



# Traditional Fishing Gears and Methods of the Bodo Tribes of Kokrajhar, Assam

Nelson Basumatary<sup>1</sup> and Bronson Kumar Khangembam<sup>1\*</sup>

<sup>1</sup> Department of Zoology, Bodoland University, Kokrajhar, Assam - 783 370

## Abstract

Fish and fishery are an important part of the culture and tradition of many tribal communities of North East India including the Bodo tribes of Assam. The Bodos use varieties of unique traditional fishing gears and methods for fishing. Understanding and documenting such traditional knowledge systems are important to prevent them from vanishing with time. This paper aims to study and document the traditional fishing gears of Bodo tribes and their methods of operation. The study was conducted in six villages of Kokrajhar district, Assam, India from April 2021 to March 2022 through surveys including semi-structured questionnaires and personal interviews. Altogether 135 respondents participated in the study and 35 different fishing gears were recorded including the ones, which were previously not reported. They were categorized into impaling gears, hook & lines, and traps and pots. The natural resources and fish diversity were seen to influence the structure and design of gears in the study. The popularity and usage of some of the gears like *Sahera*, *Baga*, *Borom Je* and *Dura Je* were found declining, which may be attributed to increasing popularity of destructive fishing techniques like electric fishing, blast fishing and poisoning. This study will help in proper recognition, documentation and preservation of rich traditional knowledge on traditional fishing gears and methods of the region.

**Keywords:** Bodo, Kokrajhar, Fishing Gears, Traditional.

Received August 26, 2022; Revised 10 January 2023; Accepted 16 January 2023

\*Email: [kbronson173@gmail.com](mailto:kbronson173@gmail.com)

## Introduction

Fish and fisheries occupy a very important place in the life and culture of the diverse ethnic communities inhabiting the North Eastern region of India since very long time. Fish not only contributes to their dietary protein requirements, but also provide livelihood. Indigenous traditional knowledge systems give authentic information for a specific population reflecting the experiences of many generations based on indigenous practices (Haverkort, 1995). Traditional fishing methods comprise those tools and techniques including crafts and gears used by a specific community for fishing activities, and have been inherited from generations. Studies on fishing gears were reported from different states of North East including Assam. In Assam, such reports are available on gears used by the Kaibarttas of the Nalbari district (Haque, 2017). There are also reports of fishing gears used in the Kulsi river (Islam et al., 2013), Nagaon district (Saha et al., 2015), Southern Assam (Sharma et al., 2017), lower Brahmaputra River (Ahmed et al., 2018), South-West Assam (Kalita et al., 2019), the Dewaddhar village of Sonebeel, Assam (Choudhury et al., 2021) and Manas River (Jabeen & Soren, 2021). However, there is no such study available on the different fishing gears or techniques of the Bodo tribal community of Assam, and hence this study is an important addition to the rich traditional knowledge system of Assam.

The Bodos are one of the largest plain tribal groups in North-East India, and they are largely confined to the Bodoland Territorial Region (BTR) in Assam (Shrabanti & Kachari, 2015). Vast areas of the Bodoland region are covered by forest and natural water resources, and hence the region has a rich diversity of flora and fauna. Studies have revealed the presence of diverse freshwater, coldwater (Baro et al., 2015) and ornamental fish species (Baro et al., 2014) in the region, which indicates the rich ichthyofaunal diversity of the region.

Fisheries is an integral part of the Bodo culture and tradition. The majority of the Bodos live in villages and are dependent on fishing as their main source of livelihood. A variety of traditional hand-made fishing gears are utilized by the Bodos for catching fish, shellfish and aquatic insects. This technical knowledge accumulates over the years resulting in specialized gears and fish harvesting methods. Documenting this rich traditional wisdom becomes important as it can be the foundation for the creation of modern novel technologies (Ansari et al., 2021), to prevent biopiracy (Rasal et al., 2021) and possible development of economically profitable products and technology (Twarog & Kapoor, 2004). This may also be useful for the upgradation of the fishing gear/techniques along with associated ITKs for the benefit and economic empowerment of resource-poor fishers (Nath et al., 2018). Hence, the present investigation aims to study the different types of traditional fishing gears and methods practiced by the Bodo Tribes of Kokrajhar, Assam.

## Materials and Methods

The study was conducted in the Kokrajhar district (89° 46' E to 90° 38' E longitudes and 26° 19' N to 26° 54' N latitudes) of lower Assam, India. Six villages in the Kokrajhar district were selected for the study, where the majority of the population was the Bodo tribal community actively engaged in fishing and allied activities. The villages surveyed were Borshijhora Part 1, Borshijhora Part 2, Lawdanga, Bagmara, Middle Kalugaon and Kazigaon (Fig. 1).

Information about the fishing gears and methods was obtained through semi-structured questionnaires and personal interviews with the respondents. The study was conducted between April 2021 to March 2022 in which 135 participants (84 males and 51 females) from 60 different families engaged in fishing and allied activities as the primary source of livelihood were interviewed in person. Detailed technical information regarding the name, type, structural design, materials used, mode and place of operation, and target fish species were collected from each respondent. Pictures of the gears were also taken for further reference and documentation. The fishing gears were further grouped and classified based on the mode of capture, design and operation following Upadhyay & Singh (2013) and Bhattacharjya et al. (2004) with some modifications. The mesh size of the fishing nets was measured following standard protocol.

## Results and Discussion

Fishing gears are the devices or tools used to capture different fish species, whereas, fishing crafts are the boats that provide a platform for fishing operations, carrying the crew and fishing gears (Singha & Dey, 2017). A total of 35 different types of fishing gears were recorded in the study. All the gears were grouped as described earlier into impaling gears (5), hook & lines (7), traps and pots (4), scooping gears (2), falling gears (3), drag nets (4), gill net (1), dewatering tools (2), brush parks (3), lift nets (1) and miscellaneous gears (3). The different types of gears recorded are described in detail as follows.

