

FISHING GEAR AND METHODS OF THE RIVER BRAHMAPUTRA IN ASSAM

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[Potentially the inland fishery resources of the country are of very high order. But the present level of their exploitation is far from optimum, mainly because of the inadequacies of the existing fishing gear and methods. There is vast scope for increasing the fish production from inland waters by improving the existing gear and methods. This would require a thorough study of the fishing gear and methods in vogue, of which very little is known at present.

In the present communication the authors discuss the fishing gear and methods of the river Brahmaputra, in Assam, based on a survey carried out by them during January- February 1964. The survey covers a 640 km stretch of the Brahmaputra river, its important tributaries and connected bheels, from Dhubri to Dibrugarh. As a result of the survey about 19 types of fishing nets, which could be grouped into eight classes, were identified.

The salient technological features of the gears and their methods of operation are discussed class-wise. The characteristics of the individual types are shown in tables. The materials used for gear and gear accessories, are briefly discussed.

The classification and relative importance of different types of gear are examined. Besides, the influence of the ecological and topographical features of the river on the development of different types of fishing gear, is also discussed.]

INTRODUCTION

The inland fishery resources of the country are very vast and varied. There is an extensive river system spreading all over the country, with an elaborate network of irrigation canals and reservoirs. There are vast brackish water lakes and

extensive estuaries. In addition, there are large numbers of bheels and ponds in the plains, and a number of hill streams and lakes at high altitudes. All these waters support a rich fauna comprising many good species of fish. These resources are far from fully exploited at present, mainly due to the inadequacies of the existing

fishing gear and methods. There is immense scope for increasing the fish landings from these waters by introducing improved types of fishing gear and methods or improving the existing ones. This would entail extensive investigations on the existing fish catching practices.

Studies on inland fishing gears have not received adequate attention in the country. The fundamentals of many of the gears are yet to be collected. With this in view, the authors undertook a survey of the fishing gear and methods of the river Brahmaputra in Assam during January-February, 1964. The present communication is an analysis of the survey.

De (1910) in his report on the fisheries of Eastern Bengal and Assam has mentioned some of the fishing methods of the river. Hornell (1924), while reviewing the fishing methods of the Ganges, has referred to some of the fishing implements. Job and Pantulu (1958) have reviewed the fish trapping methods of the river system.

MATERIALS AND METHODS

The survey covers about 640 km stretch of the river Brahmaputra from Dhubri on the West to Dibrugarh on the east, with its important tributaries along the two flanks. For the convenience of the survey 6 centres (Fig. 1) were selected, namely; Dhubri and Goalpara, Gauhati and Tezpur, Jorhat and Dibrugarh, respectively in the lower, middle and upper Brahmaputra. Most of the important fishing grounds, fishing villages and landing places (Appendix - I) in and around these centres were visited and data collected.

The salient structural features and the methods of operation of the important groups of nets are briefly described

in the paper. Technical details of the gear, such as the type of material, dimensions, method of rigging etc. are given in separate tables. The classification adopted is that of von Brandt (1958) which is based mainly on the principles laid down by the Joint Committee of ICNAF, ICES and FAO (1956).

RESULTS

As a result of the survey, 29 types of fishing nets were identified, which were grouped into eight classes as listed below.

1. Seine nets: Structurally these are rectangular nets without bag or bunt. The net is provided with a head rope which carries floats and a foot rope which may or may not possess sinkers. The absence of sinkers is often compensated by a much thicker foot rope. The length and breadth of the nets show considerable variation and are dependent mainly on the area and depth of the stretch to be fished. The size of the mesh also varies depending upon the size of the fish sought. Table I indicates the technological details of the important types of seines.

Some of the seines are provided with a peripheral pocket. The pocket is formed by folding up a portion of the lower extremity of the net, along with its weighted foot rope, and stitching at intervals. The weighted foot rope keeps the mouth of the pocket open while under operation. 'Gully jal' is the most popular pocketed seine.

The most elaborate seine net enjoying a wide use is 'Ber jal'. 'Chella jal' and 'Pan jal' are seines of medium size. The method of operation of these nets is remarkably uniform. The net is shot in a semi-circle with the bank of the river as base and is hauled up on to the land by gradually pulling in either ends. The paying of the net is done by two boats, each of which

TABLE — I INDICATING THE DESIGN DETAILS OF SEINE AND SURROUNDING NETS

Sl. No.	Local name	Material	Mesh size (bar) mm.	Length (m.)	Height (m.)	Ratio of take up
1.	Chella jal	Cotton 20/5/1	7.0 - 9.0	150-200	2—3	0.5 - 0.6
2.	Gully jal	Cotton 20/10/1	21.0 - 30.0	35-45	4—5	
3.	Pan jal	Cotton 20/4/3	15.0- 17.50	200-240	12.0-15.0	0.35 - 0.45
4.	Ber jal	Cotton 20/18/1, 20/15/1 & 20/24/1	25.0 - 50.0	200- 400	20—25	0.33 - 0.44
5.	Catamara jal	Cotton 20/15/1	30.0 - 32.5	200-300	10—12	0.34 - 0.40

carries half the length of the net. The boats proceed to an appropriate distance from the bank, turn to either side and row towards the bank, simultaneously releasing the net. The net is then hauled up. In pocketed seines, the catch collects in the pockets, while in others, it is collected at the middle part of the net, which is kept slackened during hauling by manipulating the head and foot ropes. Operation of 'Ber jal' requires about 10 - 15 men and 2—4 boats.

