



## A survey on variation and availability of fishing gears and crafts in Tulsiganga river, Bangladesh

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**Abstract.** A survey was conducted on the different type and size of fishing gears and crafts that were used in Tulsiganga river, Bangladesh. The survey was based on interviews with the local fishermen and secondary data collected from the local fisheries offices. The collected data reported a total of six distinguishing fishing nets with moderate mesh sizes, two hooks using in line fishing along with four non mechanized fishing traps and two pointed spear like gears handled by human directly during harvesting of fish. Captured fishes were classified into species where the nets captured bigger size of fish and traps are common for harvesting the small indigenous species (SIS). Nets were commonly used rather than hooks and traps because of the high price. Uses of fishing gears and crafts were depending on the depth of water. The trap nets were used at the lower water depth in general while the fishing nets were more capable to catch the fishes in the deep water.

**Key Words:** fishing gear, mesh size, fishing traps, captured fishes, Tulsiganga river.

**Introduction.** Bangladesh is a sub-tropical agro-based riverine country. Crisscross riverine network such as the Padma, the Megna, the Jamuna, the Testa, the Brahmaputra, and the Mohananda are important especially for fisheries and their tributaries numbering about 230 with a total length about 24,140 km (BBS 2010; Moumita et al 2011). There are ~0.80 million ha of inland closed waters and 3.92 million ha of inland open waters along with huge areas of the Bay of Bengal in Bangladesh which are highly potential for fisheries sector (Alam et al 2013; Flowra et al 2013; DoF 2014). Among them, Tulsiganga is a main river of Joypurhat district. The poor fishermen who live on the surroundings of these wetlands or rivers are fulfilling their own protein level and leading livelihood by selling fish through catching by using various fishing gears and crafts (Shahriar et al 2010; Paul et al 2018).

These fishing gears as well as crafts were divided into many categories (Rahman et al 2016). It has different shapes and sizes to capture various size of fish species (Azam et al 2014). Modernized crafts have advancement to capture and transport fishes as well (Rahman et al 2017). Present status of fishing gear and craft indicates the local socio-economic status and fish harvesting capacity from that particular local waterbody. The modern gears and technologies have influenced the fish biodiversity (Rahman et al 2016). Therefore, the evaluation and information about fishing gears and crafts are necessary to deploy developmental measures about smooth harvesting among fisherman's' community (Baleta et al 2017) from any area.

Many researches raised regionally to report the biodiversity of fishers and fishing gears (Azam et al 2014; Ali et al 2015; Rahman et al 2016; Rahman et al 2017) to

understand the fishing status deeply. However, there is no report of fishing gear and craft distribution from the Tulsiganga river, though it is the main river of study area. Thus, the present research was conducted to determine the size variation and availability of fishing crafts and gears with capturing species to know the socio-economic conditions of the fishermen of the Tulsiganga river under Khetlal upazila at Joypurhat district in Bangladesh.

## Material and Method

**Study area.** This study was conducted through a survey analysis for a period of 8 months with adequate questioner interview among the local fishermen from May 2014 to December 2014 in Tulsiganga River under Khetlal upazila at Joypurhat district (Figure 1). The gear selling area like bazar (Market) and the harvesting area (River bank) were selected for direct data collection. Approximately, all the fishermen communities around the river (marked as red box) were covered by researchers.

