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**Dr. Mofidul Islam**
Department of Zoology,
West Goalpara College,
Ambari, Goalpara, Assam,
India

**Mobarok Hussain**
Department of Zoology,
West Goalpara College,
Ambari, Goalpara, Assam,
India

**Correspondence**
**Dr. Mofidul Islam**
Department of Zoology,
West Goalpara College,
Ambari, Goalpara, Assam,
India

# Different types of fishing gears used by the fishermen in "Kumri Beel" of Goalpara district, Assam

**Dr. Mofidul Islam and Mobarok Hussain**

**Abstract**
The "Kumri beel" is situated on the southern bank of the Brahmaputra river in the Goalpara district of Assam. The beel serves as one of the vital livelihood option for the local communities as the beel is rich in fish diversity. A diverge range of fishing gears and method have been evolved over a long period of time by the fishermen in and around the Kumri beel to capture a wide range of fish species. In the present study an attempt has been made to record the different types of fishing gears and methods used by the fishermen in the beel. During the study 43 different types of fishing gears were recorded belongs to several categories. From the study it is evident that Fansi jal, Musari jal and Langi jal and koi jal are the most extensively used fishing gears in the beel.

**Keywords:** Fishing gears, Kumri beel, Fansi jal, fish capture, goalpara district

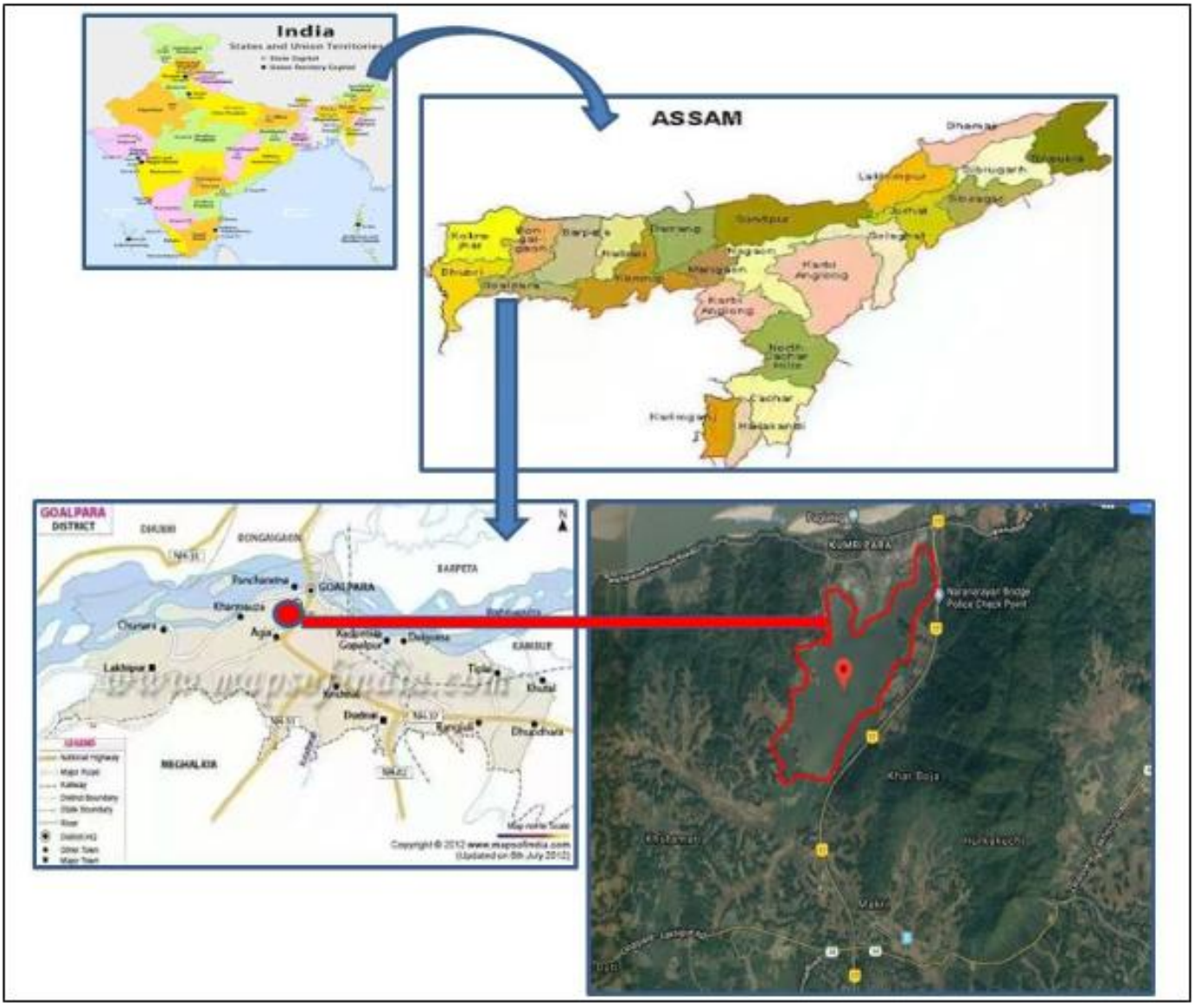
## 1. Introduction
The fishing gears are the different types of devices, nets materials etc. which are used in propose of collection of fishes in different water bodies (beels, rivers, ponds, lakes, streams etc.). Assam has a tremendous potentiality of beel fisheries. The activities of fishermen and their socio-economic have been influencing the development and utilization of the fishery resources in a significant way. The aspect has gained importance in view of the inferior social status and over fishing of the beels by the unprogressive poverty stricken people. The fisher-folk of Assam belongs to four principal communities viz., the *Kaibaria*, the *Patni*, the *Maimal* and the *Namasudra* [1]. More the local tribes, such as *Bodo*, *Rabha*, *Lalus*, etc are also engaged in fishing in the surrounding beel fisheries.
