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PRINCIPLES AND METHODS OF INLAND FISHING



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PRINCIPLES AND METHODS OF INLAND FISHING

FISHING GEARS

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Introduction :-

Fishing is a major source of food for humanity and provides employment and economic benefits to large section of society especially for less developed countries and India, being a developing nation is in no way an exception. The fish production of our country has a significant growth rate but captive fisheries, both for inland and marine sectors is following declining trend. These facts put an accent on sustainable exploitation of natural fisheries water including vast network of rivers. A wide array of fishing gears and practices ranging from small scale artisans to large scale industrial system are used for fish culture.

In recent years, significant development which affected the historical evolution of fishing gear and practices are:- development in crab-technology and mechanisation of propulsion, gear and catch handling, introduction of synthetic gear materials, development in acoustic fish detection and satellite based remote sensing technique, advances in electronic navigation and position fixing equipment, awareness for the need for responsible fishing to ensure sustainability of resources, protection of biodiversity environmental safety and energy efficiency, etc.

CLASSIFICATION SCHEMES OF INLAND FISHING GEARS

Several system of classification of fishing gear have been developed based upon the principles of capture, design and technical features and operational methods.

The various fishing methods used is capture process are - gilling or tangling, trapping (pond nets), filtering (net-fishing system), hooking and spearing (hook and line, harpoons) and pumping (fish pumps).

According to International Standard statistical system of classification adopted by FAO for fishery statistics, fishing gears are grouped into fourteen categories based on principle of capture as:-

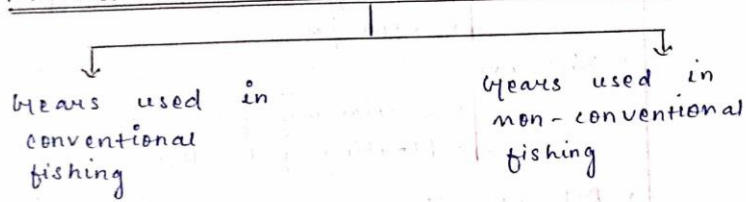
- i) Surrounding nets
- ii) Sieve nets
- iii) Trouts
- iv) Drift net
- v) Lift nets
- vi) Pulling gear
- vii) Bill nets and entangling nets
- viii) Traps
- ix) Hooks and line
- x) Wrapping and wounding gear
- xi) Harvesting machine
- xii) Miscellaneous gear
- xiii) Recreational gear, &
- xiv) Unspecified gear.

But for practical purposes major categories of fishing gears have been grouped into following:-

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- i) Fishing with the help of wounding gears / weapons like spear, harpoon.
- ii) Fishing with baited weapons like hooks and line fishing.
- iii) Trawlers
- iv) Boat seines
- v) Purse seines
- vi) Lift nets
- vii) Gill nets, and
- viii) Traps

DIFFERENT MODES OF INLAND FISHING GEARS



GEARS USED IN CONVENTIONAL INLAND FISHING

A. Fishing with wounding gears

- Spear
- Harpoon (Ek-katya)
- Fishing hooks (line fishing)

B. Fishing with non-wounding gears

- Trap net
 - Basket trap
 - Koneh trap
 - Pot trap
- Hand net
 - Cast net (Whagaria Net)
 - Triangular Net.
- Drag net
 - Chanti net
 - Mahajal (Long Drag Net)
 - Kona jal
- Gill net
 - Stationary gill nets
 - Floating gill nets
- Dip net / Lift net
 - Hela jal
 - Kharra jal
 - Bhesal jal
 - khowsala jal
- Drift nets
- Purse nets
 - Kharki jal
 - Shanglo jal
 - Been jal
- Fixed / Stationary nets

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A. Fishing with wounding gears

Large size fishes are caught by spearing by using weapons like spear, harpoons and rifles.

1. Spear - It consists of a split bamboo shaft of $4\frac{1}{2}'$ to $6'$ in length fitted with a conical iron point. It is also used to spear the fish through holes in the ice while the fish is on rest.

Two basic types of spears are used for this purpose - 'the fixed type' and 'the detaching type'.

2. Harpoon or Ek-katya - It has a shaft of $9-10'$ long and to one of its end barbed iron point is attached.

3. Line fishing / Angling / Fishing with hooks

Lines are used in both traditional and modern fisheries. The principle of capture is based upon feeding and hunting behaviour of target species. Although, in this technique, quantity landed is less but the catch obtained by the line fishing is of high quality and high commercial value. Environmental impact of the lines are consented to be minimal.

