A SYNOPSIS OF THE TRADITIONAL FISHING GEARS USED IN ARTISANAL FISHERIES ALONG THE UPPER PART OF THE CROSS RIVER.

by
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ABSTRACT
Artisanal fishery is the main type of fishing practised occupationally by the fishermen along the upper sectors of the Cross River. No form of mechanised fishing has so far been introduced to the fishermen in these areas.

Quite a large number of traditional fishing gears are being used by these fishermen. They show some seasonality and selectivity on the types of fishes caught. This study has attempted to find out the different gears used, when and where used along the main river channel, its tributaries and flood plains. An effort has also been made to provide some information on the types of fishes caught with the different gears. Recommendation for effective management are also advanced.

INTRODUCTION
The need to study the traditional fishing gear used in artisanal fisheries along the Cross River cannot be over emphasized. This is so because this is the only method of catching fish (which is a general property yet far fetched) that provides high cheap protein source to the underdeveloped community.

The aim of this study is therefore to throw some light on the catching methods employed by the artisanal fishermen along the upper part of the Cross River as shown in Fig. I. Work on this has not been carried out comprehensively. However, Moses (1979) threw some light on this topic in his article on "The Cross River, ITS ECOLOGY AND FISHERIES".

Fishermen
These number about 1,000 in the area. Most of them are not full time fishermen; they are principally crop farmers. Along the study areas are found a few migrant fishermen mainly from Afikpo in Imo State. These fishermen settle on sand banks as soon as the flood starts to recede. They leave when the river starts filling.

Fishing Craft Fig. II
The dug-out canoe is the traditional fishing craft in the area. This is invariably small, operated by one to four persons and unmechanized. The canoe is mainly used along the Cross River and in swampy deep waters when the flood is high; but in shallow streams and swamps the fisherman just wades in to set his trap.

The Fishing Gear
The fishing gear though mostly traditional are not necessarily primitive.
CLASSIFICATION OF THE DIFFERENT GEARS (CATCHING METHODS) IN THE AREAS

Without gear

This is the collection of fish and other preys by hand. It is the fishing of bivalve molluscs attached to hard substratum in deep waters or clams buried in shallow sandy water in the dry season and the picking up of gastropod snails functional in the flooded plains, and Pachymelina sp. in some swampy areas.

Wounding gear Fig. III

This involves the use of long handled spear instruments. There are two types with various designs. One type has the spear head fastened to a short wooden handle varying in length from 80cm to 1.30m. The spear point has a serrated teeth varying in number from 4 pairs to 8 pairs of teeth. This is used in conjunction with the hook and line gear. This spear is usually thrusted into the flesh of big fishes to ease carriage into the canoe.

The other type consists of a long raffia pole varying in length from 7 to 8cm. The bigger end of the raffia pole bears a hard wood usually of 3cm thick which is inserted into the raffia after the wood has been removed. This is securely fastened round by one rope. The end of the wood bear 3-4 pointed sharpened barded iron rods of 5mm thickness displayed outwards. This is used separately as an independent gear and not in conjunction with some other gear. Its operation is based on siting a fish or fishes that move in shoals tending to feed on surface air bubbles or foam. The fisherman aims and throws the spear depending on experience and luck to pin the fish. Usually one fish at a time is pinned but chance could permit two. This gear can be operated from land or from a small canoe operated by the individual or by a second person.

The catch is not great per unit time. Alestes, Hepsetus odoe, cichlids such as Tilapia and Hemichromis are common victims to this gear.

It is used all year round. The greatest catch occurring in the tributaries when the flood is receding.

Line Fishing Fig. IV

This varies from a single hook at the end of a piece of twine attached to a raffia or bamboo pole (hand line), to a long line stretched between two poles. The main line bear snoods varying in number according to the length of the main line, (e.g. with the length of the main line of 10m to 12m, length of snoods vary between 12 - 14cm). Distances between snoods vary from 3cm to 5cm. This is set very close to the bottom of shallow water in flooded plains about 2cm to bottom. The hooks (mainly flat headed) are clove hitched with a twisted twine to the entangling in gill covers, scales etc as fish attempt to pass through them.

The catch composition is mainly Clarias, Heterobranchus, Protopterus annectans, Ophiocephalus obscurus.