Proliferation of synthetic fishing nets with small mesh size, violation of restriction period for fishing, high amount of discard, reckless use of fertilizers and such other problems have compounded that situation. Regulation and prohibition of destruction fishing gear and practices can help secure economic and social rights of small-scale fishing communities [2].
The first fishing gear was reported from Mesolithic site at Fyum in Middle East [3]. The size and shape of the gear corresponds to the gear used by the people in different parts of North east India. Assam is gifted with many extensive water bodies commonly known as beels that are the only source of fish for the poor people in the surrounding villages. Beels are major fishery resources contributing to about 25% of the fish production in Assam. Assam is bestowed with enormous water resources covering as much as 3.65 lakhs hectares of water spread areas. This constitutes about one twelfth of the country's Inland water resources. However, the rich biodiversity of the freshwater fish of Assam has been rapidly dwindling because of increasing degradation of inland water.
Assam being a predominantly fish consuming state, the demand for fish is very high in the state. Assam produced 2.06 lakhs metric ton fish against a requirement of 2.26 lakhs metric ton in 2008-09. Around 20,000 metric ton fish come from outside the state to fulfill the demand [4]. Thus there exist a gap between demand and production.
A fairly large number of types and forms of gear are being operated in the floodplains to exploit wild fishes since time immemorial. The intensity of use of any form of gear in a beels dependent on the intensity of target fish population presumed to be available in that beel. Among them, many of these have been known to catch carp fingerlings before they grow to legal size and many of these are responsible for sharp decline in the population of wild species of the floodplain of the country. However, operation of all types of gears cannot be kept

suspended to allow the stocked fingerlings and also wild fishes to grow. Considering the above circumstances in the present study emphasis has been laid down to document different types of fishing gears used by the fishermen during different seasons in the Kumri beel of Goalpara district, Assam.

