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ORIGINAL RESEARCH ARTICLE

Assessment of the ichthyofaunal diversity in the Juri River of Sylhet district, Bangladesh

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ABSTRACT

This study was conducted to assess the present status of ichthyofaunal assemblages in the Juri River of Fenchuganj upazila in Sylhet district, Bangladesh. Survey works were made in three different locations of the river during May to December, 2018 comprising direct fish catch observations, questionnaire interviews, focus group discussions with fishers, fish traders, *aratders* (wholesalers) and river bank community members, and key informant interviews with upazila fisheries officer, district fisheries officer, non-governmental organization officials, and local leaders. The results revealed that a total of 75 species of fishes under 25 families were available. Among these species 11 were commonly available, 32 were moderately available, 25 were less available, and 7 were rarely available. Cyprinidae was the leading family consisting of 27% of the total fish population of the study area. However, 10 vulnerable, 8 endangered and 1 critically endangered fish species were also found in small amount. During this study the highest number of species (61) was found in the catches in October and lowest number of species (22) was recorded in July. According to the perceptions of fishers and resource person degradation of habitat, climate change, and human activities are the triggering agents for declining ichthyofaunal diversity in this river. Therefore, this study recommends application of proper management measures including community participation to conserve the ichthyofaunal diversity and enhance fish production in the Juri River.

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INTRODUCTION

Bangladesh is blessed with vast and diversified fisheries resources which include rivers, estuaries, *beels*, *haors*, *baors* (ox-bow lakes), floodplains, and huge area of marine water resources (DoF, 2018). These productive water resources support many fish species which ultimately afford the country's total fisheries production (Shamsuzzaman *et al.*, 2017). Throughout the world fish form an indispensable part of the daily food intake. Fish and fisheries have become a vital part of Bangladeshi diets from ancient time and presently play a dynamic role in nutrition supply, employment generation, foreign currency earnings and other economic aspects of the country (DoF, 2018; Hossain, 2014). However, many fish species in the natural waterbodies are under different levels of threats.

During the last century, riverine ecosystems have endured from passionate human intervention, resulting in habitat degradation and loss of aquatic ecosystems. Consequently, many fish species have become highly threatened, particularly in rivers where substantial demand is placed on freshwaters (Rahman *et al.*, 2012). According to IUCN (2015), there are 253 species of inland freshwater fishes; among those 9 species are critically endangered (CR), 30 species are endangered (EN), 25 species are vulnerable (VU), and 27 species are near threatened (NT), 122 species are least concern (LC), and the rest 40 species are considered data deficient (DD) throughout the country. Due to overharvesting, degradation of habitat and consequent declining fish production from natural waterbodies, contribution of inland capture fisheries has been reduced from 50% to 35% of annual fisheries production, and production of marine capture

fisheries has remained static over the last decade (Mazid, 2010). Overfishing, siltation, indiscriminate fishing of larvae and juveniles, and water pollution are recognized as the major worries linked with the declination of ichthyofaunal diversity (Islam *et al.*, 2015a).

The Juri River is one of the important waterbodies in the northeastern part of Bangladesh in terms of fish production and income generation of many fishermen surrounding that wetland. This river originated from the hilly region of the Tripura state of India and enters into Bangladesh towards Dharmanagar at Kulaura upazila of Maulvibazar district. Another vital flow of this river named the Sonai River also originated from India and joins to this river at Sonai-Bardan point and their joint flow supports a rich diversity of fishes in the surrounding waterbody. The Juri River flows through the Hakaluki *haor* at different upazila in Maulvibazar district and falls into the Kushiyara River at Fenchuganj upazilas of Sylhet district. In the monsoon season it merges with the flooded Hakaluki *haor*. Due to these circumstances the Juri River is very significant for the availability of diversified aquatic species, especially fishes, and believed to be an essential spawning and feeding ground for *haor* and riverine fish species.

Maximum number of wild populations have been disappeared from the rivers and streams of Bangladesh due to overexploitation augmented by various environmental changes and degradation of the natural habitat (Galib *et al.*, 2009, 2013). Nowadays, gradual reduction of aquatic biodiversity from natural waterbodies is a vital problem in Bangladesh (Galib *et al.*, 2009, 2013; Imteazzaman and Galib, 2013; Chaki *et al.*, 2014; Mohsin *et al.*, 2013, 2014). These brief discussions indicate the necessity for in-depth study of biodiversity which is essential to assess the present status and sustainable management of any wetland (Imteazzaman and Galib, 2013).

