

Studies on Fish Diversity and Fishing Gears Used in the Wetland Areas of Jorhat District Assam

GAYATRI AGNI BORAH¹, PUBALI BHUYAN² and RIMEN BORDOLOI^{*3}

¹ Department of Zoology, Bahana College, Bahana, Jorhat - 785 101, Assam, India

² Department of Life Sciences, Dibrugarh University, Dibrugarh - 786 004, Assam, India

³ Department of Zoology, Debraj Roy College, Golaghat - 785 621, Assam, India

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Abstract

Fishing gears is the prerequisite in the study of different aspects of fishes. Present study mainly focus on the fish diversity and fishing Gears use in the wetland areas of Jorhat District, Assam. A field study was conducted to record the traditional fishing techniques used in selected area, from which it was found that there are ten different kinds of traps, nets, and hooks used for fishing. It was also observed that different synthetic nets were used instead of traditional fishing gears. From different wetland of Jorhat district, Assam different fish species and five main types of gears were reported.

Key words: Fishing gears, Fish, Wetland, Diversity, Jorhat

North East India is considered as one of the hot spots of freshwater fish biodiversity in the world [1]. There has been wide varieties of fishes reported from this region ranging from 172 [2] to 267 [3]. About 1.03 lakh hectares of natural lentic water bodies, including wetlands connected to the rivers Brahmaputra, Barak, and their tributaries, are present in Assam. Wetlands, which occupies approximately 6% of the earth's surface and are considered as the most significant ecosystem, are a crucial component of both terrestrial and aquatic ecosystems. The wetland ecosystems are very rich in fish diversity [4-9]. About 217 fish species belonging to 104 genera 37 families and 10 orders have been recorded from the water bodies of Assam including wetlands [10].

The success of fishing tactics depends on a number of variables, including site selection, timing, effectiveness of the materials employed, and availability of fish. Traditional, non-mechanized, locally made fishing equipment and crafts are popularly used in North-east India. In Assam, grappling and locally built nets are mostly used to catch various types of fish due to the widely diversified natural water regions of the state.

The choice of equipment may vary depending on time of the year, type of the water body, type of the targeted fish and the efficiency of the equipment based on certain accepted standards. Different studies were carried out by various authors in different parts of India on types and uses of fishing gears, practices and cultural aspects of fisher folk [11-17]. Different studies also found on the community fishing and economic aspects of fishermen communities in Assam [18-21]. Present study mainly focus on the various types of fishing equipment used by the Kaibarta community along with occurrence of fish species in Borsola beel, Jorhat, Assam.

The Borsola wetland (Open beel), which is about 5 kilometres to the northeast of Jorhat town in Assam, is situated in the geographic coordinates 26048/-26049/N and 94008/-94010/E. Between August 2021 and July 2022, fishermen using the sampling locations frequently gathered fish samples. Additionally, fish species were gathered from the fish landing sites. Collected specimens were preserved in 5% formaldehyde solution for further study. Identifications of the fish species were carried out following standard literature of Talwar and Jhingran [22] and Jiyaram [23]. Conservation status of each species was determined following IUCN red list. Fieldwork and direct questions to the fishermen about the specifics of their fishing equipment, its workings, and the kinds of fish they caught in the research region were utilized to acquire the information.

RESULTS AND DISCUSSION

In this study fish species composition comprised sixty-three (63) individuals from twenty (20) families. Among the families recorded Cyprinidae is the dominant family with 21 species are found. Several different types of fishing nets, bamboo traps, hooks, and lines to catch fishes have been documented during the research period in response to numerous aspects, such as the physiography of the water body, the nature of the fish stock, etc. Different fishing crafts, their structure, size mode of operation, type of fish trapped etc. are depicted in (Table 2).

Berjal

It is a big rectangular seine net, and the term "tanaber" also refers to the surrounding net. The net is closed in a semicircle, using the coast as its foundation, and is slowly

MATERIALS AND METHODS

***Correspondence to:** Rimen Bordoloi, E-mail: pubalibhuyan14feb@gmail.com; Tel: +91 8638039538

pulled in at each end to raise it onto the ground. The payment of the net is done by two boats, each of which carries half of the net. The boat travels to a suitable distance from the coast, turns to the side, and then heads straight towards the shore when it becomes aware of the net. The catch is then gathered at the

centre of the net once the net has been brought up. Berjal needs 10-15 persons and 7 to 4 boats to operate. The surface and column feeders such *Labeo spp.*, *Cirrhinus spp.*, *Mystus spp.*, *Channa spp.*, *Wallago attu*, *Ompok spp.*, and *Rita rita* make up the majority of the catch composition.

