

## Indigenous fishing devices in use of capture fishing in Tripura

A D Upadhyay<sup>1\*</sup> & B K Singh<sup>2</sup>

<sup>1</sup>College of Fisheries, Lembucherra, CAU, Tripura(W)-799210 and <sup>2</sup>College of Agricultural Engineering & Post Harvest Technology, CAU, Sikkim  
Email: ad\_up@rediffmail.com

*Received 15.11.11; revised 29.06.12*

Fishing with traditional devices is an old age practice followed by fisher folk of Tripura. The present fishing technique and devices are the results of knowledge and experience gained the fishing community from the ancestors. The documentation of these practices and devices are important for their development on scientific line and for betterment of fishing community. Hence an attempt has been made to study existing the fishing methods, designs, structures and operations of fishing gears of Tripura. The Rudra Sagar lake of West Tripura district and Harijala water body of South Tripura district were selected for conducting this study. The survey results revealed that three types of fishing devices, viz. fishing gears with net, hooks and spears and traps are in use for fishing in the study area. It appears from the study of fishing devices of Tripura that though it is a small state of the country yet has a rich indigenous know how about capture fishing. The indiscriminate fishing, fishing in the breeding season, poisoning and fishing with gillnets are some of the ill practices of fishing observed in the study area. These are potential threats to the fish biodiversity of Tripura and as such these should be discouraged.

**Keywords:** Fishing gears, Net, Hook, Spear, Trap, Tripura

**IPC Int. Cl.<sup>8</sup>:** A01K 69/00- A01K 97/00, A01K 61/00, A01K 74/00

In Tripura, capture fisheries resources constitute about 37% of the total fisheries resources in the state but its contribution in total fish production is only 5.50% indicating lower productivity<sup>13</sup>. The reasons behind lower productivity include poor management of common fisheries resources, indiscriminate fishing and also the use of inefficient fishing devices. Nevertheless, the sector is important because livelihoods of about 22,373 fishermen families are solely dependent on it. The family income of fishermen mainly depends on the daily catch which itself depends on fishing devices, fishing efforts, availability of fishes and market prices. Generally the age old traditional fishing gears are being used by the fisher folk of Tripura without realizing the strength and weakness in terms of its efficiency as well as its long term impact on the fish diversity. For sustainable fishing and judicious fishing, it is very important to understand the existing fishing practices and devices in the area. Realising this fact fish catching devices of Inland water bodies have been studied by several researchers<sup>4,5,7,8,14,15,16,17</sup>. Similarly the operational details of the fishing techniques carried out by the tribal and other fishing communities of North-Eastern states were reported by different researchers<sup>2,3,6,11</sup>. However,

from the review of literatures it is found that documentation on fishing methods and fishing devices of Tripura is not systematically attempted by researchers in the past. Hence this study was undertaken to examine existing fishing practices, designs, structures and operations of traditional fishing gears of Tripura state for documentation.

### Methodology

The Rudra Sagar lake of West Tripura district and the Harijala water body of South Tripura district were selected for conducting this study from July 2006 to June 2007. Out of a total of 13 dependent fishermen villages in the Rudra Sagar lake, five villages, viz. West Melagarh, Yubrajghat, Chandanmura, Rudijala and East Durlavnsagar were selected on the basis of number of fishermen families. Similarly, three fishermen villages such as Harijala GP, Chandamura and Kokraban GP from Harijala water body of South Tripura district were selected. From each of the selected fishermen villages, 10 % of total fishermen families were selected using simple random sampling without replacement for survey and data collection. The sample comprises 204 fishermen. The Prior Informed Consent (PIC) was taken from the respondents before collection of the information. The

\*Corresponding author

standard format of survey sheet prescribed by FAO for study of 'Traditional Marine Fishing Craft and Gear of Orissa' was used for collecting information on fishing gears of Tripura<sup>12</sup>. The information collected through survey sheet of fishing gears includes name of net, classification, material of construction, dimensions, float sinkers, target fish species, suitable water body, cost, catch, economic life, etc.