Some research activities have been conducted on ichthyofaunal diversity in different waterbodies of Bangladesh (Galib *et al.*, 2009, 2013; Imteazzaman and Galib, 2013; Ahmed *et al.*, 2004; Zafar *et al.*, 2007; Mohsin *et al.*, 2013; Saha and Hossain, 2002). However, yet no research work has been published on ichthyofaunal diversity of the Juri River. Therefore, the present study was undertaken to prepare a checklist of fish species focusing on their relative present availability status compared to the national conservation status of Bangladesh by IUCN (2015). Thus, the information from this research work is supposed to provide a baseline dataset for carrying out further in-depth investigation on aquatic ecology, conservation, and sustainability for the proper management of fisheries resources of this river.

MATERIALS AND METHODS

Study area

This study was carried out at three fishing spots of the Juri River: Gilachhara and Purbo-Badidewli under Gilachhara union, and Pitaitikor under Fenchuganj union of Fenchuganj upazila in Sylhet district. Among 56 km of the total river length about 12 km from connecting point from the Kushiyara River to the Sonai-Bardan point was selected for data collection (Figure 1). The primary criteria for the selection of study area were a suitable geographical coverage for wide variety of fish biodiversity and good numbers of fishermen depended on fishing for their livelihood.

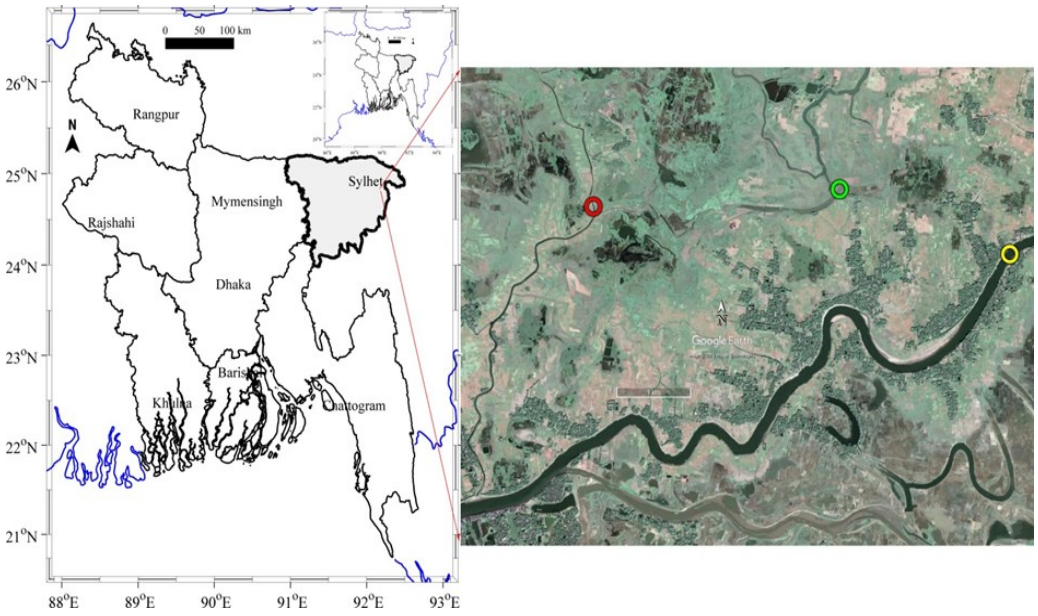

Figure 1. *Map showing locations of the study sites in Google Earth Pro map (Pitaitikor, Gilachhara, and Purbo Badiadewli are shown by red, green and yellow circles, respectively).*

Study period and target group

This study was conducted for a period of eight months from May to December, 2018. During the study period several field visits were made to collect necessary information. Different levels of stakeholders of fisheries like fishermen, *aratdars* (wholesalers), fish retailers and local leaders engaged in fishing, fish marketing and other related activities in the study areas who were well-known about the Juri River biodiversity were considered as target group. A total of 90 fishermen, 20 fish retailers, 10 *aratdars* (wholesalers) , and 5 local leaders were randomly selected for questionnaire interviews from the selected three study sites.

Preparation of questionnaire

A draft questionnaire was prepared keeping in view the objectives of the study. Then that draft questionnaire was used for pre-testing with few sample respondents. In pre-testing, attention was paid to incorporate any new information, which was not designed to be asked and filled in the draft interview schedule. The questionnaire was then modified and rearranged according to the experience gathered from the pretest. Thus, the questionnaire was finalized by arranging the questions in such a logical sequence so that the fishermen could answer chronologically.

Collection of data

Both primary and secondary sources of data were considered for collection in the present study. Primary data were collected from fishermen, *aratdar*s and fish traders through direct catch observation, questionnaire interview (QI), focus group discussion (FGD), and key informant interview (KII) (Arefin *et al.*, 2018; Gebre, 2015). The secondary information was collected from upazila fisheries office of Fenchuganj, district fisheries office of Sylhet, books, journals, MS thesis, published articles, and different internet sources.

Focus group discussion

A total of 3 FGDs were made at the three villages as mentioned before. The participants of FGD were fishermen of different ages: young, middle aged and old aged.

