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Original Research Article

A Study on Traditional Fishing Gears and Fish Capturing Methods Used by The Mising Community of Gohpur Subdivision, Biswanath District, Assam

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ABSTRACT:
The implementation of various fishing gears is the product of experiences gathered over the course of a significant amount of time. Every water body has its own particular arrangement of gears. The use of fishing equipment also provides insight on the community of fishermen's financial situation. In order to produce substances of technological delight while keeping costs to a minimum, fishermen employ materials that are readily available in their local area. A research was carried out on the fishermen in the Mising subdivision of the Gohpur district in order to collect data on the various traditional fishing gears and methods of catching fish. It has been discovered that Mising fisherman employ a variety of fishing gear, the majority of which they designed on their own. Different fishing gear is utilized during different times of the year and in distinct bodies of water for catching fish of varying sizes. In addition to their participation in community fishing, Mising women also participate in fishing on their own. They fish for enjoyment in addition to commercial reasons. Total 28 types of gears and different methods of fish capturing have been reported during the survey period. All gears are eco-friendly. To raise awareness among fishermen of the long-term effects of their fishing techniques,workshops or training programmes should be organised.

Keywords: Traditional, fishing methods, fish, Mising community, Gohpur, Assam

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INTRODUCTION

Fish plays an important role in human resource management. Fish is high in nutrients such as protein, carbohydrates, and lipids, especially vital fatty acids, all of which are important in the human diet. Fishing is one of humanity's oldest activities, and from prehistoric times, fish has been one of the most essential food sources (Haque, 2017). In India, fish has always been a staple of the tribal diet due to the presence of tribal people and their rich primitive culture (Singh & Pandey, 2015). The North Eastern region of India is gifted with vast aquatic resources in the form of rivers, streams, lakes, reservoirs, floodplain, wetlands, ponds, and large area under rich fish culture system. The region has a high level of biological variety and endemism (Teronpi et al., 2012). The North-Eastern region of India, particularly the state of Assam, is endowed with an abundance of biological diversity and fishing resources; also, the majority of the population consumes fish (Bhuyan et al., 2017).Assam is blessed with a significant quantity of fresh water resources, which can be broadly divided into two types based on fundamental ecological considerations. It consists of i) Ponds and ii) Streams and rivers. These water bodies are exceptionally nutrient-dense and have enormous production potential due to their rich nutritional status and organic matter content.

Assam is a land of many tribes, culture and religions. It includes Bodo, Karbi, Mising, Garo, Deuri, Kuki, Dimasa etc. Among the all tribes of Assam, Misings are the second largest ethnic tribe of Assam, population of which is estimated to be 7 lakhs approximately (2011 census).They mainly depend on nature for food, medicine, drinks, fishing and other activities. Considering the importance of the traditional knowledge for the welfare of human being, a number of research activities have been under taken in North-East India. They reveal a lot of interesting findings on traditional knowledge in relation to biodiversity. Human societies of each and every region possess individual types of fishing gears and traditional fishing practices. There are around 30 villages in Biswanath district of Assam that are home to a large group of Mising people, whose economy is heavily reliant on fish and agricultural commodities grown in the area. Despite the fact that fishing is their main source of income, they still rely on the traditional methods. A wide range of traditional and local fishing gear is used to harvest the resources of fisheries of the region. The vast majority of traditional gears are fully constructed of bamboo. The area from where the fishing resources were taken, along with other essential factors, must be properly studied and analyzed because they all affect the fishery potential of that region. As a result, the objective of the current study was to compile baseline information on fishing gear and specifications from a few lake bodies. The practices and equipment used by the fishing community in the Gohpur subdivision.