One other type with 50cm to 70cm is normally baited with earthworms, red scap or insect larvae or smaller fishes. In this the long main line is stretched and anchored at both ends or anchored at one end, the other end carrying an anchored float.

The handline is used mainly in shallow streams and the catch include, Clarias, Hepsetus odoe, Malapterurus electricus, Synodontis, Tetraodon and Labeo Sp.
The long horizontal line is used in deeper waters of rivers and lakes. The depth of the line is controlled by suitable combination of floats and sinkers. Such lines are operated from canoes. Catch composition consists of Schilbeidae, Synodontis, Chrysichthys, Heterobranchus, Lates, Hydrocynus and Mormyridae.

Single large hooks usually from Nos. 6 - 10 are attached to calabashes and floated down the river during most times of the year except during the highest flood. It drifts with the currents and predators are mostly their victims, Hydrocynus, Alestes and Schilbeidae.

Traps

These are mostly one chambered which can be closed when the prey enters. Some funnels or valves and the smaller ones are completely closed except at the entrance.

The different types of trap gears seen in the area include:

Brush traps

The tubes are opened at one end and placed in fish habitat. This can be collected and the fish removed. Catches are mostly fresh water crayfish Atuva gabonensis and Palaemon pancidens. This is not a very popular gear and is efficient along rocky bottom.

Basket pots Fig. V

These are basket pots made of raffia strips with a cover and a handle to which is attached to a long twine tied to a support. These are led into very deep waters with rocky bottom where fresh water cat-fishes find shelter and cannot come out.

Artificial shelters Fig. VI

Some tree stems are used to create a good environment for fish in shallow muddy beaches, especially in locations shaded by large tree branches. As soon as the fisherman is sure the location has been recognised by fish, he sets his 'Capture' usually in the evening to encircle the spot.

The 'Capture' is made of woven raffia strips with a trigger door to let in fishes and closes when the door is released from an attached rope. The trapped fish are fished out the next morning with a scoop net.

Capture is not used in the flooded river, they are normally swept away by the current. Capture accounts for the greatest Tilapia fishery in the area. However Alestes and larger predators like Hydrocynus are also caught as they enter the 'Capture' in pursuit of smaller Alestes and Tilapia. The 'Capture' is very similar to 'bangana' used in Northern Nigeria.

However argument against the staking of tree branches, is that silting occurs rapidly and the place becomes very shallow. Another school of thought states that leaves falling into the water, settle at the bottom and decomposition occurs increasing the nutrients.

Frequency of occurrence of 'Capture' is highest - along the banks of zones 1 - 2 of the intertidal zone, the muddy shallow banks allowing for its success.
Basket traps Fig. VII

These are fish screens extending between 10 to 20cm and constructed across flooded plains to direct fish to fish chambers. The fish chambers are very long basket funnel traps. The fish caught include Clarion, Protopterus annectans, Tilapia, Pelmatochromis, Hemichromis and other types of fishes that enter the trap, including the freshwater crayfish.

Trigger traps

These are made of strips with a valve door. The non-return catching principle depends on the use of an inner non-return valve door mechanism which allows the fish in but prevents its escape. It varies from conical to fusiform and oblong shape. The conical ones are of 2 types. Those with bamboo strips very closely fixed are also of two types. Catches include crayfish, Tilapia, Chrysichthys, Lates niloticus. The advantage of basket traps in fishing is that the large spaces between twisted bush ropes allow only big sized fish to be trapped while smaller ones are filtered out. Basket traps are used all year round and predominantly around Itigide, and Atan Onoyom down to Ikot Offiong Area (Fig. 1).

Fish fences Fig. VIII

These are fish screens extending between 10 to 20cm and constructed across flooded plains to direct fish to fish chambers.

The fish chambers are very long basket funnel traps. The fish caught include Clarias, Protopterus annectans, Tilapia, Pelmatochromis, Hemichromis and other types of fishes that enter the trap, including the freshwater crayfish.

Trigger traps

This is a spring loaded basket trap and as the name trigger implies the catching principle is based on trigger mechanism situated inside the chamber of the trap which when released closes the door.

They are generally made of silvers of cane brought together at the top where they are fastened to a spring pole about 1m long.

Diameter = 20mm thick
Length of catching chamber = 60 - 80cm
Depth diameter of mouth = 20 - 25cm.