## Results

A wide array of fish catching device are in use in capture fishing of Tripura. These fishing devices used in *lentic* and *lotic* water bodies showed variations with regard to their fabrications and operations. Fish catching devices based on design, materials used, technical details and operational methods may be broadly categorized as follows:

1. Fishing gears with net
2. Hooks and Spears
3. Traps

The passive as well as active types of fishing gears are being used for fishing in the study area (Table 1). About 70.5% fishermen of Harijala water area were using gillnets including set gillnets, encircling gillnets, dragged gillnets and drifts nets for catching fishes. Whereas in case of Rudra Sagar lake, Kunijal (cast net) was used by 45.37 % fishermen, followed by *faloon jal* (21%), *ber jal* (10%), gill net (9.24%) and *chapila jal* (8.40%).

The different types of fishing gears with netting used in the study area and their vernacular names, dimensions, economic life and target species, etc. are shown in Table 1 and figures 1-17.

### Fishing gears with nettings

**A. Gill net:** Gill netting is a very common fishing technique in shallow and moving water bodies of Tripura. Both selective and non selective types of gill nets with different mesh sizes were found to be in operation in the study areas. Gill nets are generally fixed against the flow of water with bamboo stakes and the catch is collected after 6- 8 hrs. The details of the net and their local names are as follows:

- i. **Fash Jal/Kanke Jal/Chat jal/Current net:** Gill nets are widely used fishing gears during the rainy season especially in shallow moving water bodies in Tripura. They are also known by various names like *fash jal*, *kanke jal*, *chat jal* and current net. They are single walled nets with mesh size 2-12 cm (mostly 5.2-6.2 cm) and length of the gear varies from 10-50 m

depending upon the width and depth of water bodies. It has been observed that gill nets operated in the study area were mostly made up of polyamide monofilament. Head rope used with this gear is made of poly propylene. The small stones or gravels are used as sinkers. A person small *kusha/dingi* boat fixes the net with bamboo poles across the flow of water. Gill net is usefully operated during the night time, from the evening to the next morning. After 4-6 hrs, fishes are collected from the net. The target species of fish are *puntius*, *tengra*, *glassogobuis*, *loaches*, *chanda*, Indian major carps and prawn.

- ii. **Drift gill net:** Drift gill net without foot rope is widely used in Tripura. Drift gillnets are operated on the surface layer, which drift with the current either separately or with a boat to which it is attached. But, it is not effective to operate such gill net in reservoir and lake as catches mainly composed of catfish and carps.

### B. Drag nets

- i. **Laitya Jal:** This is a circular net which is mostly used to catch *Channa spp.* One end is held by fishermen on shore and a boat speeds the net and encircles the area designate. Its mesh size is 2.5 3.75 cm. It is used to catch *Gudusia chapra*, *Chanda nama* in Rudra Sagar lake. It is made of nylon.

- ii. **Fy-Jal:** This is a surrounding net, operated by two boats. First the boat goes to the centre of the lake and subsequently spread the net by holding each boat one end of the net each and encircling the area. The two ends are pulled up and catch the entire lot of fishes. Generally it is made up of very small mesh size for catching pelagic small size fishes.

- iii. **Ber-Jal :** This is the most popular dragnet of Tripura (Fig. 1). The mesh size of this net varies from 1-2.5 cm. The length of the net varies from 25-150 m. Its breadth is 4-25 m. It is mainly used for catching of carps and bottom living fishes. It is also commonly used in aquaculture ponds at the time of complete harvesting and removal of weed fishes. It is operated from boats in deeper lakes. It is one type of surrounding gear mostly used in larger domestic ponds. During the operation, the net is spread horizontally and vertically on one side of the tank by covering the whole breadth of the tanks with float and sinkers. Sometimes

Table 1— Vernacular name, dimensions, economic life and target fish species of different fishing gears used in Tripura