MATERIALS AND METHODS

Study area

The area of study is the "Gohpur subdivision," which is between 26.88N and 93.63E and is in the Biswanath district of Assam, India with a population of 1, 21,830 (2011census). There are more than thirty villages in the Gohpur subdivision, of which five Gram panchayats are dominated by Mising people. For the purposes of this study, twelve villages located in close proximity to water bodies with significant potential for fisheries were selected at random. The Brahmaputra, Dikrong, Kharoi, and Solengi rivers are the most significant contributors of water. The water body close to the research area consists primarily of Dhandibeel and Bahumaribeel (Table 2), while other beels are also present.The villages for study are viz Rajabari, Dhandipathar, No 1 & 2 Ujabora, No.1 Majukuchi, No.2 Majuchi, Kutumgaon, Chirakhowa, Rawnamukh, Kamalapathar, Borphalang, Gopaljarani, Thotechapori (Table 1).

Table 1: Showing information about the study area

Sl. No.	Name of the village	Population(in Numbers)	Longitude	Latitude	Name of GP	Name of Block
1	Rajabari	1136	93.666396	26.666396	Kharoiparia	Pub Chaiduar development block
2	Dhandipathar	3200	93.695478	26.843834	Kharoiparia	-
3	No 1 & 2 Ujabora	2300	93.645502	26.856278	Kharoiparia	-
4	No.1 Majukuchi	1248	93.691093	26.846616	Pachimkalabari	-
5	No.2 Majuchi	2664	93.70684	26.864293	Pachimkolabari	-
6	Kutumgaon	1172	93.709678	26.822444	Lohitmukh	-
7	Chirakhowa	2779	93.653012	26.797672	Bortamuli	-
8	Rawnamukh	3006	93.673251	26.804795	Rawnamukh	-
9	Kamalapathar	407	93.673251	26.804795	Gopalpur	-
10	Borphalang	780	93.649395	26.872325	Solengi	-
11	Gopaljarani	872	93.5952	26.7852	Bakoridoloni	Helem Block
12	Thotechapori	433	93.5568324	26.7765998	Bakoridoloni	

Because these regions are subject to flooding on an annual basis, the area of the settlements does not remain the same; rather, it frequently grows and shrinks as a result of the flooding. The threat of flooding has a significant impact on their way of life and their ability to make a living.

Table 2: Morphological representation of the two wetlands

Name	Latitude	Longitude	Area	Type
Bahumari	26-42-36-10N	93-38-28-08E	8 ha	Riverine
Dhandi	26-51-02-38N	93-42-31-25E	17 ha	Riverine

Data collection

The current work was completed based on investigations conducted from January to September of 2019. All information for the current study was acquired through a thorough field survey, and 200 local fishermen were interviewed utilizing a semi-structured, previously tested interview schedule. The type of fishing gear used, how it operated, measurements, and other details were gathered. To choose sample respondents, a multistage sampling technique involving stratified random sampling and cluster sampling was used, and statistical analyses were performed using MS EXCEL 2007.

RESULTS

Communities have been documented using a wide variety of self-made fishing gear, including a wide variety of fishing nets, bamboo traps, harpoons, hook and lines, all of which are based on the communities' innate traditional knowledge (Table 3).

Table 3: Showing different forms of traditional fishing gears and their uses

Name of the gears	Waterbody where used	Mesh size(mm)	Type of fish caught by the gear	Fabrication material	Commercial use
Langi jaal	Streams, wetlands, water logged fields	55-60	Small fishes,	Nylon threads, earthen load/lead load	Yes
Phansijaal	Streams, wetlands, water logged fields	110-125	Small medium	Nylon threads, lead load,	Yes
Khewalijaal	Where net can reach the bottom	15-30	All type of fishes	Nylon threads, lead loads, jute rope	Yes
Musharijaal	Water logged field	20-30	Small medium fishes	Nylon threads, jute rope	Yes
TengoniJaal	Water logged field	60-70	Medium fishes	Nylon threads, lead loads	Yes
DhekiJaal	River, streams, beels	5-10	Medium	Nylon cloth, rubber float, jute rope	Yes
Sotijaal	Rivers	1-2	Big fishes, medium fishes	Nylon cloth, rubberfloat, iron beads	Yes
Borjaal	Rivers, Deep channels	1-2	All type of fishes	Nylon cloth, rubberfloats, iron beads	Yes
Raja-ranijaal	Rivers, Deep channels	1-2	All type of fishes	Nylon cloth, rubber floats, iron beads	Yes
Baghjaal	Rivers , streams	5-10	All type of fishes	Nylon cloth, rubberfloats, iron beads	Yes
Basurijaal	Rivers	1-2	All type of fishes	Nylon cloths, rubberfloats, iron beads	Yes
Juluki	Small streams, water logged areas	-	Small and medium fishes	Bamboo, plasticrope, rubber	No
Jakoi	Small streams, water logged areas	-	Small	Bamboo, cane/plastic wire	No
Sepa	Small streams, Water logged fields	-	Small	Bamboo, plastic wire/cane	Occasionally yes
Dingora	Streams, beels, water logged fields	-	Medium	Bamboo	Occasionally yes
Koloya	Streams, beels, water logged fields	-	Medium	Bamboo	Occasionally yes