In certain tributaries 'Ber jal' is operated in a different fashion. One net which extends from one bank to the other, is set across the river. A second net, which also extends from bank to bank, is dragged towards the first from a distance of 400 to 800 m. The process of dragging requires the strenuous work of about 20- 30 men for a number of days. Fishes are caught either gilled in the first net or entrapped in the peripheral pockets of the second net. Fishes are also taken by employing other types of gear such as scoop nets and cast nets from the enclosed area. This type of fishing is called 'Mah' fishing and is particularly popular during festival days.

2. Surrounding nets: The design and rigging of these nets, in the present instance, are identical to that of the 'Ber jal'. The salient technical features are given in Table I. The net is used to surround a detected school of fish. The net is paid around a collection of water hyacinth or other types of weeds, often kept in the shallow stagnant areas of the river. After removing the weeds, the circumference of the net is made shorter and shorter by manipulating the foot and head ropes. The enclosed fish are caught by scoop nets and cast nets. This type of net, which is used to surround a detected shoal of fish, is popularly known as 'Catamara jal'.

3. Dragged gear: Two types of net fall under this group, namely 'Bachru jal' and 'Fesy jal', both are towed nets. The 'Bachru jal' (Fig. 2) has an apparent resemblance to a pocketed seine. The net consists of two horizontal layers of webbing of disproportionate mesh size. The height of the upper layer does not exceed 0.5 m. and the mesh measures 25 mm. (bar). The lower layer has a height of about 1.5 m and the size of the mesh is 10.0mm.

(bar). This lower layer of webbing is folded up at the middle and the free margin is sewed at intervals of 0.3 m. to the upper layer. The foot rope which carries closely arranged lead sinkers, borders the free margin of the pocket. In some cases, it has been observed, that the pocket is divided vertically into as many compartments as there are openings.

For about 2 m. on either ends, the net does not possess an upper layer, with the result, the length of the head rope is roughly 4 m. less than that of the foot rope. This arrangement also imparts an arc shape to the upper border of the net. The length of the net at the lower margin is about 12 m.

The net is used to drag shallow muddy areas of the river for prawns and small cat fishes. The net is dragged using two long bridles one on either end of the head rope, by men standing at wading depths.

The 'Fesy jal' is a bag shaped net. The foot and the head ropes measure 5 m. and 8 m. respectively. The foot rope is very thick and heavy. It does not carry sinkers while the head rope is provided with floats. The size of the mesh, which varies from 15 mm. to 25 mm. (bar) is uniform throughout for a net. The net is usually towed employing two small dug-out canoes. It is also used to drag shallow areas by men standing at wading depths or on the bank.

4. Gill nets: The gill nets of the river Brahmaputra are known under two local names, 'Lungi jal' and 'Phansi jal.' Both are rectangular nets, which are provided with head and foot ropes. In 'Lungi jal', the foot and head ropes are provided respectively with sinkers and floats. In 'Phansi jal', the foot rope is generally devoid of sinkers, but is much thicker. The head rope invariably carries floats. 'Lungi jal' is often fabricated of coarse, but

stronger materials like sunn hemp, whereas 'Phansi jal' is made of light materials, such as cotton and silk. The type of materials, size of mesh, dimension etc, of the different types of gill nets are given in Table-II.

The *modus operandi* of gill nets varies. 'Lungi jal' is operated as bottom set, encircling or dragged gill net depending on the behaviour of the species of fish sought.

The method of operation involves several ingenious devices to drive the fish into the net. 'Phansi jal' is generally operated as surface set or drift net for hilsa, migratory carps and cat fishes.

5. Dip or lift nets: In dip nets, the fishing principle is to keep the net submerged for an interval of time and then pull it rapidly out of water so as to catch any fish which happen to be over it. A variety of nets, employing the above principle of fishing, is operated in the river.

In all cases the net is fixed to a suitable frame. Based on the shape of the frame two types of nets can be recognised, namely, net with a triangular frame and net having a rectangular frame. The triangular or 'V' shaped frame is formed by tying two bamboo poles at their base, keeping an angle of 45° in between. The side opposite to the angle forms the mouth of the net. A hexagonal webbing of suitable size is loosely hung to the frame in such a way, as to give a miniature bag-shape to the net at its rear end. One side of the hexagon forms the mouth end while the side opposite to that, together with the two adjacent sides goes into the formation of the bag. The net is worked from a platform constructed either at wading depths near the bank of the river or on the deck of a plank built boat. 'Khora jal' (Fig. 3) belongs to the former category, while 'Kahj jal' comes

