Present Status of Fish and Plankton Biodiversity at the Padma River in Munshiganj District, Bangladesh

Article *in* World Applied Sciences Journal · December 2020

DOI: 10.5829/idosi.wasj.2020.386.394

CITATIONS
3

READS
466

5 authors, including:

Zakir Hossain
Bangladesh Agricultural University
154 PUBLICATIONS **1,123** CITATIONS

SEE PROFILE

Md. Saddam Hossain
Bangladesh Agricultural University
20 PUBLICATIONS **63** CITATIONS

SEE PROFILE

World Applied Sciences Journal 38 (5): 386-394, 2020
ISSN 1818-4952

DOI: 10.5829/idosi.wasj.2020.386.394

Present Status of Fish and Plankton Biodiversity at the Padma River in Munshiganj District, Bangladesh

Md. Saddam Hossain, Md. Nagim Uddin, Mohammad Matiur Rahman and Zakir Hossain

Department of Fisheries Biology and Genetics,
Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

Abstract: Climate change is a modern global threat to Bangladesh for its adverse impacts. The study was conducted to assess the consequences of global climate change on fisheries resources at the Padma river in Munshiganj district, Bangladesh. Water quality parameters and plankton communities were measured by using appropriate types of equipment and plankton nets. A total of only 79 fish species belonging to 14 orders and 36 families were documented in the sampling area of Padma river during the study period. The total number of identified genera of phytoplankton and zooplankton was 41 and 24, respectively in the Padma river. The temperature, pH, DO and salinity of water were recorded in the range of 28.7±0.66 to 32.3±0.52°C, 7.8±0.26 to 8.9±0.41, 7.8±0.26 to 8.9±0.41ppm and 0.10±0.01 to 0.15±0.01ppt, respectively in the Padma river. The results of this study revealed that fisheries' biodiversity is decreasing day by day in the Padma river due to the effects of climate changes.

Key words: Biodiversity · Climate Change · Fisheries Resources · Plankton · River

INTRODUCTION

Global climate change is the most discussed issue among the ongoing environmental changes and it also related to the natural disasters that affect the world [1]. Climate change is occurring at all levels such as global and local levels and would lead to adverse effects on population health, natural ecology, fisheries and agricultural production [2]. The steady ascent of average air and oceanic temperatures will change rainfall and snowfall patterns, dry seasons and heatwaves, exacerbate tropical cyclones and floods and increase ocean level. In the context of global climate change, Bangladesh is considered a highly vulnerable country. It is often at the mercy of natural forces, particularly water from the sky, land and ocean [3].

The climatic conditions of Bangladesh are affected by various worldwide and provincial scale factors. These factors incorporate topographical area, the effects of atmospheric pressure, the monsoon system, changes in solar albedo due to land use, changes in land cover in the region and their effects on wind patterns and fluctuations in land and ocean surface temperatures [4]. Bangladesh is already proving the adverse effects of global warming and climate change. The subsequent effects were observed: more sizzling summers, sporadic storms, untimely rainfall, short periods heavy rainfall (leading to waterlogging and landslides), little or no rainfall in dry periods, river flow and flooding increase during monsoons, frequency, intensity and strength increase, crop damage caused by flash floods and monsoonal rain, crop failure caused by drought, long cold waves, salt intrusion along the coast (leading to scarcity of drinking water and redundancy of prevailing crop practices), river bank and coastal erosion, deaths due to extreme heat and cold, increased mortality and morbidity and the prevalence and outbreak of dengue fever, malaria and diarrhea diseases [5]. Bangladesh was beat by two following cyclones Sidr in 2007 and Aila in 2009. Due to global climate change, natural disasters in the region (such as cyclones, storms and flood frequencies) have increased a lot than before [6].

Global climate change can affect fisheries biodiversity in multiple ways. Changes in water temperature, precipitation and oceanographic variables (such as wind speed, wave action and ocean level rise) can bring significant ecological and biological changes to marine and freshwater ecosystems and their inhabited fish

Corresponding Author: Zakir Hossain, Department of Fisheries Biology and Genetics,
Bangladesh Agricultural University, Mymensingh-2202, Bangladesh.

populations [7, 8]. Extreme weather events may also damage fishing activities and land infrastructure [9] while fluctuations of fisheries production and other natural resources may affects livelihood strategies and the outcomes of fishing communities [10, 11]. Environmental change may altruism certain species over others [12] and thereby changes the biogeography of fish stocks and their relative abundance [13]. Additionally, fisheries biodiversity conservation has gained great ecological importance over current years [14]. The reduction of the biodiversity of freshwater fish species in Bangladesh is a major concern. IUCN [15] evaluated a total of 253 species of fish, of which 64 species (25.3%) were found to be threatened. Threatened fish include 9 critically endangered species, 30 endangered species and 25 vulnerable species. Extreme weather and climate events have a major impact on the fishing sectors especially fish production, fish growth and fish catch [16].

The Padma river is one among the longest rivers in Bangladesh. It is a crucial spawning and feeding ground as well as the great sources of the freshwater fish species in Bangladesh [17, 18]. A large number of fish and other fishery organisms are harvested from this river every year, which reflects the richness of Bangladesh's water bodies. However, in Bangladesh, the current loss of aquatic biodiversity in natural water bodies is a crucial problem [19]. Fisheries biodiversity of numerous large and prominent water bodies of the country including the mighty Padma rivers at stake [20]. So there is a need for an updated list to know this present status and to commence necessary management to enhance the status of fishes. Some research work was carried out on the Padma river.