Table 1 Showing the main catches of the gears and books along with their cost of fabrication and efficacy

Gear name	Description	Fishes caught	Person involved	Cost of fabrication (Rs)	Operation time	Total Fish weight (kg)	Total income per day (Rs)
Berjal	It is a big rectangular seine net. Now a days mosquito net is also used	All size groups	7 -10	6000-10000	1-3 days	Up to 400-500	500-1500
Gilnet / Phansi jal	It is made up of delicate nylon fibre of different mesh sizes with floats and sinks.	Up to 1-2 kg	1	500-5000	6-7 hr	1-5	300-1000
Castnet	Made with synthetic net consists of very small gaps in it.	All size group of fishes	1	2000-5000	5-10 min	4-6	700-1000
Polojal	Made up of triangular net fitted in a bamboo frame	Large sized fish <i>Labeo</i> , <i>Channa</i> <i>maurilius</i> etc	1	8-1000	15-30 min	1-10	500-2000
Ghatjal	Made up of large triangular net fitted in a bamboo frame	Small and medium sized fishes are caught in large numbers	1	5000-1000	2-5 min	1-100	500-10000
Lines and hooks	Made of thin bamboo sticks with a thread bind in the anterior end of the stick and hooks at the end of the thread.	Carnivorous fishes e.g., <i>Walagoo</i> , <i>Channa</i> sp are caught	1	50-100	30-60 min	50-4	150-300
Uvoti	It is constructed with thin bamboo sticks and placed with baits for trapping carnivorous medium sized fishes e.g., <i>Clarias</i>	carnivorous medium sized fishes e.g., <i>Clarias</i>	1	20-50	30 min	10-15kg	150-300

Gheko

It is a fishing device generally constructed in the outlet of the wetland. To the nearby river. It is mainly made up of “banas” made of bamboo. Before winter fishes go out of the wetland through the feeding channel and they are caught while entering this device.

Phansijal

A typical gill net called a *phansijal* is smaller than a *langijal*. Additionally, it has a rectangular form and is composed of lightweight materials like nylon or hemp. This net is controlled by connecting it to a support (often bamboo) at one end of the river, and a rope is fastened to the other end of the net. Medium size fishes are caught with this net.

Cast net

The most typical sort of net used in the area is a cast net called *khewali jal*. It is a conical cast net with an 8–15 mm mesh size, measuring 2–2.5 metres in length. The cone's bottom circular border is doubled and ranges in height from 30 to 50 cm. A chain of drum-shaped sinkers is positioned around the inner border of the mouth of the pockets. The cone's tip has a rope tied to it. The fisherman's right hand held the folded net while his left held the rope's end. Typically, all fish species are captured with this net.

Ghat jal

It is made of triangular net fitted in a bamboo frame. The wide mouth side of the net is placed in the flowing water body opposite to water current. Fishes enter the net and they are caught in large number by dragging it up by weigh of the fisherman and kept alive in cage made by net.

Line and hooks

Different types of lines and hooks are used to catch medium to big sized fishes as follows:

Sip barshi

It is made of bamboo, which is frequently longer than 6 metres. A nylon line with a hook and a grasshopper or earthworm or small forage fish as bait is fastened to the tip of the bamboo. This type of hooks is used to catch small and indigenous fishes.

Nal Boroshi

In this type a short line is attached with a floating piece of *Nal* (a hollow stem of riverine grass). In the other end a small live fish is attached to the hook and released to open lentic water bodies at night. Mostly *Channa* species are caught by this method.