Questionnaire interview

A total of 90 fishermen, 10 aratders and 20 fish retailers were randomly selected for QIs from 3 selected villages.

Cross checking of information with key informants

After collection of data through FGDs and QIs the information were justified by KII. KIIs were conducted with key resource persons, such as highly experienced fishers, upazila fisheries officer (UFO), district fisheries officer (DFO), local leaders, and workers from non-government organization (NGO) like Center for Natural Resource Study (CNRS).

Identification of ichthyofauna

Samples of different fish species were collected from the fishermen's catch landed at different fish landing centers of the selected sampling stations and from fish markets as well. The fish species were identified and sorted based on their external morphology (Rahman, 2005; IUCN, 2015). Then, on the basis of QI and catch records of 90 fishermen the collected species were categorized in four statutes: commonly available (CA) which were observed throughout the year; moderately available (MA) which were observed infrequently in the study area; less available (LA) which were observed infrequently and less amount in the study area, and rarely available (RA) species which were observed fortuitously once or twice in a year. The species of the collected fishes were verified based on IUCN red list (IUCN, 2015) and internet source (http://www.fishbase.org).

Statistical analysis

After the collection the data were documented in a computer, and were analyzed by using Microsoft Office Excel 2010 to assess the present status of fish biodiversity in the Juri River. For the presentation of the analyzed data, table, pie-chart and bar diagrams were used in the results.

RESULTS AND DISCUSSION

Ichthyofaunal diversity status

The Juri River is naturally rich in aquatic biodiversity, mainly fishes, because of its location as an interconnecting water body with the Hakaluki *haor* and as a tributary of the Kushiyara River. This river ecosystems play a vital role in supporting the biodiversity of fishes, and contributes in animal protein supply as well as to the economy of Bangladesh. For the estimation of abundance and biodiversity status, the identified ichthyofauna were characterized as different levels of threatened conditions such as critically endangered (CR), endangered (EN), vulnerable (VU), near threatened (NT), and least concern (LC) (IUCN, 2015).

During the study period in accordance with the speech of local fishermen as well as direct catch observation and market visits' the fishes were categorized as 11 species were CA, 32 species were MA, 25 species were LA, and 7 species were found as RA in the study area (Figure 1). The recorded total number of fishes with their family details, present status and IUCN status are described in Table 1. In the present study a total of 75 fish species under 25 families were recorded which is higher than the results of Rahman *et al.* (2015) who recorded a total of 56 species of fishes belonging to 21 families from the Talma River at northern part of Bangladesh. Kamrujjaman and Nabi (2015) documented 48 species of fishes belonging to 18 families in the Bangshi River of Savar. Ali *et al.* (2014) found 53 species of fishes in the Chitra River at the south-western part of Bangladesh. Mohsin *et al.* (2014) documented 53 fish species belonging to 28 families at the Andharmanik River in Patuakhali district. Galib *et al.* (2013) found a total of 63 fish species in the river of Choto Jamuna at Naogaon district, Bangladesh. Islam *et al.* (2015c) recorded 61 species of fishes from the Sibsa River at south-western part of Bangladesh. Thus, the species diversity of the Juri River is much higher than those rivers. However,

Gain *et al.* (2015) identified a total of 95 finfish species contributing to 45 families at the Passur River of Bangladesh that is higher than present study. Joadder *et al.* (2015) identified and recorded 71 fish species belonging to 26 families from the river Padma which is closely similar with the present study.

Table 1. Fish species occurrence in the studied area with their IUCN (2015) status.

