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Fish Species Availability and Fishing Gears Used in the Ramnabad River, Southern Bangladesh

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ABSTRACT

Ramnabad River is a vital river in the southern Bangladesh in terms of fishing. This survey aimed to assess the fish and fishing gear diversity in the Ramnabad River from March 2013 to February 2014. Fish samples were collected fortnightly from four sampling stations of the Ramnabad River at Patuakhali district in Southern Bangladesh. A total of 64 species of fish under 12 orders and 32 families were recorded during the study period in the Ramnabad River. Perciformes were most leading order constituting 34.38% of the total fish population followed by Siluriformes (21.88%), Cypriniformes (17.19%), Clupeiformes (9.38%), Pleuronectiformes (4.69%), Tetraodontiformes (3.13%), Osteoglossiformes (1.56%), Beloniformes (1.56%), Anguiliformes (1.56%), Pristiformes (1.56%), Rajiformes (1.56%) and Aulopiformes (1.25%). Eight major types of fishing gears were detected to harvest fish in different stations of the Ramnabad River. Major categories of gears include nets, traps and hooks. For fishing purpose, a wide variety of nets such as gill nets, seine nets, lift nets, push nets and cast nets were usually used. The fishing traps were *Polo* and *Bana*. For line fishing *chip barshi*, *wheel barshi* and longline were used. From this estimation there were indication of low fish species composition and richness in the population of fish in Ramnabad River. For sustainability of these resources, an adequate knowledge of species composition, diversity and relative abundance of its water bodies must be understood. Use of the illegal fishing gear should be prohibited and monitored properly. Therefore, there is need for the conservation and management of the fisheries resources of this water body by relevant agencies. So, the government as well as non-government initiatives also should come forward to consider these cynical impacts.

Key words: Fish diversity, fishing gears, ramnabad river, Southern Bangladesh

INTRODUCTION

Bangladesh is blessed with numerous inland water bodies which are very rich in diversity of fish species (Ali *et al.*, 2012; Al Mahmud *et al.*, 2012). About 800 rivers counting tributaries flow through the country constituting a waterway of total length around 24, 140 km where it bears a

huge potential for fisheries sector (Banglapedia, 2012; DoF., 2013). It has the third biggest aquatic fish bio-diversity in Asia, after China and India, with about 800 species in fresh, brackish and marine waters (Hussain and Mazid, 2001).

Fish is deliberated as one of the most significant food items from the very beginning of human civilization (Akter *et al.*, 2012; Islam *et al.*, 2012; Ahmed *et al.*, 2012; Hossain *et al.*, 2013). It is one of the major important elements in the aquatic habitat and play a key role in economy of many nations (Okyere and Denis, 2011) as they have been a stable item in the diet of many people (Kouamelan *et al.*, 2003). As animal proteins consumed by 1 billion people worldwide (Marichamy *et al.*, 2011).

Fisheries sector plays a significant role and main source of animal protein, employment opportunities, food security, foreign incomes and socio-economic improvement (Ali *et al.*, 2014a; Siddiq *et al.*, 2013; Azim *et al.*, 2012). This sector contributes 4.39% to GDP and 22.76% to agricultural GDP. Fish supplements to about 60% of our daily animal protein intake. About 10% of the population is dependent directly and indirectly on the fisheries for their living (DoF., 2013). It has already been renowned as a vital income and employment-generating sector in Bangladesh, cheap sources of healthy food for the population of the country (Ali *et al.*, 2014a, b). However, over exploitation, degradation of fish habitats and subsequent declining fish production from natural aquatic resources, inland capture fisheries contribution has declined from 50-35% of total fish production and marine capture fisheries production has remained static over the last ten years (Mazid, 2002).

Generally gears are those equipment's that are used to catch the fishes. For fishing, different kinds of crafts, gears and traps are used. Different types of fishing method used from primitive times and now fishing methods had been modified. The fishermen selected their fishing gears depending on types of water body, different operation area, depth of water and availability of target species to be caught. In Bangladesh fish and fisheries items of inland water still are caught by using traditional crafts and gears. The amount of catch by unit depends upon its effectiveness and productivity of the fishing grounds (Naidu, 1939). Most of the fishing gears have to break off process after certain period of action for rest and repair work (Ahmed, 1958).

