Shobuj Bangladesh Publications House
International Journal of Natural and Social Sciences
ISSN: 2313-4461

Assessment and monitoring fish biodiversity of Meghna river in Bangladesh

Md. Sumon Mia[1], Farida Yeasmin[1], Nur-Un-Nesa[2], Md. Fida Hassan Kafi[2], Md. Idris Miah[1], Muhammad Shahidul Haq[1]

[1]Department of Fisheries Management, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh
[2]Faculty of Fisheries, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

ABSTRACT

A survey was conducted to determine the current status of fisheries of Meghna river of Bangladesh. The study was aimed to formulate recommendation for effective management of the fisheries of the river. Different fish capture methods, fishing gears and crafts were usually used in the study area. Various types of fishing gears were found to operate in this river, among them, a total of six types of fishing nets were used by the fishermen. A total of 20 species of fishes were identified in the catches of different nets in this river. The highest numbers (20) of species were recorded in the catches of ber jal while the lowest numbers (3) were recorded in case of moiya jal. Different species of fish fauna were caught by the fishers in Meghna river including carps, barbs, minnows, catfish, gobies, perch, murrels, eels, small prawn, miscellaneous species. Most of them are found all the year round except carps, perch and Murrells. Maximum catches are obtained during the month of July to December. The highest catch 500g and 86.11% was recorded whereas the lowest was 8g and 1.39% during the study period. The highest percentage of respondent (45%) caught fish of 3.1-4.0 kg/person with maximum duration of 6-7h of fishing. Decline in fish catch (100%) was the greatest problem to the fishers followed by lack of capital for purchase of fishing gear and net. The status of fisheries at Meghna river is closely related to the livelihood of fishermen. Steps to be taken at government and non government level to support their livelihood.

Key words: Fish biodiversity, assessment, Meghna river, Bangladesh.

*Corresponding author.
E-mail address: summon_reod@yahoo.com (MS Mia)

INTRODUCTION

Bangladesh is crisscrossed by various types of water bodies such as rivers, lake, haors and beels, ponds, baors, estuaries coastal belt, seashore which all together offer tremendous opportunities for fisheries development. All these water bodies provide immense scope and potentiality for augmenting fish production and livelihood support of the people living around these inland water bodies. The fisheries sector plays an outstanding role in the national economy and nutrition, as it provides about 60% of the animal protein intake thereby helps to reduce malnutrition problem and more than 11% of the total population of the country is directly or indirectly involved in this sector for their livelihoods. The inland fisheries of Bangladesh are the most productive and the total areas of capture and culture fisheries are 39,25,290 ha and 7,74,055 ha which contributes 29.34% and 52.92% of the total fish production respectively. Fisheries sector contributes about 2.73% of the total export earning, 4.43% to GDP and 22.21% to agricultural sector. Annual fish production was 30.62 lakh metric ton (MT) in 2010-11 fiscal year which contributed about 60% to the nation's animal protein intake in this year.

The population of Bangladesh depends on wild fish for food and the generation of income. A large portion rural family are engaged in part time fish capture from the rivers and beels (Hughes et al.

How to cite this article: MS Mia, F Yeasmin, NU Nesa, MFH Kafi, MI Miah and MS Haq (2015). Assessment and monitoring fish biodiversity of Meghna river in Bangladesh. International Journal of Natural and Social Sciences, 2(3): 13-20.

1994). For fishing, different types of crafts, gears and traps are used. Different types of fishing method used from prehistoric times and now fishing methods had been modified. Generally gears are those equipments that are used to catch the fishes. The fishermen selected their fishing gears depending on types of water body, different operation area, depth of water and availability of target species to the caught. In Bangladesh fish and fisheries items of inland water still are caught by using traditional crafts and gears. Most of the fishing gears have to break off operation after certain period of activity for rest and repair work (Ahmed, 1958). So, the present study is taken to identify the existing fish capture techniques, diversified fishing gears to know the existing condition for fishing in Meghna river.