TABLE — II SHOWING THE DIFFERENT CHARACTERISTICS OF GILL NETS

Sl.No	Local name	Type of net	Material	Mesh size (bar) mm.	Height (m.)	Ratio of take up	Fish sought
1.	Mola lungi jal	Encircling gill net	Cotton 20/3/1	12.5	0.80	0.40	Mola (<i>Amblypharyngodon mola</i>)
2.	Ari lungi jal	Dragged gill net	Sunn hemp 4 ply 1.5 mm. dia	57.5 to 60.0	1.15	0.57	Ari (<i>Mystus seenghala</i>)
3.	Tor lungi jal	—do—	—do—	60.0	1.50	0.70	Barali (<i>Wallage attu</i>)
4.	Pitta lungi jal	—do—	Sunn hemp 6 ply 2 mm. dia.	115.0	1.60	0.53	Pitta or Mahseer (<i>Barbus tor</i>)
5.	Sittica lungi jal	Bottom set gill net	Reha 0.6 mm. dia.	40.0	1.28	0.60	Minor carps
6.	Karal phansi jal	Surface set or drift	Nylon 210/2/3 & Cotton 20/5/3	120.0 to 135.0	1.30	0.47	Karal (<i>Catla catla</i>)
7.	Rau phansi jal	Surface set gill net	Sunn hemp 3 ply 1.5 mm. dia.	107.5	1.50	0.46	Rau (<i>Labeo rohita</i>)
8.	Ari phansi jal	Surface set or drift gill net	Cotton 20/15/1 & 20/8/3	150.0 to 165.0	2.50	0.45	Ari (<i>Mystus aor</i>)
9.	Ilisha phansi jal	Surface drift gill net	Nylon 210/2/2 & 210/2/3	35.0 to 40.0	1.20	0.49	Ilisha (<i>Hilsa ilisha</i>)

under the latter group. In 'Pah jal' (Fig.4) the rear end of one of the poles is longer than the other and is used as a handle. This is a comparatively small net operated by a man standing at the bow end of the boat while it is drifting. It is said to

be a special gear of hilsa and migratory carps. 'Berhri jal' is identical in design to 'Pah jal'. It is used as a drive-in-net in shallow areas, using scaring devices. Table III indicates the type of material used, mesh size etc. of the above nets.

TABLE -- III INDICATING THE CONSTRUCTIONAL DETAILS OF TRIANGULAR DIP NETS

Sl. No.	Local name	Material	Mesh size (bar) mm.	Length of one limb (m.)	Width of the mouth (m.)	Method of operation
1.	Khora jal	Cotton 20/3/3& 20/4/3	7.5 to 12.5	9.7 to 10.2	3.5	Worked from a platform constructed near the bank
2.	Kahj jal	Cotton 20/3/3	7.5 to 15.0	5.0 to 6.5	2.4	Platform constructed on the deck of a boat.
3.	Pah jal	Sunn hemp 14 mm. dia.	70.0	2.2	1.4	Operated by a man standing at the bow of the boat
4.	Berhri jal	Cotton 20/4/3	12.5 to 25.0	3.5	1.5	As above but in shallow areas. The net touches the bottom under operation.

In nets with rectangular mouth, the frame consists of two bamboos, crossing each over the other at the mid-point and tied in the form of an arc. The free ends of the arc are attached to the opposite corners of the mouth of the bag shaped net. The mesh of the bag measures 7.5 to 12.5 mm. (bar). The material is cotton 20/3/3. The frame with the net is suspended from a long handle. 'Polongi jal' and 'Thony jal' belong to this group.

6 Purse nets: The principle underlying pursing is to submerge a bag shaped net with its mouth wide open and to close it as soon as fish gets in. Purse nets are generally used for the capture of migratory fishes, which ascend rivers for breeding.

'Illisha shangala jal' and 'Karal shangala jal' are very popular purse nets in the lower Brahmaputra, the former for hilsa and the latter for migratory carps. Both are identical in design, rigging and method of operation.

The net (Fig 5) consists of an elliptical frame formed by tying two split bamboos on either side and a bag shaped net attached to it. The bag is formed by lashing four right-angled triangular pieces of webbing of identical dimensions. A rope which is attached to the lower lip of the net, after passing through the upper lip, goes into the right hand of the man standing at the fore part of the boat, which is drifting. This forms the haul rope. A big knot, which

limits the opening of the mouth, is made at some distance on the rope. A stone or brick is attached to the middle of the lower arc to keep the net submerged. The arcs are about 4-6 m. in length. The mesh measures 35 to 50 mm knot to knot. The material is sunn hemp or cotton,

7. Cast or falling nets: Falling nets of various sizes are widely used all over the river. The salient feature of this type of net is that, irrespective of the size, it is provided with a peripheral pocket. The pocket as in other cases is formed by folding up a portion of the lower extremity of the net with the heavily weighted foot rope and stitching at intervals with the upper part. Small cast nets are known as 'Kevali' 'Asra' or 'Regha jal'. The 'Ottal jal', also known as 'Pash jal', is a falling net of considerable size. The peripheral circumference of this net measures about 120-150 m. The

operation of 'Ottal jal' is very interesting. The net is operated from a boat manned by two or three men.

The net is first spread diagonally on the deck of the boat. After securing the haul rope to a wooden post, driven on the middle of the deck, the men on either ends of the boat start releasing the net, using one hand, while the other hand and one leg holding the paddle. The boat is driven backwards while the net is released. The net is hauled up by pulling the haul rope. The catch is collected in the peripheral pockets. 'Ottal jal' is said to be the most effective net for fishing in deep areas of the river. It is popularly known as "Brahmastra."

The method of rigging, type of material, dimension, etc. of the different types of cast nets are indicated in Table IV.