A line fishing gear consists of

- a) Line
- b) Hook
- c) Pole
- d) Floats
- e) Sinkers
- f) Swivel
- g) Snap

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- a) Line - Line usually holds the hook and other materials used in line fishing. The material and thickening of line depends upon types of fishing. Due to being thin and strong, nylon is so far best material used for line fishing. In case of long line the main line is 3mm in diameter and made up of nylon and polyester while hook line is made up of steel wires.

- b) Hook - A hook consists of different parts:-

- (i) Head - shaped as an eye or loop and serves for fastening the line.

- (ii) Long shanks are especially designed to prevent the escape of fish after biting the line.

- (iii) Bend

- (iv) Point

- (v) Hooks are made up of galvanized or iron coated irons, brass or steel.

Most hooks have barb to prevent the captured fish from trapping out of hook.

Barbless hooks are used in pole and line fishing to facilitate easy removal of fish.

Barbed hooks, which are twisted in the bend part make the baiting easier and increase efficiency.

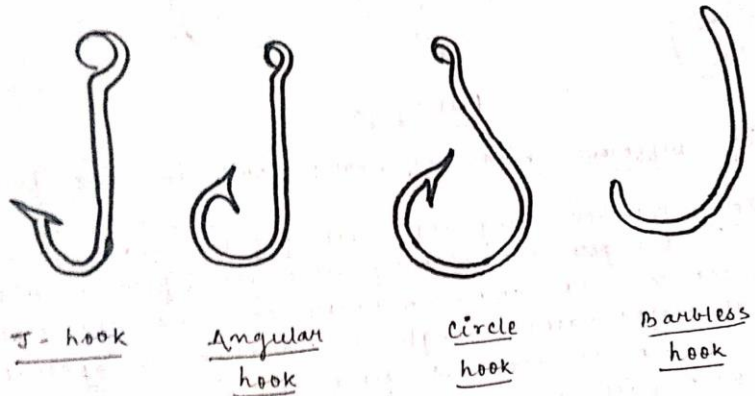
Hooks may be classified as round, angular, double and triple.

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Double hooks and triple hooks are used for trawl fishing, since they prevent the fish from dropping out of hook. Squid jigs have a single or double whorl of barbless hook around suitably shaped coloured plastic / vinyl / rubber / cloth / wood / lead and metal body.

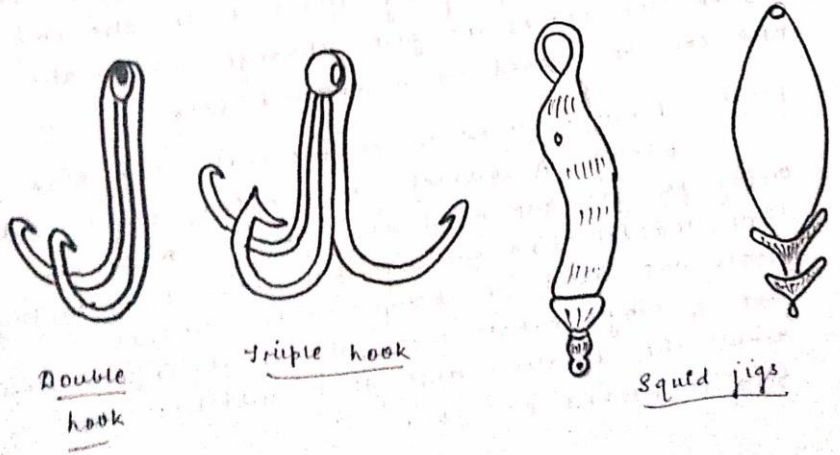


J-hook

Angular hook

Circle hook

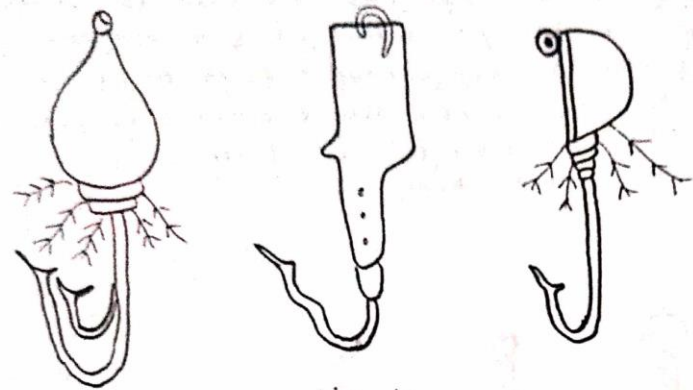
Barbless hook



Double hook

Triple hook

Squid jigs



Fish jigs

fig. Different kinds of hooks used in line fishing

- c. Pole - Bamboo being the most popular material used for pole but recently fibre glass pole is also used for the same. In order to catch the fish of deeper water through a handline, a 'special balance' is used. A piece of thin stainless steel wire with a strong spring attached to the end of the line serves as pole, through which the hook can be moved to a desired level.
- d. Float - Float is used in commercial long line fishing. A barrel, a block of wood and empty pot etc are used as 'float' in small scale coastal line fishing. But glass or polyethylene floats are used in large scale coastal line fishing. Float gives the dual information about the location and that whether the fish is hooked or not.

