

A Review of Fishing Methods and Gears in Niger Delta Nigeria

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Abstract

Fishing gears and methods of fishing in the Niger Delta has a great influence on the sustainability of the fisheries resources in the area. This review work explains the classification of different types of fishing gears commonly use in the Niger Delta. The methodology of the use of these fishing gears, their description, possible effects both positive and negative on the water body and the environment

Keywords: Fishing gears, fishing methods, description, Niger Delta

INTRODUCTION

The Niger-Delta Region is one of the most important deltas in Nigeria. It occupies a significant important position in fisheries and aquaculture development of Nigeria. The region is naturally endowed and is rich in crude oil, gas, water, wildlife; useful vegetation's and human resources. It covers relatively over number ecological zones such as the sandy coastal ridge barriers, brackish mangrove, fresh water permanent, seasonal swamp forests, and the lowland rainforests. Fishing is the main occupation of the people of Niger Delta (Udo, 1987). Fishing is an act of harvesting fish and Equipment or devices used for fishing are called 'fishing Gears' Fishing gear can be described as any kind of equipment used in harvesting, cropping or capturing fish from any water body. Fishing gears are the tool or implement or equipment used in capturing fish from any water body such as traps, hooks and lines, gill nets, trawls, seine nets, lift nets, clap nets, spears, cast nets, entangling nets, drift nets etc. (Nuhu and Yaro, 2005; Tagago *et al.*, 2011; Davies and Kwen, 2012) while fishing method is how the gear is used.

According to (Moses, 1992) fishing gear has generally undergone a lot of modifications and improvements in consonance with advances in modern technology. The types, designs and mode of operations of the traditional and modern fishing gear employed in the inland and coastal waters of Nigeria have been fairly described (Reed *et al.*, 1967 and Udolisa *et al.*, 1994). Due to different habits and habitats of the arrays of fish species in a particular water body, different gears are also being used for capturing fish (Tagago *et al.*, 2011). Seasonal changes in species diversity and abundance have given ways to the invention of different fishing gear annually (Bankole *et al.*, 2003). Fishing methods have continuously evolved throughout recorded history. Fishers are inventive and not afraid of trying new ideas. The opportunities for innovation have been especially good in recent decades with advances in fibre technology, mechanization of gear handling, improved performances of vessels and motorization, computer processing for gear design, navigation aids, and fish detection to mention only a few technologies. (Moore and Jennings, 2000)

Whereas technological development of fishing gear and methods in the past was aimed to increase production, the present situation with many overfished stock, limited possibilities to expand fishing on underexploited resources and concerns about the environmental impact of fishing operation, gear development is now very much focused on selective fishing and gears with less impact on the environment.

CLASSIFICATION OF FISHING GEARS

Various methods to catch fish and other aquatic resources, with or without a gear, have always been practiced in Nigeria. A fishing gear is the tool with which aquatic resources are captured, whereas the fishing method is how the gear is used. Gear also includes harvesting organisms when no particular gear (tool) or boat is involved. Furthermore, the same fishing gear can be used in different ways by different fishers. A common way to classify fishing gears and methods is based on the principles of how the fishes or other preys are captured and, to a lesser extent, on the gear construction or gear materials used (Nedelec and Prado, 1990).

There are many different types of fishing gear. Some gear has been adapted to certain species on the basis of the species' special characteristics such as their behaviour, their feeding and spawning migration patterns. Changes in fishery activities throughout the year are due to biological and climatic conditions. Active fishing methods have been employed ever since the Stone Age and have developed over the ages to give us the wide variety of fishing gear we have today. Fishing gears are internationally classified according to F.A.O (1990) as follows

TABLE 1: CLASSIFICATION OF FISHING GEARS

GEARS	TYPES
NETS	SET NETS (GILL NET, TRAMMEL NET, DRIFT NET) SURROUNDING NET (BEACH SEINE) THROW NET (CAST NET) HAND NET (SCOOP NET) LIFT NET (ATTALA) CLAP NET (SINGLE & TWIN CLAP NET)
TRAPS	TRIGGER TRAPS NON-RETURN VALVE TRAP ITA TRAP SPRING LOADED TRAP CIRCULAR TRAPS BAMBOO TRAPS
BRUSH PARKS	IKEN ACADJA
WOUNDING GEARS	CUTLASS SPEAR
POSIONS AND EXPLOSIVES	DYNAMITE DERRIS PLANT GAMALIN 20
HOOKS AND LINES	SPRING LOADED HOOK LONG LINING
ELECTRIC FISHING	ELECTRICITY (DC /AC.CURRENT)

PASSIVE AND ACTIVE GEARS

Fishing gears are commonly classified in two main categories: passive and active. This classification is based on the relative behavior of the target species and the fishing gear.

