With the help of modern equipment and local administration, BGB, army, and their joint efforts might be helpful to explore detailed biodiversity including fish diversity in the upper extremity and headwaters of Matamuhuri and Sangu rivers along with mountain springs up to the border.

This study recognized 263 freshwater fish species in Bangladesh instead of 253 (253 reported by IUCN 2015). Forty of them are described as data deficient in IUCN Red List. The IUCN conservation status of various categories does not adequately address their distribution and availability. Lack of sufficient research and related literature, are the causes of this information gap. The fish species richness (95 spp.) in the upper Matamuhuri River was found to be higher in comparison with fish distribution in most of the other rivers (48-83 spp.) of the country i.e. Halda 83 spp, Sikalbaha 74 spp, Chandkhali 72 spp (Azadi and Arshad-Ul-Alam 2020), Padma 84 spp (Rahman *et al.* 2012), Padma 71 spp. (Joadder *et al.* 2015), Padma 82 spp. (Habib *et al.* 2016), Padma 69 spp. (Mohsin *et al.* 2013), Brahmaputra 67 spp (Galib 2015), Shiba 30 spp. (Khanom *et al.* 2016), Bangshi 48 spp. (Kamrujjaman and Nabi 2015), 55 spp. (Islam *et al.* 2018), Dhepa 61 spp. (Parvez *et al.* 2019), Baral 60 spp. (Flowra *et al.* 2013), Narsunda 54 spp. (Arefin *et al.* 2018), Nabaganga and Kaliganga rivers 54 spp. (Chandra and Kumar 2015).

The fin fish richness in the hilly part of the upper Matamuhuri river is quite diverse and found to be higher in comparison with most of the rivers of Bangladesh. Twenty-three threatened species, eleven under endangered category and twelve under vulnerable category were found to be resident in the Matamuhuri river. Copper mahaseer (*Neolissochilus hexagonolepis*) was previously recorded by the present authors only from Sangu river (Azadi and Arshad-ul-Alam 2014), but during the present study another congeneric species (*Neolissochilus* sp.) was recorded from Matamuhuri river and there is no record of its occurrence elsewhere in the country. There is no report of the resident golden mahseer (*Tor putitora*) in Bangladesh except in the Sangu river. However, Indian migratory golden mahseer is found in Mahananda river and Tanguar haor. The golden mahseer found in the Kaptai lake is also considered to be the Indian Migratory Mohashol. Matamuhuri river is also found to be the habitat of this golden mahseer (*Tor putitora*) through this study.

Apart from tobacco cultivation on both the banks of the Matamuhuri river, no serious harmful activities were noticed. In the upper Matamuhuri river, movement of engine boats and fishing were found to be low. No significant anthropogenic changes were also noticed. No pollution from domestic household waste was noticed due to its safe distance from the residential areas. Related authorities should take needful measures and to following the policy to preserve the environment of the Matamuhuri river. If the population increases as a future tourist destination, the environment of

the Matamuhuri river may be disrupted. Matamuhuri-Sangu Forest Reserve Zone should be protected by allowing limited number of tourists with some regulations to protect the river environment.

The major achievement of this research work is the discovery of the existence of a new congeneric species of *Neolissochilus* and golden mahashol (*Tor puttitora*) in the Matamuhuri river. This study also reported the occurrence of rich biodiversity in this river. There was no information about the presence of 22 resident fish in the Matamuhuri River, in the distribution and range Map of the Red List of IUCN (2015), which has overcome through this study.

ACKNOWLEDGEMENTS

The financial support received from the Research grants of the Research projects of National University Bangladesh Authority is gratefully acknowledged. The first author expresses his gratitude to his teacher and PhD supervisor Prof. Dr. Mohammad Ali Azadi for his sound advice for conducting the research. Sincere gratitude to Prof. Dr. Md. Sagir Ahmed and DU Researcher Sujan Kumar Datta for confirming the identification of several fishes through DNA barcoding. The assistance received from Mr. Bidhan Dutta and Mr. Chitu Datta during field trip and survey in the remote hilly areas is also thankfully acknowledged. The authors are also grateful to Dr. Ferdous Akhter for providing partial support for conducting this research.