So a comprehensive research on fish biodiversity in the Padma river is utmost important to conserve the resident fish species. The objective of this recent study was to focus the climatic factors, primary productivity and available fish species in the Padma river.

MATERIALS AND METHODS

Study Area: The present study was conducted at the Padma river in Munshiganj district, Bangladesh; located between 23° 30' north and 90° 20' east in latitude and longitudes, respectively. It is bounded by the districts of Dhaka and Narayanganj on the north; Madaripur and Shariatpur on the south; Comilla and Chandpur on the east; and Faridapur on the west. The sampling site was Louhajong upazila, Munshiganj district which is located between 23° 47' north and 90° 37' east in latitude and longitudes, respectively (Fig. 1). The study was conducted for a period from May 2017 to December 2018.

Data Collection: Samples of different fish species were collected from the fisher's catch landed at fish landing centers of the selected sampling area and from fish market as well. A digital camera was used to capture the photos of different fish species. Sampling was made once a month during the study period. The data was collected personally by field visit observation from the sampling area. The data on fish species were collected through interview of boat owners of commercial fishing vessels, retailers, fish traders, local people, fishers, riverside settlers and from the sampling area.

Fig. 1: Map showing the study areas Padmariver, Louhaganj, Munshiganj

Observation of Climatic Factors: During the entire sampling period the following climatic factors of water were recorded regularly. Water temperature was recorded with a digital thermometer once per month from different places of the Padma river in Munshiganj district, Bangladesh. Dissolved oxygen (DO) concentration was determined using a DO meter (Model: DO-5509, China) once per month from different places. pH was recorded using a portable digital meter (HI 98107, Romania) once per month. Water salinity was determined using a digital refractometer (ATAGO, S/Mill, salinity. 0-100 ‰, Japan).

Plankton Collection and Identification: Plankton samples were collected monthly by plankton net (40 µm mesh size) from the Padma river at Munshiganj district in Bangladesh, during the study period. Collected planktons were preserved at 4% neutral buffered formalin in the plastic container. Plankton was identified under a light microscope by using S-R cell. A series of pictures of the species were observed under microscope to identify the plankton. Identification of plankton was done according to Bellinger [21]. Zooplanktons were identified following keys given by Bhouyain and Asmat [22].

Fish Identification: Most of the collected fish species were identified on the spot with the help of prepared fresh water fisheries resources list, related books and IUCN red list 2015. Fish samples were also brought to the laboratory for double confirmation to identify the fish species. The fish specimens were identified based on the morphometric and meristic appearances according to Rahman [23] and, Talwar and Jhingran [24].

Fish and Plankton Diversity Analysis: In this study, the Shannon-Weaver diversity index was calculated for evaluating the status of fish diversity using the following formulae:

$$H' = -\sum_{i=1}^{R} p_i \ln p_i$$

Here, H′ is the diversity index, p is the proportion (n/N) of individuals of one particular species found (n) divided by the total number of individuals found (N) and R is the total number of species.

RESULT AND DISCUSSION

Climatic Factors: Climatic factors are shown in Table 1. The temperature, pH, DO and salinity of water were recorded in the range of 28.7±0.66 to 32.3±0.52°C, 7.8±0.26 to 8.9±0.41, 7.8±0.26 to 8.9±0.41 ppm and 0.10±0.01 to 0.15±0.01ppt, respectively in the Padma river. The climatic factors fluctuated in river for different reason such as season, geographic location, environment, sampling time and temperature of effluents entering the stream. The optimum temperature range (22-31°C) for the survival and best growth of aquatic organisms in subtropical aquatic environment [25]. Dissolved oxygen is a biological factor, which selects the natural strength of the water body and even supports aquatic living organisms [26]. The pH of a water body influences other compound responses, for example, dissolvability and metal toxicity [27]. Salinity is also a major important factor for the marine fish species but it is perilous for the freshwater species. According to Sridhar, *et al.* [28] salinity acts as a limiting factor that hugely influences the dispersal of plankton community. Mobin, *et al.* [29] recorded the average value of pH 6.83 at the Turag river, Bangladesh. Hossain, *et al.* [30] recorded the range of temperature, salinity, pH and dissolve oxygen were 22.7±4.0 to 22.6±3.08°C, 7.33±0.58 to 6.50±0.50 ppt, 7.33±0.76 to 6.80±0.20 and 10.5±1.2 to 9.5±0.76 mg L^{-1}, respectively in the Meghnariver, Laxmipur. Rahaman, *et al.* [31] recorded the average value of temperature, dissolved oxygen, pH and salinity were 27.5±0.90°C, 27 6.37±1.11ppm, 8.3±0.59 and 0.10±0.10 ppt, respectively in the Meghna river. The findings show that the climatic factors do not directly affect on both the fish and plankton communities.