MATERIALS AND METHOD

Study area

The present investigation was conducted in the areas of 4 kilometers in the bank of the Meghna river, located at Ashuganj upazilla under Brahman Baria District in the South-Eastern region of Bangladesh.

Data collection

The data were collected from 40 fishermen of the study area in year 2009 addressing several key issuing interviews with the fishermen at fishing sites during fishing time, at household sides during leisure time, and at local fish markets during marketing or purchasing time.

RESULTS AND DISCUSSION

Fishing gears used in the river

Different fishing methods are employed in different seasons for fishing in the Meghna river. Modes of operations of gears are dependent on various factors, e.g., water level, rainfall. In general, fishermen defect the gear types, design, mesh size to capture the desired species and size of fish. Type of nets, their lengths, depths and mesh sizes vary depending on choice and capital of the persons involved in commercial fishing as well as the abundance of fish. During the period of study, several types of fishing gear were found to operate in the study area, with their specifications, mode of operations and catch compositions. They were mostly of traditional type and some of them were unique for the particular locality. Gears are classified into three (3) groups, such as nets, traps and wounding gears (Table 1).

Most of the areas of the river were to remain dry from January to April. During this period the use of any type of gear were very much limited. As soon as the monsoon rain comes down and water level is increased, the use of all types of gear also increased simultaneously. Due to the vastness of the water bodies, nets are operated more frequently. Due to presence of current, traps are widely used in the canal connecting and shallow water level area in the river up to October and decreased gradually during rest of the month of the year. At this time, the wounding gear was used in increasing numbers in shallow water due to abundance of pelagic fish. Wounding gear is generally used by the subsistence fishermen. When the water level is started to decrease during post monsoon (November-December) period the number of nets used also decreased except the use of current jal and jhaki jal that are used at increasing numbers in the adjacent canal with the river during monsoon.

Table 1
Types of fishing gear used in the Meghna river.

Group Name	Name of gears
Nets	i) Ber jal (seine net) ii) Current jal (Gill net) iii) Veshal jal iv) Thela jal (Push net) v) Moiya jal vi) Khara jal (Lift net)
Traps	i) Bair ii) Chandi bair
Wounding gear	i) Borshi

Ber jal

In the catches of ber jal, a total of 12 species of fishes were recorded during the study period. Among the 12 species, boal was found the highest in weight which contributed about 27.44% of the

total weight of catch. The next dominant species recorded were choto chingri (18.29%), chapila (15.24%), rui (9.14%), choto chanda (5.48%), bacha (4.88%), ghaura (4.28%) and punti (4.28%) of the total weight. Kachki, mola, shilon, and baila were found the lowest in weight, which contributed about 10.97% of the total weight of catch. Rabbani (2007) recorded 22 species of fishes including chingri in the Karatoa river. Miah (2004) found 23 species of fishes in Zolkor beel where *A. mola* was the most dominant species which contribute about 24.09% and *L. calbasu, L. rohita* were the least dominant species contribution separately only 30% of the catch, respectively. Shahjahan (2000) recorded 25 species of fish including shrimp in the Jamuna river, whereas Hossain (1998) recorded 19 species of fish in the old Brahmaputra river in the catches of this gear.

Khora jal

A total of 6 species of fishes were recorded in the catches of Khora jal. Among the 6 species boal was found the highest in weight which contributed about 32.68% of the total weight of catch. The next dominant species recorded were chitol (22.88%) and kajoli (13.07%) of the total weight. Bacha was found the lowest in weight which contributed about 3.27% of the total weight of catch. Shahjahan (2000) reported 15 species of fishes in the catches of dharma jal during the study period in the Jamuna river. Paul et al. (1993) recorded 28 species of fishes in the catches of lift net in Halti beel.