During the last century, associated habitats are a great challenge. In addition, riverine ecosystems have suffered from intense human the conservation of aquatic biodiversity has gained great intervention resulting in habitat loss and degradation and ecological importance over recent years. As a consequence, many fish species have become highly Bangladesh is exclusively endowed with extremely endangered, particularly in rivers where heavy demand is rich and extensive inland and marine water resources, placed on freshwaters (Rahman *et al.*, 2012).

The degradation of natural water bodies resulting from human interferences due to construction of roads, embankments, deforestation, encroachment for agricultural production, indiscriminate use of pesticides and natural causes (siltation, drought, cyclone and intrusion of saline water) has had negative impacts on fish diversity in Bangladesh. On the other hand, the indiscriminant use of different fishing gears, harmful techniques of fishing threatens the biodiversity of the seasonal floodplains. For the implementation of National Biodiversity Strategy and Action Plan it is essential to manage some of the distinct features of which biodiversity are composed (Chowdhury *et al.*, 2011).

Therefore, our main objective in this study was to provide accounts of the fish and gear diversity in the Ramnabad River. In addition, it can identify the existing fish capture techniques

and diversified fishing gears. The information from this investigation will serve as a baseline data for carrying out further study on ecology, conservation, sustainability and management of fisheries resources of this water body.

MATERIALS AND METHODS

Study area: The current study was carried out for the identification of the fish and gear diversity in the fishing community of Ramnabad River from March 2013 to February 2014. Ramnabad River is situated in the Patuakhali district, Southern Bangladesh (Fig. 1). There were four landing centers were selected for this experiment. The names of the sampling stations as landing centers