Plankton Community: The total number of identified genera of phytoplankton was 41 and the total number of zooplankton genera was 24 in the Padma river. Phytoplankton was included to the six group of Bacillariophyceae, Chlorophyceae, Cyanophyceae, Euglenophyceae, Xanthophyceae, Dinophyceae (Table 2) while zooplankton included to Rotifera, Copepoda, Cladocera (Table 2). The highest and lowest numbers of phytoplankton were recorded from groups Chlorophyceae (25) and Dinophyceae (1) whereas the number of zooplankton groups, Rotifera (8) and Cladocera (4), respectively in the Padma river (Table 2). According to Monjurul and Pramanik [32], a total 41 genera of 6 groups of phytoplankton and 31 genera of 4 zooplankton groups were identified in the Meghna river. According to Rakhi, *et al.* [33] total 20 and 17 genera of phytoplankton were recorded in Burignga and Turag river, respectively and 6 major zooplankton taxonomic groups were also identified during monsoon in both river. Additionally, Rahaman, *et al*. [34] a total of 7 groups including 41 genera were of phytoplankton and 4 groups including 31 genera of zooplankton were recorded in the Meghna river.

Table 1: Water quality parameters during study period in the Padma river at Louhajang, Munshiganj

Parameters	Pre-monsoon	Monsoon	Post-monsoon
Temperatures	32.3±0.52	28.7±0.66	30.4±.65
Dissolved oxygen (DO)	7.8±0.26	8.9±0.41	8.1±0.30
pH	8.0±0.25	8.2±0.15	7.7±0.25
Salinity	0.15±0.01	0.10±0.01	0.10±0.01

Table 2: List of plankton genera found from the Padma river during study period

Plankton	Group	Pre-monsoon Genera/species	Diversity Index (H´)	Monsoon Genera/species	Diversity Index (H´)	Post-monsoon Genera/species	Diversity Index (H´)
Phytoplankton	Bacillariophyceae	*Amphora* *Anomoeoneis* *Asterionella* *Bacillaria* *Coscinodiscus* *Cyclotella* *Diatoma* *Fragillaria* *Gomphonema* *Gyrosigma* *Melosira* *Navicula* *Nitzschia* *Pleorosigma* *Rhizosolenia*	2.6	*Amphora* *Anomoeoneis* *Asterionella* *Bacillaria* *Coscinodiscus* *Cyclotella* *Diatoma* *Fragillaria* *Gomphonema* *Gyrosigma* *Melosira* *Navicula* *Nitzschia* *Pleorosigma* *Rhizosolenia* *Surirella* *Synedra* *Tabellaria* *Triceratium*	3.7	*Amphora* *Anomoeoneis* *Asterionella* *Bacillaria* *Coscinodiscus* *Cyclotella* *Diatoma* *Fragillaria* *Gomphonema* *Gyrosigma* *Melosira* *Navicula*	1.7
	Chlorophyceae	*Actinastrus* *Ankistrodesmus* *Botryococcus* *Chlorella* *Closterium* *Coelastrum* *Micractinium* *Microspora* *Muogeotia* *Oedogonium* *Oocystis* *Palmella* *Pediastrum* *Pleorococcus* *Scenedesmus* *Selenestrum* *Spirogyra* *Staurastrum*	2.3	*Actinastrus* *Ankistrodesmus* *Botryococcus* *Chlorella* *Closterium* *Coelastrum* *Micractinium* *Microspora* *Muogeotia* *Oedogonium* *Oocystis* *Palmella* *Pediastrum* *Pleorococcus* *Scenedesmus* *Selenestrum* *Spirogyra* *Staurastrum* *Stichococcus* *Synedra* *Tetraedron* *Ulothrix* *Uroglena* *Volvox* *Zygnema*	3.1	*Actinastrus* *Ankistrodesmus* *Botryococcus* *Chlorella* *Closterium* *Coelastrum* *Micractinium* *Microspora* *Muogeotia* *Oedogonium* *Oocystis* *Palmella* *Pediastrum* *Pleorococcus* *Scenedesmus*	1.9
	Cyanophyceae	*Anabaena* *Aphanizomenon* *Aphanocapsa* *Chroococcus* *Gomphosphaeria* *Merismopedium* *Microcystis* *Nostoc*	2.6	*Anabaena,* *Aphanizomenon* *Aphanocapsa* *Chroococcus* *Gomphosphaeria* *Merismopedium* *Microcystis* *Nostoc* *Oscillatoria* *Polycistis* *Spirulina*	3.8	*Anabaena* *Aphanizomenon* *Aphanocapsa* *Chroococcus*	1.8
	Euglenophyceae	*Euglena* *Phacus*	2.2	*Euglena* *Phacus*	3.1	*Euglena* *Phacus*	1.7
	Xanthophyceae	*Botrydium* *Tribonema*	2.1	*Botrydium* *Tribonema*	3.4	*Botrydium* *Tribonema*	1.9
	Dinophyceae	*Ceratium*	1.9	*Ceratium*	2.7	*Ceratium*	1.6
Average			2.28±0.27		3.30±0.41		1.78±0.12
Zooplankton	Rotifera	*Anuraeopsis* *Asplanchna* *Brachionus* *Filinia* *Hexarthra* *Keratella* *Polyarthra*	2.4	*Anuraeopsis* *Asplanchna* *Brachionus* *Filinia* *Hexarthra* *Keratella* *Polyarthra* *Trichocerca*	3.8	*Anuraeopsis* *Asplanchna* *Brachionus* *Filinia* *Hexarthra*	1.8
	Copepoda	*Cyclops* *Diaptomus* *Laptodora* *Mesocyclops* *Naupleus*	2.6	*Cyclops* *Diaptomus* *Laptodora* *Mesocyclops* *Naupleus*	3.2	*Cyclops* *Diaptomus* *Laptodora* *Mesocyclops*	1.7
	Cladocera	*Bosmina* *Diaphanosoma* *Daphnia* *Moina*	2.3	*Bosmina* *Diaphanosoma* *Daphnia* *Moina* *Sida*	3.1	*Bosmina* *Diaphanosoma* *Daphnia*	1.7
Average			2.43±0.15		3.37±0.38		1.73±0.05

