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Fishing gears used by the Fishers at Rupsha River in Khulna District, Bangladesh

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Abstract

Rupsha is one of the most famous rivers in Bangladesh and endures country's important multi-species commercial fishery. The present study was conducted to assess the operation of used fishing gears of the fishermen in the Rupsha River during the period from February 2011 to January, 2012. A wide variety of fishing gears were operated throughout the year in the study area for commercial fishing. A total of 2 gill net, 1 fixed purse net, 1 cast net, 1 dip net, 2 traps, 2 hooks and lines and 2 wounding gears were found in the study area. But a number of the fishing gears was found to catch fish irrespective of their size or species and destroys the habitat of the wild species. An awareness or training program should be conducted to the fishermen to create awareness of the long-term effects of different fishing gears and to impart knowledge of fishing laws.

Keywords: Fishing Gear, Fishing Net, Fishing Trap, Rupsha River and Bangladesh.

1. Introduction

Bangladesh has the third biggest aquatic fish bio-diversity in Asia, after China and India, with about 800 species in fresh, brackish and marine waters^[1]. Fish and fisheries substances have been providing food or animal protein for millions of poor people in Bangladesh^[2-13]. Rupsha is one of the most famous rivers of Bangladesh and sustains country's important multi-species commercial fishery. It is a distributary of the Ganges that forms from the union of the Bhairab and Atrai rivers, and flows into the Pasur River. Many factories, dock yard, ship yard are situated in the bank of this river^[14]. A large number of fishing crafts and gears are operated in the Rupsha for commercial exploitation of the fishery resources. Fishing gear is any form of equipment, implement, tool or mechanical device used to catch, collect or harvest fish^[15]. The major categories of fishing gears that are habitually used in Bangladesh can be counted as the following: fishing nets, fishing traps, hooks and lines, wounding gears and fish aggregation device^[16]. Various types of materials are used to make these fishing gears include netting, twine, plastic structural and fasteners, clips and swivels, ropes, steel wire ropes, combination wire ropes, purse rings, polyester, polyethylene, nylon, cotton, polypropylene, mixed fibers, floats and sinkers, bamboo, wood etc^[17]. The form and size of the gear depends on the use of gears and the environmental condition of the water body. Literatures outline the description, mode of operation and classification of fishing gears of the Rupsa River is very revealing. Such information is very much essential for developing a sound management practice for the commercial fishery in the river. In view of the above, the current study was accompanied to know the types of fishing gears and their method of operation that are employed for the exploitation of the fishery resources in the Rupsha River of Southwestern Bangladesh.

Materials and Methods

The present study was conducted to assess the operation of used fishing gears in the Rupsha River (Latitude 22° N and Longitude 89° E) during the period from February 2011 to January, 2012 (Figure 1). The primary data were collected from fishermen of the fishing community, direct observation of fishing gears at the time of operation and from the local fishing gear market. Data about gear size, operation mode, building materials, fish species caught, etc. were collected by interviews and personal communication from the riverine area. Interviews were conducted through face to face interview method by using semi-structured open ended questions. Cross-check Interviews (CI) were conducted with key informants such as Upazila

Fisheries Officer (UFO), District Fisheries Officers (DFO) and relevant GO and NGO officers and staffs. The data collected

were compiled and discussed to have a clear idea about the gears operated in the Rupsha River.



Fig 1: Map of the Study Area

Results and Discussion

The investigation showed that a wide variety of fishing gears were operated throughout the year in the Rupsha River near Khulna district for commercial fishing. A total of 12 types of fishing gears were observed to harvest fish in the study area (Table 1-4). The gears found in the study area were classified into four types: fish net, fish trap, hook & line and wounding gear.

Fishing nets: Fishing nets were grouped into 4 categories according to the mode of operation and catching of fish viz., gill net, fixed purse net, cast net, dip net (Table 1). Gill nets were the principal and common type of net used in the region. These are single walled nets with a mesh opening of such a size that the required fish is gilled themselves in the net. This is a passive gear, but fish can also be driven into the gill nets. The nets were used singly or in series. They are vertical walls of netting normally set out in a straight line.

Floats and sinkers are attached plastic ropes are used as head ropes and foot ropes. Two types of gill nets were widely operated in the study area viz., punti jal and bata jal.