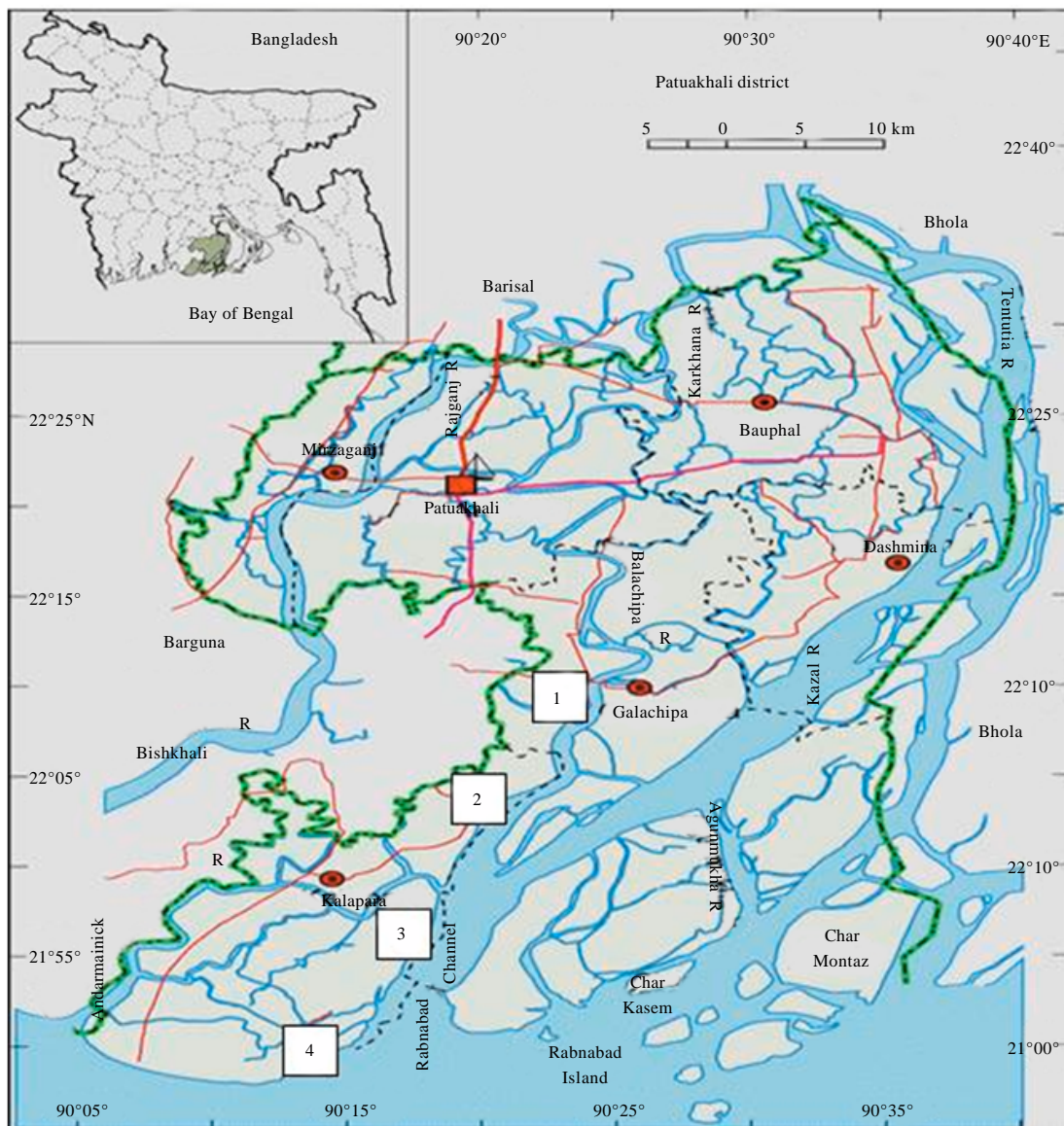


Fig. 1: Study area showing the sampling stations

Table 1: Commonly operated fishing gears in Ramnabad River, Bangladesh

Name of gears	Local name in Bangladesh
Gill net	Poa Jal, Current Jal
Seine net	Ber jal, Jagat ber jal, Moia jal, <i>Khata</i> ber jal,
Set bag net	Bada jal
Lift net	Bheshal jal, Dharma jal
Cast net	Khepla jal, Jhaki jal
Push net	Thela jal
Trap	Kholsun, Anta, Polo, Charai, Ghuni
Hook and Line	Barshi, Dati Barshi
Others	Bana, Khata, Kua, by Hand

are four union of the kolapara upazila named Dhankhali (Station-1), Lalua (Station-2), Dhaluasar (Station-3) and Lata chapli (Station-4). The stations were selected on the basis of the possibility of getting more fishes and operated fishing gears.

Methodology: Fish samples were periodically collected from the catch of fishermen in the Ramnabad River. A number of fishing gears were used during the catching of fishes by fishermen (Table 1). Samples were also collected from fish-landing centers and fish markets. Samplings were conducted fortnightly from commercial catches landed at different fish landing centers.

Primary data on the concerned species were collected from the fishermen, fish traders, local people and also from the on the spot situation. Relevant data such as local name of the collected fish samples, source, distribution and availability of the species etc. were collected from the study sites. Secondary data were also collected from the District Fisheries Offices, Department of Fisheries (DoF., 2013), Statistical Yearbook of Bangladesh etc. The collected fish samples were identified by evaluating their morphometric and meristic characteristics as well as the color of the specimens referring the books, Fish Base etc. Data were analyzed in relation to composition of species caught in every month (March 2013 to February 2014) with help of key from Rahman (2005) and Inland Fishes of India and Adjacent countries by Talwar and Jhingran (1991), Fischer and Whitehead (1974) and De Bruin *et al.* (1995) were also used for their identification.

Data analysis: Collected data from different stations were coded and entered into a data base system using Microsoft office Software. The processed data were transferred to a master sheet from which classified tables were prepared revealing the findings of the study. Finally these data were analyzed by MS-Excel and then presented in textual, tabular and graphical forms to understand the present status of the fish and gear diversity in the Ramnabad River.

RESULTS AND DISCUSSION

Fish diversity: A total of 64 species of fish under 12 orders and 32 families were recorded during the study period in the Ramnabad River. Perciformes were most leading order constituting 34.38% of the total fish population followed by Siluriformes (21.88%), Cypriniformes (17.19%), Clupeiformes (9.38%), Pleuronectiformes (4.69%), Tetraodontiformes (3.13%), Osteoglossiformes (1.56%), Beloniformes (1.56%), Anguiliformes (1.56%), Pristiformes (1.56%), Rajiiformes (1.56%) and Aulopiformes (1.25%). In Table 2, Fish orders, families, species, English name, local name(s) and their availability status in different stations in Ramnabad River are given.