## 2. Materials and Methods

### 2.1 Study area

"Kumri beel" is situated in the district of Goalpara, Assam, India in between $26^{0}10^{l}52.0^{ll}$ N latitude and $90^{0}32^{l}53.9^{ll}$ E longitude and covers an area of about 5 sq. km.(Map-1). The beel is a natural lake is located 11 km North-West of Goalpara town, 1 km from Naranarayan Setu and 5 km North-East of Paglatek Mandir. Kumri beel is having enough space for development of tourist spots, gardens, boating and for developing bird sanctuary facilities. It is one of the most attractive and convenient places for development of tourism. It is easily accessible to travelers across the Naranarayan Setu. Kumri beel surrounded by lush green forests and vast area of marshy land, this lake is a haven for migratory birds visit every winter.




**Map 1:** Location map of "*Kumri beel*" of Goalpara district, Assam, India

### 2.2 Data Collection

The data were collected during the study period of July, 2016 to June, 2017. All the relevant data about the fishing gear and fishing method were collected through the field survey with the help of the local fishermen. A large number of fishermen were personally interviewed. The data were collected mainly on the types of gears, seasonal variation of gears, types of indigenous fishing devices and fish composition. The fishing gears were classified into several groups for the better study of the same.

The particulars of fishing gears (mesh size, length, width, materials etc.) and the catch data were collected from the fishermen at the fishing spot through interview and direct observation. Then detail description (mesh size, length, materials etc.) of each and every type of fishing gear was recorded from the fishermen during fishing. Mode of operation of the gear (time, place habitat, lure, accessories etc.) was also recorded. Fishing gears were identified during their operation. Local name of the gear, physical characteristics, use in season and rate of use of gears were recorded on the spot during survey. Recorded fishing gears were categorized into 7 types viz. encircling gear, entangling gear, scooping gear, trawling gear, hooking and line fishing, traps and impaling gear.

## 3. Results

During the study period, it was recorded a total of 43 numbers of fishing gears, which were used by the fisherman in different purposes for catching the fish species in the Kumri beel, Kumripara (table-1). Out of the 43 numbers of gears some are highly used and some are rarely used. The study revealed that maximum numbers of fishing gears are made of nylon or cotton threads and some are made of bamboo splits. The use of fishing gears was found to be very according to the depth of water body and size of the fishes. Different types of fishing gears used in Kumri beel such as Encircling gears, Entangling gears, Scooping gears, Trawling gears, Hooking and line fishing gears ,Traps gears and Impaling gears. Maximum numbers of Trap gears used in Kumri beel and minimum numbers of Scooping gears used in Kumri beel. 14 numbers of "Traps" fishing gears used in Kumri beel. 13 numbers of "Entangling gears", 4 numbers of "Impaling" and "Hooking and line" fishing gear used in Kumri beel. 3 numbers of "Encircling" and "Trawling" gears used in Kumri beel. 2 numbers of "Scooping" gears used in Kumri beel.

Maximum numbers of fishing gears used in monsoon, pre monsoon, post monsoon and some of used in winter season. Mushari jal, Puthi jal, Pah jal, Moi jal, Horhori jal, Shangla jal, Juluki, Jakoi, Ghani, Chepa,Dingora, Cherha, Jhupri, Punti jal, koi jal are highly used in Kumri beel. Khewali jal, Kawoi langi jal, Ari langi jal, Ari phansi jal, Dheki jal , Nal barasi, Sip barasi, Dhan barasi, Dan barasi, Jongar, Tiara, pokora are rarely used in Kumri beel. Some other gears are medium used in Kumri beel.

