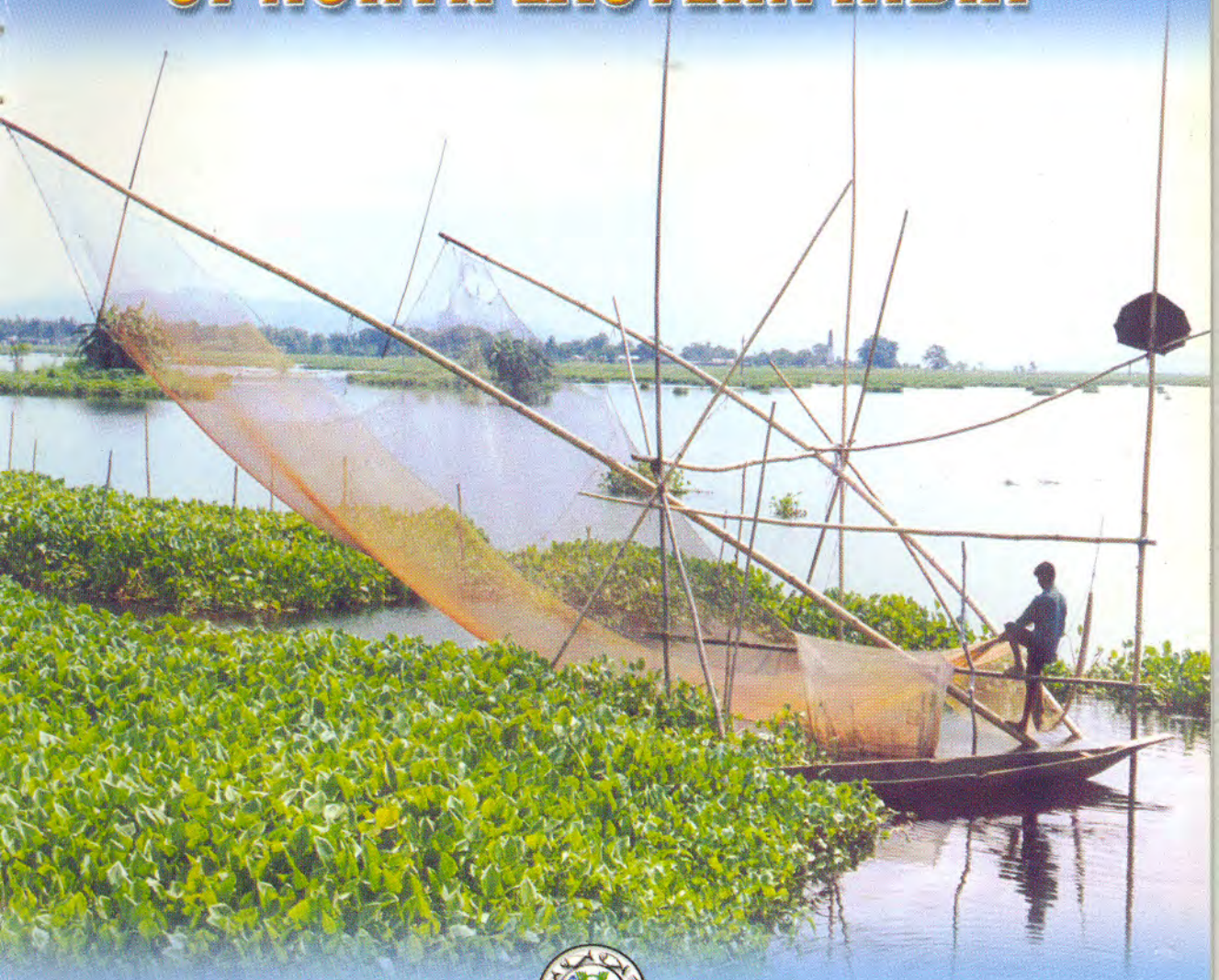
FISHING CRAFTS AND GEAR OF NORTH EASTERN INDIA



Central Inland Fisheries Research Institute
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Barrackpore, Kolkata - 700 120 • West Bengal

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FOREWORD

The northeastern region of India - encompassing the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura – presents diverse topographical conditions ranging from the plains of Assam and Tripura, upland flat lands of the Imphal valley in Manipur to predominantly hilly/mountainous regions of Arunachal Pradesh and Sikkim. The region has vast and varied fisheries resources in the form of rivers, floodplain wetlands (*beels*), lakes, ponds and mini-barrages as well as low-lying areas suitable for paddy-cum-fish culture systems. Further, the eastern Himalayan region, which includes the Northeast, has been recognized as one of the global hot spots of freshwater fish biodiversity. So far, 297 fish species including 31 endemic species - has been recorded and reported from the region.

The Northeast is home to over 100 different ethnic tribes, each having its own culture and dialects. What is common among them is perhaps their very high preference for animal protein in general and fish in particular. Almost the entire population of the region is fish eater. Naturally, most of them take active interest in fishing and subsistence fishers (including women and children) far outnumber commercial fishers in the region. In view of the diversity in the nature of water bodies, fish fauna, socio-cultural ethos, indigenous technical knowledge and also availability of natural construction materials like bamboo, cane, etc. a large number of fishing crafts and gear are used for fishing operations in the region. However, the vast majority of these crafts and gear are yet to be properly documented owing to remoteness of most parts of the region and lack of concerted action. This booklet is the first ever attempt to document some of the fishing crafts and gear available in the northeastern region. Naturally, it will be naive to expect this booklet to include all types of crafts and gear of the region. Nevertheless, the team of personnel from the Northeastern Regional Centre of CIFRI, Guwahati has done a commendable job in collecting field data from different parts of the region in spite of time and resource constraints. I trust this booklet will serve as a very useful reference material for those associated with fisheries research and development in the region.

September 15, 2004

(S. Ayyappan)

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CONTENTS

INTRODUCTION

The northeastern region of India has rich and diverse types of fishing crafts and gear. Richness of these implements can be attributed to a number of factors. Almost the entire population of the region is fish eaters and most of them double up as artisan fishers. They use whatever implements they can to catch fishes especially during the monsoon season, when fishes migrate to shallow areas for spawning. The region houses over 100 ethnic tribes each of which has their own fishing implements and indigenous technical knowledge associated with them. Hunting had been a way of life for most of the hill tribes and they use this skill to exploit the fish stock also (with hunting spears, bow and arrow, etc.). Further, the region has a number of natural construction materials like wood, bamboo, cane, etc. which are effectively used to construct a variety of fishing implements. More importantly, it has diverse types of water bodies like fast-flowing hill streams, rivers, floodplain wetlands (beels), low-lying areas, ponds, etc. Each of these (e.g., hill streams, weed-chocked beels) present different conditions and fish fauna requiring different types of gear to exploit their fish stocks. In certain northeastern hill states, people of one hamlet do not understand the dialect of the adjacent one. All these factors have contributed to evolution of a multitude of fishing implements over the ages.

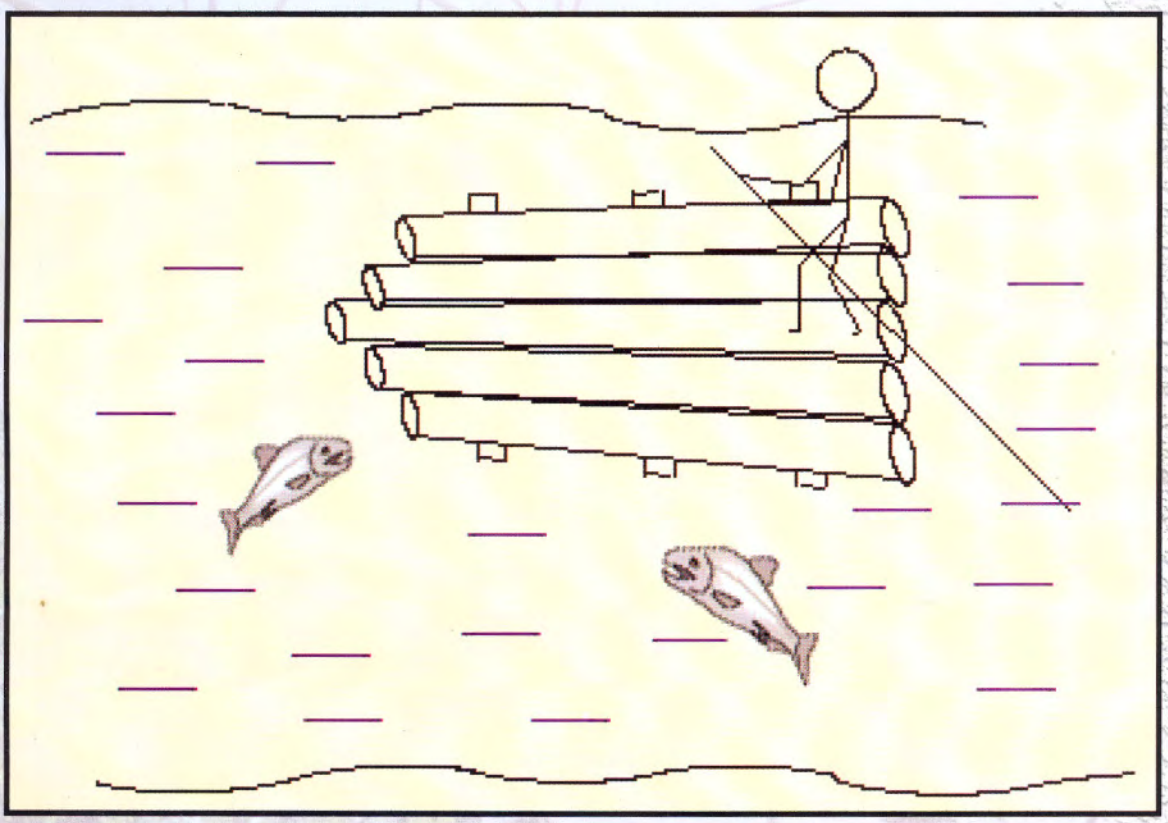
A thorough understanding of fishing crafts and gear is sine qua non for understanding the present exploitation system of natural fisheries and also for making suitable improvements. However, information on the rich variety of fishing crafts and gear used in the region is scanty owing to a number of factors like difficult terrains, linguistic barriers, poor road communication and lack of extensive field investigation. In view of the above, an attempt is being made in the present publication to document the fishing crafts and gear commonly used in the region. In view of the limited time and manpower available, implements used in certain remote areas of the region could not be documented here.

In the following fourteen chapters, more than ninety varieties of fishing crafts and gear used in the Northeast including a few harvesting pots are described. A number of them are described for the first time. The description has been made as concise as possible so as to make the publication handy.

FISHING CRAFTS

Fishing crafts are needed to negotiate through water for operating fishing gear in deeper waters. The following four types of fishing crafts are commonly used in various types of water bodies of northeastern region of India.

1. **Banana raft**
2. **Bamboo raft**
3. **Dug-out canoe**
4. **Plank-built boat**



Banana Raft

Local name : *Kolor bhel* (Assam), *Kola gachher bheura* (Tripura), *Laphu paou* (Manipur)

Brief description : It is the cheapest and easily made craft used by poor fishers. Banana trees are cultivated by most households of the Northeast. For constructing this raft, 4-5 matured banana tree trunks are joined together (keeping all the bigger ends of the trunks towards the stern side) by hammering 2-3 split-bamboo strips (*khila*) through the trunk along the transverse axis. The front of the raft is made pointed by cutting the sides to reduce resistance of water while moving through it. Commonly used banana rafts are 1.5-2.5 m long and 1.0-1.2 m wide. These rafts have the advantage of never sinking in water. However, these are quite heavy to push through water (done with the help of bamboo poles) and have a very short life span (3-4 weeks). These are used for operating cast net, gill nets, and line fishing mainly in shallow, still waters.

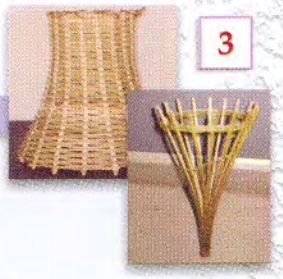
Banana Raft (Inset : Close-up view)

Bamboo Raft

Local name : *Bahor bhur* (Assam), *Banser veura* (Tripura), *Paou* (Manipur)

Brief description : It is another cheap and easily made craft used by poor fishers since bamboo is abundantly available in the region. About 20-50 light-weight variety bamboos (e.g. *Jati*) are tied together (keeping all the bigger ends of the trunks towards the stern side) with coir/jute ropes for constructing this raft. These rafts are usually 0-12 m long and their width is variable (1.5-5.0 m depending on the water

Bamboo Rafts in a river in Assam



current and number of bamboos used). These rafts are also heavy to push through water (done with the help of bamboo poles) and have a moderate life span (1-2 years). They are usually used in sluggish rivers and floodplain lakes.

A Tulunga Nao of Assam

Dug-out Canoe

Local name : *Tulunga nao, Donga* (Assam), *Dingi nouka* (Tripura), *Lukai hee* (Manipur)

Brief description : These are small wooden canoes dug-out from a single log of tree. Naturally, there is a limitation on the overall length (3-4 m) and width/depth (0.5-0.6 m) of these boats. Trunks of palm trees are also occasionally used to make smaller canoes. Construction of these canoes requires good craftsmanship and suitable (long and straight) wooden logs. Because of their small size, these canoes can accommodate only 1 or 2 fishers. Also, because of their narrow width, there is a lot of rolling movements (hence the name tulunga nao) requiring skills to maneuver them. Consequently, these are usually used in shallow floodplain lakes and other wetlands to carry and set fish traps, gill nets and lines. These canoes have the advantage of being leak-proof (since these are curved out of a single tree log and have no joints). However, they are now becoming rare because of spiraling prices of suitable tree logs (e.g. mango) and labour.

A Lukai Hee of Manipur

The dug-out canoes used in Manipur (*Lukai hee*) are unique in design of their stern part. The stern of these canoes are extended into a

rectangular wooden platform of 50-60 cm length on which a fisher can comfortably sit and operate his gear (usually gill nets, hook-line etc.). These are constructed from logs of certain trees like *Artocarpus chaplasa, Cedrella tuna* and *Phoeba* spp.

Plank-built Boat

Local name : *Nao* (Assam), *Nouka* (Tripura), *Hee* (Manipur)

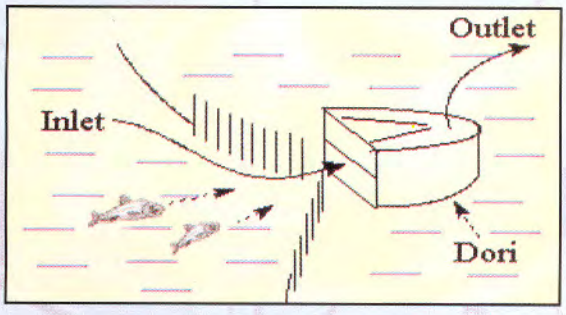
Brief description : This is the most advanced fishing craft used in the region. These spindle-shaped boats are constructed by joining together planks of good quality timber (e.g. sal, urium, sam, etc.) with iron nails. The boat is painted with coal tar to make the joints leak-proof and also to increase their life. These boats vary widely in size and shape depending on where they are used and the type of fishing to be carried out. Small sized plank-built boats (4-6 m long and 0.8-1.0 m wide) are commonly used for fishing in smaller floodplain wetlands and tanks. On the other hand, bigger fishing boats used for operating shore seines (*moha/ bor jal*) and bagnets (*sangla jal*) in large rivers (e.g. Brahmaputra and Barak), reservoirs and large floodplain wetlands (e.g. Sone *beel* in southern Assam) can be as big as 7-8 m long and 1.2-1.8 m wide and are usually covered with roof made of bamboo, plastic sheets etc. At present, the fishing boats are manually propelled. Big mechanized boats (*mar nao, bhut-bhuti*) are used only for transporting people and materials including fishes in large rivers. Boat-making has by and large remained a small-scale enterprise in the hands of traditional artisans.

