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A CHECKLIST OF FISH SPECIES FROM THREE RIVERS IN NORTHWESTERN BANGLADESH BASED ON A SEVEN-YEAR SURVEY

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Abstract: Bangladesh is rich in freshwater biodiversity, but information on riverine fish diversity is lacking. This study represents a complete list of fish species of Dhepa, Punarbhaba, and Atrai rivers of Bangladesh based on surveys carried out for seven years, from 2009 to 2016. A total of 121 species belonging to 80 genera and 33 families were recorded, of which Cyprinidae was the most dominant family representing 24 species. A total of 42 threatened species and 10 exotic species were collected during the survey. This study highlights that Dhepa, Punarbhaba, and Atrai are critical habitats for many conservation-concern fish species, and reveals the need for developing suitable conservation and management plans for the future.

Keywords: Atrai River, Dhepa River, exotic fish, freshwater fish, Punarbhaba River, threatened species.

Freshwater biodiversity constitutes a vitally important component of the planet, with relatively higher species richness than terrestrial and marine ecosystems (Gleick 1996). Bangladesh is rich in freshwater fish diversity with 253 species of which 64 are categorized as threatened (IUCN 2015). The natural habitats of the majority of the freshwater species are rivers (~230), their tributaries, and adjacent ‘beels’ (a lake-like wetland with static water).

The northwestern part of Bangladesh is traversed by Dhepa, Punarbhaba, and Atrai rivers which are considered hotspots of some small indigenous fish species. The information on the availability of fish species in these rivers, however, is lacking in scientific literature, and

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considerable variations in species diversity are known to exist between different seasons and years (Shahadat et al. 2012). This study aims to provide a comprehensive list of the species available in the Dhepa, the Punarbhaba, and the Atrai rivers of northwestern Bangladesh to facilitate river management and biodiversity conservation.

MATERIALS AND METHODS

Data were collected as part of three projects conducted from 2009 to 2016 at Hajee Mohammad Danesh Science and Technology University, Dinajpur. The survey included monthly visits to fishing spots and local markets (bazaars) adjacent to the rivers. The sites were in Punarbhaba River (25.628°N & 88.618°E; 25.595°N & 88.614°E; 25.646°N & 88.620°E), Atrai River (25.718°N & 88.739°E; 25.538°N & 88.759°E; 25.871°N & 88.719°E),

Dhepa River (25.703°N & 88.635°E; 25.783°N & 88.672°E; 25.652°N & 88.629°E), Dhepa River Fish Sanctuary (25.865°N & 88.665°E), Bahadur Bazaar (25.626°N & 88.633°E), Rail Bazaar (25.636°N & 88.643°E), Birgang Bazaar (25.862°N & 88.656°E), and Khanshama Bazaar (25.926°N & 88.727°E).

Fish species were identified by experienced fish biologists (Mohammad Shaifuddin Shah, Mostafa Ali Reza Hossain, Imran Parvez, and Mohammad Mahbulul Hassan) based on morphometric characters and meristic counts mentioned in Talwar & Jhingran (1991) and Rahman (2005). Updated taxonomic names follow Eschmeyer et al. (2018). The extinction risk and conservation status of the collected fishes follow IUCN (2015).

