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Fish Catch Assessment of Maljhee-Kangsa Floodplain in Bangladesh

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Abstract: A study was conducted to assess fish catch in the Baila beel of Maljhee-Kangsa floodplain in the north-central part of Bangladesh. A total of 7 types of fishing gear were found in use by the fishermen which are: push net, gill net, cast net, lift net, current net, fish traps and hooks. The duration of fishing depends on use of fishing gear, season, habitat type, water depth and abundance of fishes. From the survey it was found that the highest average fishing time was estimated in fish trap (18.04 h/day) and the lowest in push net (3.21 h/day). There are variations in the Catch Per Unit of Effort (CPUE) of different gears in different seasons. The highest and the lowest CPUE were recorded in current net and hook which were 0.31 and 0.02 kg/gear/h, respectively. According to the fishermen, the highest catch was obtained during the receding of floodwater in post-monsoon season (October-December) and the lowest during the pre-monsoon season (April-June). A total of 39 fish species were identified in the catches of different gears. From the survey it was found that a fisherman daily catches an average 1.43 kg of fish. Alarmingly, the catch of fish has declined by an estimated 20% in the past five years. Concerns arise about the sustainable catches due to over fishing and indiscriminate use of gears. It is therefore necessary to provide institutional and organisational supports for artificial stocking and establishing fish sanctuaries through active community participation for sustainable catches.

Key words: Fish, catch, gear, floodplain

INTRODUCTION

Bangladesh is a country with vast floodplains[1]. The floodplains of Bangladesh form one of the world's most important wetlands[2]. These wetlands provide habitats to hundreds of unique fish, plants, birds and other wildlife species and most importantly, a source of income for millions of the rural poor[3]. The floodplain provides habitat in the form of feeding, breeding and nursery ground for a wide range of wildlife including fish[4]. However, there has been a gradual decline in the production of fish from the floodplains over the last two decades due to the reduction of wetlands and biodiversity, over fishing, siltation and management problem[5]. Over exploitation of floodplains poses a threat to maintaining the natural function of this unique, dynamic and productive environment, which is an important reservoir for aquatic biodiversity[6].

Despite the destruction of floodplain ecosystem, a number of floodplains still exist in Bangladesh. Among them Maljhee-Kangsa floodplain is one of the most important ecosystem where the livelihoods of a large number of rural poor are associated with its fisheries activities[7]. This floodplain fishery plays a very important role in 'cushioning rural poverty and supplying food to the poor'. Hence, it is essential that this resource to be managed sustainably.

However, to sustaining livelihoods of the rural poor in the Maljhee-Kangsa floodplain, a major constraint for the management and conservation of aquatic biodiversity and environment is the lack of awareness of the local community[8]. In addition, the absence of quality information on fish catch is a serious threat to sustaining aquatic resources and hence undermines sustainable development and food-security for the rural poor[9]. Therefore, it is important to know the fish catch in the Maljhee-Kangsa floodplain for management and conservation of aquatic biodiversity and environment.

MATERIALS AND METHODS

Study area: The study area was the Baila beel (i.e., beel refers to a seasonal floodplain), which is one of the most important wetlands, lies at the Maljhee-Kangsa floodplain

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in Sherpur district, north-central Bangladesh. The Baila beel is estimated to cover an area of 44.1 ha. This water body is famous for its rich reserve of aquatic life. Most of the year it remains under water and drying out only a few months. From the month of June to October it remains inundated with flood water to a depth of up to 2 to 3 m. At the end of October, the flood water starts to recede and by the end of December the entire area becomes dry, except for some natural deep pockets. A large number of people live in the beel area, whose livelihoods, culture and daily activities are related and adapted to its aquatic environment.

Data collection methods: The study was conducted for six months from July 2003 to December 2003. A combination of the following survey techniques were used for data collection:

Questionnaire interviews: For questionnaire interviews, 50 fishermen were selected in the study area through simple random sampling method. Fishermen were interviewed at home and/or fishing sites. In a given day approximately 8 to 10 interviews were conducted, where each interview required about an hour. The interview schedule for fishermen was addressed the issue of fishing activities, fishing effort, duration of fishing, fish catch and their socio-economic condition.

Participatory Rural Appraisal (PRA): PRA is a group of methods to collect information from rural communities in a participatory fashion[10]. The advantage of PRA over other methods is that it allows wider participation of the community. The information collected is likely to be more accurate. For this study, PRA tool such as Focus Group Discussion (FGD) was conducted with fishermen in the study area. A total of 10 FGD sessions were conducted where each group size of FGD was 6 to 12 fishermen. FGD sessions were held on front of village shops, under the big trees and fishermen's houses wherever there were spontaneous gatherings and where participants can sit, feel comfortable and are easily observed. FGD sessions were conducted to get an overview of fishing activities, using of fishing gear, duration of fishing and catch composition in the study area.

Data processing and analysis: Data from various sources were coded and entered into a database system using Microsoft Excel software. Preliminary data sheets were compared with the original coding sheets to ensure the accuracy of the data entered. At each stage of survey, data were checked up, editing and coding at the field-level. Statistical method such as Statistical Package for Social Science (SPSS) was used to analyze the data. Data were summarized using descriptive statistics.

