

<http://www.pjbs.org>

PJBS

ISSN 1028-8880

**Pakistan
Journal of Biological Sciences**

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Present Status of Fisheries in the Jamuna River

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Abstract: A field study was conducted on the hydrographic parameters, types of fishing gears used, catch assessment survey (CAS) and species composition of fish of the Jamuna River adjacent to the Dhunat upazilla under the district Bogra. The study was conducted from July to October, 2000. Hydrographic parameters were in the suitable ranges for fish. Various types of fishing gears were found to operate in this river, they were broadly classified into 3 groups, such as, nets, traps and wounding gears. A total of 5 types of nets, 2 types of traps and 1 type of wounding gear were recorded. A total of 38 species of fish were identified in the catches of different gears used by the fishermen. Among the different types of nets, the highest number of species (25) were recorded in catches of ber jal (sein net), which was followed by jhaki jal cast net (18) and relatively less number of species (7) were recorded in the catches of thella jal (push net).

Key words: Fisheries, Jamuna river, fishing gear, catch assessment.

Introduction

Bangladesh is a riverine country. A net work of rivers, of which the Padma, the Meghna, the Jamuna, the Teesta, the Brahmaputra, the Surma and the Karnafully are important and their tributaries numbering about 230 with a total length of about 24,140 km, criss-cross the country and eventually flow down the Bay of Bengal (BBS, 1991). The Jamuna river plays an important role in the fisheries of Bangladesh. Every year large amount of fish are caught from it. Many portions of this river are breeding ground of Indian major carps. Large quantities of carp fry are caught from numerous breeding grounds of this river (DoF, 1996). The riverine resources are declining day by day due to lack of proper management policy, over-exploitation, unplanned establishment of flood control dam (FCD) and flood control drainage and irrigation (FCDI) dams. Moreover, due to rapid growth of population in Bangladesh and the first rate expansion of agricultural, domestic, irrigation and industrial activities and municipal wastes, an unbalanced heavy pressure has been put on the fishery resources of the rivers over the decades (Jhingran, 1991). The present study was conducted to understand the types of different fishing gears used in fishing, quantity and quality of fish caught in each year through catch assessment of the Jamuna River. The results of the present study may contribute largely in the formulation of appropriate management measures for the riverine fishermen of Bangladesh. Therefore, this study was conducted with the objectives of:

- measuring hydrographic parameters of the Jamuna river
- and assessing the diversity of fishing gears used in Jamuna River.
- also to undertake a catch assessment and specie composition of fish of the Jamuna River.

Materials and Methods

The study was conducted for a period of 4 months from July to October, 2000 in Jumuna River adjacent to the Dhunat upazilla under the district Bogra. The study area was extended from northern border of Kazipur upazilla under the district Sirajganj to southern border of Sariakandi upazilla under the district Bogra. Water samples were collected weekly at regular intervals from the River. Air and water temperature ($^{\circ}\text{C}$), transparency (cm), current speed of water flow (m/sec), dissolved oxygen (mg/L) and pH were measured at the river side.

The gears were surveyed at 6 (six) hours intervals in each

sampling day. A specially designed gear survey form was filled-up by counting the gears. Sampling of catches and their assessment were done once a week. The fishermen were selected on the basis of types of gear they operated. The total catches were weighed by a balance and the representative samples were taken with the help of hand without repetition of the same gear in each sampling day. The collected fish were sorted species-wise and the number of individuals for each species were counted and then their percent composition was determined.

Results and Discussion

Hydrographic parameters of the Jamuna river: Table 1 shows the results of hydrographic parameters of the Jamuna river.

Air and water temperature ($^{\circ}\text{C}$): The highest air and water temperature were recorded in the 4th week of August and the lowest air and water temperature were in the 4th week of July. The variation was due to weather changes in these months. Similar results of air and water temperature were observed by Hossain (1998).