Five types of impaling gears (*Jakra*, *Kushia Suli*, *Bwrla & Kebjang*, *Ouwahasung & Kebjang*, and *Shika Kongkai*) were recorded in the study. Generally, these are sharp & pointed structures or prongs that are shot or thrown to immobilize the fish by piercing or injuring it. The *Jakra* resembles a spear with a wooden handle (7-8 feet long) and multiple detachable sharp, pointed iron prongs (7-12 in number) at one end (Fig. 2a & 2b). It is used for hunting larger species like *Wallago attu* mainly during the floods and breeding season (April and May), when the fish moves near the shallow peripheral waters. Whereas, the *Kushia Suli* is a smaller gear made of a single iron rod with a sharp pointed end and a small wooden or bamboo handle mainly used to catch mud eels (*Monopterus albus*). The *Bwrla-Kebjang* is a type of bow and arrow, with multiple prongs attached to the tip of the arrow. Mainly operated at the night and usually in summer, the target species are *M. albus*, *Mastacembelus armatus*, *Clarias batrachus* etc. The *Ouwahasung-Kebjang* is a simpler version of bow and arrow, where a hollow bamboo handle instead of a bow is used to set the arrows with the help of a rubber band. The target species usually are *M. albus*, *M. armatus*, *C. batrachus* etc. The *Shika Kongkai* is a sharp, curved sickle-shaped knife held on a long bamboo or wooden handle. Exclusively operated by male fishers, it is an active gear used to hunt species such as *M. armatus*, *M. albus*, *W. attu* etc., which appear at the edge of beels in summer.

Hooks and lines are used to lure the fish with a bait set in a hook or kind, normally concealed, following which the fish gets trapped. In the present study, seven different types of hooks and lines viz., *Bwrsi Danda*, *Lopaigra Danda*, *Barli Dan*, *Kushia Dan*, *Bata*, *Kangkrai Haigra* and *Bami Dan* were recorded. *Bwrsi Danda* and *Barli Dan* are the conventional hook and lines, which consists of a line fixed to a bamboo

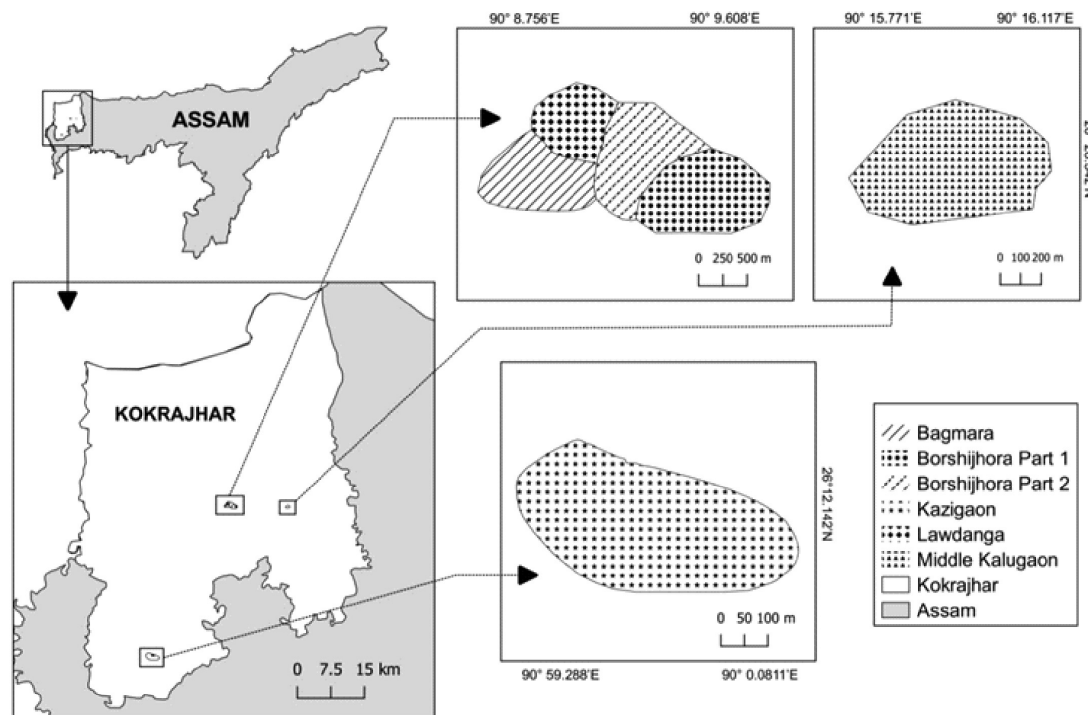


Fig. 1. Map showing the study area in Kokrajhar district of Assam, India

pole. The target fish includes *Mystus sp.*, *Channa sp.*, and *Wallago attu* etc. *Barli dan* uses live bait such as *Channa orientalis* or *C. stewartii*, and are especially used for catching *Wallago attu* during monsoon season from the rivers. The *Lopaigra Danda* is unique from the others in structure and operation as the line is without the conventional fish hook, sinker or float (Fig. 3a & 3b). No sharp hooks are used and instead about 5 to 15 earthworms are compactly attached at the free end of the line (length 15-21 cm) using the stem of a plant *Imperata cylindrica*. The target fishes are highly carnivorous species such as *Channa stewartii*, *C. orientalis* and *M. cuchia*. A quick upward movement pulls the fish out of water as it takes the bait. This method is usually employed in local wetlands, waterlogged areas and small beels. Other types of hooks and line are variations of the conventional types modified for catching specific fish species. For instance, the *Kushia Dan* is specially used for catching *M. cuchia* (Fig 3c) and the *Bami Dan* for catching *Mastacembelus armatus*. In case of the *Bata*, the line (4-5 feet) is held using a small floating twig (7 to 8 inches) of *Aeschynomene aspera* (Fig. 3d) and the target fishes are *Channa sp.*, *Anabas sp.*, and *Heteropneustes sp.* The *Kangkrai Haigra* is a

pair of hooks tied to a bamboo handle (5-6 feet, Fig 3e) specially designed to catch mud crabs known locally as *Kangkrai Jamini* (*Sartoriana sp.*).