**Table 1:** List of different type of fishing gears and their description in the Kumri beel

| S. No | Name of gears | Type of gears | Use in season | Description | Rate of use |
|---|---|---|---|---|---|
| 1 | Mushari jal | Encircling gear | Pre monsoon, post monsoon and winter. | It is also known as "mohori jal" in Goalpara district. It is used extensively all through the year except monsoon season. The net made up of 2-5 pieces of rectangular nylon nets of mesh size 1-1.2 mm | +++ |
| 2 | Ber jal | Encircling gear | Monsoon & post monsoon | The net is made up of nylon twine or double cotton twines or tier cord. Length is 50-67 m, depth is 1.5-2 m, mesh size is 0.5-2.5 cm. | ++ |
| 3 | Khewali jal | Encircling gear | monsoon | It is a circular made the shape of a large umbrella. The net sinks to the bottom and the circumference closes due to the weights attached to it. All kinds of small sized fish are entangled in the net, which is then pulled out by means of the cord. The net is made up of nylon twine. | + |
| 4 | Puthi langi jal | Entangling gear | Pre monsoon, monsoon & post monsoon | The design is similar as mentioned above and the mesh size is only 8-10 mm. the total length varies from 10-50 m. The net is made up of sunn-hemp. | +++ |
| 5 | Goroi langi jal | Entangling gear | Pre monsoon & monsoon | The mesh size is 20 mm. The net is usually set near weed infested shore area. | ++ |
| 6 | Kawoi langi jal | Entangling gear | Pre monsoon | The length varies from 10-50 m. Mesh size is only 17 mm. The major catch composition is *Anabas* species, *Nandas* species, *Heteropneustes* species and *Clarias* species. | + |
| 7 | Ari langi jal | Entangling gear | Pre monsoon | The mesh size is 55-60 mm. The height of the net is about 1.15 m. It is made of sunn-hemp (4 plys). | + |
| 8 | Rou phansi jal | Entangling gear | Monsoon & Post monsoon | It is made up of sunn-hemp (3 plys) with 107.5 mm meshes. It is used to capture *Labeo rohita* but other similar size could also be captured. | ++ |
| 9 | Karal phansi jal | Entangling gear | Monsoon & Post monsoon | It is made of nylon or cotton with 120-135 mm meshes and 1.3 m height. It is used as surface set or drift gill net to capture *Catla catla* and other fish species of similar size. | ++ |
| 10 | Ari phansi jal | Entangling gear | Post monsoon | It is mostly used as surface set or drift net and is made of cotton with 150-160 mm meshes 2.5m height. | + |
| 11 | Punti jal | Entangling gear | Monsoon, post monsoon & winter | The net is made up of nylon twine or double cotton twines or tier cord. Length is 10-12 m, depth 0.6-1 m and mesh size is 2.5-3.18 cm | +++ |
| 12 | Koi jal | Entangling gear | Monsoon , post monsoon & winter | The net is made up of nylon twine or double cotton twines or tier cord. Length 10-12 m, depth 0.6-1 m and mesh size is 3.18-3.8 cm. | +++ |
| 13 | Fesh jal | Entangling gear | Monsoon & pre monsoon | The net is made up of nylon twine or double cotton twines or tier cord. Length is 10-12 m, depth 0.6-1 m and mesh size is 8.0-9.0 cm. | ++ |
| 14 | Veshal jal | Entangling gear | Monsoon & pre monsoon | The net is made up of nylon or cotton twine or bamboo frame. Length is 12-15 m , depth 10-12 m and mesh size is 0.5 cm (centre) 1.5 cm (front). | ++ |
| 15 | Khepla jal | Entangling gear | Monsoon & pre monsoon | The net is made up of cotton or nylon. Length is 8-10 diameters, mesh size is 1.0-1.5 cm. | ++ |
| 16 | Bhuri / bhuti jal | Entangling gear | Post monsoon | The net is made up of nylon or cotton twine and bamboo pole. Length is 1.5-2.0 diameters (mouth) and 0.5-0.6 diameters (opening). | + |
| 17 | Pah jal (Thela jal) | Scooping gear | Pre monsoon, monsoon, post monsoon & winter | It is also thela jal. Mesh size about 70.0 mm and is made up of sunn-hemp instead of cotton. It is said to be a special gear of *Hilsa* and migratory carps. | +++ |
| 18 | Dheki jal | Scooping gear | Monsoon | It is a large triangular net stretch across two bamboos tied near the thick ends. The net is balanced in front of bamboo platform raised in the beel of the beel about 6 feet above the level of water. | + |
| 19 | Moi jal | Trawling gear | Pre monsoon, post monsoon & winter | Length is 45.1 m, height is 1.29 m and mesh size is 1.57 cm. it is generally used in shallow water. | +++ |
| 20 | Horhori jal | Trawling | Pre monsoon, | It is also called as drag net and is used for dragging the beds of beel. | +++ |

