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Landing Pattern of Fish in Open Water Fisheries Projects of Cumilla, Bangladesh

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Abstract: The present study explains fish species diversity, landing quality and catch composition in Daudkandi Floodplain Fisheries (DFPF) from January to December 2019. Seine nets were used to harvest 26 species in ten fishery projects in two tiers, from February to July and August to January. The total catchment area was 748.08 ha. Maximum water depth (4.5±2.48 feet in August - October) was recorded in Satgram Fisheries, while minimum (2.28±1.32 feet in April - May) in L.K.S Fisheries. The most dominant fish family was cyprinidae with 10 species and major carps were the highest in species richness. Pankouree Fisheries had the highest fish landing, followed by Chargram, Goureepur, Khirai, Mitali, Prosanto, Shatgram, Shanto and Shaibal Fisheries. Goureepur Fisheries obtained the highest catch (7709.12 kg/ha) in terms of unit area production. Perches were the highest volume landed followed by carps. The total fish landing was increased by 18.56% in 2019, compared to the previous year, while project-wise performance, Pankouri (-31.58%), Shaibal (-26.95%) and Shanto (-20.98%). Fisheries showed decreased landing. Fish quality was very good since mostly live fish were landed and transported. Because of uniqueness as community enterprise management, wild fish landing and prime quality of fish, the DFPF deserves continuous research and development emphasis.

Key words: Daudkandi Floodplain Fisheries · Fish Landing · Biodiversity · Live Fish Quality

INTRODUCTION

Bangladesh is ranked 5th in the world in aquaculture production and 4th in inland fisheries production, while it is 3rd in Asia, accounting a total production of 42.77 lakh MT (Metric tonnes) in 2017-18. Of these, about 84.69% comes from freshwater fisheries and aquaculture and the rest are from marine sources. Fisheries contributes about 3.57% to GDP and 25.30% to agricultural GDP. Fish supplements to about 62.58 g/day against set target of 60 g/day [1]. This sector also has high potential for the perspective of agro-economic development of the country. Bangladesh earns a considerable amount of foreign currencies by exporting fish, shrimps and other fisheries products. However, there are rooms to further booming up freshwater production through increasing productivity and introducing traditional to semi-intensive aquaculture in inland floodplain areas. On the other hand, around 2.8 million hectors of floodplains and low-lying areas including haors are mostly untapped with a natural productivity of less than 311 kg/ha/year [2]. Traditional aquaculture has only been started in floodplain areas in the form of community-based fishery [3]. However, floodplain fisheries are multifaceted, dynamic and important. Most of the population living around the floodplains exploit the rich and productive multi-species groupings in the water body for nutritive source and income on a seasonal basis, associated agricultural activities [4]. Which in turn, altered into community enterprise accomplished by a group of community operators (leasers), while shares of leased money distributed to the shareholders. Under such community enterprise development, present fish production will be multifold indeed, if the entire floodplains are brought under aquaculture. The DFPF are seasonal in nature and formed by submerging large or small areas of lands during the monsoon. Each of these water-bodies, in the majority of cases, brings privately owned lands of different landowners within it by flooding them and turns them into a single continuous resource system by

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practically making the boundaries among the lands unrecognizable and unusable. Therefore, no single landowner legally and practically exercises property rights over a whole floodplain water-body. This reality makes floodplain water-bodies open for surrounding community members and, as the landowners had no collective aquaculture management system, until recently these water-bodies remained as sources of capture fish, rather than cultured fish. The management system of floodplain in Daudkandi later gained popularity as community fishery/aquaculture enterprise nationally [5]. In course of time, thousands of farmers have got involved with this new approach. In 2009, the seven floodplain projects produced about 1168 tons of fish from about 601 ha, with an average fish production of 1.942 tonnes/ha [6]. In the whole DFPF projects about 46, 000 MT of cultured and captured fishes were landed from a 47, 000 ha water area, along with 92 aquaculture projects [7]. That feed a good number of consumers of Dhaka, Chittagong and other big cities. Floodplain aquaculture projects in Daudkandi also claim their activities with having a positive effect on wild fish stocks increment and environmental protection. But there was no published document or valid record of wild fish harvest or catch increment in DFPF projects. Wild fish stocks may be recruited from the nature through sluice gate and be benefited from the feed and fertilizer applied, where predominance of indigenous and exotic carp species was mostly recorded [8]. Floodplain aquaculture practice in Daudkandi areas has occurred as an advanced approach of aquaculture compare to the traditional practices, which ensures community participation through a well-set organization with possible best use of local resources [9]. Recent research also notably shows that each of the projects have their own particular fish landing station or spots which are associated with well-organized documented project office. However, DFPF projects may make a significant contribution to nutrition, fish diversity, community people, environment, cropping pattern and food production and livelihood of fisher's community from both cultured and naturally recruited species. Therefore, it would be worthy to conduct scientific investigation on catch composition, annual productions and biodiversity of fishes in the DFPF projects. With these aims, ten selected DFPF projects were investigated for one year during the present investigation.