PASSIVE GEARS: Passive gears are stationary gears. It does not have to be dragged, pulled or towed to capture fish. The catch is recovered by simply removing the gear from the water after a time period. No energy is expended on towing, pulling or dragging of gear. With passive gears, the capture of fish is generally based on movement of the target species towards the gear examples are: traps, Set hooks, Gill net, Drift net while with active gears capture is generally based on an aimed chase of the target species example are: Cast net, Beach Seine, Hand net, Clap net Lift net and trawls .Hook and lines, traps, wires, gill nets among others affectively fish by themselves A parallel on land would be the difference between the trapping of and hunting for animals.

Passive gears are in general the most ancient type of fishing gears. These gears are most suitable for small scale-fishing and are, therefore, often the gear types used in artisanal fisheries. Some passive fishing gears are often referred to as "stationary" fishing gears. Stationary gears are those anchored to the seabed and they constitute a large group of the passive gears. However, some moving gears such as drift nets may also be classified as passive gears, as fish capture by these gears also depend on movement of the target species towards the gear (Brandtand Lokkeborg,1984).

ACTIVE GEARS: Active gears has to be moved, dragged, or towed in order to capture fish. They usually require engine-propelled boats and usually involve additional investment over passive or stationary gears. Active fishing gears are especially suitable for sampling large proportion of the whole fish stock. The term 'active' means that the fishing gear is dragged through the water by human, animal or engine. Fish capture by active gears is based on the aimed chase of the target species and combined with different ways of catching it. (Nadreev, 1966).

This classification is being slightly modified to accommodate the most recent development of fishing gears and methods. (Sparre and Venema, 1992) reported that the various types of fishing gears and the ways they are used on Nigerian waters are dependent on the following factors:

- Financial status of fisherman
- Seasons of the year
- Species of fish targeted
- Shoreline pattern
- Depth of the water

Fishing gear and methods used in Niger Delta are both modern and traditional.

MODERN METHODS

Artisanal fishermen utilize various gears including trawls, seines and hook and line. In a number of localities,

TRADITIONAL METHODS

Traditional methods including baskets, traps and mosquito nets continue to be used. The gears commonly used include gill nets, lift-nets, scoop-nets used in light fishing; hook and line gear (hand-lines, fishing rods or tackles) and fish traps (Schrfe, 1989)

In almost every fishing community in Nigeria, nets from nylon are prevalently used. The netting materials are either monofilament or multifilament.

ARTISANAL FISHERIES

This is usually practiced along coastline. They make use of small size canoes and could be of three types

- Dugout Canoe
- Plank
- Plank/Dugout
- Fibre glass canoe

The fishing gears used are rather simple and constructed locally. These include various forms of traps, gillnet and other simple fishing gears. The energy imparted on fishing is usually much as compared to the catch in return.

INDUSTRIAL/COMMERCIAL FISHERIES

This is mostly practiced in the coastal waters; they make use of modern technology. Some highly sophisticated and of foreign origin to catch fish and this is inform of fishing boats referred to as TRAWLERS which are of different types, shapes and sizes.

TABLE 2: FISHING GEAR USED IN THE LOWER TAYLOR CREEK AREA BAYELSA

Gear	Frequency	Percentage	Rank
Drifting gill nets	43	47.8	3rd
Spear	18	20	6th
Hook and line/ Long line	54	60	1st
Cast Net	23	25.6	5th
Lift Net	7	7.8	7th
Seine Net	25	27.8	4th
Traps	54	60	1st
Fence	7	7.8	7th
Others	2	2.2	9th

Source :(Kingdom and Kwem,2009)

COMMONLY USED FISHING GEARS IN NIGER DELTA

NETS

I. Surrounding net

A surrounding net is fishing net which surrounds fish on the sides and underneath. It is set vertically in water to surround the school of fish, generally of pelagic nature. It is typically used by commercial fishers, and pulled along the surface of the water. There is typically a purse line at the bottom, which is closed when the net is hauled in (Otobo, 1976).