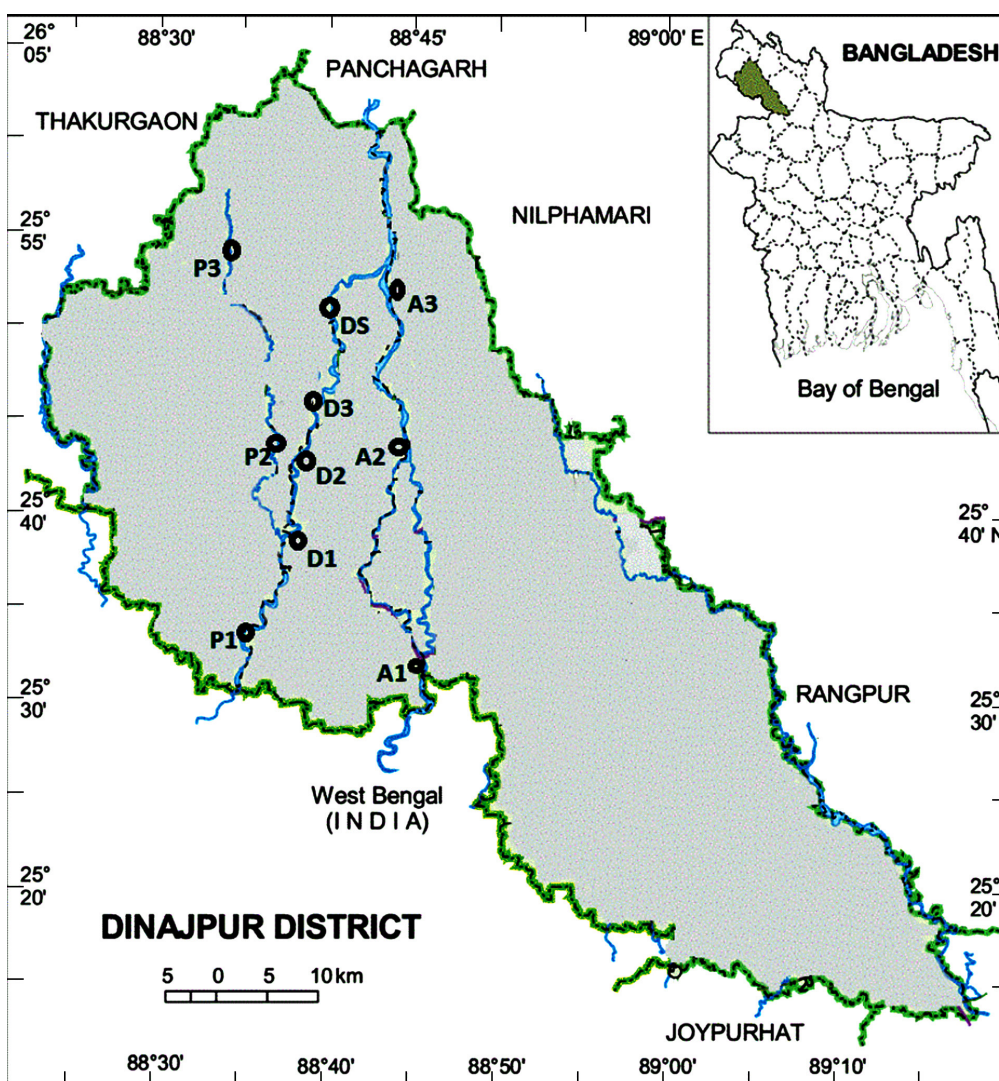


Figure 1. Locations of rivers in northwestern Bangladesh from which fish species were collected: P1, P2 & P3 - three sites of Punarbhaba River | D1, D2 & D3 - three sites of Dhepa River | A1, A2 & A3 - three sites of Atrai River.

RESULTS

A total of 121 species (including 10 exotic species) belonging to 80 genera and 33 families were recorded during the study and are listed together with details of their IUCN status and habitats in Tables 1 and 2.

Cyprinidae was the most dominant family (24 species) followed by Danionidae (22 species) and Bagridae (10 species). Four species each belonged to the families Channidae, Mastacembelidae, Ambassidae, Siluridae, and Cobitidae and three species each to Psilorhynchidae and Ailiidae (Fig. 2).

Of the 111 indigenous species, 42 species (32.8%) were threatened, of which four species were listed as Critically Endangered, 24 as Endangered, and 14 as Vulnerable in the National Red List of Bangladesh (IUCN 2015; Fig. 3).

DISCUSSION

This study provides the first comprehensive list of fish species availability in Dhepa, Punarbhaba, and Atrai rivers of northwestern Bangladesh. Cyprinidae dominated the species richness, a result similar to other freshwater ecosystems in Bangladesh (Rahman et al. 2012; Galib et al. 2013; Hasan et al. 2013; Chaki et al. 2014).