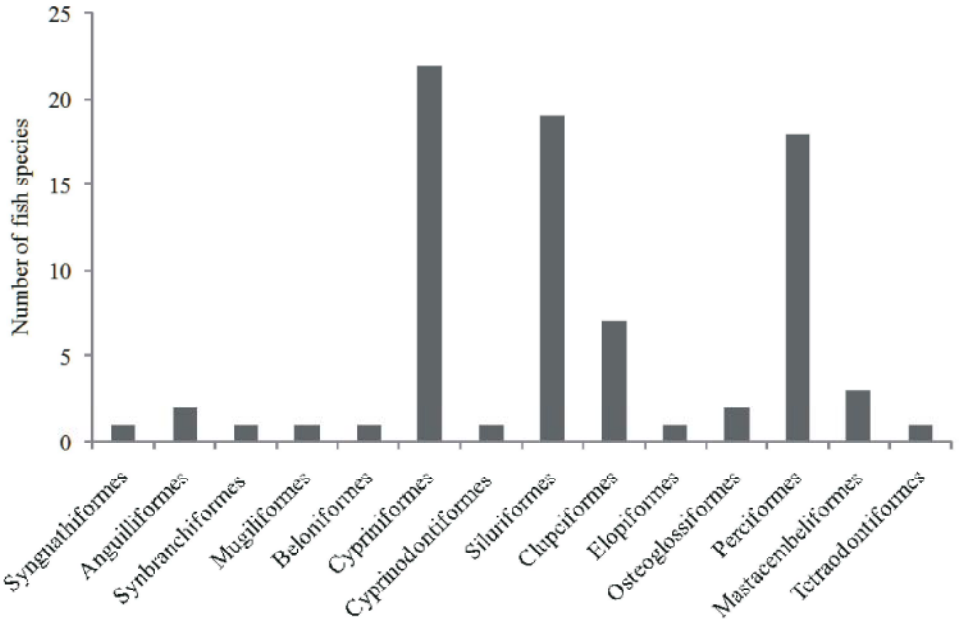

Fig. 2: Species richness of different fish orders in the Padma river during the study period

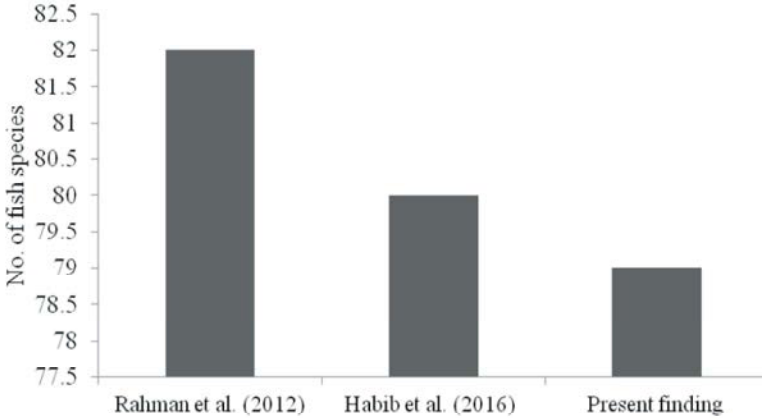

Fig. 3: Comparison between the present and past status of fish species richness in the Padma river

The present results reveal that the plankton community in the Padma river did not change with changed climatic factors. The present diversified planktons indicated that the Padma river in a good habitat for fish.

Fisheries Resources: A total of 79 fish species belonging to 14 orders and 36 families were documented in the Padma river during the study period. List of existing fish species with their taxonomic position (order and family name), scientific name and local name are presented in Table 3. Cypriniformes was the most dominant family contributing 22 species followed by Siluriformes (19), Perciformes (18), Clupeiformes(7), Mastacembeliformes (3), Osteoglossiformes (2), Anguilliformes (2), Syngnathiformes (1), Synbranchiformes (1), Mugiliformes (1), Beloniformes (1), Cyprinodontiformes (1), Elopiformes (1) and Tetraodontiformes (1) (Fig. 2 and 3). Habib, *et al*. [35] found 80 species under 11 orders and 2 classes in the Padma river near Rajshahi city which was very close to the present study. Rahman, *et al.* [36] a total of 82 species of fish under 9 orders and 24 families were recorded in the Padma river and also found that Cypriniformes was the most dominant order of the total fish population. Joadder, *et al*. [37] recorded 71 species constituting 10 orders, 26 families and 54 genera in the Padma river. Mohsin, *et al*. [38] found 69 species belonging to 10 orders, 25 families and 47 genera in the Padma river at Rajshahi district. Rahaman, *et al*. [34] recorded 61 species under 13 orders and 29 families in the Meghna river.

