COURSE CODE:	FIS304
COURSE TITLE:	Fishing Gear Design and Production
NUMBER OF UNITS:	3 Units
COURSE DURATION:	Three hours per week

COURSE DETAILS:

Course Coordinator: Dr. D.O. Odulate

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Office Location: Room D203, COLERM

Other Lecturers: Dr. W.O. Abdul

COURSE CONTENT:

Study of types of fishing gears and fishing crafts. Classification of fishing gears and crafts gear selectivity. Properties of the materials used in the construction of fish gears. The design and construction of different types of gears and graft. Assessment of fishing gear efficiency.

COURSE REQUIREMENTS:

This is a compulsory course for all students in Department of Aquaculture & Fisheries Management. In view of this, students are expected to participate in all the course activities and have minimum of 75% attendance to be eligible to write the final examination.
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READING LIST:

FAO CDR: Fishing gear selectivity and performance. Being a paper presented at the expert consultation on the regulation of fishing efforts
Sparre, P. and S.C. Venema (1992).Introduction to tropical fish stock assessment. Part 1 &2 manual. FAO Fisheries Tecch. Paper No 306 .1, Rev.1. Rome, 376p

LECTURE NOTES

FISH GEAR DESIGN AND PRODUCTION
FISHING METHODS IN NIGERIA
.
Fishing is an act of harvesting fish. Equipment or devices used for fishing are called fishing gears. The various types of fishing gears and the ways they are used on Nigerian waters are

dependent on the following factors:

o Financial status of fisherman

o Seasons of the year

o Species of fish targeted

o Tribes of the fisherman

o Shoreline pattern

o Depth of the water

METHODS

o Traditional

o Modern

In almost every fishing community in Nigeria, nets from nylon are prevalently used. The netting

materials are either monofilament or multifilament.

CLASSIFICATION OF FISHING ARTISANAL GEAR

Artisanal fishing gears are internationally classified as follows:

o Set nets e.g. gill net, trammel net drift net, etc.

o Surrounding nets e.g. beach seine

o Throw net e.g. cast net

o Hand net e.g. scoop net

o Lift nets e.g. Attala

o Clap net e.g. single clap net and twin clap net

o Traps e.g. trigger traps, non-return valve trap, ita trap, spring loaded traps, circular traps, bamboo trap, etc

o Electric fishing

o Brush parks e.g. Iken, acadja

o Wounding gears e.g. spears, cutlass & head lamp, etc.

o Basket and hand picking for small fishes and periwinkles

o Use of poisons and explosives e.g. Gamalin 20, dynamite, derris plant

o Hooks and lines e.g. spring loaded hook, long lining

Fishing gear could also be classified based on their methods of use:

o Active gear

o Passive gear

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Active gear Passive gear

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o Cast net Gill net

o Beach seine Trammel net

o Hand net Drift net

o Clap net Traps

o Lift net Set hooks

INDUSTRIAL FISHING TRAWLING

A fishing trawler is an industrial fishing vessel designed to operate fishing trawls. Trawling is a

method of fishing that involves actively pulling a trawl through the water behind one or more trawlers. Trawls are fishing nets that are dragged along the bottom of the sea or in midwater at a

specified depth. A trawler may also operate two or more trawl nets simultaneously, double-rig

and multi-rig.

Variations in trawling gear

There are many variants of trawling gear. They are according to:

· Local traditions

· Bottom conditions

· How large and powerful the trawling boats are

Trawl variants include beam trawls, large-opening mid water trawls, and large bottom trawls

(rock hoppers). Modern trawlers are usually decked vessels. Their superstructure [wheel house

and accommodation] can be forward, midship or aft. Motorized winches, electronic navigation

trawl sensors echo sounder and sonar systems are usually installed. Fishing equipment varies depending on the size of the vessel and the technology used. Also modern trawlers store the fish

they catch in some form of chilled condition. Fish are stored with ice in the fish hold. Many of

the trawlers also carryout some measures of onboard fish processing.