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Sinkers - Sinkers are made up of iron, stones and leads etc. They help in placing the hook of desired level of depth and at the same time prevent hook and line from drifting away by water current.

f) Swivel - Swivel is generally used in joints i.e. between mainline and branchline / branchline or hookline. It prevents the line from twisting.

g) Snaps - Snaps is widely used for joining branchline to mainline in large scale - fine long line. It is also used in trap fishing.

B. Fishing with non-wounding gears

1. TRAP NET

Various traps are used to catch the fish in which the fishes are allowed to get in but are prevented from escaping.

(a) Basket trap net:- A basket trap consists of two dome-shaped hemispherical basket each provided with narrow opening and is guarded by flexible curved bamboo sticks with their free ends facing towards the inner side, which prevents the escape of fish which has been entered to bite the suitable bait placed under water on a ball.

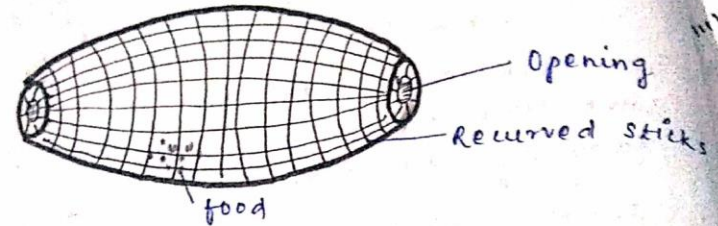


fig. A basket trap net

(ii) Pot trap net:- Very often, a wide mouthed earthen 'pots' or 'vessels' is used as a trap whose mouth is covered with thick clothes having few holes for entry of fish to bite the bait placed inside the pot. Once entered, the fish is unable to come outside. e.g. Channa, clarias and heteropneustes are caught in this manner.

2) Korih trap net and fisher net.

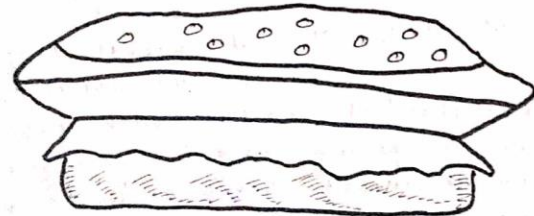


fig. Pot trap net



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1. Konch trap net :- Live fishes like Channa, Clarias, Heteropneustes, etc are trapped by 'coverpots' or plunge basket.

It is about 2-2½' high and used in shallow muddy water of summer. It is made up of split bamboo pieces in the form of a conical basket with a small circular opening at top to allow the hands (for trapping) to enter the trap. It is dropped in water and the wide mouth is pressed in the soft mud. The fisherman brings his hand through top opening (mouth) and catches the fishes which wriggle in muddy shallow water of bottom.

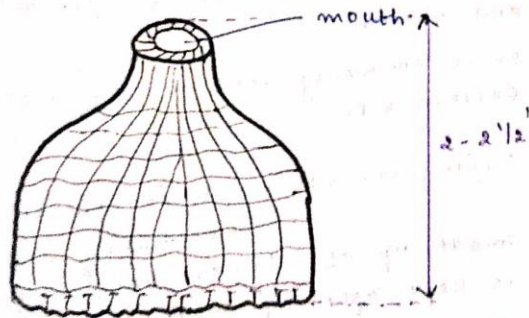


fig. cover trap (A konch trap net)

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2. HAND NET

Two most common handnets used in inland fisheries:-

(i) Cast net (bihariana jal) - It is a large umbrella-shaped net.

A strong cord is attached to the apex of umbrella and a number of lead and iron weights are fixed all along the margin. It is operated by a single fisherman.

The net is trapped in water surface fully expanded sinks down to bottom. Circumference closes due to iron weight attached to it.

All kinds of small fish get trapped and the net is pulled out by means of strong cord or rope.

It is extensively used in ponds and lakes and rivers.

It is commonly used in the districts of eastern U.P.

