

# Floats and Sinkers in Enhancing Efficacy of Fishing Gears Operated in Assam Water Bodies

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## ABSTRACT

Floats and sinkers are intrinsic components of a fishing gear fabricated for its effectual stability in water mass or to catch a targeted fish species. Different types of floats and sinkers were developed by the fishers of Assam with time to enhance a fishing operation in terms of gear selectivity at a desired water depth, maintaining the desired configuration and its vertical opening. These fishing gear accessories were prepared mostly with locally available materials which are economical in cost, readily available and easy to fabricate. Floats were either made of natural substances such as light wood and grass stalks or synthetic substances such as plastic bottles and thermocole. Similarly, sinkers are also made of jute materials as organic substances and iron and lead as inorganic substances. The requisite quantities of the floats to be fabricated in a gear were determined based on the buoyancy to withstand water pressure whereas sinkers are determined based on the preferred vertical standing of a net in water column or to stretch the net downwards during operation.

**Keywords:** Fishing, gear accessories, fabrication, technology, Assam

The art of capturing fish from natural water is quite ancient (Hornell, 1950). Over the past, simple fishing gears have been replaced by more efficient ones with the advent of new netting materials and in addition or replacement of gear accessories enabling the gears in catching fish in bulk (George, 1971; Sreekrishna and Shenoy, 2001). The application of gear accessories in the form of floats and sinkers in different forms of fishing gears have been developed by the fishers over the years to adapt to its operational water bodies and their hydrological conditions, the species of fish desired and the targeted size. The success of fishing methods in water bodies are those that have stood the test of time (Eyo & Akpati, 1995). The earliest record of fishing gear and techniques of the inland waters in the region is that of De (1910) in his report on the fisheries of Eastern Bengal and Assam; Joseph and Narayanan (1965), Choudhury *et al.* (1996), Pravin *et al.* (2011), Baruah *et al.* (2013) had an account on

fishing gear and methods of the river Brahmaputra; Dutta & Bhattacharjya (2009) explained fishing by attractants in Assam water; Baruah (2014) described on bamboo made fishing implements. An attempt has been made in this present communication to document the various kinds of gear accessories applied in fishing nets to improve their efficacy in method of operation as there is hardly any information available on these gear accessories used in the state.

## MATERIALS AND METHODS

The present communication is based on observations made on fishing gears and methods operated in freshwater systems of Assam with special importance on the gear accessories used to enhance the efficacy of the fishing devices. The information was collected by personal visits at the fishing sites and fishing villages and interaction with fishermen, village heads, *mohaldars*, lessees and fishery officers.

Prior Informed Consent (PIC) was obtained from them for visiting the fishing sites, observe the operation and to collect data for documentation in published format (Singh *et al.* 2013). Individual fishermen of the various communities in the state residing along the river banks were approached to observe the actual method of fabrication of fishing gears and the associated usage of floats and sinkers. The fishing gears mentioned in this present work is based on the classification of Brandt (1984); Alam *et al.* (1997) and Sreekrishna and Shenoy (2001). The technical specifications and design details of the structure and method of operation were recorded following a prescheduled Performa by Miyamoto (1962) and Nedelec (1975). Fish identification was performed at the site on the basis of morphometric and meristic characters by Jhingran (1991), Talwar and Jhingran (1991), Jayaram (1999) and Eschmeyer *et al.* (2018). Photographs were taken with the aid of digital camera Sony Cyber-shot DSC-77 at the fishermen houses and fishing sites.

## RESULTS AND DISCUSSION

The floats and sinkers are essential components of fishing gears which help in maintaining the gear at the required water depth, obtaining proper shape during operation and facilitating vertical opening in gears like bag nets.

### (1) Floats used in fishing gears of the Brahmaputra valley

The floats used in fishing gears must have all the characteristics to make it highly buoyant. The floats must be able to withstand water pressure, light in weight, must not absorb water and durable. The different types of floats used in the fishing nets commonly operated in the Brahmaputra valley of Assam are as follows:

(i) **Light wood:** The most common floats used in the fishing nets are made of light wood (Fig. 1-3). These woods are highly buoyant and are used in large size surrounding nets operated in wetlands and larger ponds. Some of the wood varieties used as floaters are *Aeschynomena aspero* (sola), *Erythrina indica* (modar), *Dalhousia bracteata* (telilota) and *Starmalia villosa* (udal). Special care is taken by the fishers to increase the durability and self life of the wood in water. Wood tar and coal tar (Fig. 4) are used as preservative to evade from mechanical wear

and tear of light woods due to abrasion and decay. The wood pieces are generally dipped in hot wood tar or coal tar and are later kept to get cool in shade for 3-5 days for hardening.