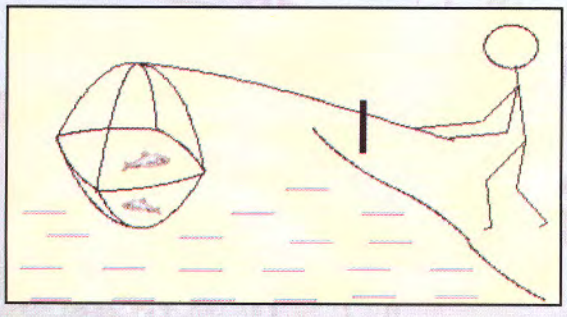
Smaller Fishing Boats used in Assam & Tipura

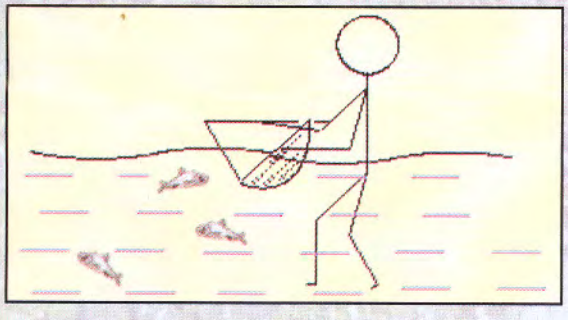
Fishing Boats with roof made of bamboo

Big Fishing Boats used in R. Brahmaputra and Barak

FISHING GEAR





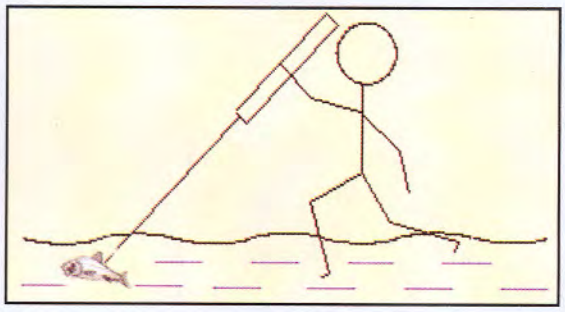


Fishing gear available in the northeastern India are vast and varied. These are being described under the following broad groups as per the revised classification of fish catching methods of the world (A. von Brandt, 1984).

1. **Grappling and wounding gear**
2. **Stupefying devices**
3. **Lines**
4. **Traps**
5. **Aerial traps**
6. **Bag nets**
7. **Dragged gear**
8. **Seine nets**
9. **Drive-in nets**
10. **Lift nets**
11. **Falling gear**
12. **Gill and tangle nets**
13. **Unusual gear (including dewatering devices and harvesting pots)**

1. Grappling And Wounding Gear

Traditionally, the inhabitants of the northeastern India are good hunters. They use a large number of implements, which can be pushed, thrown or shot to immobilize the prey fishes by grappling, squeezing, piercing, transfixing or wounding. In some of them like the prongs barbs are provided to prevent escape of fishes.



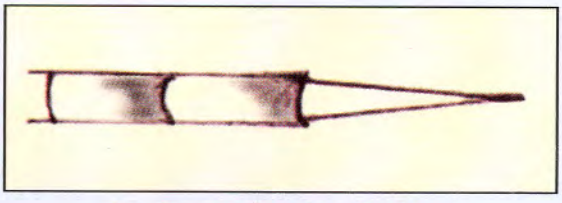
1. **Spears**
2. **Knife-sickle**
3. **Arrows and similar missiles (shot by bows, catapults, rifles, etc.)**

Spears

Pointed bamboo/ wooden spear

Local name : *Pokora* (Assam)

Brief description : It is a single pointed spear made from bamboo or wood. This spear is sometimes detachable, fastened with the bamboo/wooden shaft by a fine string. It is generally used for spearing large fishes.

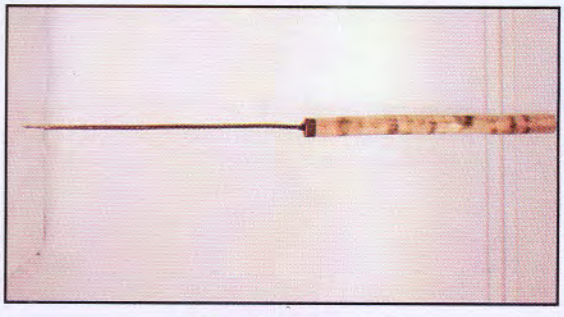


Line diagram of a pokora (fixed type)

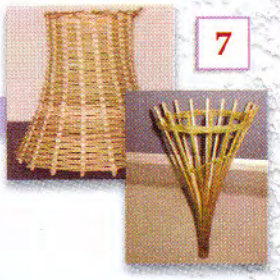
Pointed iron spear

Local name : *Jathi, shel, hat-kati, ek-sholia* (Assam), *Ta* (Manipur)

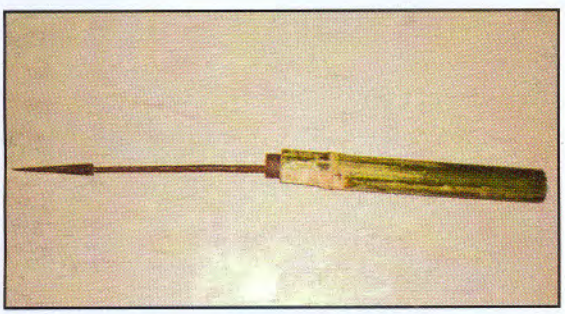
Brief description: This spear is made of either a pointed iron/ bamboo rod (with a sharp iron cap fixed at the apex). The spear is thrown at



A jathi used in Assam



the fish coming to shallow marginal areas of a water body. The operation requires special attention and skill on part of the fishers.

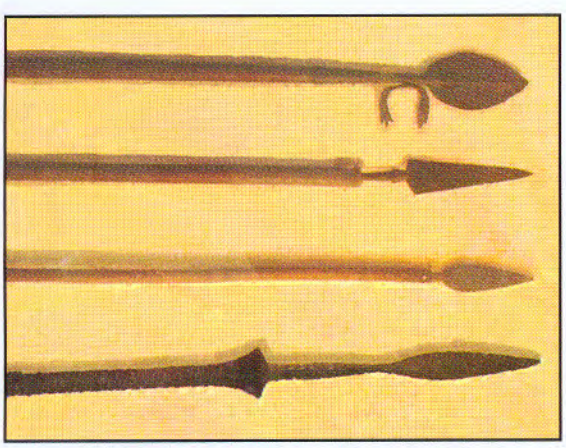


A Kuchia hana sholi of Assam

Eel Catching Pointed Spear

Local name : *Kuchia hana sholi* (Assam)

Brief description : This pointed spear is similar to *jathi* except for the provision of a constriction immediately after the tip so as to prevent escape of speared eels. It is used to catch fresh water eels (mainly *Monopterus cuchia*), which is locally known as kuchia and hence the name kuchia hana sholi. The mode of operation is to pierce the slippery eels living in holes underneath exposed pond/*beel* bed. The metal rod is 60-70 cm in length and 4-6 mm in diameter.



Different types of ballam used in Northeast

Flattened Iron Spear

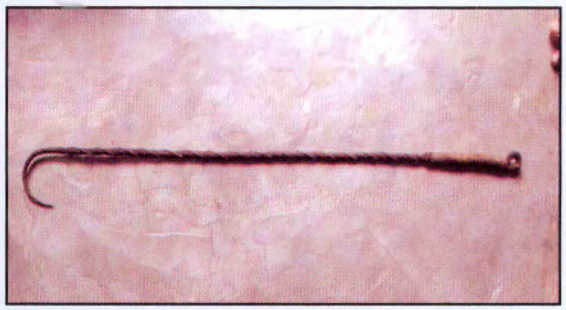
Local name : *Ballam* (Assam)

Brief description : This flattened iron spear is similar to *jathi* except for the fact that here the tip of the iron spear is either rhomboidal (as in Manipur) or like a spindle/fulcrum (as in Assam). This single spear is fixed to a bamboo/wooden handle. The spear is thrown at the fish coming to shallow marginal areas of a water body. The operation requires special attention and skill on part of the fishers.

Curved Iron Spear

Local name : *Kol, kati* (Assam)

Brief description : This is a small (1.0-1.2 m long) pointed and curved iron rod. It is used to immobilize Bagh-ari (*Bagarius* spp.) entangled in *phansi jal*.

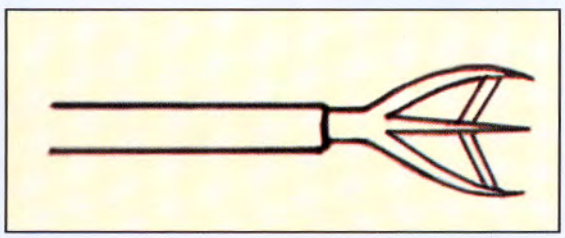


A Kol used for Bagarius sp.

Multiple Pronged Spear
Three Pronged Spear

Local name : *Tiara* (Assam), *Tin kathi chol* (Tripura)

Brief description : It is a light-weight bamboo spear ending in a detachable fork of three barbed points. The fork made of steel wire is attached to the shaft by a fine string. Operation of this spear is similar to that of flattened iron spear and small/medium sized fishes are caught.



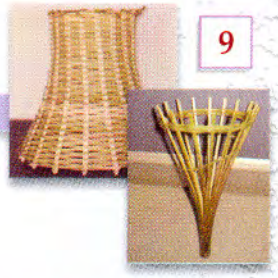
Line diagram of a tiara

Six Pronged Spear

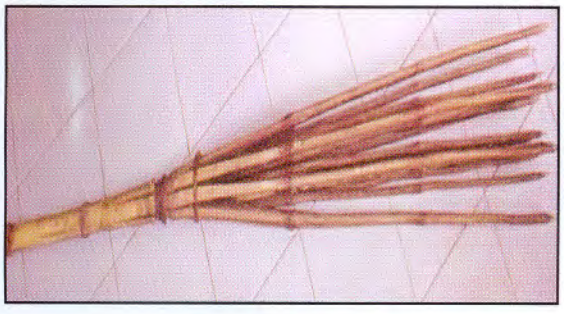
Local name : *Pocha, jowar, jongar* (Assam), *Long* (Manipur), *Chhoy kathi chol* (Tripura)

Brief description : Its design and mode of operation is similar to that of *jathi* except that instead of single pointed rod, it has six barbed prongs, some of which pierce the targeted fish.

A multi-pronged pocha



Multi-pronged Bamboo Spear

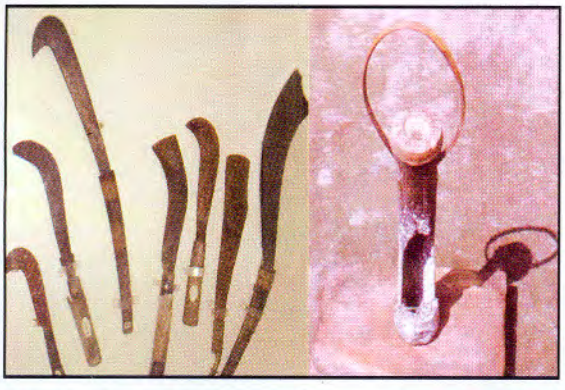


A jowar with iron cap

Local name : *Jowar, kootch* (Assam)

Brief description : This is a multi-pronged spear made by joining together 9-12 pointed bamboo sticks at the base. The sticks are tied into a bundle at the base and inserted into a short bamboo handle. The tips of individual pointed bamboo sticks are sometimes covered with small conical caps made of iron to make it more lethal. Major fishes like large murrels, major carps, cat fishes (e.g., *Wallago attu*), etc. are hunted by this spear especially during the early part of monsoon season (May-June) in flooded areas.

Knives



Different types of knives and bhota used for light fishing

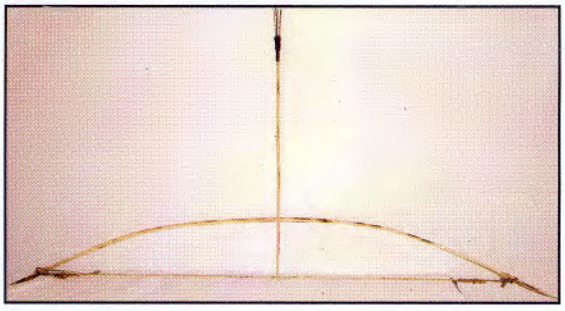
Local name : *Dah, degar* (Assam), *Thangpak, Thangol, Thangou* (Manipur)

Brief description : These knives are used to cut fishes coming to shallow, marginal areas at night with the help of light. Here fishes are attracted/ blinded by a light (lantern/ torch/ burning tyres etc.) and these are then cut across the body by these sharp-edged weapons. Indigenous light made of bamboo called *bhota/jora* are also used in many places.

Bow and Arrow

Local name : *Dhanu-karh* (Assam), *Teer-karh* (Tripura), *Ten-tenjin* (Manipur)

Brief description : The bow used for catching fish especially in streams by the people of the Northeast is more or less similar in shape with those used for hunting terrestrial animals and birds throughout the country. However, here the bow-string is mostly made of bamboo/cane strips. Further, a small multiple prong (*pocha*) is attached at the tip of the arrow. Usually large–sized mahseers, cat fishes, carps, etc. are caught with this gear. The *Bodo* and *Santhal* tribes of Assam and *Khasis* of Meghalaya are especially skilled in using bow and arrow.

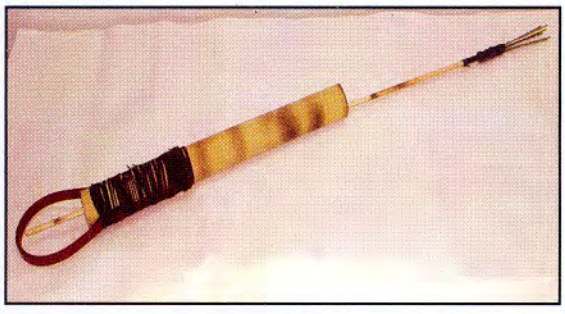


A dhanu-karh used for fishing

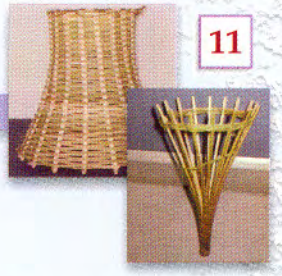
Bamboo Cylinder And Arrow

Local name : *Chunga-karh* (Assam)

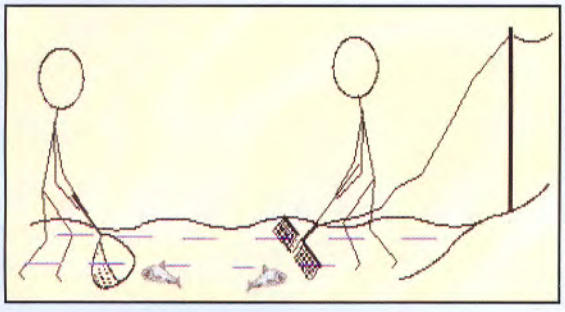
Brief description : It is an indigenous version of catapult wherein a rubber strip is fixed at one end of a hollow bamboo cylinder (*chunga*). The arrow used here is identical with that used in bow and arrow. Its operation requires slightly lesser skills than that needed for bow and arrow and, therefore, can be used by young boys for fishing in relatively shallower streams. This gear is usually used to catch smaller sized fishes than that caught by bow and arrow.