MATERIALS AND METHODS

Study Area and Duration: The study was conducted in ten landing spots of ten DFPF projects (Khirai, Chargram, Prasanto, L. K. S, Shanto, Shatgram, Pankouree, Mitali, Shaibal and Goureepur fisheries limited) at Daudkandi Upazila of Cumilla district for a period of 12 months from

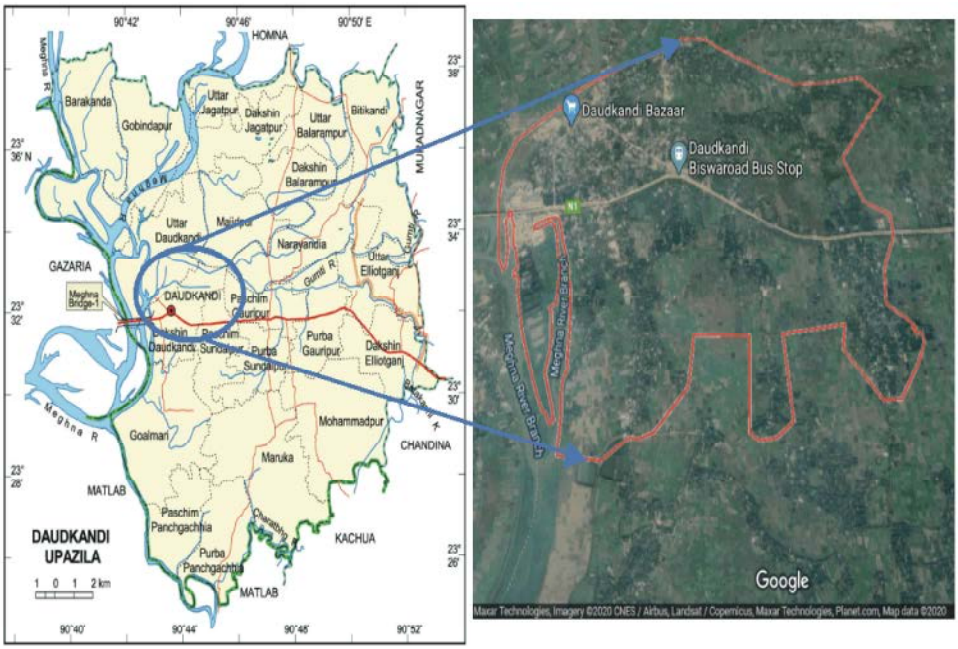

Fig. 1: Maps of the Daudkandi upazila in Cumilla district showing sampling area- depressions in Google map are the floodplains of mighty Meghna River

January 2018 to December 2019. Daudkandi Upazila is 61.6 kilometers away from Dhaka city and the geographical location of the study area is 23.5333°N latitudes and 90.7167°E longitudes. All DFPF projects had their own office and landing center associated with their cultured water body. Different DFPF have different catchment area and they have different shareholders and fishers (Table 2).

Methods of Data Collection: The study was based on the collection of primary and secondary data. Primary data were collected from 100 randomly selected stakeholders through questionnaire interviews, focus group discussion with intermediaries, cross-check interviews with key informants and direct catch data from landing spots. A well-structured questionnaire form was developed through rigorous process of drafting, editing, fine-tuning, expert-sharing, pre-testing and final field validation. Secondary data were collected from the DFPF projects record books, Upazila Fisheries Office, District Fisheries Office, books, journals, reports and NGOs.

Catch per Unit Effort Data: The fishes in the fisheries projects were caught by only seine nets. Catch and effort data were analyzed to calculate catch per unit effort (CPUE) of the year using Gunarso and Wiyono's [10] formula, as applied by Jatmiko *et al.* [11].

$$CPUE = Ci/Ei$$

where, CPUE is catch per unit effort (tonnes or kg/unit), Ci is caught in the year (tonnes or kg), Ei is effort in year (how many trips of fishing).