A cane rope is run from the tip of the pole to a cleverly devised trigger mechanism, and to the door of the trap. They are set near river banks and in lakes. They are baited with dead fish. In river banks they catch Hydrocynus, Hepsetus odoe, turtle and Heterobranchus. In lakes they catch Clarion and freshwater tortoise.

They are used all year round. Its disadvantage is that only one fish can be caught at a time when the door closes, no other fish enters.

Frequency of occurrence is highest in Itigidi area.

Conical Basket traps Fig. IX

Conical basket trap is kept open by two cane rings, the body is woven with brown sticks with 2mm spacing between brooms. Length varies between 0.70 - 0.75m. Diameter or depth of mouth varies between 0.35 - 0.40m and has 3 supporting rings to keep the catching chamber open.

It is used in flooded river to catch millions fish, in flood pools and lakes to catch millions fish, freshwater crayfish and Hemichromis and also used to scoop flying fish Pantodon bucholzi when they submerge on sight.
Bag nets

These are bags of netting which are kept open vertically by a frame on the opening side and horizontally by the current.

Bag nets used in the area are of two types.

(i) One handed scoop net

(ii) Two handed scoop net.

"The one handed scoop net has a one handed can rim, which is attached to a bag netting. It is used in conjunction with hook and line to scoop large fish that would otherwise have been impossible to hand into the boat. They are also used to scoop narcosed fish after application of fish poison.

The two handed scoop net is used mainly in the dry season for collecting fish from drying up swamps and man-made lakes. Fish caught being mostly Clarias and Ctenopoma kingsleyae.

It is also kept vertically in water staking between two poles against the current in flooded plains to catch fish that retreat with the current in the month of October.

It is constructed with a circular can rim carrying the net. The two handed scoop net is used as a separate gear and not in conjunction with some other gear as the scoop net. It is seen most often during the month of August to December.

Fishes caught include Tilapia, Tiger fish, Channa (Ophiocephalus) and Xenomystus.

It is found almost equally in all zones due to the fact that all zones have tributaries which enhance flooded plains hence creating backwater and swampy areas when the flood recedes.

Lift nets Fig. X

A special type of lift net is seen from September to January for catching mullet fry and juveniles of fishes.

The netting materials are strips of cane of woven traditional bamboo screen and have been modernised by woven synthetic fibres with meshes varying from mosquito net mesh to about 5mm. This is mounted on a rectangular rigid bamboo frame, 5 meters squared made from four raffia palm poles. The base of the vertical poles are lashed to notch pieces of hard wood which fit over the side of the canoe and become steps with which the net can be depressed below water level. Two ropes lead to the outer corners of the frame and one from the centre of the net; the former are used to raise and lower the net, the latter to shake the fish into the canoe.

This performs indiscriminate catching of fishes that enter into its frame, Tilapia, Citharinus, Clupeid (Cynothrissa), Hepsetus odoe, Mormyrids, Alestes and even large Lates niloticus. The leaping from within the submerged rectangular frame pole of Hydrocynus, Alestes and Hepsetus odoe is a common sight and is an indication that the catch can be great. Two to three fishermen operate the gear. Two operate the gear, the third makes sure the fishes are all emptied into the canoe.

Frightening devices are used in conjunction with the gear by beating frantically with paddles on surface water to frighten fish into the rectangular net.
Falling gear Fig. XI

These are gears for covering the fish and are used mostly in shallow and swampy waters during the dry season.

A special type of fishing gear - the cover gear called thrust basket is like the conical basket with the apex removed giving it somewhat cylindrical appearance.

Length vary between 1.0 - 1.20m and diameter of mouth between 50 - 60cm. The body is made of reed matting. The thrust basket is used in organised fishing party in swampy areas.

The catch composition are mostly Clarias, Heterobranchus, Ophiocephalus obscurus and Ctenopoma kingsleyae. It is not a very safe gear because removing the catch necessitates using the hand; and the possibility of trapping some dangerous water snakes cannot be ruled out. However catches are few and mostly operated by women.

Cast net Fig. XII

These are used in open waters (generally clear of rooted vegetation) on sandy and muddy banks to catch mostly those species that tend to move in shoals. Such species include the grey mullet, Mugil falcipinnis which penetrate deep into fresh water and particularly during the dry season, some Schilbeidae, Tilapia and Alestes. They are used all round the year.