A Chunga-karh used for fishing

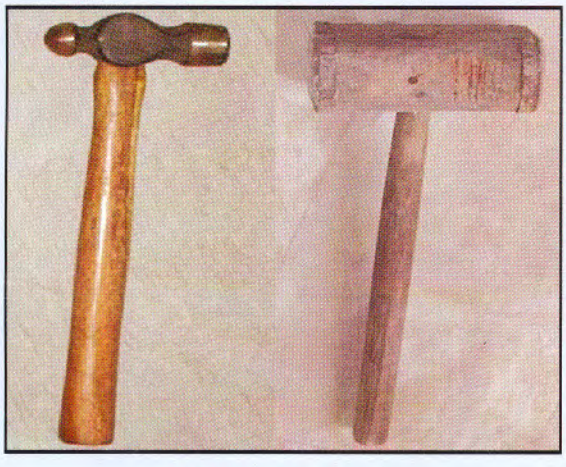


2. Stupefying Devices



These devices prevent fishes from escaping by stupefying or stunning them. The existing devices of the region can be grouped under the following :

1. **Mechanical stupefying**
   a. Striking gear: Throwing stones, hammer, fish clubs, etc.
   b. Explosives: Dynamites and hand grenades.
2. **Chemical stupefying** (fish poisoning): toxic plant parts, chemicals (e.g. burnt lime, pesticides etc.).
3. **Electrical stupefying** (electric fishing gear)



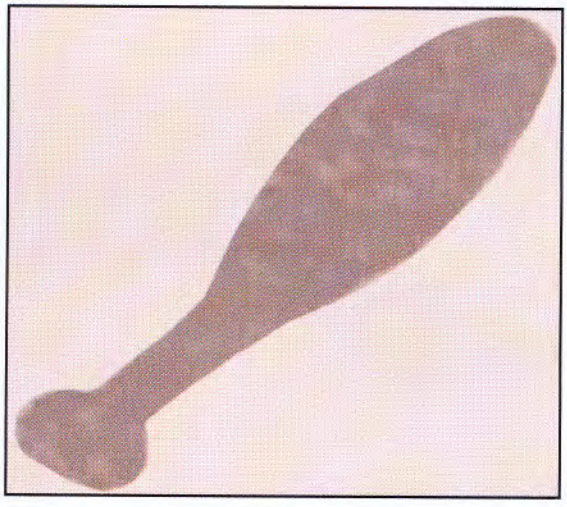
Wooden and iron hammer

Hammer

Local name : *Haturi* (Assam), *Nungdang* (Manipur)

Brief description : This device is a simple large-sized hammer used by carpenters, mechanics, etc. This device is used to stun the fishes hiding underneath boulders in shallow hill streams.

When submerged boulders are hit with a large big hammer, fishes hiding underneath are stupefied/injured. These are then manually collected. Usually it is operated during winter months when the water levels in the stream is low and waters are transparent forcing the fishes to take shelter below the boulders/ pebbles. All sorts of hill-stream fishes like *Garra* spp., mahseer, snow trouts, *Glyptothorax* spp. etc. are caught by this simple gear.



A wooden club

Beating With Clubs

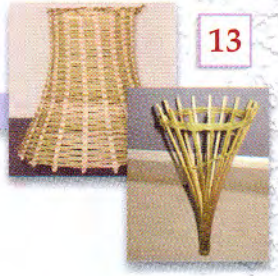
Local name : *Lathi/tangon* (Assam), *Chhai* (Manipur)

Brief description : This is a physical method of stupefying fishes by manually beating them on careful watching. This fishing is usually practiced at night with lights during the early part of the southwest monsoon season (May-June) in submerged paddy fields or shallow hill streams where fishes migrate for spawning.

Fishing with explosives

Explosives

Local name : *Boma diya* (Assam), *Bom bula* (Manipur)



Brief description : Dynamites or hand grenades are detonated/thrown in to deep pools of hill streams for catching all the fishes by stupefying/killing them in many parts of the region. The stupefied/dead fishes floating in water surface are collected manually or with hand scoop nets.

Preparation of fish position using Moin fruit

Fish Poisons/Chemicals

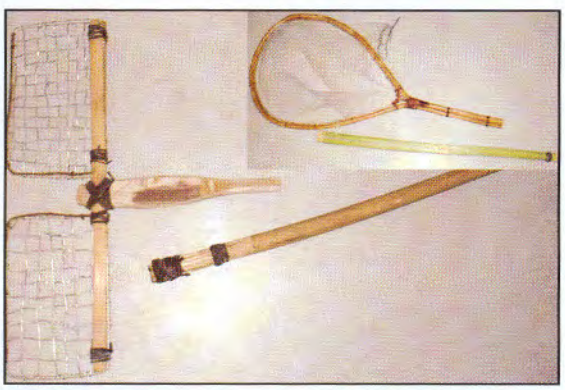
Local name : *Bish/bih diya* (Assam), *Nga phanaba hu* (Manipur)

Brief description : Burnt lime or pesticides is sometimes directly applied into the water body to kill/stupefy fishes. Some plants of local origin are also used. Paste made from the whole plant of the shrub, *Polygonum hydropiper,* which grows abundantly in wetlands is commonly used for fish poisoning. The paste is sprayed over water surface in pools of streams. After some time, fishes come to the surface and start gasping. They are then easily caught. Powder made from the outer skin of *Karoi* tree (*Albizzia odoratissima*) and paste made from the fruit of the shrub, Moin (*Duranta plumieri*) are also used as fish poison.

Electro-fishing Apparatus

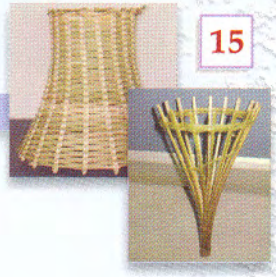
Local name : *Antenna, electric fishing, generator fishing* (Nagaland, Meghalaya)

Brief description : In many hill streams of the Northeast (especially in Nagaland and Manipur), which are full of pebbles, operation of conventional fishing methods is difficult. In such water bodies a low-cost, ingenious type of electro-fishing is successfully employed to catch fishes in live condition. It consists of connecting household electricity (only the positive phase) to a T-shaped antenna (either wire-mesh or wooden with aluminum plating) and a scoop net for fish collection. The master (one who handles the antenna/ power line) pushes the antenna along the bottom of the stream in the direction of the current to a place where two other companions hold the collection device. The fishes taking shelter under the pebbles get numb by electric shock and drift down to the collection device along with water current. The collected fishes are removed time to time from the collection device and kept in a cylindrical basket made of perforated plastic cloths partially submerged in the stream. Most of the caught fishes are brought back to live condition by the water flow through the basket. The only disadvantage of the method is the risk of electric shock to the fishers. Now-a-days, many people use portable generator sets instead of alternating currents since it is safer to handle.

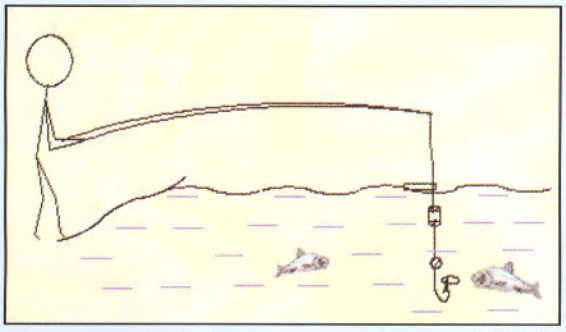


An antenna made of wire mesh (Inset : scoop net)

Elecro-fishing in Dikhu river, Nagaland

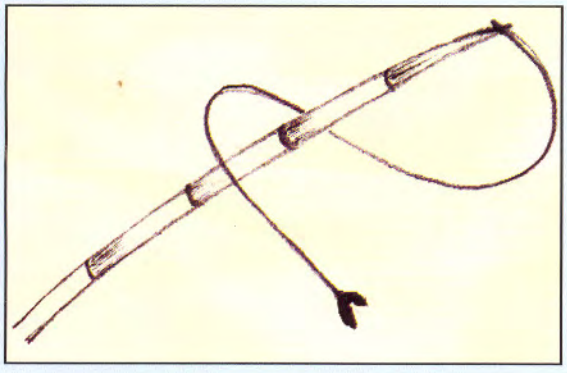


3. Line Fishing



Here the fishes are tempted with real or artificial bait attached to a line in such a manner that the fishes cannot escape from the line after it swallows the bait. This is usually done by putting the bait along with gorges or hooks at the end of the line. The following types of line fishing are practiced in the region.

1. **Line With Gorges Or Hooks**
   (single or multiple)
2. **Hand Lines**
   (e.g. *Hat boroshee*, pole and line)
3. **Set Lines**
   (e.g. Set long line, *pota* boroshee)
4. **Drift Line**
   (e.g. *Zori boroshi, nol boroshee*)



Line diagram of a bamboo hook

Bamboo Hook (Single)

Local name : *Kathi boroshee* (Assam)

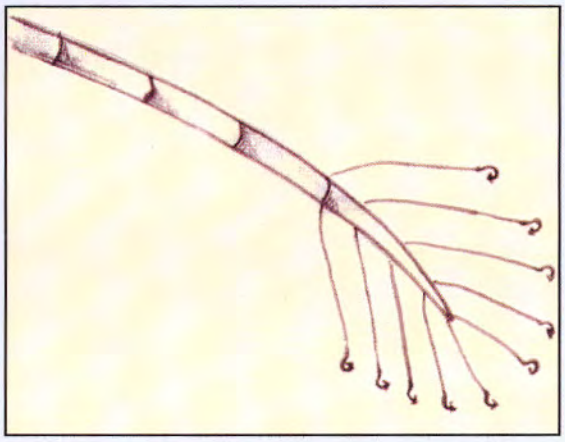
Brief description : Bamboo hook is made of fine flexible bamboo strips (*kathi*), which is folded in the middle and the two ends are joined together with earthworm or prawn bait. When a fish devours the bait, the two ends of the hook

are suddenly released. The mouth of the fish remains wide open thereby preventing it from escaping. The usual length of the *kathi* is 10 mm and width is 1-2 mm. It is normally operated during the monsoon months (June – September) to catch carnivorous fishes like *Anabas* sp., *Nandus* sp. etc.

Multiple Iron Hooks

Local name : *Dhan boroshee* (Assam)

Brief description : Here a number of iron hooks are attached to short lines branching out from a main line resembling a paddy panicle. The hooks are baited (usually with earthworm) and the whole *boroshee* is placed at the bottom of a river/stream. The fisher holds the other end of the main line and hauls it from time to time. Catch comprises small, shoaling catfishes like *Mystus* spp., *Nangra spp.* etc.



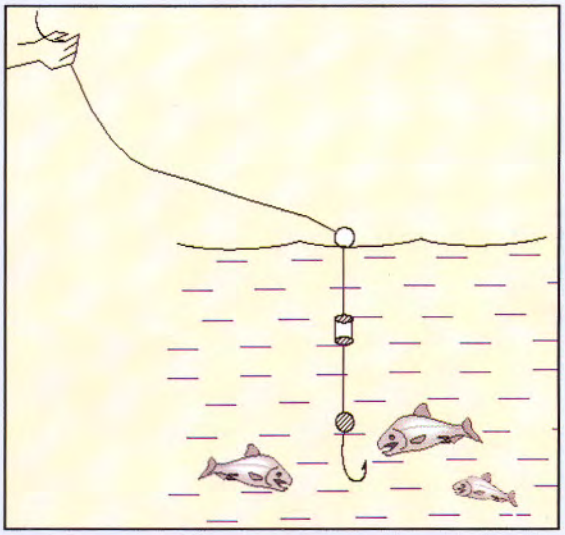
Line diagram of a dhan boroshee

Hand Lines

Short Hand Line

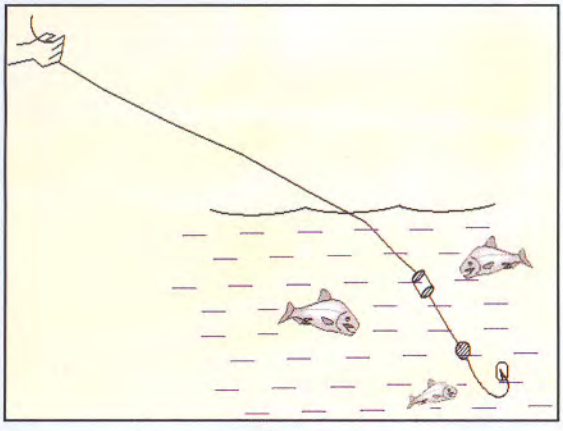
Local name : *Hat boroshee* (Assam)

Brief description : It is composed of a short line, a sinker, one hook and occasionally a small



Line diagram of a hat boroshee

float. The baited hook is either placed in marginal waters of a pond/ beel or inserted in to marginal holes which may have carnivorous fishes like *channa* spp., *Monopterus cuchia* etc. The baited hook is slowly moved to attract fishes. The hooked fish is pulled out swiftly.



Line diagram of a long hand line

Long Hand Line

Local name : *Suta boroshee* (Assam), *Khoisang* (Manipur)

Brief description : Here the line is very long to which a baited hook and sinker is attached at one end. The other end of the line is held in hands and the line with baited hook is thrown at a certain depth of river water. When a carnivorous fish (e.g. eels, cat fishes, murrels, etc.) take the bait, a jerk is felt by the fisher, who pulls out the hooked fish swiftly.

Fishing with a chip boroshee

Pole And Line

a) Hand held pole and short line

Local name : *Chip boroshee* (Assam), *Khoi tek* (Manipur)

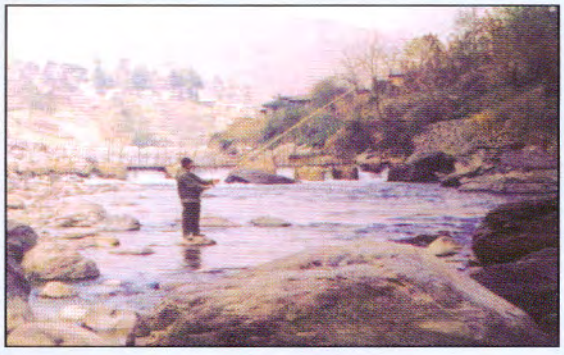
Brief description : Here a limited length of line is fixed to a slender bamboo pole. A hook (with

bait), sinker and small float are attached to the tip of the line in that order. Pulling down of the float below water surface indicates that a carnivorous fish (e.g., cat fishes, knife fishes, etc.) has taken the bait, prompting the fisher to pull it out with swift upward movement of the pole.

b) Hand held pole and long line (with/without wheel)

Local name : *Pahari/ wheel boroshee* (Assam)

Brief description : It consists of a small, slender bamboo/ steel pole to which a long line is tied which can be released either from a steel wheel or from two nails fixed on to the bamboo pole. A simple iron hook with artificial baits and sinker are attached to the tip of the line. In *paharee boroshee*, a small float made of light-weight wood is used adjust to the desired depth of the hook in water. Length of the pole is usually 2.0 - 2.5 m.