There were no previous information of fishes and fishing gears in the Ramnabad River was found and thus comparison of the present findings with previous one was not possible. The recorded

Table 2: Diversity of fishes and fishing gears of ramnabad river at Southern Bangladesh

Order	Family	Scientific Name	Common Name	St1	St2	St3	St4
Anguilliformes	Ophichthidae	<i>Pisodonophis cancrivorus</i>	Snake-eel		✓	✓	✓
Aulopiformes	Synodontidae	<i>Harpadon nehereus</i>	Bombay-duck	✓	✓	✓	✓
Beloniformes	Belonidae	<i>Xenentodon cancila</i>	Freshwater garfish	✓	✓	✓	✓
Clupeiformes	Clupeidae	<i>Corica soborna</i>	Ganges river sprat	✓	✓		✓
Clupeiformes	Clupeidae	<i>Gonialosa manmina</i>	Ganges river gizzard shad	✓	✓	✓	✓
Clupeiformes	Clupeidae	<i>Gudusia chapra</i>	Indian river shad	✓	✓	✓	✓
Clupeiformes	Clupeidae	<i>Tenualosa toli</i>	Toli shad	✓	✓	✓	✓
Clupeiformes	Clupeidae	<i>Tenualosa ilisha</i>	Hilsa shad	✓	✓	✓	✓
Clupeiformes	Engraulidae	<i>Setipinna phasa</i>	Gangetic hairfin anchovy	✓	✓		✓
Cypriniformes	Cobitidae	<i>Botia dayi</i>	Hora loach	✓			✓
Cypriniformes	Cobitidae	<i>Botia lohachata</i>	Reticulate loach		✓	✓	
Cypriniformes	Cobitidae	<i>Lepidocephalichthys annandalei</i>	Annandale loach	✓		✓	
Cypriniformes	Cyprinidae	<i>Devario devario</i>	Sind danio	✓	✓		
Cypriniformes	Cyprinidae	<i>Garra annandalei</i>		✓			✓
Cypriniformes	Cyprinidae	<i>Garra gotyla</i>	Sucker head	✓		✓	✓
Cypriniformes	Cyprinidae	<i>Labeo bata</i>	Bata	✓	✓	✓	✓
Cypriniformes	Cyprinidae	<i>Labeo dyocheilus</i>		✓		✓	✓
Cypriniformes	Cyprinidae	<i>Labeo boga</i>		✓	✓		✓
Cypriniformes	Cyprinidae	<i>Puntius conchoniuis</i>	Rosy barb	✓	✓		✓
Cypriniformes	Cyprinidae	<i>Rasbora daniconius</i>	Slender rasbora	✓		✓	
Osteoglossiformes	Notopteridae	<i>Notopterus notopterus</i>	Bronze featherback	✓	✓		✓
Perciformes	Badidae	<i>Badis badis</i>	Badis	✓			
Perciformes	Channidae	<i>Channa striata</i>	Snakehead murrel	✓			
Perciformes	Channidae	<i>Channa orientalis</i>	Walking snakehead	✓		✓	✓
Perciformes	Eleotridae	<i>Eleotris fusca</i>	Dusky sleeper			✓	✓
Perciformes	Gobiidae	<i>Acentrogobius caninus</i>	Tropical sand goby	✓	✓		
Perciformes	Gobiidae	<i>Awaous guamensis</i>			✓		✓
Perciformes	Gobiidae	<i>Glossogobius giuris</i>	Tank goby	✓	✓	✓	✓
Perciformes	Gobiidae	<i>Pseudapocryptes elongatus</i>			✓	✓	✓
Perciformes	Gobiidae	<i>Taenioides buechanani</i>	Burmese goby		✓	✓	✓
Perciformes	Leiognathidae	<i>Leiognathus equulus</i>	Common ponyfish		✓	✓	✓
Perciformes	Latidae	<i>Lates calcarifer</i>	Barramundi	✓	✓	✓	
Perciformes	Nandidae	<i>Nandus nandus</i>	Gangetic leafish	✓	✓	✓	
Perciformes	Osphronemidae	<i>Colisa lalia</i>	Dwarf gourami	✓		✓	✓
Perciformes	Osphronemidae	<i>Colisa fasciata</i>	Banded gourami	✓	✓		
Perciformes	Osphronemidae	<i>Pseudosphromenus cupanus</i>	Spiketail paradisefish	✓	✓	✓	
Perciformes	Polynemidae	<i>Polynemus paradiseus</i>	Paradise threadfin	✓	✓	✓	
Perciformes	Stromateidae	<i>Pampus argenteus</i>	Silver pomfret			✓	✓
Perciformes	Stromateidae	<i>Pampus chinensis</i>	Chinese silver pomfret		✓	✓	✓
Perciformes	Sillaginidae	<i>Sillaginopsis panijus</i>	Flathead sillago	✓	✓	✓	✓
Perciformes	Trichiuridae	<i>Lepturacanthus savala</i>	Savalai hairtail	✓	✓		✓
Perciformes	Toxotidae	<i>Toxotes chatareus</i>	Largescale archerfish		✓	✓	✓
Perciformes	Terapontidae	<i>Terapon jarbua</i>	Jarbua terapon	✓	✓		
Pleuronectiformes	Cynoglossidae	<i>Cynoglossus arel</i>	Largescale tonguesole	✓	✓	✓	✓
Pleuronectiformes	Cynoglossidae	<i>Cynoglossus cynoglossus</i>	Bengal tongue sole		✓		✓
Pleuronectiformes	Cynoglossidae	<i>Cynoglossus lingua</i>	Long tongue sole	✓		✓	✓
Pristiformes	Pristidae	<i>Anoxypristis cuspidata</i>	Knifetooth sawfish		✓	✓	✓
Rajiformes	Dasyatidae	<i>Dasyatis zugei</i>	Pale-edged stingray		✓	✓	✓