Table 2 Distribution of fish species found in Borsola beel

Family	Scientific name	Common name	Frequency	Status
Notopteridae	<i>Chitala chitala</i>	Chital	Common	EX-NA
	<i>Notopterus notopterus</i>	Kanduli	Very common	LC
Clupeidae	<i>Gudusia chapra</i>	Koroti	Common during summer	EX-NA
	<i>Hilsa ilisha</i>	Ilish	Common	EX-NA
Cyprinidae	<i>Amblypharyngodon mola</i>	Mowa	Very common	LC
	<i>Pseudeutropius atherinoides</i>	Bordua	Common	LC
	<i>A. morar</i>	Boriala	Occasional	EX-NA/DD
	<i>Catla catla</i>	Bahu	Common	LC
	<i>Chela atper</i>			EX-NA
	<i>Cirrhinus mrigala</i>	Mirika	Very common	LC
	<i>Reba</i>	Bhangun	Common	LC
	<i>Esomus denricus</i>	Dorikona	Very common	EX-NA
	<i>Labeo rohita</i>	Rahu	Very common	EX-NA
	<i>L. beta</i>		Common	EX-NA
	<i>L. boga</i>		Common	EX-NA
	<i>L. calbasu</i>	Mali	Common	EX-NA
	<i>L. gonius</i>	Kunhi	Very common	EX-NA
	<i>Punctius chola</i>	Cheni puthi	Common	EX-NA
	<i>P. phutunio</i>	Chokori puthi	Very common	EX-NA
	<i>P. sarana</i>	Kani puthi		EX-NA
	<i>P. sophore</i>	Puthi	Very common	EX-NA
	<i>P. ticto</i>	Henduri puthi	Common	EX-NA
	<i>Rasbora daniconius</i>	Dorikona	Common	EX-NA
	<i>Ctenopharyngodon idella</i>	Common carp	Common	LC
	<i>Cyprinus carpio communis</i>	Silver carp	Common	VU
Cobitidae	<i>Botia dario</i>	Gethu	Common	LC
Bagridae	<i>Aorichthys aor</i>	Ari	Common	LC
	<i>Mystus bleekeri</i>	Singara	Common	LC
	<i>M. cavasius</i>	Lalua singara	Very common	LC
	<i>M. tengra</i>	Singara	Common	LC
	<i>M. vittatus</i>	Singara	Common	LC
	<i>Rita rita</i>	Ritha	Common	LC
Siluridae	<i>Ompok bimaculatus</i>	Bami	Common	NT
	<i>O. pabda</i>	Pavo	Common	NT
	<i>O. pabo</i>	Pavo	Common	NT
	<i>Wallago attu</i>	Borali	Common	VU
Schilbeidae	<i>Alia colia</i>	Kokila	Common	EX-NA/DD
Badidae	<i>Dario dario</i>	Gatho	Common	DD
Symbranchidae	<i>Monopterusuchia</i>	Cuchia	Common	LC
Heteropneustidae	<i>Heteropneustes fossilis</i>	Singi	Common	EX-NA/DD
Chacidae	<i>Chaca chaca</i> (Ham)	Kurkuri	Common	LC
Belonidae	<i>Xenentodon cancila</i>	Kokila	Common	LC
Chandidae	<i>Chanda nama</i> (Ham)	Chanda	Common	LC
	<i>Parambasis ranga</i>	Chanda	Very Common	EX-NA/DD
	<i>P. baculis</i>	Chanda		EX-NA/DD
Nandidae	<i>Nandus nandus</i>	Gadgedi	Common	LC
Gobiidae	<i>Glossogobius giuris</i>	Patitmutura	Common	DD
Anabantidae	<i>Anabus testudinius</i>	Kawoi	Very common	VU
Belontidae	<i>Colisa fasciata</i>	Kholihona	Very common	EX-NA/DD
	<i>C. lalia</i>	Kholihona	Common	EX-NA/DD
Channidae	<i>Channa barca</i>	Futuki senga	Common	DD
	<i>C. gachua</i>	Sengali	Very common	LC
	<i>C. marulius</i>	Saal	Common	LC
	<i>C. punctatus</i>	Goroi	Common	LC
	<i>C. stewarti</i>	Sol	Common	LC
	<i>C. straitus</i>	Sal	Common	LC
Mastacembelidae	<i>Macrognathus aculeatus</i>	Tora		LC
	<i>M. puncalus</i>	Jati tora		EX-NA/DD
	<i>Mastacambelus aral</i>	Tora		EX-NA/DD
	<i>M. puncalus</i>	Tora		EX-NA/DD
Tetrodontidae	<i>Tetrodon cutcutia</i>	Gangatup	Common	EX-NA/DD

EX: Extinct, VU: Vulnerable, EX-NA: Not applicable, DD: Data deficient, LC: Least concern



Fig 1 Fish catching using fishing gear in study area

Dham borosi

Here many hooks with small pieces of lines are attached to a long rope and kept in suitable water bodies during night hours. Many fishes are hooked in this process.

Uvoti

It is constructed with thin bamboo sticks and placed with baits for trapping carnivorous Fishes. Mostly clarius species are caught in this process.

CONCLUSION

In the present study it is found that the quantity of fishes caught in every gear has been decreasing resulting over exploitation of wetlands. Indiscriminate catching of fishes violating fishing laws results in lesser production in the successive years. For conservation of indigenous fish species and the traditional gears indiscriminate fish catching during breeding season must be banned. According to the current

study, fish are caught in the study region using different types of fishing equipment. The majority of people living in the study region depend primarily on agriculture and fishing for their livelihood, and traditional fishing gear plays a significant role

in preserving their way of life.

Conflict of interest

Authors declared no conflict of interest.