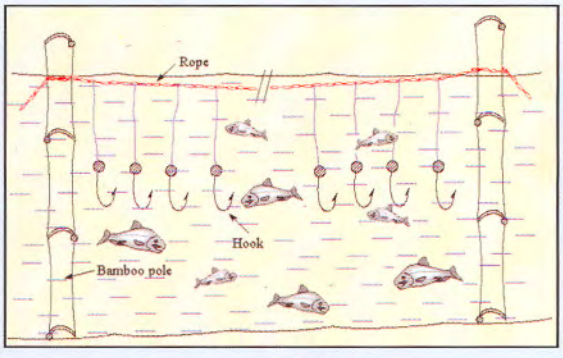


Fishing with a pahari boroshee

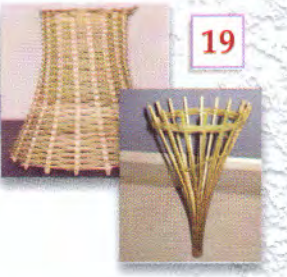
Set Long Line

Local name : *Khuti boroshee* (Assam)

Brief description : Here, a number of hooks with short and slender lines (30-40 cm) are hung vertically from a main rope (nylon/coir). The main rope is fixed with two bamboo poles driven into bottom soil at shallow depths. The



Line diagram of a khuti boroshee



A pota boroshee

Young boys displaying their nol boroshees

length of the main rope ranges from 5-10 m. Normally, 12-25 hooks are hung with a gap of 0.2-0.3 m between adjacent hooks. The hooks are baited (usually with earthworm) and catch comprises carnivorous fishes (*Channa* spp., *Mystus* spp., *Wallago attu*, etc.).

Set Pole And Short Line

Local name : *Pota boroshee* (Assam), *Khoi* (Manipur)

Brief description : This gear is similar to the hand held pole and short line except that here the pole is firmly inserted into pond/ beel bed. It is set in shallow waters usually in afternoon hours and harvested the next morning. Live frogs and small fishes are used as baits. Catch usually comprises large murrels like *Channa striatus* and *C. marulius.*

Drift Line With Floating Twig

Local name : Nol boroshee (Assam), Patna borshi (Tripura)

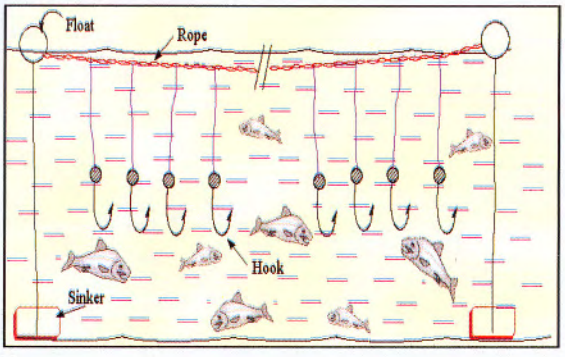
Brief description : Here, a hook attached to a short line is hung from the middle of a floating twig, usually made of nol bamboo, *Colocasia* stem, *kankulla* piece, etc. The hook is baited

(with earthworm, insects, etc.) and set in shallow stagnant water of *beels* or flooded shallow areas. The length of the floating twig varies from 0.2-0.3 m. Species caught include *Channa* spp., *Anabas* sp., *Heteropneustes* sp., etc.

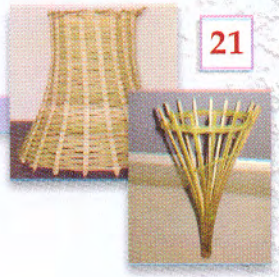
Drift Long Line

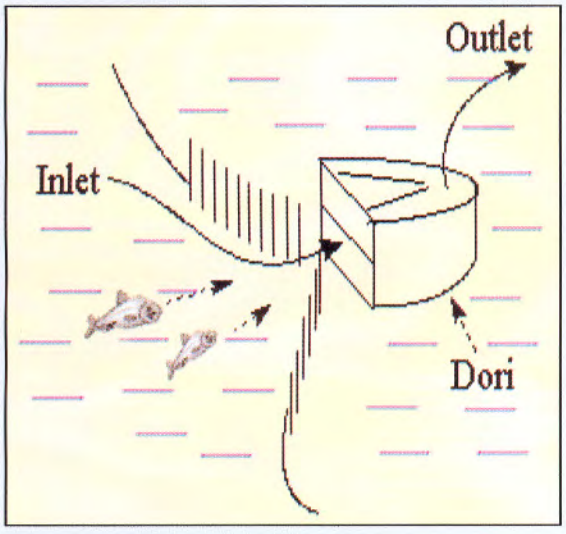
Local name : *Jori boroshee* (Assam), *Thouri khoi* (Manipur), *Roshi/ larh borshi* (Tripura)

Brief description : This line is similar in its construction, mode of operation and catch composition with that of set long line described earlier. However, it is set with the help of floats and sinkers attached to the ends of the main rope instead of using fixed bamboo poles. As a result, this line drifts with water currents for a certain distance. Normally, this line is longer (length of the main rope 10-30 m) and contains much larger number of baited hooks (30-100) than set long line. Further, this line is usually operated in deeper and larger water bodies compared to set long line.



Line diagram of a jori boroshee





4. Traps

Traps are fishing implements wherein fish enters voluntarily but cannot come out. There may be one or more chambers in these traps, which may be closed when the fish enters inside. Some others have a complicated entrance device like a gorge or a tunnel. Diverse types of traps varying from small portable structures (closed on all sides except for the entrance) to extensive areas of water body (barricaded with bamboo poles / chips) are found in the regions which are enumerated below:

1. **Hiding places**
   - **Brush traps** (e.g., Brush parks, *dhara jakhe*)
   - **Bamboo tubes** (*Chunga*)
2. **Barriers** (fish screens e.g., *Bana/ bheta mara*)
3. **Tubular traps** (e.g., *Sohra*)
4. **Baskets** (mostly small traps which are made of bamboo or wooden sticks/ wires/ plastics and are three dimensional with retarding devices)

- Pots
- Conical or drum like traps
- Box like traps (having strong frames).

BRUSH PARKS

Brush parks are the most common fish aggregating device used in the beels of the northeastern region. These parks mainly act as shelter areas. Three different types of brush parks locally known as katal/ jeng, pit/ chek and athaphoom are practiced in the region.

Small Circular Parks With Submerged Branches

Local name : *Jeng/ katal* (Assam), *khatal/ ber* (Tripura)

Brief description : *Katal/ jeng* is a small and circular (15 - 30 m diameter) sheltered area. They are erected immediately after the monsoon season (August-October) and harvested during January-February. These are set by dumping tree/ bamboo branches in a *deep* pool of beel over which a circular canopy of water hyacinth is barricaded with bamboo poles and strips. Fishes take shelter in the *katal/ jeng* in the face of intense fishing going on in the beel. During November - February, the *katal* is encircled by drag nets (*Katal mara jal* and *ber jal* having 2.0-5.0 cm mesh size and 5-15 m height) and split - bamboo screens (*bana*). The floating water hyacinth and tree branches from the circled area are thrown out and the circumference is slowly reduced by dragging the nets and screens

A Jeng/katal in an Assam beel

inwards. Cast nets are operated simultaneously. The foot ropes of the net are finally brought together to form a bag and fishes are caught. Sometimes, after the first harvest the *katal / jeng* are reconstructed again at the same site, which is called sera *katal / jeng*. After 15-30 days the *sera katal* is harvested in the same way. Catch from these parks comprise Indian major and minor carps, large cat fishes, knife fishes, etc.

Small Circular Parks Without Submerged Branches

Local name : *Athaphum* (Manipur)

Brief description : This is another type of small, circular brush shelter popular in the floodplain wetlands (pats) of Manipur. These are similar to *katal/jeng* in shape and size. However, here only a circular boundary is erected using floating mats of macrophytes and the middle portion is more or less clear. Further, no bamboo/tree branches are used for erecting *athaphum* unlike in katal/jeng. Another distinguishing feature of *athaphum* is that it is a perennial structure unlike the other two types of brush parks. When a *phum* is erected in a wetland, it is termed as *phum thaaba;* harvesting the same is known as *phum naamba*. There are over 3000 *phum* circles erected for fishing purpose in Loktak Lake alone.

Harvesting of a pit

Extensive Parks

Local name : *Pit/ chek* (Assam)

Brief description : It is a very large brush park (0.5-2.0 ha) erected in beels heavily infested with floating water hyacinth. For erection of *pit/chek*, an extensive area covered by water hyacinth is simply barricaded at both the ends with split-bamboo tied to closely spaced bamboo poles from shore to shore so as to prevent chunks of water hyacinth from spreading to clearer areas. Pits are erected immediately after the monsoon season (August-October) and harvested during winter months (January-February). For harvesting, the area is cordoned with nets and the net is gradually advanced with the removal of macrophyte from inside. Catch comprises Indian major and minor carps as well as air-breathing fishes e.g., *Channa* spp., *Notopterus* sp., *Anabus* sp., etc.

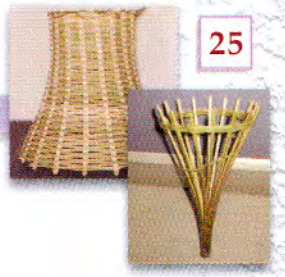
Athaphums of Manipur

Triangular Brush Park

Local name : *Dhara jakhe* (Assam)

Brief description : This triangular brush trap, made by weaving finely split bamboo strips, have the front part open. Tree/ bamboo branches are put inside the trap and it is partially submerged in shallow areas of small rivers. The fishes taking shelter inside the trap are caught after 7-10 days by lifting the trap

A dhara jakhe



and removing the branches. It is operated in the post-flood season (August- November).

Bamboo Tube

Local name: *Chunga* (Assam)

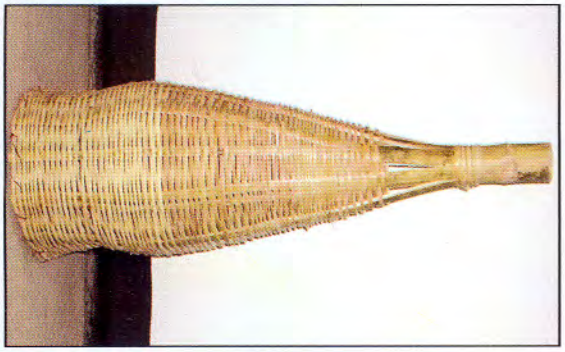
Brief description: This is a simple trap consisting of a single node and internode of bamboo. One end of the bamboo tube is open enabling eels (e.g. *Mastacembelus* sp., *Macrognathus* spp.) and loaches (e.g. *Botia* sp., *Nemacheilus* spp.) to take shelter inside the tubes. A number of such tubes are set in the bottom of shallow rivers and marginal areas of floodplain wetlands. The tubes are periodically removed from water, taking care to seal the open end before lifting them.

A chunga

Conical brush trap

Local name: *Dalangi, hukuma* (Assam), *Ruh ship* (Meghalaya)

Brief description: It is a medium sized brush trap of conical shape. This is set in rivers or *beels* usually after the southwest monsoon season (August-November) and is fastened to stakes driven into the bank with ropes. The inside of the trap is loosely filled with branches of bamboo/trees to provide shelter to fishes. *Hukuma* is larger than the other two wherein a



A ruh ship of Meghalaya

bamboo pipe is fitted to the tapering end. Animal offals or mustard oil cake is kept in this tube to attract fishes like spiny eels, walking catfish, etc.

Barriers

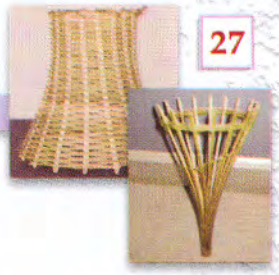
a) Split-bamboo screen barrier

Local name : *Bana mara* (Assam), *Bara* (Tripura)

Brief description : This method is a combination of 2-3 fishing gear. It primarily comprises erection of split-bamboo screens (*bana/bara*) across a water way (small river/connecting channel of open *beel*) with the help of bamboo poles. The interspace of the screen is small (4-6 mm). The inside of the *bana* is sometimes also lined with small meshed nets to prevent even small fishes from passing through it. In the middle of the channel, a gap is left, where a Chinese dipnet (in case of bigger gap) or a 'V'-shaped tapering net (smaller gap) known as *bin jal* is installed to catch the fishes (both small and big ones) passing through the gap. Behind the dip net another semi-circular enclosure of bana may be constructed. Fishes escaping the deep net remain within the semi-circular

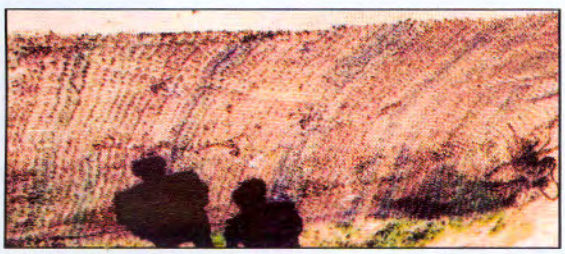
Bana fishing (using bin jal)

Close-up view of split-bamboo screen (bana)



enclosure and are caught by cast net/tapering net. Fishes attempting to jump over the bana are caught in the pockets of hanging (*verandah*) net behind the *bana*. *Bana* fishing is usually done during May-June and September-October.

Bheta mara in Assam



A bheta jal

b) Net barrier

Local name : *Bheta mara* (Assam)

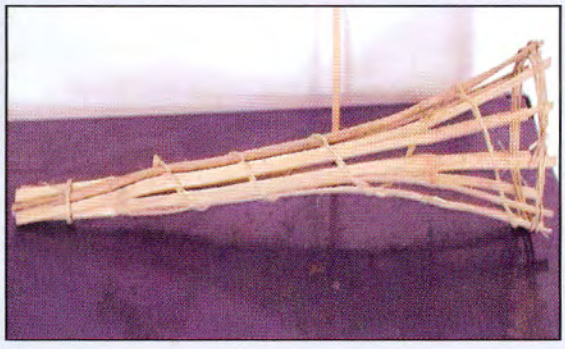
Brief description : This is similar in construction and mode of capture with that of split-bamboo screen barrier except for the fact that here net is used to block a river or connecting channel of open *beel* instead of split-bamboo screens. *Bheta* is usually larger (both in expanse and depth) than *bana* barrier. A special type of net made of thick parachute chord locally known as *bheta jal* is used for barricading the water way. Since the gap provided in the middle of a *bheta* is also quite big, it is invariably fished with Chinese dip net (dheki/ghat jal). Usually big and medium sized fishes are caught here since smaller ones can pass through the net barrier.

Tubular Traps

Elongated Conical Trap

Local name : *Sohra, jopona, thona* (Assam)

Brief description : It is an elongated conical trap (50 - 60 cm long, 10 - 15 cm mouth diameter) made of bamboo. During the rainy season, when water flows over low-lying fields the water flow is regulated through a number of small gaps. A number of these traps are set in these gaps against the current. The fishes coming along with water enter the trap and being conical at the posterior end, the fishes (usually small ones like small murrels, gouramies, etc.) get trapped head-on.



A shora

Short And Wide Conical Trap

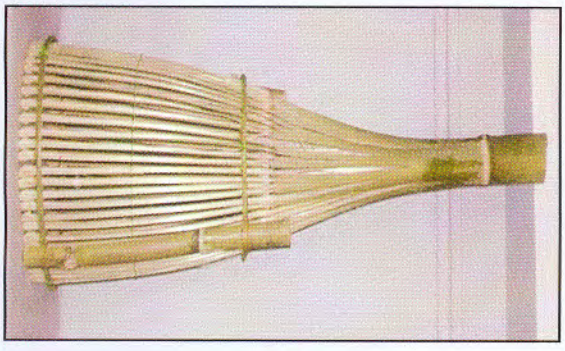
Local name : *Bamidhora- sohra* (Assam)

Brief description : This is a smaller (30 - 45 cm long) funnel-shaped trap made from a single bamboo piece, having a node at the bottom and a circular wide mouth (diameter 15 - 20 cm). The whole body is woven with bamboo strips. It is used for catching spiny eels (*bami*) and other small fishes in shallow turbid water.