Transparency (cm): Transparency of water was lowest in 2nd week of August and highest in 3rd week of July. Similar results were reported by Patra and Azadi (1987), Singh *et al.* (1990) and Hossain (1998).

Current (m/sec): River current was lowest due to absence of rainfall and flood in 3rd week of July and highest current was in 1st week of September. Similar results were reported by Singh *et al.* (1990) and Hossain (1998).

Dissolved oxygen (mg/L): The highest dissolved oxygen was recorded in 2nd week of September and the lowest in 4th week of July. Dissolved oxygen ranged from 4.0 mg/L to 6.5 mg/L, which was similar to that of river Halda (Patra and Azadi, 1987) and Old Brahmaputra river (Hossain, 1998).

pH: In the Jamuna river pH was slightly alkaline, ranging from 6.5 to 8.0. Similar findings of Allanson (1961) and Islam (1977).

Fishing gears operated in Jamuna river: Various types of fishing gears were found to operate in the study area and they were classified into 3 groups, such as: nets, traps and wounding gears. The fishing techniques that are currently used amongst the fishermen of Bangladesh have been broadly

Shahjahan *et al.*: Present Status of Fisheries in the Jamuna River

Table 1: Hydrographic parameters of Jamuna River

Hydrographic parameters	Months																Mean ±SD value
	July				August				September				October				
	1st W	2 nd	3 rd	4 th	1st W	2 nd	3 rd	4 th	1st W	2 nd	3 rd	4 th	1st W	2 nd	3 rd	4 th	
Air temperature (°C)	30.0	32.0	29.0	26.0	30.5	30.0	31.2	33.0	30.0	29.5	28.0	30.2	30.0	29.25	28.0	27.0	29.7 ± 1.87
Water temperature (°C)	27.0	28.0	26.0	24.0	28.0	28.0	29.5	30.0	27.5	27.0	24.0	27.4	28.0	26.5	26.0	24.5	26.8 ± 1.84
Transparency (cm)	11.0	12.0	20.0	13.0	12.0	10.0	11.0	12.0	16.0	16.0	13.0	11.0	13.0	13.0	15.0	17.0	13.4 ± 2.63
Current (m/sec)	0.65	0.55	0.25	0.75	0.85	0.75	0.50	0.65	0.85	0.75	0.50	0.55	0.50	0.50	0.30	0.27	0.57 ± 0.198
Dissolved oxygen (mg/L)	5.0	5.0	5.5	4.0	5.75	6.0	5.5	6.0	5.5	6.5	4.5	5.16	5.7	5.7	6.25	5.75	5.46 ± 0.647
pH	7.0	7.8	7.5	8.0	7.8	7.5	7.0	7.21	7.21	7.0	7.75	7.6	7.5	7.5	7.75	7.0	7.42 ± 0.419

Table 2: Weekly variation in the use of gears in the Jamuna River in different months

Hydrographic parameters	Months															
	July				August				September				October			
	1 st W	2 nd	3 rd	4 th	1st W	2 nd	3 rd	4 th	1st W	2 nd	3 rd	4 th	1st W	2 nd	3 rd	4 th
Nets	15	13	17	-	-	14	16	18	-	-	15	13	16	17	17	18
Ber Jal	25	22	23	24	21	18	20	15	17	13	21	20	18	17	19	14
Jhaki jal	23	20	24	27	25	17	15	18	20	22	16	17	14	-	10	-
Dharma jal	10	-	20	24	26	24	-	-	18	15	14	12	10	18	14	-
Current jal	18	10	8	-	-	12	14	10	-	-	12	14	-	-	10	8
Thella jal	91	80	92	75	72	85	88	83	55	50	78	76	58	52	69	40
Total																
Traps	25	20	24	-	-	26	27	12	-	-	20	23	20	18	-	-
Bair	-	-	12	15	14	10	-	-	13	15	13	10	8	-	-	-
Dharki	25	20	36	15	14	36	27	12	13	15	33	33	28	18	-	-
Total																
Wounding gears																
Borshi	12	13	16	24	20	16	8	18	23	24	17	18	14	17	15	14
Total	12	13	16	24	20	16	8	18	23	24	17	18	14	17	15	14