We also recorded 10 exotic species, namely *Cyprinus carpio*, *Hypophthalmichthys nobilis*, *Barbonymus gonionotus*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *Mylopharyngodon piceus*, *Hypostomus plecostomus*, *Clarius gariepinus*, *Oreochromis mossambicus*, and *Pangasianodon hypophthalmus*. Although exotic species were introduced into Bangladesh to increase aquaculture production,

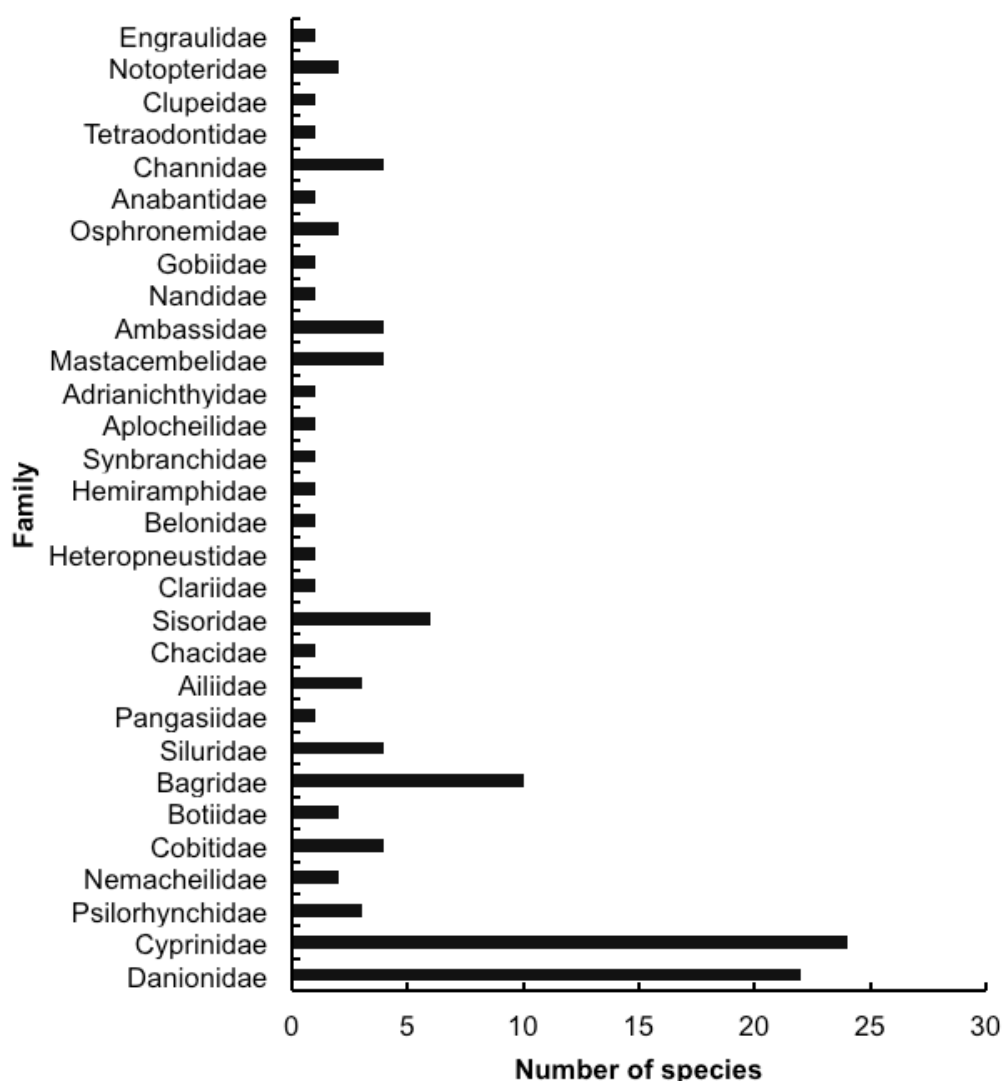


Figure 2. Number of fish species within different families collected from 2009 to 2016 in Punarbhaba, Dhepa, and Atrai rivers of northwestern Bangladesh.