Veshal jal

A total of 6 species of fishes were recorded during the study period in the catches of vessel jal. Among the 6 species, kajoli and ghaura were found the highest in weight which contributed about 30% and 24% of the total weight of catch respectively. The next dominant species recorded were chapila (16%), and shilon (12%) of the total weight. Chela and bacha were found the lowest in weight which contributed about 18% of the total weight of catch. Karim (2004) recorded 25 species of fishes in Dhamharail beel where *P. sophore* (11.40%) was the highest dominant species and *P. sarana*, *W. attu*, *N.chitala*, *M. armatus* and *H. fossilis* were the lowest abundant species to the catch.

Dur jal

In the catches of Dur jal, a total of 6 species of fishes recorded during the study period. Among the 6 species, air was found the highest in weight which contributed about (27.36%) of the total weight of catch. The next dominant species recorded were choto chingri (23.16%) and chapila (16.85%), baila (15.79) of the total weight. Punti and kachki were found the lowest in weight which contributed about 16.84% of the total weight of catch.

Current jal (Gill net)

In the present study, in case of current jal a total of 5 species of fishes recorded during the study period. Among the 5 species, jatka was found the highest in weight which contributed about (31.53%) of the total weight of catch. The next dominant species recorded were kalibaus (24.32%) and bacha (18.01%) of the total weight. Magur was found the lowest in weight which contributed about (12.62%) of the weight of catch. Miah (2004) recorded 13 species of fishes in Zolkor beel where *P. sophore* (38.53%) was the highest dominant species and *L. calbasu* (.9%) was the lowest dominant species. Karim (2004) recorded 18 species of fishes in Dhamharail beel. Rabbani (2007) recorded 12 species in the Karatoa river.

Moiya jal

The net was found to be quite effective in catching fishes of medium and small sizes of different species. In the present study, a total of 3 species of fishes recorded during the study period. Among the 3 species, choto chingri was found the highest weight in which contributed about (53.52%) of the total weight of catch. The next dominant species recorded was punti (36.62%) of the total weight. Baila was found the lowest in weight which contributed about (9.36%) of the total weight of catch. Hossain (1998) recorded 12 species of fish in the catch of Moiya jal in the old Brahmaputra river. He recorded chingri (87.86%), guchi baim (2.32%), baim (1.55%), golda chingri (1.42%),

gutum (1.29%), baila (1.29%), tit punti (1.29%), and bhada (1.16%) in the old Brahmaputra river.

Bair

In the catch of bair trap, about 6 species were recorded during the present study period (Table 3). Among these different species recorded *M. bleekeri* (gulsha) was found to be highest which contributed about 37.5% and *P. ticto* was found to be the lowest which contributed about 5% in the catch. Hossain (1998) recorded 3 species of fishes caught by bair in the study area. Holder (2002) recorded 11 and 12 species of fishes in Doba beel and in Chara beel, respectively. The highest and lowest dominant species were *P. sophore* (19.74%) and *H. fossilis or M. aculeatus* which contributed separately 2.63% in Doba beel, respectively. Karim (2004) recorded 16 species of fishes in Dhamharail beel where the highest dominant species was *M. lamrrei* (20%) and the lowest abundant species were *M. aculeatus, C. punctatus* and *C. fasciatus* which contributed separately 0.95% to the catch. This information is more or less similar with the present findings.

Chandi bair

In the catch of chandi bair trap, about 6 species were recorded during the present study period (Table 3). Among these different species recorded *M. lamerii* (icha) was found to be highest which contributed about 86.11% and *M. aor* (air) was found to be the lowest which contributed about 1.39% in the catch. Our results are in agreement with previously reported research carried out by Hossain (1998) who recorded 5 species, among which *M. lamerii* (89.77%) and *Macrobrachium* spp. (1.14%) were the highest and lowest species of fishes, respectively in the old Brahmaputra river.

