

# NEW FISHING GEAR AND METHODS REQUIRED

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**F**ISHING as a means of gathering food is probably as old as hunting, if not older. The fundamental principles underlying the different fishing techniques and which have remained unaltered through ages, are luring, attacking and snaring or a combination of these. Initial efforts in almost all fisheries were essentially with simple implements. Subsequently, more complicated gears were introduced. Very little of the early developments had been the outcome of deliberate planning. In the majority of cases, as the fishery developed and the specific requirements became better known, the fishermen themselves effected the improvements and modifications to the gear and the methods of operation. Obviously, this was the result of strong economic pressure requiring the maximum possible gear efficiency to meet the keen competition prevailing in the different commercial fisheries.

Planned fishing gear development is a subject of recent origin. Gear research facilities are yet available only in a few countries. The profession of gear technology is, therefore, still in the development stages. However, in recent years much progress has been registered towards evolving new methodology and tools of the trade.

Modern fishing has developed through the following four channels: (i) introduction of mechanisation, (ii) advent of synthetic fibres, (iii) improved methods of fish detection, and (iv) advances in fish attraction.

## **Mechanisation**

In almost all countries fishing has met with keen competition from land-based industries, which normally offer relatively comfortable employment. To meet this challenge fishing units had to be increased in size, bigger engines provided and larger shore installations maintained for processing of the catch. Mechanisation involves not only provision of motor for propul-

sion but also mechanised gear handling. Every fishing method has been effected by these developments. In trawling, greater efficiency is effected by the speed of tow and the speed with which the gear is hauled up. In purse-seining, with the introduction of the puretic power block bigger net could now be operated which also ensures extra effectiveness. The technique of handling has been greatly improved in long lining with the introduction of mechanisation. It is now possible to operate lines which are miles long thereby considerably increasing the catch per operation.

*Synthetic fibres.* The advent of synthetic man-made fibres is yet another landmark in fishing gear development. The non rotting character of synthetics is of great importance particularly in hot climates. The laborious and expensive rot proofing treatments can be dispensed with and the gear could also be stored without drying.

Gill netting has greatly benefited by man-made fibres. The main requirements of materials for gill nets are fineness and pliability; elasticity and durability and invisibility when used in water. Polyamide (Nylon) continuous filament yarns are, therefore, in great demand for gill nets. However, in order to prevent the disfiguration of the mesh caused by currents and waves and assure more catching efficiency and extremely selective fishing polyester (Terelyne) yarns are used for the large gill nets. In sardine gill nets polyvinyl alcohol (Kuralon) yarns are more in demand. As they are staple fibre yarns, they do not normally damage the soft meat of the sardine unlike the fine yarns of polyamide and polyester groups.

For most parts of a trawl net the theoretical requirements are to have fine twines to minimise hydraulic resistance against current. The twines should be strong and should be of low specific gravity so that the net fully opens up under water.

Suitable synthetic materials are polyamides, polyethylene and polypropylene.

Fatigue and decrease in elongation due to loss of elasticity are most important in long line ropes. Another factor to be reckoned is the weakening of the breaking strength caused by abrasion by the lines rubbing against line hauler, body of boat and line itself. Vinylon and polyvinyl alcohol lines are in common use. In the near future ropes mixed with polyethylene or polypropylene groups would gain popularity for the main line of the long line gear. For the branch lines polyester material is preferred due to their high catching efficiency by the favourable characteristics such as the specific gravity, tenacity, fineness and modulus of elasticity.

*Fish detection.* In the early twenties of this century the echosounder came into use in many countries for measurement of the depth of water. Later the instrument was suitably modified as a fish finding device.

In the present day the fish finder is an essential equipment of a fishing vessel. Apart from its general use for measurement of depth of fishing ground, it helps to locate the fish shoals and to study the behaviour of the fish schools. The fish finder is also used to determine the various parameters of the fishing gear under operation.

*Fish attraction.* (a) Colour of the net. The response to colour can be judged by the capability of the fish to detect the existence of interruptions erected in the path. In the case of net fishing, therefore, the selection of the colours for the net is very important. In the set nets, drift nets and surrounding nets various colours are used, the colours have been selected mainly based on previous experience. Colours of fishing nets have to vary according to the areas, where they are operated, the fish species or even the age of fish.

(b) Light. Many species of fish are attracted by light. When light falls on the surface of water, planktonic organisms gather at the surface and fish follow. Fishing lamps commonly used are; i) Oil lamp, ii) Acetylene lamp, iii) Filament lamp, iv) Mercury lamp, and v) Fluorescent lamp. Filament lamps are most common.

Experiments have shown that for many fishes the maximum gathering rate occurred in the green and blue ranges. In these fishes green light showed the largest visible efficiency followed by blue, while that of red light was the least.

(c) Bait is another method with which fishes are lured. Of late many artificial baits or lures have been developed and are in wide use in hand lining, long lining and trolling. In hand lining for certain fishes, water sprinkling is generally practised as sort of a camouflage to let the fish imagine that a big school of living fish is present.

(d) Use of electricity for attraction and stunning fishes is gaining importance. Electrical fishing in fresh water is easier, less dangerous for the same voltage and requires less power than in the sea, as conductivity of fresh water is too low. In fresh water, electrical fishing can be conducted by using alternating current or direct current. Since the conductivity of sea water is 500 times more, the use of AC or DC for fishing is not economical. In sea fishing impulse current has to be used.

#### Future Development

(i) It is known that fish can detect the presence of extremely small quantities of substances in their environment. If the basis for these olfactory sensory pattern can be found out, it might be possible to develop recording instruments for tracking organic odours in the sea. Further, the possibility that fish detect their prey or predators through olfactory stimuli, presents an

opportunity for duplicating these odours which either attract or repel fish. Studies on these and similar aspects are underway.

A similar approach could be taken with sound to attract or repel fish by producing the sounds of prey or predators. The sounds that might prove important are (a) feeding sound, (b) breathing sound, (c) swimming sound, (d) sex sound, (e) fighting sound, and (f) scaring sound. These aspects are also under intense study and research. Sounds for scaring are already being used for some fishing methods. Scaring sounds commonly produced are by beating on the sides of the boat and surface of water, the sound of motor boats, etc.

The simple detection of biological resources is followed at present. Implied with this process of detection is the very important item of identification. Fish schools also exemplify patterns in swimming and schooling and these are being studied in detail so as to facilitate easy identification of the species.

It is well known to the fishermen that large pelagic fish like the tuna are often found associated with logs or other floating debris. A possible method for bringing about congregations of such species would be the use of artificial log stations. The station could be provided with a detection system which could send out signals to catcher boats when concentrations of fish are in the vicinity.

A barrier to fish movement which shows some promise is an air bubble curtain. The technique consists of pumping of air through a perforated hose laid on the sea bottom, the resulting air bubbles form a barrier to fish movement. By directing the curtain the fish could be led into a snare or trap laid. The introduction of water soluble repellants to enhance the effectiveness of air bubble curtain is also possible.

**SAVE MORE, PRODUCE MORE**