Table 3: List of fish species available in the Padma river during the study period

Order	Family	Scientific name	Local name	English name	Present status	IUCN status in Bangladesh	No. of Species	Diversity index (H´)
Syngnathiformes	Syngnathidae	*Microphis cuncalus*	Kumirer khil	Crocodile Tooth Pipefish	RA	VU	1	1.2
Anguilliformes	Ophichthidae	*Pisodonophis cancrivorus*	Bamosh	Estuary snake eel/longfin snale eel/Giant Mottled Eel	RA	LC	1	1.3
Synbranchiformes	Synbranchidae	*Monopterus cuchia*	Kuchia	Cuchia/ Gangetic Mudeel/Swamp Eel	RA	VU	1	1.5
Mugiliformes	Mugilidae	*Rhinomugil corsula*	Mulet	Corsula/Corsula mullet	RA	LC	1	1.6
Beloniformes	Belonidae	*Xenentodon cancila*	Kakila	Freshwater Garfish	RA	LC	1	2.8
Cypriniformes	Cyprinidae	*Salmostoma sardinella*	Chela	Sardinella Razorbelly Minnow	MA	DD	22	3.4
		Esomus lineatus	Darkina	Stripped Flying Barb	RA	DD		1.3
		Barilius bendelisis	Joiya	Hamilton's Baril/Hill Trout	RA	EN		1.1
		Devario devario	Banspata	Sind Danio	MA	LC		2.1
		Salmophasia phulo	Phulo-chela	Finescale Razorbelly Minnow	RA	NT		1.3
		Salmophasia bacaila	Chela/Katari	Razorbelly Large Minnow	MA	LC		1.9
		Amblypharyngodon mola	Mola	Pale Carplet	CA	LC		4.2
		Osteobrama cotio	Dhela	Cotio	RA	NT		1.2
		Chela cachius	Chep chela	Silver Hatchet Barb	RA	VU		1.4
		Systomus sarana	Sarpunti	Olive Barb	RA	NT		1.7
		Pethia ticto	Tit punti	Two-spot Barb	MA	VU		3.0
		Pethia phutunio	Phutani punti	Spotted Sail Barb/Pygmy Barb	CA	LC		4.1
		Puntius sophore	Bhadi punti	Pool Barb	CA	LC		4.2
		Labeo calbasu	Kalibaus	Orangefin labeo/Black rohu	RA	LC		1.9
		Labeo rohita	Rui	Rohu	MA	LC		3.0
		Labeo bata	Bata	Bata labeo	MA	LC		2.4
		Catla catla	Katal	Catla	MA	LC		3.6
		Cirrhinus cirrhosus	Mrigal	Mrigal carp	MA	NT		3.4
		Cirrhinus reba	Bhangna/Bata	Reba	RA	NT		1.2
	Cobitidae	*Botia dario*	Bou mach	Necktie Loach/Bengal Loach	RA	EN		1.9
		Botia lohachata	Lohachata	Y-loach/Reticulate Loach	RA	EN		1.5
		Lepidocephalichthysus guntea	Gutum	Peppered Loach/Guntea Loach	MA	LC		3.3
Cyprinodontiformes	Aplocheilidae	*Aplocheilus panchax*	Kanpona	Blue Panchax/Panchax Minnow	MA	LC	1	3.2
Siluriformes	Siluridae	*Wallago attu*	Boal	Freshwater Shark	CA	VU	19	4.2
		Ompok pabda	Madhu pabda	Pabda Catfish	RA	EN		2.5
		Ompok bimaculatus	Kani pabda/Boali pabda	Butter Catfish	CA	EN		3.5
	Schilbeidae	*Silonia silondia*	Shilong	Silond Catfish	CA	LC		3.2
		Ailia coila	Kajuli	Gangetic Ailia	CA	LC		3.5
		Neotropius atherinoides	Batasi	Indian potasi	MA	LC		2.1
		Eutropiichthys vacha	Vacha	Batchwa Vacha	CA	LC		4.0
		Pseudeutropius artherinoides	Batai	Indian Potasi	RA	LC		1.3
		Clupisoma garua	Ghaura	Garua Bacha/Gagra	MA	EN		3.1
	Pangasidae	*Pangasius pangasius*	Pangas	Pungas catfish	RA	EN		1.1
	Bagridae	*Rita rita*	Rita/Rida	Rita	RA	EN		1.9
		Sperata aor	Ayer	Long-whiskered Catfish	CA	VU		1.0
		Sperata seenghala	Guchi	Giant River-catfish	CA	VU		3.2
		Mystus bleekeri	Gulsha tengra	Day's Mystus	CA	LC		4.1
		Mystus vittatus	Tengra	Striped Dwarf Catfish	CA	LC		4.1
		Hemibagrus menoda	Ghagla	Menoda Catfish	MA	NT		2.6
	Sisoridae	*Nangra ornata*	Gang tengra		MA	DD		2.2
	Clariidae	*Clarias batrachus*	Magur	Walking Catfish	CA	LC		4.1
	Heteropneustidae	*Heteropneustes fossilis*	Shing	Stinging Catfish	CA	LC		4.3
Clupeiformes	Clupeidae	*Tenualosa ilisha*	Ilish	River shad/Hilsa shad	MA	LC	7	3.7
		Gudusia chapra	Chapila	Indian river shad	MA	VU		2.3
		Gonialosa manmina	Mukhchokhkha chapila	Ganges river gizzard shad	RA	LC		1.2
		Corica soborna	Kachki	Ganga River-spart	RA	LC		1.3
	Pristigasteridae	*Ilisha megaloptera*	Chaukka	Bigeye Ilisha	RA	LC		1.2
	Engraulidae	*Setipinna phasa*	Phassa/Fewa	Gangetic Hairfin Anchovy	RA	LC		1.8
		Setipinna taty	Teli phasa	Scaly Hairfin Anchovy	RA	LC		1.6
Elopiformes	Megalopidae	*Megalopes cyprinoides*	Tarpons	Indo-Pacific tarpon	RA		1	1.2
Osteoglossiformes	Notopteridae	*Notopterus notopterus*	Foli	Grey Featherback/Bronze Featherback	MA	VU	2	3.2
		Chitala chitala	Chital	Humped Featherback/Clown Knife Fish	MA	EN		2.9
Perciformes	Polynemidae	*Polynemous sparadiseus*	Tapasi	Paradise Threadfin	RA	LC	18	1.4
	Anabantidae	*Anabas testudineus*	Koi	Climbing Perch	CA	LC		4.1
	Osphronemidae	*Trichogaster lalius*	Lal kholisa	Dwarf gourami	RA	LC		1.7
		Trichogaster fasciata	Colisa	Banded gourami	MA	LC		3.3