Table 1. Indigenous fish species found in Punarbhaba, Dhepa, and Atrai rivers in northwestern Bangladesh from 2009 to 2016 (IUCN status: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, DD = Data Deficient, NE = Not Evaluated; '+' indicates presence and '-' indicates absence of species).

Family	Common name	Scientific name	Local name	Global status (IUCN 2015)	National status (IUCN 2015)	Presence/absence in rivers and sanctuary			
						Punarbhaba	Dhepa	Atrai	Sanctuary
Danionidae	Jaya	<i>Cabdia jaya</i> (Hamilton, 1822)	Jaya	NE	LC	+	+	+	+
	Morari	<i>C. morar</i> (Hamilton, 1822)	Morari	NE	VU	+	+	+	+
	Mola Carplet	<i>Amblypharyngodon mola</i> (Hamilton, 1822)	Mola	LC	LC	-	+	-	+
	Indian Carplet	<i>A. microlepis</i> (Bleeker, 1853)	Mola	NE	LC	-	+	-	+
	Barred Barila	<i>Barilius barila</i> (Hamilton, 1822)	Barali	LC	DD	+	+	+	+
	Shakra Baril	<i>B. shakra</i> (Hamilton, 1822)	Koksa	LC	LC	+	-	+	-
	Hamilton Barila	<i>B. bendelisis</i> (Hamilton, 1807)	Joia	LC	EN	+	+	+	+
	Vagra Baril	<i>B. vagra</i> (Hamilton, 1822)	Vagra	LC	EN	+	-	+	-
	Barna Baril	<i>Opsarius barna</i> (Hamilton, 1822)	Bani Koksa	LC	EN	-	-	+	+
	Tileo Baril	<i>O. tileo</i> (Hamilton, 1822)	Tila	LC	EN	-	+	+	+
	Bengala Barb	<i>Bengala elanga</i> (Hamilton, 1822)	Along	LC	EN	-	+	-	+
	Silver Hatchlet Chela	<i>Chela cachi</i> (Hamilton, 1822)	Chap Chela	LC	VU	+	-	+	+
	Indian Glass Barb	<i>Laubuca laubuca</i> (Hamilton, 1822)	Labuca	LC	VU	+	+	+	+
	Zebra Danio	<i>Danio rerio</i> (Hamilton, 1822)	Anju	LC	NT	-	+	+	+
	Sind Danio	<i>Devario devario</i> (Hamilton, 1822)	Chap Chela	LC	LC	+	+	+	+
	Flying Barb	<i>Esonus danrica</i> (Hamilton, 1822)	Darkina	NE	DD	-	+	+	+
	Trout Barb	<i>Raiamas bola</i> (Hamilton, 1822)	Bhol	LC	EN	-	+	+	+
	Slender Rasbora	<i>Rasbora daniconius</i> (Hamilton, 1822)	Darkina	LC	LC	+	+	+	+
	Gangetic Scissortail Rasbora	<i>R. rasbora</i> (Hamilton, 1822)	Darkina	LC	EN	-	-	+	+
	Large Razorbelly Minnow	<i>Salmostoma bacaila</i> (Hamilton, 1822)	Katari	LC	DD	+	+	+	+
	Fine Scale Razorbelly Minnow	<i>S. phulo</i> (Hamilton, 1822)	Ful Chela	LC	NT	+	+	+	+
	Gora Chela	<i>Securicula gora</i> (Hamilton, 1822)	Gora Chela	LC	NT	+	+	+	+