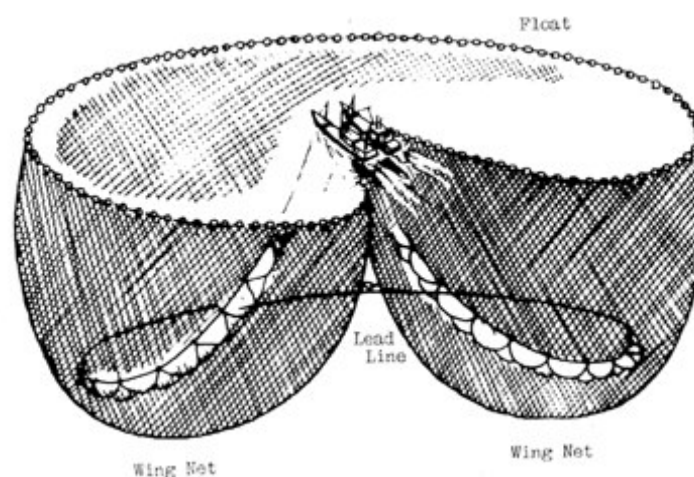


Figure 1: Surrounding net

2. Throw net

A throw net, also called a cast net, is a net used for fishing. It is a circular net with small weights distributed around its edge. The net is cast or thrown by hand in such a manner that it spreads out on the water and sinks. This technique is called net casting or net throwing. Fish are caught as the net is hauled back in. This simple device is particularly effective for catching small bait or forage fish, and has been in use, with various modifications, for thousands of years. 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 (Alegbeleye *et al*, 2003).



Plate I: Cast net

3. Hand net

A hand net, also called a scoop net or dip net, is a net or mesh basket held open by a hoop. It may or may not be on the end of a handle. Hand nets have been used since antiquity and can be used for scooping fish near the surface of the water.

A hand net with a long handle is often called a dip net. Dip nets can also be used to scoop crabs in shallow water. The basket is made of wire or nylon mesh, rather than cloth mesh, since crabs fight, bite, twist and turn when they are caught. When a hand net is used by an angler to help land a fish it is called landing net. Because hand netting is not destructive to fish, hand nets are often used for tag and release, or to capture aquarium fish.



Plate II: Scoop nets



Plate III: Harvesting net

4. Gillnet

Gill nets are currently a major and popular fishing gear widely used for fish capture in the major and minor water bodies. They are normally set at dusk and hauled in at dawn. Drift gillnetting is commonly practiced on Lakes, but rarely on other water bodies. The target fish species for the gill net fishery are Nile Perch, *Tilapia species*, *Bagrus*, *Clarias*, *Protopterus*, *Alestes*, *Hydrocynus* and many other demersal species. (Scott, 1966) describe gillnet as the commonest gear in river fishing in Niger Delta. In the Bonny estuary gill net constituted more than 50% of the gear deployed by fishers (IPS, 1990 and Chinda *et al*, 1994) and also (Solarin *et al*, 2003) reported gill nets as constituting the most abundant small scale fishing gear in Nigeria.

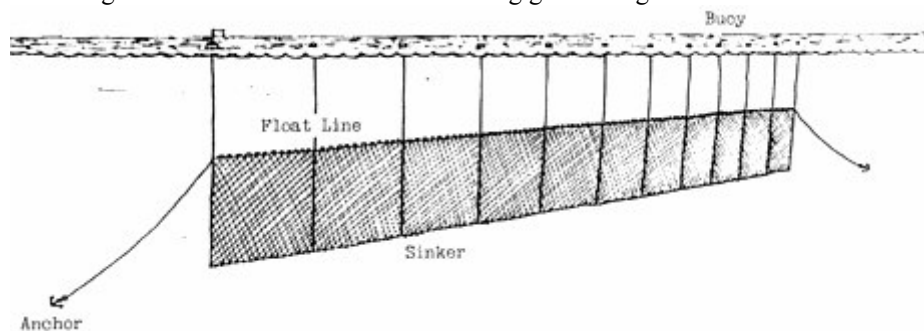


Figure.2 Gill net

The fishermen use boats to haul the net. The bigger the boat, the larger the volume of fish. One net can weigh up to 10 kg, without fish. A small boat may not be able to handle such a load.

