

## Hook, line and sinker

**The small-scale fisheries sector in Nigeria is characterized by wide variety of fishing gear**

Nigeria is situated on the west coast of Africa between longitudes 2° 29' and 14° 37' east and latitudes 4° 16' and 13° 52' north of the equator. It is endowed with large bodies of marine, brackish and freshwater systems.

Nigeria has a coastline of about 583 km, which borders the Atlantic Ocean in the Gulf of Guinea, a maritime area of 46,000 sq km up to 200-m depth and an exclusive economic zone (EEZ) of 210,910 sq km. The narrow continental shelf, which is about 15 km wide in the west and 27.8 km wide in the east, covers an area of about 41,000 sq km.

The brackish water systems, including creeks, estuaries and lagoons, represent about 0.48 mn hectares (ha). The shallow maritime area covers 2.67 mn ha up to 50 m depth, within which many of the coastal small-scale artisanal fishermen operate.

The freshwater bodies include the rivers Niger and Benue, natural lakes like Chad, and manmade lakes like Kanji, Jiga and Bakokori, as well as reservoirs and flood plains. The total area of inland water bodies has been estimated at about 12 mn ha. The small-scale artisanal fishery sector remains the backbone of fish production in Nigeria, contributing a minimum of 70 per cent of the total fish production in the last decade. In 2000, a total of 101,101 fishing units operated by 283,292 fishermen produced 325,100 tonnes of fish.

The artisanal fisheries can be categorized into: (a) the brackish water or estuarine canoe fishery operating in lagoons, creeks and estuaries; (b) the coastal canoe fishery operating usually within 5 nautical miles of the coastline, which is a non-trawling zone statutorily reserved for small-scale fisheries. (Motorization allows some of

the operators to venture farther into the sea, up to 50-m depth.); (c) the freshwater canoe fisheries in lakes, major rivers and their tributaries, and streams.

The mono-hull wooden canoes include dugout canoes (3–7 m in length), planked canoes (4–12.5 m), and planked dugout or half-dugout canoes. The latter are dugout canoes built up with planks on the sides in order to increase the hull size and include the large Ghana canoes (16–18.5 m long), which are motorized with 40 hp outboard engines. The other wooden canoes are largely nonmotorized.

Apart from full-time fishermen, there are part-time fishers who engage in other activities such as farming. Thousands of Nigerian fisherfolk migrate seasonally from their villages to other fishing communities or settlements, both within and outside the country, including Cameroon and Gabon. Fisherfolk from other countries, like Ghana and Republic of Benin, have migrated and settled in a few coastal village since the early 19th Century. Fishermen migrations also occur in inland waters.

The artisanal fisherman's main wealth is in the fishing gear, which show a lot of variations from one location to the other. The many and various fishing gear types which are used or employed by the small-scale artisanal fishermen in Nigeria are highlighted below.

### Wall of netting

The large or massive *watsa* net with, small mesh (10–50 mm), has enough length (500–1,000 m) and depth (up to 50 m) to surround the shoal/school of fish from all sides and from below. It is usually fitted with purse-rings and purse-lines to facilitate pursing/closing the bottom of the net. An impenetrable wall of netting is

allowed to sink rapidly around a shoal of fish, after which the bottom edge is closed.

**T**he net is operated by a crew of 12-16 fishermen on board the large Ghana canoe to catch pelagic/surface or midwater fish species such as the *bonga* (*Ethmalosa fimbriata*) and sardines (*Sardinella aurita* and *S. maderensis*) in fairly deep coastal waters up to 75 m. The bottom of the net is closed, making sure it does not get entangled on the seabed, and the fish scooped bit by bit onto the deck of the boat.

This is perhaps the most efficient gear type. The net surrounds large quantities of pelagic fish, and the landings constitute high-grade quality fish suitable for canning. The gear's efficiency depends on the size of the net, the size of the fish shoal, the swimming speed of the fish, and the speed of the motorized canoe used during the fishing operation. Selectivity is very low (almost nil) as no fish is allowed to escape. Though the fishermen have the option to select the desired fish size and release juvenile, young and immature fish, that is rarely done.

A huge capital investment is required for nets and procurement of the large Ghana canoe. Great professional skills are also required for making nets and fishing operations. The purse-seine net is one of the most complicated nets to operate at sea because of its huge size. Many Ghanaian fishermen and a few Nigerians operate the *watsa* small-scale purse-seine nets in the coastal waters of Nigeria to catch *bonga* and sardines (called *sawa*).