RESULTS AND DISCUSSION

Types of fishermen: A large number of people are known to be engaged in fishing in the Baila beel . There are four villages around the beel and large part of the population is dependent on fishing. Boats are the main transport during monsoon and fishing is the main activity of the people, though a few are involved in snail harvesting and rice cultivation in the dry season. The number of fishermen varies in different season. The highest number of fishermen was found during the post-monsoon season and the lowest was found during the pre-monsoon (Table 1).

Fishing gear: Various types of fishing gear were found to operate in the Baila beel where most of the gears were traditional and few of them were unique. From the survey a total of 7 types of gear were recorded operational in beel area, these are: push net, gill net, cast net, lift net, current net, fish traps and hooks. According to the mode of operation, all of the above gears were classified into three groups, such as: nets, traps and wounding gears. Besides, dewatering and handpicking were also done by the fishermen.

Fishing effort: Most of the areas of the Baila beel were to remain dry during the dry season from January to March. During this period the use of any type of gear was very limited. As soon as the monsoon rain comes down and water level increased the use of all types of gears also increased simultaneously. Due to the vastness of water bodies, gears were operated more frequently during the monsoon (July-September). When the water level started to decrease during the post-monsoon period (October - December) the number of gears also increased due to abundance of fishes (Table 2).

Duration of fishing: The duration of fishing depends on fishing gears, season, habitat type, water depth and abundance of fishes. Table 3 shows that the highest average fishing time was estimated in fish trap (13.47 h/day) followed by hook (11.87 h/day), current net (7.26 h/day), gill net (4.75 h/day), lift net (4.71 h/day), cast net (3.78 h/day) and push net (3.21 h/day).

Catch per Unit of Effort (CPUE): The CPUE was calculated as catch in kilograms per gear per hour (kg/gear/h). There are variations in the CPUE of different gears in different season. Table 4 shows that the highest

Table 1: Types of fishermen (number/day) involve in fishing in different season at the Baila beel

Fishing season	Professional Fishermen	Seasonal Fishermen	Subsistence Fishermen	Total
Dry (January-March)	23 (64%)	8 (22%)	5 (14%)	36 (100%)
Pre-monsoon (April-June)	15 (79%)	1 (5%)	3 (16%)	19 (100%)
Monsoon (July-September)	22 (52%)	12 (29%)	8 (19%)	42 (100%)
Post-monsoon (Oct-Dec)	32 (44%)	18 (25%)	22 (31%)	72 (100%)

Source: Survey data (2003)

Table 2: Fishing effort (number of gear/day) by season in the Baila beel

Fishing season	Push net	Gill net	Cast net	Lift net	Current net	Trap	Hook
Dry (Jan-March)	6	1	6	3	2	23	47
Pre-monsoon (Apr-Jun)	4	3	9	5	4	45	55
Monsoon (July-Sept)	7	5	7	7	6	51	68
Post-monsoon (Oct-Dec)	10	3	10	6	3	72	98
Average in all season	6.75	3.0	8.0	5.25	3.75	47.75	67.0

Source: Survey data (2003)

Table 3: Average fishing duration (h/day) by gear and season in the Baila beel

Fishing season	Push net	Gill net	Cast net	Lift net	Current net	Trap	Hook
Dry (Jan-March)	2.84	4.12	2.50	4.36	5.56	8.08	8.60
Pre-monsoon (Apr-Jun)	3.06	4.53	3.86	4.60	6.48	16.12	12.17
Monsoon (July-Sept)	3.20	5.74	4.35	5.24	9.43	18.40	16.45
Post-monsoon (Oct-Dec)	3.75	4.61	4.44	4.62	7.57	11.29	10.26
Average in all season	3.21	4.75	3.78	4.71	7.26	13.47	11.87

Source: Survey data (2003)

Table 4: Catch per unit of effort (kg/gear/h) by season in the Baila beel

Fishing season	Push net	Gill net	Cast net	Lift net	Current net	Trap	Hook
Dry (Jan-March)	0.15	0.21	0.18	0.22	0.21	0.03	0.017
Pre-monsoon (Apr-Jun)	0.12	0.18	0.12	0.26	0.26	0.06	0.015
Monsoon (July-Sept)	0.18	0.35	0.24	0.32	0.37	0.09	0.025
Post-monsoon (Oct-Dec)	0.26	0.28	0.29	0.34	0.38	0.07	0.023
Average in all season	0.18	0.26	0.21	0.29	0.31	0.06	0.02

Source: Survey data (2003)

and the lowest average CPUE were recorded in current net and hook which were 0.31 and 0.02 kg/gear/h, respectively. Findings reveal that CPUE was highest during the post-monsoon season and the lowest during the pre-monsoon season.

Catch per fisherman: Fish catch rates are highly seasonal and are related to the flood and water level. From the survey, it was found that a fisherman daily catches an average 1.4 kg (range 0.5-4.5 kg) of fish. According to the fishermen, the highest catch was obtained during the receding of floodwater in the month of October and the lowest in April, when the water level in the beel was at its lowest level. Almost all fishermen concerned at declined fish catches in the Baila beel . Alarmingly, the catch of fish has declined by an estimated 20% in the past five years. Respondents noted that earnings have also decreased, due to declining availability of fish in the beel area.