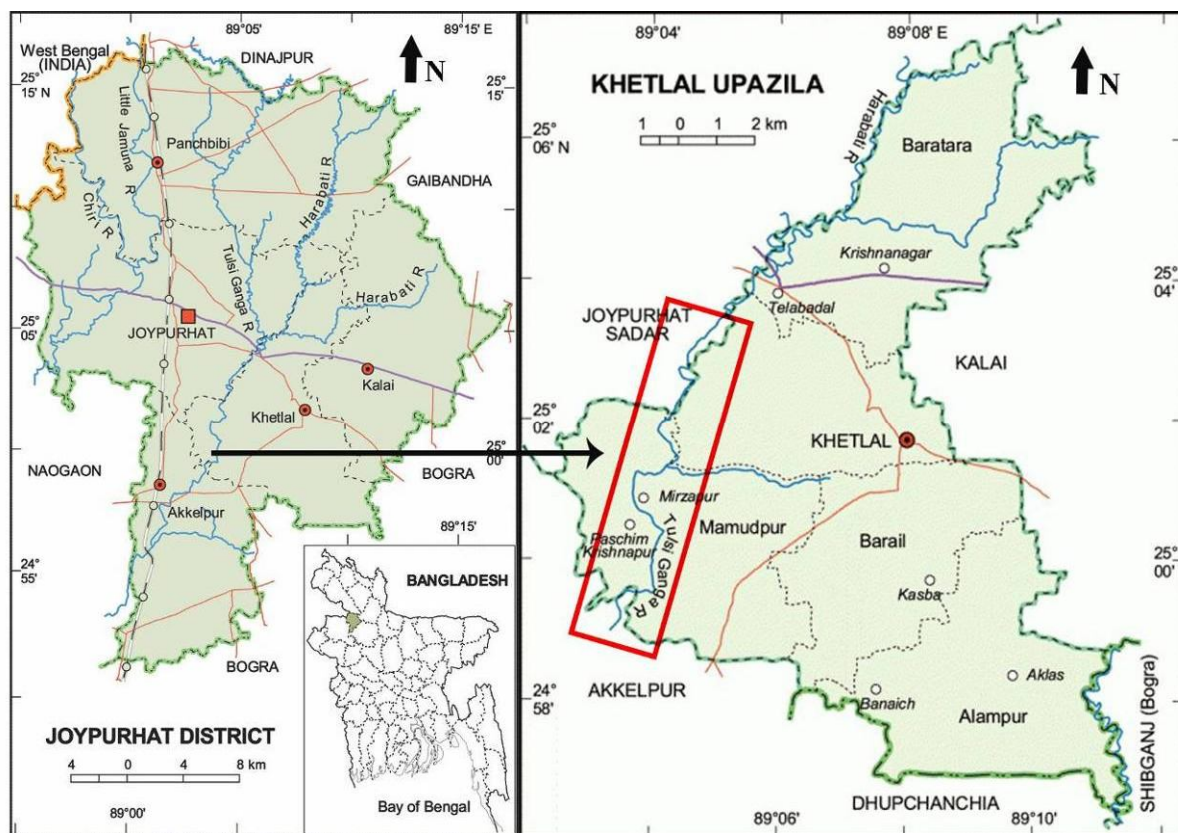


Figure 1. Map showing the study area indicated by the red box.

**Data collection.** The data were collected by questioner interview with fishermen about different fishing gears operated in the river; such as physical structure (length, width, height, mesh size) using materials, operating method, fishing duration of the gear etc. (Azam et al 2014) in tabulated form. Data were not only noted by questioner interview, but also by proper investigation at the gear selling market area.

**Questioners review.** A systematic questioner review was conducted to know the captured fish species as well as to know the mode of usage about crafts and gears during harvesting. Participatory Rural Appraisal (PRA) tools i.e. Focus Group Discussion (FGD) and crosschecking of interviews were conducted among fishermen (Shahriar et al 2010).

**Secondary data.** Cross-checking of interviews were conducted with key informants such as District Fisheries Officers (DFO), Upazila Fisheries Officer (UFO), and relevant

governmental and non-governmental officers and staffs for better analysis (Siddique et al 2013).

**Data analysis.** After cross checking, the collected data were tabulated carefully by applying simple statistics and subjected to simple descriptive analysis using software MINITAB 17 (StatSoft Inc., Tulsa, OK, USA) (Das et al 2014; De et al 2016).