Traps are impounding devices into which fish is lured either for food or shelter and are unable to escape (Pravin et al., 2011). These passive gears were found to be mostly made of split bamboos forming interweaved mats into various designs, size and shapes such as basket-shaped, conical or cylindrical. Usually set in specific locations for 6 to 12 hours, four different types of traps and pots were found in the study viz. *Sen*, *Koka*, *Sahera* and *Baga*. The *Sen* is a type of bamboo trap that may be spindle, flattened or rectangular in shape. It has 1-3 one-way inlet tunnels at the mid-dorsal side (but may vary based on the type) through which water passes taking fishes along. These are used in lotic water bodies such as small rivulets, streams, canals etc., and target fishes are small species like *Channa sp.*, *Puntius sp.*, *Mystus vittatus*, *Anabas testudineus*, etc. Four different sub-types of *Sen* were found in the study viz. *Sen Gota* (spindle-shaped, 2.5 to 3 feet in length, Fig. 4a), *Sen Dable* or *Sen Temai* (flattened, rectangular, 2.5 feet in length, Fig. 4b), *Sen Tepa*



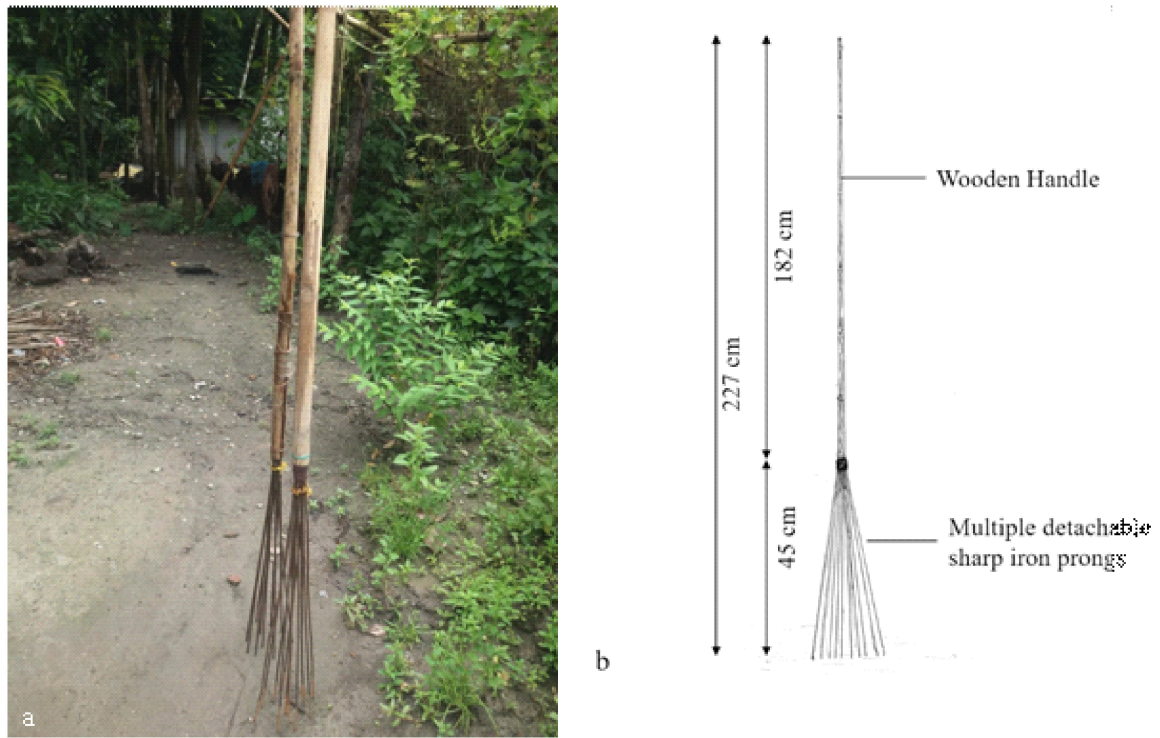


Fig. 2. (a) *Jakra*, (b) Diagrammatic representation of the *Jakra*



Fig. 3. (a) Bait (Earthworm) used in *Lopaigra Danda*, (b) *Lopaigra Danda*; (c) *Kushia Dan*; (d) *Bata*; (e) *Kangkrai Haigra*