HOOKS AND LINES

Hooks are used for fishing but on a small scale. The size of the hook used depends on the type of fish. Hooks have numbers. The lower the number, the bigger the hook. Hooks used for tilapia are from numbers eleven to sixteen. Those for Nile perch are from seven to 10. Lung fish are fished with hooks of numbers six and five. Bigger hooks are used for bigger fish so that they do not break free and swim away. Sprat is put on the hook as bait. The hooks are put 5 meters apart. Not all of them get fish. Sometimes the fishermen get 10 to twenty fish of different sizes. The hooks are kept in a wooden chest.



Plate IV: Hooks

1. Long line

The method developed in the 1980s for the effective exploitation of predatory fish e.g. *Lates niloticus*, *Protopterus*, *Clarias*, *Bagrus*, etc. A typical gear comprises a long length of a mainline (100–300 m), rigged with monofilament twine (diameter 1.00-2.00 mm) or multi-filament twine (ply 36-60) and bears short snood (0.3-0.8 m) carrying baited fishhooks. A long line is prepared for setting in the morning or afternoon by a crew or hired men (1-2). Hooks are baited with natural baits (e.g. small live fish, slices of meat, earthworms and insects). The gear is set late in the afternoon in a predetermined fishing ground and left to fish passively overnight. Hauling is normally done early next morning the quality of fish harvested by this method is usually good.

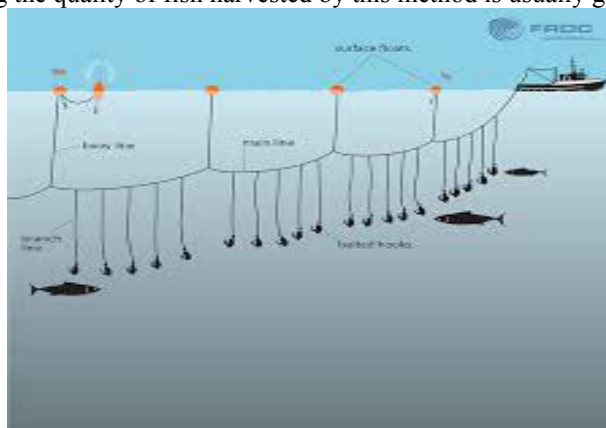


Plate V: Long line hook

2. Angling Gear

Hand line (the simplest and cheapest gear) is manually operated by one person along the lake beaches or on the riverbanks. Effective angling is done in calm waters early in the morning or evening or on dark nights. A set of hand lines can also be operated as a trolling gear. Fishing rod or tackle is mechanically operated by one man using a reel fixed on a springy plastic rod. Its mainline is baited with a fish lure. Angling for *Lates niloticus* on Lake Victoria is a lucrative activity particularly for the foreign tourists who adopt this fishing method. This method may use live bait and the catching of bait (immature fish) using small mesh-sized gillnets; seine-nets and fish-trap can be detrimental to the fishery.