Polo	Streams, beels, Water logged fields	-	Medium	Bamboo, plasticwire/cane	Occasionally
Ponsha	Shallow water	-	Medium	Iron pointed hooks, bamboo pole, ironed ring	No
Jatisul	Shallow water	-	Medium and big	Ironedspear, bamboo pole, ironed ring	Occasionally yes
Borsaloni	Water logged fields, Ponds	-	Small fishes	Bamboo, plastic/canewire	No
Dhanbarashi	Any type of water bodies	-	Fishes that eat baits	Metal hook, nylonthread, bamboostick, cork floats	No
Sip barashi	Any type of water bodies	-	Fishes that eat baits	Metal hook, nylon thread bamboo stick, cork floats	No
Daao(sword)	Shallow water	-	Medium size	Metal Dao with wooden handle	No
Jengbarashi	Any type of water bodies	-	Fishes that eat baits	Metal hook. Bamboo stick	Occasionally yes
Khaloi	All types of water bodies, used to store fishes	-	Small, medium	Bamboo	Yes
Khatol	Water logged fields	-	Small medium	Bamboo(Fish keeping)	No
Pawoi	Water logged area, shallow water	-	Small medium	Bamboo	Occasionally
Katal/Jeng fishing	Beels ,rivers	-	All type of fishes	Bamboo poles and jute ropes, sometimes nylon ropes used	Yes

Langi jaal: The rectangular nets known as langijaals come with handles at both the top and bottom. Sinkers and floats are included on the foot head ropes. The size of these nets is enlarged. The net is set up such that it flows against the tide. It is used to catch small sized fishes like *clariasspp, Anabas spp, Puntius spp,*etc and other fast moving fishes. This langijaal is of different types like Puthilangi, Kawoilangi, Goroilangi, Ari langi, Rou langi etc.

Ari langi: The net contain mesh size of 55-60mm.

Puthilangi: The net contain mesh size of 8-10 mm.

Goroilangi : The net contain contain mesh size of 20mm.Usually uses to trap *Channa spp*.

Kawoilungi: The net contain mesh size of 17mm, usually used to trap *Anabus spp.*

Rou langi: The net co taints mesh size of 50 to 80 mm.

Phansijaal: PhansiJaal are gill nets, the design of which is identical to that of langijaal with a few exceptions. The foot traps, unlike langijaal, are normally empty of sinker but much thicker. Mesh size contain 110 to 125 mm. It mainly operates in open parts of the wetlands with considerable depth. It is made up of light material i.e. nylon cotton. It is used to catch fishes like *Labeorohita*, *Hilsahilsha*,*Catlacatla*etc

Khewalijaal: It is a huge umbrella-shaped net with a circular design. It is a cast net. A sturdy cord is fastened to the umbrella's opening, and a number of lead or iron weights are added along the edge. The fisherman cast the net over the

water while holding the rope in their left hand. It is utilised to capture various small and medium-sized fish.