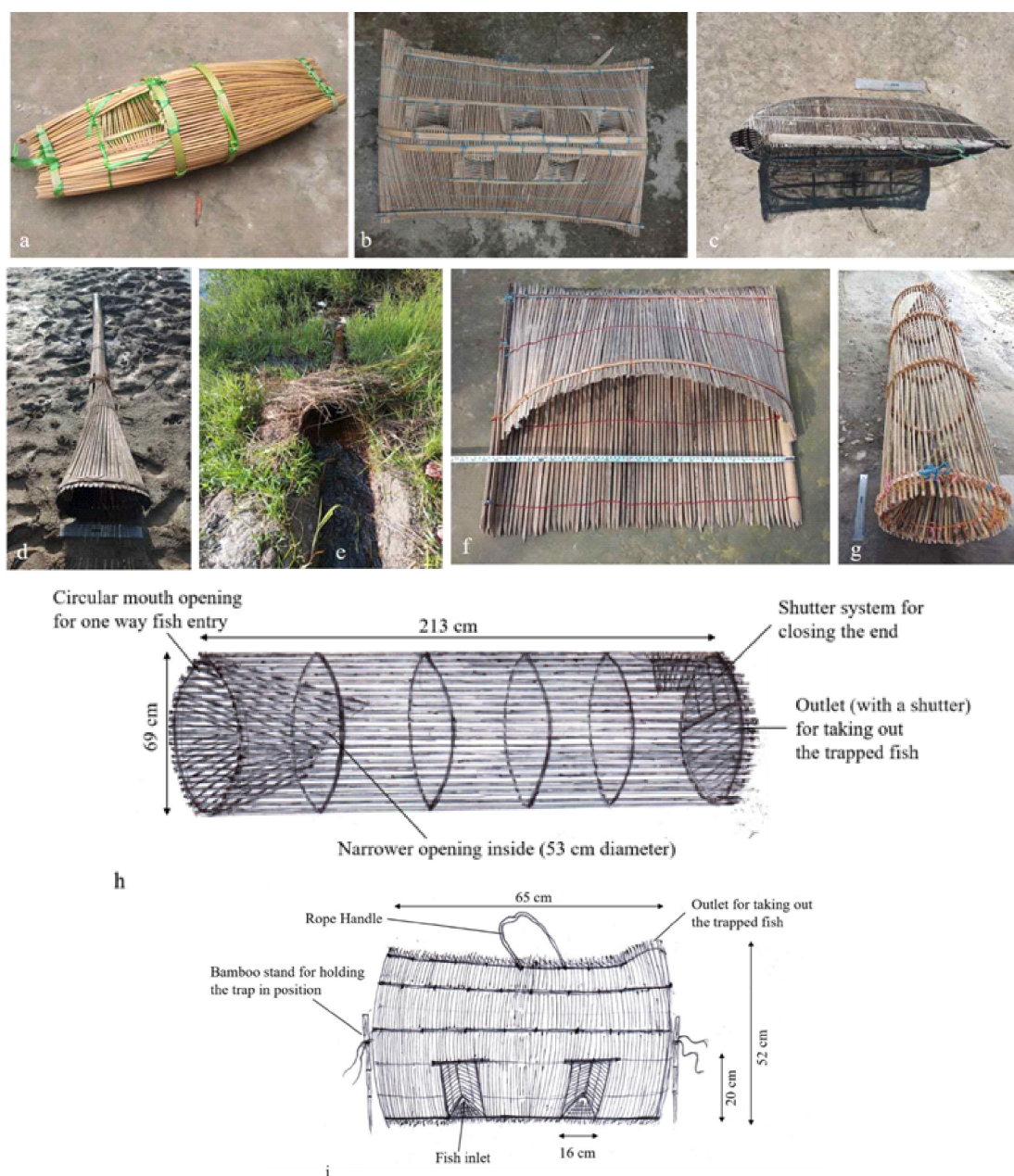


Fig. 4. (a) *Sen Gota*, (b) *Sen Dable* or *Sen Temai*, (c) *Posongra Sen*; (d) *Koka* (Larger Size), (e) Method of operation of *Koka* in flooded paddy fields; (f) *Sahera*; (g) *Baga* (Smaller Size); Schematic diagrams showing (h) *Baga* and (i) *Posongra Sen*

(smaller version of *Sen Gota*), and the *Posongra Sen* (rectangular-shaped, Fig. 4c & 4i). Another type of trap is the *Koka*, which is an elongated conical-shaped bamboo split trap (5-6 feet in length with a circular mouth of 3.5-4.5 feet circumference) made from a single bamboo and used for catching small indigenous fish species. One end of the bamboo pole is split into small strands held open by interweaved

smaller bamboo fibers forming a circular mouth (Fig. 4d). It is set (usually camouflaged with weeds and grasses) against the water current in small canals draining water-logged paddy fields (Fig. 4e).

The *Sahera* consist of flat base (2.5 feet) made of bamboo splits on which an arch-shaped structure (made from interweaved bamboo split fibers) is



attached forming a semi-circular mouth about 7 feet wide (Fig. 4f). The trap is placed against the water current for trapping small indigenous fish species in small temporary draining canals during the autumn season. The *Baga* is a large cylindrical-shaped bamboo trap (6 feet long with a circumference of 7-8 feet, Fig. 4g & 4h). The opposite ends of the *Baga* are open, one for water to enter and other small opening for removing the fish. For its operation, bamboo barriers are placed across the width of small river or streams mostly during the summer season. Only a small portion (of the size of the *Baga*) are kept open for placing the mouth of the *Bagas*, and it becomes the only passage way for the migrating fish upstream. The *Bagas* are placed with its mouth along the direction of the water current. The main target fish are mostly the larger fish species such as *Wallago attu* and occasionally *Channa marulius*.

Scooping gears are active gears that traps the fish by swift movement, quick lifting or scooping up of the gear. Two types of this gear were recorded in the study. The *Nargra je* is a nylon net (mesh size = 0.1-0.15 cm) tied onto a triangular bamboo frame. One pole of the bamboo frame is kept long for holding and operating. The gear is submerged, dragged and scooped through some distance to catch the fish from shallow water bodies exclusively by male fishers. The *Jekai* consists of a triangular basket-shaped structure made of bamboo exclu-

sively operated by women fishers (Fig. 5a & 5b). The handle is hold with the left hand and the string/rope is held in the right hand. The gear is plunged into the bed of the shallow water with the mouth facing the fishers. The fishers then stomp spontaneously the surrounding waters with their feet to drive fishes towards the mouth of the gear. The gear is then quickly lifted to catch the fish entering the *Jekai*. *Jekai* is fairly common all over Assam and a *Kobai* (harvest pot) is generally used along with it for collection and storage of the collected fish.

Falling gears are specially designed to capture the fish by making the gear fall over the target fish thereby enclosing it. Falling gears are applied normally from the margins of a water body or from aboard a craft. Three types of falling gears were recorded in the study such as cast nets (02) and cover pots/plunge basket (01). The nylon made cast nets were of two types *viz.* *Kewali je* and *Borom je*. Their structure and operation were typical of conventional cast nets. The *Kewali* forms a circular net (of mesh size of 0.67-0.71 cm), when spread giving an umbrella like shape. A foot rope attached with lead sinkers or iron weights is present, which allows it to sink. A central rope attached with the net is held by the operator during application. As the net sinks downwards, it encircles and traps the fish in the pockets at the lower margin as they try to escape. The *Borom je* is a larger cast net made of nylon designed to catch only the larger fish species.