Table 3: continued

	Channidae	*Channa punctatus*	Taki	Spotted Snakehead	CA	LC		3.7
		Channa orientalis	Gachua	Asiatic snakehead/Walking Snakehead	MA	LC		3.1
		Channa striatus	Gozar	Striped or banded Snakehead	MA	LC		2.9
		Channa marulius	Shol	Giant Snakehead	MA	EN		3.6
	Centropomidae	*Lates calcarifer*	Koral	Giant perch	RA			2.3
	Nandidae	*Nandus nandus*	Vheda	Mud Perch	MA	NT		3.1
	Gobiidae	*Pseudapocryptes elongatus*	Chewa	Lanceolate Goby/Mudskipper/ Pointed- tailed goby	RA	LC		1.2
		Glossogobius giuris	Baila/Bele	Fresh Water Goby/Tank Goby	CA	LC		4.0
	Sciaenidae	*Otolithoides pama*	Poa	Pama Croaker/Long-finned croaker	RA	LC		1.7
	Silaginidae	*Sillaginopsis panijus*	Tulardandi	Hundra/Flathead sillago	RA	LC		1.4
	Platycephalidae	*Platycephalus indicus*	Mur bailla/Chotabele	Bar-tailed Flathead	MA	LC		2.6
	Ambassidae	*Chanda nama*	Chanda	Elongate Glass-perchlet	MA	LC		3.2
		Parambassis ranga	Gol Chanda/Tek chanda	Indian Glassy Fish	MA	LC		3.3
		Pseudambassis lala/ Parambassis lala	Lal Chanda	Highfin glassy perchlet	RA	LC		1.2
Mastacembeliformes	Mastacembelidae	*Macrognathus pancalus*	Guchi baim	Striped spinyeel	RA	LC	3	1.4
		Mastacembelus armatus	Baim	Zig-Zag Eel	RA	EN		2.6
		Macrognathus aculeatus	Tara baim	Lesser spiny eel	RA	NT		1.9
Tetraodontiformes	Tetraodontidae	*Tetraodon cutcutia*	Potka	Pufferfish	MA	LC	1	2.9
Average								2.50±1.04

[CA= Commonly available species, MA= Moderately available species, RA= Rarely available species, DD= Data Deficient, LC= Least Concern, NT= Near Threatened, VU= Vulnerable, EN= Endangered, CR= Critically Endangered.]

The most dominant family found in the present study was Cyprinidae. Joadder, *et al*. [37] and Mohsin, *et al*. [38] reported the domination of this family in the Padma river of Rajshahi district and Upper Halda river of Chittagong district respectively. Rahman [23] showed that this family is also dominant in the freshwater fishes of Bangladesh. Pramanik, *et al.* [39] a total 107 species under 13 orders and 36 families were recorded from the 16 sampling stations in the Meghna river. The present study reveals that Padma river was found to be the riches habitat for freshwater fish species but its richness gradually decreasing due to climatic factors.

Diversity Indices of Fish and Plankton: Phytoplankton diversity indices fluctuated from 1.9 to 2.6, 2.8 to 3.8 and 1.7 to 2.6 with a mean of 2.28±0.27, 3.30±0.41 and 1.78±0.12 during pre-monsoon, monsoon and post-monsoon, respectively while zooplankton have fluctuated from 2.3 to 2.6, 3.1 to 3.8 and 1.7 to 1.8 with a mean value of 2.43±0.15, 3.37±0.38 and1.73±0.05 during pre-monsoon, monsoon and post-monsoon, respectively. The values of Shannon-Weaver diversity indices of fish have fluctuated from 1.0 to 4.2 with a mean value of 2.50±1.04. Islam, *et al.* [40] found that the fish, phytoplankton and zooplankton diversity indices were 2.8±1.0, 3.10±0.17 and 3.13±0.58, respectively during the wet season in Kishoreganj haor. Miaoa, *et al*. [41] reported that phytoplankton diversity varied from 1.44 to 3.08 in the Backshore Wetland in Shanghai, China. It indicated that Padma river was a productive freshwater body during the study period.