Table 3: Average species composition (% of catch by number) of fish captured by different types of nets used in Jamuna River

Species (Scientific name)	Name of nets											
	Ber. of		Thella jal		Dharma jal		Current jal		Jhaki jal			
	No. of Fish	% of total	No. of Fish	% of total	No. of Fish	% of total	No. of Fish	% of total	No. of Fish	% of total		
<i>Gudusia chapra</i>	162	30.92	-	-	23	6.50	-	-	92	26.29		
<i>Pseudeutropus athrinoides</i>	12	2.30	-	-	-	-	-	-	20	5.71		
<i>Mystus vittatus</i>	10	1.91	-	-	7	1.98	12	14.63	8	2.29		
<i>Glossogobius giuris</i>	15	2.86	24	18.18	20	5.65	-	-	5	1.43		
<i>Puntius ticto</i>	65	12.40	17	12.87	21	5.93	18	21.95	12	3.43		
<i>Puntius sophore</i>	9	1.72	12	9.1	17	4.80	6	7.31	6	1.71		
<i>Oxygaster phulo</i>	4	0.76	-	-	-	-	-	-	-	-		
<i>Nandus nandus</i>	-	-	-	-	-	-	15	18.30	4	1.14		
<i>Macrobrachium rosenbergii</i>	3	0.57	-	-	-	-	-	-	5	1.43		
<i>Mystus bleekery</i>	-	-	-	-	-	-	8	9.75	4	1.14		
<i>Ailichthys punctata</i>	20	3.82	-	-	-	-	-	-	8	2.29		
<i>Labeo rohita</i>	7	1.34	-	-	10	2.82	6	7.31	3	0.85		
<i>Catla catla</i>	10	1.91	-	-	-	-	-	-	7	2.00		
<i>Cirrhinus mrigala</i>	7	1.34	-	-	-	-	-	-	-	-		
<i>Labeo calbasu</i>	3	0.57	-	-	-	-	-	-	2	0.57		
<i>Mastacembelus punctatus</i>	13	2.48	-	-	12	3.39	-	-	15	4.29		
<i>Hilsa ilisha</i>	1	0.19	-	-	-	-	-	-	-	-		
<i>Lepidocephalus gunta</i>	-	-	-	-	16	4.52	-	-	12	3.43		
<i>Macrobrachium malcomsonii</i>	102	19.46	68	51.52	152	42.94	-	-	132	37.72		
<i>Mastacembelus armatus</i>	-	-	-	-	3	0.85	-	-	5	1.43		
<i>Botia dario</i>	2	0.38	-	-	-	-	-	-	10	2.86		
<i>Chanda ranga</i>	24	4.56	-	-	12	3.39	-	-	-	-		
<i>Chanda nama</i>	27	5.15	-	-	32	9.04	-	-	-	-		
<i>Wallo attu</i>	3	0.57	-	-	-	-	1	1.22	-	-		
<i>Mystus aor</i>	-	-	-	-	-	-	2	2.44	-	-		
<i>Clupisoma garua</i>	5	0.96	-	-	-	-	3	3.65	-	-		
<i>Anabus testudineus</i>	-	-	-	-	-	-	3	3.65	-	-		
<i>Heteropneustes fossilis</i>	-	-	-	-	-	-	4	4.88	-	-		
<i>Channa punctatus</i>	-	-	2	1.52	-	-	-	-	-	-		
<i>Clarius batrachus</i>	-	-	-	-	-	-	2	2.44	-	-		
<i>Xenentodon cancila</i>	12	2.29	-	-	5	1.41	-	-	-	-		
<i>Cirrhinus reba</i>	3	0.5	-	-	-	-	-	-	-	-		
<i>Tetradon patoca</i>	2	0.38	1	0.76	-	-	-	-	-	-		
<i>Colisha fasciata</i>	3	0.57	-	-	4	1.13	-	-	-	-		
<i>Esomus danricus</i>	-	-	8	6.06	20	5.65	-	-	-	-		
<i>Ompok pabda</i>	-	-	-	-	-	-	2	2.44	-	-		
Total no. of fish		324		100	132	100	354	100	82	100	350	100