S.N.	Family name	Local name	Common name	Scientific name	Present status	IUCN status
1	Cyprinidae	Jatpunti	Punti barb	*Puntius sophore*	CA	LC
2		Sarpunti	Olive barb	*Puntius sarana*	LA	NT
3		Tit punti	Ticto barb	*Puntius ticto*	RA	VU
4		Mola punti	Glass barb	*Puntius guganio*	MA	LC
5		Gonia	Kuria labeo	*Labeo gonius*	CA	NT
6		Kalibaus	Black rohu	*Labeo calbasu*	CA	LC
7		Bata	Bata labeo	*Labeo bata*	MA	LC
8		Rui	Rohu carp	*Labeo rohita*	LA	LC
9		Agun chokha	Angra labeo	*Labeo angra*	RA	LC
10		Naukka chela	Gora chela	*Securicula gora*	MA	NT
11		Fulchela	Finescale razorbelly minnow	*Salmostama phulo*	CA	NT
12		Narkali chela	Large razorbelly minnow	*Salmostoma bacalia*	LA	LC
13		Chap chela	Sind danio	*Dvario devario*	LA	LC
14		Mola	Mola carplet	*Amblypharyngodon mola*	LA	LC
15		Dhela	Cotio	*Osteobrama cotio*	RA	NT
16		Darkina	Flying barb	*Esomus danricus*	LA	LC
17		Lachu	Reba carp	*Cirrhinus reba*	MA	NT
18		Mrigel	Mrigal	*Cirrhinus cirrhosus*	LA	NT
19		Carpu	Common carp	*Cyprinus carpio*	LA	LC
20		Catla	Catla	*Catla catla*	LA	LC
21	Bagridae	Tengra	Striped dwarf catfish	*Mystus vittatus*	MA	LC
22		Kalo bujuri	Tengara mystus	*Mystus tengara*	MA	LC
23		Gulsha	Gangetic mystus	*Mystus cavasius*	CA	NT
24		Loitta Tengra, Gulsha	Day's mystus	*Mystus bleekeri*	MA	LC
25		Gang Tengra	Menoda catfish	*Hemibagrus menoda*	LA	NT
26		Rita	Rita	*Rita rita*	RA	EN
27		Ayre	Long whiskered catfish	*Sperata aor*	MA	VU
28		Guizza ayre	Giant river catfish	*Sperata seenghala*	RA	VU
29	Siluridae	Boal	Freshwater shark	*Wallago attu*	CA	VU
30		Kani pabda	Two spot glass catfish	*Ompok bimaculatus*	LA	EN
31	Channidae	Madhu Pabda	Butter catfish	*Ompok pabda*	MA	EN
32		Taki	Spotted snakehead	*Channa punctatus*	CA	LC
33		Cheng	Walking snakehead	*Channa orientalis*	MA	LC
34		Shol	Striped snaked	*Channa striatus*	LA	LC
35		Gozar	Giant snakehead	*Channa marulius*	MA	EN
36	Mastacembelidae	Boro baim	Tire-track spiny eel	*Mastacembelus armatus*	CA	EN
37		Guchi baim	Striped spinyeel	*Macrognathus pancalus*	MA	LC
38		Tara baim	One-stripe spinyeel	*Macrognathus aculeatus*	MA	NT
39	Anabantidae	Koi	Climbing perch	*Anabas testudineus*	MA	LC
40	Osphronemidae	Khalisha	Banded gourami	*Trichogaster fasciata*	MA	LC
41		Lal khalisha	Dwarf gourami	*Trichogaster lalius*	MA	LC
42	Notopteridae	Chital	Humped featherback	*Notopterus chitala*	MA	EN
43		Foli	Grey featherback	*Notopterus notopterus*	LA	VU

Table 1. *Continued*.....

44	Sisoridae	Baghair	Dwarf goonch	*Bagarius bagarius*	LA	CR
45	Cobitidae	Bou, rani	Necktie loach	*Botia dario*	CA	EN
46		Gutum	Guntea loach	*Lepidocephalus guntea*	MA	LC
47		Gutum	Annandalei loach	*Lepidocephalichthys annandalei*	LA	VU
48		Puiya	Burmese loach	*Lepidocephalichthys berdmorei*	LA	LC
49	Clupeidae	Ilish	Hilsa shad	*Tenualosa ilisha*	RA	LC
50		Chapila	Indian river shad	*Gudusia chapra*	MA	VU
51		Kachki	Ganges river sprat	*Corica soborna*	MA	LC
52	Schilbeidae	Bacha	Batchwa vacha	*Eutropiichthys vacha*	MA	LC
53		Gharua, laira	Garua bacha	*Clupisoma garua*	LA	EN
54		Batasi	Indian potasi	*Neotropius atherinoides*	MA	LC
55		Kajuli	Gangetic ailia	*Ailia coila*	MA	LC
56		Hilon	Silond catfish	*Silonia silondia*	RA	LC
57	Palaemonidae	Golda	Gaint freshwater prawn	*Macrobrachium rosenbergii*	MA	LC
58		Gura icha	Kuncho river prawn	*Macrobrachium lamarrei*	CA	LC
59		Kaira icha	Kaira river prawn	*Macrobrachium dayanum*	MA	LC
60	Nandidae	Meni	Mud perch	*Nandus nandus*	MA	NT
61	Heteropneustidae	Shing	Stinging catfish	*Heteropneustes fossilis*	LA	LC
62	Clariidae	Magur	Walking catfish	*Clarias batrachus*	LA	LC
63	Gobiidae	Bele	Tank goby	*Glossogobius giuris*	MA	LC
64		Bele	Tiger goby	*Eugnathogobius oligactis*	LA	VU
65		Lomba chanda	Elongate glass-perchlet	*Chanda nama*	MA	LC
66		Gol chanda	Indian glass fish	*Parambassis ranga*	MA	LC
67		Lal chanda	Highfin glassy perchlet	*Parambasis lala*	LA	LC
68	Cichlidae	Tilapia	Mozambique tilapia	*Oreochromis mossambicus*	LA	LC
69	Balitoridae	Bilturi, balichata	Sand loach	*Acanthocobitis botia*	LA	LC
70	Belonidae	Kakila	Frashwater garfish	*Xenentodon cancila*	MA	LC
71	Hemiramphidae	Ekthota	Congaturi halfbeak	*Hyporamphus limbatus*	LA	LC
72	Sciaenidae	Kuli	Cuja croaker	*Macrospinosa cuja*	MA	NT
73	Anguillidae	Bamos	Indian mottled eel	*Anguilla bengalensis*	MA	VU
74	Sybranchidae	Kuchia	Gangetic mudeel	*Monopterus cuchia*	LA	VU
75	Tetraodontidae	Potka	Ocellated pufferfish	*Tetraodon cutcutia*	CA	LC

