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## Assessment of fishing gears crafts and socio-economic condition of Hilsa (*Tenualosa ilisha*) fisherman of Padma River, Bangladesh

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### Abstract

Studies were conducted on the types and characteristics of fishing gears, crafts and socio-economic conditions of hilsa (*Tenualosa ilisha*, Hamilton, 1822) fishing communities of the Padma river region in Charghat and Bhaga upazilla under the district of Rajshahi for a period six month starting from July 2014 to December 2014. A total of 186 fishermen were selected by random sampling and interviewed which include 61 boat owners, 92 labour fishermen and 33 donga owners from two villages. Face to face interviews, group discussions and direct visits were performed to collect and verify data. Types of gears and crafts, major characteristics were recorded. Drift gill net as fishing gear and chandi boat and donga as crafts were found in the studied area for hilsa fishing. Most of the fishermen were professional (57% and 61.63%). Age group of majority of the fisherman was 21-30 years (40%) in Raowtha and 31-40 years (36.05%) in Vanukor village. Most of the fishermen have fishing experience between 0-10 years. Most of the fishermen with family size of 4-6 (61% and 56.98%). 28% of the fishermen in Raowtha village have primary (1-5) level of educations, while 29.07% fishermen in Vanukor village can only sign their name. Full katcha (71% and 51.16%) houses were abundant, while the pacca houses were 9% and 13.95% in two villages respectively. Majority of the fishermen depend on village doctor (94% in Raowtha and 97.67% in Vanukor village respectively) for health facilities. Sanitary facilities were dominated by kacha toilet. Income of the fishermen was found high during hilsa fishing season and lower during other season. It was found that majority of the fishermen were money borrower and 64% and 80.23% of the fishermen borrowed money from NGO's and the rest borrowed money from neighbors and relatives. The main problems were identified as extortion by local extortionist; other problems such as inadequate credit facilities, lack of appropriate preservation facilities and frequent conflict between professional and non-professional fishermen were prominent. They need more institutional, organizational and technical help and credit support for the betterment of their socio-economic condition and sustainable livelihood.

**Keywords:** Padma River, Hilsa fishers, gears and crafts, socio-economic condition

### 1. Introduction

Padma is a major river in Bangladesh. It is the main distributary of the Ganges, flowing generally southeast for 120 kilometres to its confluence with the Meghna River near the Bay of Bengal [4]. The Padma enters Bangladesh from India near Chapai Nababganj and meets the Jamuna near Aricha and retains its name, but finally meets with the Meghna near Chandpur and adopts the name "Meghna" before flowing into the Bay of Bengal. The bed of the Padma is wide, and the river is split up into several channels flowing between constantly shifting sand banks and islands. There are over 140 fish species, the richest freshwater fish fauna in Bangladesh [15]. One major species of Padma river is hilsa fish. People of Bangladesh glorify hilsa as the "king of fishes" and its taste is said to surpass nectar.

The Hilsa Shad, is also an important food fish, rich in omega  $\omega$ -3 polyunsaturated fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) [20]. The hilsa fishery generates employment and income for millions of people in India, Bangladesh and Myanmar, worth over US\$ 2 billion [6]. The Padma Ilish (Hilsa) is not only important for its cultural and economic values but also famous for its delicious taste, odour and flavor. In the year 2012-2013, more than 10% of the country's total fish production came from Hilsa and contributes 1% to the national GDP [10]. About 2% of the country's total populations are directly or indirectly involved in the Hilsa fishery for their livelihoods [11].

Construction of the Farakka Barrage causes the loss of fish species, the drying of Padma's distributaries, increased saltwater intrusion from the Bay of Bengal, and damage to the mangrove forests of the Sundarbans [14]. One of the most vulnerable communities in Bangladesh of this natural and man-made climate change is fisherman [16]. They are poor by any standard and over the years economic condition of the fishermen had further deteriorated. From the view point of socio-economic conditions of fishermen, it is usually told that the fishers are the poorest group of people in the country. Proper planning and development for the economically backward sector, like fish farmers, need up to date information on socio-economic framework of them. The successful implementation of developmental program is hindered due to the lack of adequate and authentic information on socioeconomic condition of the target population [8]. Unfortunately, there have very minor governmental and other organization (NGOs) initiative to manage and improve Hilsa fishermen condition in this area. As a result ban periods cannot significantly contribute in increasing catch per unit effort. This decreasing trend of catch per unit effort makes them more vulnerable to poverty day by day. Several studies have been conducted on biology [1, 2] of hilsa fisheries in Padma River. But there is no clear understanding about the impact of banning period on the livelihoods of Hilsa fishermen in these localities. Considering the above fact, the present study was carried out to review the state of structure, construction materials of gears and craft and livelihood status of Hilsa fisherman living around Padma River.