(ii) Triangular net :- It is conical shaped net resembling butterfly and made up of strings. The mouth of the bag is kept open by means of a bamboo sticks fixed like a triangular structure. One bamboo stick is longer working as handle. The closed end of net seems as reservoir called as 'Bhog'.

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It is operated in the shallow water near bank of river and is dragged slowly in water with the help of handle.

The fishes entering the reservoir are collected.

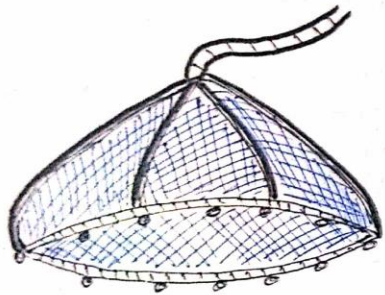


fig. Cast net

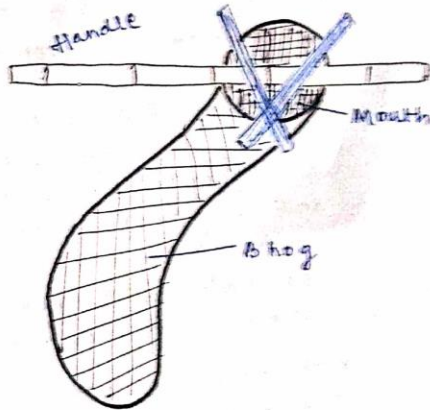


fig. Triangular net

3. DRAW NET

It is larger in size and meant for catching major fishes. It is made up of two designs:-

A. Chanti net :- This net consists of stout tough mesh, to the bottom of which iron or stone weights are tied. On the top various floats are fixed while the bottom of float is intervened to form the catching zone. The strong cord

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placed on upper surface margin of mesh is held on either side by a number of fishermen which is stretched out of river from bank to bank. The entire net may rotate at a circular point and fishes are captured in the 'Bhog'.

They may be vividly named as :-

Pedda vala - Telugu coast

Berjal - Orissa

Periya vasaal - Coromandal coast.

B. Mahajal - The 2nd type of dragnet has much length. The upper margin of the net is supported by a strong rope or head rope and is provided with large number of modern floats. Along the lower margin is float rope to which a number of stones, sinker are attached to keep the net in position.

Both types of nets are operated similarly. One end of the net remains on the bank of river or sea shore while a boat carries the rest of nets to spread it out into the water in a semicircular way bringing the other extremity of the net to another point of river bank. The two ends of the nets are slowly dragged by two parties of fishermen.



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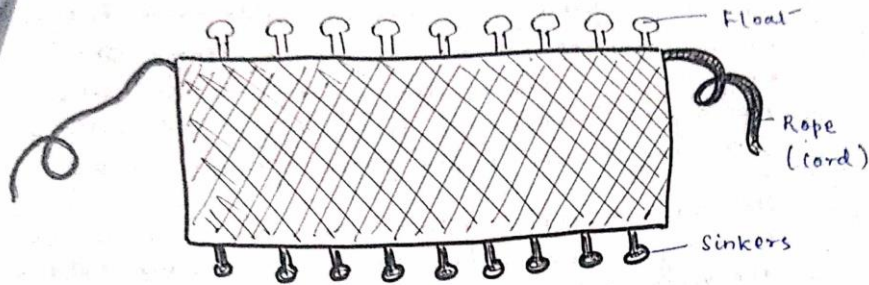


fig A. Long Drag Net (Chanti net)

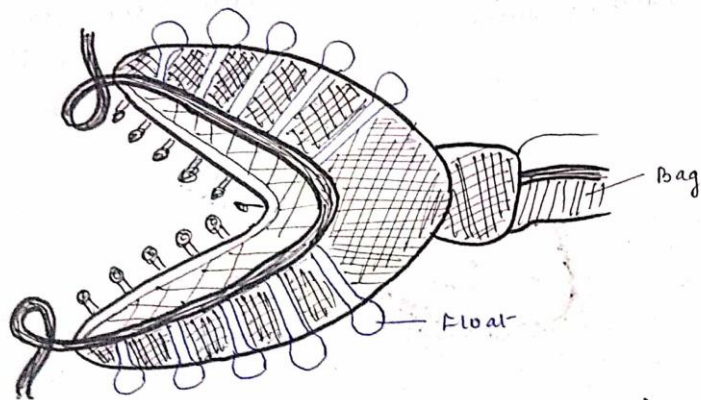


fig B. Peddavalu (A drag net) at Telugu coast

(c) Konajal - The konajal is used in bangles. It is 100 m long, 10 m wide and has a mesh size of 5 cm. Wooden floats are tied to the head ropes at 5 cm interval but there are no sinkers. At an interval of 10 m, there

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are large opening of 400 mm wide and leading into a large central bag of 6m in length. The mouth of bag is kept open by two bamboo sticks crossing each other and is also provided with a secondary funnel shaped pouch opening inward.