Data Analysis: All the collected data were accumulated in Excel sheet and analyzed by Microsoft Excel 2010 and Statistical Package for the Social Sciences (SPSS Inc. version 20.0). Most acceptable data were transferred to a master sheet from which classified tables were prepared to reveal the findings of the study and then presented in textual, tabular and graphical forms for easy understanding of present findings.

RESULTS AND DISCUSSIONS

Status of Gear Used in DFPF: The fish were captured by only seine nets (*Ber Jal*) in all ten fisheries projects. Since the fishes were kept and landed live, the quality of fish was excellent and highly acceptable when analyzed. Moreover, most of the large fishes (carps of all types, cat fishes, snakeheads, etc) were kept alive for long and transported to the markets live. In that perspective also, fish caught in DFPF areas were very good in quality. Because of mostly live fish landed and transported, the fish quality assessment data are not shown here. The same *seine nets* were used in two tiers: one from February to July with 100% frequency of utilization and other from August to January with 50% reduced frequencies in all fisheries projects, the frequency of net used is shown in Figure 2. A total of 26 fish species were caught by the nets from the 10 projects during the study period. Fish caught by large *seine net* was studied by many authors. Rubel *et al.* [12] found 26 fish species of fish caught by *ber jal* in Lohalia River. Ali *et al.* [13] recorded the highest use of seine net in Ramnabad River. Seine nets were found to be effective in catching fish in big water bodies while fish also could be kept alive in water under deck of the boat [13]. On the other hand, it was observed that the live fish could be accumulated and kept for several days at the corner of the water body by fencing with net and could be able to sell live as per market need for several days to weeks together. It is worthwhile to mention that, due to such types of harvest in project areas by seine netting, live fish transport and marketing have been very popular in Daudkandi, Cumilla and Chittagong regions. In DFPF projects, maximum fishes were transported live to the markets using vehicles installed with fish tank and other facilities, where oxygen circulation by cylinder and oxygen tablets were used. Present study found that, a total of 98% of fish were transported in live condition and the rest were in iced condition, those were mainly small fishes, featherbacks, etc. (Figure 3).

Catch per Unit Effort (CPUE): Catch and effort data were analyzed to calculate catch per unit effort (CPUE) of used seine nets per year using Gunarso and Wiyono [10] formula; applied by Jatmiko *et al.* [11] where they also used the formula for purse seine, gill net, hand lines and troll lines in Bali Province of Indonesia, the result of present data being given in Table 1. Each of the fishery project had 12 hours of fishing/day and fishing effort was one (1) time/day using same mesh size (0.508-1.25 cm.) and length (160m. to 180m.) of *seine net* in each of the project. Annual fishing day varied from 45-80 days in the projects.

From the Table 1, highest catch composition was found in Pankouree Fisheries followed by Chargram, Goureepur, Khirai, L.K.S, Mitali, Shatgram, Prasanto, Shanto and Shaibal Fisheries. Rahman *et al.* [14] found highest catch composition of 13 kg/day for *current jal*

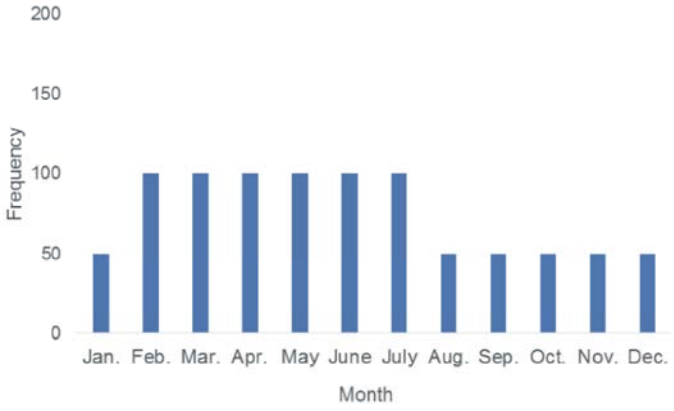

Fig. 2: Frequency of seine net used in different months in selected DFPF projects