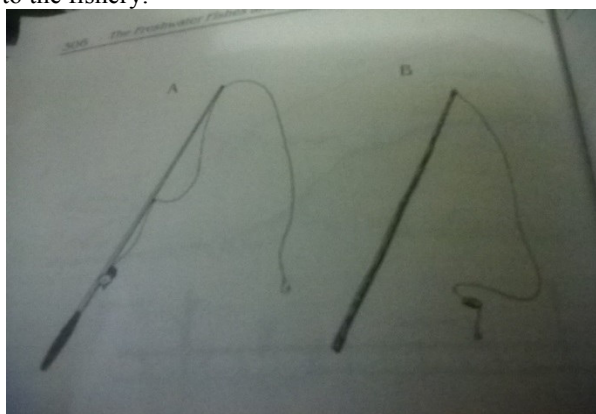


Plate VI: Angling gear

❖ FISH-TRAPS AND BASKETS

Various designs of fish traps, baskets and weirs are used in fishery. Conical traps are used most commonly for catching fish species e.g. *Clarias*, *Barbus*, *Schilbe* in These are made of raffia 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. Catches include Crayfish, *Tilapia*, *Chrysichithys*, *Lates niloticus*. The advantage of basket traps in fishing is that the large spaces between twisted bush ropes allows only big sized fish to be trapped while smaller ones are filtered out . Basket traps are used all year round and predominantly around shallow waters of lakes, rivers and in permanent and seasonal swamps. These are particularly used on Swamps and other minor lakes. The gear is strategically set as a barrier and fish voluntarily or involuntarily enter it, but their escape is hindered by a special non-return valve or device. Traps set in the river estuaries and papyrus fringes indiscriminately trap fish (*Barbus*, *Alestes*, *Clarias*, *Hydrocyrus*, *Protopterus*, *Labeo*) of all sizes and ages.



Plate VII: Fish trap



Plate VIII: Fish Basket

FISHING CRAFT

Fish in Niger Delta are caught mostly with plank canoes and to a lesser extent, fiberglass boats. Some dugout canoes are also still being used. The plank canoes are generally 4 to 12 m in length and dugout canoes average 3.5m. Some of these are motorized. Artisanal fishermen utilise various gears including gillnets, seines.



Plate IX: Dugout Canoe



Plate X: Planked canoe



Plate XII: Fibre glass boat

FISH SHELTER

Fish shelters are made up of triangular plot of branches staked firmly in the river bed and with the apex of the triangle downstream. Each fish shelter may be about 10 meters long and 4 meters across the base these shelters attract small fish, which in turn entices large predators. Prior to the raiding of the fish shelter for fish, scraps of food, mostly kitchen waste, are placed amongst the branches.

Fish fence: Fish fence are made up of sticks tied together by traditional fibers. Often traditional mats are employed in fish fencing. In Cross river, the fence usually stretches the main channel leaving space of few meters width in the centre to allow canoes and river boats passage. The catching chambers always point downstream, so they could theoretically catch almost all fish which move upstream. Often attached to catching chamber are detachable large conical traps with non-returning valves. The fisher detaches these traps to collect his catches. Fish fencing within the Cross River basin is seasonal and often used for few months of the year when the current is very slack and the water shallow. They are usually erected in March each year and dismantled in May. The most common fishes captured by this gear are: *Labeo*, *Citharinus*, *Distichodus* and Catfishes. When the water begins to rise in mid-May, the fish fence give the best results but about a week or two later, the currents becomes so strong that the traps are either dismantled or abandoned. (Reed et al., 1967).

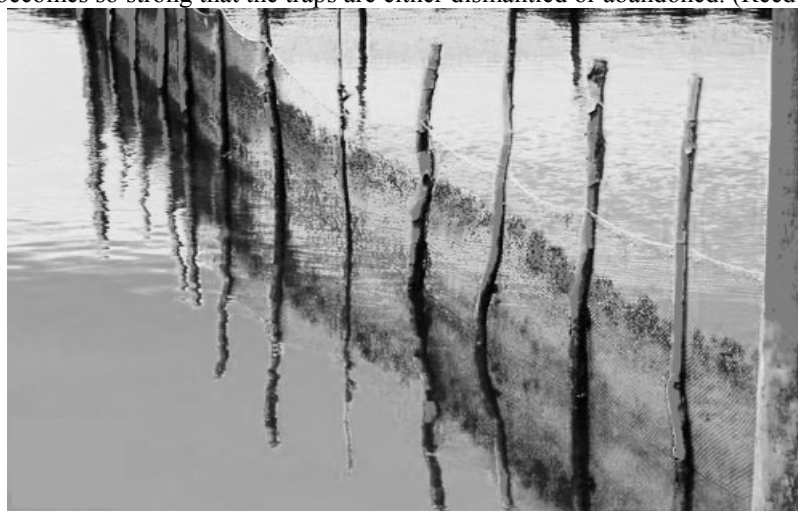


Plate XIII: Fencing

Trawl

A trawl is a tunnel-shaped fishing net which is towed through the water. The water strains out through the mesh entrapping the fish and retaining them in the cod end of the trawl.