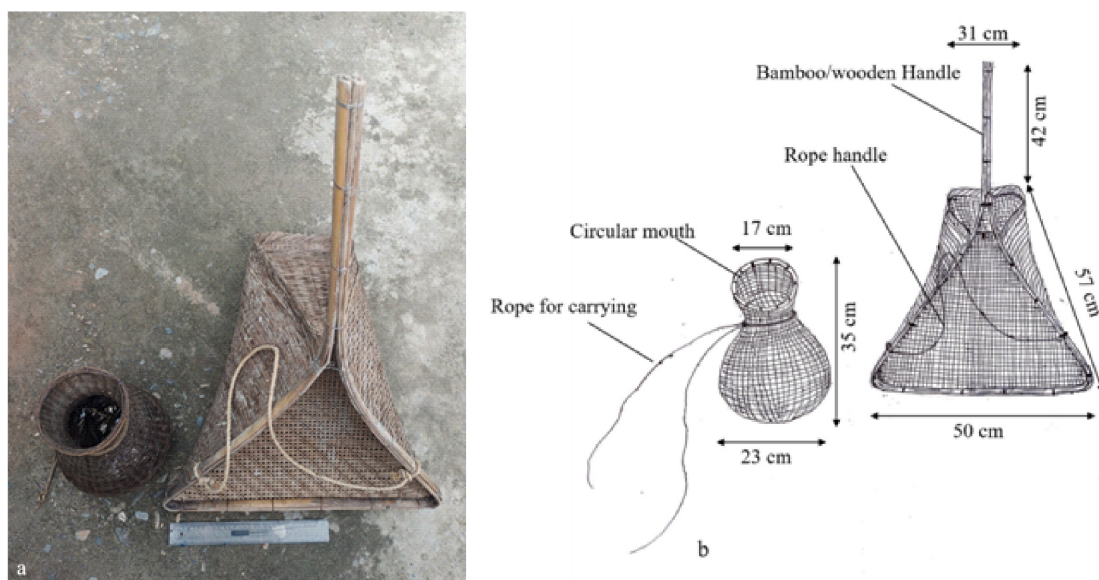


Fig. 5. (a) *Jekai* (Right) & *Kobai* (Left); (b) Schematic diagram of the *Jekai* & *Kobai*

It has a mesh size of 3.33-3.50 cm. A cylindrical plunge basket known locally as *Polo* was also recorded. It is a bamboo splits made active gear with one end normally wider than the other and is widely found all over Assam. The *Polo* is operated by quickly plunging it into water in a vertical position with the wider mouth facing downwards. Usually single-operated by male fishers, it is used for catching all variety of larger fish species including carps, murrels and catfish.

Four types of drag gear viz., *Musari je / Konta mara*, *Duli je*, *Langyi je* and *Dura je* were recorded in the study. The *Musari je / Konta mara* is a rectangular-shaped drag net (mesh size 0.10-0.15 cm) with one side open and held in between two bamboo poles on either side. The two poles are dragged by two individuals while operating. A long rope is attached to both the upper as well as lower margins of the net, and the lower margin is provided with iron sinkers. The *Duli je* is a large cuboidal bag-shaped drag net (20 to 30 feet long) having two different mesh sizes, and 2 different types of sinkers in a single net (Fig. 6a & 6b). In the anterior portion of the net, which acts as its mouth, the mesh size is larger (3.33-3.45 cm). There are small pockets present in this part of the net, where dry mud is kept, which acts as the sinkers. Whereas, the posterior portion has small pockets having small iron sinkers, and the mesh size is also smaller (0.67-0.70 cm). This lower portion of the net is in the shape of a large bag or purse, where the fish gets trapped

while dragging. Generally, the *Duli je* is operated in bigger beels or water bodies during winter. The *Langyi je* is also a huge rectangular-shaped drag net (length 80-100 feet, breadth 4.8-5.5 feet, mesh size 1.05-1.10 cm), which requires 10-15 individuals to operate. Sinkers made of burnt clay are attached at the bottom margins, and the upper margins possess a float made of rubber or the stem of a plant (*Grewia serrulata*). On the other hand, the *Dura je* is a cuboidal-shaped drag net (mesh size 2.86-2.90 cm) with sinkers on the bottom side margins (Fig. 7a & 7b). The ends of this net are held by small iron circular rings at top, and two bamboo poles at the other two ends. Poles inserted on the circular rings helps in dragging the net. Six to ten persons are required for its operation.

Locally known as the *Pasi je*, four different types of gill nets were recorded in the study. These are typical rectangular-shaped gill nets provided with floats and sinkers used extensively in the monsoon season mostly in beels. Four sub-types of *Pasi je* were recorded: the *Barli Pasi* is a gill net of mesh size of about 4 cm, specially designed to trap *W. attu*, whereas the other three types are 22 number *Pasi* (mesh size 1.20 cm), 20 number *Pasi* (mesh size of 0.91 cm) and 16 number *Pasi* (mesh size 0.71 cm).

Two types of dewatering gears were found in the study. The main purpose of these gears is to reduce the water level to reveal the fish present. The *Dohata* is a typical dewatering tool made of tin or plastic bucket with two ropes tied on either side of the