Borshi

A total of 6 species of fishes were caught by Borshi during the study period (Table 4). Among these different species recorded *Glosogobius giuris* (baila) was found to be highest which contributed about 46.52% *M. aor* (air) was found to be lowest which contributed about 2.91% in the catch. Hossain (1998) recorded 7 species of fishes in the old Brahmaputra river in the catches of borshi. Holder (2002) recorded 7 species in doba beel and 8 species in Chara beel in the catches of borshi. Among the 7 species of fishes, *P. sophore* was found to be the highest abundant species which contribute about 31.48% and *M. aculeatus* was found to be the lowest abundant species which contribute about 3.07% to the catch in Doba beel. Miah (2004) recorded 7 species of fishes in Zolkor beel where *P. sophore* (22.22%) was the highest abundant species and *A. testudinaeus* was the lowest abundant species to the catch. Karim (2004) reported 10 species of fishes in Dhamharail beel where *P. sophore* (30.65%) was the highest dominant species and *H. fossilis* (1.61%) was the lowest dominant species to the catch. These results are in line with the present findings.

However, during the study period a total of 20 species of fishes were recorded in the catches of different nets by the fishermen in the study area. Almost similar observation was reported by Miah (2004) where a total of 25 species of fishes were recorded from Savar Khagorvaria Zolkor beel in Pabna district. The catch compositions of fishes of different types of net are shown in table 2.

Fishing time and duration

Fishermen are engaged in fish catching in the Meghna River throughout the year. The selected fishermen were grouped into three categories according to the level of their fishing time. January, February, March, April are almost dry season. At that time water level was very low and riverine environment is not suitable for the growth of fish. So, during this period fish were not available and the use of any type of gear was very much limited.

Seine nets along with various forms of traps used for catching fish. The use of fishing gear and operation time depends mainly on habitat type, water depth, type of fisherman and abundance of fish. The fishermen use mechanized and non-mechanized boats for operating the fine mashed seine nets. It requires 8-10 fishermen to operate a seine net of about 150-200 meters in length and 10 meters in breadth. They start fishing at about 11 p.m. and continue till dawn. Fishing may also occur from dawn to noon or afternoon during the

peak season. It requires almost an hour and a half, on an average to complete a haul. Fishing effort is high during the monsoon season but is partially concentrated when the water of the river starts to recede during the autumn. Fish catching rate is very low at present due to high fishing pressure.

Fish group

During the period of investigation in both study location, different species of fish fauna were caught by the fishers in Meghna river including carps, barbs, minnows, catfish, gobies, perch, murrels, eels, small prawn, miscellaneous species. Most of them are found all the year round except carps, perch and Murrells. Maximum catches are obtained during the month of July to December. The different species were caught abundantly in different month shown in table 5.

Table 2
Species composition of fishes of the different types of gears used in the Meghna river of Ashuganj Upazila.

Species (local name)	Name of gears											
	Ber jal		Khara jal		Veshal jal		Dur jal		Current jal		Moiya jal	
	Wt.(g) of fish	% of total wt.	Wt.(g) of fish	% of total wt.	Wt. (g) of fish	% of total wt.	Wt.(g) of fish	% of total wt.	Wt.(g) of fish	% of total wt.	Wt.(g) of fish	% of total wt.
Chapila	250	15.24			80	16	80	16.85				
Choto chingri	300	18.29					110	23.16			380	53.52
Baila	50	3.05					75	15.79			70	9.86
Ghaura	70	4.28			120	24						
Kajoli			200	13.07	150	30						
Rui	150	9.14										
Jatka									350	31.53		
Boal	450	27.44	500	32.68								
Chitol			350	22.88								
Punti	70	4.28	180	11.76			60	12.63			260	36.62
Bacha	80	4.88	50	3.27	50	10			200	18.01		
Gutum												
Shilon	60	3.66			60	12						
Chela					40	8						
Air							130	27.36				
Kachki	40	2.44					20	4.21				
Tengra									150	13.52		
Mola	30	1.82										
Magur									140	12.62		
Choto canda	90	5.48	250	16.34								
Kalibaus									270	24.32		

Table 3
Average species composition (% of catch by number) of the fishes of different types of traps used in the Meghna river.