CONCLUSION

The present study mainly focuses on the documentations of fisheries resources at the Padma river in Munshiganj district, Bangladesh. The total number of fish species recorded during the study period has shown good indication of rich fish in this river. The threatened fish species recorded from the studied river indicates the alarming threat to the present conservation status of fishes in Bangladesh. The temperature, DO and pH was favorable but the level of salinity is increasing day by day in the studied river due to the decreasing flow rate of the river. From the above consideration it has appeared that if no necessary steps are taken to increase the flow rate of the river, this change will be epidemic in the future.

ACKNOWLEDGEMENTS

Authors acknowledge to the Project Implementation Unit, National Agricultural Technology Program-Phase II Project (NATP-2), Bangladesh Agricultural Research Council (BARC), Farmgate, Dhaka-1215, Bangladesh for funding the project (no. CRG-718).

REFERENCES

1. Kabir, R., 2014. The impacts of cyclones Sidr and Aila on the health of the coastal people of Bangladesh, Ph.D. thesis, Middlesex Univ., London, UK.

2. Wei, J., A. Hansen and Y. Zhang, 2014. Perception, attitude and behavior in relation to climate change: a survey among CDC health professionals in Shanxi province, China. Environ. Res., 134: 301-308.
3. Kabir, R., H.T.A. Khan, E. Ball and C. Kaldwell, 2014. Climate change and public health situations in coastal areas of Bangladesh. Int. J. Soc. Sci. Stud., 2(3): 109-116.
4. Islam, T. and A. Neelim, 2010. Climate change in Bangladesh: A closer look into temperature and rainfall data, 1st edition, The University Press, Dhaka, Bangladesh.
5. DFID, 2008. Climate change cell, Bangladesh reducing development risks in changing climate, Department of environment of GoB, United nations development programme (UNDP), Department for international development (DFID), Comprehensive disaster management programme, Dhaka, Bangladesh.
6. Kabir, R., H.T.A. Khan, E. Ball and K. Caldwell, 2016. Climate change impact: The experience of the coastal areas of Bangladesh affected by cyclones Sidr and Aila. J. Environ. Public Health, 16: 2-9. http://dx.doi.org/10.1155/2016/9654753
7. Cheung, W.W.L., V.W.Y. Lam, J.L. Sarmiento, K. Kearney, R. Watson and D. Pauly, 2009. Projecting global marine biodiversity impacts under climate change scenario. Fish Fish., 10(3): 235-251. https://doi.org/10.1111/j.1467-2979.2008.00315.x
8. Brander, K., 2010. Impacts of climate change on fisheries. J. Mar. Syst., 79: 389-402. https://doi.org/10.1016/j.jmarsys.2008.12.015
9. Westlund, L., F. Poulain, H. Bage and R. Anrooy, 2007. Disaster response and risk management in the fisheries sector. Rome: FAO.
10. Coulthard, S., 2008. Adapting to environmental change in artisanal fisheries-insights from a South Indian lagoon. Global Environ. Chang., 18(3): 479-89.
11. Iwasaki, S., B.H.N. Razafindrabe and R. Shaw, 2009. Fishery livelihoods and adaptation to climate change: a case study of Chilika lagoon, India. Mitig. Adapt. Strat. Gl., 14(4): 339-355.
12. Arntz, W.E., V.A. Gallardo, D. Gutierrez, E. Isla, L.A. Levin and J. Mendo, 2006. ElNino and similar perturbation effects on the benthos of the Humboldt, California and Benguela current upwelling ecosystems. Adv. Geosci., 6: 243-265.
13. Cheung, W.W.L., C. Close, V.W.Y. Lam, R. Watson and D. Pauly, 2008. Application of macroecological theory to predict effects of climate change on global fisheries potential. Mar. Ecol. Prog. Ser., 365: 187-97.
14. Hossain, M.Y., M.M. Rahman, M.A.S. Jewel, Z.F. Ahmed, F. Ahamed, B. Fulanda and J. Ohtomi, 2012. Conditions and form-factor of the five threatened fishes from the Jamuna (Brahmaputra river distributary) river, northern Bangladesh. Sains Malays., 41(6): 671-678.
15. IUCN, 2015. Red list of Bangladesh, volume 5: Freshwater fishes. IUCN, International union for conservation of nature, Bangladesh country office, Dhaka, Bangladesh, pp: 360.
16. Jain, S., G. Sharma and Y. P.Mathur, 2013. Effects of temperature variations on fish in lakes. Int. J. Eng. Res., 2: 2516-2523.
17. Jones, T., B. Phillips, C.E. Williams and J. Pittock, 2003. Managing rivers wisely: lesions from WWF's work for integrated river basin management. WWF (World Wildlife Fund) International: Gland, Switzerland.
18. Hossain, M.Y., 2010. Morphometric relationships of length-weight and length-length of four cyprinid small indigenous fish species from the Padma river (NW Bangladesh). Turk. J. Fish Aquat. Sci., 10: 131-134.
19. Mohsin, A.B.M., F. Yeasmin, S.M. Galib, B. Alam and S.M.M. Haque, 2014. Fish fauna of the Andharmanik river in Patuakhali, Bangladesh. Middle East J. Sci. Res., 21(5): 802-807. http://doi.org/10.5829/idosi.mejsr. 2014.21.05.8415.
20. Imteazzaman, A.M. and S.M. Galib, 2013. Fish fauna of Halti beel, Bangladesh. Int. J. Curr. Res., 5(1): 187-190.
21. Bellinger, E.G., 1992. A key to common algae: freshwater, estuarine and some coastal species. The institution of water and environmental management, London, UK.
22. Bhouyain, A.M. and G.S.M. Asmat, 1992. Freshwater zooplankton from Bangladesh. Gazi Publishers, Dhaka, Bangladesh, pp: 32-151.
23. Rahman, A.K.A., 2005. Freshwater fishes of Bangladesh. 2nd edition. Zoological society of Bangladesh, Dhaka, Bangladesh.
24. Talwar, P.K. and A.G. Jhingran, 1991. Inland fishes of India and adjacent countries. Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.