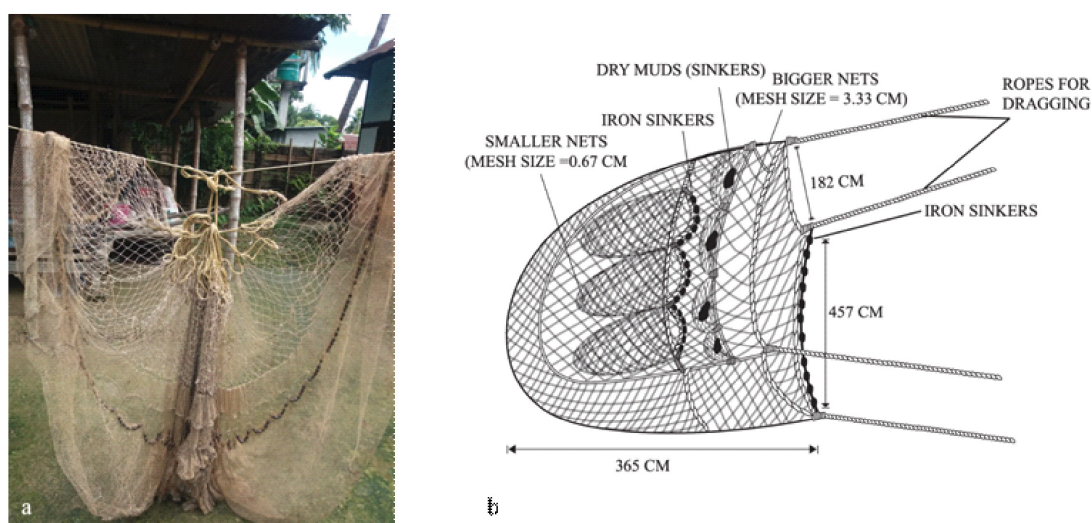


Fig. 6. (a) *Duli Je*, (b) Schematic diagram of *Duli Je*

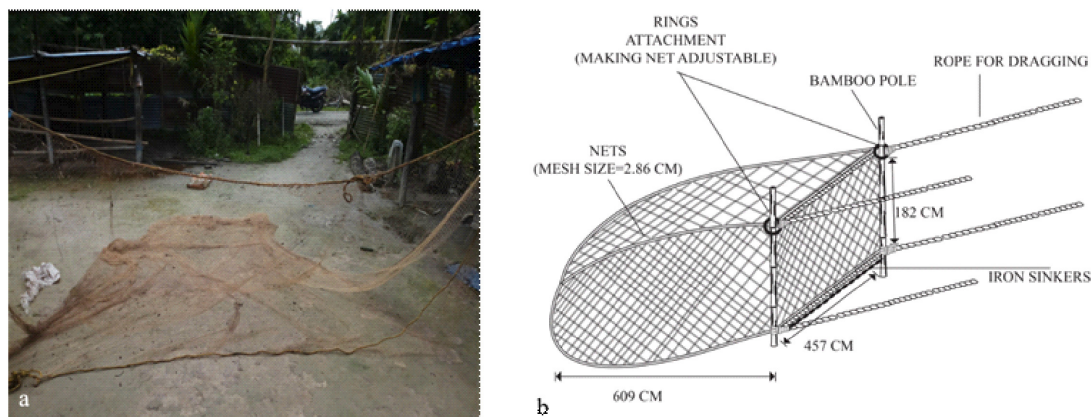


Fig. 7. (a) *Dura Je*, (b) Schematic Diagram of *Dura Je*

bucket. Another type, the *Sili* is shovel-like made of scoop-shaped tin held at one end of a bamboo pole.

Brush parks are meant to attract fish to take shelter in them from where it could be collected. Three types of brush parks *viz.*, the *Hasung*, *Swmhabgra Jekai* and the *Hagra Katumnai* were observed in the study. The *Hasung* is essentially an old betel nut palm (*Areca catechu*) or a bamboo trunk 2.5-3 feet long and 1-1.5 feet in diameter. The trunk is split into two halves and inside portion is removed to make it hollow where the fish such as Zig zag eel, catfishes and *Channa* can take shelter. It is then tied and submerged in water for 6 to 7 days, mostly during the winter season. A preference for older trunks by the fish were reported by the fishers. Two different types of *Hasung* were recorded, the *Goi Hasung* (made of old betel nut trunk; Fig. 8a) and the *Ouwa Hasung* (made of old bamboo trunks). *Goi Hasung* gives comparatively higher catch compared that of *Ouwa Hasung*. Another brush park is the *Swmhabgra Jekai*, which is a *Jekai* like structure in which some plants species such as *Streblus asper*, *Saccharum spontaneum*, *Chrysopogon zizanioides*, *Imperata cylindrica*, etc. are kept as attractant (Fig. 8b & 8d). It is kept submerged in water bodies for 10-15 days. After which small indigenous fish species are generally caught. The *Hagra Katumnai* (Fig. 8c), on the other hand is a simple single-operated brush park (about 6 feet long and 3-4 feet in circumference) in which long grasses such as *Saccharum spontaneum*, *Chrysopogon zizanioides*, *Imperata cylindrical*, etc. are used. It is operated only in low current marginal areas of rivers in the winter season. A plant species (*Streblus asper*) is sometimes added as a fish attractant. The target fish species were reported to

be zigzag eel, catfishes, shrimps, crabs, etc. Similar type of gears was also reported by Pravin et al. (2011) as shelter traps or habitat traps, and some of the common ones reported were *Dolonga* (Quadrangular); *Hukuma* (Conical); *Chunga/Dhun* (Cylindrical) and *Tack* (Circular).

Known locally as *Lov Je*, it is a typical square-shaped lift net (mesh size = 0.36 cm) held stretched using two flexible bamboo slits similar to those lift nets found widely all-over Northeast India. The net is lifted after setting for about 20-40 min to collect the fish. However, in rivers, it was reported to be operated mainly in the monsoon season with a large mesh size net.

In the present study, three different types of unique gears were observed *viz.*, *Jekai je*, *Na ahjougra* and *Na habgra*. The *Jekai Je* is a simple type of net-trap used mainly during the monsoon season, which consist of a conical-shaped net (mesh size = 0.1 cm) with a triangular mouth. It is kept in water canal draining waterlogged paddy fields against the water current for trapping the small fishes. Whereas, the *Na Ahjougra* is a rectangular-shaped net (mesh size around 0.1 cm) and it is placed horizontal in the air just above the water surface over small rapids or waterfalls at small canals or streams with high water currents. The fishes get trapped as it jumps over these rapids or waterfall against the high current. *Channa marulius*, *W. attu*, etc. are the main target species. The *Na Habgra* is bag-shaped net (mesh size around 0.1 cm) used for catching fishes moving along the small and narrow slow-flowing canals generally during September and October.





Fig. 8. (a) *Goi Hasung*; (b) *Swmhagra Jekai*; (c) *Hagra Katumnai*, (d) Schematic diagram of the *Swmhagra Jekai*

The present study has highlighted the rich diversity of indigenous fishing gears used by the Bodo tribes of Kokrajhar, Assam. The maximum number of gears was recorded in the hook & line category probably due to its simple operations, and construction. The *Bwrsi Danda* was the most common hook & line fishing gear. Similar gears reported elsewhere are the *Sip* or *Barshi* of Bangladesh (Siddique et al., 2013; Ali et al., 2014), the *Chip* or *Borshi* of Southern Assam (Sharma et al., 2017) and the *Tang Barshi* of

Tripura (Upadhyay & Singh, 2013). The bait animal used, however, differed in all these gears. While the *Chip* or *Borshi* used boiled rice or maida (refined wheat flour) paste, the *Tang Barshi* used bread, small prawns or rice paste. Other animals such as grasshopper (Purkayastha & Gupta, 2014), frogs and live fish (Galib et al., 2009) were also reported. In our study, the bait used for different hooks and lines ranged from earthworms, grubs, insect larvae, shrimps and small fishes.