**Results and Discussion.** The majority fisher folk of the study area use various forms, types, and sizes of fishing gears. One type of fishing gear may have different means in different regions and some of the gears are named after the names of the target species. In this study period, there are 6 types of nets (Table 1), 4 types of traps (Table 2), 2 types of spears and harpoons (Table 3) and 2 types of fishing line (Table 4) were found used in this area. Comparatively, in the study of Beel Kumari fisherman (wetland), there are 8 types of nets, 7 types of traps, 4 types of spears and harpoons and 4 types of line fishing were used in this area (Nayem 2013). According to Nayem (2013) the fishing techniques that are currently used amongst the fishermen of Bangladesh have been broadly categorized into netting, angling, trapping, spearing, de-watering and hand fishing. This has been found similar in the present research work. Among different types of nets used were Current jal, Vhesal jal, (Khara jal), Ber jal, and Moi jal. All types of nets are not used in fishing in all seasons. However, the use is depending on the depth of the water level. There are many types of traps used in the study area which were Kholson, Polo, Chunga and Bana. Bana is used as the barricade and the rest three traps are used for catching small indigenous species (SIS). Furthermore, among the types of spears and harpoons observed in the study area were Angta and Conch where the fish were hooked from the bank of water or from the boat. Besides, the line fishing methods were also observed in the study area by the usage of Chip barshi during low water level and Daun barshi during a very high water level. Similar finding was observed by Mia (2009) where the author observed a total of six types of fishing nets used by the fishermen of Megna river. The present data reported that the mesh size is moderate and similar (Table 5) to the other researchers. In addition, unlike other researchers, Chunga is the only reported different trap (Table 6) in the study area. Based on the size variation, Chunga trap is bigger than the other traps in the study area.

According to the local survey conducted by the authors, all nets have higher capacity of capturing variety of fish species due to their sizes. Among the gears, Chip barshi has a higher capacity of capturing various small fish species. Species capturing capacity of cast net and Chip Barshi were found similar (Figure 2) but the sizes of fishes are different (Tables 1 and 4).

Price variation of the gears (Table 7) was depending on the size variation of nets and traps. Prices of commercially used nets and personal nets are also varied widely. Dip net has the lowest price (Table 7) among all nets which is also supported by Bhattacharjee et al (2017). Present study found that seine net has higher price due to its bigger size which is also reported by other researchers (Table 7). The prices of traps are in moderate range (Table 8). Most of the net has similar price distribution compared to other researchers. Some fishermen are also capable of making traps by themselves from surrounding raw materials. Hocks are the cheapest fishing crafts among all portable gears (Table 9) with a low harvesting capacity. Chip hooks are used round the year comparing with Daun hooks (Table 4). Obtaining fishing gears by fishermen is also depending on the economic capacity of fisherman and the prices of fishing nets. Survey showed that traps and other gears were normally used in shallow water while nets were used for deep water body. Thus, the selection of gears and crafts depend on the water depth of the fishing ground.

Table 1

List of available fishing nets with their related captured fish species around Tulsiganga river

No.	English name	Local name	Shape	Component	Species captured
1	Cast net	Khepla jal	Conical	A strong cord, sinkers, nylon thread	<i>Pethia ticto</i> , <i>Puntius sophore</i> , <i>Rasbora daniconius</i> , <i>Anabas testudineus</i> , <i>Trichogaster fasciata</i> , <i>Mystus cavasius</i> , <i>Mystus tengara</i> , <i>Wallago attu</i>
2	Lift net	Khora jal, Veshal jal	Triangular	Bamboo, nylon thread	<i>Pethia ticto</i> , <i>Puntius sophore</i> , <i>Labeo bata</i> , <i>Labeo rohita</i> , <i>Labeo calbasu</i> , <i>Cirrhinus cirrhosus</i> , <i>Anabas testudineus</i> , <i>Mystus cavasius</i> , <i>Mystus tengara</i> , <i>Clarias batrachus</i> , <i>Heteropneustes fossilis</i>
3	Framed net, dip net, push net	Thela Jal	Triangular	Bamboo poles, natural or artificial twines	<i>Pethia ticto</i> , <i>Puntius sophore</i> , <i>Glossogobius giuris</i> , <i>Parambassis ranga</i> , <i>Chanda nama</i>
4	Gill net, drift net	Current jal	Rectangular	Synthetic or cotton twine, sinker, floats,	<i>Pethia ticto</i> , <i>Puntius sophore</i> , <i>Anabas testudineus</i> , <i>Glossogobius giuris</i> , <i>Mystus bleekeri</i> , <i>Mystus cavasius</i> , <i>Mastacembelus armatus</i>
5	Seine net	Ber jal	Rectangular	plastic tetron and nylon thread, floats of sponge and sinker	<i>Pethia ticto</i> , <i>Puntius sophore</i> , <i>Labeo rohita</i> , <i>Mystus cavasius</i> , <i>Mystus tengara</i> , <i>Xenentodon cancila</i>
6	Drag net	Moi jal	Rectangular	Nylon threads, synthetic floats and earthen found sinkers	<i>Pethia ticto</i> , <i>Puntius sophore</i> , <i>Osteobrama cotio</i> , <i>Amblypharyngodon mola</i> , <i>Rasbora daniconius</i> , <i>Colisa fasciatus</i>