*CA = commonly available, MA = moderately available, LA = less available, RA = rarely available, *CR = critically endangered, EN = endangered, VU = vulnerable, NT = near threatened and LC = least concern.

From the record of the study Cyprinidae was the most leading family among the 25 families containing maximum fish species (20) which consists of 27% of the total ichthyofauna species. Bagridae (11%) was the second most leading family comprising 8 fish species followed by 5 species of Schilbeidae and Gobiidae (7%), 4 species of Channidae and Cobitidae (6%), 3 species of Mastacembelidae, Siluridae, Clupeidae and Palaemonidae (4%), 2 species of Osphronemidae and Notopteridae (3%), 1 species of each family were found under Anabantidae, Sisoridae, Nandidae, Heteropneustidae, Clariidae, Cichlidae, Balitoridae, Belonidae, Hemiramphidae, Sciaenidae, Anguillidae, Sybranchidae and Tetraodontidae (1%) (Figure 2).

Similar findings of Cyprinidae as a major family were also reported for many other rivers of Bangladesh with differences of number of species. For instance, Joadder *et al.* (2015) found Cyprinidae as dominant family with 23 species of fishes at the Padma River. Galib (2015) identified Cyprinidae family as dominant with 15 species at the river Brahmaputra. Islam *et al.* (2016) found Cyprinidae as highest contributing family with highest number (10) of species at the Jamuna River of Bangladesh. Chaki *et al.* (2014) documented Cyprinidae as the most dominating fish family consisting of 18 fish species in the Atrai River of Bangladesh. Mohsin *et al.* (2013) recorded Cyprinidae as the most dominant fish family containing of 22 species of fishes in the Padma River of Rajshahi district. However, dominant fish species of the Cyprinidae family was different in many rivers of Bangladesh which might be due to geographical and environmental differences of those rivers.

According to the present study, 7 fish species were rarely available in the study sites (Figure 3). The rarely available species are those fish species which passing a very critical condition that will be disappeared in near future. In percentage, MA species consists 43% of the total recorded fish species followed by LA (33%), CA (15%) and RA (9%) (Figure 4). Kamrujjaman and Nabi (2015) found 29 species (40.42%) of fishes as locally rare, only 3 species (6.25%) of fishes were very common and 16 species (33.33%) were common in the Bangshi River. Islam *et al.* (2015b) recorded 24 commonly available, 16 moderately available, 18 rarely available species of fishes from the wetlands of Sylhet district. Islam *et al.* (2015a) recorded as available (43.86%), less available (29.82%), rare (18.42%) and very rare (7.89%) species

of fishes at the Payra River of Bangladesh. Gain *et al.* (2015) recorded 50% of the fishes as available followed by 26% less available, 16% rare and 8% very rare in the Passur River of Bangladesh. Arefin *et al.* (2018) found 14 species as commonly available (23%), 28 species as moderately available (45%), and 20 species as rarely available (32%). The number and percentage of available fish species found in the present study is slightly different with the above studies which might be due to the differences of geographical location, study duration, and difference of availability of fishes in the study periods.

In the present survey gulsha (*Mystus cavasius*) was documented as the most abundant fish species among the 11 commonly available species. Boro baim (*Mastacembelus armatus*) was the second most abundant species followed by jatpunti (*Puntius sophore*), rani (*Botia dario*), gonia (*Labeo gonius*), kalibasu (*Labeo calbasu*), gura chingri (*Macrobrachium lamarrei*), boal (*Wallago attu*), fulchela (*Salmostama phulo*), potka (*Tetraodon cutcutia*), and taki (*Channa punctatus*). Similar findings were also found in various studies on several small rivers. Kamrujjaman and Nabi (2015) recorded the most dominated species kalo bujuri (*Mystus tengra*) and jatpunti (*Puntius sophore*) from the Bangshi River of Bangladesh. Imteazzaman and Galib (2013) documented jatpunti as the most abundant fish species in the Halti *beel* of Bangladesh. Hossain *et al.* (2009) recorded jatpunti, tit punti (*Puntius ticto*) followed by chanda (*Chanda nama* and *Parambassis ranga*), chapila (*Gudusia chapra*) and tengra (*Mystus vittatus*) as the most abundant fish species in the Chalan *beel* of Bangladesh.