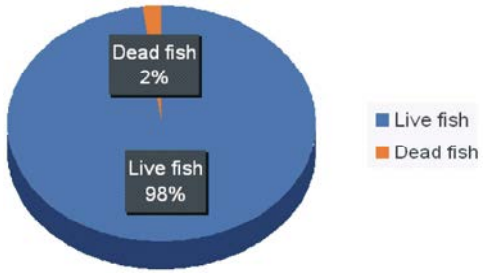

Fig. 3: Fish transportation in the study area

Table 1: Catch per unit effort (CPUE) of *seine nets* in the study area

DFPF Projects	Catchment area (Ha)	Fishing day/year*	*Fishing hour/year (fishing effort)	Total fish landing (MT) 2019	CPUE (Kg/ha/hour/year)
Khirai Fisheries Ltd	60.72	75	900	463.74±94.23	515.26
Chargram Fisheries Ltd	97.16	80	960	614.95±71.87	640.57
Prasanto Fisheries Ltd	121.45	85	1020	438.291±89.26	429.69
L. K. S Fisheries Ltd	54.66	65	780	374.445±85.44	480.05
Shanto Fisheries Ltd	72.87	80	960	410.906±114.88	428.02
Shatgram Fisheries Ltd	66.80	75	900	413.925±88.66	459.91
Pankouree Fisheries Ltd	88.60	80	960	629.38±130.71	655.60
Mitali Fisheries Ltd	88.66	80	960	444.578±88.72	463.09
Shaibal Fisheries Ltd	36.44	45	540	116.881±26.01	216.44
Goureepur Fisheries Ltd	60.72	70	840	468.098±65.02	557.25

*Each of the fishery project had 12 hours of fishing/day and fishing effort was one (1) time/day using same mesh size (0.508-1.27 Cm.) and length (160m. to 180m.) of *seine net* in each of the project. Annual fishing day varied from 45-80 days in the project

and 12.5 kg/day *Jagat ber jal* (seine net) in Kajal River. Sayeed *et al.* [15] observed the CPUE from different fishing gears including seine nets in Chalan Beel of Bangladesh. Ahmed [16] recorded the CPUE of different fishing gears in Titas river ranged from 0.95 to 15.25 kg unit/1 day. All of the referred data on CPUE were however lower than the present findings shown in Table 1.

Water Depth of Fishery Project: The water depth of DFPF projects is summarized in Figure 4 and 5. The average depth of water at different fisheries projects varied from 2.28±1.32 to 4.5±2.48 feet. Among 10 fisheries projects, the minimum water depth varied from 2.28±1.32 feet in LKS Fisheries project to 3.1±1.71 feet in Goureepur Fisheries, while the maximum depth of water varied from 3.39±2.16 feet in LKS Fisheries to 4.5±2.48 feet in Satgram Fisheries in August, September and October (Figure 4). Nuruzzaman [6] recorded maximum water depth of 1.0 m (3.28 ft) for Aman rice production in the same fisheries projects in 2010, which are mostly similar to our present study. April and May are water-scare months in the study area, while the land owners use floodplain lands for rice