The net is shot against the current from boats enclosing stream area. The two ends are held on the river bed and the net is dragged by a group of 20-30 fishermen from the fish encircled within the ring rush blindly into the pocket and are caught. This is usually done for catching Hilsa.

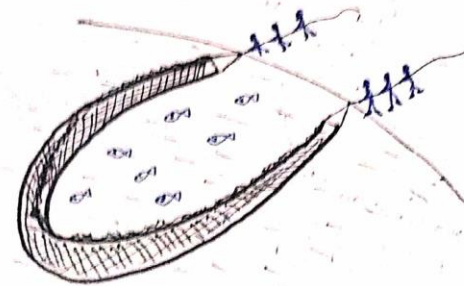


fig Berjal (Orissa coast)

4. GILL NETS

Gill nets are wall like nets with floats attached to head rope and sinkers to the foot rope. When the fish tries to swim across the transparent net wall the meshes form a wrap around its head and the fish is caught.



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In recent years, various transparent synthetic fibres are used instead of natural cotton.

Two types of gill nets are used.

A. Stationary gill nets :- It is made up of long rectangular piece of mesh, which is stretched from one bank to another bank of river and held up by several bamboo sticks in the middle. The net projects about one to two feet above the surface of water and is kept in this position throughout the night with the help of bamboo sticks. Fishes swimming along the stream are entangled in bag.

It is mostly used in rivers and tributaries of V.P.

B. Floating gill nets :- These gill nets are not firmly fixed to poles but are simply anchored on the bottom and are suspended by float on the water surface. They are usually called floating nets.

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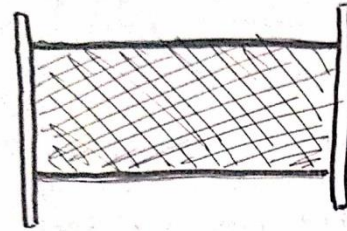


fig. Simple set net
(Stationary net)

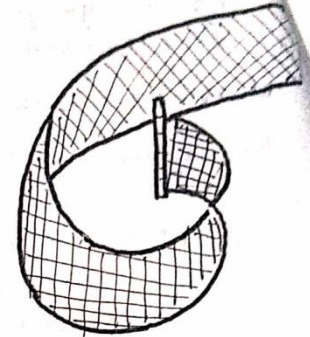


fig. Stationary nets
with a turning

5. DIPNET / LIFTNET

Dipnets are lowered into water and when a fish swims over it, lifted out of water. They are triangular, rectangular or square in shape. The smaller ones are used by hand while the fisherman uses a bamboo pole as a lever to lower or lift the larger net.

It is of following types :-

A. Hela jal - It is used to catch prawns, catfishes and fry. Here, two light bamboo sticks of 2.5 m long cross each other near one end supporting net to form a 'v'. A short cross-sticks about 50cm long is fixed near the apex of the triangle and a bamboo



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pole is fixed so it to work as handle. A net of 100 to 1.5 cm mesh is fixed to 'v'. The broad end of net is pushed along the bottom and these lifted with a jerk to throw fish to handle. The net is used widely to catch prawns, catfishes and fry.

B. Kharra jal - It is very much similar to Hela jal but operated from a stage or platform made of bamboo pieces and implanted in the river bed.

C. Bhesal jal - It is operated from boat. The net is fixed to the 'v' shaped bamboo sticks and is allowed to hang like a bag. Prawn and small fish are easily caught by scooping over the bottom.

D. Khoursala jal - Rectangular in shape of 3 x 2 m and is suspended from the ends of two curved bamboos crossing each other at right angles. It is generally used for catching fish fresh water mussels.