Local name of fishing gears	Fishing gears								
	Chat jal	Faloon jal	Atha Jal	Para jal	Ber jal	Panchan jal	Kuni jal/Uran Jal	Pai jal	Chapilajal
Gears' category	Gill net	Bag net	Dragnet	Dragnet	Dragnet	Cast net	Cast net	Dragnet	Bag net
Length(Mt.)	10-50	3-5	80	180	25-150 (upto 300mt )	45	6	18-20	100-150
Depth(Mt)	12	3.15	5	15	5-25 (Av 10 mt)	5.1	2.85	7.2	3
Mess size(cm)	2-12	0.5-0.8	1.5	0.5-0.65	1.0-2.5	5.5	2.5-3	4.2	6-10
Material of construction	Nylon (Mostly polyamide twines and propylene twines are being used) and cotton twines very low in case of fishing gears found in Rudrasagar								
Twine thickness	Single thread	6 suta	6 suta	6 suta	8 suta	2 suta	6 suta	6 suta	6 suta
Floats and Head rope	Rubber	Bamboo frames	Bamboo or Cork	Bambo or Cork	Bamboo and jute ropes	-	-	Jute ropes and Plastic, thermal, foam	Jute ropes and Plastic, thermal, foam
Sinkers and Foot rope	Stones	No	No	No	No	Iron balls	Iron ball		Footrope without sinkers
Fishing gears	Chat jal	Faloon jal	Atha Jal	Para jal	Ber jal	Panchan jal	Kuni jal	Pai jal	Chapilajal
Type of boat required for fishing	Kusha	Dingi	Dingi/Saranga	Three dingi boats	Three dingi boats	Kusha	any kusa or dingi or none	Dingi	Two dingi boats
No of fishermen required	1	2	5-6	12	16	1	1	4-6	4-6
Cost of net (Rs)	2000	1200 @ Rs 600/kg	6000	4000-6000	30000-40000	2000-5000	1200	4000	1500-2000
Economic Life of gears (Years)	1-2	3	3-4	3-4	3-4	2-4	2-4	8-10	6
Target species	IMC, Prawn, <i>Puntius, Tengra, glassogobuis, loaches, chanda</i>	Puti, tengra, prawn, loches, Mrigal	Small fishes	all type of fishes	IMC, Prawn, <i>Puntius, Tengra, glassogobuis, loaches, chanda</i>	big size fishes, IMC	IMC, Boal, Tengra, Bajari, Chapila ,	all type of fishes	<i>Gudusia chapra</i>
Average catch(Kg)	10-15 kg/day	15-20 kg and 4-5 kg	60 kg/catch	10-100 kg fish/time	300-400 kg/day(10 hr)	1-4 kg/day	1-4 kg/day	25-50 kg fish/day	7-12 kg/day

it is also called as *Gharra jal*. About 60 % of resources are exploited by this gear.

- iv. **Tana-Jal** : This is a dragnet operated by two persons. The mesh size of the net varies from 0.1-0.8 cm. It is a net with a rectangular mouth kept open to 4.5m and its breadth is

1.8m. The mouth is kept open by bamboo sticks of a length of 1.2m. It is dragged in shallower water. Small and medium size fishes are caught during daytime. It is made of mosquito net hence it is also called *Masari jal*.

- v. **Para-Jal** : Its mesh size 5-6.25 cm. It is used only for demersal big size fishes. A boat will spread the net and 2 or 3 fishermen press the net sinker onto bottom by leg and after surrounding the areas, they will pull the net and harvest the fish.