Cast nets are conical in form with lead weight attached at regular intervals at the perimeter of the cone. The apex bears a retrieving line. Some cast nets have pockets and some are without pockets. The pockets are traps for fishes especially Tilapia.

Cast nets can be operated by one person from land or by two in a canoe, one throws the net, the other controls the canoe.

Cast nets are used all year round, night and day and the catch per unit effort could be great, though the operation is somehow very exerting.

Gill nets Fig. XIII

This is essentially a curtain of netting hanging vertically in the water.

Operation is both at night and day and used throughout the year. Catch composition is higher in flooded river than when the river is low. The reason being the nutrients are abundant and fishes that move out to feed in the feeding grounds do not easily see the meshes due to the low transparency or turbidity of the flooded river. As the flood recedes the transparency is higher and fishes can recognise the danger and even jump over the seeming wall as in the case of Hepsetus odoe and Hydrocynus. Therefore as transparency increases catch composition decreases. However, use is made of the monofilament netting to increase the catch composition of the gill net in transparent water. Monofilament netting are invisible in water and fishes even with long standing experience are gilled before attempt is made to escape.

The high catch composition of gill net in the area can be accounted for by the indiscriminate use of betting with meshes less than 50mm.

The netting material is usually made up of 210D PA twines Z twisted. Mesh sizes vary between 20 - 60mm, length between 12 - 40m, and depth between 2 - 3m twist. For monofilament betting mesh size vary between 60 - 80mm. Two types of gill nets are commonly seen in the area:
(1) The first carries a foot rope with lead sinkers or stone, to keep it vertically in water. The lead rope is passed through calabash or plastic corks which act as floats. When the floatation capacity of the cork is greater than the sinking capacity of the sinkers the tendency is that the gill net acts as surface set. But when the reverse is the case, the gill net is used as bottom set.

(2) The second type carries no head line, no sinkers and invariably floats at an angle thereby reducing the effective catching efficiency. This type is used in lakes, swamps and back river water.

<table>
<thead>
<tr>
<th>TYPE OF GILL NET</th>
<th>CATCH COMPOSITION</th>
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<tbody>
<tr>
<td>Gill net without float or</td>
<td>Protopterus annectens</td>
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<tr>
<td>sinkers</td>
<td>Ctenopoma kingsleyae</td>
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<tr>
<td></td>
<td>Calamichthys calabaricus</td>
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<tr>
<td></td>
<td>Ophiocephalus obscurus</td>
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<tr>
<td>Surface Gill net</td>
<td>Alestes, Schilbeidae</td>
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<tr>
<td>Bottom Set net</td>
<td>Schilbeidae, Mormyridae</td>
</tr>
<tr>
<td></td>
<td>Clupeidae (Cynothrissa)</td>
</tr>
<tr>
<td></td>
<td>Hydrocynus, Lates niloticus</td>
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<tr>
<td></td>
<td>Cat-fishes, Chrysichthys</td>
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<tr>
<td></td>
<td>Papyrocranus afer</td>
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</tbody>
</table>

Hanging Coefficient (Ratio) of some Gill nets

A number of hanging ratios were determined for some gill nets. Hanging ratio being the relationship between length of rope and the total stretched length of the meshes hung to it. This has influence on the efficiency of filtration of gill nets because it affects the shape of the meshes which in turn determines the size of fish caught, the mesh size notwithstanding.

However, meshes less than 25mm are not recommended as they catch small sexually immature fishes even though their hanging ratio fell around the preferrable 0.5.

Beach seine nets

This is the closest link between traditional fishing gear to the modern type of gear, the dragged net gear. It is built of long wings bag or belly at the middle portion and towing warps. It is used in surrounding an area and both ends come to a fixed point at the shore.

The headrope carries floats and the foot rope carries sinkers all uniformly spaced out. Large beach seine nets are usually a packed work affairs made from a variety of webbing of different meshes and twine sizes. Meshes of wings range from 50mm at the wings and decrease to small meshes of 10mm - 20mm at the middle portion.

Head and foot ropes are made of local fibre usually braided extending into very long warps. Floats are wooden corks and plastic floats and sinkers are heavy lead.
Catch composition is any fish within the surrounded zone. They can be gilled to the wings or trapped in the bag, mostly - Chrysichthys, Mormyrids, Cat-fishes, Papyroranus afer, Lates, Hydrocynus and Cynothrissa (Clupeid).