Table 2: Continue

Order	Family	Scientific Name	Common Name	St1	St2	St3	St4
Siluriformes	Bagridae	<i>Rita rita</i>	Rita	✓	✓	✓	✓
Siluriformes	Bagridae	<i>Mystus gulio</i>	Long whiskers catfish	✓		✓	
Siluriformes	Bagridae	<i>Mystus vittatus</i>	Striped dwarf catfish	✓	✓		
Siluriformes	Bagridae	<i>Sperata seenghala</i>	Giant river-catfish	✓	✓	✓	✓
Siluriformes	Erethistidae	<i>Pseudolaguvia ribeiroi</i>	Painted catfish	✓		✓	
Siluriformes	Pangasiidae	<i>Pangasius pangasius</i>	Yellowtail catfish	✓			✓
Siluriformes	Schilbeidae	<i>Ailia coila</i>	Gangetic ailia			✓	✓
Siluriformes	Schilbeidae	<i>Ailiichthys punctata</i>	Jamuna ailia		✓	✓	✓
Siluriformes	Schilbeidae	<i>Neotropius atherinoides</i>	Indian potasi	✓		✓	
Siluriformes	Sisoridae	<i>Bagarius bagarius</i>	Dwarf goonch	✓	✓		
Siluriformes	Siluridae	<i>Ompok pabda</i>	Pabdah catfish		✓	✓	✓
Siluriformes	Siluridae	<i>Ompok pabo</i>	Pabo catfish	✓	✓		✓
Siluriformes	Siluridae	<i>Ompok bimaculatus</i>	Butter catfish	✓		✓	
Siluriformes	Siluridae	<i>Wallago attu</i>	Wallago	✓	✓		✓
Tetraodontiformes	Tetraodontidae	<i>Tetraodon cutcutia</i>	Ocellated pufferfish	✓	✓		✓
Tetraodontiformes	Tetraodontidae	<i>Tetraodon fluviatilis</i>	Green pufferfish	✓	✓	✓	✓

fish species was much lower than some other rivers of Bangladesh (Bhuiyan *et al.*, 2008; Rahman *et al.*, 2012) but presence of similar number of fish species was also reported in Mahananda River (Mohsin and Haque, 2009).

However, all these researchers concluded with gradual loss of biodiversity in their considered rivers. In that sense, this is also true for Ramnabad River. Order Cypriniformes was found to be the most diversified fish group in terms of both number of species and individuals followed by Perciformes and Siluriformes. Similar findings were also reported by Ali *et al.* (2014b), Galib *et al.* (2009), Mohsin and Haque (2009), Mohsin *et al.* (2009) and Imteazzaman and Galib (2013). This is because these three groups are the most dominant groups in freshwater bodies of Bangladesh (Rahman, 1989, 2005).

Fishing gears: A total of 8 major types of fishing gears were detected to harvest fish in different stations of the Ramnabad River (Table 1, 3-5). Major categories of gears include nets, traps and hooks. For fishing purpose, a wide variety of nets such as gill nets, seine nets, lift nets, push nets and cast nets were usually used. The fishing traps were Polo and bana. For line fishing chip barshi, wheel barshi, Tagi and longline were used.