**Fig. 1:** Local wood (*modar*) used as floats



**Fig. 2:** Floats made of locally available light wood



**Fig. 3:** Floats made of light wood with local variations



**Fig. 4:** Tarring of floats and sinker ropes



(ii) **Grass stalks:** Stems of grasses such as *Saccharum spontaneum* (khagra), *Vetiveria zizanioides* (birina) serve as an excellent source of floats for fishing nets in Assam. These stalks are chopped for 3-10 cm length and are attached to gill nets (monofilament and multifilament) in particular which are operated in rivers and wetlands. However the durability of these gears are less for which the floats are to be replaced every year. Carps, clupeids and cichlids are caught in gill nets with grass stalks as floats.

(iii) **Bamboo pieces:** Splits of bamboo or whole pieces of bamboo are also used as floats in the region. Many varieties of bamboo (*Bambusa* spp.) are widely available in the state of Assam and the easy access to procure the raw materials make the gear cheaper in cost for the fishers. Bamboo floats are used in surrounding nets, seine nets operated in the Brahmaputra valley. Bamboo is used as whole pieces from node to node or as splits. No specific dimensions can be mentioned for these floats as these are used depending on the fisher's needs. The catch composition is generally large sized fishes.

(iv) **Banana stem:** The stems or trunks of banana (*Musa* spp.) can provide sufficient buoyancy for retaining fishing net in vertical position. The banana trunk is split into pieces and the splits are tied to the head rope of drag nets and surrounding nets. These floaters are prepared freshly and tied to the nets. Banana stems do have a long shelf life and therefore are discarded after 2-3 operations.

(v) **Colocassia spp.:** Stems of *Colocassia* spp. are also used as floats in fishing gears such as hook and line. These floats (15-30 cm) do not allow the hook to sink or carried away on fish bite. This buoyant also helps to indicate the position of the drifting hook and line in water. *Colocassia* species are readily available in wetlands and pond banks of Assam and therefore does not have a cost to fabricate it on the line. Fish species of genus *Channa* and *Anabas* are mostly caught which are insectivores by their feeding habit.

(vi) **Water hyacinth:** Water hyacinth is a very common sight in the water bodies of Assam. Fishing nets such as gill nets operated in *beels* and ponds use bunches of water hyacinths to catch catfishes, barbs and eels. The head rope of gill nets is spread over water hyacinths enabling the gear to get drifted. The stems of water hyacinth (*Eichhornia* spp.) are also cut into pieces to make floats in several situations.

(vii) **Cork:** Cylindrical shaped cork pieces are tied as floats to fishing nets in several water bodies of Assam. These cork pieces (2-10 cm length) have tremendous buoyancy with durability. Cork floats are mostly used in head ropes of gill nets.

(viii) **Thermocole:** Thermocole are also widely used floats in fishing nets of Assam such as gill nets, surrounding nets, drag nets etc. These floats have very high buoyancy and cheaper in cost due to its ready availability in the region. The dimensions of these thermocoles vary in sizes with their usage.

(ix) **Rubber:** Rubber floats are usually made of left-over pieces of slippers (Fig. 5). Rubber pieces of sizes 3-5 cm length and 0.4-0.6 cm breadth are cut and are stitched with the head rope of the fishing nets, mostly the gill nets. In drag nets and surrounding nets this float is attached along with other floats in certain locations.



**Fig. 5:** Rubber floats made from rubber sandals

(x) **Plastic bottles:** Utilized plastic water bottles of varying sizes are also used by fishers of Assam as floats for operation of fishing gears in rivers, wetlands and ponds. The plastic bottles are readily available everywhere and are used for drifting gill nets, drag nets and surrounding nets. There is no cost involved for these floats.

## **(2) Sinkers used in fishing gears of the Brahmaputra valley**

Sinkers are weights used in conjunction of a fishing gear to increase its rate of sink and to keep the gear in the desired column of water as in gill nets and to stretch the net in horizontal position or to pull downwards as in drag nets and seine nets. The materials used for sinkers are as follows:



(i) **Old twisted net of jute:** This type of sinkers serve as foot rope for many larger sized fishing nets such as surrounding nets and seine nets operated in rivers. Unused old nets (single or multiple nets) made of jute material are twisted (5-8 cm girth) to make a single length footrope (Fig. 6). These footropes gradually become heavier as it comes in contact with water. Furthermore, this sinker cum footropes may be treated with coal tar to enhance their sinking ability, durability and self-life.