TYPES OF TRAWLERS

Trawlers can be classified based on:

· The architecture
· The type of fish they catch
· The fishing method used and
· Geographical origin

According to FAO, trawlers are categorized by gear as:

· Outrigger trawlers for shrimps
· Beam trawlers for flatfish fisheries.
· Otter trawlers
· Pair trawlers
· Side trawlers
· Stern trawlers
· Freezer trawlers
· Wet fish trawlers
· Trawler / purse seines
· Naval trawlers

CLASSIFICATION OF FISHING CRAFTS

(a). Canoes/boats - These are made either from wooden materials or synthetic materials such as

robber (PVC) or fibre-glass. hey could be operated with paddle or driven with an outboard engine. The wooden canoes could be dug-out or planked. These crafts are commonly used by artisanal fishermen.

(b)Vessels - These are commonly referred to as trawlers in the industrial fishery sector. They are

used to pull or drag fishing gear.

GEAR SELECTIVITY

Selective fishing refers to a fishing method's ability to target and capture organisms by size and

species during the fishing operation allowing non-targets to be avoided or released unharmed.

Selective types of gear

Fishing gear types and methods used in the tropics, some are extremely species selective. Even

in waters where other species abound, their use does not create a complex management problem.

Selective types of gear:

Gear type species sought

· Pole and line skip jack tuna
· Mid trawl sardine /mackerd
· Drift net small tuna ,barracuda
· Tuna long line large tuna
· Scoop net shrimp, grey mullet
· Shell fish dredge oysters, clams

Less selective gear type:

Fishing gear and methods which are less selective include most of the demersal fish trawls ,the
seines and lift nets used in conjunction with light attraction or FADs (fish aggregating devices),
and many of the artisanal traps ,line and tangle nets

Factors influencing selectivity of gear

1. Design and mode of operation
For instance in trawl net considering speed of tow headline height, ground contact , flow of water , otter door spread , length of ground cable , and mesh size .

2**.** Area swept — many types of bottom gear depend on the area of sea - bed swept for their effectiveness in fish capture. Ropes, wires, cable, and bridles are used to herd fish in the direction of the net. Several species of fish respond to herding by ropes, and possibly just as many do not (e.g. prawn , clupeids shrimps and mackerel). Gear types that depend on sweeping a
wide area of sea bed are bottom seines, pair trawls and otter trawls.

3. Effect of tickler chains and ground ropes: - the ground rope of a trawl net has an effect on the
amount or proportion of flatfish and shellfish that may be caught. A heavy ground rope will tend
to scrape tightly on the sea bed while a lighter one may travel more gently over the ground. The
tickler chain is often used to dig up the sand just ahead of the ground rope. This drives flatfish
and some shrimp and scallop up into the mouth of the net.

4. Mesh size: **-** this is very useful in purse seines than trawl net. Small fish caught normally have
the likelihood of surviving and they may be allowed to go. The seines most times carry a filter
panel at the top to permit the escape of small fish. The filter panel is 20 --25% larger than the other seine meshes. Some fish are gilled but they can be shaken out of filter netting. This could
hardly be done if the larger mesh was used throughout the body of the net. The mesh size also affects the selective nature gillnet, but the net is loosely hung and large fish rarely escape capture. .

5. Season of year:- during cold weather or in the dry season, fish in most African lakes becomes
very in activate. Their metabolism slows down to the point where they hardly move or eat. During such period they will rarely be caught by gillnet, unless they are driven -in as done in Ogun estuary and Epe lagoon.

6. Fish attraction method: **-** the three main methods of fish attraction are by light, by bait and by
floating raft and artificial reef. Each method is selective under different conditions. The selectively is the product of the combined effect of the attractant, the fishing gear, the location
and the method of application. Note also that secondary attraction occurs. Larger species come to
prey on small fish congregating around the attractant. Most small pelagic fish in the tropics display positive photo-taxis e.g. Sardinella. Live bait fish are used for skipjack tuna for capture
by pole and line. FADs attract pelagic fishes.