25. Martin, G.D., J.G. Vijay, C.M. Laluraj, N.V. Madhu, T. Joseph and M. Nair, 2008. Freshwater influence on nutrient stoichiometry in a tropical estuary, Southwest coast of India. Appl. Ecol. Env. Res., 6: 57-64.
26. George, B., J.I.N. Kumar and N.R. Kumar, 2012. Study on the influence of hydro-chemical parameters on phytoplankton distribution along Tapi estuarine area of Gulf of Khambhat, India. Egypt. J. Aquat. Res., 38: 157-170. https://doi.org/10.1016/j.ejar.2012.12.010
27. Fakayode, S.O., 2005. Impact assessment of industrial effluent on water quality of the receiving Alaro river in Ibadan, Nigeria. Ajeam-Ragee, 10: 1-13.
28. Sridhar, R., S.S. Kumar and L. Kannan, 2006. Water quality and phytoplankton characteristics in the Palk Bay, south- east coast of India. J. Environ. Biol., 27: 561-566.
29. Mobin, M.N., M.S. Islam, M.Y. Mia and B. Bakali, 2014. Analysis of physico-chemical properties of the Turag river water, Tongi, Gazipur in Bangladesh. J. Environ. Sci. Nat. Resour., 7(1): 27-33.
30. Hossain, M.J., M.J. Sarker, M.N. Uddin, A. Islam, I.J. Tumpa and Z. Hossain, 2018. Macrobenthos Presence in the Estuarine Waters of the Meghna River, Ramghati, Laksmipur, Bangladesh. World Appl. Sci. J., 36(4): 598-604. https://doi:10.5829/idosi.wasj.2018.598.604.
31. Rahaman, M.J., M.S. Hossain, M.M. Rahman and Z. Hossain, 2020. Impacts of climate change on livelihood of the fishers´ at the Meghna, Laukhati and Galachipariver in Bangladesh. Asian J. Med. Biol. Res., 6(1): 81-92. http://doi: 10.3329/ajmbr.v6i1.46482
32. Monjurul, M.M. and M.M.H. Pramanik, 2017. Fish biodiversity and their present conservation status in the Meghna river of Bangladesh. Int. J. Fish. Aquat. Sci., 5(1): 446-455.
33. Rakhi, S.F., A.H.M.M. Reza, M.S. Hossen and Z. Hossain, 2013. Alterations in histopathological features and brain acetylcholinesterase activity in stinging catfish *Heteropneustes fossilis* exposed to polluted river water. Int. J. Aquatic Res., 5: 2-18. http://www.intaquares.com/content/5/1/7.
34. Rahaman, M.J., N.S. Ema, M.S. Hossain, M.M. Rahman and Z. Hossain, 2019. Effects of climate change on fisheries biodiversity of the Meghna, Laukhati and Galachipa river in Bangladesh. Eurasia J. Biosci., 13: 1705-1717.
35. Habib, F., S. Tasnin and N.I.M. Abdus, 2016. A checklist of fishes and fisheries of the Padda (Padma) river near Rajshahi city. Int. J. Pure. App. Biosci., 4(2): 53-57. http://dx.doi.org/10.18782/2320-7051.2248.
36. Rahman, M.M., M.Y. Hossain, F. Ahamed, Fatematuzzhura, B.R. Subba, E.M. Abdallah 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. https://doi.org/10.5829/idosi.wjz.2012.7.4.6634.
37. Joadder, M.A.R., S.M. Galib, S.M.M. Haque and N. Chaki, 2015. Fishes of the river Padma, Bangladesh: Current trend and conservation status. J. Fish., 3(2): 259-266. http://doi.org/10.17017/jfish.v3i2.2015.111.
38. Mohsin, A.B.M., S.M.M. 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. Marine Sci., 5(6): 680-685. http://doi.org/10.5829/idosi.wjfms.2013.05.05.75109.
39. Pramanik, M.M.H., M.M. Hasan, S. Bisshas, A.B.M.A. Hossain and T.K. Biswas, 2017. Fish biodiversity and their present conservation status in the Meghna river of Bangladesh. Int. J. Fish. Aquat. Stud., 5(1): 446-455.
40. Islam, A., S.S. Basak and Z. Hossain, 2020. Fish and plankton biodiversity in the Kishoreganj haor, Kishoreganj, Bangladesh. Gene. Aquat. Org., 4(1): 39-48. http://doi.org/10.4194/2459-1831-v4_1_04.
41. Miaoa, X., S. Wanga, M. Liua, J. Maa, J. Hua, T. Lia and L. Chena, 2019. Changes in the phytoplankton community structure of the Backshore Wetland of expo garden, Shanghai from 2009 to 2010. Aquacult. Fish., 4: 198-204. http://doi.org/10.1016/j.aaf.2019.02.004.