Species (Local name)	Name of traps			
	Bair		Chandi bair	
	No. of fish	% of catch	No. of fish	% of catch
Golsha	30	37.5	10	2.78
Air	16	20	5	1.39
Golda chingri	20	25		
Icha	-		310	86.11
Baila	-		15	4.16
Gutum	10	12.5		
Punti	4	5	20	5.56
Total	80	100	360	100

Table 4
Average species composition (% of catch by number) of the fishes of different types wounding gear used in the Meghna river.

Species (Local name)	Name of gears	
	Borshi	
	No. of fish	% of catch
Tengra	12	6.98
Baila	80	46.52
Tit punti	25	14.53
Jat punti	14	8.14
Boal	20	11.62
Baim	16	9.30
Air	5	2.91
Total	172	100

Amount of fish caught by the fishers (kg/person)

The selected fishermen were grouped into three categories according to the level of their amount of fish caught. The 1st category included 17.5% of the fishers who catch fish about 1.1-2.0 kg fish/day/person. The 2nd and 3rd, categories included 37.5% and 45% who catch fish about 2.1-3.0 kg and 3.1-4.0 kg fish/day/person respectively (Table 6). In case of study area 2, the 1st category included 17.5% of the fishers who catch fish about 1.1-2.0 kg fish/day/person. The 2nd and 3rd, categories included 45% and 37.5% who catch fish about 2.1-3.0 kg and 3.1-4.0 kg fish/day/person respectively (Table 6).

Fish marketing channel

It was observed that two types of fish marketing channel exist in the study area. Of the total (40) interviewed, 75% stated that they sold their fish by using 1st type of marketing channel (Fishermen→Arotder→Wholesaler→Retailers→Consumers) and 25% used 2nd type of marketing channel (Fishermen→Consumer) in study area 1. In study area 2 67.5% stated that they sold their fish by using 1st type of marketing channel and 32.5% used 2nd type of marketing channel **(**Table 7).

Table 5
Types of fish yearly caught by the fishers in both areas of Meghna river.

Fish group	Season/Month					
	J-F	M-A	M-J	J-A	S-O	N-D
Carps	-	-	-	+	++	+++
Barbs	++	+++	++	+	+	+++
Minnows and Clupied	++	+	+	++	+++	+++
Catfish	++	+	-	+	+++	+++
Gobies	+++	++	++	+	++	+++
Perch	-	-	+	+	++	+++
Murrels	++	-	-	-	-	+
Eels	++	+	+	++	++	++
Small prawn	+++	+++	++	+++	+++	++
Miscellaneous	++	++	++	++	++	++
Snakehead	+	+	++	++	+++	+++

Here- "+" = rare, "++" = available, "+++" = most available, "-" = not available

Table 6
Fishing time and amount of fish caught by fishermen of Meghna river.

Fishing status		Number of respondents (%)	
		Study area 1 (%)	Study area 2 (%)
Time/Duration	2-3hr	8 (20)	7 (17.5)
	4-5hr	26 (65)	26 (65)
	6-7hr	6 (15)	7 (17.5)
Amount of fish caught by the fishers (kg/person)	1.1-2.0	7 (17.5)	7 (17.5)
	2.1-3.0	15 (37.5)	18 (37.5)
	3.1-4.0	18 (45)	15 (45)

Table 7
Fish marketing channel in study areas.

Type of marketing channel	Number of respondents (%)	
	Study area 1	Study area 2
Fishermen→Arotder→Wholesaler→ Retailers→Consumers	30 (75)	27 (67.5)
Fishermen→Consumer	10 (25)	13 (32.5)

Constraints faced by the fishermen

Social Capital

Almost all fishermen community is disadvantaged in social capital such as the networks, groups, trust, access to institutions etc. There was poor existence of social organizations in the surveyed areas. Lack of social capital has affected socio-economic condition of poor people in fishing communities.