The beach seine net is designed with two long wings and a cod end fitted at the centre or on one side of the wings. The head line ranges between a few metres (say, 200 m) to about 1 km or more in length. The net is operated in shallow waters (5-25 m depth) and very close to the shore or beach. It is designed with enough depth such that the bottom/lead line touches the sea bed, in order to prevent fish from escaping underneath. It is set in a semicircle in the water and manually pulled or dragged with the aid of the towing rope attached to each of the wings. In the process, the cod end is

gradually drawn close to the shore and is finally hauled out of water on to the beach.

Coastal beach seine nets are set during the day only. They are also operated from wooden canoes 9-12 m in length. In over 70 per cent of the operations, no outboard engine is used. The net targets mainly the demersal fish species, including croakers (*Pseudotolithus* spp.), sole (*Cynoglossus* spp.), jackfish (*Caranx* spp.), shiny nose (*Galeoides decadactylus*), barracuda (*Sphyraena* spp.), moonfish (*Selene dorsalis*) and grunters (*Pomadour jubelini*). Beach seine nets without bags (50-120 m long and 3-8 m deep) are operated from the beach or on board the canoe midwater or within a relatively calm body of water such as a lagoon, creek, estuary, lake or any other water reservoir.

While many live fish specimens are caught, a few are in a semicomatose or unconscious state, and some are dead either due to entanglement in the mesh of the wings or crushed by the weight of fish herded into the cod end. The efficiency of operations depends on the mesh size of the net and the size of the water body.

Lift-nets are rectangular or circular implements which are lifted vertically out of the water from a submerged position to catch fish or crab that get attracted above the net. The water is strained in the process.

The rectangular *atalla* lift-net is usually constructed with a 10-25 mm mesh size. It is highly selective for the pelagic fish *Pellonula ionensiis* in rivers and lakes.

The circular crab gear (called *garawa*), which is baited with fish or chicken parts, is used extensively in the lagoons, creeks and estuaries. In some areas the crab gear is made of small conical bags to improve catching efficiency.

#### Varying mesh size

Cast-nets are conical falling nets with lead weights attached at regular intervals along the perimeter of the cone. The netting material is monofilament or multifilament nylon with twine thickness and mesh sizes varying between 12 mm and 100 mm. For each net used in streams, rivers with shallow depths and in the Lagos lagoon, the total stretched height of

the cone varies between 3 m and 6 m. However, in estuaries and rivers with deeper waters (over 9 m), the cone height varies between 5 m and 8 m. A typical cast-net has a retrieving line of 4-10 m in length and is attached to the apical portion. In some cast-nets, the lead line is tucked underneath and attached at intervals to the inner side of the net to form pockets for trapping fish.

**F**or a good fishing operation, the physique of the fisherman has to match the size of the cast-net. The net is thrown on sighting a shoal of fish in such a way that it opens and unfolds to cover the greatest possible area of the water surface. Simultaneously, the net is allowed to sink to the bottom of the water, trapping some of the fish species and catching others in the pockets. The net is left in that position for three to five minutes before it is gently, but skillfully, drawn into the canoe with the retrieving line.

Cast-nets are also used by fishermen who wade in shallow waters of 0.5-1.2 m depth. Group cast-netting is also practised in the Lagos lagoon mainly by the migrant Beninois fishermen. Eight to 15 canoes, each manned by at least two men, form a circle. The nets are cast simultaneously in either a clockwise or anticlockwise direction. In a few instances, two lines of fishermen face each other and cast their nets into the area between them, starting

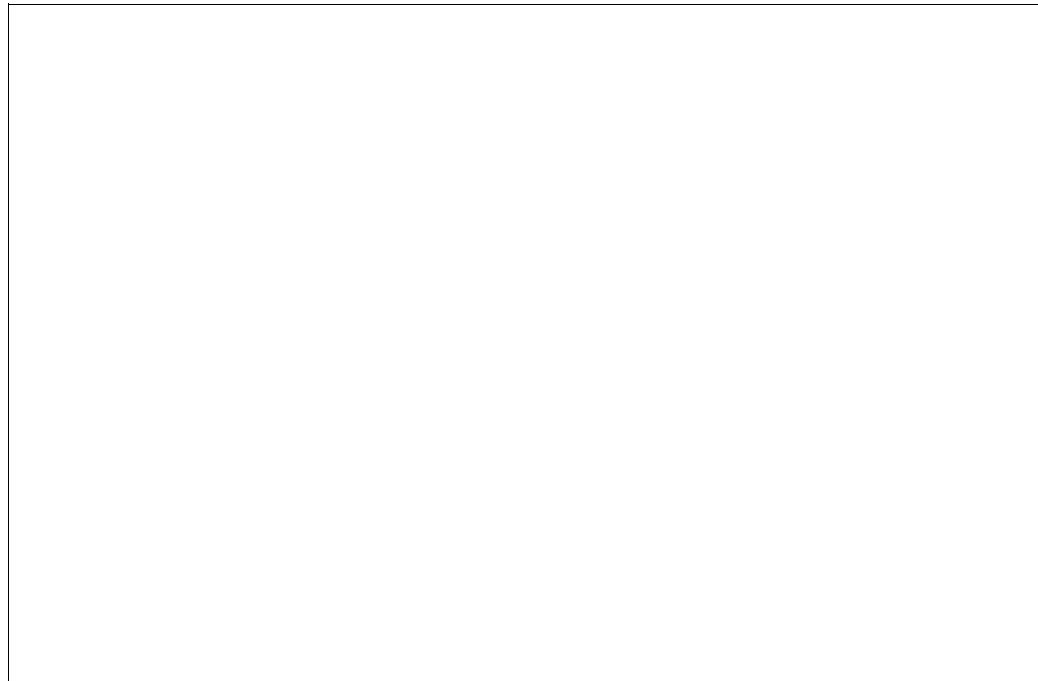
from one end to the other. In such an operation, the catches are shared equally among the fishermen.