REFERENCES

- Ahmed, K. K., M. A. Mamun, M. E. Haque and M. Alamgir. 2003. Post impoundment changes in the fish fauna of Kaptai reservoir, Bangladesh. *Bangladesh J. Fish. Res.* **7**(10): 61-68.
- Arefin, F., M. Moniruzzaman, S. T. Lupa, M. A. Rahman, A. Islam and S. Akter. 2018. Status of threatened fish species in Narsunda river. *Res. Agric. Livest. Fish.* **5**(2): 259-268.
- Arshad-UI-Alam, M. 2020. Monograph on threatened biodiversity in the interconnected rivers of Chattogram with reference to new records of horned carp and mahseer carp. *J. Chittagong College.* **1**: 19-31.
- Arshad-UI-Alam, M. 2023. Personal communication.
- Arshad-UI-Alam, M. and M. A. Azadi. 2017. First record of horned carp *Schismatorynchos nukta* (Sykes, 1839), (Cypriniformes: Cyprinidae) from Bangladesh and its present status. *J. Biodivers. Conserv. Bioresour. Manag.* **3**(1): 85-92.
- Arshad-UI-Alam, M., M. A. Azadi, M. N. Naser, M. A. R. Hossain, M. G. K. Khan and S. Sultana. 2021. First record of freshwater *Ophiocara porocephala* Valenciennes 1837 (Gobiiformes, Butidae) from a small plunge pool of Cox's Bazar, Bangladesh. *J. Govt. City College, Chattogram.* **1**: 43-49.
- Azadi, M. A., N. Mahmood and M. Shafi. 1994. Studies on the age and growth of chital, *Notopterus chitala* (Ham.) (Notopteridae: Clupeiformes) from the Kaptai reservoir, Bangladesh. *Chittagong Univ. Stud. Part II Sc.* **18**(2): 197-205.
- Azadi, M. A. and M. Arshad-ul-Alam. 2011. Diversity of finfish and fhellfish of the River Halda with notes on their conservation. In: E. Roskaft and D. J. Chivers (eds.). *Proceedings of the International Conference on Biodiversity-Present State, Problems and Prospect of its Conservation.* Norwegian Center for International Cooperation in Education (SIU), NO 5809, Bergen, Norway., pp. 92-102.
- Azadi, M. A. and M. Arshad-UI-Alam. 2013. Ichthyofauna of the River Halda, Chittagong, Bangladesh. *Bangladesh J. Zool.* **41**(2): 113-133.