**2. Materials and Methods**

**2.1 Description of the study area**

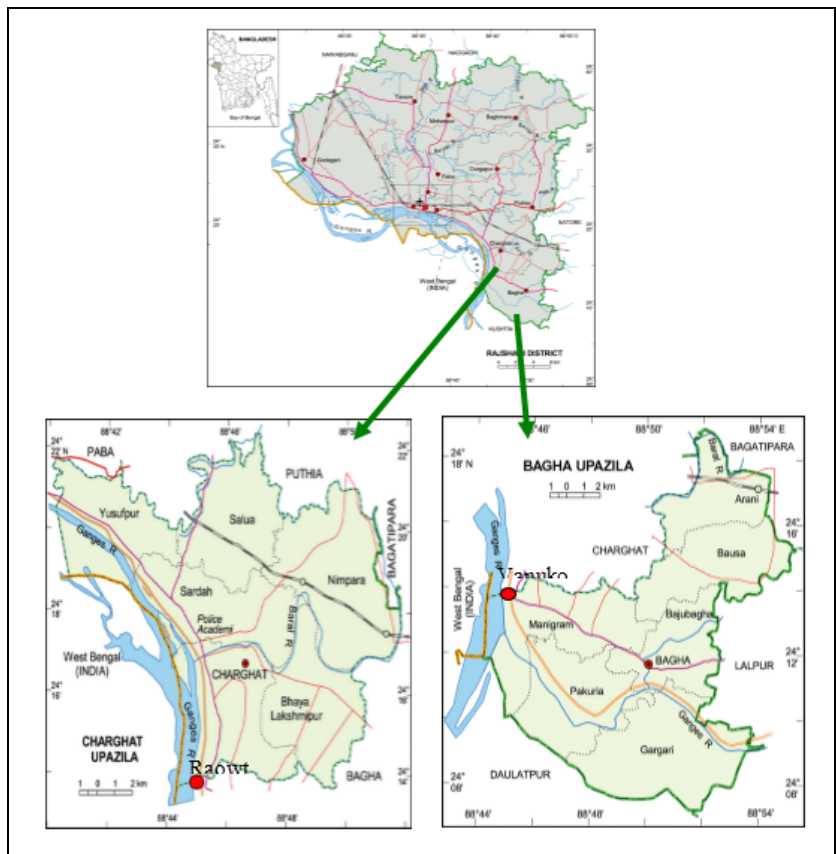
The study area was on the bank of Padma River under Raowtha and Vanukor village of Charghat and Bagha upazilla of Rajshahi district (Figure-1). The study was conducted for a period of 6 (Six) months from July, 2014 to December, 2014 in respect of fishing activities and livelihood conditions of fisherman.

**2.2 Sample size and data collection**

A total of 186 fishermen were selected proportionately from 2 kilometer of Padma River. Both primary and secondary data were used during the study period. Primary data were collected based on questionnaire interview, field survey, Focused group discussion (FGD) and direct observation. Different types of gears, operation time, and total number etc. and different necessary information on Hilsa fishing crafts used in the study area were collected on the basis of needs of the study by direct observation. Secondary data on fishing gears and fishing crafts used for Hilsa fishing and livelihood of fishermen were collected from journals, text books, newspaper etc. Cross-check interviews were conducted with key person such as, Upazila Fisheries Officer, and relevant NGO workers for confirmation of the relevant information. The interviews of respondents were conducted in their office.

**2.3 Data processing and analysis**

After collection of data, these were edited and coded. All the collected data were summarized and scrutinized carefully and recorded. All the collected information were accumulated and analyzed by MS-Excel and then presented in textual, tabular and graphical forms to understand the present livelihood status of the fishermen in the studied area.