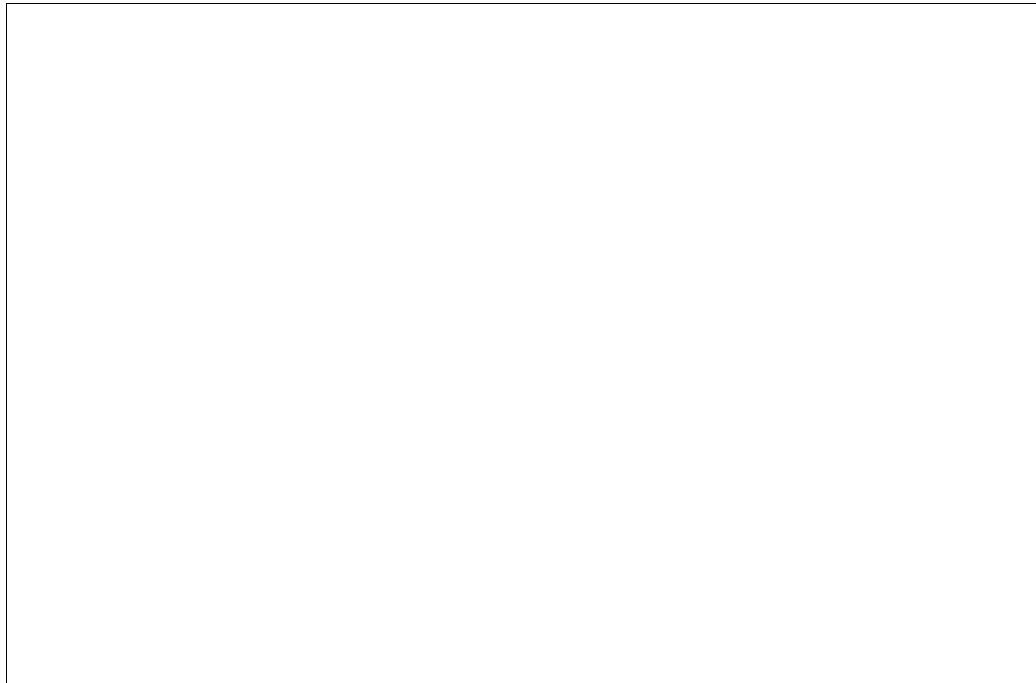
Another type of gear is the conical net thrown/operated from the shore/canoe to cover an area of the water surface and allowed to sink and close in on the fish. The symmetrical net is constructed with either rectangular panels or a big rectangular panel is joined diagonally to form a cone.

The efficiency of this gear depends on (i) the size/area and volume of the net, which should match the physique of the fisherman; (ii) whether the design incorporates pockets or not; and (iii) the sinking speed of the net. The falling gear are often used both intensively and extensively in calm waters for a rapid sampling of the fish population.

Gill-nets constitute the most abundant small-scale fishing gear in Nigeria. They include the monofilament and multifilament set gill-nets for demersal fish species in the coastal waters or inland water bodies; drift gill-nets for sardines and *bonga* and shark, as well as the encircling gill-nets for sardines and *bonga*. (Trammel nets, which belong to the group, are rare; not only are they not sustainable but they are also costly.)

Traps occur in various shapes and forms—pot-like, rectangular or





cylindrical basket cages made of bamboo, netting material, cane or wire gauze.

**T**he *gura* trap made of synthetic netting material is cylindrical in shape. However, its lower surface is wider than the upper surface. Each trap is provided with a mouth opening or entrance (with or without a non-return valve) and chamber(s) for fish collection, irrespective of the shape or the design or the material used in the construction.