Family	Common name	Scientific name	Local name	Global status (IUCN 2015)	National status (IUCN 2015)	Presence/ absence in rivers and sanctuary			
						Punarbhaba	Dhepa	Atra	Sanctuary
Cyprinidae	Kalabans	<i>Bangana dero</i> (Hamilton, 1822)	Kursha	LC	DD	+	-	+	+
	Catla	<i>Gibellion catla</i> (Hamilton, 1822)	Katal	NE	LC	+	+	+	+
	Gotyla	<i>Garra gotyla</i> (Gray, 1830)	Ghor poia	LC	EN	-	-	+	-
	Chaguni	<i>Chagunius chagunio</i> (Hamilton, 1822)	Jarua	LC	VU	+	+	+	+
	Reba Carp	<i>Gymnostomus ariza</i> (Hamilton, 1807)	Korki	LC	NT	+	+	+	+
	Pangusia Labeo	<i>Labeo pangusia</i> (Hamilton, 1822)	Ghora Muikkha	NT	EN	-	-	+	-
	Kuria Labeo	<i>L. gonius</i> (Hamilton, 1822)	Ghannya	LC	NT	+	+	+	+
	Angra Labeo	<i>L. angra</i> (Hamilton, 1822)	Angrot	LC	VU	+	+	+	+
	Bata Labeo	<i>L. bata</i> (Hamilton, 1822)	Bata	LC	LC	+	+	+	+
	Boga Labeo	<i>L. boga</i> (Hamilton, 1822)	Bhangan	LC	CR	-	+	-	+
	Black Rohu	<i>L. calbasu</i> (Hamilton, 1822)	Kalibaus	LC	LC	+	+	+	+
	Rohu Carp	<i>L. rohita</i> (Hamilton, 1822)	Rui	LC	LC	+	+	+	+
	Hillstream Carp	<i>Tariqilabeo latius</i> (Hamilton, 1822)	Kala bata	LC	EN	-	+	-	+
	Kosuati	<i>Oreichthys kosuatis</i> (Hamilton, 1822)	Kosuati	NE	EN	-	+	+	+
	Cotio	<i>Osteobrama cotio</i> (Hamilton, 1822)	Dhela	LC	VU	+	+	+	+
	Olive Barb	<i>Systemus sarana</i> (Hamilton, 1822)	Sarpunti	LC	NT	+	+	+	+
	Swamp Barb	<i>Puntius chola</i> (Hamilton, 1822)	Chalapunti	LC	LC	+	+	+	+
	Pool Barb	<i>P. sophore</i> (Hamilton 1822)	Jatpunti	LC	LC	+	+	+	+
	One-spot Barb	<i>P. terio</i> (Hamilton, 1822)	Teri Punti	LC	LC	+	+	+	+
	Ticto Barb	<i>Pethia ticto</i> (Hamilton, 1822)	Tit Punti	LC	VU	+	+	+	+
	Glass Barb	<i>P. gugania</i> (Hamilton, 1822)	Mola Punti	LC	LC	+	+	+	+
	Spotted Barb	<i>P. phutunia</i> (Hamilton, 1822)	Phutani Punti	LC	LC	+	+	+	+
	Rosy Barb	<i>P. conchanius</i> (Hamilton, 1822)	Kanchan Punti	LC	LC	+	+	+	+
	Golden Barb	<i>P. gelius</i> (Hamilton, 1822)	Gilipunti	LC	NT	-	-	-	+
Psilorhynchidae	Balitora Minnow	<i>Psilorhynchus balitora</i> (Hamilton, 1822)	Balitora	LC	LC	+	+	+	+
	Rainbow Minnow	<i>P. nudithoracicus</i> Tiak & Husain, 1980	Balitora	DD	DD	+	+	+	+
	River Stone Carp	<i>P. sucatia</i> (Hamilton, 1822)	Balitora	LC	NT	+	+	+	+
	Sand Loach	<i>Paracanthocobitis botia</i> (Hamilton, 1822)	Balichata	LC	LC	+	+	+	+
Nemacheilidae	Corica Loach	<i>Nemacheilus corica</i> (Hamilton, 1822)	Korica	LC	EN	+	+	+	+