Table 2

List of different traps and its structures available around Tulsiganga river

No.	Name of trap	Shape	Materials	Measurement (Ft)	Species cultured
1	Bana	Rectangular	Narrow bamboo splits, flat bamboo splits, coir, ropes.	Length: 0.7-0.8; Breadth: 0.3-0.5	SIS species
2	Polo	Bell-bottom	Bamboo splits, coir, nylon thread	Length: 2-2.5; Diameter: 1.4-1.6	<i>Labeo rohita</i> , <i>Labeo calbasu</i> , <i>Clarias batrachus</i> , <i>Wallago attu</i>
3	Kholson	Rectangular	Narrow and smooth bamboo splits, flat bamboo splits, coir or nylon threads	Length: 2-3; Breadth: 1-0.5	SIS species
4	Chunga	-	bamboo or trunk	Length: 2.5-3.5	<i>Clarias batrachus</i> , <i>Heteropneustes fossilis</i>

Table 3

## List of spears and harpoons used around Tulsiganga river

No.	Local name	English name	No. of spear	Length of fork and handle (feet)	Species captured
1	Coach	Spear	8-15	0.75 and 5.83	<i>Pethia ticto</i> , <i>Puntius sophore</i> , <i>Trichogaster fasciata</i> , <i>Mystus bleekeri</i> , <i>Mystus cavasius</i> , <i>Mastacembelus armatus</i> , <i>Macrognathus pancalus</i>
2	Angta	Harpoon	2-3	0.83 and 6.25	<i>Anabas testudineus</i> , <i>Clarias batrachus</i> , <i>Channa punctata</i> , <i>Channa striata</i>

Table 4

## List of hooks and lines used around Tulsiganga river

No.	Local name	English name	No. of hooks	Materials	Bait	Using season	Species captured
1	Daun barshi	Daun hook	10-55	Sola, thread, hook,	Earthworm, snail flesh	August-December	<i>Wallago attu</i> , <i>Channa punctata</i> , <i>Channa striata</i>
2	Chip barshi	Chip hook	1-2	Split bamboo, nylon thread	Earthworm, bread, prawn	Round the year	<i>Pethia ticto</i> , <i>Puntius sophore</i> , <i>Labeo rohita</i> , <i>Labeo calbasu</i> , <i>Cirrhinus cirrhosus</i> , <i>Channa punctata</i> , <i>Channa orientalis</i>

Table 5

## Comparison of mesh size variation of available nets around Tulsiganga river with other studies

Type of net	References					
	Present study	Bhattacharjee et al (2017)	Rahman et al (2017)	Islam et al (2016)	Rahman et al (2016)	Siddique et al (2013)
Seine net (Ber Jal)	0.5-1.5 cm	0.5-2.3 cm	0.5-1.0 cm	-	0.5-2.0 cm	0.2-2.3 cm
Lift net (Dharma Jal)	0.5-1.0 cm	0.5-2.0 cm	0.5-1.0 cm	-	0.5-1.0 cm	0.5-2.0 cm
Cast net (Jhaki Jal)	1-1.5 cm	0.63-1.25 cm	2.5 cm	0.625-1.25 cm	0.5-1.0 cm	0.625-1.25 cm
Gill net (Koi Jal)	Varies	4.5-15 cm	6-10 cm	2.5 -5.0 cm	0.2-11.0 cm	2.2-15 cm
Push net (Thela Jal)	1.25-2.5 cm	0.2-1.0 cm	0.5 cm	0.5-2.0 cm	0.5-1.0 cm	0.2-1.0 cm
Fixed purse net (Behundi, Bedha, Jakhi net)	-	-	0.5-1.0 cm	0.5-1.25 cm	0.5-2.5 cm	0.5-1.25 cm
Drag net (Moi jal)	1.5-2.0 cm	-	-	-	-	2-5 cm
Area	Tulshiganga River, Joypurhat	Hakaluki hoar, Bangladesh	Agunmukha River, Patuakhali	Rupsha River, Khulna	Paira River, Patuakhali	Meghna River, Chandpur