The study also revealed some unique gears and/or methods not reported in previous studies. For instance, the *Lopaigra Danda*, unlike other hooks and lines, is devoid of any hook, sinker or float and interestingly only *Channa sp.* and *M. cuchia* were the target species, probably due to their high predatory and carnivorous nature. The use of the plant *A. aspera* (known locally as 'Posla') for making the float in the *Bata* was not reported elsewhere. Alternatively, *Arundo donax* was also used for making the float. In a study from Bangladesh dried reed was reported to be used for a similar gear called *Borsha* (Siddique et al., 2013), whereas the *Nolboroshee* in Assam and *Patna borshi* in Tripura use floating plants like *nol* bamboo, *Colocasia* stem, *Kankulla* piece, etc. (Bhattacharjya et al., 2004). The *Baga* of the Bodos reported in this study were operated only in rivers, and its target fishes are only large indigenous fish species. Kalita et al. (2019) also reported a similar category of gear known as *Baagha* used by the fishing communities of Southwest Assam, which was operated in streams, beels, water logged areas, and the target fish were small and medium fishes. The most common maze or barricade *Sen Gota* recorded in the study can be compared with the *Chepa* of Arunachal Pradesh and Assam (Das et al., 2015; Kalita et al., 2019; Jabeen & Soren, 2021), or the *Seppa* in different parts of Assam (Barman et al., 2013; Baruah et al., 2013; Purkayastha & Gupta, 2014; Sharma et al., 2017; Baruah et al., 2018). The traps and pots observed in the study were similar to the various cylindrical shaped traps such as the *Seppa*, *Faron*, *Doo*, *Dingora*, *Ghumai khowa*, *Goni*, *Khoka*, *Hufa*, *Runga* etc reported by Pravin et al. (2011). Similar to the gears observed in the present study, the *Jakoi*, *Polo*, *Khewali jal* and *Jakra* was also described by Baruah (2017) as traditional fishing gears of Assam among the rural Kamrup population.

Some of the gears like the *Kangkrai Haigra*, *Sahera* and *Baga* were rarely used by the fishers in the study. Probable reasons for their decline in popularity and use may be the reduction of target fish population due to application of pesticides and herbicides in paddy fields. Another possible reason may be the increasing popularity and application of techniques such as blast fishing, electric fishing, poisoning, etc. Although, the Bodo and Santhal tribes of Assam, and Khasis of Meghalaya are especially known to be skilled in using such impaling gears (Bhattacharjya et al., 2004), the use of such gears like *Bwrla Kebjang*, *Ouwa Hasung* and *Kebjang* were now found to be restricted to a few

fishers in the present study, probably due to lack of trained fishers. Different communities in North East India utilize it under different local names such as *Dhanu-Karh* (Assam), *Teer-Karh* (Tripura) and *Ten-Tenjin* (Manipur). Similar to the *Hasung* of the Bodos, the *Chunga* of the Brahmaputra valley (Baruah et al., 2013) and Nagaon area of Assam (Saha et al., 2015), and the *Chalan Beel* of Bangladesh (Sultana & Islam, 2016) were gears reported in previous studies. *Swmhaggra Jekai* reported in the present study was also reported in other parts of Assam but were known by different names such as *Dhara Jakhe* (Bhattacharjya et al., 2004). The *Hagra Katumnai* and other miscellaneous gears such as *Na Ahjougra* and *Na Haggra* reported in this study may also be seen in other parts of Assam, but has not yet been reported. Drag nets such as *Duli Je*, *Dura Je* and *Langyi Je* were seen losing popularity in many fishing households possibly due to the higher cost and manpower requirement for operation. The *Duli* and *Dura Je* recorded in this study are unique gears of the Bodos and not yet reported anywhere. The *Langi jal* of Assam (Islam et al., 2013; Saha et al., 2015; Kalita et al., 2019) and Arunachal Pradesh (Das et al., 2015), and the *Laang* of Manipur (Bhattacharjya et al., 2004) are gears reported in other parts of India similar to the *Langyi Je* reported in the present study.

This study has revealed the rich traditional fishing gears of the Bodos, which may serve as a valuable addition to traditional knowledge of Assam. Most of the fishing gears were traditionally made using ecofriendly, low cost and readily available natural resources such as bamboo, jute fibers, woods and other plants. Traditional knowledge systems are an important part of the cultural identity of a community (Rasal et al., 2021). With increasing population, urbanization and the introduction of modern technologies, there is a threat to the existence of these indigenous fishing gears and techniques. Although these indigenous crafts and gears cannot alone sustain the increasing demand of the growing population, they are nonetheless significant for the local population living in and around the natural water bodies. Hence, efforts may be made for the popularization, documentation, and preservation of these rich traditional knowledge systems for future generations.

In conclusion, fishing and allied activities traditionally play an important role in the socio-economic life of the Bodos of Kokrajhar, Assam, India. This study has highlighted 35 different types of fishing gears

of the Bodos for the first time. Locally available raw materials were used for the construction of majority of these gears. Gear like the *Lopaigra Danda* was unique and not reported elsewhere. With time, the popularity and application of gears like the *Sahera*, *Baga*, *Borom Je*, *Dura Je Kangkrai Haigra*, etc. were declining and without proper attention, may be lost forever. Notwithstanding its limitations, these gears are crucial for ensuring livelihood and nutrition of the local population. This study may be helpful in the conservation of this rich traditional knowledge system, and also provide a valuable addition to the rich knowledge of traditional fishing gears of North East India.

### Acknowledgment

The authors are thankful to all the respondents and participants for their active participation, and the Botany Department Herbarium Centre, Bodoland University, Kokrajhar, Assam, for identification of the plant species. The authors thank Mr. Saurabh Mardi, Research Scholar, Department of Zoology, Bodoland University for his contribution in preparation of the map of the study area. The authors also acknowledge the Head, Department of Zoology, Bodoland University for providing necessary facilities for doing the research work.