### C. Bag nets

- i. **Pelni Jal**: It is a scoop net, having a round or triangular frame. The mesh size of *pelni jal* varies from 0.4-0.5cm and bamboo strip used to form small square. The diameter of the bamboo frame is 50-60 cm. It may be operated by the help of a boat or by walking. *Puntius spp.*, *Amblypharyngodon mola*, *Glossogobius* and small prawns, etc. are caught by it.
- ii. **Phaloon/Khara JAI/ Bel Jal**: This is a traditional boat operated dip net. It can be operated by moving bag up and down or by pushing it forward (Fig. 2). The netting is hung to a triangular frame. Two bamboo poles of length 3-5 m are tied together to form an acute angle. The net is fastened on two poles of bamboo while at the free end, it is supported by rope. The mesh size of the *phaloon* ranges from 0.5 cm to 0.8 cm. The fabrication cost of the gear is about Rs. 1200/ and its expected economic life is 3 yrs. In a good season a fisherman with small *dingi* boat catches on an average about 7-10 kg of fish per day. During the rainy season it is fixed in canals facing the current of water to catch fishes that come through drifting. It is used for catching medium size pelagic fishes.
- iii. **Chapila Jal**: It is used to catch *Gudusia chapra* mainly. It is operated from two boats. While spreading the net, the fishermen thump their feet on the boat. This attracts the fishes which aggregate and the bag like net is pulled up and the fishes are harvested. Length 100-150 m and breadth 3 m. Mesh size 0.6-1 cm.
- iv. **Maiya Jal**: It is mainly to catch catfishes specially *Mystus spp.* in rivers. Float has a bit lesser weight than sinkers. During rainy season, it is most frequently used.

### D. Falling gears

The cast nets which commonly are used to catch riverine fishes includes kuni jal and polo jal.

- i. **Kuni Jal/Ural Jal**: This is the most commonly used fishing gear by the fishermen of Tripura. It is a cast net operated by a single fisherman

(Fig. 3). The principle is to throw the net to cover the fish. The lower edge is provided with a series of sinkers. It may be cast from the bank of the rivers, beels, and ponds or from a boat. It is provided with a line to haul it.

- ii. **Polo Jal**: This is used in shallower water. Its length 0.5-5 m. The frame is made up of bamboo surrounded with mosquito net. A 15-25 cm hole is kept on the upper side of the gear. A fisherman pushes it over the fish and takes it out from the hole.

### E. Lift nets

**Dharma Jal**: It is used in running water especially in rivers. The frame is made up of a bamboo (Fig. 4) and the net is made up of cotton twine. Its mesh size is 1-3cm. It is also widely used in *beels* and *Chera* (riverlets). Mainly used for catching fishes during raining season when a swift current in the river exists. It operates in pelagic and surface level waters.

### Spears and hooks

Fishing hooks and lines are one of the simplest and most important fish catching devices of Tripura. They are simple, easy to operate, cost effective and selective. The hooks serve the functions of holding bait, enticing the fish to it and ensuring that the fish shall be unable to spit out the bait after swallowing it. It usually penetrates into the mouth of the fish when the bait is taken or when hook is pulled. The different types of lines and fishing hooks found in Tripura are described below:

- i. **Juitya** : It consists of bamboo stick (70-80 cm long), the tip of which is equipped with 5-8 hooks and extreme end of the stick is attached with a nylon rope. When the fishermen perceive that a fish is passing nearby him, he throws the *Juitya* that pierces the fish. These are practiced by experienced or trained persons only. This practice is used to catch mainly big size fishes like silver and other carps.
- ii. **Gathynna/Guthia**: *Gathynna* is a steel or wooden stick with pointed end (Fig. 5). This type of spear is used mainly to locat *Monopterus cuchia* (eel) in swampy areas and marginal embankments. The fisherman first seals the hole and then inserts the stick on the soft ground randomly. When he feels the movement of the eel, he tans out the eel by digging with hand.

- iii. **Ek-Kaithia:** It is a type of spear with varying lengths varying from 1.5- 2.5 m. It has 4-10 sharp prongs made up by splitting seasoned bamboo at one end. Sometime this type of wounding spear referred as *Chal* which is used by the tribal fishermen in catching of or fishing of large fishes. They pushed it in shallow areas and the fish can not come out of it. In particular, *Cyprinus carpio* is caught by spearing with the above. It is useful only in clear water. Sometime it may cause injury to the fishes, which may lower their market value. But stroked and injured fish which escape may die afterwards. It is mostly used in *beels*, *Charra* and swampy areas.

**Hooks (Barshi):** *Barshi* fishing in Tripura is a very common and age old practice. This type of fishing is specially used in shallow water bodies with weeds or standing crops and also to catch bottom fishes. It is operated throughout the year. A Nylon line is tied on the tip of a bamboo pole. It is a type of hand line. The sinker in it is locally called as *Bhar*. The hook is provided with lure/baits like earthworm, forage fishes, small prawns, bread and rice paste. The following types of *Barshi* are used by the fishing community to catch different type of fishes.