Musharijaal: It is a fine mesh seine net. The mesh size varies from 25-30 milimeter. Most of the time, this monofilament fixed gill net is used to catch small freshwater fish. To catch fish, multiple nets are sometimes tied together and put in rice fields or open bodies of water.

Tengonijaal: It is a medium sized net to use for medium size fishes.

Dhekijaal (lift net): It is a large triangular net. It is consist of a triangular bamboo frame which is supported by a simple and short bamboo handle. Mesh size about 1-1.5 cm. It catches *Labeorohita*, *Cirrhinusmrigala* etc.

Sotijaal: It is a large net and almost all fishes like large, medium size and small fishes are caught through this jaal. It requires 8 to 10 men to handle while fishing.

Borjaal: It is open at the deep channels of wetland. It is a very large size net. It requires 7-8 mento handle it while fishing. It is used to catch large fishes.

Raja-rani jaal: Another net locally called is Raja-rani net. It is made up of nylon nets and floats, foot rope and sinkers. It is used to catch large sized fishes as well as commercial fishes. Fisherman uses this kind of nets during early morning or in night time.

Baghjaal: This net is also use for commercial purpose. It is used to catch medium and big size fishes. It's a sein net. It's a large wall of rectangular netting.

Basurijaal: A large-sized net used in streams and other large bodies of water to catch small and medium-sized fish. It resembles with that nets use in the sea side to catch different fishes. It takes many hours for the operation to catch fishes and requires more than one fisherman.

Juluki: It is a trap for fish, opening in the top (20-30 cm). Rice brains are used as baits to entice fish into the nets so that they can be readily captured. It is utilised throughout the year.

Jakoi: It is utilised in the capture of fishes ranging from small to medium in size. Additionally, it is constructed out of bamboo. It is mainly used in community fishing. This gear is more popular among the woman folk for catching the fishes for daily consumption.

Sepa: It is most frequently employed. It is a bamboo sieved trap with tapered ends that is formed like a drum. In opposition to the current, the trap is facing the entrance. For the entry of the fish, it typically features two mouth openings in the middle of the trap. On one end of the trap, which is closed and fastened together during operation, a hole is provided for the removal of the catch. The entrance measures 20–40 cm in diameter and 80–250 cm in length overall. The meshes typically measure 50 to 70 mm in square. These are frequently employed to collect various fish species in beels, submerged paddy fields, and catchment areas.

Dingora: It is formed of rectangular bamboo stripes that have a mouth on one side and a sieve that is pointed inward, almost like spines. The length ranges between 0.5 and 1.3 meter. It is utilised between April and June.

Koloya: It is a bamboo trapping. Primarily utilised during the months of April through June. It ranges in length from 0.5-1cm in length. It is placed in shallow water with bait to catch fish fry and fingerlings.

Polo: The polo is a bamboo trap in the shape of a bell, and it has a narrow hole on both the top (15-25 cm) and the bottom (60-90 cm). It is employed in areas of shallow water for the purpose of catching various species of fish. Fishermen are observed to carry the trap in their hands, wade gently into the water, then lower it into the water in a likely location, operated by a single person.

Ponsha: Ponsha are made up of a tapering bundle of ten or more bamboo spears that havesharpened iron cones for the tips. It is thrown heavily and with great power towards the fish, who is facing the bottom. In monsoon

season, fishermen goes to the swallower areas in search of fish with the help of torch or lantern, when they sense fish, they instantly pierce it with spear and catch it.

Jatisul:It is a thin spear made of bamboo that terminates in a detachable fork that has three barbed points on it. A fine string served as the attachment point for the fork to the shay. Steel wire is used to make the points, and a piece of thinner wire is used to bind a lot of them together. It catches fishes less than 5kg. Fisherman uses it to hunt fishes.

Borsaloni: It is a round shape mainly made up of bamboo sieve in which edges are tied with nylon rope. It is operated in winter when the depth of water is low, mainly after dewatering of beel area. With this trap *Anabas spp*, *Notopterusnotopterus* are normally captured. Fishes taking shelter beneath the water hyacinth and other aquatic weeds are mostly caught by women fishermen.