| | | | | | |
|---|---|---|---|---|---|
| | | gear | Post monsoon & winter | It is generally used in shallow water. | |
| 21 | Shangla jal | Trawling gear | Pre monsoon, Post monsoon & winter | It is also called as drag net and is used for dragging the beds of beel. It is generally used in shallow water. | +++ |
| 22 | Nal barasi | Hooking and line fishing | monsoon | This type of barasi bear a Nal instead of bamboo, which is of about 1.5 m long and is tied centrally with a central rope with a hook, which can float freely it right angle to the Nal. It is made up of split-bamboo pieces with barbed iron point, which attached to the shaft by cords. | + |
| 23 | Sip barasi | Hooking and line fishing | monsoon | It is made up of bijuli- bamboo, which measures about 20-24 feet in length. All the top of the bamboo, a nylon rope with a hook is tied with a grasshopper taking as bait. The nylon rope measures about 4 to 4.5 feet length. | + |
| 24 | Dhan barasi | Hooking and line fishing | monsoon | It is also known as khuti barasi. It is made up of split-bamboo pieces, pointed end covered with iron cap. | + |
| 25 | Dan barasi | Hooking and line fishing | monsoon | The main nylon rope measuring 1-1.5 m in length and are spread at an interval of 3-3.5 feet so that the hooks entangled each other. | + |
| 26 | Polo | Traps | Pre monsoon, monsoon, post monsoon & winter | The polo jal is a bell shaped slit bamboo trap with a small opening on the top 15-25 cm and bottom 60-90 cm. It usually 0.6-0.9 m in height. | +++ |
| 27 | Juluki | Traps | Pre monsoon, monsoon, post monsoon & winter | Opening in the top 20-30 cm, bottom 28-30 cm. Rice bran bails are used to lure the fishes which facilitated easy trapping. | +++ |
| 28 | Jakoi | Traps | Pre monsoon, monsoon, post monsoon & winter | It is a made of bamboo sieves even at intervals of 0.3-0.7 cm. A bamboo rod is fixed across the mouth from the middle of the base of the triangle to the vertex and is prolonged to a short handle. | +++ |
| 29 | Ghani | Traps | Pre monsoon, monsoon, post monsoon & winter | All Ghani is a cylindrical fixed tap slightly flattened at the bottom to enable it to lie stable on the floor of the beel. The meshes are of generally 50-70 mm square. | +++ |
| 30 | Cheap | Traps | Pre monsoon, monsoon, post monsoon & winter | It is most commonly used. The diameter of the opening is 20-40 cm and total length varies from 90 to 150 cm. | +++ |
| 31 | Dingora | Traps | Pre monsoon, monsoon, post monsoon & winter | It is made up of a bamboo stripes, rectangular in shape. The length varies from 0.5 to 1.3 m. | +++ |
| 32 | Cherha | Traps | Pre monsoon, post monsoon & winter. | It is funnel shaped fishing trap which is also known as “Choroha”. The height of the trap measure 77 cm and width is about 10.1 cm (diameter). The trap is set in the shallow water. | +++ |
| 33 | Jhupri | Trap | Pre monsoon, post monsoon & winter | It is a bell shaped slit bamboo trap. It usually 0.6-0.9 m in height, mesh size is much smaller which can trap fish fry also. All types of fishes are trapped with Jhupri. | +++ |
| 34 | Koi dughair khadam (u-shaped) | Trap | Monsoon &post monsoon | The trap is made up of split of bamboo and cane. Length is 45-90 cm, height is 15-30 cm diameter (mouth portion) 100-150 cm front, breadth is 50-60 cm, mesh size is 1.0-2.0 cm | ++ |
| 35 | Arinda | Trap | Monsoon &post monsoon | The trap is made up of split of bamboo and cane. Length is 45 cm, height is 25 cm, breadth 25 cm, mesh size is 0.8 cm. | ++ |
| 36 | Ramari | Trap | Monsoon &post monsoon | The trap is made up of split of bamboo and cane. Length is 100-150 cm, height is 60-80 cm, breadth 30-40 cm, mesh size is 1.5-2.5 cm. | ++ |
| 37 | Charo | trap | Monsoon &post monsoon | The trap is made up of split of bamboo and cane. Length is 40 cm, height is 25 cm, breadth is 15 cm, mesh size is 1.0-1.5 cm. | ++ |
| 38 | Ghuni | Trap | Monsoon &post monsoon | The trap is made up of thin bamboo stick and cane. Length is 25-60 cm, height is 25-40 cm, breadth 9-20 cm, mesh size is 0.2-0.5 cm. | ++ |
| 39 | Tubo | Trap | Monsoon &post monsoon | The trap is made up of thin bamboo stick and cane. Length is 20-25 cm, breadth is 15 cm, mesh size is 0.2 cm. | ++ |
| 40 | Jongar | Impaling gear | Monsoon | The jongar or joar consist of a tapering bundle of 10 or more split bamboo spears, shod with sharp conical iron points. It is also known as a pocha. | + |
| 41 | Tiara | Impaling gear | Monsoon | It is a light bamboo spear, ending in a detachable fork of three barbed points. The fork is attached to the shaft by a fine string. The point is made of steel wire. | + |
| 42 | Pokora | Impaling gear | Monsoon | The pokora is a thin bamboo spear with a single barbed point. It is generally used for spearing large fishes and for tortoise also. | + |
| 43 | Kol or kati | Impaling gear | Monsoon & post monsoon | It is a thin bamboo spear. It is generally used for spearing small fishes. | ++ |