TABLE - IV SHOWING THE CONSTRUCTIONAL DETAILS OF FALLING NETS

Sl. No.	Local name	Material	Mesh size (bar) mm.	Peripheral circumference (m.)	Height of the net (m.)	Height of the pocket (m.)
1.	Kevali jal	Cotton 20/5/1 & 20/8/1	10 to 15.0	8-12	2-3.5	0.25 to 0.48
2.	Regha jal	Sunn hemp 1.0 mm. dia.	30 to 40	15-25	5-8	0.4 to 0.65
3.	Ottal jal	Cotton 20/10/1	35.0	80-120	11.7	0.6 to 0.8
4.	Pash jal	Sunn hemp 1.5 mm. dia. & Cotton 20/10/1	30 to 42	150-200	25-30	0.6 to 1.0

8. Bag net with fixed mouth: 'Kona jal' is a common fishing gear of the lower Brahmaputra. Essentially the net (Fig. 6) consists of a number of conical bags of 3 - 4 m. length, with rectangular mouths streng-

thened by split bamboos, separated from each other by intervening rectangular webbings of 4-6 m. length and 2 - 3 m. height. Inside the mouth of the bags, at some distance is a flapper or pouch, which

prevents the escape of the entrapped fish. The completed net gives the appearance of a rectangular net having a number of conical pockets on one side. The length of the net is about 150 - 200m. and is provided with continuous head and foot ropes. The foot rope may or may not carry sinkers whereas the head rope is always provided with floats. The mesh of the rectangular webbings measures 25 - 40 mm. knot to knot while that of the bag measures 7.5 to 17.5 mm. The material can be cotton or sunn hemp.

The net is set across the river by fixing stakes at intervals and the catch is removed once or twice in a day by lifting the cod-end of the bags. Sometimes, another wall net is set above the first net, which prevents the fish which jumps over the main net. During hilsa fishing season, the net is said to be operated in the fashion of a surrounding net.

MATERIALS USED FOR FISHING GEAR AND ACCESSORIES

Hand twisted 20 count cotton seems to be the most widely used gear material. Sunn hemp is used for stronger but coarser nets. 'Reha' (*Abroma augusta*) and a variety of silk known as 'Mugha' also find application as materials for gill nets. The use of synthetic twine is rare.

'Bamboo' *Bambusa* (sp.). 'Khagara' (*Fragmatica* sp.), 'Udal' (*Stermalia villosa*). and 'Sola' (*Aeschynomene aspera*) are the important varieties of woods used for floats. Sinkers are of burnt clay, rolled into different shapes and sizes.

Extracts of the bark of 'Jamuch' (*Eugene jambolana*) the leaves of 'Jeea' (*Garuga pinnata*) and the fruit of 'Khendu' (*Diospyros embryopteris*) are the common vegetable gear preservatives. Coal tar is used for seines and bigger falling nets.

DISCUSSION

A general survey of the fishing gear of the river Brahmaputra reveals that seines are the most extensively used implements in commercial fishing. Based mainly on the fishing height and the place of operation, four types can be distinguished. The first type has a fishing height of 20 - 25 m. and is generally operated in the deep areas of the main river. This net is locally known as 'Ber jal'. The second, usually known as 'Pan jal' has a width of 10-15 m. and is predominantly operated in the upper reaches of the tributaries. 'Gully jal', which has a width of 5-8 m. belongs to the third type and is common in the bheels. The height of 'Chella jal', the fourth type does not exceed 3 m. and finds extensive use along the two flanks of the main river. A gradual decrease in the size of the mesh is also noticeable from the first to the fourth type.

When compared to the conventional shore seine of the East coast, the seines of the Brahmaputra show certain peculiarities. The most important of these, is the absence of a bag or bunt at the mid length of the net. Another feature is the uniform width of the net from end to end, while the third is the presence of peripheral pockets in some of the seines. Hornell (*op. cit.*) and Naidu (1937) have observed similar features in the seines of the river Ganges, Padma and Hooghly. It may be presumed that the absence of a bunt at the mid length of the net, the presence of peripheral pockets and the even width of the nets are features, common to the seines of the Brahmaputra and Ganges system of rivers.

Hornell (*op. cit.*) has stated that seines with the above characteristics are very primitive, "as it appears fully developed in Egyptian paintings of the dynasty". It seems to the present authors

that the uniform width of the net is a feature which is closely associated with the steep nature of the river banks and the relatively even depth of the fishing grounds. The purpose of a bag or bunt is fulfilled to a certain extent, by the peripheral pockets. Hence it is quite likely that the above features have been developed to suit the peculiar ecological and topographical needs of the river system.

The operation of the seines differ from that of the conventional beach seine, in that the net is shot from the middle of the river towards the shore and not from the shore towards the river. This method of operation seems to be more effective than the conventional method, as the area is covered much quicker.

'Mah' fishing with 'Ber jal' shows a close resemblance to the 'Veri' fishing in Baroda waters described by Pillai (1957). Considering the method of operation and the method by which fish are brought into relationship with the gear, 'Mah' fishing cannot be strictly regarded as seining. The principles involved are more of the nature of gill netting and dragging than of seining.