- iv. **Boal Barshi:** A Nylon line is tied on the tip of bamboo pole. Length varies between 1-3 m (Fig. 6). The hook is provided with a small live bait. As the name of the fishing hook suggests, this net is specially used to catch riverine fish *Boal (Wallago attu)*.
- v. **Tang Barshi:** This type of hook is used in large scale during the floods. A Nylon line is tied on a bamboo stick of length varying from 1-1.5 m (Fig.7). The hook is provided with earthworm, small prawns, bread, and rice paste. This type of fishing hook is used to catch *puntius, chana and tilapia* fishes.
- vi. **Lait Barshi:** This type of hook is used on large scale during the floods. A nylon line is tied on the bamboo stick. Length varies from 1-1.5 m. The hook is provided with earthworm, small prawns, bread, and rice paste. This fishing hook, is used to catch *Tilapia*, common carp and medium size IMCs *Anabus* and *Kanla* fish (Fig. 8).
- vii. **Gucha Barshi:** This type of hook is used in large scale during the flood. A nylon line is tied

on the bamboo stick. The hook is specially designed and made of wooden sticks (Fig. 9). The hook is provided with earthworm, small prawns, bread, and rice paste. This fishing hook, used to catch snake fish *Monopterus cuchia*, is generally found in the mud/soil of water bodies.

- viii. **Baira:** This is an arc like hook made of flexible bamboo sticks (Fig. 10). In the middle of the stick a nylon line is tied while at the other end, the line is tied with bamboo round stick of 9-12". The hook is specially used in either paddy fields or weedy shallow water body to catch *Koi* fish (*anabus testudinous*), *Magur (Clarius batrachus)*, *Singhi (Heteropneustes fossilis)*, *kanla (Notopterus notopterus)*, etc.

The hook is provided with an insect found in paddy field. Both end of hook are brought together and an insect is put into it which attracts the fish. As soon as the fish attacks on insect, both ends of the hook get free and pierce into the mouth of the fish.

#### Fishing traps

- i. **Anta trap:** It is a rectangular box-shaped trap made up of bamboo wire mesh or iron or polythene strips (Fig. 11). There is a small opening which only opens only in its inner side by water pressure. Earthworms, rice bran mixed with dry fish are placed inside the box to attract prawns. These traps are placed in a series marking each with bamboo sticks. These traps are placed in the evening hours. The mouth opening is against current. The prawn can enter the device through the mouth which opens by water pressure, but it can not come out from it. In the morning, catch is collected. The crabs and small fishes are also collected by this trap.
- ii. **Benta:** This trap is like Anta with only slight difference that it has a wide front and a round or narrow back (Fig. 12). It is also made of bamboo strips and tightly woven with steel wire or plastic threads. It is fixed in moving water especially on the dyke of the paddy field. This trap is mainly used to catch fishes like *chanda, putti, baim* and *gutom*, etc.
- iii. **Singchai:** It is a tubular trap with a circular mouth and a tapered back portion of the trap (Fig. 13). It is made with narrow bamboo strips, bamboo sticks which are woven together with plastic threads. The *Singchai* is used to catch bottom feeder fish like *magur, singhi, baim and baila, crab, prawn*, etc. in small shallow water



Fig.1-15— Fishing operating with *ber jal*; 2-Fishing operation with *faloon jal*; 3-*Kunijal* (Cast net) operated by fisherman; 4-*Dharma jal* fixed for fishing; 5-*Gathynna/Guthia* spear; 6-Hooks of *Boal barshi*; 7-Hooks of *Tang Barshirshi*; 8-Hooks of *Lait Barshi*; 9-Hooks of *Guchha Barshi*; 10-Hooks of *Baira*; 11-*Anta* trap; 12-*Benta* trap; 13-*Singhchai* trap; 14-*Pharam* trap; 15-*Deur* trap

bodies. It is fixed at the bottom, with the mouth opening across the flow of water.