Definition of Common Terms in Fishing Gear Technology
The Terms:

1. Fisheries 2. Fishery 3. Fishing 4. Fishing technology 5. Mesh (and types) 6. Mesh size
7. Fisherman's needle 8. Webbing/Netting 9. Bar length 10. knots

TWINE WORK

Tools for making nets:

a. Needle: It is used to hand-knit webbing. It can be constructed by using materials like wood, plastic and metal.

b. Mesh gauge: It is helps to make equal-sized meshes during knitting. Width of gauge (Gw) = (M/2 – 2T) where M = desired mesh size

T = thickness of gauge

c. Sharp knife: Needed for trimming and cutting of knots preferably pocket knife.

CLASSIFICATION AND TYPES OF FIBRE

Types of fishing fibers:

Natural fibers : Thy are fibers obtained from plants and animals. They are predominantly vegetable fibres.

Their characteristics and examples (e.g. coir, manila etc).Preservation of natural fibers.

Synthetic fibers: They are man-made materials made from simple basic substances via chemical process.

Advantages of synthetic fibers: They are have high strengh, abrasion resistance and rot resistance.

Classification of synthetic fibers and examples of each group.

PHYSICAL PROPERTIES AND FORMS OF SYNTHETIC FIBREAND STRAND SYSTEM

Physical properties of synthetic fibers include the following:

Elasticity *Resistance to abrasion

Breaking strength *Elongation

Density *Changes in water

Strength

FORMS: There are various types or forms of synthetic fibreswhich provide different properties. The most common forms of synthetic fibers are:

Continuous fiber 2. Stable fiber

Monofilament 4. Split fiber

STRAND SYSTEM:

Two-yarn system

Three-yarn system

Four-yarn system

YARNS AND TWINES

Fibers Yarns Twines

Main types of twine: a. twisted

b. braided.

"S" Twist

"Z" Twist

Soft

Medium

DESIGNATION OF FISHING TWINE

Types of numbering system:

* DIRECT METHODS: British and Metric systems

* INDIRECT METHODS : Denier and Tex systems

Standardization:

Direct methods (a) British system : 840 yards = 1 pound

(b) Metric system: 1000 m = 1 Kg

Indirect methods (a) Denier system : A unit of denier refers to the weight in grams of 9000 meters of a yarn or single filament i.e. 1 denier = 1 g /9000 m.

(b) Tex system : 1 tex = 1 g/ 1000 m e.g 23 tex twine means a single yarn of which 1000 m has a mass of 23 g. Example: 23 texx 3.

Conversion from Denier system to Tex system and vice versa.

Calculation of runnage (kg/m) and twine diameter Ø mm)

NETTING

Definition: A netting is a meshed structure of indefinite shape and size composed of one yarn (monofilament) or one or more systems of yarns joined or interlaced. It is also called webbing' or simply 'web'.

length: It is the distance between the center two knots measured in mm.

Mesh size: It is the distance from the center of one knot to the center of the opposite knot when the mesh is fully stretched. It is also measured in mm. 2 bar length = 1 mesh size. Mesh size Information on the netting label:

Standard length = 91.5m

Width = 100 meshes

Twine size = 210D/18

Mesh size 20mm

Colour = white

91.5 m

100

meshes

20mm

MOUNTING

Definition: It is the fixing of the head, foot and sidesropes (if any) to the netting. Mounting can be done with or without loops. Important factors to be considered include

Primary hanging coefficient = % of hanging (E1)

mounted length/stretched length

Percentage of looseness = excess length/stretched length

% of hanging + % of looseness = 100%

Secondary hanging coefficient (E2)

Fictitious area (Af): It is an area of unmountednetting. $Af = Lo \times Ho$ m²

where Lo = no of meshes along the length x mesh size

Ho = no of meshes along the depth x mesh size

Area of a mounted netting (Aw) is referred to as

Actual working area.

$Aw = Lw \times Hw$ m²

Where Lw = no of meshes along the length x mesh size x E1

Hw = no of meshes along the depth x mesh size x E2

Netting utilization coefficient (Eu) defines how well netting materials are used in fabrication