A bamidhora - sohra

Large Conical Trap

Local name : *Khaki/khoka, baha* (Assam)

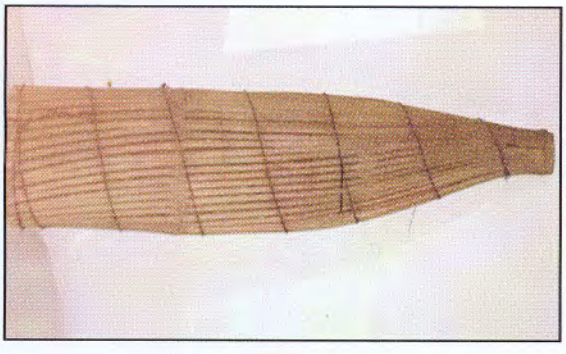


A baha

Brief description : The shape and mode of operation of this trap is similar to *sohra* though it is bigger (1.5 - 2.0 m long) than the latter. The mouth of the trap is quite wide (diameter 20 - 30 cm). The body is strengthened by several rings made of bamboo strips. It is placed in a small stream with the mouth facing strong current. The trap is secured with bamboo poles or stakes. Catch comprises both small and medium sized fishes.

Large Tubular Trap

Local name : *Therka* (Assam), *Aphen* (Nagaland)



An aphen (Nagaland)

Brief description : This tubular trap is made of a long bamboo piece. Length of this trap is 1.5 - 2.0 m. and diameter of mouth is 20 - 30 cm. The mouth has a circular ring around it. At the time of operation, the mouth of the gear is placed against the current in a stream or water channel. The fishes are taken out by inverting the trap.

Box Trap For Crab

Local name : *Angakhang* (Nagaland), *Dola* (Tripura)

Brief description : This is a box trap made from bamboo strips, which is used to catch crabs. Bait of snail meat or animal offal is kept inside the pot. Thereafter it is immersed in shallow water. Crabs enter the pot to eat the bait and get trapped. It can also be used to transport crabs to markets.

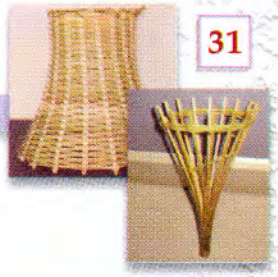
A angakhang

Dome-shaped Trap (Vertical)

Local name : *Ubhati, runga* (Assam)

Brief description : This is a dome-shaped trap used in marginal areas of floodplain wetlands of Assam. It varies widely in size (0.2-0.3 m in diameter and 0.3-0.5 m in height). There is a small rectangular tunnel mouth at one side leading to a second funnel-shaped tunnel towards the dome. The trap is set vertically and baits of snail meat is usually kept inside the trap to attract fishes especially *Mystus* spp.

Ubhati

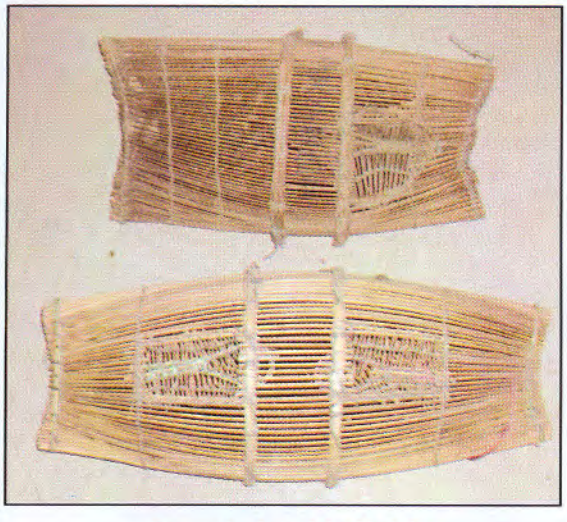


Dome-shaped Trap (Horizontal)

Local name : *Pouri* (Assam)

Brief description : *Pouri* is another dome-shaped trap, which is much bigger than *ubhati* (2.0-2.5 m long; diameter of mouth 0.7-0.8 m) and is set horizontally. It has a single funnel-shaped tunnel (*kol*) provided at the bigger end of the trap. It is commonly set horizontally in submerged fields after blocking both the sides with split-bamboo screens/netting. A smaller version of *pouri* (0.2-0.3 m high) set vertically on the holes of *Channa barca* (a murrel) and *Monopterus cuchia* (an eel) is used in Jorhat district of Assam to catch these species. These fishes get trapped in the *pouri* when they come up to the water surface for air-breathing or in search of food.

A pouri



Sepa - single and double inlet

Spindle-shaped Trap

Local name : *Sepa* (Assam), chai (Tripura), *Kabo loo* (Manipur)

Brief description : It is a spindle-shaped trap made by weaving split-bamboo strips (with cane /plastic strips) which is tapering at both the ends. There is slight variation in shape and design of these traps used in different areas of

the region. For example, *sepa* used in Assam is oval in mid section and both the ends are flattened. On the other hand, *kabo loo* used in Manipur is circular in mid-section and both the ends are dome-shaped. Further, it can have either one (e.g. *kabo loo*) or two inlet tunnels (e.g. *sepa*). *Sepa* usually have a total length of 0.4 -0.8 m, while *kabo loo* is much longer (0.9-1.5 cm). The inlet tunnel (*kol*) is made with bamboo strips pointed inwards, so that fishes get an easy entry to the trap but cannot escape easily. The trap is set either along or against the current in shallow areas. In all types, fishes collected inside the trap is removed through an opening provided at one end, which is closed by either a piece of wood or straw plugs. Catches usually comprise small fishes like barbs, gouramis, prawns, small murrels, glass fishes, loaches, etc.

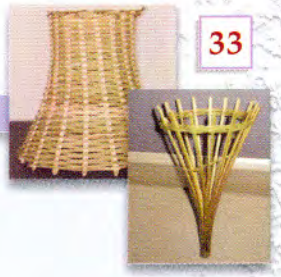
A Kabo loo of Manipur

Mace-shaped Trap

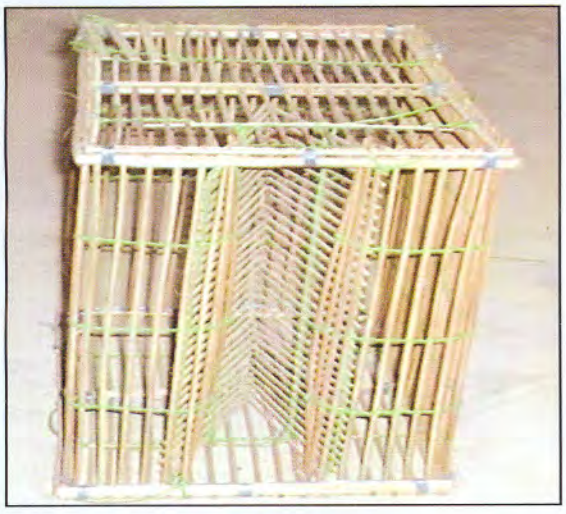
Local name : *Chepeti* (Assam)

Brief description : It is similar in shape and mode of operation with the spindle-shaped trap (*sepa*). However, it is made from a single bamboo piece and is smaller in size. Further, it has single

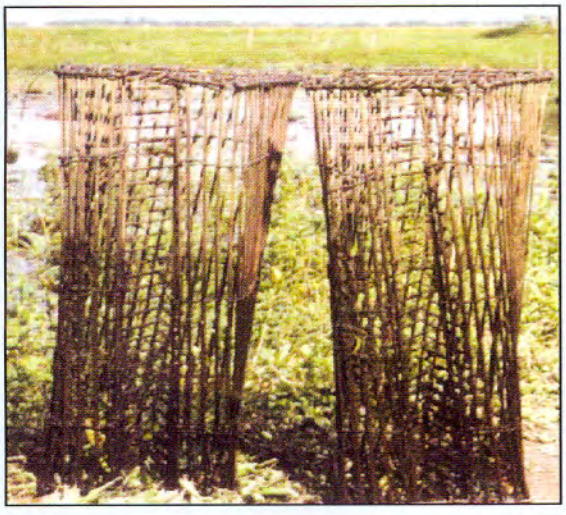
A Kabo loo of Manipur



inlet tunnel and fishes are removed from the larger rounded end, which is closed with wooden piece/straw plugs. It is set along or against water currents in shallow waters to catch small fishes.



A boldha of Assam



A tai jep of Manipur

Cube-shaped Box Trap With Single/Double Inlet

Local name : *Boldha, kholha, idea* (Assam), *Tai jep* (Manipur)

Brief description : This trap made of bamboo strips is rectangular in shape having a vertical inlet at the narrow side. The inlet structure is 'V' shaped and the sticks from either end touch together at the middle resembling spines, thereby preventing the trapped fishes from moving out. These are variable in size (0.4-0.6 m long, 0.2-0.3 m wide and 0.5-0.7 in height). It is operated either for or against water currents to catch miscellaneous fishes in shallow areas. The kholha used in upper Assam (north bank) is similar to boldha except that it has inlets (*kol*) on both front and rear sides.

The *tai jep* used in Manipur wetlands (*pat*) to catch small economic fishes are similar in structure to that of *boldha*, but it is larger in size

(0.5-0.6 m long, 0.3-0.4 m wide and 1.0-1.2 m in height). Baits of snail meat are sometimes kept inside these traps to attract the fishes, especially *Mystus* spp.

Cube-shaped Trap With Wide Inlet

Local name : *Dori, dingorah* (Assam)

Brief description : It is a cube - shaped box trap with a wide V-shaped inlet at one side. The back side of the trap is rounded making it semi-circular in cross-section. It is made strong with 5 rows of split-bamboo pieces (*kami*) fixed transversely at regular intervals. As shown in the picture, it is vertically set against water current. Small fishes including prawns moving with the current are trapped inside the trap, which are removed through a big opening provided at the top (may or may not be closed with a removable cover).

Dori, commonly used in Barak Valley of Assam, is moderate in size (0.5-0.6 m wide, 0.7-0.8 m deep and 0.8-1.0 m high). *Dingorah*, used in the Brahmaputra valley of Assam, is slightly smaller (0.6 × 0.5 × 0.7 m) in size. This is comparatively wider than dori in the front and is devoid of transverse bamboo strips making it less sturdy.

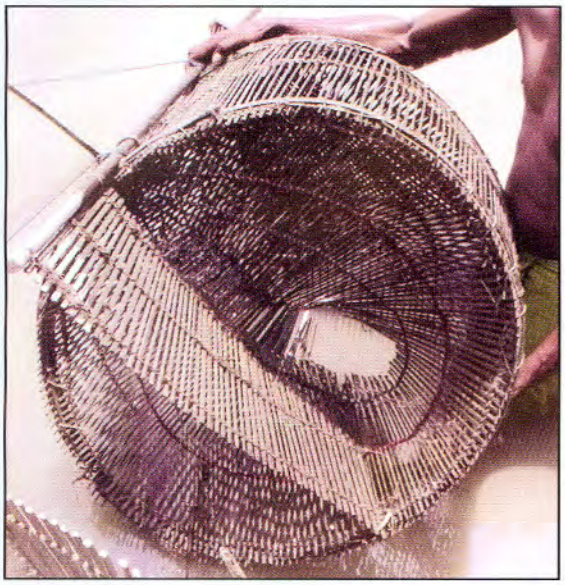
A dori, used in Barak valley of Assam

A dingorah used in Brahmaputra valley of Assam

Big Cylindrical Trap

Local name : *Dhowar*

Brief description : This is a big cylindrical fishing trap used in marginal areas of large rivers of Assam. The top of the trap, which houses the inlet tunnel, is circular in shape (60-80 cm in diameter) while the opposite end is made triangular. An additional split-bamboo screen of 30-40 cm height is fixed on to the top by the side of the inlet tunnel so as to direct the fishes moving along the current into the tunnel. The total length of the trap is 0.9 - 1.2 m and is quite heavy. The trap is set vertically/horizontally with the help of split-bamboo screen and bamboo poles so as to guide the fishes into trap. The catch comprises both small (e.g., small catfishes, minor carps, etc.) and big fishes (e.g., catla, *Labeo gonius*, etc.).

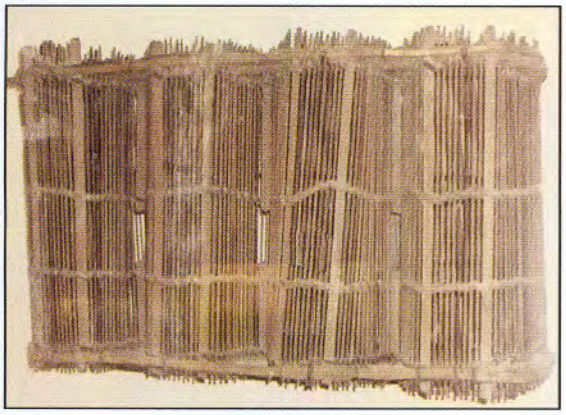


A dhowar in river Brahmaputra

Elongated Box Trap With Multiple Inlets

Local name : *Darki* (Assam)

Brief description : This long (1.2-1.5 m) and cube-shaped (0.2-0.3 m wide and 0.3-0.4 m high) trap has several small, V-shaped openings (individual openings smaller than that of



A darki with three opening

dingorah). The inlets are simple and do not have spine like inward directed structures. It is set vertically against water current to catch small fishes.

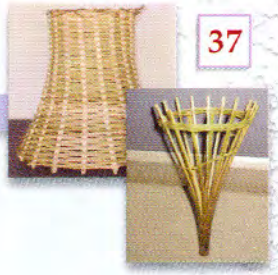
Vertical Spindle-shaped Trap

Local name : *Dhieri, dingori* (Assam)

Brief description : This trap appears to be a combination of the spindle-shaped trap (*Sepa*) and the elongated box trap (*darki*). It is roughly rectangular in shape when viewed from the front but is dome-shaped when viewed from the sides. It is similar to *sepa* with respect to the design of the inlet tunnel and the round opening provided at one corner to remove trapped fishes. Larger traps (0.9-1.0 m long, 0.2-0.3 m wide and 0.5-0.6 m high) have 3 inlet tunnels, two in the front and one in the rear side (middle). Smaller ones (0.6-0.7 m long, 0.15-0.2 m wide and 0.4-0.5 m high) have only 2 inlet tunnels in the front. It is set vertically usually in rows of several traps (8-20) set side by side with support of split bamboo strips. It is usually used in flooded paddy fields during the monsoon and post-monsoon months (June-October) to catch small economic fishes.

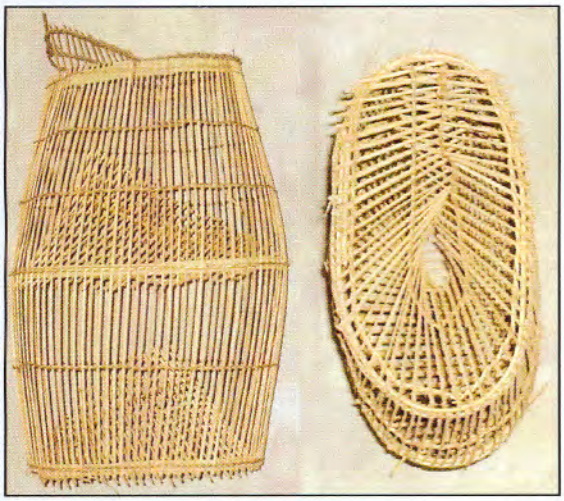
A dhieri

A series of dhieri set in low-lying areas



Pear-shaped Trap

Local name : *Kathia* (Assam)



A kathia

Brief description : This is a more or less pear-shaped small trap (0.3-0.4 m long, 0.25-0.30 m wide and 0.14 - 0.18 m deep) with both the ends slightly tapered. It is roughly oval in mid-section and one end of the trap is slightly bigger than the other. The inlet tunnel (having spikes) is constructed at the bigger side, which leads to a second inlet tunnel provided at the middle of the trap. One opening (closed with strings at the time of setting) is provided at the smaller end to remove trapped fishes. It is normally used to catch small fishes moving with water current in shallow submerged areas during monsoon months.