Shahjahan *et al.*: Present Status of Fisheries in the Jamuna River

Table 4: Average species composition (% of catch by number) of fish captured by different types of traps and wounding gears (borshi) used in Jamuna River

Species (Local name)	Name of gears					
	Bair		Dharki		Borshi	
	Number of fish	% of total	Number of fish	% of total	Number of fish	% of total
<i>Macrobrachium rosenbergii</i>	13	37.15	5	1.86	-	-
<i>Mystus aor</i>	2	5.70	-	-	-	-
<i>Mystus bleekery</i>	7	20.00	3	1.12	-	-
<i>Lepidocephalus gunta</i>	-	-	12	4.46	-	-
<i>Puntius ticto</i>	3	8.57	18	6.69	13	22.41
<i>Macrobrachium malcomsonii</i>	10	28.57	216	80.30	-	-
<i>Glossogobius giuris</i>	-	-	15	5.57	8	13.80
<i>Channa marulius</i>	-	-	-	-	3	5.17
<i>Puntius sophore</i>	-	-	-	-	17	29.31
<i>Channa striatus</i>	-	-	-	-	5	8.62
<i>Wallago attu</i>	-	-	-	-	2	3.45
<i>Channa punctatus</i>	-	-	-	-	6	10.34
<i>Mystus vittatus</i>	-	-	-	-	4	6.90
Total number of fish	35	100	269	100	58	100

Table 5: Weekly comparison of total catch (kg) in different months captured by different fishing used in Jamuna River

Types of gears	Name of gears	Months															
		July				August				September				October			
		1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th
Nets	Ber Jal	3.0	4.0	3.5	-	-	0.05	5.20	4.30	-	-	3.60	5.15	5.5	5.75	6.0	5.15
	Jhaki jal	1.75	1.50	1.25	0.75	0.50	1.30	1.62	2.50	2.00	1.35	2.00	2.15	2.00	2.15	1.5	1.25
	Dharma jal	1.05	0.70	0.85	1.00	1.5	0.75	0.50	0.75	1.30	1.65	1.25	1.15	0.85	-	0.25	-
	Current jal	0.50	-	1.75	2.15	3.25	1.50	-	-	2.10	2.75	2.00	1.50	1.75	1.50	1.25	-
	Thella jal	0.25	0.20	0.15	-	-	0.30	0.40	0.45	-	-	0.25	0.50	-	-	2.58	0.02
	Total catch	6.35	6.40	7.50	3.90	5.25	5.90	7.72	8.00	5.40	5.75	9.10	10.45	10.10	9.40	11.58	6.42
	Total catch rates	1.31	1.60	1.50	1.30	1.75	1.18	1.93	2.00	1.80	1.91	1.82	2.09	2.53	3.13	2.79	2.14
Traps	Bair	0.50	0.75	1.0	-	-	0.65	0.80	0.50	-	-	0.25	0.40	0.55	0.65	-	-
	Dharki	-	-	0.65	0.75	1.0	1.25	-	-	0.50	0.40	0.60	0.70	0.65	-	-	-
	Total catch	0.50	0.75	1.65	0.75	1.0	1.90	0.80	0.5	0.50	0.40	0.85	1.10	1.20	0.65	-	-
	Total catch rates (kg/gear)	0.50	0.75	0.83	0.75	1.00	0.95	0.80	0.50	0.50	0.40	0.43	0.55	0.60	0.65	-	-
Wounding gears	Borshi	0.95	0.90	0.72	0.45	0.50	0.70	0.55	0.65	0.75	0.85	1.00	0.75	0.65	0.60	0.55	0.45
	Total catch rates (kg/gear)	0.95	0.90	0.72	0.45	0.50	0.70	0.55	0.65	0.75	0.85	1.00	0.75	0.65	0.60	0.55	0.45

categorized into netting, angling, trapping, spearing, de-watering and hand picking (Dewan and Mazid, 1994).