Family	Common name	Scientific name	Local name	Global status (IUCN 2015)	National status (IUCN 2015)	Presence/ absence in rivers and sanctuary			
						Punarbhaba	Dhepa	Atrai	Sanctuary
Cobitidae	Guntea Loach	<i>Lepidocephalichthys guntea</i> (Hamilton, 1822)	Puiya	LC	LC	+	+	+	+
	Loktak Loach	<i>L. irrorata</i> Hora, 1921	Puiya	LC	VU	+	+	+	+
	Anandale Loach	<i>L. annandalei</i> Chaudhuri, 1912	Puiya	LC	VU	+	+	+	+
	Gongota Loach	<i>Canthophrys gongota</i> (Hamilton, 1822)	Pahari Gutum	LC	NT	+	+	+	+
Botiidae	Bengal Loach	<i>Botia dario</i> (Hamilton, 1822)	Rani	LC	EN	+	-	+	+
	Y-Loach	<i>B. lohachata</i> Chaudhuri, 1912	Rani	NE	EN	+	-	+	+
	Dwarf Catfish	<i>Batasio tengana</i> (Hamilton, 1822)	Tengra	LC	EN	-	-	+	-
	Menoda Catfish	<i>Hemibagrus menoda</i> (Hamilton, 1822)	Gang Tengra	LC	NT	+	-	-	+
Bagridae	Day's Mystus	<i>Mystus bleekeri</i> (Day, 1877)	Gulsha Tengra	LC	LC	-	-	+	+
	Gangetic Mystus	<i>M. cavasius</i> (Hamilton, 1822)	Kabashi Tengra	LC	NT	+	+	+	+
	Striped Dwarf Catfish	<i>M. tengana</i> (Hamilton, 1822)	Bujri Tengra	LC	NT	+	+	+	+
	Gulio Catfish	<i>M. gulio</i> (Hamilton, 1822)	Nuna Tengra	LC	NT	+	+	+	+
	Striped River Catfish	<i>M. vittatus</i> (Bloch, 1794)	Tengra	LC	NT	+	+	+	+
	Rita	<i>Rita rita</i> (Hamilton, 1822)	Rita	LC	EN	-	+	+	+
	Long-whiskered Catfish	<i>Sperata aor</i> (Hamilton, 1822)	Ayre	LC	VU	+	+	+	+
	Giant River Catfish	<i>S. seenghala</i> (Sykes, 1839)	Gujiayre	LC	VU	+	+	+	+
	Two-spot Glass Catfish	<i>Ompok bimaculatus</i> (Bloch, 1794)	Kanpabda	NT	EN	-	-	+	+
	Two-stripe Pabda Catfish	<i>O. pabda</i> (Hamilton, 1822)	Madhu Pabda	NT	EN	-	+	-	+
Siluridae	Pabo Catfish	<i>O. pabo</i> (Hamilton, 1822)	Kala Pabda	NT	CR	-	+	-	+
	Freshwater Shark	<i>Wallago attu</i> (Bloch & Schneider, 1801)	Boal	NT	VU	+	+	+	+
	Pungas	<i>Pangasius pangasius</i> (Hamilton, 1822)	Pangas	LC	EN	-	+	-	+
	Gangetic Ailia	<i>Ailia colla</i> (Hamilton, 1822)	Baspata	NT	LC	+	+	+	+
Ailidae	Vacha	<i>Clupisoma garua</i> (Hamilton, 1822)	Bacha	NE	EN	+	+	+	+
	Murius Vacha	<i>Eutropichthys murius</i> (Hamilton, 1822)	Muri Bacha	LC	LC	-	+	-	+
Chacidae	Square-head Catfish	<i>Chaca chaca</i> (Hamilton, 1822)	Chaka	LC	EN	+	+	-	+
Sisoridae	Devil Catfish	<i>Bagarius bagarius</i> (Hamilton, 1822)	Baghair	NT	CR	+	-	+	+
	Clown Catfish	<i>Gagata cenia</i> (Hamilton, 1822)	Couwa	LC	LC	+	+	+	+
	Gangetic Gagata	<i>G. gagata</i> (Hamilton, 1822)	Gang Tengra	LC	LC	+	+	+	+
	Sisor Catfish	<i>Sisor raddaphorus</i> Hamilton, 1822	Sai Sore	LC	CR	+	-	+	+
	Kosi Hara	<i>Erethistes hara</i> (Hamilton, 1822)	Kultakanti	LC	LC	+	+	+	+
	Conta Catfish	<i>Conta conta</i> (Hamilton, 1822)	Hara Machh	NE	NT	-	+	+	+