Beach seine net is operated manually both night and day and the composition is higher per haul than any other type of traditional gear. The number in the study zone are about 50. The reason being that it is difficult and expensive to construct, but when constructed the yield is high.

Its limitations is that it can only be used during the dry season in muddy sandy banks clear of obstacles and becomes non-functional in rainy season (high flood) because the swift current distort easy manipulation.

Stupefying Devices

Stupefying devices are employed in the area to narcose fishes in tributaries, streams, lakes and back river waters to ease their capture.

Chemical stupefying

Involves the use of chemicals like gamalin '20' and pounded leaves and roots of some Icthyotoxic plants belonging to the Derris genus. This plant is renowned for its high content of Rotenone which acts as an effective fish poison with high mortality rate. The leaves and the roots of the plant are pounded in a mortar and moulded to be tied to the tip of palm fronds. It is mixed haphazardly in a small body of water and within a short time narcosed fishes are seen to over-turn and can be collected by scoop nets. Narcosis cause large scale mortality of fish and observation has shown that the Mormyrids are always the first group of fishes to be narcosed. This indicates its greater susceptibility to fish poisons.

The disadvantage of fish chemical poisons being the indiscriminate mortality of juveniles and adult fish thus depleting the standing stock. Also the poison pollutes the water which in most cases is the only source of drinking water.

Mechanical narcosis is not very frequent in the area. Only one was witnessed where explosives were used to blow a large body of the river water. Disadvantage stems also from indiscriminate killing of fish. Most adult fish have their air bladders blown open thus exposing them to bacterial attack which hastens spoilage if the fish is not picked up in time.

DISCUSSION AND CONCLUSIONS

It is found that the type of gear used in the area depends on the environment, area to be covered, season and river bottom topography. Some zones in the study area have more of a particular type of gear because its environment favours its success and operation.

Some gears are seasonal. This creates difficulty in determining the exact percentage contribution of each gear on annual basis. However, by calculating percentage contribution of each gear that are operational all year round, it has been found that the non-return valve traps, the drag or gill nets, cast nets, and beach seine nets, contribute the highest fish landing and others including fish poisons contribute the least.

The importance of the studies of traditional fishing gear to fisheries therefore lies on the fact that gears that contribute to more fish landings are known and emphasis on their usage stressed in order to increase fish yield.
However, disadvantages stem from the fact that some of the traditional gears are constructed without the knowledge of filtering fish that has not yet been recruited into the fishable stock. The result is, young immature juveniles are killed thereby depleting the stock, indiscriminate use of net with undersized meshes (less than 25mm) are predominant in the area, also resulting in the capture of unrecruited fish stock.

However, like any other scientific venture, reports on the study of the traditional fishing gear of the area can be communicated to the Government. Village fishermen can then be educated on the disadvantage of small mesh sized nets, and the use of fish poisons as it depletes the fish stock and poisons their only source of drinking water. The Government can thus enact rules and regulations to control fisheries in the area.

For the federally projected Green Revolution Programme in fisheries to have enough impact in these areas there is much need for the fishermen along these parts of the Cross River to be educated on how to improve on their traditional gears to derive the best and effective result without depleting the population stock of some fish species through indiscriminate and uncontrolled fishing to the point that some favoured species are overcropped and may start exhibiting considerable decline and signs of strain. This sort of measure can also help to ensure that reproduction provides sufficient individuals to constitute a continuous resource.

REFERENCES


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DISCUSSION

There was a comment on the exclusion of the cost, and catch efficiency of the gears described. The author agreed that there was a substantial degree of selectivity of catch with the various gears and even seasonal adaptive use. These were said to be contained in the paper under preparation.

Fig. 1. Map showing the areas overed.

Fig. 2. Dug out canoe used as a fishing craft.

Fig. 3. Wounding gear.
FIG IX

CONICAL BASKET

70cm

FIG X

FIG XI

THRUST BASKET

60cm

120cm

FIG XII

LIFT NET

FIG XIII

DISPLAYING THE MULTIPILAMENT GILL NET TO DRY UNDER THE SUN

FIG XIV

FISHERMAN MENDING HIS CAST NET DRIED UNDER THE SUN