- iv. **Pharam:** It is a rectangular box shaped trap made of bamboo strips. There is a small mouth with a flexible opening which opens only in its inner side (Fig. 14). The opening of trap is set against the current of water. It is placed in stagnant weedy water bodies to catch medium and small sized fishes including IMCs. The traps are placed at evening in a series marked with bamboo sticks and are placed in the evening hours. The fish entered in the trap but cannot come out from it. In the morning these fishes are collected
- v. **Deur:** This trap is just like carry bag made up with bamboo strips, sticks woven together with plastic thread (Fig. 15). This trap is set in moving water to catch fish such as *putti*, *baim*, *tengra*, *chanda* and *gutam*, etc.
- vi. **Phala:** This trap is funnel shaped with circular bottom and narrow upper side (Fig. 16). It is made of bamboo strips, sticks and woven together with plastic or iron wires. This trap is very common in Bangladesh and some parts of Tripura state. Small and medium sized fishes are caught by this device.
- vii. **Jak:** This is sometimes referred as fish aggregating device. It is mainly practised in Rudra Sagar lake as well as in most of wild water bodies of Tripura. The fishermen keep bushes, *Eichhornia*, bamboo poles with leaves in the water body (Fig. 17). They also provide feeds in it. Fish consider the *Jak* as their habitat, start to congregated there and breed. After 2-3 months the fishermen harvest the whole plot by mosquito net. They take out the bushes for placing at new location again. They harvest all the fishes residing at that *Jak* (Fig. 17- *Jak* system of fishing).

## Discussion

In the present study highlighted broadly three categories of fishing gears such as net, hooks & spears and traps those are traditionally used for ages by fishermen of Tripura. The details of the fishing nets presented in Table 1. These fishing nets were designed and developed by fisher folk of Tripura keeping in view of technical specification, operational requirements, economic life, target species, catch per unit effort (CPUE), materials availability and making cost, etc. Both selective and non selective type of



Fig.16— *Phala* trap

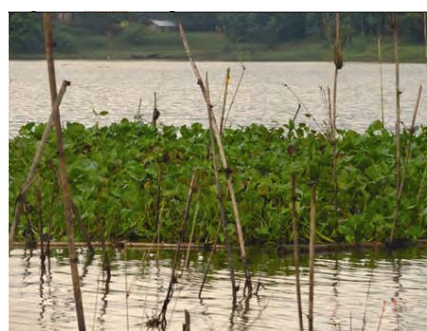


Fig. 17— *Jak* system of fishing

fishing gears is being used by the fishermen of the study area. Some of fishing devices like spears, hook and traps are specifically designed to catch a particular type of fish species such as spear *Gathynna/Guthia* is used mainly to locate *Monopterus cuchia* (eel) in swampy areas, hook *Boal Barshi* specially used to catch reverine fish *Boal* (*Wallago attu*), *Gucha Barshi* used to catch snake fish *Monopterus cuchia*, etc. The jack system of fishing is an indigenous fishing method followed by fishermen in Rudra Sagar Lake. For comparison this type of study is not available for Tripura but studies on fishing methods, fishing gears, review paper on fishing hooks used in India and traditional riverine fish catching devices for different states like Assam, North Bihar and Manipur were conducted and reported<sup>10,14,17,6</sup>.

## Conclusion

It appears from the study of fishing devices of Tripura that though it is a small state of the country yet has a rich indigenous know how about capture fishing practices. The indiscriminate fishing, fishing in the breeding season, poisoning and fishing with gillnets are some of the ill practices of fishing observed in the study area. These are potential threats to the fish biodiversity of Tripura and as such should

be discouraged. The fishermen are use nylon net for gillnetting which is harmful by resulting in ghost fishing. Therefore, only bio-degradable netting should be allowed for gill netting. If synthetic netting is used, then proper care should be taken for the positioning of gillnets and complete recovery of the same must be undertaken. Knotless netting should be introduced to reduce the manpower for operations in the case of larger nets, particularly drag nets. Further studies on efficiency of gears in terms of selectivity, catch per unit effort (CPUE), cost effectiveness and convenience in operation for optimum exploitation of capture fisheries resources may be considered in future.