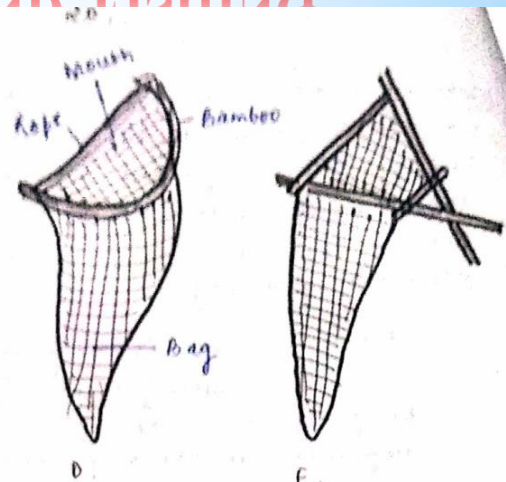
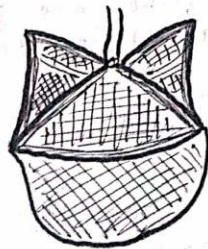
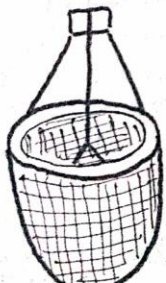


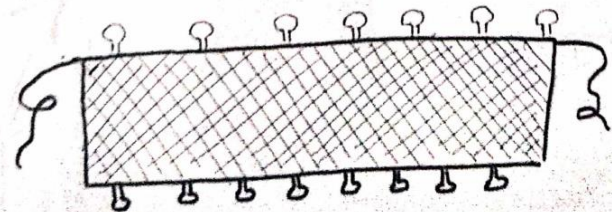
fig - Liftnet / Dipnet

b. DRIFT NET

Fish drifting nets are specially used in sea fishing to catch herrings, Mackerrals and salmon.

These nets are of large size and each made up of 15-25 piece each 3.5 m long, and 2-3 m high with a mesh of 5-6 cm. Floats are attached to the head rope and sinkers are tied to foot rope. The net is allowed to drift freely in water.

Prawn and fishes are first entangled which is later lifted for catch.





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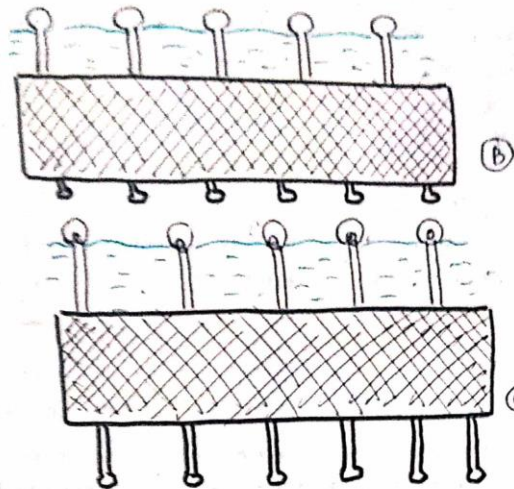


fig:-
Different
kinds of
drift nets

➤ PURSE NETS (medium sized fish)

It is a purse shaped net used in banga riverine system. It is principally used to catch tilisa fishes. It is operated from boats.

It is of three kinds -

A. Kharki jal -

Such rectangular net is made up of tanned cotton having a wide mouth with two flexible bamboo rods hinged at two angles and forming upper and lower lip.

A vertical bamboo is attached to the middle and lower lip and passes upward through a ring in upper lip.

The net is suspended from a boat and the mouth is kept open by pressure on bamboo poles.

Tilisa ascends the river during floods and boat using purse net move downstream. As soon as fishes enter the net, the mouth is closed by releasing pressure on the bamboo pole.

B. Shangle jal :-

It is a type of purse net used in the upper reaches of estuaries. It is operated from a dug out cause.

The length of the base is 10' and semi-circular mouth is supported by 20' long bamboo lips.

It is similar to 'Kharki jal' but vertical bamboo pole is replaced by a weighted cord used for opening and closing the mouth and is set at any desired depth.

C. Been jal

It is bagnet set against tidal current. It is tied to bamboo poles or stakes. Floats are tied to the lateral wing. It is used in the capture of small sized fishes in deltas of river at W.B.

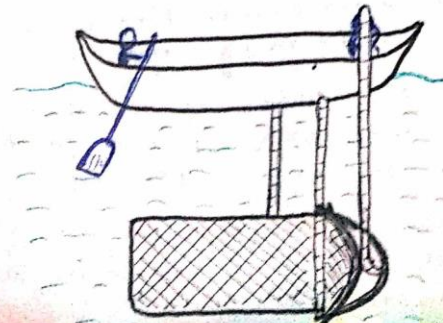


fig.
Kharki jal

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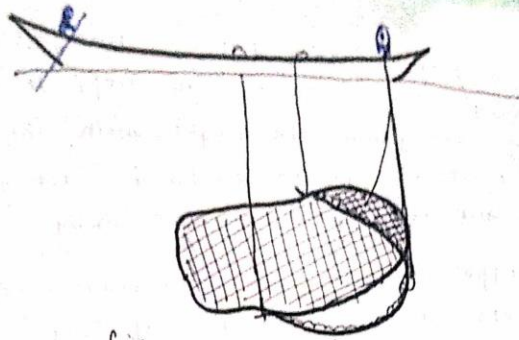