According to previous study in the literature the fishing gears in Chandpur, Muhuri, Halda and Ichamati project area there were 21 different types of gears. There is the degradation or overexploitation of natural resources in the riverine system is a common phenomenon (Ali *et al.*, 2014c). Dewan and Mazid (1994) mentioned the fishing techniques that are currently used amongst the fishermen of Bangladesh have been broadly categorized into netting, angling, trapping, spearing and hand fishing. Beside these many researcher such as Khaled (1985), Rahman *et al.* (1993), Aksomboon (1994), Dewan and Mazid (1994), Chakraborty *et al.* (1995), Alam *et al.* (1997), Das *et al.* (2003) and Alam *et al.* (2009) worked on fishing activities in beels and rivers. This has been found similar in the current study.

At present, the earliest effective management is necessary to sustain the biodiversity of the fishes. According to Lakra (2010), conservation of fish diversity is essential to maintain ecological,

Table 3: Main species caught by the different types of gear in the Ramnabad River

Gill net	Seine net	Set bag net	Lift net	Cast net	Push net	Trap	Hook and Line
<i>Tenudosa ilisha</i>	<i>Tenudosa ilisha</i>	<i>Nandus. nandus</i>	<i>Gudusia chapra</i>	<i>Wallago attu</i>	<i>Glossogobius giuris</i>	<i>Mystus vittatus</i>	<i>Glossogobius giuris</i>
<i>Nandus. nandus</i>	<i>Gudusia chapra</i>	<i>Mystus vittatus</i>	<i>Macrogynathus aculeatus</i>	<i>Mastacembelus armatus</i>	<i>Nandus. nandus</i>	<i>Macrogynathus aculeatus</i>	<i>Channa striata</i>
<i>Gudusia chapra</i>	<i>Macrogynathus aculeatus</i>	<i>Mastacembelus armatus</i>	<i>Pampus argenteus</i>	<i>Gudusia chapra</i>	<i>Mastacembelus armatus</i>	<i>Xenentodon cancila</i>	<i>Wallago attu</i>
<i>Glossogobius giuris</i>	<i>Pampus argenteus</i>	<i>Channa striata</i>	<i>Mystus vittatus</i>	<i>Notopterus notopterus</i>	<i>Pampus argenteus</i>	<i>Puntius conchoniis</i>	<i>Setipinna phasa</i>
<i>Wallago attu</i>	<i>Xenentodon cancila</i>	<i>Gudusia chapra</i>	<i>Mastacembelus armatus</i>	<i>Colisa fasciata</i>	<i>Macrogynathus aculeatus</i>	<i>Pseudosphromenus cupanus</i>	<i>Pseudosphromenus cupanus</i>
<i>Mystus vittatus</i>	<i>Bagarius bagarius</i>	<i>Macrogynathus aculeatus</i>	<i>Channa striata</i>	<i>Setipinna phasa</i>	<i>Xenentodon cancila</i>	<i>Ailia coila</i>	
<i>Labeo bata</i>	<i>Setipinna phasa</i>	<i>Xenentodon cancila</i>	<i>Ompok pabda</i>	<i>Mystus vittatus</i>	<i>Puntius conchoniis</i>		
<i>Pseudosphromenus cupanus</i>	<i>Labeo bata</i>	<i>Colisa fasciata</i>	<i>Xenentodon cancila</i>	<i>Labeo bata</i>	<i>Pseudapocryptes elongatus</i>		
<i>Bagarius bagarius</i>	<i>Wallago attu</i>	<i>Cynoglossus arel</i>	<i>Colisa fasciata</i>	<i>Ailia coila</i>			

Table 4: No. of different types of gears used in the Ramnabad river

Name of gears	No. of the fishermen	Fishermen (%)
Gill net	12	20.0
Seine net	36	60.0
Set bag net	2	1.2
Lift net	1	0.6
Cast net	2	1.2
Push net	3	1.8
Trap	1	0.6
Hook and line	2	1.2
Others	1	0.6

Table 5: No. of species caught by different gears used in the Ramnabad river

Name of gears	No. of the species
Gill net	35
Seine net	58
Set bag net	30
Lift net	33
Cast net	15
Push net	8
Trap	6
Hook and line	5

nutritional and socio-economic equilibrium. Abundance of threatened fish species among the total catch strongly reflecting its potentiality to be an excellent site for natural conservation (IUCN Bangladesh, 2000).

Management steps should be needed for stopping illegal fishing, identifying illegal fishing gears, protecting crucial breeding habitats. Mass awareness should be needed to save the threatened fish fauna of this river; also fishermen and protecting diverse fish resources. There should be a strong implementation of conservation laws and acts to make free from illegal catch and pollution in this river.

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