Family	Common name	Scientific name	Local name	Global status (IUCN 2015)	National status (IUCN 2015)	Presence/ absence in rivers and sanctuary			
						Punarbhaba	Dhepa	Atra	Sanctuary
Clariidae	Walking Catfish	<i>Clarias magur</i> (Hamilton, 1822)	Magur	LC	LC	+	+	+	+
Heteropneustidae	Stinging Catfish	<i>Heteropneustes fossilis</i> (Bloch, 1794)	Shing	LC	LC	+	+	+	+
Belontiidae	Freshwater Garfish	<i>Xenentodon cancila</i> (Hamilton, 1822)	Kankila	NE	LC	+	+	+	+
Hemiramphidae	Congaturi Halfback	<i>Hyporhamphus limbatus</i> (Valenciennes, 1847)	Ekhoata	NE	LC	+	+	+	+
Synbranchidae	Freshwater Mud Eel	<i>Monopterus albus</i> (Hamilton, 1822)	Kuchia	VU	VU	+	+	+	+
Aplocheilidae	Panchax Minnow	<i>Aplocheilichthys panchax</i> (Hamilton 1822)	Kanpona	LC	LC	+	+	+	+
Adrianichthyidae	Estuarine Rice Fish	<i>Oryzias latipes</i> (McClelland, 1839)	Kanpona	LC	LC	+	+	+	+
Mastacembelidae	One-stripe Spiny Eel	<i>Macragnathus arai</i> (Bloch & Schneider, 1801)	Tara Baim	LC	DD	+	+	+	+
	Stripped Spiny Eel	<i>M. pancalus</i> Hamilton, 1822	Guchi Baim	LC	LC	+	+	+	+
	Spotted Spiny Eel	<i>M. aculeatus</i> (Bloch, 1786)	Tara Baim	NE	NT	+	+	+	+
	Tiretrack Spiny Eel	<i>Mastacembelus armatus</i> (Lacepède, 1800)	Sal Baim	NE	EN	+	+	+	+
	Elongated Glass Perchlet	<i>Chanda nama</i> Hamilton, 1822	Chanda	LC	LC	+	+	+	+
Ambassidae	Indian Glossy Fish	<i>Parambassis ranga</i> (Hamilton, 1822)	Ranga Chanda	LC	LC	+	+	+	+
	Indian Glossy Fish	<i>P. baculis</i> (Hamilton, 1822)	Kata Chanda	LC	NT	+	+	+	+
	Highfin Glassy Perchlet	<i>P. lala</i> (Hamilton, 1822)	Lal Chanda	NE	LC	+	+	+	+
Nandidae	Gangetic Leafish	<i>Nandus nandus</i> (Hamilton, 1822)	Veda	LC	NT	+	-	+	+
Gobiidae	Tank Gobi	<i>Glossogobius giuris</i> (Hamilton, 1822)	Balla	LC	LC	+	+	+	+
Osphronemidae	Banded Gourami	<i>Trichogaster fasciata</i> Bloch & Schneider, 1801	Kholisha	LC	LC	+	+	+	+
	Dwarf Gourami	<i>Trichogaster lalius</i> (Hamilton, 1822)	Lal Khalisha	LC	LC	+	+	+	+
Anabantidae	Climbing Perch	<i>Anabas testudineus</i> (Bloch, 1792)	Koi	DD	LC	+	+	+	+
Channidae	Great Snakehead	<i>Channa marulius</i> (Hamilton, 1822)	Gajar	LC	EN	+	+	+	+
	Spotted Snakehead	<i>C. punctatus</i> (Bloch, 1793)	Taki	LC	LC	+	+	+	+
	Snakehead Murrel	<i>C. striata</i> (Bloch, 1793)	Shol	LC	LC	+	+	+	+
	Walking Snakehead	<i>C. gachua</i> (Hamilton, 1822)	Cheng	LC	LC	+	+	+	+
Tetraodontidae	Ocellated Pufferfish	<i>Leiodon cutcutia</i> (Hamilton, 1822)	Tepa	LC	LC	+	+	+	+
Clupeidae	Ganges River Spral	<i>Corica sobarna</i> Hamilton, 1822	Kachki	LC	LC	+	+	+	+
Notopteridae	Clown Knife Fish	<i>Chitala chitala</i> (Hamilton, 1822)	Chital	NT	EN	+	+	+	+
	Bronge Featherback	<i>Notopterus notopterus</i> (Pallas, 1769)	Foli	LC	VU	+	+	+	+
Engraulidae	Gangetic Hairfin Anchovy	<i>Setipinna phasa</i> (Hamilton, 1822)	Faisa	LC	LC	+	+	+	+