fig - Shango jal

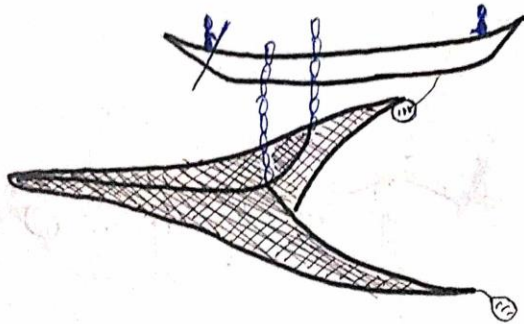


fig. Beenjal

7. FIXED / STATIONARY NETS

It consists of long rectangular piece of mesh which is stretched from one bank to another bank of river and held up by several bamboo sticks in the middle.

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The net projects about one to two feet above the surface of water and is kept in this position throughout the night with the help of bamboo sticks. Fishes swimming along the stream are entangled in the bag.

This type of net is commonly used in the rivers and tributaries of U.P.

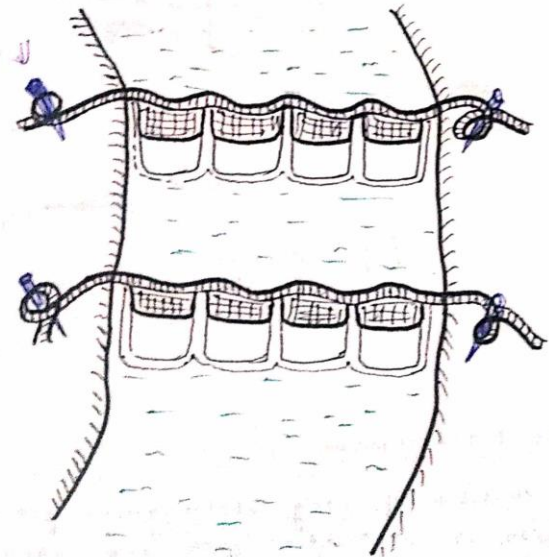


fig Fixed net used in inland fishing in U.P.



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MANUFACTURE OF NETS

There are two basic common things for net preparation.

1. Light nets are made of ordinary cotton threads from the market which are spun into thicker twine composed of 3-6 threads. Stronger but coarser nets are generally prepared from hemp fibre (*Crotalaria juncea*). Besides, ropes can also be obtained from linen, Ramie (Chinese grass), Manila (fibre from the leaf stalk of Abaca plant), sisal and coir.
2. Synthetic fibres used recently for net manufacture have been the advantage of being transparent as well as resistant to rotting.

Different kinds of synthetic fibres materials used for net making are:-

- (i) Nylon - polyamide
- (ii) Terylene (Dacron) - polyester
- (iii) Plastics, tetron, envilon - PVC (polyvinyl chloride)
- (iv) Vinyton - Polyvinyl alcohol
- (v) Orlon, Daxlon etc - Polyacrylonitrile

Floats are attached to head rope to keep the net in desired position and stage. They are made up of cork, wood, plastics,

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sponge, rubber, glass or hollow metal.

Floats are generally spherical or oblong and are painted from outside. Those made of cork or wood are made waterproof by applying tar.

Sinkers are attached to the foot rope and made up of stone, cement, concrete, etc.

Flag is used for indication of net.

PRESERVATION OF NETS

All type of fishing gears are liable to deterioration which may be due to mechanical wear and tear caused by rubbing, bending and stretching of components or due to rotting caused by moulds and bacteria.

- (i) After fishing, a net is contaminated with fish slime and other organic matters and hence it should immediately be cleaned by washing in running water otherwise it should be dipped in brine or sufficient quantity of coarse common salt sprinkled over it.
- (ii) Cosan / Cu Naphthanate / Cu oleate etc are also used for cleaning nets.
- (iii) Exposure to direct sunlight is harmful and hence it should be washed immediately after use and dried in shed.