March – May = Pre monsoon ‘+++’ = Highly used
June – August = Monsoon ‘++’ = Medium used
September – November = Pre monsoon ‘+’ = Rarely used
December – February = Winter

## 4. Discussion

The study revealed a total of 43 numbers fishing gears which are used by the fishermen in Kumri beel which is comparable to different studies. Different type of fishing gears used in Kumri beel, such as Encircling gears, Entangling gears, Scooping gears, Trawling gears, Hooking and line fishing, Traps and Impaling gears. In 1965, K. M. Joseph and K. P. Narayanan [5] was reported a total 29 numbers of fishing nets used in Brahmaputra River in Assam. In 1996, S. Rahman, M. A. Mazid, M. Kamal, M. A. Hossain and M. S. Hossain [6] was reported a total 29 numbers of fishing gears used in BSKB (Barnal, Salimpur, Kola and Bashukhali) beel in Khulna, Bangladesh. In 2007, S. M. Galib, M. A. Samad, M. M. Kamal, M. A. Haque and M.M. Hasan [7] was reported a total 27 numbers of fishing gears used in Chalan beel in North-West Bangladesh. In 2013, Pranjal Chakravartty and Dr. Subrata Sharma [4] was reported a total 36 numbers of fishing gears used in Nalbari district of Assam, which are almost similar with this study.

The survey of the fishing gears and their method of operation have revealed that 43 numbers of fishing gears are in vogue in commercial use which belongs to several categories as described already. The topography of the water body and behavior of fishes play a dominant role on the types of fishing gear used in fishing process.

As obtained from the study. It is evident that Mushari jal, Langi jal and Phansi jal are the most extensively used implement in commercial fishing. The fishing with these gear is banned during 1st May to July 15th vide Assam Fishing Rule 1953 [8]. Another type of encircling net is the "Ber jal" or "Bor jal" the design details of which are same as "Mushari jal" except the mesh size (25-30 mm). These gears are generally operated in deep areas of the main beel.