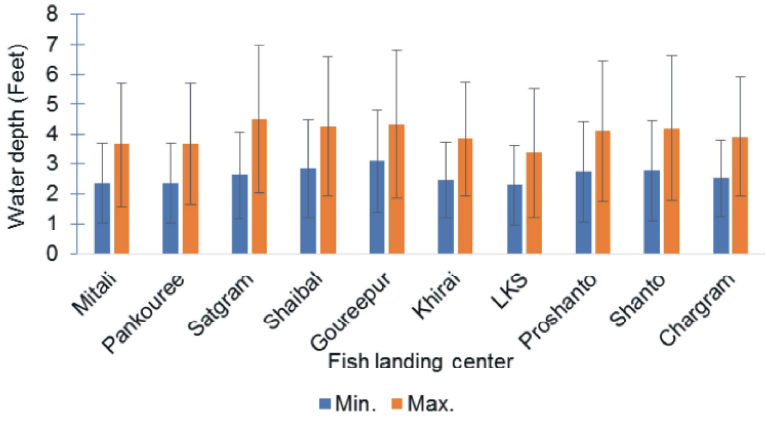

Fig. 4: Water depth of DFPF project

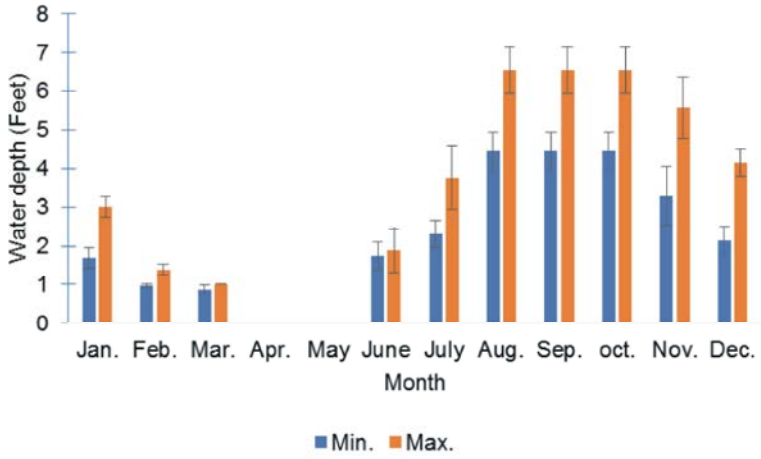

Fig. 5: Water depth of DFPF projects in different month

and other crops cultivation. In July to October, flood water associated with rain increase the water depth and make the depression useful for fish cultivation (Figure 5). As can be seen in Figure 5, August, September and October were the peak in water depth, which was also the best for seasonal fish culture. Craig *et al.* [4] and Beazley [17] also suggested June to October for best season for fish culture in submerged water body in seasonal floodplains in Bangladesh.

Landing of Fish in the Study Area: A total of 4375.194 MT of fish was landed in 2019 in 10 studied fisheries projects, while it was 3690 MT in the previous year (2018), according to DFPF projects office records. There is no published record or study report that showed any fish landing statistics of DFPF. Therefore, it was not possible to compare the present findings with any dependable previous sources except only with project record books. A total of 18.56% production increment compared to previous year was calculated. Among the 10 fisheries projects, most of the projects landed increased quantity of fish in 2019, except Shanto, Pankouree and Shaibal Fisheries (Table 2). Goureepur Fisheries obtained the highest production (7709.12 kg/ha) in terms of unit area production, followed by Khirai (7637.35 kg/ha), Pankouree (7103.61 kg/Ha), L.K.S (6850.34 kg/ha), Chargram (6329.25 kg/ha), Shatgram (6196.48 kg/ha), Shanto (5638.89 kg/ha), Mitali (5017.81 kg/ha), Prasanto (3608.81 kg/ha) and Shaibal (3207.49 kg/ha) (Table 2). All of the above data, in terms of unit area production, were much higher than the country average data [1] or others obtained by Chandra *et al.* [1]. Chandra *et al.* [1] noted that floodplain productivity tended to be somewhat higher and, in some cases, had been high as 6000 kg/ha, which are in agreement of our present findings. Major carps and exotic carps were the highest in the DFPF landings, as observed during our present study (Table 3). Majumdar *et al.* [18]

Table 2: Fish landing/production in DFPF projects

DFPF Projects	Catchment area (Ha)	Share holders	Fishers	No. of Fish/fry release/ha	Ice Factory	Total fish landing (MT) 2018*	Total fish landing (MT) 2019	Production/Landing /Kg/Ha	% increase
Khirai Fisheries Ltd	60.72	779	21	47831	1	450	463.74±94.23	7637.35	3.05
Chargram Fisheries Ltd	97.16	621	20	48268	1	460	614.95±71.87	6329.25	33.67
Prasanto Fisheries Ltd	121.45	625	21	42131	0	420	438.291±89.26	3608.81	4.35
L.K.S Fisheries Ltd	54.66	498	20	35460	0	200	374.445±85.44	6850.34	87.22
Shanto Fisheries Ltd	72.87	612	21	36094	0	520	410.906±114.88	5638.89	-20.98
Shatgram Fisheries Ltd	66.80	1221	19	35171	0	0	413.925±88.66	6196.48	413.92
Pankouree Fisheries Ltd	88.60	418	21	53745	1	920	629.38±130.71	7103.61	-31.58
Mitali Fisheries Ltd	88.66	335	20	43050	0	240	444.578±88.72	5017.81	85.24
Shaibal Fisheries Ltd	36.44	250	19	16482	1	160	116.881±26.01	3207.49	-26.95
Goureepur Fisheries Ltd	60.72	220	22	48243	0	320	468.098±65.02	7709.12	46.27
Total	748.08	5579	204	406475	4	3690	4375.19±867.98	59299.15	18.56