Cylindrical Cane Trap

Local name : *Chunga zaliben* (Nagaland)

A chunga zaliben used in Nagaland

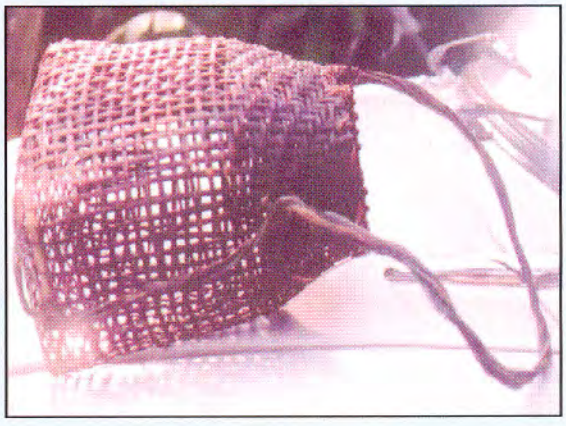
Brief description : It is a small cylindrical fishing trap made of cane strips used by *Ao* community in Nagaland. The lower end of the trap is totally closed and an inlet tunnel provided at the upper side. Baits of poultry offals and snails are kept inside the trap to lure the fishes. It is submerged in shallow streams

to catch small catfishes, eels, loaches, etc. The top cover containing the inlet tunnel is partially opened to take out trapped fishes.

Bag-like Cane Trap

Local name : *Zaliben*

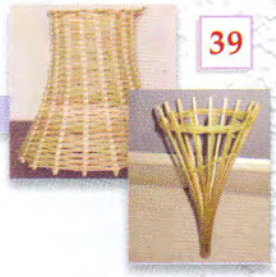
Brief description : The construction (including that of the inlet tunnel), catch composition and mode of operation of this trap is similar with that of *chunga zaliben*. However, it is usually slightly bigger then the latter. This is also a common trap used by the *Ao* community of Nagaland.



A zaliben of Nagaland

A zaliben of Nagaland

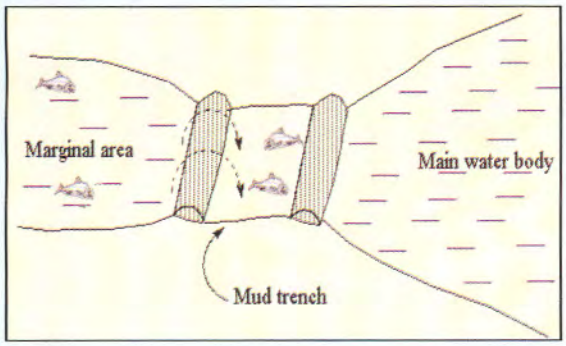
A zaliben of Nagaland

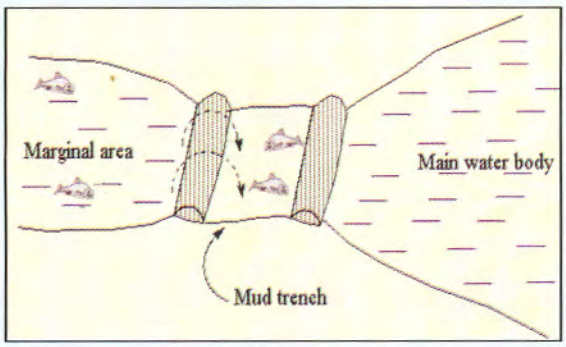


5. Aerial Traps

Some fishes have the habit of jumping out of water when they face an obstacle or danger. Such fishes are induced to jump out of the water by placing certain obstacles and are caught in the air by special devices obstructing their gliding flight. The following two types of devices are commonly used in the Northeast.

1. **Mud trench** *(Leti diya)*
2. **Verandah net** *(Dolonga)*





A line diagram of leti diya

Mud trench

Local name : *Leti diya* (Assam)

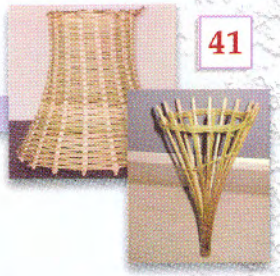
Brief description : Here, a water channel is blocked by constructing a mud trench of about 30-50 cm width. The sizes of the trench are elevated creating a muddy pit in between. When fishes encounter the obstruction, they try to jump over the barrier and fall in the muddy pit and are caught by hand. Murrels (*Channa* spp.), and barbs (*Puntius* spp.) are commonly caught in this trap. It is usually practiced during the post-rainy season (August-October) when fishes start movement from shallower to deeper waters.

Veranda Net

Local name : *Dolonga* (Assam)

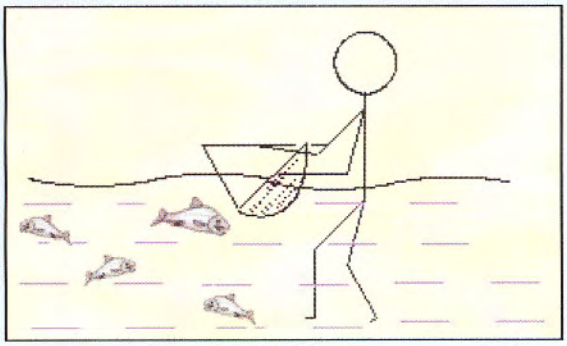
Brief description : This trap is constructed by erecting split-bamboo screens (*bana*) across water currents. The upper end of the screen remains just above the water level so that fishes can jump over it. Behind the screen, a piece of netting is loosely hung with the help of bamboo poles so as to form a U-shaped hanging cradle. When fishes undertaking spawning or feeding migration face the screen on their way, some of them like *Channa* spp., *Puntius* spp., *Rasbora* spp. etc. jump over and get trapped in the hanging net.

A dolonga under operation



6. Bag Nets

These are bag like nets, which are kept vertically open either with the help of a fixed frame or through the counter forces of floats and sinkers fitted to the net mouth. The net is horizontally extended by the water current. Smaller bag nets like scoop nets are moved through water. The fishes entering the net are caught by filtering. The following types of bag nets are used in the region.

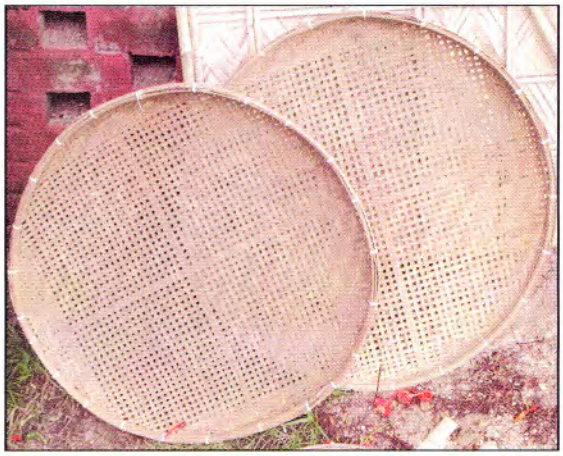


1. **Scoop baskets** (e.g. *Chalonee, khorahee, paachi* etc.)
2. **Bag-like net** *(e.g. Harhari jal)*
3. **Landing nets** (*Hat jal*) with more or less round frame. It is mostly an accessory in electro-fishing and sport fishing and also used for fishing directly.
4. **Push nets** (with triangular or semi-circular frame)
5. **Drag scoop gear** (e.g. *Jakoi*)

Saucer-shaped Bamboo Sieve

Local name : *Chalonee* (Assam), *dali* (Tripura), *jarie* (Angami Naga)

Brief description : This is a big (1.0-1.2 m diameter) saucer-shaped circular bamboo sieve. It is inserted below a patch of floating water hyacinth in weed-infested regions of a water body (pond/*beel*). Fishes like murrels, perches, eels, etc. take shelter inside thick roots of water hyacinth during winter months (December-February). The water hyacinth is shaken on the sieve thereby forcing the fishes hiding inside the root tufts to come out and fall on the sieve from where they are hand-picked. A rectangular bamboo sieve is used by Angami Naga people to catch edible snails and aquatic insects.



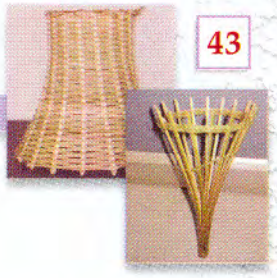
Chalonee

Bowl-shaped Bamboo Busket

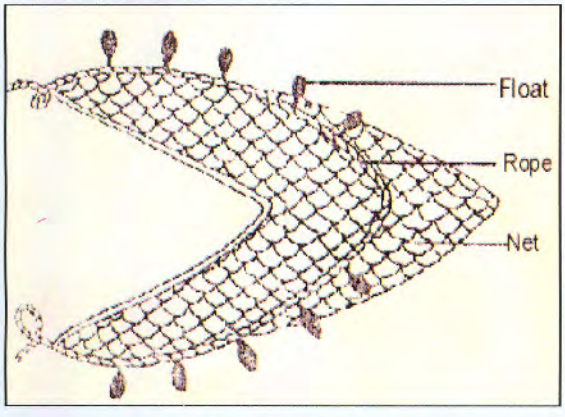
Local name : *Khorahee, paachi* (Assam), *kharai* (Manipur)

Brief description : It is similar in the mode of catching, fishing season and catch composition with that of saucer-shaped sieve. However, these are bowl-shaped (concave) baskets and therefore, chances of fishes escaping from them are less. *Paachi*, a stronger and bigger basket than *khorahee*, is also used by fishers of Assam.

A khorahee



A *paachi* can lift heavier load of floating weeds and its longevity is also more.



Line diagram of harhari jal

A hand landing net

Bag-like Net

Local name : *Harhari/harhare jal* (Assam)

Brief description : This is a common bag net used in rivers of Assam. As shown in the picture, it is a bag-like conical net, which is kept vertically open through the counter forces of floats and sinkers. The net is usually towed against current with the help of a boat. The fishes are collected in the net bag and the catch usually comprises small economic fishes like *Aspidoparia* spp., *Labeo* spp., etc.

Hand Landing Net

Local name : *Hat jal* (Assam), *long thrai* (Manipur), *pelun jal* (Tripura)

Brief description : It is an oval-shaped small scoop net tied on to a frame made of wood/bamboo/cane. It is fixed to a long handle for operating the net. An oval bag net piece of 1-5 mm mesh size is tied on to the frame. The net is dipped into water and lifted up quickly in a jerky movement for catching fishes in shallow/muddy waters. Often, the net is used

for catching fishes stupefied by electro-fishing, explosive use, poisoning and angling. Catch composition varies accordingly. It is used sporadically all through the year.

Push Net With Triangular Fixed Frame

Local name : *Thela jal* (Assam), *long thrai* (Manipur), *pelun jal* (Tripura)

Brief description : It is a conical bag net tied on to a triangular bamboo frame. One pole of the bamboo frame is extended by about 1 m for operating the net. A triangular bag net piece of 5-10 mm mesh is tied from the frame. The frame is held by the handle and dipped into the water, pushed forward along the bottom for some distance and then lifted up quickly. The gear is operated in shallow waters of 2-3 m depth. Often, the net is dragged along the weed-infested areas before lifting. It is used sporadically all through the year. Catch comprises mainly small economic fishes.

Operation of a thela jal

Scoop Net With V-shaped Fixed Frame

Local nam : *Pah/ghoka mara jal* (Assam)

Brief description : The structure of pah jal resembles that of thela jal. However, it has a V-shaped bamboo frame. Mesh size of the net is

A fisher operating pah jal

usually 4-6 mm. It is operated either from shore of rivers or from boats. Unlike thela jal, it is used to scoop out fishes (not pushed through water). A short crosspiece of bamboo is fixed near the apex to keep the angle between the two bamboo poles constant (30-45°). Catch comprises small fishes like Puntius spp., Chanda spp., Amblypharyngodon mola etc.

Drag Scoop Gear

Local name : *Jakoi* (Assam), *chekki* (Meghalaya)

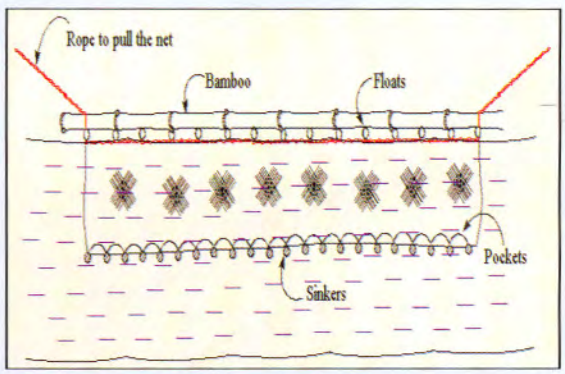
Brief description : It is a conical gear made exclusively of bamboo. It has a triangular mouth. In case of *jakoi*, the mouth is of the shape of an equilateral triangle (each of the three sides measuring 0.5-0.7 m). However, in case of *chekki*, the two sides are longer than the base. Mesh size of this gear is either very small (2-3 mm) or moderate (4-5 mm) according to the target species/size of fish. The gear is dragged along the shallow areas of a water body with the help of a bamboo handle in the left hand and a bamboo/cane string in the right hand. The gear is quickly lifted to catch collected fishes. Catch usually comprises small fishes. It is commonly used in community fishing by tribal women in shallow waters throughout the region.

Cheki (left) and jakoi (right)

7. Dragged Gear

These gear are moved/ towed through water on or near the bottom for a certain distance. The mode of capturing fishes is by filtering passive fishes with active movement of the gear. The following types of dragged gear are commonly used in the region.

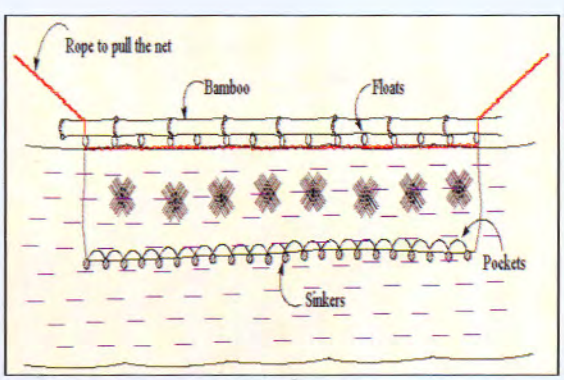
1. **Sweep net** (towed sieves of netting e.g., *Moi* and *dol jal*)
2. **Runner net** *(Sangla jal)*



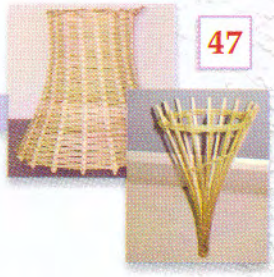
Dragged Gear
Ladder net

Local name : *Moi jal* (Assam)

Brief description : The net derives its name from the ladder (*moi*) used for leveling tilled land in agriculture operations since it resembles the latter in its shape (rectangular) and mode of operation. It is a moderate sized net (10-20 m long and 1.5-2.0 m in width) operated in shallow river waters. The net is kept vertical while dragging through water by attaching appropriate floats and sinkers (number and size). There are bag-like pockets provided at the lower margin of the net to entrap the fishes. Mesh size at the bottom of the net is 10-12 mm, which gradually increases to 20-22 mm near the head rope. A thin bamboo rod is usually fixed to the head rope to keep the net fully



Line diagram of a moi jal

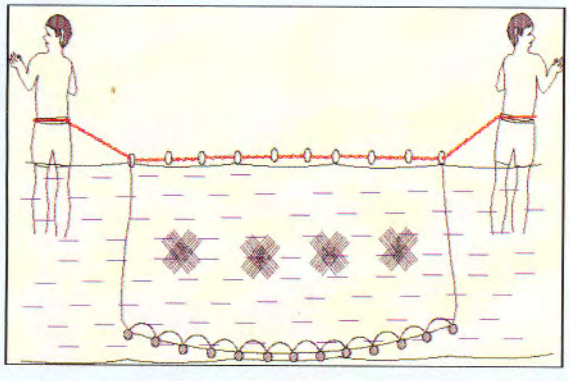


stretched while in operation. It is dragged towards the shore by 6-8 persons with the help of long ropes tied to the two ends of the net. The sinkers attached to the foot rope help in pulling the net along the bottom of river/*beel*. Fishes are collected in the pockets. The net is normally used during the dry season (November - April). Catch comprises small fishes like *Puntius* spp., *Gudusia* spp., *Mystus* spp., *Clarias* sp., *Heteropneustes* sp., *Ompok* spp., *Esomus* sp., etc.