Weekly variations of gear used in the Jamuna river in different months: Weekly variations of gear used in Jamuna river in different months are shown in Table 2. It was found that July, August, September and October covered almost with rainy season. So, during this period the use of any type of gear was very limited. Due to vastness of water bodies, nets are operated more frequently. When the water level started to increase day by day due to heavy rain fall and creates flooded condition, the number of nets decreased. Due to presence of current, traps were widely used in the adjacent shallow water bodies. At this time the wounding gears were used mostly in the shallow water due to abundance of pelagic fish.

Catch Assessment Survey (CAS)

Species composition: A total of 38 species of fish were recorded in the catches of different gears used by the fishermen (Tables 3 and 4).

Ber jal (sein net): In the catches of ber jal, a total of 25 species of fish including shrimp, were recorded. BCAS (1994) recorded 19 species offish other than shrimp and small size fish in Chanda Beel, whereas Hossain (1998) recorded 19 species in the Old Brahmaputra river in the catches of this gear.

Jhakijal (cast net): A total of 18 species of fish including

shrimp were recorded during the study period. BCAS (1994) recorded 20 species offish other than shrimp and other small fish in the Chanda Beel. Among 18 species, *Macrobrachium malcomsonii* was found to be the highest in quantity which contributed about 37.72% and *Labeo calbasu* was the lowest species (0.57 %) of the catches. The rest of the species were found to contribute insignificant quantity to the catch. But the contribution of dominant species in the catches of this gear recorded by BCAS (1989) in the Beel of Arial khan were *Puntius sp.* (30%), *Ompok pahda* (5%), *Channa punctatus* (5%), *Glossogobius giuris* (10%), *Mastacembelus armatus* (5%) and *Channa striatus* (10%). The percent composition of dominant species recorded by Rahman *et al.* (1993) were 13.17 to 49.59 % of *Mystus vittatus*, 20.28 to 40.72 % of *Puntius sp.* and 3.42 to 24.5 % of *Glossogobius giuris* during their study period in Haiti Beel from August to March.

Dharma jal (Lift net): A total of 15 species of fish were recorded in the catches of Dharma jal. Hossain (1998) recorded 13 species of fish in Old Brahmaputra river. Among the 15 species *Macrobrachium malcomsonii* was found to be of highest percentage about 42.94% and the lowest species was *Mastacembelus armatus* which contribute about 0.85% in the catches (Table 3). The next dominant species were *Chanda nama* (9.04 %), *Gudusia chapra* (6.5%), *Puntius ticto* (5.93 %), *Glossogobius giuris* and *Esomus danricus* (5.65 %). The rest of the species were found to contribute less significant to the total catch. Rahman *et al.* (1993) recorded

Puntius sp. (30.18 %) as the dominant species in Chanda Beel.

Current jal (gill net): In case of current jal, a total of 13 species were recorded. Hossain (1998) recorded 14 species in the Old Brahmaputra river. Among the 13 species *Puntius ticto* was recorded as the highest species which contributed about 21.95 % and *Wallago attu* was recorded as the lowest species which contributed about 1.22 % of the catch.