Punti Jal: Punti jal is a rectangular shaped gill net commonly operated in the estuary made of cotton twine or monofilament. It is known as punti jal because it catches mainly punti and other small size fish. The net is 10 to 30 m long and 0.5 to 1.0 m wide having a mesh size between 2.2 and 3.5 cm. Most punti jals have both floats and weights attached to them, though some have only floats. The net is operated in both surface layer and bottom layer of the water body. The net is usually set in the morning in shallow water, but sometime it is also operated from boat both day and night. One to two persons are needed to operate the net. Cost depends on the size of the net usually varies between 500 to 5000 BDT and the life span of the net is 1-3 years. Catch per unit effort was found to be 1 to 5 kg. It can be used in all over the year to catch small

sized fish like Punti (*Puntius spp.*), Bele (*Glossogobius giuris*), Gulsha (*Mystus cavasius*), Bata (*Labeo bata*), Koi (*Anabas testudineus*), Poa (*Otolithoides pama*), etc. (Table 1).

Bata Jal: The rectangular shaped gill net which is mainly used to catch Bata fish is locally known as bata jal. The length and width of the net is 6.5 to 33 m and 1.25 to 2 m respectively, whereas the mesh size varies from 2.5 to 5 cm (Table 1). The net is fixed on tide near the shore by using bamboo, wood and iron but sometimes the net is operated from the boat which requires 2 to 3 persons. The construction cost of this net is 50000 BDT having a life span of 1 to 2 years. The main species trapped in the net is Bata (*Labeo bata*) with a catch per unit effort of 4 to 10 kg. Seine nets are designed to be towed in an arc around fish shoals to surround them. As the seine net has a very fine mesh size, fish of both small and large size are vulnerable to such gear. Usually one end of the net is attached to a pulley or anchored on the shore and a boat is used to pull the net into a large arc back to the shore before hauling in^[18]. Shatting jal/jagat ber jal and gosi jal/khoti jal are the most used type of seine net in the study area.

Behundi Jal: Behundi jal is a purse or conical in shape net and has two extensions. The length of the net is 12 to 15 m and width of mouth of the net is 11 to 12 m. The mesh size at the mouth of the net is 5 to 6.25 cm and at the end of the pouch is 0.5 to 1.25 cm (Table 1). The net is constructed by polyamide monofilaments, polypropylene, polyvinyl chloride or nylon rope, in traditional practice the net is made up of nylon ropes and is knotted. Mouth of the net is spread and fixed on tide by bamboo, wood or iron. Fish is trapped in the Centre pouch of the net and net is monitored carefully for 2 to 3 hours. Two persons are required to operate the net where the catch per unit effort is 100 to 300 kg. The durability of the net is 2 to 3 years whereas the construction cost is 200000 BDT. The main species trapped in the net are Bata (*Labeo bata*), Kuchia (*Monopterusuchia*), Koral (*Lates calcarifer*), Koi (*Anabas testudineus*), Chewa (*Odontamboopus rubicundus*), Chiring (*Apocryptes bato*), Bashpata (*Brachypleura novaezealandiae*), Poa (*Otolithoides pama*). This net is also found in Chittagong locally known as behuti jal^[19].

Cast net is made up of three parts: the upper section (net band), the middle section (a conical-shaped net mesh), and the lower section containing pockets fixed by iron weights. Cast net,

locally known as Jhaki jal/Khapla jal, is used in the shallow region of the river and estuary to catch different types of fish.

Jhaki Jal/Khapla jal: The net is conical shaped where it is 3 to 6 m long from anterior part to the posterior end with 6 to 12 m in diameter of the mouth (Table 1). The mesh size of the net is 0.625 to 1.25 cm. One person can operate this net as the weight of the net is 3 to 6 kg. The net can be operated in tide, ebb-tide and in the freshwater also at both day and night. Construction cost of the net is 5000 to 10000 BDT having a catch per unit effort of 1 to 5 kg. The main species caught by the net are Bata (*Labeo bata*), Chela (*Salmostoma baciala*), Taposhi (*Polynemus paradiseus*), Baim (*Mastacembelus armatus*), Koi (*Anabas testudineus*), Koral (*Lates calcarifer*), Kuchia (*Monopterusuchia*) and Prawn. The net is found in all over the Bangladesh, known as 'khapla' in Dhaka, Mymensingh, Rajshahi, Jessor, Bogra, Pabna, Rangpur and Dinajpur, 'jhanki' in Rangpur, 'chlatki' in Chittagong, 'Dhundi and kheo' in Sylhet, 'teora' in Jessor and 'pheka' in Dinajpur^[19]. Framed or Dip net are triangular shaped small fishing net made of bamboo frame with which the net is fixed in a water body. This net is locally named as khara jal and mainly used at the mouth of the canal to river.