**Fig 1:** Map of the study area (●)

### 3. Results and Discussion

#### 3.1 Fishing gears

The gear used in catching Hilsa fish were mainly monofilament gill net (Plate 1). The net used in Hilsa fishing were of different sizes depending on the fishing crafts used in catching fish. Different measurements of mesh size were also used and it named according to the number of fingers fit into the mesh by the local people such as “tui ungli”, “tin ungli” (in Bengali) etc. General descriptions of this net are given in Table-1.

During the study period it was found that most of the fishermen used chandi jal (drift gill net) for catching Hilsa fish in Hilsa fishing season. The length and width of this type of net ranges from 122 m to 244 m and 2.14 m to 3.05 m. Mesh size of these net ranges from 45 mm to 105 mm. Generally gill net used having 5 to 14 cm mesh size were used for Hilsa fishing [7]. According to Siddique *et al.* [23], chandi jal used in Megna River has mesh size 4 to 4.5 cm and the length of the net is 650 to 700 m and width is 10 to 12 m.

#### 3.2 Fishing crafts

Fishing crafts are specialized boats, ships or other vessels used for fishing. Small-motorized boats (Plate 2) were most commonly used in Hilsa fishing in the study area. 61 small motorized fishing boats (chandi nauka) were found during study period. These boats having length ranging between 5.31 to 7.6 m, wide 1.40 to 1.65 m and depth 0.45 to 1 m. They have flat bottom, pointed stern and requires 1-3 persons to operate. Durability of this type of boat is 2-6 years. The fishermen were also used “Donga” (in Bengali) (Plate 2) to catch Hilsa fish. The numbers of studied donga in the study area were 33. The donga had length 3.41 m, wide 0.64 m and depth ranging from 0.4 to 0.6 m. They have slightly rounded bottom, blunt stern and requires only one person to operate. Durability ranged between 1-2 years. Descriptions of these fishing crafts are given in Table-2. Sazzad [22], found the major crafts operated in the Meghna River were small motorized boats and non-motorized boats (chandi boats, dingi boats). BCAS [5], reported 7 different types of fishing crafts operated in the Meghna, Padma and Jamuna rivers.

**Table 1:** Description of gear used for hilsa fishing

Name of the gear	English name	Habitat	Number of crew	Length and width (m)	Mesh size	Materials	Operation period
Drift gill net or chandi jal	Monofilament nylon seine net	River	1-2	152.5-244 and 2.14- 3.05	45-105 mm	Synthetic monofilament fiber, rope, sinkers and floats	June to December

**Table 2:** Description of crafts used in hilsa fishing

Name of the crafts	Size (m)			Bottom	Stern or bow	Person per craft	Mechanized or manual	Durability (years)
	Length (m)	Wide (m)	Depth (m)					
Chandi nauka	5.31 to 7.6	1.40 to 1.65	0.45 to 1	Flat	Pointed	1-3	Both	2-6
Donga	3.42	0.64	0.4 to 0.6	Slightly rounded	Blunt	1	Manual	1-2



**Plate 1:** Drift gill net



**Plate 2:** (A) Chandi Nauka, (B) Donga



#### 3.3 Socio-economic conditions of hilsa fisherman

For the livelihood characteristics of the fishermen, a detailed analysis were made on the following parameters and presented in this following section.

##### 3.3.1 Types of fisherman

In the present study, two types of fishermen were found professional (57% in Raowtha and 61.63% in Vanukor respectively) and occasional (43% in Raowtha and 38.37% in Vanukor respectively) (Figure-2). Faruque and Ahsan [9] have found 56.52-75.00% professional, 20.83-43.48% occasional

and 0.00-7.69% subsistence Hilsa fishermen in Padma River. Mondal *et al.* [21], found that 82% of fishermen were professional and 18% were seasonal in Meghna River.