Dhanbarashi: It is a barashi where a bamboo pole is used as a khuti and has one end tied to bait while the other end has a number of finer lines tied to it at intervals with baited hooks. It is called "Dhanbarashi" because it resembles an ear paddy. It is also called Khutibarashi and is same as sip barashi but the length of the bamboo is much lesser than the sip barashi. This is used during the flood to catch big fishes.

Sip barashi: It is made up of bamboo and iron hookA nylon rope is used, with one end tied to a hook and the other end tied to a piece of bamboo, the length of which ranges between 18 and 24 feet. The length of the nylon rope is between 4 and 4.5 feet, and juice sticks or rubber are utilised as floats. Typically, this is utilised to collect *Heteropneustes fossillis* and *clarias* spp.

Daao: It is a fishing tool which is used to catch fishes in riverside areas mostly. It is used to catch big fishes during the fish hunting.

Jengbarashi: It is a multi-hooked barashi, which means that there are multiple hooks contained within a single barashi. A primary nylon rope of the requisite length is coupled with two bamboos pest at the end (other) of a particular region where there is a greater likelihood of catching something. The primary nylon rope, which ranges in length from 1 to 1.5 feet, is dispersed at intervals of between 3 and 3.5 feet so that the hooks can become entangled with one another. The *Channastriatus* fish is the most common target for this particular style of barashi.

Khaloi: It is also made up of bamboo, It looks likes "Kalash" Its size is variable. It is mainly used for keeping the fishes after caught. It is used as collecting pot.

Khatol: It is a round shaped bamboo made vessel, which is mainly use for fish keeping during fishing.

Pawoi: It is a large cylindrical bamboo trap. It is placed in a deep channel of core zone. It is used to catch fishes like *Wallago attu*, *Mystustengara* etc.

Katal/Jeng fishing: The beel fisheries of Assam use the technique of katal fishing (Yadav et al., 1981) widely. The technique, which has now emerged as a successful way to fish on beels, was likely introduced to this area by migratory fisherman from Bangladesh. Although the technique is fairly straightforward and inexpensive, it takes take time between installation and harvesting. The purpose of "Jeng" is to draw fish into an amassed mass of shrubs, weeds, and tree branches that is thrown there for a period of two to three months, where they construct their home and are eventually trapped by enclosing the area. No boats are permitted to move in this Katal or Jeng area, often known as a no disturbance zone. Monsoon season is mostly when Katal or Jeng are installed (October–January). Mising people call this fishing as 'jeng'. Interestingly they only use soura branch for jeng. Because sourajeng has a peculiar smell this attracts the fishes and lures. Another fact is found that fish eats soura brace when it wets deep inside water. Jeng is used for business purpose by this community. Almost 1 to 8 quintal fish can be caught at one time.

Table 4: Categorization of gears in different forms

Entangling	Encircling	Scoping	Trawling	Trap	Hooks lines	Impaling Gears	Indigenous	Others
Langi jaal Phansijaal	Khewalijaal, Musharijaal, Tengonijaal	Dhekijaal	Sotijaal Borjaal Raja-rani Baghjaal Basurijaal	Juluki Jakoi Sepa Dingora Koloya Pawoi Polo	Dhanbarashi Sip barasih Jengbarashi Khutibarashi	Ponsha Jatisul	Katal/Jeng fishing	Borsaloni