String Attached Drag Net

Local name : *Dol jal* (Assam)

Brief description : This net is similar in shape (i.e. rectangular), construction (i.e. pockets, floats, sinkers etc.) and mode of operation with that of *moi jal*. However, it is smaller (5-8 m long, 1.0-1.5 m wide) and there is no bamboo strip attached to the head rope. Further, the net is dragged along the bottom of a floodplain lake in waist-deep water by two fishers for a certain distance with the help of strings attached to both the ends of the head rope. The strings (*dol*) are tied to their waists. Catch comprises miscellaneous benthic fishes including air-breathing catfishes (*Clarias* sp., *Anabas* sp., *Heteropneustes* sp.) and the tank goby (*Glossogobius* sp.). This net is mostly operated during winter months (December to February).



Line diagram of a dol jal

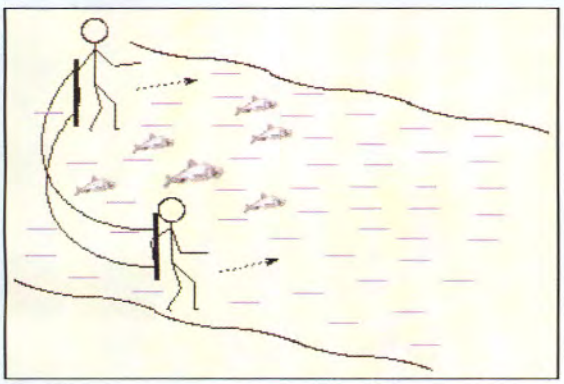
Semi-circular Purse Net

Local name : *Shangla/kura/jem jal* (Assam)

Brief description : It is a semi-circular purse net extensively used in catching Hilsa (*Tennualosa ilisha*). The net consists of an elliptical frame by tying two split bamboo on either side and a bag shaped net attached to it. The attached net appears hemispherical when open and roughly spherical when closed. The net with its mouth opened vertically is towed along the river bottom by 1-2 fishers while being steered by 2 more. Once a migratory hilsha fish hits the net, it is closed with the help of a rope attached to the lower frame of the net. The net and entrapped fishes are then hauled on to the boat. This net is operated during the southwest monsoon season (June-September) in R. Brahmaputra and Barak to catch migratory hilsha fish. 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 upper net of the purse is tied in three points near the mouth to pieces of strings, which is held by the fisher. By manipulating the rope, the fisher can regulate the opening of the mouth. This net is used at all depths. The upper and lower arcs are usually 4-6 m long and mesh sizes of 35-50 mm are commonly used.

Sangla jal is being operated in Brahmaputra river

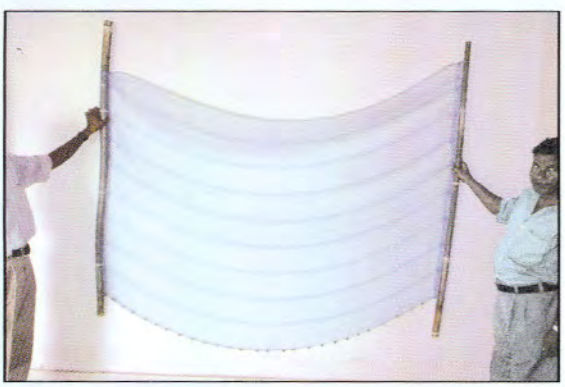
8. Seine Nets



These nets may be with or without bags. They usually have very long wings and towing ropes. A certain area of an open water body is surrounded with this net. The net is then gradually hauled to a fixed point on the shore or on to a boat by pulling the ropes/ net from both the ends. The following types of seine nets are commonly used in the region.

1. **Double stick nets**
   (e.g. *Panti/henga jal*)
2. **Shore seines**
   (Moha/bor/moshori jal, chati jal)
3. **Boat seine**
   (Pesi/ber jal)

1. Double Stick Nets



A panti jal

Local name : *Panti/henga, duitonia jal* (Assam)

Brief description : It is a small rectangular net having lengths of 2-5 m and width of 1.5-2.0 m. Sinkers are fixed to the foot rope of the net. The net is pulled by two fishers through water with the help of two bamboo/ wooden sticks fixed vertically to the two ends of the net. It is mostly operated in marginal areas of rivers/ floodplain

wetlands and shallow submerged areas. This net is mostly operated during the southwest monsoon season (June- September). Mesh size of the net is small (2-8 mm) and catches usually comprise small fishes.

The net is also operated during winter months (September-February) in shallow areas of beels. A single operation requires 15-30 minutes.

Fishers operating a henga jal

2. Shore Seines

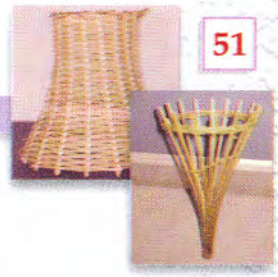
This net is used to encircle a part of the open water body. It is encircled from shore to shore with or without the help of boats and is manually pulled ashore. There are two types of shore seines used in the region.

A) Large Shore Seine

Local name : *Moha/bor jal, moshori jal* (Assam)

Brief description : This net is fabricated by joining large number of net pieces together and attaching suitable floats and sinkers. These are usually 100-250 m long and 2-3 m wide. Sometimes very large nets up to 500 m are also operated in certain large floodplain lakes of the

A mosori jal under operation



region (e.g. Sone beel of southern Assam). It seines all the fishes in the encircled area including both minor and major fishes. A single operation of such large nets requires 20-30 persons, 2-3 boats and 8-12 hours for one haul. In recent years, such nets are also fabricated using pieces of polyethylene mosquito netting which are highly destructive ones. Shore seines fabricated using mosquito netting is also known as *'moshori jal'*. This net is usually operated after the monsoon season (October - February) in relatively macrophyte-free areas.

B) Small Shore Seine

Local name : *Chati jal* (Assam)

Brief description : This is smaller shore seine (15-20 m long and 1.5-2.0 m wide). The net is made up of 2-5 pieces of rectangular nylon nets of mesh size 5-10 mm. joint together by nylon threads. This net is used throughout the year except during May- July. The net has a stout head rope and a foot rope made of jute. Floats of light-weight wood / bamboo or polystyrene pieces and sinkers of lead, bricks or terracotta are used. Long ropes are tied on either side of the net. The net is taken into the deeper portion of the beel, stretched and the bottom rope is allowed to settle. The two ends are dragged

A chati jal being hauled

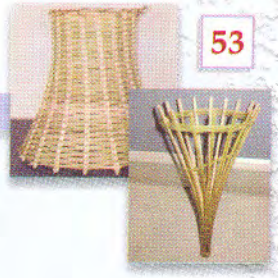
towards the shore and brought together. As the central portion of the net comes to the shore, the net is lifted to form an effective bag. 6-12 persons are required for a single operation (with or without both), which takes 2-4 hours time. Catches comprise small and intermediate fishes.

3) Boat Seine

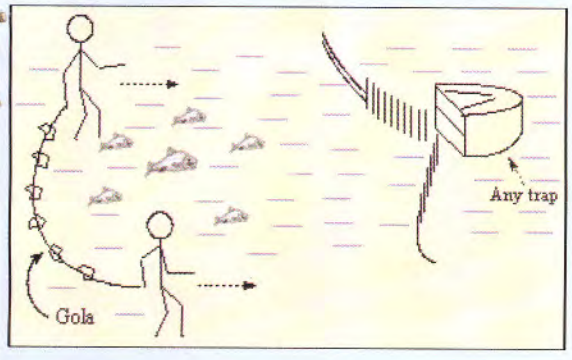
Local name : *Pesi jal* (Assam), *Ber / pan / gully jal* (Tripura)

Brief description : This net is similar in dimension with that of small shore seines except for the fact that it is wider (2-3 m) than the later. Further, in this case the entire fishing operation (encircling an area and hauling) is carried out from two big boats. Fishing with this net requires 4-6 persons and another two persons are required to steer the boat. Fish catch usually consists of intermediate and big fishes (*Labeo* spp., *Cirhinus* spp., *Notopterus* spp. etc.). *Ber jal* is bigger than *pesi jal* (20-30 m long and 3-4 m deep). Further, the mesh size of *ber jal* is also bigger (25-30 mm). Operation of *ber jal* requires 12-15 men and 2-4 boats. Its fish catch composition includes species of *Labeo, Cirrhinus, Mystus, Channa, Wallago attu, Notopterus, Ompok,* etc.

A pesi jal being hauled from boats



9. Drive-in Gear



These gear are used to scare/ drive fishes from a certain area into another fishing gear (of any type). These nets are usually used to increase the volume of catch from stationary/ slow moving gear like scoop nets. Such drive-in gear is usually made by tying pieces of bricks, torn nets, cloths, etc. on to a long rope. These gear are pulled by 2-3 persons through the water towards the stationary gear so as to disturb the water. When the fishes are driven into the stationary gear, it is hauled. Two types of drive-in gear are commonly used in the region.

1. **Rope Scare Line**
   (e.g. Gola/ serakasi)
2. **Assorted Drive - In Gear**
   (e.g. Tik-tiki khedani)

A gola

Scare Line

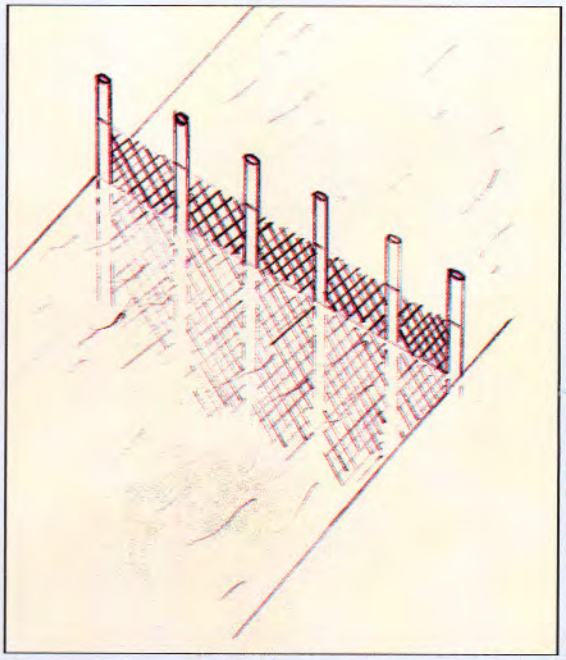
Local name : *Serakasi, gola, tolua rochee* (Assam)

Brief description : Here earthen sinkers, pieces of bricks, torn net pieces, cloth pieces etc. are tied on to a jute rope. The gear is highly variable in length (10-30 m). When only brick pieces or earthen sinkers are tied on to the rope, the scare line thus formed is called as gola or tolua rochee. In serakasi, pieces of torn net/ cloth is attached to the rope. An enclosure (20-30 m area) is made in a convenient place in a water body with split-bamboo screens. One end of the enclosure facing the open part of the water body is kept open.

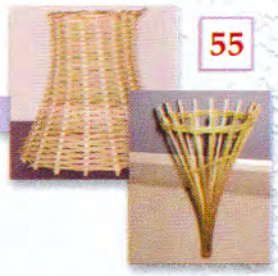
Two men pull the *gola/serakasi* towards the enclosure along the bottom. Simultaneously, other persons also disturb the water surface by beating it with bamboo poles. Fishes on the way are driven into the enclosure in the process. Thereafter, the mouth of the enclosure is closed with bamboo screens. The fishes (e.g. small cat fishes, barbs, etc.) driven into the enclosure are then captured using suitable methods (e.g. with *polo, porongi jal, cast net*, etc.).

Local name : *Tik-tiki khedani* (Assam)

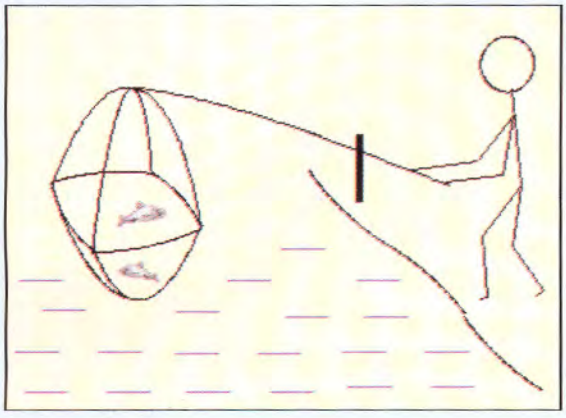
Brief description : This is a unique way of driving fishes by disturbing water surface with half - split bamboo and also making sounds with household utensils. At one end of the beel, gill nets (*langi jal and phansi jal*) are set at the surface layer of the water column with the help of bamboo poles stretching the whole width of narrow *beels*. From a certain distance from the set gill net, fishers move towards the net making noises with the help of utensils and also making disturbances to *beel* water with the help of half-split bamboos. Generally, 2-3 boats are needed to disturbed entire width of the *beel* and each boat houses of 2-3 fishers. The fishers approach the set gill nets by making continuous noise/ disturbances, thereby driving the fishes to move towards the net where they are entangled/ gilled. The fishers then lifts the gill nets and catch the entangled fishes. It is also practiced during night time with the help of lights.



A tik-tiki khedani



10. Lift Nets



This method is based on the principle of lifting submerged net from the water bed quickly so as to catch the fishes, which are moving over it. Two types of lift nets are very common in the northeastern region.

1. **Chinese dip net** *(Dheki jal)*
2. **Hand lift net** *(Porongi jal)*

Chinese Dip Net

Local name : *Dheki jal, ghat jal* (Assam), *Injao* (Manipur)

Brief description : It is a big triangular net (8-10 m long, 4-5 m wide at the mouth). The net is fixed on a water channel with the wider end (mouth) facing the water current with the help of a number of bamboo driven in to the bottom. The net is lifted by a single fisher through lever action. The net of suitable mesh size (usually 10-20 mm) is loosely hung by mounting it on to the frame so as to give a bag like structure to the tapering end. The net is operated by dipping it in water facing mild current, for about 30 min. The hauling is done by lowering the posterior part of the net frame behind the lever by the fisher through putting his weight on the crosspiece. The fishes caught slide down

A dheki jal in a connecting channel

to the tapering end of the net from where they are handpicked. Fish catch composition of this net varies from intermediate to major fishes depending on the mesh size. Fishes caught by these nets throughout the day are kept alive in cylindrical harvesting pots (*jeeoni*) made of bamboo or in net cages.