* PRINCIPLES AND METHODS OF INLAND FISHING: CONCLUSION

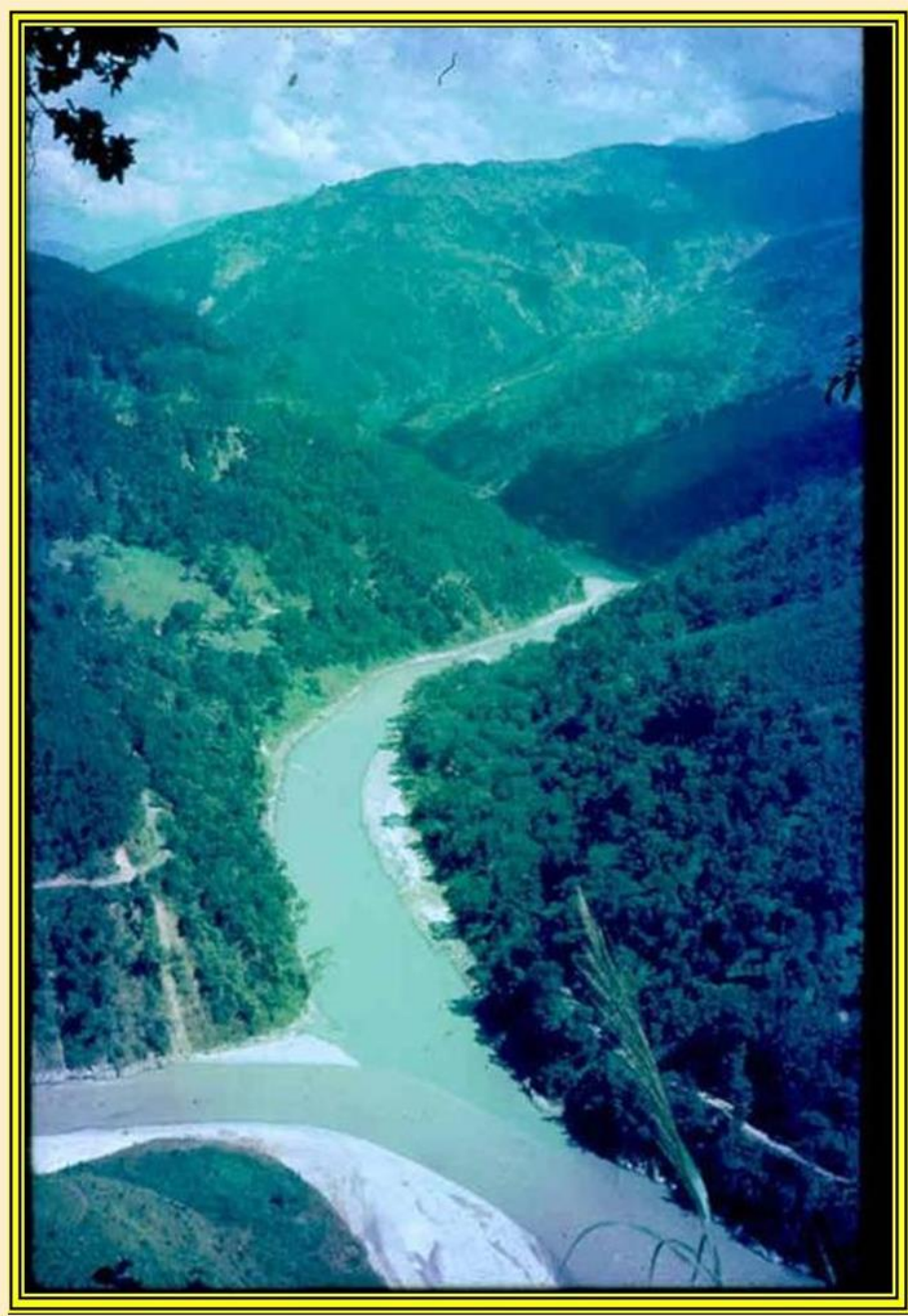
- (i) To prevent bacterial action, the nets are frequently tanned with various tanning materials as bark of trees like karela wood, mangrooves, Acacia boiled with water. The net is soaked in decoction prepared as a result of thin film of tannic acid is formed in fibres which is then treated with 1% solution of $K_2Cr_2O_7$ to fix the dye.
- (ii) Certain nets are protected by tanning which make the fibre durable and waterproof.

CONCLUSION

Hence, fisheries is the oldest business of human civilization, global statistics show 26 major areas for fishing of which 7 major areas are inland areas while 19 major areas are marine zone distribution in relation to Pacific, Atlantic and Indian Ocean. India occupies the 3rd position in producing freshwater fishes in the world. The fresh water fishes are 40% of total fish community. About 16 lakh hectares are cultivable water bodies or 38% is inland fisheries.

Since various methods have been used for fishing in India,

Nets have got prime importance in this regard. However, in the coming era, fish will be the chief available sources of food and new techniques are still to be discovered.



THANK YOU