**Fig. 6:** Preservation of sinker ropes with coal tar

(ii) **Iron:** Iron bars (Fig. 7) of size 3-5 cm length and 0.2-1.0 cm diameter are used as sinkers in many nets especially gill nets and drag nets. More number of iron sinkers weighing 3-5 kg is added in cast nets operated in fast flowing rivers and streams in hilly regions of India.



**Fig. 7:** Iron sinkers used in fishing nets

(iii) **Burnt clay:** Burnt clay sinkers made at pottery houses are efficiently used for sinking fishing nets in water column. The clay materials gain weight in water and facilitate easy sinking. Cylindrical and circular shaped clay sinkers were observed in Assam (Fig. 8 & 9) used in gill nets in particular. The durability of the sinkers depends on their usage

and the substratum of the fishing zone. A dozen of these sinkers can be bought at ₹ 10.00.



**Fig. 8:** Cylindrical shaped burnt clay sinkers used in fishing nets



**Fig. 9:** Circular shaped clay sinkers for net preparation

(iv) **Lead:** Beads (Fig. 10) made of lead were observed to be in use in many fishing nets such as gill nets and drag nets. These sinkers are locally known as *Sessa* in Assam. These sinkers have longer durability and are prepared by the local fishers in their own fabrication centres.



**Fig. 10:** Gill nets made of lead sinkers



(v) **Stone:** Stones serve as an excellent sinker in many kind of nets such as surrounding nets, dragged nets and seine nets. Stone sinkers were also observed in hook and lines to retain the vertical position of the gear under water. Stone sinkers work very efficiently in fast flowing rivers for selectively catching snow trout by noose and line method (Fig. 11). Usage of stones as sinkers is the easiest way to put weight to a fishing gear for easy sinking and anchoring in water and without any cost involvement.



**Fig. 11:** Noose and line fishing in fast flowing rivers of Arunachal Pradesh

(vi) **Bone:** Bone pieces of tortoise or buffalo from their left-over carcasses are used in a specific gear drive-in-net operated in the Brahmaputra valley in Sonitpur district. A scare line (*rosi*) is operated along the river bottom to drive the fishes into a 'V' shaped push net (*pah jal*). This scare line is alternatively tied with bones and brick pieces (Fig. 12) to increase the sinking rate on one hand and to scare to drive the fishes on the other hand.



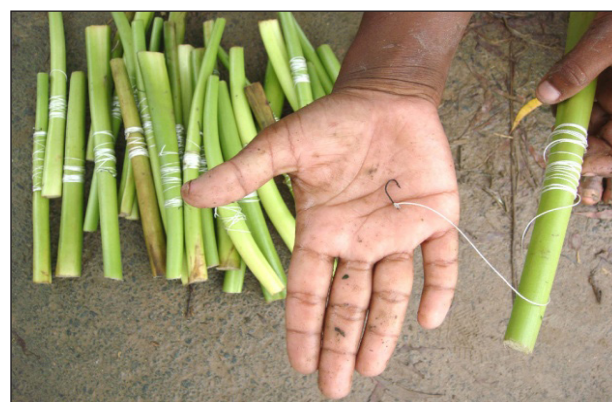
**Fig. 12:** The scare line in drive-in-net

The materials used in fabrication of floats and sinkers in fishing gears operated in Assam are environment friendly, cheaper and readily available. Many of these accessories consisted of materials found ordinarily in the natural environment such as grass stalk (Fig. 13), water hyacinth of plant origin; stones, brick pieces, clay materials etc.



**Fig. 13:** Gill nets with grass stalk floats and clay sinkers

However, sinkers made of lead materials are reported across the world to deteriorate the water environment due to occasional loss of lead sinkers in water during fishing operations. Floats were observed to have a bigger importance in designing a fishing gear in the state which serves several purposes. The floaters suspend the large sized fishing nets operated in the mighty Brahmaputra valley and its tributaries at a predetermined water depth, facilitate to float or drift in a prevailing water velocity and may act as an indicator of fish bite a hook (Fig. 14) under water.



**Fig. 14:** Colocassia stalks as floats in hook and line (*ponga boroxi*)

Most of these floats are usually dull in colour to render it as inconspicuous as possible to the fish. Similarly, the density of sinkers used in Assam were found with requisite weights and sizes making it possible to sink a gear comfortably and with minimal visual cues to shun fish to drive away during fishing.

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