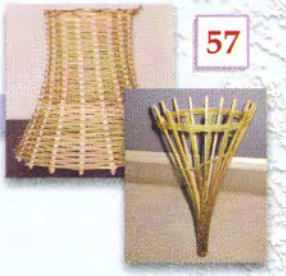
Hand Lift Net

Local name : *Porongi/jati/promanik jal* (Assam), *Nupi ill* (Manipur), *Dharma jal* (Tripura)

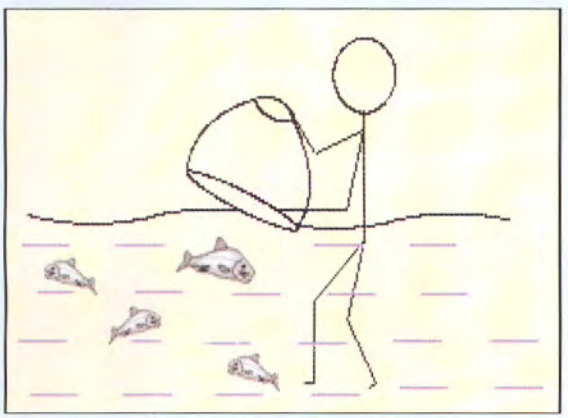
Brief description : It is a smaller lift net consisting of a square netting of variable size (1.5 × 1.5 m to 4 × 4 m) fixed to a X- shaped flexible bamboo frame. The frame is made by two flexible bamboo sticks/ pieces. The four corners of the net are tied into the four bamboo sticks. The net thus formed is then hung from a bamboo pole and dipped into waters having mild current. It is lifted by pulling a rope tied into the tip of the pole. Fishes caught by the net are handpicked. Smaller, portable version of this net is operated by women and children of the region. Such smaller nets are also extensively used in community fishing. Catch composition varies from small to medium sized ones depending on the mesh size of the net (4-10 mm). Fishes collected in larger nets are also kept alive in cylindrical bamboo pots (*jeeoni*).

Hand lift net

Hand lift net in use



11. Falling Gear



These gear fall over the fishes inside water from above. When the fishes are entrapped inside the gear, they are either caught by hand (e.g. diving) or they enter inside marginal net pockets while trying to escape. The following types of falling gear are used in the region.

1. **Cover Pots** *(e.g. Polo, juluki)*
2. **Conical Falling Net** *(e.g. Chak jal)*
3. **Cast Net** *(e.g. Khewali / asra jal, anghtha jal)*

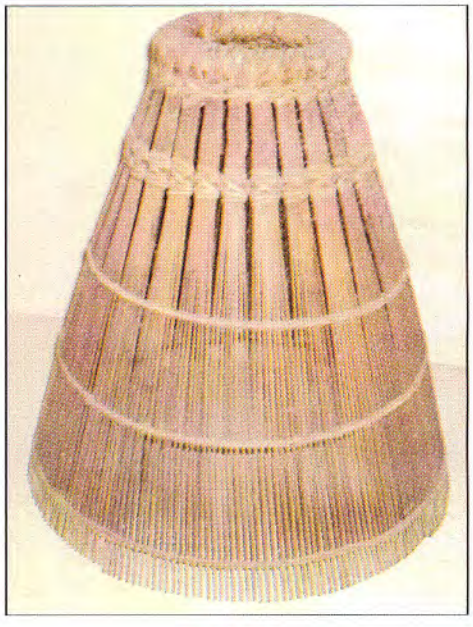
Cover Pot For Big Fishes

Polo-a common cover pot of Assam

Local name : *Polo* (Assam), L*ong oop* (Manipur), *Aanta* (Tripura)

Brief description : Polo is operated during winter months (October to February) when water level is low. This is a conical cover pot (open at both the ends) made of bamboo strips woven together by cane or plastic strips. The opening at the top is 15-25 cm and the diameter of the bottom is 60-90 cm in circumference. The height of the trap is 0.6-0.9 m. The inter-space

of adjacent sticks is 4-6 mm. The fisher carries the trap in hand, slowly wades and plunges it into water in a probable place. He firmly presses the pot, insert one hand through the top opening, fishes inside are caught (usually medium sized ones) and taken out. Sometimes, this trap is used in combination with goroi *langi jal*. Fishes disturbed by operation of *polo* are entangled in the net.

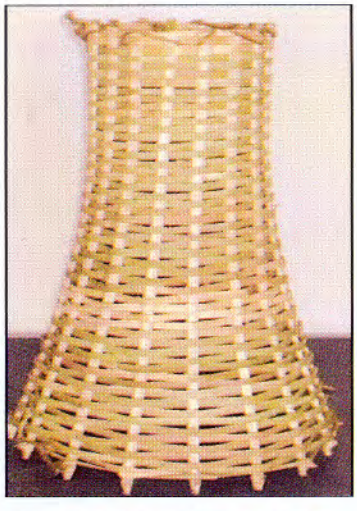


A juluki

Cover Pot For Small Fishes

Local name : *Juluki* (Assam), *Aanta* (Tripura)

Brief description : The design, mode of operation and size of this pot is similar with that of *polo*. However, the inter-spaces between adjacent woven bamboo sticks are much smaller in this pot (2-3 mm) than that of polo. As a result, even very small fishes like minnows and barbs are caught in this gear. Usually, rice bran is applied over a small hay canopy placed in shallow waters to attract fishes into the area before operating this gear. It is used round the year.



A jolpi used in western Meghalaya

A jolpi used in western Meghalaya

Cylindrical Cover Pot

Local name : *Jolpi* (Meghalaya)

Brief description : This cover pot is similar to juluki in construction and mode of operation except that it is cylindrical in shape. The diameter of the top opening is 12-15 cm and the bottom is 20-25 cm in diameter. The height of the trap is 0.4-0.5 m. In another version, thin bamboo strips are interwoven against bamboo sticks to make this gear. Small and medium sized fishes like minnows, barbs, eels are caught using this gear.

Chak jals being operated in a beel of Assam

Conical Falling Net

Local name : *Chak jal* (Assam)

Brief description : It is a conical net fitted with a conical (pentagonal) bamboo frame. This falling gear is operated in shallow, macrophyte infested areas of beels from boats. After plunging the net, the rope of the conical net tied on to the top of the cone is untied from the frame. The fisher then steps over the net and catches the fishes by hand.

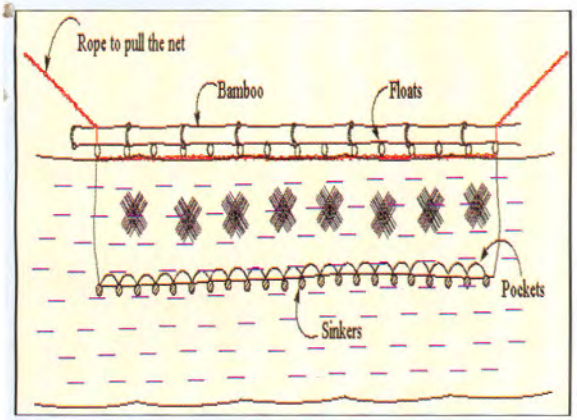
Cast Net

Local name : *Khewali/asra jal, angtha jal* (Assam), *nupa ill* (Manipur), *koni jal* (Tripura), *ushe-menam* (Nishi, AP)

Brief description : It is conical in shape forming a circle when spread out. The length of the net is usually 2-2.5 m and the mesh size is 8-15 mm. The foot rope is attached with lead sinkers. A rope passes from the center, which is held by the operating person. The edges of the net are overturned inwardly to form pockets. Before throwing, the net is folded carefully and thrown into the air with a strong swing to spread it. As it falls on the water, it sinks down fast inside water. Fishes inside the net try to escape and are entrapped within the pockets present along the lower margin. The central rope is slowly pulled till the edges are closed. *Angtha jal*, a larger size cast net (3-4 m long and 2-3 m in circumference) are operated in deeper zones of *beels*/rivers. In Sikkim, a small (1.0-1.5 m long) and heavier net is used to fish in pools of hill streams.

Cast netting in a beel of Assam

12. Gill Nets



This is a passive gear where the mesh size varies as per the body depth of the targeted fish. The fishes either get gilled or entangled while trying to pass through the net. This is one of the most common gear used in the region. It is operated in all depths ranging from shallow wetlands to deep rivers. Two types of gill nets used in the region are:

1. **Entangling net** *(Phansi jal)*
2. **Gill net** *(Langi jal)*

Entangling Net

Local name : *Phansi jal, baghar jal* (Assam), *kurrent jal* (Assam/ Tripura)

Entangling net used in rivers

Brief description : This net is rectangular in shape with a head rope attached with floats. No sinker is attached to the foot rope. Its size ranges from small (20-30 m long; 0.7-0.8 m wide) for catching Hilsha fishes to as large as 130-150 m in length and 2.5-3.0 m width to catch Baghar (Bagarius spp.). The net is usually loosely set by fastening to anchor. Sometimes, the net is simply allowed to drift for some distance. Fishes are sometimes driven towards

the net by beating kerosene tins or by disturbing the water with bamboo poles. Fishes get entangled in the loosely set net. Mesh size of these nets is highly variable depending on the targeted species as given below.

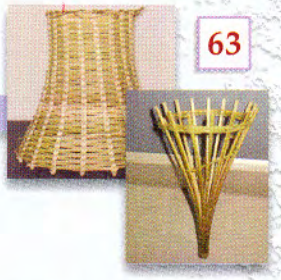
a) *Ilish phansi* : 35-40 mm (for *Hilsha*)
b) *Rau phansi* : 100-110 mm (for *Rohu*)
c) *Katal phansi* : 120-135 mm (for *Catla*)
d) *Ari phansi* : 140-150 mm (for *Aorichthys* spp.)
e) *Baghar phansi* : 160-200 mm (for *Bagarius* spp.)

Gill Net

Local name : *Langi jal* (Assam), *Laang* (Manipur)

Brief description : The design and mode of operation of gill nets are similar to that of *phansi jal*, but, here the net is made of very thin nylon monofilament yarn. Fishes are gilled in the net. The mesh size and catch composition varies in different gill nets as given below.

Langi jal is being dried



a) ***Puthi langi jal :*** This net has small mesh size (8-10 mm). The total length varies from 10-20 m. It is used for *Puntius* spp., *minor carps*, *Heteropnuestes* sp., etc.

A goroi langi jal showing attachment of floats and sinkers

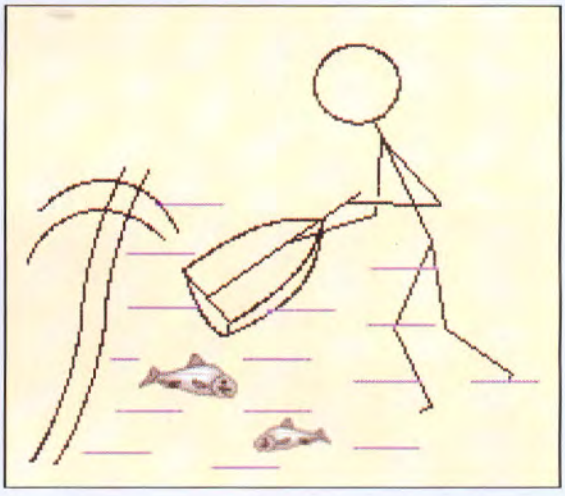
b) ***Moa langi jal :*** The mesh size is 12 mm and it is used for catching *Amblypharyngodon mola*.

c) ***Kawai langi jal :*** It has slightly bigger mesh size than that of Puthi langi jal (15-17 mm) and is used to catch *Anabas* sp., *Clarias* sp., *Nandus* sp., etc.

d) ***Goroi langi jal :*** Here, the mesh size is still bigger (20 mm) than the above two types. The net is usually set near weed infested shore areas to catch small murrels (*Channa* spp.).

e) ***Sitica langi jal :*** Here, the mesh size is 40 mm. It is a bottom set gill net used to catch minor carps.

13. Unusual Fishing Gear



In addition to the gear enumerated in the previous chapters that come under standard categories, fishing in the northeastern region of India is also performed by some unusual gear. Two types of such unusual gear used in the region are described.

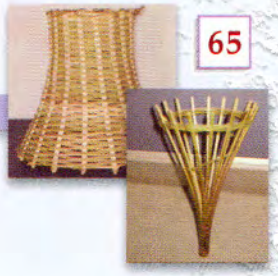
1. **Dewatering Devices**
   (e.g., seoni, lahoti)
2. **De-oxyfication**
   (community fishing)

Dewatering Devices

Local name : *Seoni, Lahoti* (Assam), *Istop (Manipur)*, Kun (Tripura)

Brief description : These devices are used to bail out all the waters from a small water body. The fishes are then manually caught. Dewatering gear may be operated by 1-2 persons and are generally made of bamboo (e.g. *Seeoni*) or converted tin containers (e.g. *Lahoti*). Dewatering is usually done after monsoon months (August-February).

Dewatering with seoni



Lahoti made of tin

Lahoti made of bamboo

De-oxyfication

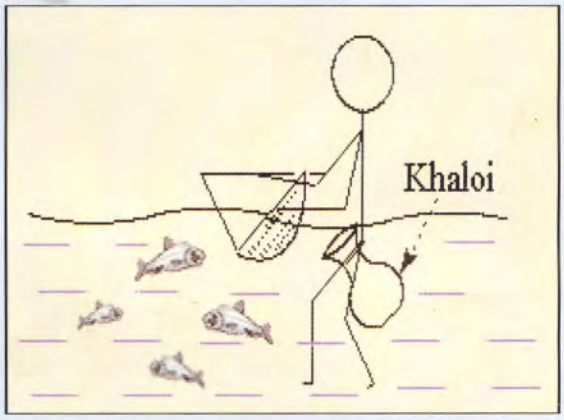
Local name : *Dol baandhi maachh dhora* (Assam)

Brief description : In northeastern states, community fishing is a significant event especially during social/religious festivals. Almost the entire village community takes part in fishing in some community pond or beel with assorted indigenous gear (e.g. *polo, jakoi, porongi jal* etc.). Even some people catch fish with bare hands. As number of persons fishing very high, the water body becomes muddy very soon. Fishes start gasping for air and come to water surface, as a result of which they are easily caught.

Dol baandhi maachh dhora

14. Harvesting Pots

Fishing pots are an integral part of fishing especially for artisanal/small-scale fishers. A number of indigenous fish harvesting pots are used in the northeast to keep captured fishes. Two main types of these pots are briefly described.



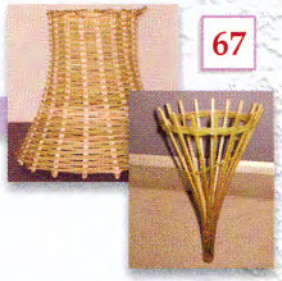
1. **Box-like Harvesting Pots**
   (e.g., khaloi)
2. **Cylindrical Pot**
   (jeeoni)

Box-like Harvesting Pots

Local name : *Khaloi* (Assam), *Khoksi* (Meghalaya)

Brief description : These are mostly made of bamboo strips woven to form a shape of a pitcher. Necks of those containers are generally constricted to prevent escape of fishes. These can be hung from waist of the fisher while fishing in waist-deep waters. Slightly bigger versions are used for keeping fish caught with porongi jal. They are also used to carry fish to nearby markets for selling.

Different types of fish harvesting pots of the Northeast



A jeoni

Cylindrical Harvesting Pot

Local name : *Jeoni* (Assam)

Brief description : These are big cylindrical baskets (1.0 -1.5 m high and 0.5-0.8 m diameter) made by weaving polished bamboo strips. The top of the basket is often closed with a bamboo lid. Sometimes, half of the top cover can be opened for keeping/removing fishes. They are usually used for keeping fishes captured in fishing with barriers and lift nets in rivers and connecting channels. As they are placed in waters, fishes remain alive for long (hence called *'jeoni'*).