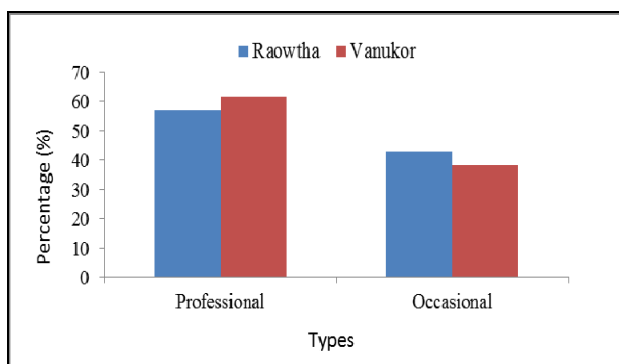


Fig 2: Types of fishermen

### 3.3.2 Age structure of fishermen

Different categories of age groups: less than 20, 21-30, 31-40, 41-60 and above 60 were considered to examine the age structure. In the present study, 40% and 36.05% fishermen in Raowtha and Vanukor villages were between the age group of 21-30 and 31-40 years old (Figure-3). But Faruque and Ahsan [9] and Hossain *et al.* [12] reported that majority of the fishermen were in the age group of 31-40 years old in their study. In case of Raowtha village most of the fishermen were between the age group of 21-30 years. This may due to the involvement of young fishers in fishing activity in the study areas. Our findings were also similar to the findings of Kostori [18], who reported that majority (36%) of fishermen of the Chalan Beel were belonging to the age group of 20 to 30 years group.

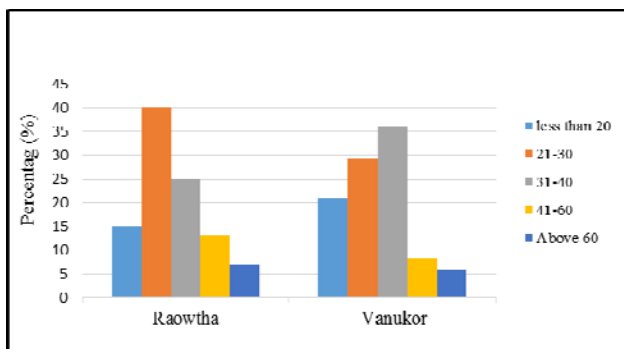


Fig 3: Age structures of fishermen

### 3.3.3 Fishing experience

To examine the durability of fishing profession under different categories, fishing experience was divided into three categories like 0-10 years, 11-20 years and >20. In Raowtha village, 41.17% boat owner, 84.32% labour fishermen and 60% donga owner were found with fishing experiences of 0-10 years. That means young generations are involved in fishing activities now-a-days. But in Vanukor village, most of the boat owner (51.85%) had fishing experience of >20 years, as the number of professional fishermen was high in this village (Table-3). Islam *et al.* [13] found fishing experiences of fishermen ranging between 2-32 years, which is more or less similar to the present study.

Table 3: Fishing experience of different categories of Hilsa fishermen

Categories	Years	Villages	
		Raowtha (%)	Vanukor (%)
Boat owner	0-10	41.17	7.41
	11-20	29.41	40.74
	>20	29.41	51.85
Labour fisherman	0-10	84.32	75.61
	11-20	9.80	17.07
	>20	5.88	7.32
Donga owner	0-10	60.00	55.56
	11-20	26.67	27.78
	>20	13.33	16.67

### 3.3.4 Educational status

In present study the fishermen were classified into six categories on the basis of the level of education. (Table-4). According to Faruque and Ahsan [9], about 67.54% of the hilsa fishermen were only could sign their name while 16.62%, 14.05% and 1.57% were illiterate, primary and secondary level of education respectively which is not similar to the present study. The present study have found that most of the Hilsa fishermen of the selected areas were between the categories of classes 1-5 and able to sign. This is might be due to afford of some NGO(s) for the development of educational status among the fishermen in the study areas.

Table 4: Educational status of the Hilsa fishermen in the study area

Categories	Villages	
	Raowtha (%)	Vanukor (%)
Illiterate	15.00	19.77
Only can sign	20.00	29.07
Class 1-5	28.00	24.42
Class 6-10	23.00	22.09
Above SSC	12.00	3.49
Above HSC	2.00	1.16

### 3.3.5 Family size

The family sizes of the fishermen were divided into four categories. Among them 4-6 groups of family members were dominant (61% in Raowtha and 56.98% in Vanukor respectively) in both studied villages (Table-5). Similar result was also found by Faruque and Ahsan [9], who recorded that 57.14 to 78.26% fishermen have 4-6 family members.