It has been found that the majority of fisherman utilizes gear that is constructed out of nylon and bamboo. There is around 23 percent of fisherman that use entangling gears for the purpose of harvesting fish. 20 percent of the studied fishermen reported using traps as their primary method of capture, followed by encircling gears and hooks (12 percent). The usage of scoping and trawling nets to collect fish is said to be done by approximately 10 percent of fishermen. 8 percent of them are young males, and for them, using impaling gear is similar to hunting for them. Only for commercial purposes do 5 percent of those surveyed use indigenous practices such as Katal with a variety of people on a leasing basis. Interestingly, 5 percent of Mising women and children also like to fish (Figure 1). They catch fish for fun and to feed their families, and they do this in different ways, such as with a Chaloni or by hand. Most frequently caught fishes by these gears are *Puntius spp., Rasbora spp., Mystus spp.* Like *M. tengara, M. cavasius, M. vittatus*, *Channa punctatus*, *Botiaspp.*, *Chanda spp.*, *Anabas spp., Glossogobius spp., anabas spp., Clariasspp., Heteropneustes fossilis, Wallago auto, Notopteruschitala, Colisha spp., Mastacembelus spp.* Exotic Carps like *Catla catla, Cirrhinus mrigala* and other miscellaneous large and small fishes.

A study of Mising fishing gears and their methods of operation has shown a variety of fishing gears. The topography of the waterbody and the species, habit, and size of fish play a significant role in determining the types of fishing techniques.

The research indicates that fishing activities follow a seasonal trend. All gears cannot be utilized at all times. It has been shown that the use of gears in beels and rivers differs. Katal or jeng are common for river activities. In beels, hooks, lines, dingora and koloya are utilized more frequently than in river water. The majority of the gears were constructed out of bamboo and most of nets are composed of nylon net. It has also been observed that Mising women are exceptionally diligent and skilled at fishing. They also engage in various types of fishing, such as hand picking, trapping, and so on, in order to catch fish. However, they never go to the market to sell fish. Despite the fact that those areas have immense potential for sources of fish, the sole reason that residents there fish is for food. But as time went on, they started to take fishing seriously and began using it as a means of supporting themselves financially. However, they all employ traditional tools and methods, and the government does not provide them with any training of any kind. Because the majority of these communities are located in flood-prone areas, the gear that people there use is designed to be user-friendly in flood conditions.

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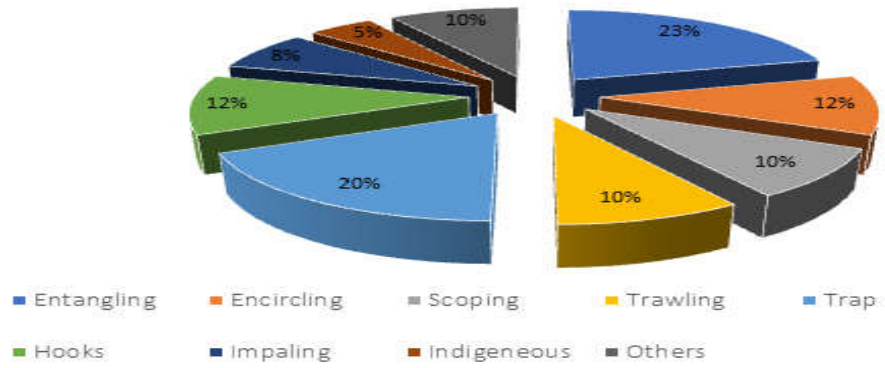

Figure 1: Percentage of usages of different fishing gears


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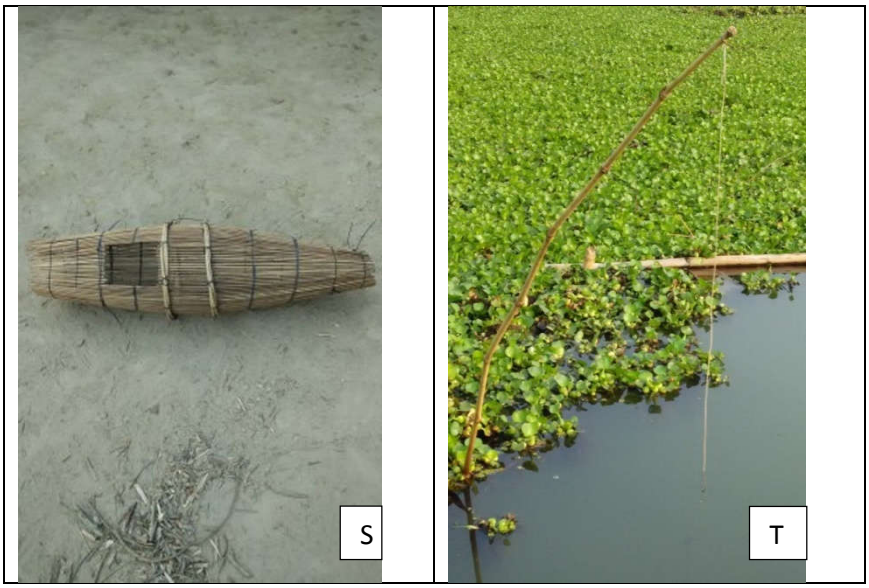