- Azadi, M. A. and M. Arshad-UI-Alam. 2014. Biodiversity and conservation of fin and shellfishes of the River Sangu, Bangladesh. In: M. A. R. Khan (ed.). *The Festschrift on the 50th Anniversary of the IUCN Red List of threatened Species*. The IUCN Bangladesh, Dhaka, Bangladesh. 182 pp.
- Azadi, M. A. and M. Arshad-UI-Alam. 2020. Ichthyodiversity of the five linked rivers of Chattogram, Bangladesh. *Bangladesh J. Zool.* **48**(2): 215-230.
- BANGLAPEDIA. 2023. National Encyclopedia of Bangladesh: Chittagong Region River System. en.banglapedia.org/index.php/Sangu_River. Accessed on 11th Oct. 2023.
- Chandra, B. B. and P. A. Kumar. 2015. Diversity of small indigenous fishes (SIF) of Nabaganga and Kaliganga rivers of Jhenaidah, south western part of Bangladesh. *Res. J. Recent Sci.* **4**(12): 77-80.
- Flowra, F. A., M. A. Islam, S. N. Jahan, M. A. Hussain, M. M. Alam, F. A. Bashir, A. G. Mazian and K. D. Simon. 2013. Status and decline cause of fish diversity of Baral river, Natore, Bangladesh. *AACL Bioflux.* **6**(4): 352-357.
- Galib, S. M. 2015. Fish fauna of the Brahmaputra River, Bangladesh: richness, threats and conservation needs. *J. Fish.* **3**(3): 285-292.
- Habib, F., S. Tasnin and N. I. M. A. S. Bhuiyan. 2016. A checklist of fishes and fisheries of the Padda (Padma) river near Rajshahi City. *Int. J. Pure App. Biosci.* **4**(2): 53-57.
- Haque, M. A., J. Rashid, M. L. Mia, M. K. Rahman, M. Ali, A. Bhadra and Y. Mahmud. 2023. The First Report on a New *Tor* Species, *Tor Barakae* (Arunkumar and Basudha, 2003), from Bangladesh using dna barcoding technique. <https://ssrn.com/abstract=4418902> or <http://dx.doi.org/10.2139/ssrn.4418902>.
- Hossain, M. A. R. 2015. *Neolissochilus hexagonolepis*: *Freshwater Fishes*. Red List of Bangladesh. Vol. 5. International union for conservation of nature (IUCN), Bangladesh Country office, Dhaka, Bangladesh. 76 pp.
- Islam, M. R., M. Das, M. N. Mondal and G. M. Mostakim. 2018. Status of fish species diversity in Ghaghat river in Northern Bangladesh. *Ann. Bangladesh Agric.* **22**(1): 95-105.
- IUCN Bangladesh. 2015. Red List of Bangladesh: Freshwater Fishes. Vol. 5. International Union for conservation of Nature, Bangladesh Country office, Dhaka, Bangladesh. 360 pp.
- Joadder, M. A. R., S. M. Galib, S. M. M. Haq and N. Chaki. 2015. Fishes of the River Padma, Bangladesh: Current trend and conservation status. *Journal of Fisheries* **3**(2): 259-266.
- Kamrujjaman, M. and M. R. Nabi. 2015. Ichthyodiversity of Bangshi river, Savar, Dhaka. *Jahangirnagar University J. Biol. Sci.* **4**(1): 19-25.
- Khanom, D. A., T. Khatun, M. A. S. Jewel, M. D. Hossain and M. M. Rahman. 2016. Present status of fish biodiversity and abundance in Shiba river, Bangladesh. *Univ. J. Zool. Rajshahi. Univ.* **35**: 7-15.
- Kullander, S. O., M. M. Rahman, M. Norén and A. R. Mollah. 2017. *Devario* in Bangladesh: Species diversity, sibling species, and introgression within danionin cyprinids (Teleostei: Cyprinidae: Anioninae). *PLoS One.* **12**(11): e0186895.
- Kullander, S. O., M. M. Rahman, M. Norén and A. R. Mollah. 2018. *Laubuka tenella* a new species of cyprinid fish from Southeastern Bangladesh and Southwestern Myanmar (Teleostei: Cyprinidae: Danioninae). *ZooKeys.* **742**: 105-126. <https://doi.org/10.3897/zookeys.742.22510>.
- Kullander, S. O., M. Norén, M. M. Rahman and A. R. Mollah. 2019. Chameleon fishes in Bangladesh: hipshot taxonomy, sibling species, elusive species, and limits of species delimitation (Teleostei: Badidae). *Zootaxa.* **4586**: 301-337.

- Mohsin, A. B. M., S. Haque, S. M, Galib, M. F. H. Fahad, N. Chaki, M. N. Islam and M. M. Rahman. 2013. Seasonal Abundance of Fin Fishes in the Padma River at Rajshahi District, Bangladesh. *World J. Fish Mar. Sci.* **5**(6): 680-685.
- Parvez, I., M. Rana, M. S. Chhanda, K. Rekha, T. Mahajebin, S. Nehrin and Y. Ara. 2019. Fish biodiversity and conservation status of the lower streams of the Dhepa river of Dinajpur, Bangladesh. *Int. J. Bio. Sci.* **14**(3): 273-287.
- Rahman, A. K. A. 2005. *Freshwater fishes of Bangladesh*. 2nd ed. Zoological Society of Bangladesh. Department of Zoology, University of Dhaka. Dhaka, Bangladesh.
- Rahman, M. M., M. Y. Hossain, F. Ahmed, Z. Fatematuz, B. J. Subba, E. M. Abdulla and J. Ohtomi. 2012. Biodiversity in the Padma distributary of the Ganges river, Northwestern Bangladesh: Recommendations for conservation. *World J. Zool.* **7**(4): 328-337.
- Rahman, M. M., A. R. Mollah, M. Norén and S. O. Kullander. 2016. *Garra mini*, a new small species of rheophilic cyprinid fish (Teleostei: Cprinidae) from southeastern hilly areas of Bangladesh. *Ichthyol. Explor. Freshwaters.* **27**(2): 173-181.
- Rudra, A. K. and A. K. M. R. Alam. 2023. Streamflow characteristics of Sangu Matamuhuri watershed in the southeastern part of Bangladesh. *Heliyon.* **9**: e14559.
- Talwar, P. K. and A. G. Jhingran. 1991. *Inland Fishes of India and Adjacent Countries*. Vol. 1 and 2. Oxford and IBH Publishing Co. Pvt. Ltd.
- WIKIPEDIA. 2024. The Free Encyclopedia. Sangu river. en.wikipedia.org/wiki/Sangu_river. Accessed on 27th Feb 2024.

(Manuscript received on 22 October, 2023)