Gill nets come next in importance to seines. The line of demarcation between seines and certain types of gill nets ('Lungi jal') seems to be indeterminate as gill nets are sometimes operated in the fashion of seines. Conversely, seines are also operated in the fashion of gill nets (see 'Mah' fishing). De (*op. cit.*) has classified 'Lungi jal' as drag nets while Hornell (*op. cit.*) has treated it as "gilling seines". During the present survey it has been observed, that, irrespective of the method employed, fish are caught in these nets by gilling or encircling. 'Lungi' nets are sometimes used to drag or encircle an area. But such practices are only the means to scare and drive fish into the net. The main distinction

between 'Lungi jal' and 'Phansi jal' lies in the method of operation and rigging. The foot rope of the former touches the bottom during operation whereas in the latter it does not. Consequently the foot rope in 'Phansi jal' is devoid of sinkers.

Cast nets and dip nets are equally important and can be placed third in order of importance. The remarkable feature of cast net is the presence of peripheral pockets. The 'Bachru jal' resembles the 'Moi jal' described by Nazir Ahmed (1956), with the exception that it has no bamboo beam. The use of 'Catamara jal' involves the principle of pursing, to a certain extent. It has a remote resemblance to the tuck seines described by Umali (1950).

The classification of 'Kona jal' presents difficulty as the use of this net differs from place to place and season to season. De (*op. cit.*) has referred to it as a 'Labyrinth net' and has stated that it is a specialised boat seine. According to Hornell (*op. cit.*) it is a multi-purpose gear which can be operated in the fashion of a seine, drag or set bag nets. Naidu (*op. cit.*) has regarded 'Kona jal' as a drift net. David (1954) has stated that it is used as a purse - cum - drift net in the river Hooghly. The general disagreement seen in the classification of this gear is a clear illustration of the variability with which this gear is operated at different places and different seasons. This indicates that classification of 'Kona jal' based on its method of operation, may not give a clear identity to it. The most salient structural feature of this gear is the presence of several bags with fixed mouths. Hence 'Kona jal' may be included under bag nets with fixed mouths.

A major change from the classification suggested by von Brandt (*op. cit.*) is the inclusion of 'Shangala jal' in a separate class, namely, Purse nets. The peculiar structural features and method of operation of this gear vindicate this deviation.

As regards the material used in the fabrication of fishing nets, the most notable feature is the extensive use of hand twisted single stranded, cotton twine. A discussion on the merits or demerits of hand twisted twine is possibly beyond the scope of this paper. Another notable feature is the apparent lack of agreement between the twine size and mesh size of fishing nets. This is clear from Tables — I & II.

SUMMARY

The salient features of the indigenous fishing nets of the river Brahmaputra are discussed. An attempt has been made to identify and classify the different types of nets. The details of the gear such as the type of material, size of mesh, percentage of take up, method and type of rigging, etc. are given in tables. A short note on the materials used for floats, sinkers and preservation of gear is also given.

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REFERENCES

- David, A., 1954 *Ind. J. Fish.* 1 (1 & 2), 231—255
- De, K. C., 1910. Report on the fisheries, of Eastern Bengal and Assam. Government Printer, Shillong.
- Devasundaram, M. P., 1952. *Ind. Farm.* 12. (1—2) 22—25
- F. A. O., 1960. Proc. Joint Sci. meeting of ICNAF, ICES and FAO on fishing effort, the effect of fishing on resources and the selectivity of fishing gear. Reports FAO, Rome.
- Hora, S. L., 1921. *Rec. Ind. Mus.* 22, 165—214.
- Ibid., 1926. *Proc. Asiat. Soc. Bengal.* 22, 81—84.
- Hornell, J., 1925 *Mad. Fish. Bull.* XVIII, 59—110.
- Ibid., 1924. *Mem. Asiat. Soc. Bengal* VIII, 3, 199—137.
- Ibid., 1938. *Mad. Fish. Bull.* XXVII, 1—69
- Job, T. J. & Pantalu, V. A., 1958. *Jour. Asiat. Soc.* 19 (2), 175—196
- Jones, S. & Sujana Singani, K. H., 1954. *Ind. J. Fish.* 1 (1 & 2), 256—343
- Motwami, M. P., Jay Ram, K. C. & Sehgal, K. L., 1962. *Trop. Eco.* III (1 & 2), 17—43.
- Naidu, M. R., 1939 Report on a Survey of the Fisheries of Bengal. Government Printer, Calcutta.
- Nazir Ahmed; 1956 Fishing gear of East Pakistan. East Pakistan Govt. Press, Dacca.
- Pillai, T. V. R., 1949. *Science & Culture* 15 (1), 20—23
- Umali, A., 1950. Res. Rep. No. 17, Fish and Wildlife Service, U. S. Department of Interior, Washington.
- von Brandt, A., 1958. "Modern Fishing Gear of the World, 274—296. Fishing News (Books) Ltd., London.
- Wilson, H. C., 1921. *Mad. Fish. Bull.* 12, 135—156