### References

- Ahmed, I., Borah, S., Bhattacharjya, B.K., Landge, A.T., Kakati, A., Saud, B.J., Chetia, B.R., Kumar, M., Payeng L.K. and Dutta. R. (2018) An indigenous predatory fish catching technique of lower Brahmaputra valley, Assam. *J. Entmol. Zool. Stud.* 6(3): 491-494
- Ali, M.M., Das, B.C., Islam, S.M.A., Masud M.A. and Rahman. M.Z. (2014) Fishing Gears and Crafts used by the Fishers at Lohalia river in Patuakhali. *J. Environ. Sci. Nat. Resour.* 7(2): 169-175
- Ansari, M.A., Sharma, S.K., Roy, S.S., Ramakrishna, Y., Datt, S., Ningombam, A., Singh, N.A., Luiram, S. and Prakash, N. (2021) Documenting the agriculture based indigenous traditional knowledge in Manipur State of North Eastern India. *Indian J. Tradit. Knowl.* 20(4): 1065-1074
- Barman, J., Baruah, U.K. and Goswami, U.C. (2013) Indigenous techniques of catching the mud eel, *Monopterus albus* (Ham.) in Goalpara district, Assam. *Indian J. Tradit. Knowl.* 12(1): 109-115
- Baro, D.C., Sharma, S. and Sharma, D. (2015) Coldwater fish diversity and abundance of upper reaches of Sonkosh river, Kokrajhar, Assam. *Sci. Vis.* 15(1): 8-18
- Baro, D.C., Sharma, S. and Baishya, R.A. (2014) Status of Ornamental fish diversity of Sonkosh River, Bodoland Territorial Council, Assam, India. *Sci. Vis.* 14(1): 28-33
- Baruah, D. (2017) Traditional community fishing practices of rural Kamrup of Assam. *Aquacult. Asia.* 21(1): 7-17
- Baruah, D., Dutta, A. and Pravin, P. (2013) Traditional fish trapping devices and methods in the Brahmaputra valley of Assam. *Indian J. Tradit. Knowl.* 12(1): 123-129
- Bhattacharjya, B.K., Manna, R.K. and Choudhury, M. (2004) Fishing Crafts and Gears of North-Eastern India, 67 p, Central Inland Fisheries Research Institute, India
- Choudhury, M., Paul, S. and Chhetri, B. (2021) Study on fish catching devices used by the fishing community of Dewaddhar village of Sonebeel, Assam, India. *Int. J. Fish. Aquat. Stud.* 9(4): 306-309
- Baruah, A., Dutta, A., Bhuyan and Puthra, P. (2018) Fishing gear and practices in flood waters of Assam. *Aquacult. Asia.* 22(4): 6-19
- Das, B.K., Singh, N.R., Boruah, P. and Kar, D. (2015) Fishing devices of the river Siang in Arunachal Pradesh, India. *J. Fish.* 3(2): 251-258
- Galib, S.M., Samad, M.A., Kamal, M.M., Haque, M.A. and Hasan, M.M. (2009) A Study on Fishing Gears and Methods in the Chalan Beel of North-West Bangladesh. *J. Environ. Sci. Nat. Resour.* 2(2): 213-218
- Haque, Md. C. (2017) Traditional Fishing Methods and Tools of the Kaibarttas: Study in the Nalbari district of Assam, India. *IOSR J. Humanit. Soc. Sci.* 22(2): 20-33
- Haverkort, B. (1995) Agricultural Development with a Focus on Local Resources: ILEIA's view on Indigenous Knowledge. In: *The Cultural Dimensions of Development: Indigenous knowledge systems* (Warren, D.M., Slikkerveer, L.J. and Brokensha, D., Eds.), pp 454-457, Intermediate Technology Publications Ltd., London
- Islam, M.R., Das, B., Baruah, D., Biswas, S.P. and Gupta, A. (2013) Fish Diversity and Fishing Gears used in the Kulsi river of Assam, India. *Ann. Biol. Res.* 4(1): 289-293
- Jabeen, F. and Soren, A.D. (2021) Fishing Crafts & Gears of the River Manas in Assam, India. In book: *Advances in Scientific Approach for Sustainable Development* (Barthakur, M. and Borthakur, M. Kr., Eds.), pp. 172-184, AkiNik Publications, Rohini, Delhi, 110085, India
- Kalita, K.D., Das, B.K. and Kalita, S. (2019) Fishing Communities and Traditional Fishing Gears in South-West Assam. *IOSR J. Agric. Vet. Sci.* 12(5): 01-07
- Pravin, P., Meenakumari, B., Baiju, M., Barman, J., Baruah, D. and Kakati, B. (2011) Fish trapping devices and methods in Assam - a review. *Indian J. Fish.* 58(2): 127-135



- Purkayastha, P. and Gupt, S. (2014) Traditional fishing gears used by the fisher folk of Chatla flood plain area, Barak valley, Assam. *Indian J. Tradit. Knowl.* 13(1): 181-186
- Rasal, V., Dasgupta, S., Yadre, S. and Shukla, S.P. (2021) Fishing techniques and gears developed by tribal communities around Bargi Reservoir in Madhya Pradesh, India. *Indian J. Tradit. Knowl.* 20(4): 1098-1101
- Saha, B., Devi, R., Kashyap, D. and Baruah, D.J. (2015) Perceived effectiveness of indigenous traditional fishing methods including gears and traps in Nagaon district of Assam. *Indian J. Tradit. Knowl.* 1(1): 103-111
- Sharma, B., Rout, J. and Swain, S.K. (2017) Traditional fishing gadgets used by fishermen of Barak valley, Southern Assam, North-East India. *J. Entomol. Zool. Stud.* 5(5): 1555-1560
- Shrabanti, M. and Kachari, S. (2015) Socioeconomic status and the factors influencing the socio-economic status of Bodo tribes: A case study of Udalguri district, Assam. *Socioeconomica* 4(8): 371-394
- Siddique, A.B., Saha, D., Rahman, M. and Hossain, M.B. (2013) Fishing gears of the Meghna river estuary of Chandpur region, Bangladesh. *Trends Fish. Res.* 2(1): 1-8
- Singha, B. and Dey, A. (2017) A textbook of Fish and Fisheries from basic ichthyology to aquaculture biotechnology, 88 p, Invincible Publishers, G-120, Shushant Lok III, Sector 57, Gurgaon-122001, India
- Sultana, N. and Islam, M.N. (2016) Fishing gears and methods in the Chalan Beel, Bangladesh. *J. Fish.* 4(2): 377-384
- Twarog, S. and Kapoor, P. (2004) Protecting and promoting traditional knowledge: systems, national experiences and international dimensions, 418p UNCTAD, United Nations, Geneva 10, Switzerland
- Upadhyay, A.D. and Singh, B.K. (2013) Indigenous fishing devices in use of capture fishing in Tripura. *Indian J. Tradit. Knowl.* 12(1): 149