Financial Capital

Financial capital denotes the financial resources that people use to achieve their socio-economic condition objectives. Financial capital of fishermen represents saving, credit etc. which were virtually lacking among the fishers. The study shows that small fishermen are often disadvantaged due to poor financial resources.

Table 8
Problem faced by the fisher's of the Meghna river.

Name of problem	Nature of problem			
	High (4)	Moderate (3)	Low (2)	Ranki-ng
Decline in catch	40(100%)	-	_	1st
Lack of capital	32(80%)	8(20%)	_	2nd
Inadequate credit	8(20%)	32(80%)	_	3rd
Banning of fish catching	16(40%)	16(40%)	8(20%)	4th
Lack of appropriate gear	16(40%)	14(35%)	10 (25%)	5th
Training Facility	8(20%)	26(65%)	6(15%)	6th
Lack of ice	_	40(100%)	_	7th
Transportation	_	32(80%)	8(20%)	8th
Instability in the price of fish		30(75%)	10(25%)	9th
Extortion	_	_	40(100%)	10th

The most important problem faced by the respondents is listed in table 8. It is evident that decline in fish catch (100%) was the greatest problem to the fishers, because they do not have enough fish to catch. The second vital problem was lack of capital for purchase of fishing gear and net. Lake of inadequate credit facility was reported to be the 3rd problem followed by instable market price of fish and extortion. Lack of appropriate gear, training facility, lake of ice and banning season of fish catching were another problem that were faced by the fishers.

The fishing status of fisher's community at Meghna river is closely related to their livelihood. Steps to be taken at government and non government level to support their livelihood through providing institutional credit to the fishermen at their crisis moment. Educational institutions should be set up in fishermen's village to improve their educational status. Some rules should be implemented in the use of gears so that fishermen cannot catch fingerlings, brood fish indiscriminately through the use of different gears. Extension service, institutional and policy support should be given to the fishermen for sustainable livelihood. Local, regional, national and international NGOs should provide technical knowledge, credit support and alternative income sources to the fishermen. Fish sanctuaries around each known spawning and nursery grounds should be declared and restricting year round fishing, that can be implemented with community participation.

REFERENCES

Ahmed N (1958). Socio-economic of fishing Industry. Directorate of Fisheries. East Pakistan Govt. Press, Dacca.

Holder DK (2002). Studies on the availability of small, indigenous species (SIS) of fishes and socio-economic condition of fishers in two beels off rice fields. An M.S. Thesis, Department of Fisheries Management, BAU, Mymensingh, pp. 84-104.

Hossain M (1998). A preliminary survey on the fisheries and socio-econmic conditions of fishermen of the old Bramaputra river. M. Sc. Thesis, Department of Fisheries Management, BAU, Mymensingh, 95 p.

Hughes R, Adnan S and Dalal-Clayton B (1994). Floodplains or flood plans? International Institute for Environment and Development and Research and Advisory services, London.

Karim MM (2004). Community based fishing activities and socio-economic status offishermen in Dhamharail beel under Kapasia upazila of Gazipur District. M.S. Thesis, Department of Fisheries Management, BAU, Mymensingh, pp. 41-55.

Miah MAR (2004). Study on the community based fish catch assessment of Savar Khagorvaria Zolkor beel in Pabna district. M.S. Thesis, Department of Fisheries Management, BAU, Mymensingh, pp. 28-50.

Paul SK, Rahman S, Razzaque A and Chakraborty B (1993). Gear selectivity of the floodplains. Progress Report. Fisheries research Institute, TFP. Santahar, Bogra.

Rabbani MG (2007). Study on the Fisheries and socio-economic condition of fishermen of Kareatoa river. M.S. Thesis, Department of Fisheries Management, Bangladesh Agricultural University, Mymensingh, 85 p.

Shahjahan M (2000). Studies on the Fisheries and Socio-economic status of Fishermen of the Jamuna River. M. S. Thesis, Department of Fisheries Management, Bangladesh Agricultural University, Mymensingh, 93 p.