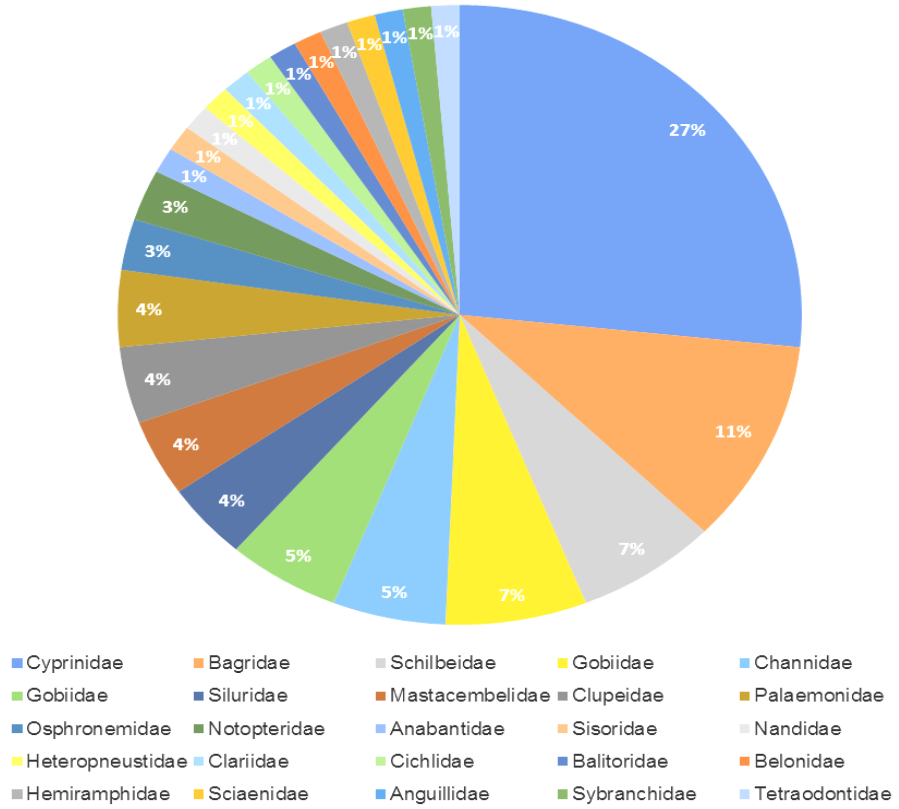

Figure 2. *Percentage of fish species diversity under different families recorded in the Juri River.*