Table 5: Family size of the Hilsa fisherma

No. of family members	Villages	
	Raowtha (%)	Vanukor (%)
1-3	35.00	36.04
4-6	61.00	56.98
7-9	2.00	6.98
10 or above	2.00	0.00

### 3.3.6 Earners and dependents

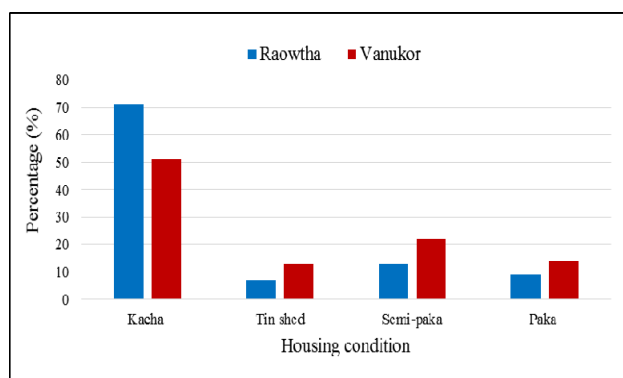
It was observed in the study area that only male fishermen earns money and the female helps in making net, but in some families, children (below 15 years) also earns money. The dependency ratio was calculated by dividing the total numbers of dependent members by the total number of earning members of each family. Highest earners and dependents ratio was found in the village of Raowtha (1:2.48) (Table-6).

**Table 6:** The percent distribution of earners and dependency ratio

Categories	Villages	
	Raowtha (%)	Vanukor (%)
Total earners	28.71	31.59
Total dependents	71.29	68.41
Earners : dependents	1:2.48	1: 2.17

**3.3.7 Housing condition**

Housing condition of the fishermen is shown in Figure-4. Most of the fishermen of the two villages had katcha house (walls and floor with mud and roof with tin or straw) (71% and 51.16% in Raowtha and Vanukor village respectively). This is because most of the fishermen are poor and they did not have the ability to build their house with brick or wood which supports the findings of Faruque and Ahsan [9], who found that 75.00-80.77% and 82.14-86.96% of the fishermen’s housing conditions were katcha.



**Fig 4:** Condition of living house of Hilsa fishermen

**3.3.8 Health facilities**

Health status is the reflection of the livelihood status. The health facilities enjoyed by the fishermen were not satisfactory. From the present study it was found that the fishermen take health service from unskilled, non-professional village doctor (94% in Raowtha and 97.67% in Vanukor village respectively). They also got health service from upazilla health complex (4% in Raowtha and 2.33% in Vanukor village respectively) and Kabiraj (2% in Raowtha and 0.00% in Vanukor village respectively) (Table-7), which shows slight dissimilarities with the result of Faruque and Ahsan [9], who found that 24.05% and 7.81% got health service from the Thana Health Complex and Kabiraj respectively. No MBBS doctor facility was found in the study area which is similar to Khan *et al.* [17], who reported that all MBBS doctor was absent in his study area.

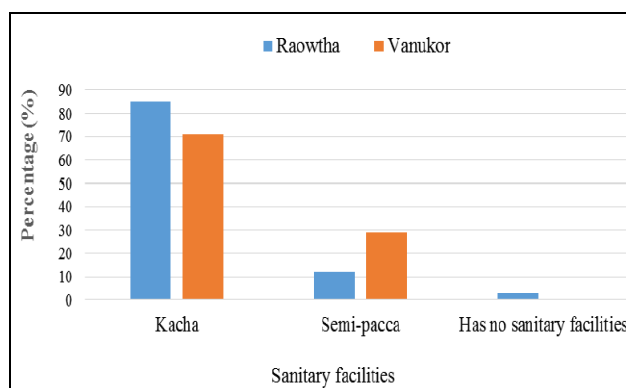
**Table 7:** Health facilities of the Hilsa fishermen in the study area

Health facilities	Villages	
	Raowtha (%)	Vanukor (%)
Village doctor	94.00	97.67
Upazilla health complex	4.00	2.33
Kabiraj	2.00	0.00

