

# **SELECTION OF FISHING GEAR**

## **Active fishing gears :**

i) Surrounding nets

ii) Seine nets

iii) Trawls

iv) Dredges

v) Hooks & lines

vi) Lift nets

vii) Falling gear

## **Passive fishing gears**

i) Gill nets & entangling nets

ii) Traps

iii) Hooks & lines (passively operated)

## **Other methods :**

i) fishing without gear

ii) stupefying devices

- When fishing introduced 1<sup>st</sup> time in a particular area, some ways were there to select appropriate fishing gear.
- 1<sup>st</sup> is trying all imp commercial gears & selecting the one which is most successful.
- 2<sup>nd</sup> , a few selected gears were operated on trial & error basis & best one is selected.
- Several factors determine the selection of a fishing gear for a particular sps in a particular area.

### ❖ 1. Biological factors :

- Choice & design of fishing gear greatly influenced by biological factors.

- **A. Size & shape of fish body:**
- Determine the mesh size required to enmesh & hold fish in gill net.
- Mesh size to retain fish without gilling in trawls, seines & traps.
- Body size related to tensile strength required for netting in gill net & hook size & line in hook & line.
- Smaller fish are caught in bulk & bigger fishes as single.
- Their sense of sight & hearing are made use of to attract the fish to the gear by exhibiting light & lure.

- **Behavior of fish :**

- swimming depth, schooling behavior, feeding & breeding habit etc have bearing on gear selection.
- Size, type of gear & depth at which it is operated depend on swimming depth of fish.
- Body size directly proportional to swimming speed which is considered in success of dragged gear.
- Swimming speed of target sp. for active fishing methods like trawling, seining & trolling.
- Fishes sustain a cruising speed 3-4 body length/second for long period without fatigue & burst.

- Fish in front of trawl mouth caught if trawl speed is greater than cruising speed of fish.
- Such differential behaviour used to separate sps of fishes in separator panel inside trawl.
- Behavioural & size difference between fish & crustacean could be used to design selective trawl.
- In such design, rigid grids are placed at an angle before codend.
- Small sized prawns move through grid into codend.
- These are sometimes called Trawl efficiency devices.
- They reduce sorting time thus increase efficiency of operation.

- Protected sps like turtle are allowed to escape in the same way by Turtle Excluder Device (TEDs).
- Tendency of some fishes to aggregate towards light is used in squid jigging, light assisted purse seining & dip net operation.
- Behaviour of tuna to aggregate around floating objects is utilized in FAD assisted purse seine.
- Vertical distribution of target fishes could be used to optimise the horizontal & vertical dimensions of netting panels in gill net.
- Sparsely distributed scattered fishes are efficiently caught by passive gears like gill net & long line.

- Schooling fishes are caught by purse seining & mid water trawling.
- Food & feeding habit of fishes are imp for hook & line fishing.
- Fishes having migratory habit, spawning habit & season are imp in selecting gear.



- **2. Fishing areas :**

- Distance of fishing ground, depth of operation, bottom topography directly/indirectly influence selection of fishing gear.
- Bulk catching method & more productive gears – feasible for far off fishing ground.
- Buoyancy elements used in deep sea fishing gears such as deep sea trawl, gill net & bottom
- Buoyancy elements which are light & cheap are used in surface operated gears. Eg. Seine & surface gill net
- Gill net visibility of netting panel adversely affects fishing efficiency.

- Visibility is also imp in effective herding during capture of fish by trawls, large pound nets & trapping enclosures.
- **Sea bottom condition :**
- Nature of bottom is of significance for demersal fishing gears.
- Rough sea bottom – limits operation of most fishing gears.
- Trawling on rough bottom needs special rigging such as bobbin rig or rock hopper rig.

- **3. Environmental factors :**
- Temp, salinity, current, wind, tide, turbidity etc. influence distribution & abundance of fish.
- Distribution of tuna is limited to temp of water.
- Some fishes prefer low saline water at certain stage in life cycle, others avoid the same.
- Operation of gill net & purse seine is affected by strong wind.
- Dol net & danish seine depend on strength & direction of tide for their catching efficiency.

- Line requires clear transparent water, whereas gill net & purse seine need more turbid water.
- Other factors include, scale of operation, size & engine power of fishing vessel, energy conservation, selectivity & resource conservation, catch volume, operational & handling requirement of gear, prevailing weather condition, Skill required for fabrication, maintenance & operation, material availability etc.

- **4. Economic consideration :**
- For successful commercial fishing, gear should give reasonable profit besides operational & capital costs.
- **5. Social condition :**
- Before introducing a particular gear in an area it has to be ensured that the gear is socially acceptable.
- Sometimes, new & sophisticated method of fishing are not accepted easily by fishermen due to their traditional attitude & social customs.