### Acknowledgement

The authors are thankful to the 204 fishermen (respondents) of 8 villages, viz. West Melagarh, Yubrajghat, Chandanmura, Rudijala and East Durlavnsagar, Harijala GP, Chandamura and Kokraban GP from Harijala of West Tripura and South Tripura Districts of Tripura, for providing information. Further we are thankful to the Directorate of Research, Central Agricultural University, Imphal for funding IRP on Study on "Status of Fishing Gears and Crafts of West and South Districts of Tripura as this research paper is partially the study made under Intramural Research Project.

### References

- 1 Brandt AV, Fish catching methods for the World, 3<sup>rd</sup> edn, (Fishing News Books Ltd., London), 1984, 418.
- 2 Chatia RI & Seydur Rahman, Traditional riverine fish catching devices of Assam, *Fishery Technology*, 44 (2) (2007) 137-146.
- 3 Datta R & Bhattacharyja KB, Traditional fishing method of Assam for Catfishes using duck meat as an attractant, *Indian J Tradit Knowle*, 8(2) (2009) 234-236.
- 4 George VC, Fishing techniques of riverine and reservoir systems: Present status and future challenges, riverine and reservoir fisheries, SOFT(I), 1971, 192-196.
- 5 George VC, Fishing techniques of riverine and reservoir systems present status and future challenges, In: *Riverine and Reservoir Fisheries of India*, edited by Boopendranath MR, Meenakumari B, Joseph J, Sankar TV, Pravin P & Edwin L, [Society of Fisheries Technologists (India), Cochin], 2002, 192-196
- 6 Gurumayum SD & Chaudhary, M, Fishing methods in the rivers of Northeast India, *Indian J Tradit Knowle*, 8(2) (2009) 237-241.
- 7 Hornell J, The fishing methods of the Ganges, *Mem Asiatic Soc Bengal*, 8(3) (1923) 199-237.
- 8 Job TJ & Pantulu VR, Fish trapping in India, *J Asiatic Soc*. 19(2) (1953) 175-176
- 9 Kar D & Dey, SC, Variegated encircling gears in Lake Sone of Assam, *J App Zool Res*, 4(2) (1993) 171-175.
- 10 Kar D, Barbhuya AH, Barbhuya MA, Chetia P, Islam R & Rahman S, Traditional Rivrine Fish Catching Devices of Assam, *Fishery Technol*, 44 (2) (2007) 137-146
- 11 Lalthanzara H & Lalthanpuii PB, Traditional fishing methods in rivers and streams of Mizoram, North-east India, *Sci Vis*, 9 (4) (2009) 188-194
- 12 Mohapatra P, Traditional Marine Fishing Craft and Gear of Orissa. Bay of Bengal Programme. Development of Small-Scale Fisheries, Food and Agriculture Organization of the United Nations, Sweden. Styrelsen för internationell utveckling. Bay of Bengal Programme, FAO, 1986. WORKING PAPERS - BOBP/WP/24, 1986, 60.
- 13 Riyan S, Tripura's March Towards Shelf-Sufficiency in Fish, *Fishing Chimes*, 31(1) (2011) 42-45
- 14 Saly N Thomas, Gipson, Edappazham, B Meenakumari & PM Ashraf, Fishing hooks: A overview, *Fishery Technol*, 44 (1) (2007) 1-16.
- 15 Saxena RK, The fishing nets and traps in a section of middle reaches of Ganga river systems, *Proc IPFC*, 11 (1966) 250-271.
- 16 Varghese MD, George VC, Gopalkrishna Pillai AG & Radhalakshami K, Properties and Performance of fishing hooks, *Fishery Technol*, 34 (1997) 39-44.
- 17 Verma AM, Fishing gears used by Riparian Fisheries posing threat to the conservation of rare fish fauna in North Bihar, *Fishery Technol*, 44 (2) (2007) 147-152.