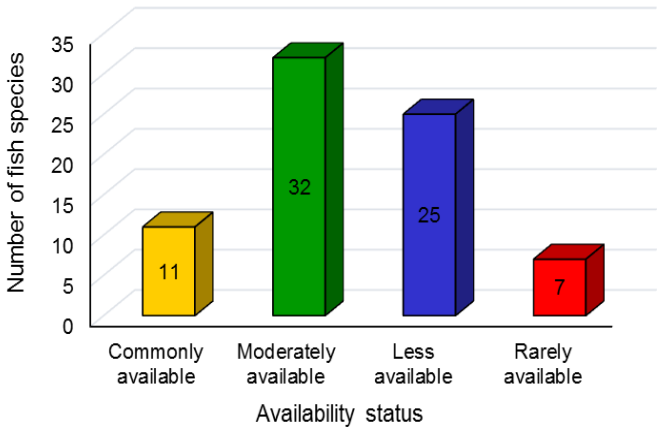

Figure 3. *Status of ichthyofaunal diversity in the study area.*

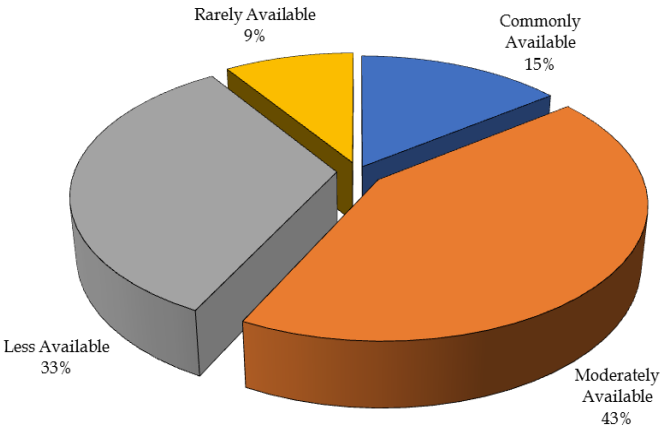

Figure 4. *Percentage of fish biodiversity in the study area.*

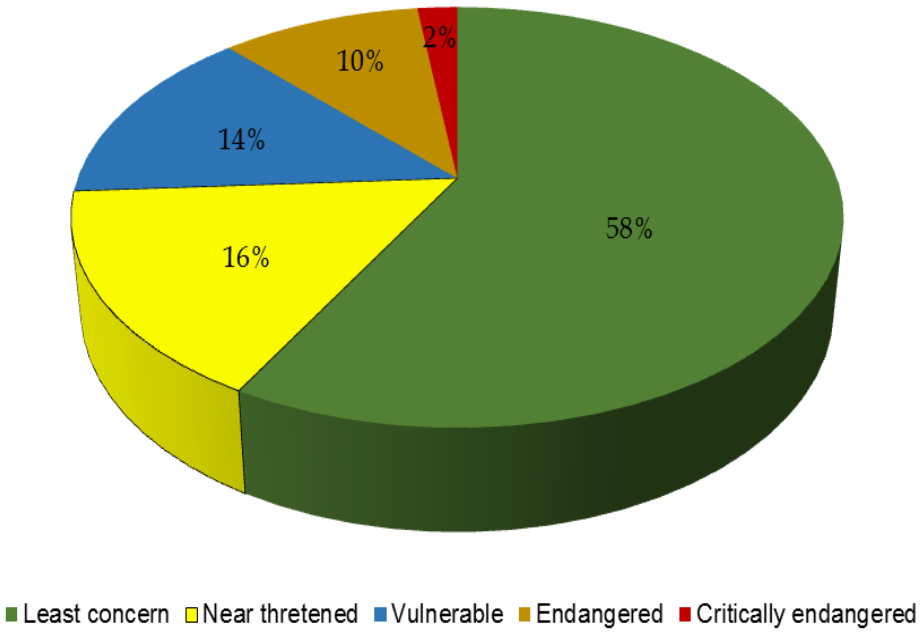

Figure 5. *Percentage of fish species according to IUCN status.*

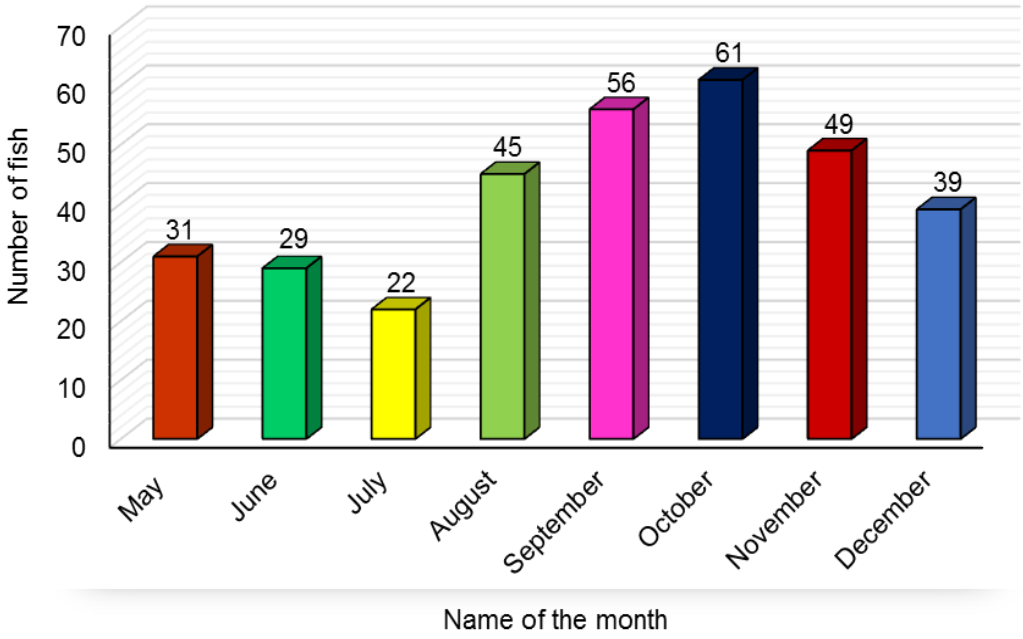

Figure 6. *Monthly variation of fish species availability.*

Biodiversity of threatened ichthyofauna species

Out of the recorded 75 fish species, 44 species LC, 12 species NT, 10 species VU, 8 species EN, and 1 species CR were recorded from the Juri River (IUCN, 2015). According to the present study vulnerable species were ayre (*Sperata aor*) and guizza ayre (*Sperata seenghala*) of Bagridae family, tit punti (*Puntius ticto*) of Cyprinidae family, boal (*Wallago attu*) of Siluridae family, foli (*Notopterus notopterus*) of Notopteridae family, gutum (*Lepidocephalichthys annandalei*) of Cobitidae family, chapila (*Gudusia chapra*) of Clupeidae family, bele (*Eugnathogobius oligactis*) of Gobiidae family, bamos (*Anguillla bengalensis*) of Anguillidae family, kuchia (*Monopterus cuchia*) of Sybranchidae family. Among the 8 EN species, kani pabda (*Ompok bimaculatus*) and modhu pabda (*Ompok pabda*) were identified under the family of Siluridae, gozar (*Channa marulius*) of Channidae family, boro baim (*Mastacembelus armatus*) of Mastacembelidae family, rita (*Rita rita*) of Bagridae family, chital (*Notopterus chitala*) of Notopteridae family, rani (*Botia dario*) of Cobitidae family, and gharua (*Clupisoma garua*) of Schilbeidae family.