**3.3.9 Sanitary facilities**

The sanitary condition of the fishermen of the studied area was very poor. The toilets used by the fishermen were dominated by katcha (85% in Raowtha and 70.93% in Vanukor village respectively) and semi-paka (12% in Raowtha and 29.07% in Vanukor village respectively) toilet (Figure-5). Findings of the present study agreed with the

findings of Faruque and Ahsan [9], who found about 92% of fishermen’s toilets were kacha while 7% were semi-pacca and remaining 1% had no sanitary facilities in the Charghat upazila it was found that about 88% and 10% of toilets were kacha and semi-pacca respectively while 2% had no sanitary facilities.



**3.3.10 Income of fishermen**

Income is the most important factor for better understanding of the socio-economic conditions of fishermen [18]. The income profiles of the fishermen are shown in Table-8. Respondent has reported that the families under the survey spend more when their income is high and spend less when their income is low. When the catching rate decreases the fishermen were in the low income group. As a result they borrow money to solve their essential needs. Sometimes they faced poverty, lived with ill-health and suffered from different types of diseases. During the study, highest income was recorded for boat owner (500-600 BDT) followed by donga owner (300-350 BDT) and labour fishermen (250-300 BDT). But during other season the income of fisherman was very low compared to Hilsa fishing season. Kostori [18] stated that at the time of peak fishing, majority of fishermen (50%) earn BDT 200-250 per day which is slightly lower than the present findings as because Hilsa is a high prized fish.

**Table 8:** Income of the Hilsa fishermen in the study area

Season	Categories of fisherman	BDT income per day
During hilsa fishing season	Boat owner	500-600
	Labour fisherman	250-300
	Donga owner	300-350
Other season of the year	Boat owner	150-200
	Labour fisherman	100-140
	Donga owner	100-140

**3.3.11 Alternative occupation**

Almost all categories of fishermen were fully occupied with Hilsa fishing during the peak season of Hilsa. Occupation of Hilsa fishermen are shown in Table-9. According to Faruque and Ahsan [9], most of the fishermen (52.17 to 75.00%) of all four villages were found to be involved only in fishing for conducting their livelihood in Padma River which is similar to the present findings (51% in Raowtha and 55.81% in Vanukor respectively). The present study is also similar to the findings of Alam and Bashar [3] and Kabir *et al.* [16].

**Table 9:** Occupation of the fisherman engaged in Hilsa fishing

Occupation	Villages	
	Raowtha (%)	Vanukor (%)
Only fishing	51.00	55.81
Fishing and agriculture	14.00	13.95
Fishing and day labour	22.00	20.93
Fishing and others	13.00	9.30

### 3.3.12 Credit access issues

Sometimes fishermen borrowed money for buying fishing equipment, food, livestock and poultry items and to mitigate their other essential needs. Majority of the fishermen borrowed money from NGO's, neighbors and relatives (Table-9). According to the survey of Mia *et al.* [19], it was found that 70% and 62.5% of fishermen received loan while the rest 30% and 37.5% of the fishermen don't received loans in the study area 1 and 2 respectively of the fisher's community of Meghna river.

**Table 9:** Sources of borrowing money of Hilsa fisherman

Sources of borrowing money	Villages	
	Raowtha %	Vanukor %
None	9.00	3.49
Neighbour	10.00	5.81
Relatives	17.00	10.47
NGO	64.00	80.23

### 4. Conclusion

Socio-economic condition of riverine fisherman communities was presented in terms of age structure, religion, family type, family size, housing condition etc. The fishermen were deprived of many amenities such as population pressure, low income, lack of alternative employment opportunities, extortion by the local extortionist, loan problem, theft robbing etc. Fishermen also faced various problems such as child education, health facilities, food consumption, and pasting of savings during banning season. Almost all fishermen mentioned lack of capital and lack of viable alternatives during banning period as their main problems. Demand, availability, conservation means, etc. indicated that it is a sector of massive prospect bearing urgent initiative to uplift the livelihood of this marginal segment of population by searching alternative livelihoods, most importantly during ban and lean periods.

### 5. Acknowledgements

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