*2018 fish landing/production data were obtained from interview and project record book

*Only featherback and some other minor species were died and iced for marketing

Table 3: Category-wise annual landing of fish (MT) in DFPF projects

Category	Khirai	LKS	Proshanto	Shanto	Chargram	Mitali	Pankouree	Satgram	Shaibal	Goureepur	Total
Carps	189.65±17.68	134.72±11.68	176.57±13.77	195.89±18.55	224.62±20.66	177.41±16.56	266.71±25.38	183.76±14.98	54.79±4.5	166.88±13.76	1771±55.48
Catfish	17.78±5.08	20.48±6.59	22.39±6.25	16.58±4.57	60.88±14.36	24.27±7.71	29.72±9.9	9.06±1.5	2.46±0.4	69.56±18.15	273.17±21.48
Snakeheads	19.55±9.0	22.3±10.6	7.67±2.09	12.73±4.58	24.75±11.91	20.77±9.33	15.91±6.61	9.41±3.35	1.85±0.42	11.84±4.36	146.78±7.27
Featherbacks	0.03±0.02	0.02±0.01	0.03±0.02	0.02±0.01	0.03±0.02	0.09±0.01	0.03±0.02	0.13±0.02	0.01±0.007	0.05±0.03	0.42±0.04
Eel	0.01±0	0.005±0.001	0.015±0.004	0.015±0.004	0.023±0.005	0.018±0.001	0.018±0.001	0.032±0.006	0.02±0	0.047±0.002	0.203±0.01
Perches	216.65±151.03	177.74±123.7	207.18±143.17	169.89±117.13	278.9±194.04	206.56±142.98	293.77±204.71	193.52±133.11	54.7±36.77	198±134.53	1996.91±64.94
Barbs and minnow	20.08	19.2	24.46	15.78	25.76	15.47	23.23	18.05	3.07	21.74	186.84±6.49

recorded exotic carp was the highest in production in floodplain. But in our study, we found exotic carps as the second highest of production (Table 3). It indicates that quantity of fry release of exotic carps has been decreased now-a-days owing to their decreased demand in the market compared to major carps, since the price of major carp species are now in affordable range. Production of fish might increase due to the artificial feed provided and also for natural feed source from vast waterbody. Floodplains are the food-rich breeding, nursery as well as growth areas for fish and interconnected areas of habitat provide ample opportunities for recruitment, migration, feeding and growth [19]. According to DoF [8] in 2007, a total of 92 aquaculture projects in Daudkandi floodplain produced only 8, 000 MT fish. Whereas, in the present study, we found a significantly increased production in only 10 fisheries projects. Nuruzzaman [6] recorded that exotic species had the bulk of production in DFPFs, which is in good agreement of our present data.

Species Richness of Fish in Study Area: A total 26 fish species were recorded in DFPF projects during the study period (Table 4). Category wised annual fish landing were shown in the Table 4 and percentage of fish species richness on the basis of fish family (a) and category (b) were summarized in the Figure 6. The highest number of species (10) found under the family Cyprinidae and its contribution was 38% (Figure 6). Which is almost similar to that recorded by Hasan *et al.* [20] where they studied biodiversity of fish in Kishoreganj floodplain area. Second highest number of fish was found under the family Channidae. Nuruzzaman [6] found 25-30 wild fish species in the Daudkandi floodplain fisheries projects in 2010. Almost similar findings were recorded in our study too. Both cultured and naturally recruited fish species were found in the present studied area, which yields a total of 26 different fish species which are in agreements with Chandra *et al.* [9] who recorded 27 fish species at Daudkandi floodplains. In the present study, we found 3 species under Channidae and 2 species Mastacembelidae, whereas 4 species of Channidae and 3 species of eel were found by Hasan *et al.* [20] in natural Naoli beel and Kalai beel at Kishoreganj haor. Suravi *et al.* [21] studied fish diversity of Dekar haor in Sunamganj, where they found 8 species of carps, 4 snakeheads, 3 eels, 11 catfishes and 1 minnow. More or less similar species diversities were also recorded in our study (Table 4). A total of 15 species were deliberately released for culture, but rest of the 11 species were naturally recruited. Floodplain natural fish recruitment was also studied by Craig *et al.* [4].