Table 2. Exotic fish species found in Punarbhaba, Dhepa, and Atrai rivers in northwestern Bangladesh from 2009 to 2016 ('+' indicates presence and '-' indicates absence of species).

Family	Common name	Scientific name	Local name	Presence/ absence in rivers and sanctuary			
				Punarbhaba	Dhepa	Atrai	Sanctuary
Cyprinidae	Common Carp	<i>Cyprinus carpio</i> Linnaeus, 1758	Carp	+	+	+	+
	Bighead Carp	<i>Hypophthalmichthys nobilis</i> (Richardson, 1845)	Bighead	+	+	+	+
	Java Barb	<i>Barbonymus gonionotus</i> (Bleeker, 1849)	Thai Sarpunti	+	+	+	+
	Grass Carp	<i>Ctenopharyngodon idella</i> (Valenciennes, 1844)	Grass Carp	+	+	+	+
Xenocypridae	Silver Carp	<i>Hypophthalmichthys molitrix</i> (Valenciennes, 1844)	Silver Carp	+	+	+	+
	Black Carp	<i>Mylopharyngodon piceus</i> (Richardson, 1846)	Black Carp	+	-	+	-
	Suckermouth Catfish	<i>Hypostomus plecostomus</i> (Linnaeus, 1758)	Choshok Machh	+	-	-	-
Clariidae	African Catfish	<i>Clarias gariepinus</i> (Burchell, 1822)	African Magur	-	-	+	-
Chichlidae	Mozambique Tilapia	<i>Oreochromis mossambicus</i> (Peters, 1852)	Tilapia	+	+	+	+
Pangasidae	Striped Catfish	<i>Pangasianodon hypophthalmus</i> (Sauvage, 1878)	Thai Pungus	+	-	-	-

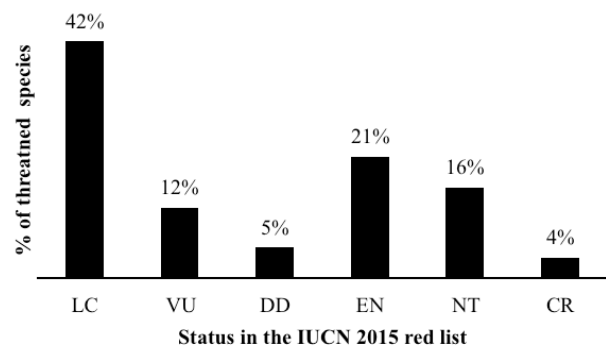


Figure 3. Threatened fish species recorded in Punarbhaba, Dhepa, and Atrai rivers of northwestern Bangladesh from 2009 to 2016 (CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, DD = Data Deficient).

none of these was meant to be released into the wild. These exotic species might have, therefore, escaped from aquaculture ponds during heavy rains or flood. Currently, no information exists whether these exotic species have established breeding populations in the wild, and such studies need to be carried out in the future along with the development of management plans for their control and eradication.

Freshwater fish biodiversity in Bangladesh is under threat due to various anthropogenic and natural causes (Islam et al. 2017). This study indicated that Dhepa, Punarbhaba, and Atrai rivers are important habitats for 42 threatened species; therefore, sanctuaries were established to provide a safe refuge for the species, especially during the breeding period (Parvez et al. 2017). Other threats, such as water abstraction for agriculture, however, are threatening the ecosystem. Therefore, there is a need for a trade-off between managing rivers for biodiversity conservation and agricultural production. This study provides a scientific basis of fish biodiversity status which would be useful for policy-makers to set priorities for river management in Bangladesh.

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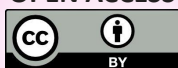
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