# Choice of fishing gear based on biological, behavioral & distribution characteristics of target species

Sl No.	Biological, behavioral & distribution characters	Choice of fishing gear
1.	Demersal, large feeding fish with sparse & scattered distribution.	Bottom set long line, bottom vertical long lines, bottom gill net, hand lines, traps, bottom trawls.
2.	Demersal small size fishes	Gill net, traps, bottom trawls
3.	Pelagic, large size with sparse & scattered distribution	Drift long lines, vertical long lines, gill nets, mid-water trawl

4.	Pelagic, small & medium size schooling fishes	Purse seines, mid-water trawls, hand lines
5.	Pelagic predatory fishes	Troll line, long line
6.	Light attracted fishes & cephalopods	Light assisted dip net & purse seine, jigging
7.	Fish concentrated by FADs	Purse seine, hand lines, gill nets

Sl. NO.	Fishing condition	Choice of fishing gear
1.	Rough sea bottom, demersal fishes	Hand line, vertical long line, bottom vertical long line, traps
2.	Strong currents	Long line, gill net
3.	Bad weather	Hand line, vertical long line, long line, gill net.

Sl. No.	Energy value	Choice of fishing gear
1.	Low energy fishing	Gill net & entangling nets, hand line, long line, traps, surrounding nets
2.	Energy-intensive fishing	Bottom trawls, mid-water trawls, dredges, troll lines, light fishing



# FISHING GEAR MATERIALS

- The efficiency of fishing gear to a great extent depend on material used for its construction.
- A variety of materials ranging from natural fibres, wood & metal to synthetic fibres are used for construction of fishing gears.
- In past, natural fibres were mainly used, subsequently synthetic fibres came into existence.
- The natural fibres get decomposed by cellulose digesting bacteria on continuous usage under water.
- So, short life expectancy than synthetic fibre.

- Advantages of Synthetic fibres over natural fibres :
  - ❖ Stronger
  - ❖ Do not absorb water
  - ❖ Preservatives not required as rot resistant
  - ❖ Durable
  - ❖ Better catching efficiency.
- Extensively used in fishing gear construction.
- **Netting :**
- A meshed str. of indefinite shape & size composed of one yarn or more system of yarns interlaced or joined.

# Classification of fishing gear materials

## 1. Natural fibres



• I. Vegetable fibre

II. Animal fibre



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- i) Seed fibre
  - ii) Bast fibre
  - iii) Leaf fibre
  - iv) Fruit fibre

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- i) Wood
  - ii) Hair
  - iii) Silk

- **Classification of fishing gear materials :**

## 2. Synthetic fibre



- **I) Polycondensation**
- **polyamide (PA)**
- **Polyester (PES)**
- **II) Polymeric compound**
- **poly vinyl alcohol (PVA)**
- **poly vinyl chloride (PVC)**
- **III) Mixed polymer**
- **Polyvinylidene chloride**
- **(PVD)**
- **IV) Polyadditive compound**
- **polyethylene (PE)**
- **polypropylene (PP)**

- **1. Natural fibres :**

- Basic material for construction of fishing gear.
- ‘A unit of matter of hair like dimensions whose length is at least 200 times greater than its width.’
- Based on source they are classified as natural & synthetic/man made fibres.
- Natural fibre obtained from plant (veg fibre) or animal.

- **I. Vegetable fibre :**

- Have a cellulose base.
- Obtained from leaves, stalk, seeds & fruits.

- prone to rotting in water by the cellulose digesting bacteria.
- Further classified into :
  - i) Seed fibre :
    - grow in seed pods of cotton plant. Eg. Cotton.
    - Extremely fine with length – 20–50 mm, dia – 0.01 – 0.04 mm.
    - Dull white color.
    - Due to fineness used in lighter gill nets as well as heavier nets.

- Before introduction of synthetic gear cotton was commonly used.
- **ii) Bast fibre :**
- Component of bast tissue of stem.
- Eg. Ramie, hemp, linen.
- Also known as soft fibre.
- Ramie also called china grass. Length 8–25 cm, dia– 0.024 to 0.07 mm.
- Hemp also called Italian hemp. Length 175 cm, dia– 0.018 to 0.023 mm.

- **iii) Leaf fibre :**
- Source is the pulpy tissues of long leaves.
- Also called hard fibres.
- Eg. Sisal & manila.
- Sisal obtained from sisal plant.
- Manila from Abaca plant.
- Manila have a large dia & hence used in cordage & heavy netting.



- **iv) Fruit fibre :**
- Obtained from coconut husk is coir.
- Length– 15 to 25 cm, dia – 0.01 to 0.025 mm.
- Mainly used for fabrication of ropes.
- **II) Animal fibres :**
- Have a protein base. Eg. Silk, wool & hair.
- Only silk has been used in fishing gears to certain extent.

- **2. Synthetic fibre :**

- Man made fibres manufactured by chemical synthesis of simple substances like phenol, benzene, acetylene, prussic acid etc.
- Depending on type of polymerization 4 diff groups :

- **I. Polycondensation :**

- Water is eliminated in the process of fibre making.
- Eg. PA, PES.
- Some well known trade names of PA are nylon, amilan, perlon, kapron etc.

- Trade names of PES are terylene, dacron etc.
- **II. Polymeric compounds :**
- Water is not eliminated in the chemical process.
- Eg. PVA & PVC.
- PVC was the first synthetic fibre to be produced & was the 1<sup>st</sup> material used for fishing gear.
- **III. Mixed polymer :**
- Formed by co-polymerization of mixture of vinylidene & vinyl chloride.
- Eg. PVD.

- **IV. Polyadditive compound :**
- Monomers polymerize to simple additive manner to form polymer.
- Eg. PE & PP.



**Coir**

**Coir fishing net**





polyethylene

Nylon (PA)





**Polypropylene**

**Polyester**