The gill nets of the set type are the principal fishing gear in the beels of the district because of the many underwater obstructions [9]. In the beel fisheries of Assam, the gill nets come next to seine in its importance. The line of demarcation between seine and gill nets (Langi jal) seems to be intermediate as gill nets are sometimes operated in the fishing of seines. De, KG, (1916) [10] has classified it as a drag net, but Hornell (1924) [11] has treated it as "Gilling seines". During the present survey, it is observed that fishes are caught in these nets by gilling or enmeshing. Langi jal are sometimes used to drag or encircle an area. But such particles are only the mean to scare and drive the fishes into the net. The main difference between "Langi jal" and "Phansi jal" is in the method of operation and rigging. The foot rope the "Langi jal" touches the bottom during operation whereas the later doesnot. The foot rope of "Phansi jal" is devoid of shinker.

The present study reveals that "Khewali jal", i.e., cast net is used all through the year unlike other gears which shown a distinct seasonal pattern. This gear is generally found in operation in the shallow depth areas of the beel and can be placed third in order of importance. The remarkable features of cast net are the presence of peripheral packets as described by Von Brandt (1968) [12], he considered that the net originated in India.

The scooping gears such as "Dharma jal" and "Dheki jal" are also used all through the year except stormy weather " Dheki jal" resemble with "Khorka jal" (Joseph, 1965) [5] in shape and operation and are mostly used in flood season. "Dharma jal" on the other hand is used all through the year.

Contrivances for trapping fish may be presumed to antedate the invention of nets (Hornell, 1924) [11]. In the beel, different types of fish traps have been found in operation. They are found to have economic and energy related advantages over active search and capture method (Samajdar and Saikia, 2014) [13], but the use of perch traps has been criticized because of their low catching power (Dewan and Mazid, 1994) [14]. The present survey has shown that there is a marked seasonal variation in the catching power of traps, which to a large extent can be attributed to be behaviuor of fish. In general traps are a highly versatile gear whose dexterous operation enables several scattered areas to be worked out simultaneously.

Fishing method in the beels is diverse and some of them are unique common gears such as cast nets, gill nets dip nets and traps are in vogue. But the district also often ample scope to certain indigenous fishing devices like "katal fishing" (Yedave YS, 1981) [15].

Among the all indigenous fishing devices "katal fishing" is the unique method of capturing big sized fishes. This method has some resemblances with the "Byana" fishing of West Bengal (Dey and Kar, 1989) [1]. In lower Assam it is known as "Jeng fishing" this special fishing device needs "khewali jal", "Ghurni jal", "katalmara jal" and "Ber jal" and certain other gears such as "Athua jal" and "Thala jal". The catch composition includes mainly the major carps.

Likewise, Banas are fixed barriers, erected across the channels to prevent return of fishes from the beel to river along with receding waters. It is considered one of the major fishing methods where the beel has a connection with river. It act as an obstruction for the commercially important varieties like *Lebeo rohita, L. gonius, L. calbasu, Catla catla, Cirrhinus cirrhosa* and feather backs migrating back to the river [16]. The pre-monsoon, monsoon, post-monsoon and winter are the main fishing seasons in the beel and almost all gears are used in these seasons. Moreover, in winter Katals are harvested which yield a substantial catches of the beels.

## 5. Conclusion

The economic condition of the fishermen were too poor, even they were not fully engaged in a fishing business. Maximum numbers of fishermen were unable to fulfill their minimum requirements. Most of fishermen were less perceptive about modern capture fisheries techniques. Here capture fishery business was totally male dominant. It's also an important finding. During the survey, it was found that a total 43 numbers of fishing gears used in Kumri beel. As obtained from the study, it was noticeable that Pah jal, Moi jal, Puthi langi jal, Horhori jal, Punti jal, Koi jal, Mushari jal, Polo, Juluki, Jakoi, Ghari, Chepa etc. were most extensively used in Kumri beel for fishing by local fishermen. According to the seasonal variation different kinds of fishing equipment's were also used in Kumri beel.


**Fig 1:** different types of fishing gears

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