LITERATURE CITED

1. Kottelat M, Whitten T. 1996. Freshwater Biodiversity in Asia with special reference to Fish: World Bank Tech. Paper No. 343. The world Bank, Washington, DC. pp 17-22.
2. Ghosh SK, Lipton AP. 1982. Ichthyofauna of the N.E.H. Region with special reference to their economic importance. ICAR Spl. Bulletin No. 1 (ICAR Research Complex, Shillong). pp 119-126.
3. Sen N. 2000. Occurrence, distribution and status of diversified fish fauna of North East India. *In: Fish Germplasm Inventory and Conservation in North East India* (Eds.) A.G. Ponniah and U.K. Sarkar, NBFGR, Lucknow.
4. Agarwala NK. 1996. Limnology and fish productivity of Tamranga wetland in Bongaigaon district of Assam (India) with special reference to some productivity indicators. *Ph. D. Thesis*, Gauhati University, Guwahati.
5. Deka TK, Kakati M, Goswami MM. 2001. Diversity of wetland fish and its impact on the income of fishermen community of Assam. *Jr. Indian Fish. Association* 26: 11-22.
6. Dey SC. 1981. Studies on the hydrobiological conditions of some commercial lakes (Beels) of Kamrup District of Assam, their bearing on fish production. Final Technical Report, North Eastern Council. pp 177.
7. Kumar P, Meenakumari B. 2002. Suggestion for management of beels, the Brahmaputra River system, Assam. *Aquaculture* 3(2): 223-228.
8. Goswami TK, Goswami MM. 2006. Ichthyofaunal diversity and catch statistics of Jamlai wetland in Kamrup district of Assam, India. *Jr. Inland Fish. Soc. India* 38(2): 38-44.
9. Nayak L, Mishra AK. 2008. Socio economic condition of fishermen and its effects on environment. A case study of Ganjam district, Orissa. *Jr. Nat. Environ. Poll. Technology* 7(1): 111-116.
10. Bhattacharjya BK, Choudhury M, Sugunan VV. 2003. Ichthyofaunastic resources of Assam with a note on their sustainable utilization. *In: Participatory Approach for fish biodiversity conservation in North East India*. Pub. Director, NBFGR, Lucknow, India. pp 87-105.
11. Kurien J. 2001. The socio-cultural aspects of fisheries: Implication for food and livelihood security- A case study of Kerala State, India. *In: (Eds) J. R. McGoodwin. Understanding the cultures of fishing communities: A key to fisheries management and food security*, FAO Fish. Tech. Pap. No. 401.
12. McGoodwin J. 2001. Understanding the cultures of fishing communities: A key to fisheries management and food security (FAO Fish. Tech. Pap. No. 401)
13. SIFFS. 1992. Census of the Artisanal Marine Fishing Fleet of Kerala State. (South Indian Federation of Fishermen Societies, Thiruvananthapuram, India.
14. Kar D, Dey SC. 1991. Gill nets in Lake Sone of Assam with their economics and impact on fishery. *Journal of Applied Zoology Research* 2(2): 76-79.
15. Kar D, Dey SC. 1993. Variegated encircling gears in Lake Sone of Assam. *Journal of Applied Zoology Research* 4(2): 171-175.
16. Kar D, Dey SC. 1996. Scooping Gears of Lake Sone in Assam. *Journal of Applied Zoology Research* 7(1): 65-68.
17. Gurumanyu SD, Choudhury M. 2009. Fishing methods in the Rivers of Northeast India. *Indian Journal of Traditional Knowledge* 8(2): 237-241.
18. Dey SC. 1984. Community fishing in Assam and its impact on beel fisheries, Proc. Assam Science Society Conference 31, Guwahati. pp 14-15.
19. Deka J, Bhuyan SK, Baruah C, Rahman M. 2008. Sustainable economy and livelihood through participatory approach in the deeporbeel Wetland of Assam. Proceedings National Seminar on Wetland and Livelihood, Guwahati. pp 245-248.
20. Deka TK. 2008. Status of wetland and their impact on the livelihood of fisherman community of Assam. Proceedings of National Seminar on Wetland and Livelihood, Guwahati. pp 249-263.
21. Barman R, Boro A. 2008. Wetlands in Assam: An appraisal of their natural and socio-economic importance. Proceedings of National Seminar on Wetland and Livelihood, Guwahati. pp 227-237
22. Talwar PK, Jhingran A. 1991. *Inland Fishes of India and Adjacent Countries*. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. 2: 1158.
23. Jayaram KC. 1999. *The Fresh Water Fishes of the Indian Region*. Narendra Publishing House, Delhi. pp 551.