Table 6

Comparison of length-size variation of available traps around Tulsiganga river with other studies

Type of trap	Present study	References			
		Islam et al (2016)	Siddique et al (2013)	Sultana & Islam (2016)	Sultana et al (2016)
Bana	Length: 0.7-0.8 ft; Breadth: 0.3-0.5 ft	-	-	Length: 0.7-0.8 ft; Breadth: 0.3-0.5 ft	-
Polo	Length: 2-2.5 ft; Diameter: 1.4-1.6 ft	-	-	Length: 2-2.5 ft; Diameter: 1.4-1.6 ft	Height: 0.6-0.9 m
Kholson	Length: 2-3 ft; Breadth: 1-0.5 ft	Height: 0.75 to 1 m; Length: 1 to 1.25 m; Width: 0.3 to 0.5 m	Height: 0.75 to 1 m; Length: 1 to 1.25 m; Width: 0.3 to 0.5 m	Length: 2-3 ft; Breadth: 0.5-1.0 ft; Height: 1.5-2.0 ft	-
Chunga Area	Length: 2.5-3.5 ft Tulshiganga River, Joypurhat	- Rupsa river, khulna	- Meghna River, Chandpur	- Chalan Beel, Nator	- Payra River, Patuakhali

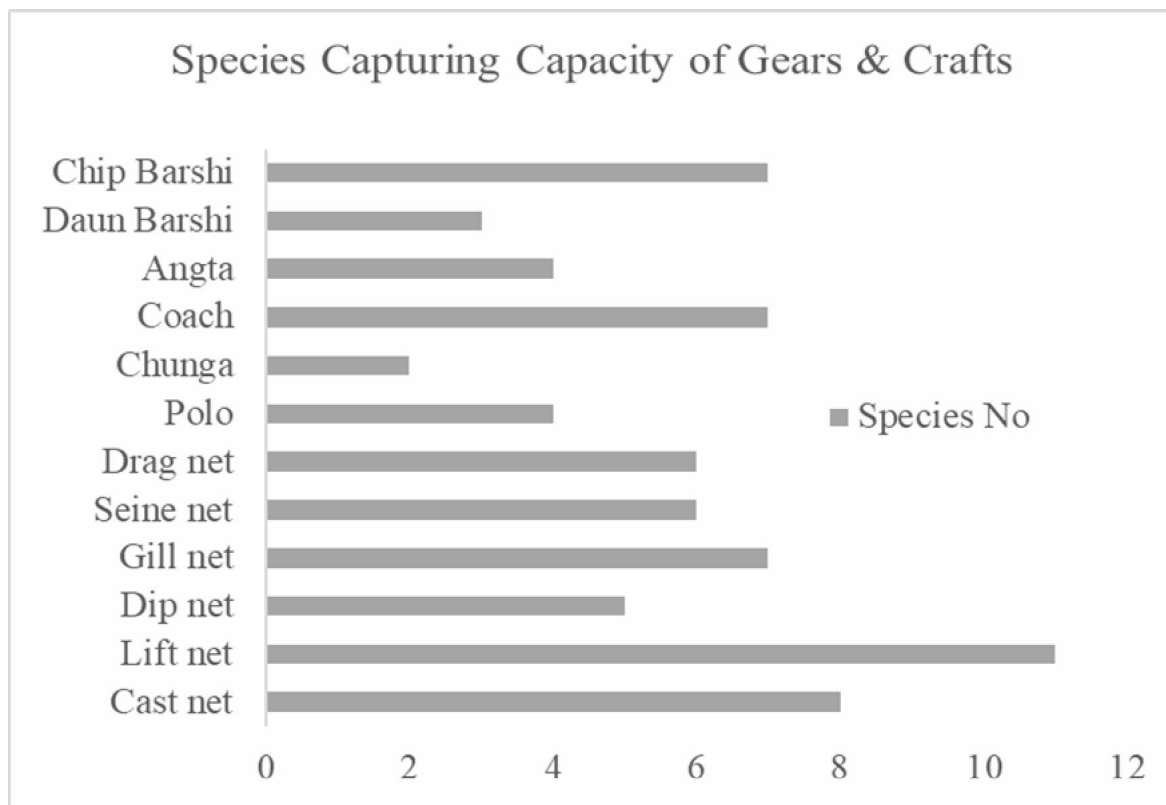


Figure 2. The number of species captured according to different fishing gears and crafts.

Table 7

Comparison of price variation in US dollar (USD) of available nets around Tulsiganga river with others studies

Type of net	References				
	Present study (USD)	Sultana et al (2016) (USD)	Siddique et al (2013) (USD)	Islam et al (2016) (USD)	Bhattacharjee et al (2017) (USD)
Cast net	9.52-20.23	35.71-47.62	59.52-119.04	59.52-119.04	5.95-17.86
Lift net	41.67-71.42	47.62-71.43	59.52-595.23	-	119.04-166.67
Framed net, dip net, push net	2.38-5.95	-	119.04-238.09	119.04-238.09	5.95-11.90
Gill net, drift net	Varies	238.09-595.23	5.95-595.23	5.95-595.23	178.57-238.09
Seine net	142.85-238.09	476.19-714.28	2380.95-3571.43		2380.95-3571.43
Drag net	17.86-20.24	11.90-16.67	11.90-14.28		
Area	Tulshiganga River, Joypurhat	Payra River, Patuakhali	Meghna River, Chandpur	Rupsa River, Khulna	Hakaluki hoar, Bangladesh

Table 8

Comparison of price variation in US dollar (USD) of available traps around Tulsiganga river with others studies