Khara jal: The net is 5 to 7 m long where the front side is 2.5 to 3.5 m wide and the mesh size of the net is 0.5 to 2 cm (Table 1). Two bamboos are attached at an angle of 35° to make the triangular shape and a bamboo frame stage is built over the narrow canal for staying, pulling and collecting the net from the water body. The triangular portion of the net is lowered to the shallow water areas, the lower portion of the net block total passes way of fish and the fishes are trapped. The net is constructed by polyamide monofilaments, polypropylene or nylon rope but in traditional practice the net is made up of mosquito net available in the market. All small size fish are caught by the net but the main species are Ketchki (*Corica soborna*), Bele (*Glossogobius giuris*), Shoal (*Channa striatus*), Taki (*Channa punctatus*), Punti (*Puntius spp.*), Koi (*Anabas testudineus*), Pangus (*Pangasius pangasius*), Poa (*Otolithoides pama*), Tengra (*Mystus vittatus*) and Prawn. The net is operated by one person and generally used in the rainy season having a life span of 1 to 2 years. The construction cost of the net is 10000 to 20000 BDT having a catch per unit effort of 1 to 5 kg.

Table 1: Different types of net used for fishing in the Rupsha River

Gear Type	Local Name	Construction Cost (BDT/net)	Mesh Size (cm)	Operational Fishermen	Species Caught
Gill net	Punti jal	500 to 5000	2.2 to 3.5	1 to 2	Punti, Bele, Gulsha, Bata, Koi
	Bata jal	50000	2.5 to 5	2 to 3	Bata
Fixed Purse Net	Behundi jal	200000	5 to 6.25 and 0.5 to 1.25	02	Bata, Kuchia, Koral, Koi, Chewa, Chiring, Bashpata, Poa
Cast net	Jakhi jal / Khapla jal	5000 to 10000	0.625 to 1.25	01	Bata, Chela, Taposhi, Prawn, Baim, Koi, Koral,
Dip net	Khara jal	10000 to 20000	0.5 to 2	01	Ketchki, Bele, Shoal, Taki, Punti, Koi, Pangus, Poa, Tengra and Prawn

Fishing Traps: Fishing traps are mostly bamboo and wooden made mechanical devices used in shallow water by both professional and non-professional fishermen. It is very difficult to classify the traps because same device has different names in different districts. Two types of fishing traps were identified in the study area viz., Kholsun and Bitte.

Kholsun: Kholsun is a rectangular box shaped fish trap made of split bamboo, tied with jute rope or cane and consisted of two doors from its apex for fish opening. Height, length and width of the trap are 0.75 to 1 m, 1 to 1.25 m and 0.3 to 0.5 m respectively and the gap between two bamboo sticks is 0.5 to 1 cm (Table 2). The trap is set in shallow part of the estuary with

the help of a bamboo pole or tree branches during early morning or evening from January to July. Small fish like Baim (*Mastacembelus armetus*), Koi (*Anabas testudineus*), Punti (*Puntius spp.*), Tengra (*Mystus vittatus*), Katchki (*Corica soborna*), Mola (*Amblypharyngodon mola*), Chanda (*Chanda nama*), Khalisha (*Colisa fasciatus*) and small prawn are trapped in the trap.

Bitte: Bitte is a basket shaped fishing trap, made of split bamboo with two or three entrances and an opening on the trap

for collecting fish. Height, length, width and gap between two bamboo sticks of the trap are 0.25 to 0.5 m, 0.25 to 1 m, 0.1 to 0.5 m and 0.5-1.0 cm respectively (Table 2). The trap is sunken (0.1 to 0.75 m below from the water surface in shallow water, where small current is present during early morning and evening checked up every one or two hour interval. Usually small fishes are caught by the trap including Baim (*Mastacembelus armetus*), Koi (*Anabas testudineus*), Punti (*Puntius spp.*), Tengra (*Mystus vittatus*), small prawn etc.

Table 2: Different types of trap used for fishing in Rupsha River.

Name of Traps	Size of trap (Approximately)			Made with	Species Caught
	Height	Length	Width/Dia.		
Kholsun	0.75 to 1 m	1 to 1.25 m	0.3 to 0.5 m	Bamboo stick	Punti, Koi, Baim, Punti, Tengra, Katchki, Mola, Chanda, Khalisha
Bitte	0.25 to 0.5 m	0.25 to 1 m	0.1 to 0.5 m	Bamboo split	Baim, Koi, Punti, Tengra, small prawn etc.