Figure 2: Showing the images of some traditionally using fishing gears. [A] Langi jaal, [B] Phansijaal, [C] Raja-rani jaal, [D] Basurijaal, [E] Dhekijaal, [F] Baghjaal, [G] Khewalijaal, [H] Sotijaal, [I] Musharijaal, [J] Katal/Jeng fishing, [K] Ponsha, [L] Polo, [M] Koloya, [N] Khaloi, [O] Khatol, [P] Jakoi, [Q] Dingora, [R] Borsaloni, [S] Sepa, [T] Sip barashi

DISCUSSION

The investigation of fishing gears and their operation indicated that the natives of Biswanath district, Assam, employ 28 distinct types of fishing gears. The varieties of fishing equipment used in the fishing process are heavily influenced by the topography of the water body and fish behavior (George, 1971; Chakraborty & Sharma, 2013). According to the findings of the study, it clear that Langi Jaal and PhansiJaal are the fishing tools that are utilised in commercial fishing the most. The use of these fishing methods is prohibited from May 1st through July 15th in all waterbodies of Assam as per the fishing regulations of Assam, 1953 (Chakraborty & Sharma, 2013).“BorJaal” is another type of encircling net. Its design is the same as “MushrariJaal”, except for the size of its mesh (25-30mm). Most of the time, these gears are used in deep parts of the river and Beels. Again, when compared to traditional East Coast shore seins, the seins employed in Assam's Beel fishery exhibit some characteristics. The main difference between them is the absence of a bag or bunt running the length of the net from end to end and the inclusion of side pockets in some of the seins (Chakraborty & Sharma, 2013). This locality also used two exceptional seins named as “Raja-rani” and “Basuri” for commercial purpose.

According to the findings of the current research, "KhewaliJaal" is used at all times of the year, in contrast to the other gears, which demonstrated a clear seasonal trend. The existence of peripheral pockets is one of the most distinguishing characteristics of cast nets (Von Brandt, 1968) and considered to be originated in India. Except when severe weather is present, scooping gears such as the DhekiJaal are utilised throughout the entire year. In both appearance and functionality, DhekiJaals are quite similar to "KholkaJaals" (Chakraborty & Sharma, 2013) and are utilised the majority of the time during the flood season.

Women are also interested in fish catching, and they typically employ simple bamboo traps such as polo, jakoi, and chaloni. They capture fish for everyday consumption.

CONCLUSION

Fisheries, the environment, and human intervention in nature are all closely related. The

need to improve fish captures while protecting the ecology and biodiversity is fundamental. The investigation found a vast variety of fishing gears in various species, demonstrating the inventiveness of the fisherman. Again, it has been discovered that the majority of fisherman in that region are underprivileged; therefore they are unable to use any modern equipment or techniques. Therefore, it is crucial to upgrade all of the known traditional fishing techniques with new technology fusion in order to maintain the fishing system's sophisticated forms. Traditional fishing technologies in this community require special attention from scientists and researchers in order to be recovered, conserved, improved, and used for future development and research. Traditional gears, on the other hand, are occasionally discovered to be damaging and inefficient, and hence should be discouraged from being used through mass awareness education programmes. The findings and conclusions will also be very valuable to the fishery sectors, researchers, and scientists in meeting the needs of fishermen in order to ensure their livelihood.

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Conflict of Interest

The authors declare no conflict of interest.

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