Catch efficiency depends on the size, mouth opening, bait type and leaching time, tidal current and other factors. Such gear retains the high quality of fish caught. The pots or the closely knit basket traps do not allow small fish to escape.

The stow-net is a conical bag made of multifilament nylon netting used in the sea, estuaries and lagoons to catch shrimp and small fish as well as brackish water eel (*Ophichthus ophis*). It is known as *nkoto* (in Kalabari), *esik* (in Ibibio), *asuwe* (in Yoruba) and *asu* (in Itsekiri).

The trap has a rectangular mouth that tapers to the bag. The netting material surrounding the mouth has a bigger stretched mesh size (100 mm), with thicker twine. The netting material and stretched meshes are progressively reduced in size towards the bag, which has 3–10 mm mesh sizes and are made of R300 tex twine thickness.

A very big stow-net, 30.5 m long with a mouth opening 15 m wide and 4 m high, has been observed. The gear is fixed against the tide by means of anchors or stakes. When anchors are used, the gear is inspected once a day for shrimp caught, since the mouth and body of the gear are automatically reversed with the changes of tide. However, when stakes are used, the trap has to be harvested just at the change of tide, and the mouth of gear manually reversed. Occasionally, the smaller size of this gear can be towed by two fishers either wading in the shallow (1.5-m deep) water or operating from two canoes. The stow-net is operated throughout the year but the best fishing season is between November-December and April-May.

At sea, the *nkoto* filter net is attached to a motorized plank canoe (7–11 m long and 1.7 m wide) and towed by a 8–15 hp outboard engine. The operation of the filter net in the nearshore coastal water conflicts with other small-scale fishing gear, which are damaged. Commercial fish species, including shiny nose, are also greatly impaired.

#### **Barrier nets**

The barrier-net, in its simplest form, is a fence of bamboo and palm fronds erected across the channel connecting the swamp with the river at high tide, in order to cordon off the fish. At low tide, the fish are stranded and picked up by hand or

collected in a basket from the mud. V-shape fences also form barriers across rivers, streams or creeks and are fitted with one large *iganna* trap at the centre of the narrow opening for collecting the fish.

**I**n hook-and-line fishing, a hook is fixed to a line only or to a line attached to a pole. Many hooks fixed to many secondary lines (snoods) are attached to the main line. The longlines include the set longlines and the drifting longlines, which are used in the coastal waters, rivers, lakes and creeks.

Efficiency depends on size (hooks vary in size and are numbered from 1 to 20, with No. 20 being the smallest), quantity and shape of bait (artificial lure or natural bait), soak time and other factors. A positive correlation obtains between hook and fish size.

Efficiency is also highly associated with the feeding pattern of the fish and the type of food as well as seasonal and diurnal variations in feeding behaviour. Hooking without bait also occurs when the fish get hooked by their scales, gills, fins or other appendages. Hausa fishermen use unbaited bottom-set *marimari* or *mamari* longlines to catch soft and scaleless fish such as *Clarias* spp.

Spears are used mostly in rivers and creeks for killing, wounding or grappling with fish. They have metallic heads and are used extensively at night with torches, flares and hunters' carbide lamps to catch large fishes, such as *Lates niloticus*, *Gymnarchus* sp. and *Chrysichthys nigrodigitatus*. In some cases, spears, matchets and axes are used along with other types of fishing gear, such as lines, gill-nets and traps. They are used throughout the year but mostly in the dry season between November and April.

The other miscellaneous fishing gear and methods used in Nigeria include scoop-nets used to scoop up mechanically stunned fish; gathering by hand; using chemicals and ichthyotoxic plant poisons; and using hand grenades/bombs and locally made dynamites, which are generally prohibited in Nigeria. The latter may result in accidental loss of lives, while the former taint the fish and contaminate the water bodies. In both cases, the fish,

including juvenile, immature specimens, are killed.

The artisanal fishing gear types with small meshes (25–45 mm) catch juvenile immature fish and thereby inflict a great toll on the populations of commercial fish like the catfish (*Chrysichthys nigrodigitatus*). A minimum of 50-mm mesh size is thereby recommended in order to mitigate against overexploitation of the resources.

Some of the gear types are used throughout the year, while others are seasonal. The gear performance and efficiency are influenced by environmental factors, including tidal current and the lunar cycle, as well as the behaviour of the target species.

The fishing practices or operational methods in the sector tend to be labour-intensive, with low technological applications or minimal mechanical assistance. The canoes are mainly non-motorized. The total investment in fishing gear, canoe and other accessories is generally low, compared to the industrial sector. In other words, the small-scale fishery sector is characterized by low capital outlay and low operational costs, with variable and low fishing productivity, which generates low revenues.

The high costs of some fishing inputs, lack of subsidy or credit facilities plus high interest rates have had a negative impact on the sector. 3

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