Name of traps	References		
	Present study (USD)	Bhattacharjee et al (2017) (USD)	Sultana et al (2016) (USD)
Bana	0.95-1.42	2.38-5.95	-
Polo	1.07-1.31	-	2.38-3.57
Kholson	1.19-1.78	-	-
Area	Tulshiganga River, Joypurhat	Hakaluki hoar, Bangladesh	Payra River, Patuakhali

Table 9

Comparison of Price variation in US dollar (USD) of available fishing crafts around Tulsiganga river with others studies

Name of crafts	References	
	Present study (USD)	Rahman et al (2017) (USD)
Koch	1.19	1.19-1.54
Angta	2.02	2.98-3.57
Daun Barshi	0.30-0.71	-
Chip Barshi	0.23-0.47	1.19-1.42
Area	Tulshiganga River, Joypurhat	Agunmukha River, Patuakhali.

**Conclusions.** Tulsiganga river plays an important role in capture fisheries at Joypurhat, Bangladesh. By using different gears and traps, this helps in fishing but using oversized craft and nets are threat to the biodiversity. Afterwards, new researchers should identify the future developmental sector in fishing crafts and gear with environment friendly mechanism without hampering the biodiversity of those harvesting area. Further research is essential to have a clearer view of impacted fishing community by fishing gears and traps.

**Acknowledgements.** Thanks to Institute of Climate Change, UKM for the financial support through the research grant "GUP-2017-023" to the corresponding author.

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Received: 19 September 2018. Accepted: 02 December 2018. Published online: 17 February 2019.

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How to cite this article:

Paul A. K., Ray S., Islam M. S., Bashak S. K., Noor N. M., De M., Das S. K., 2019 A survey on variation and availability of fishing gears and crafts in Tulsiganga river, Bangladesh. *AAFL Bioflux* 12(1): 230-238.