The next dominant species were *Nandus nandus* (18.30 %), *Mystus vittatus* (14.63 %), *M. bleekery* (9.75 %), *Puntius sophore* and *L. rohita*, fry (7.31 %), *H. fossilis* (4.88 %), *C. reba* and *A. testudineus* (3.5 %), *C. batrachus* and *O. pabda* (2.44 %). Hossain (1998) recorded *Puntius ticto* (22.03 %), *Mystus bleekery* (15.25 %), *Mastacembehis armatus* (13.56 %), *Puntius sophore* (10.17 %), *Glossogobius giuris* (6.78 %) and *Channa punctatus* (5.08 %) in the Old Brahmaputra river.

Thella jal (push net): A total of 7 species of fish were recorded. Hossain (1998) recorded 6 species in the Old Brahmaputra river by the catches of this net.

Among the 7 species *Macrobrachium malcomsonii* was found to be highest in number which contributed about 51.51% and *Tetradon patoca* was found to be lowest species contributing about 0.47 % of the catch. The next dominant species recorded were *Glossogobius giuris* (18.18 %), *Puntius ticto* (12.87 %), *Puntius sophore* (9.1 %), *Esomus danricus* (6.06 %) and *Channa punctatus* (1.52 %).

Hossain (1998) recorded *Macrobrachium malcomsonii* (49.23 %), *Glossogobius giuris* (19.23 %), *Puntius sophore* (13.08 %), *Puntius ticto* (9.23 %), *Mastacembelus punctatus* (5.38 %) and *Esomus danricus* (4.62 %) in the Old Brahmaputra river.

Bair (trap): Five species were recorded in catches of bair trap, while Hossain (1998) recorded 3 species of fish in the Old Brahmaputra river.

Dharki(trap) : About 6 species were recorded during the study period in the catches of dharki traps. Among them *Macrobrachium malcomsonii* was found to be highest which contributed about 18.30 % and *Mystus bleekery* was found to be lowest which, contributed about 1.12 % in the catch. The next dominant species recorded were *Puntius ticto* (6.69 %), *Glossogobius giuris* (5.57 %), *Lepidocephalus gunta* (4.46 %) and *Macrobrachium rosenbergii* (1.86 %).

Borshi(wounding gear): Eight species were recorded. Hossain (1998) recorded 7 species of fish in the Old Brahmaputra river in the catches of borshi. *Puntius sophore* was found to be the highest in number and contributed about 29.31 % and *Wallago attu* was found to be the lowest which contributed about 3.45 % in the catch. The next dominant species recorded were *Puntius ticto*(22.41 %), *Glossogobius giuris* (13.80 %), *Channa punctatus* (10.34 %), *Mystus vittatus* (6.90 %) and *Channel marulius* (5.17 %). The percent composition of species recorded by Hossain (1998) found *Punthis ticto* (36.36 %), *Glossogobius giuris* (22.73 %), *Puntius sophore* (13.64 %) as major species.

Weekly variation of total catch rates in different months by different fishing gears used in the Jamuna river: In respect of nets, the highest catch per unit of effort (CPUE) was found in the 2nd week of October and the lowest was found in the 1st

week of July which was 3.13 kg/ gear and 1.31 kg/ gear respectively (Table 5). This happened due to the variation in water levels, current and flood condition. The highest CPUE was found in the 2nd week of August and lowest in the 2nd week of September in case of traps which were 0.95 kg/gear and 0.40 kg/gear respectively. In case of wounding gears (borshii), the highest CPUE was found in the 3rd week of September and lowest in 4th week of July which were 1.00 and 0.45 kg/gear, respectively. This was happened just due to flood conditions.

According to information gathered so far, it may be concluded that fish production in this river have declined alarmingly due to embankment erosion, indiscriminant gears used and as a whole due to absence of proper management policy for the open water resources of Bangladesh. In order to increase the fish production from the open water bodies some immediate action plans should be taken.

For example prohibition on brood fishing, the fish fry should be released by Government, bans on the current jal fishing, bans on fishing of small under size fish, establishment of the fish sanctuary in certain parts of the river etc.

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