Historically, trawling is a new method. Trawling started about 100 years ago. Since then there has been significant development in terms of methods and equipment, particularly with regard to the size of the trawl and specialization according to the type of species one wishes to catch. Thus, different trawls have developed that are

better for a particular type of fish than others. The shape and size of the trawl vary significantly. The main factors taken into account when it comes to developing and specializing trawling includes fish behaviour, seabed conditions, selection devices (grating and mesh selection) and the vessel's engine power. The pulling speed during trawling ranges from 1.5 knots to 5 knots. Smaller shrimp trawlers travel at the lowest speed, whereas larger whitefish trawlers and pelagic trawlers travel at the highest speed.

Two main uses of trawls have developed: bottom otter trawl and pelagic trawl. In addition, there is a midway solution referred to as semi-pelagic trawl. In the following, we will describe the characteristics of bottom trawl and pelagic trawl, as well as beam trawl as this type of trawl deviates significantly from the ordinary trawling concept.

The trawling activity pattern using a single bottom otter trawl varies according to several factors such as catch availability, the number of vessels on the field, as well as other circumstances.



Plate XIV: Trawl net

❖ UNORTHODOX AND OBNOXIOUS FISHING PRACTICES

This is a very bad fishing method, which is not good for the conservation of the aquatic resources. It is also a very old method used in harvesting fish in Nigeria. The use of poisons and dynamite for fishing has been prohibited in Nigeria since 1992. But the artisanal fishermen still use explosives and poison from time to time in Nigerian Inland waters to kill, daze or shock fish

FISHING POISON

This involves the use of synthetic chemical and Ichthyotoxic plants, in Nigeria Inland waters. The synthetic chemicals include Gamalin 20, Aldrex 40 as well as Didimacs 25, Atranex, etc. These chemicals, which are usually in liquid forms, are simply poured on the water surface ponds, rivers and lakes to narcotize and kill fish. Ichthyotoxic plants commonly used and their active ingredients in Nigerian Inland waters are well described by Udolisa *et al.* (1994) and in Lake Kainji basin by Reed *et al.* (1967). The appropriate plants- parts (bark, leaves or roots) are collected from surrounding bushes prepared and poured into water. The neurotoxic or suffocating effects eventually result in the fish floating belly up on the surface, where they are collected with scoop nets or clap nets. Most poisons affect oils of the fish and the flesh is generally safe to eat (Welcomme, 2001), although where synthetic chemicals are used residues may accumulated in the fish flesh to toxic levels. Because poisons are indiscriminate, many other benthic organisms may be severely damaged. Often these organism and small fish, which are not desired, are much more vulnerable to the effect of poisons than the target fish. Fish poisons take place mainly in the dry season. Between November and April in waters less than two meters deep (Udolisa and Lebo, 1983)

EXPLOSIVES

This involves the use of locally made dynamites and hand grenades along river banks and mining paddocks. This explosive was first introduced to Nigeria to blast stones (quarrying) Fishing with explosives is extremely dangerous and destructive, indiscriminately killing all species within the radius of action of the explosion. The dead and dazed fish are then picked up with hands and scoop net. Human victims of self-made explosives can take months or even years to recover.

CONCLUSION

Currently, most of the Niger Delta waters are overfished. Upgrading the fishing gears and making it more efficient increases the risk of further depleting the fish stock. Therefore the introduction of new gears and fishing methods should be accompanied by proper monitoring, enforcement and protection of the aquatic resources in order to avoid these resources from going into extinction

RECOMMENDATION

A thorough study of the technical details or design of the common gears in the Niger Delta area should be carried out. This is necessary to ascertain possible effects in the fishery and likely areas of improvement. Enforcement of the required mesh size for fishing in Niger Delta waters should also be carried out to avoid some of the species going into extinction

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