Table 4 shows the species biodiversity recorded during the harvest of one year semi-culture in the protected DFPF project areas where only Indian major carps (*Labeo rohita*, *Gebelion catla*, *cirrhinus cirrhosis*), exotic carps (*Hypophthalmichthys molitrix*,

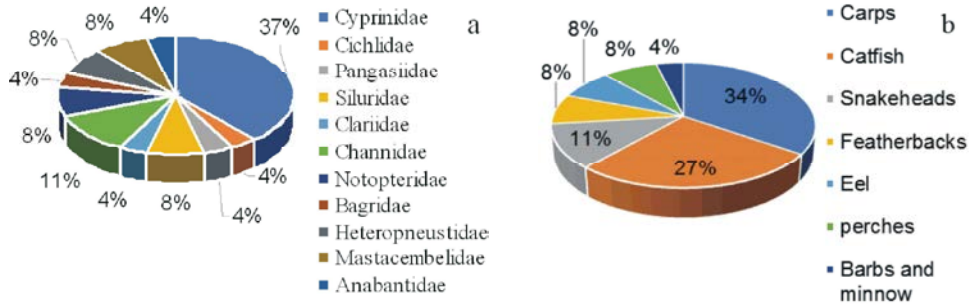

Fig. 6: Percentage of fish species richness on the basis of family (a) and category (b)

Table 4: Fish species diversity in selected DFPF projects

Local Name	Scientific name	Common/English name	Family name	Category
Rui	*Labeo rohita*	Indian major carp	Cyprinidae	Carps
Catla	*Gebelion catla*	Indian major carp		
Mrigal	*Cirrhinus cirrhosus*	Indian major carp		
Bighead carp	*Hypophthalmichthys nobilis*	Bighead carp		
Silver carp	*Hypophthalmichthys molitrix*	Silver carp		
Carfu	*Cyprinus carpio*	Common carp		
Bata	*Labeo bata*	Bata Labeo	Cyprinidae	
Black carp	*Mylopharyngodon piceus*	Black Chinese roach	Cyprinidae	
Grass carp	*Ctenopharyngodon idella*	Grass carp	Cyprinidae	
Sharpunti	*Puntius sarana*	Olive burb	Cyprinidae	Barbs and minnows
Baim	*Mastacembelus armatus*	Zig-zag eel	Mastacembelidae	Eel
Tara Baim	*Macrognathus aculeatus*	Lesser spiny eel		
Ayr	*Sperata aor*	Giant river-catfish	Bagridae	Catfish
Boal	*Wallago attu*	Helicopter catfish	Siluridae	
Shing	*Heteropneustes fossilis*	Stinging catfish	Heteropneustidae	
Pangus	*Pangasianodon hypophthalmus*	Yellowtail catfish	Pangasiidae	
Pabda	*Ompok pabda*	Pabda catfish	Siluridae	
Magur	*Clarias batrachus*	Walking catfish	Clariidae	
Shilong	*Silonia silondia*	Silond catfish	Schilbeidae	
Shol	*Channa striata*	Snakehead murrel	Channidae	Snakeheads
Gojar	*Channa marulius*	Great snakehead	Channidae	
Taki	*Channa punctata*	Spotted snakehead	Channidae	
Tilapia	*Oreochromis nilonticus*	Nile tilapia	Cichlidae	Perches
Koi	*Anabas testudineus*	Climbing perch	Anabantidae	
Chital	*Chitala chitala*	Clown knifefish	Notopteridae	Featherbacks
Foli	*Notopterus notopterus*	Brozen featherback	Notopteridae	

Ctenopharyngodon idella, *Hypophthalmichthys nobilis*, *Cyprinus carpio*) and some catfishes *Pangasianodon hypophthalmus, Heteropneustes fossilis clarias batrachus* and other fish like *Puntius sarana* and *Labeo bata* were stocked at different proportions in different project (Table 5). Different projects were stocked differently (Table 5). But it was seen that, in addition to stocked fingerlings of 10-15 species, a total of 26 fish species were captured at the close of fishing season under different projects. These included *Mastacembelus armatus*, *Macrognathus aculeatus*, *Wallago attu*, wild *Ompok pabda*, wild *Clarias batrachus*, wild *Heteropneustes fossilis*, *Silonia silondia*, *Channa striata*, *Channa marulius*, *Channa punctata*, *Chitala Chitala*, *Notopterus notopterus*, etc. Wild *Heteropneustes fossilis*, *Clarias batrachus* and *Anabas testudineus* could easily be identified from their size, shape and appearance. The catch size (volume of fish caught) of these fishes were also very significant (Table 3). So, it was evident that wild recruitments were going on in the DFPF, where a good number of endangered species (like *Silonia silondia*, *Notopterus notopterus*, *Channa marulius*, *Chitala chitala*, *Mastacembelus armatus*, *Macrognathus aculeatus* etc.) were protected through allowing flood waters to the projects and protecting fish from frequent harvest to allow them to grow up and release eggs for next year recruitment. Due to our intervention in the DFPFs, a portion of water in each project has now been