A single CR species is baghair *(Bagarius bagarius)* under the family of Sisoridae. The CR are those fish species which passing a very critical condition that will be disappeared in near future. During the study period 2 species were recorded as extinct which were available one or two decades ago. These 2 species named- mohashol (*Tor tor*), and nandina (*Labeo nandina*) were documented frequently as extinct. Conversely, it was informed that the CR fish species would be extinct in near future.

In percentage, among the five categories (IUCN, 2015) of available 75 fish species, LC species consists 58%, NT species consists 16%, VU species consists 14%, EN species consists 10%, and CR consists 2% (Figure 5). Here, 19 fish species (26% of the total recorded species) were recorded as threatened species. Joadder *et al.* (2015) recorded 28 species of fishes as threatened by IUCN at the river Padma and categorized as VU (13%), EN (18%), and CE (8%). Kamrujjaman and Nabi (2015) documented 52.08% threatened species in the Bangshi River of Bangladesh in which VU, EN and CE were 20%, 36% and 44%, respectively. Rahman *et al.* (2015) revealed that 32.14% of fish species were threatened in the Talma River of northern part of Bangladesh, and documented 12.5% as VU, 16.07% as EN and 3.57% as CE species among the total threatened fish species. Chaki *et al.* (2014) identified 30 locally threatened species among which VU 13.51%, EN 18.92%, and CE 8.11% were recorded at the Atrai River of Bangladesh. Galib *et al.* (2013) found 41.27% species threatened including 15.87% VU, 15.87% EN and 9.52% CE fish species at the river Choto Jamuna of Bangladesh. Mohsin *et al.* (2013) considered 26 species threatened by IUCN Bangladesh including VU (13.04%), EN (13.04%) and CE (8.70%) of the total fish species from the Padma River at Rajshahi district. The threatened fish species with their various percentages of categories of different small and big rivers of Bangladesh slightly too largely differed from the present study due to various manmade and natural factors.

During the survey with the respondents of the present study, two species of fishes namely mohashol and nandina were not found in the study area which were available before 10-20 years. Chakraborty and Mirza (2010) studied and recorded six important commercial aquatic species, mohashol, nandina, olive barb and reptiles as extinct species from the Someswari River during 2001-2005. The excess fishing pressure, different geographical locations, water flow, and suitability of feeding, breeding and nursing grounds of different waterbodies cause different calculation and identification of threatened fish species from the Juri River.

Monthly variation in fish availability

During this study maximum number of species (61) were found in October followed by September (56), August (45), November (49), December (39), May (31), June (29), and lowest numbers of species (22) in July. However, in the study area the amount of fish caught was abundant during September to November (Figure 6). The availability and abundance of the fish as observed during the period of study were closely related to seasonal variations and fishes were found to be more available in the Juri River immediately after rainy season. With exceptions of a few occasions, fishes were available round the year. However, all species could not be easily caught by the used fishing gears due to the extent of water flow and depth variation in the river basin. Khan *et al.* (2018) recorded maximum number of fish species from Kolavanga *beel* during the month of August (35) followed by September (29) and October (25).

Ahmed (1997) observed that seasonal fluctuation in the fish species is a normal phenomenon and concluded that some species were found throughout the year. Haque (2013) recorded 31 species of fish in Baikka *beel*. The maximum number of species in both wetlands was found during the month of August. It was reported by all the respondents that the availability of fishes has been declining due to various manmade and natural reasons.

Conclusion

The Juri River is naturally an aquatic resourceful river in the north-eastern part of Bangladesh. Since, it is an interconnecting body of water between two important waterbodies of Sylhet region (Hakaluki *haor* and the Kushiyara River) its ecosystem plays a dynamic role in supporting the ichthyofaunal diversity. It was perceived from the fishers and visiting fish markets around the study area that about 42% species of fishes were less available and rarely available which might be disappeared from the study area in near future. From the statement of the respondent's habitat degradation, climate change, and human activities are found to be responsible for ichthyofaunal diversity loss in the Juri River. It can be concluded that proper management measures should be taken including community participation to conserve the overall aquatic ecosystem and enhance fish production in the Juri River of Sylhet district in Bangladesh.

Conflict of interest

The authors declare there are no conflicts of interest.

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