Species composition: A total of 39 fish species were recorded in the Baila beel . Among the 39 species, small indigenous species was found to be the most dominant (40.42%) (Table 5).

Income from fishing: Increasing population pressures may aggravate the problem of meager incomes of fishermen. According to the survey, the average daily

Table 5: List of fish species and catch composition (%) in the Baila beel

SL No.	Local name	Scientific name	%
Indian major carps (1.76%)			
1	Rui	*Labeo rohita*	0.48
2	Catla	*Catla catla*	0.42
3	Mrigal	*Cirrhinus mrigala*	0.63
4	Kalbasu	*Labeo calbasu*	0.23
Minor carps (0.71%)			
5	Bata	*Labeo bata*	0.71
Exotic carps (0.66%)			
6	Common Carp	*Cyprinus carpio*	0.13
7	Silver Carp	*Hypophthalmichthys molitrix*	0.32
8	Grass Carp	*Ctenopharyngodon idellus*	0.21
Catfish (15.44%)			
9	Shing	*Heteropneustes fossilis*	1.76
10	Magur	*Clarius batrachus*	1.59
11	Pabda	*Ompok pabda*	1.88
12	Tengra	*Mystus vittatus*	2.54
13	Gulsa	*Mystus cavasius*	2.92
14	Boal	*Wallago attu*	2.02
15	Air	*Mystur aor*	2.73
Snakeheads (8.55%)			
16	Taki	*Channa punctatus*	4.71
17	Cheng	*Channa gachua*	3.84
Small indigenous Species (40.42%)			
18	Sepchela	*Chela laubuca*	1.39
19	Dhela	*Rohtee cotio*	3.05
20	Mola	*Amblypharyngodon mola*	3.17
21	Darkina	*Esomus danricus*	3.35
22	Vheda	*Nandus nandus*	3.69
23	Tit Puti	*Puntius ticto*	4.09
24	Puti	*Puntius stigma*	4.15
25	Jat Puti	*Puntius sophore*	4.01
26	Lamba Chanda	*Chanda nama*	3.19
27	Ranga Chanda	*Chanda ranga*	2.16
28	Bele	*Glossogobius giuris*	4.39
29	Rani	*Botia dario*	1.28
30	Kakila	*Xenentodon cancila*	1.43
31	Gutum	*Lepiodocephalus guntea*	1.07
Climbing Perches (5.55%)			
32	Koi	*Anabas testudineus*	2.17
33	Khalisha	*Colisa fasciatus*	2.32
34	Chuna Khalisha	*Colisa laboisa*	1.06
Eels (3.61%)			
35	Guchi Baim	*Mastacembelus pancalus*	1.24
36	Boro Baim	*Mastacembelus armatus*	1.17
37	Tara Baim	*Mastacembelus aculeatus*	1.20
Prawn (23.30%)			
38	Golda Chingree	*Macrobrachium rosenbergii*	2.05
39	Echa	*Macrobrachium lamrrei*	21.25

income of a fisherman was calculated at Tk 55 (US$ 0.92) from fishing. From those interviewed, 44 (88%) fishermen stated that their daily income was between Tk 45 and 70 (US$ 0.75 and 1.25) and the rest (12%) were less than Tk 45 (US$ 0.75). However, their income varies with fishing season, use of gear and the market price of fish. According to the fishermen, a few years ago they earned more money than they earn now. They also claimed that their income had decreased over the last few years, which they attributed to due to high fishing pressure.

Living conditions of fishermen families are extremely poor, although a few local NGOs have been working with them to improve their conditions by providing loans, support, training and technical assistance. Most fishermen noted that their families could not have three times meals a day. Hannan[11] stated that fishermen lived from hand to mouth and were a highly neglected class in both Muslim and Hindu society in Bangladesh. According to Hotta[12], the rapid population increase in fishermen communities and limited alternative employment opportunities have made the life of fishermen even more difficult. The results of the present survey appear to confirm this continuing level of disadvantage.

Constraints of fishermen: Constraints associated with over-population, low incomes, poor education, low economic status and lack of alternative employment opportunities are common amongst fishermen communities. Fishing families specifically face problems of children's education, cooking fuel, animal feed and house building materials. These factors in turn may affect poor resources in that there are few options available except to exploit fish. Almost all respondents claimed lack of capital to be their biggest problem, others including sanitary problem, poor medical facilities and lack of fresh drinking water due to poor tube-well facilities.

It is concluded that fish catch and species diversity has significantly declined over the last few years. Alarmingly, the catch of fish has declined by an estimated 20% in the past five years. As a result earnings of fishermen have also declined. The fish catch from this beel are assumed to be declining due to the over fishing and indiscriminate use of gears. In addition, there is no management policy for this beel. Therefore some beel management policies should be adopted for sustainable catches. Recommendations are made for sustainable catches and conservation of aquatic biodiversity through fisheries enhancement by I) artificial stocking, ii) construction of fish sanctuaries and iii) active community participation.

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