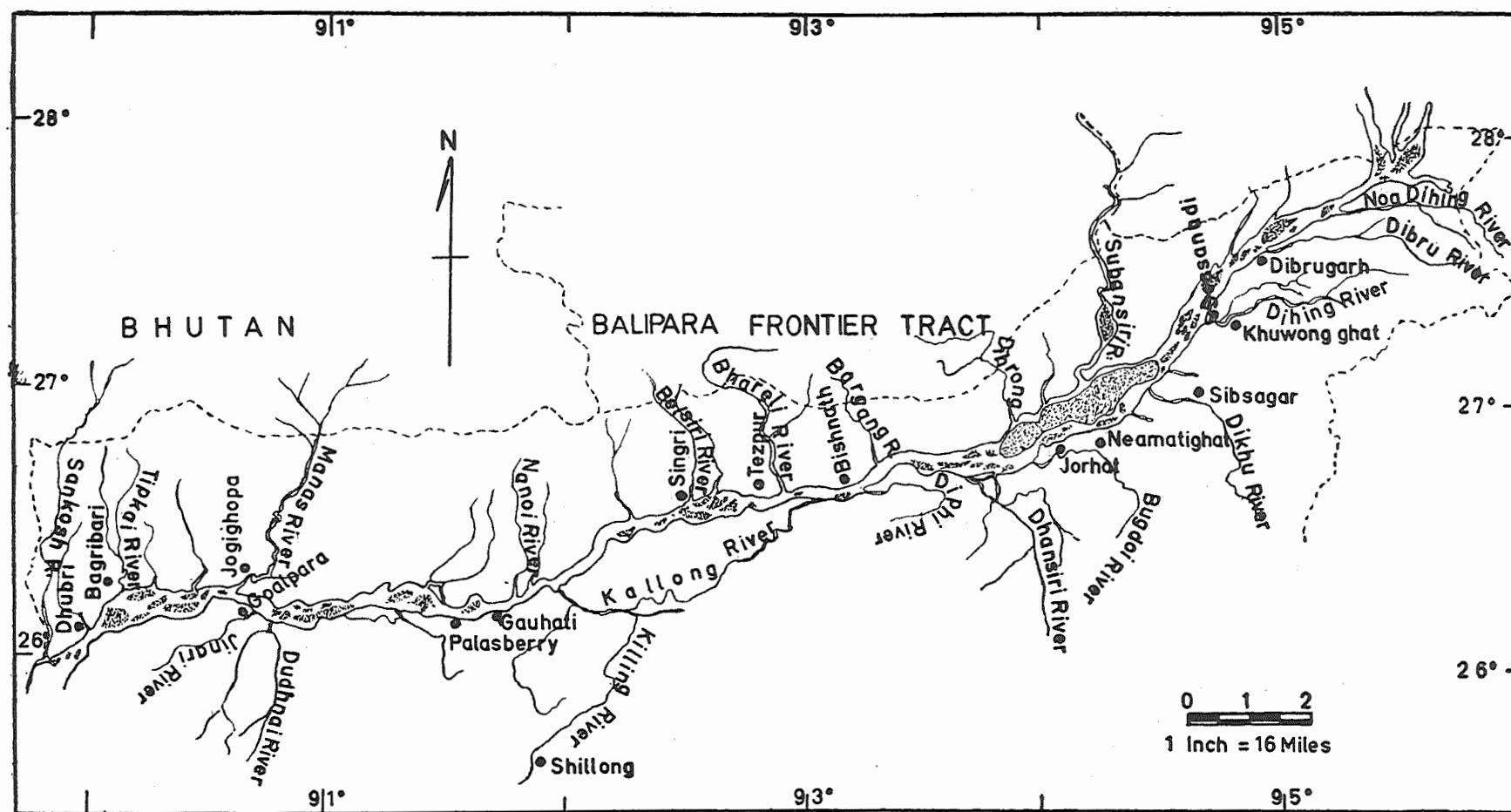


Fig.1. Sketch map of the Brahmaputra River in Assam showing principle tributaries and important sampling Stations