Hooks and Lines: Hooks are manufactured in a wide range of size, and the gap between the point and the shank appears to be the dimension, which determines the size range of fish caught by a particular hook. The most familiar type of manufactured steel hook is "J" shaped, which is mostly used for hook and line fishing. Three types of hooks and lines were found in the study area.

Sip Barshi: Sip or Barshi is a very simple barbed hook tied with one end of a line and the other end with a bamboo stick (Table 3). Above the hook there is a float used to drift the hook into desired sub surface of water level which also indicates that if the fish is baited or not. Earth worm and small prawn is used as bait. Main fish species caught by this type of

gear are Kalibaus (*Labeo calbasu*), Koi (*Anabas testudineus*), Shing (*Heteropneustes fossilis*), Punti (*Puntius spp.*), Rita (*Rita rita*), Tengra (*Mystus vittatus*) and some carp species.

Wheel Barshi: Wheel barshi is moderately barbed hook tied with one end of a line and the other end with a bamboo stick and controlling site (Table 3). Above the hook there is a float used to drift the hook into desired sub surface of water level which also indicates that if the fish is baited or not. Earth worm and small prawn is used as bait. Main fish species caught by this type of gear are Kalibaus (*Labeo calbasu*), Koi (*Anabas testudineus*), Shing (*Heteropneustes fossilis*), Punti (*Puntius spp.*), Tengra (*Mystus vittatus*) and some carp species.

Table 3: Different types of hooks and line used for fishing in the Rupsha River

Types of Gear	Name of gear	No. of hooks	Person needed	Boat Needed	Species Caught
Hook and line	Sip barshi	1	1	No Boat Needed	Kalibaus, Koi, Shing, Punti, Tengra and some carp species.
	Wheel barshi	1-4	1	No Boat Needed	Kalibaus, Koi, Shing, Punti, Tengra and some carp species.

Wounding Gears: Spears are the fishing devices which are used to catch fish by throwing or wounding fishes. Two types of spears are mainly used in the Rupsha River.

Konch: Konch is similar to juti but more than 10 pieces of bamboo splits are firmly fixed in a bunch. The pointed ends of the bamboo splits are covered with sharp and pointed iron caps to increase the efficiency. The fishermen wait with great patience from a boat or from any craft or just standing on the bank of a water body and when find the fish, throw the gear with a great force at the fish so as to pin down, when strikes the fish. Fish caught by this gear are Rui (*Labeo rohita*), Catla (*Catla catla*), Shoal (*Channa striatus*), Gozar (*Channa marulius*) etc.

Teta: Teta is a wounding gear made of a long bamboo handle about 2 to 4 long and several iron hooks with iron rod at the base (Table 4). The length of iron rod is about 60 to 65 cm with hooks at the apex. The iron rod with hooks is tightly tied with the bamboo handle by coconut thread or iron wire. The fisherman throws the gear to target species like Boal (*Wallago attu*), Shoal (*Channa striatus*), Taki (*Channa punctatus*), Bele (*Glossogobius giuris*) and others fish species.

In addition to the use of gears for fishing, other devices viz. hand catch, fishing by katha fishing (spots where bushes/branches of plants are accumulated to gather fishes) are also practiced in all the study area.

Table 4: Different types of wounding gears used for fishing in the Rupsha River

Types of gear	Name of gear	Length of handle (m)	Parson and boat needed	Species Caught
Wounding Gears	Konch	2-3	1 & no	Kalibaus, Koi, Shing, Punti, Tengra and some carp species.
	Teta	2-3	1 & no	Boal, Shoal, Taki, Bele

Conclusions

Rupsha River is very rich with fishery resources but the use of fishing gears that catch fish irrespective of their size or species will destroy the habitat of the wild species thus causing multiple damages to all the fish living in the river. For that, the use of selective fishing gears which have the capability to catch fish of distinguishing size and species will help to protect the target species hence reduce the loss of fish biodiversity. Though the use of several types of fishing gear is limited and regulated under the national fishery laws, but they are still used. As the operation of all types of gear cannot be banned immediately to allow the stocked fingerlings to grow out, it is important to identify the gear that can be operated without exploiting undersized fingerlings stocked under the government plan and the gear that should be regulated. The main fundamental objective of responsible fishing is to maximize economic returns to the fishermen without affecting the long-term sustainability of the fishery resources and with minimum impact on the ecosystem. At the same time, an awareness or training program should be conducted under the supervision of the government as well as non-government organizations to the fishermen to create awareness of the long-term effects of different fishing gears and to impart knowledge of fishing laws.

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