Table 5: Number of different fish fry released in different DFPFPs

			No. of fish fry or fingerling released/30 Decimals									
Category	Local Name	Scientific name	Khirai	Chargram	Proshanto	L.K.S	Shanto	Satgram	Pankouree	Mitali	Shaibal	Goureepur
Carps	Rui	*Labeo rohita*	60	70	60	50	50	90	90	60	40	60
	Catla	*Gebelion catla*	10	10	10	10	10	10	10	10	5	10
	Mrigal	*Cirrhinus cirrhosus*	80	105	90	75	75	-	100	60	10	90
	Bighead carp	*Hypophthalmichthys nobilis*	10	-	-	10	10	90	-	60	5	15
	Silver carp	*Hypophthalmichthys molitrix*	70	75	85	40	45	150	82	80	45	50
	Carfu	*Cyprinus carpio*	100	105	120	100	100	180	100	60	75	100
	Bata	*Labeo bata*	2700	2650	2200	1500	2000	1500	2850	2400	1200	2100
	Black carp	*Mylopharyngodon piceus*	7	5	5	-	7	5	6	15		7
	Grass carp	*Ctenopharyngodon idella*	45	-	-	10	40	45	7	8	10	100
Barbs and minnows	Sharpunti	*Puntius sarana*	900	1000	600	900	500	900	1290	1200	1	1500
Eel	Baim	*Mastacembelus armatus*	-	-	-	-	-	-	-	-	-	-
	Tara Baim	*Macrognathus aculeatus*	-	-	-	-	-	-	-	-	-	-
Catfish	Ayr	*Sperata aor*	15	15	15	15	10	10	5	10		15
	Boal	*Wallago attu*	-	-	-	-	-	-	-	-	-	-
	Shing	*Heteropneustes fossilis*	-	-	-	-	-	-	-	-	-	-
	Pangus	*Pangasianodon hypophthalmus*	10	25	20	15	30		5			10
	Pabda	*Ompok pabda*	-	-	-	-	-	-	-	-	-	-
	Magur	*Clarias batrachus*	-	-	-	-	-	90	-	60	10	-
	Shilong	*Silonia silondia*	-	-	-	-	-	-	-	-	-	-
Snakeheads	Shol	*Channa striata*	-	50	10	30	5	-	-	-	-	-
	Gojar	*Channa marulius*	-	-	-	-	-	-	-	-	-	-
	Taki	*Channa punctata*	-	-	-	-	-	-	-	-	-	-
Perches	Tilapia	*Oreochromis niloticus*	1800	1750	1900	1550	1500	1200	1980	1200	600	1800
	Koi	*Anabas testudineus*	-	-	-	-	-	-	-	-	-	-
Featherbacks	Chital	*Chitala chitala*	-	-	-	-	-	-	-	-	-	-
	Foli	*Notopterus notopterus*	-	-	-	-	-	-	-	-	-	-
Total species released/30 Dec.			5807	5860	5115	4305	4382	4270	6525	5223	2001	5857

kept undrained and undried, as a pit or ditch at the deeper center of the beel, to protect the valuable wild species for subsequent years' recruitments. These also helped in protection of biodiversity and natural recruitment phenomena.

CONCLUSIONS

The floodplain fishery was found to play a very important role in the protection of fisheries resources and biodiversity in the southeastern part of Bangladesh. Post-harvest quality of fish was excellent due to capture by only two seine nets and transportation and marketing made with live fish in most of the cases. The production of fish had been increased from the previous years in most of the projects. Many valuable wild fishes were found to be harvested in addition to stocked fishes. However, more adequate initiatives should be taken through new policy formulation for effective management of floodplain fisheries resources to allow more wild fish to take shelter, grow and recruit. NGOs role in floodplain fisheries should be streamlined and clearly defined and practiced to ensure reasonable benefits for the shareholders.

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