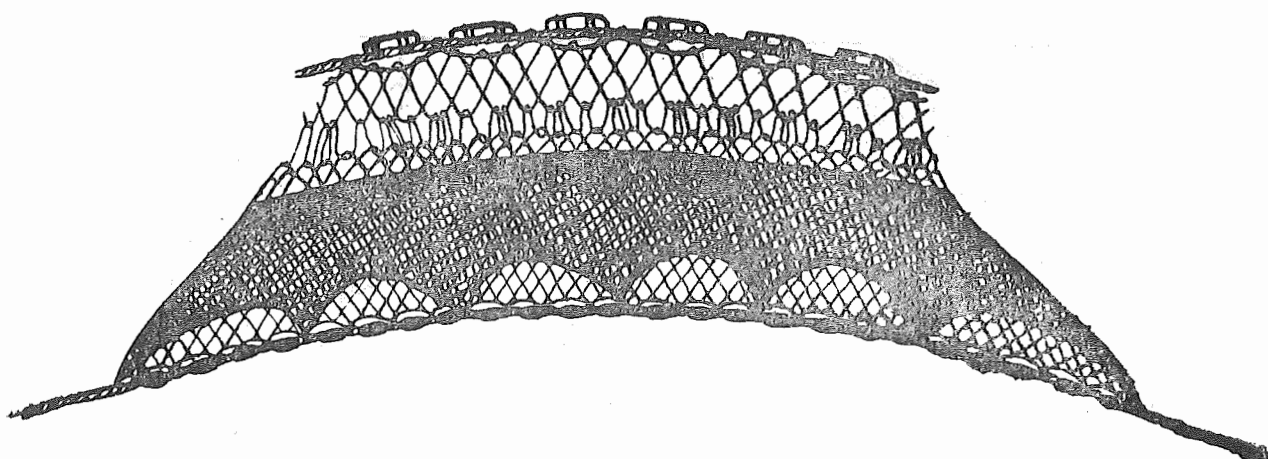


Fig.2. Bachru Jal

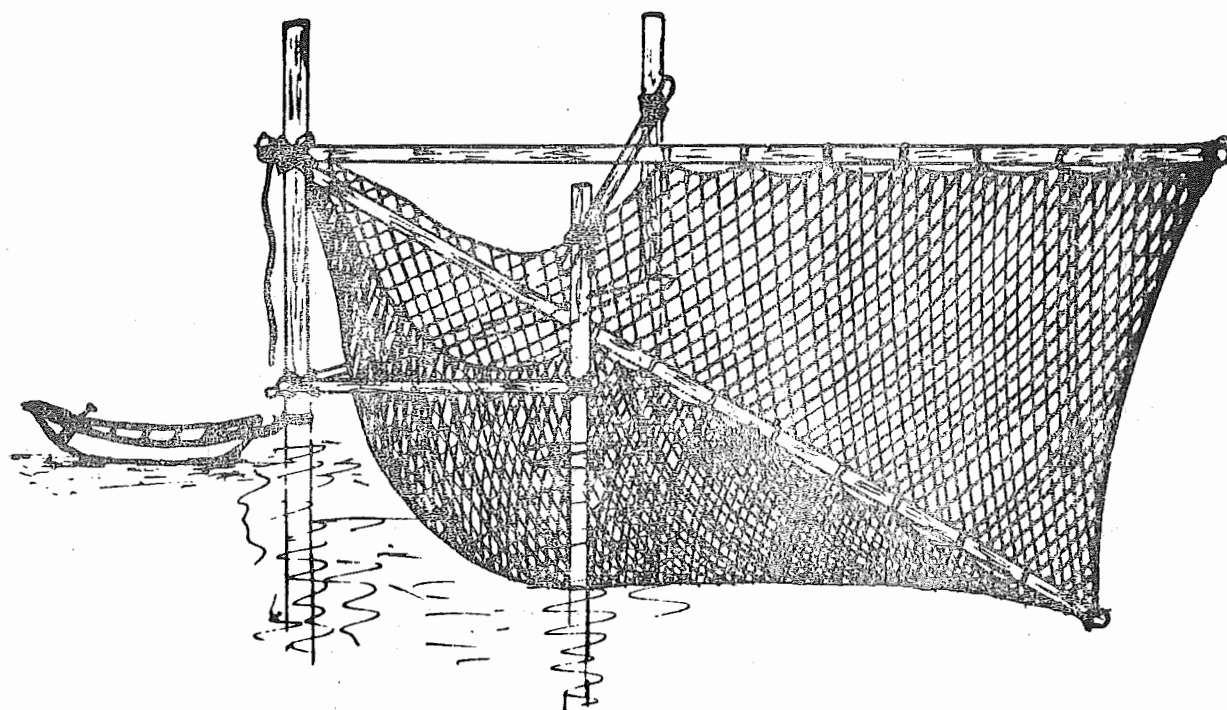


Fig. 3. Khora Jal

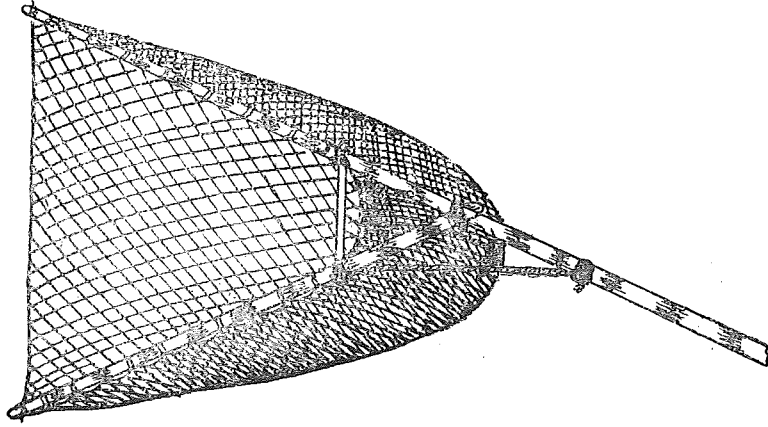


Fig.4 Peh Jal

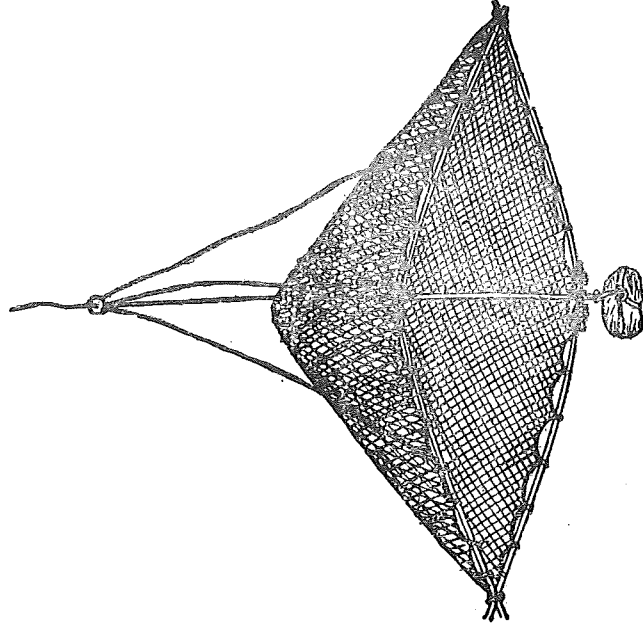


Fig.5, Shangla Jal

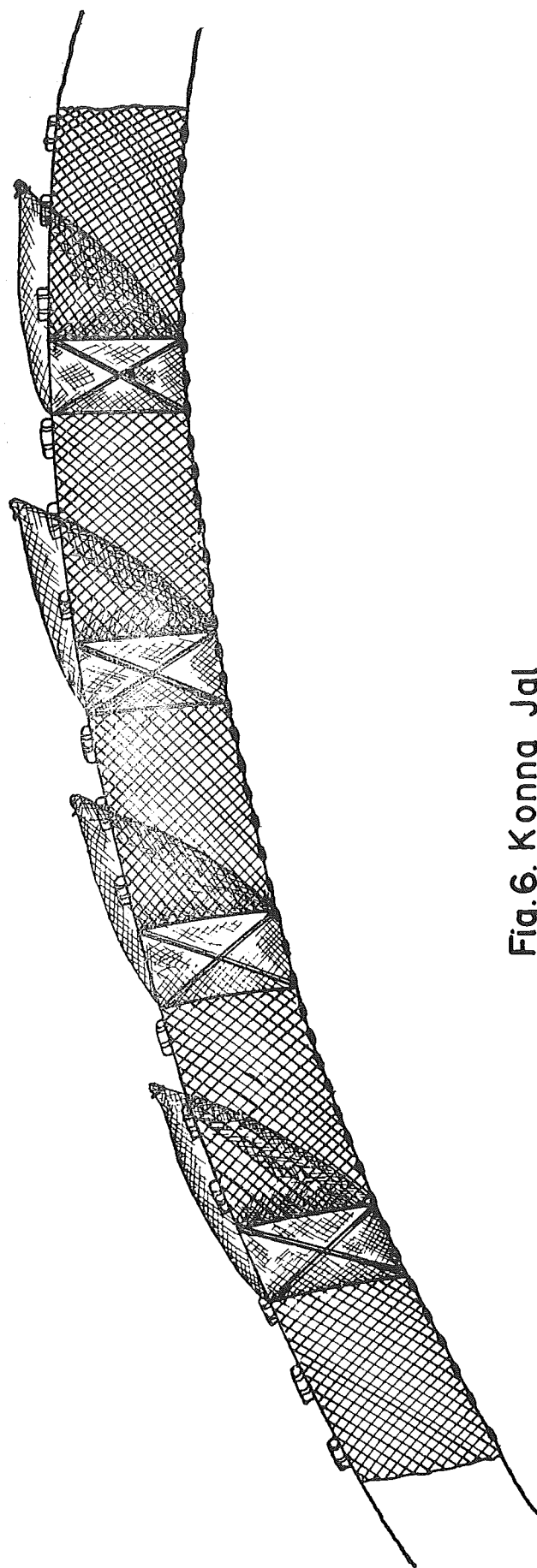


Fig.6. Konna Jal

APPENDIX - I

LIST OF SAMPLING STATIONS AND TYPES OF NETS SURVEYED

The following list details the sampling stations and the type of nets surveyed from each.

Station 1. Dhubri. January 16 to January 19.

The following places were visited.

North Salmara, Bagri Bari, Dhubri-ghat and Jingi Ram River.

The following types of nets were surveyed:

'Konna jal', 'Ilisha Shangala jal', 'Ber jal' and 'Pash jal'.

Station 2. Goalpara. January 11 to January 15

The following places were visited.

Gopinadha puri, Dolgama, Goalpara ghat and Jogighopa.

The following types of nets were surveyed:

'Fesy jal', 'Gully jal', 'Karal shangala jal', 'Khora jal', and 'Ottal jal'.

Station 3. Gauhati. January 4 to January 10

The following places were visited.

Palasberry, Bojy nagar, Pandu, Kuruva and Gauhati ghat.

The following types of nets were surveyed.

'Chella jal', 'Ari lungi jal', 'Polongi jal', 'Kahj jal' and 'Asra jal'.

Station 4. Tezpur. January 21 to January 24

The following places were visited.

Biswanath, Chowkighat, Singri and Tezpur ghat.

The following types of nets were surveyed:

'Pah jal', 'Bachru jal', 'Karal phansi jal', 'Ilisha phansi jal', 'Regha jal' and 'Ber jal'.

Station 5. Jorhat. January 25 to January 28

The following places were visited.

Kokilimugh, Nemateghat and Jorhat ghat.

The following types of nets were surveyed.

'Rau phansi jal', 'Ari lungi jal', 'Tor lungi jal', 'Mola lungi jal' and 'Pitta phansi jal'.

Station 6. Dibrugarh. January 30 to February 3

The following places were visited.

Sibsagar, Sessymugh, Khuwong ghat and Dibru ghat.

The following types of nets were surveyed:

'Sittica lungi jal', 'Pan jal', 'Berhri jal', 'Regha jal' and 'Ber jal'.