

FISHING GEAR RESEARCH AT THE CENTRAL INSTITUTE OF FISHERIES TECHNOLOGY

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Ever since the advent of Independence, the central objective of public policy and the nation's endeavour have been the promotion of a rapid and balanced economic development. An increased rate of production of food, either by cultivation or culture or by an increased tempo in the exploitation of the country's hitherto untapped natural wealth, holds the accent in the successive development schemes. Hardly anywhere does this apply more distinctly than in the field of marine fishing, where a remarkable degree of mechanisation has already been registered for a greater and more efficient exploitation of the existing resources.

That the out-moded types of inefficient and less effective fishing craft and gear in vogue can only lead the industry to eventual extinction is fully well realised. Enhanced production of fish could possibly be achieved by increasing the number of traditional gear in vogue. However, it is now an accepted fact that for any substantial increase, in all sections of the industry, it would require widespread use of modern techniques and equipments. Accordingly there has been unanimity in the opinion of experts that the fishing boats and operation of the gear should be

completely mechanised. The Craft and Gear Wing of the Central Institute of Fisheries Technology was, therefore, established to develop the country's fishing boats and implements scientifically and systematically. The Wing was organised in the year 1957 as a part of the fisheries development schemes included under the Second Five Year Plan.

Gear research work is conducted under two principal sections, namely;

- (a) Materials Section
- (b) Gear Design and Fishing Methods Section.

MATERIALS SECTION

It is well known that the construction of fishing gear is dependent upon the materials used and their basic characteristics. Estimation and evaluation of strength, reduction in strength while made into loops and knots, relation between load and elasticity, fatigue in static and impact loads, sinking speed, abrasion, rotting-its process, causes and prevention, reaction to sunlight, acid, alkali and other chemicals are some of the characteristics, which exert a profound influence on the selection of materials, design and methods

of operation of different fishing gear. From the very inception of the Section, large volume of data have been collected on the dynamic characteristics of gear materials. The Section has also specified the standards for different twines of indigenous manufacture.* As a direct outcome, the quality of cotton, hemp and nylon twines has been improved.

In the field of preservation, particularly of those gear made with vegetable fibre twines, several methods were experimented upon and suitable techniques to be followed for different materials and different classes of nets have been evolved and recommended for adoption by the industry.

Similarly considerable data have been collected on the quality requirements of fishing floats. This has facilitated indigenous production of different type of floats particularly those made of glass, aluminium and plastic.

The Section also undertakes detailed quality tests of all materials for fishing gear.

GEAR DESIGN AND FISHING METHODS SECTION:

(i) *Trawling Gear*: Being a method suitable for adoption by mechanised boats, a good deal of investigations were undertaken by the Section on the bottom trawling gear. Commencing from the stage of a single beam trawl, investigations were directed towards evolution of designs of more complicated otter and mid-water trawls. Amongst the bottom trawls more specific attention in initial years were on shrimp trawls and their relative efficiency. Essential studies conducted on resistance of trawls and effective utilisation of power have made it possible to evolve several new designs of trawling gear suitable for

small and medium type boats. Investigations are now under way to develop designs for the larger class vessels.

The effect of long wings and attachment of tickler chain on the foot rope to increase shrimp landings have been successfully demonstrated. To ensure a greater vertical opening in the trawl nets for fish, the use of kite and false head rope were experimented with. A recent development is the design of a bulged-belly net.

Simultaneously, experiments with otter boards of different shapes, to increase efficiency in the trawling technique, were also being undertaken. A rectangular curved otter board has been found to be relatively more effective in bottom trawling. The different scope-ratio of the warp in relation to the size of the net and trawling depth, particularly in shallow waters, has been worked out.

The experiments now undertaken are to further increase the efficiency of the trawling gear. An "electrical trawl" is also under trial operation.

ii) *Gill nets*: Gill nets are popular gear in both marine and inland fishing. Investigations undertaken at the Institute are mainly directed towards determining the principal dimensions of a standard unit, rigging, mesh size and more appropriate twine sizes. The use of coloured and monofilament twine nets are also being studied. Results of the investigations so far conducted have shown that, in marine fishing, the design and rigging of gill nets at present used for Sardine, Pomfret and Seer could be improved. A suitable design of lobster gill net was also evolved.

In inland fishing, particularly in reservoirs, framed gill nets and trammel nets have been found to be efficient in certain reservoirs, while in some others simple gill

*Institute's specifications for nylon twines have been adopted as an Indian Standard (IS : 4401-1967)

nets of monofilament are relatively more effective.

(iii) *Lines*: Several designs of artificial baits suitable for the trolling or whiffing lines have been evolved. Particular mention has to be made of buffalo horn and fish head jigs. Trolling as a simple, cheap and effective method has also been popularised.

The design of a simple long line for commercial operation is at present under study. The experiments are primarily directed towards the selection of suitable natural baits and the size of hooks.

(iv) *Set nets*: As a result of experiments conducted earlier with a simple set net, a large class of set net for mackerel has been made. The net is awaiting field trials.

(v) *Fish attractions*: In the field of fish attraction, light and electricity are being experimented. Laboratory trials have been completed and experiments in the field are to be undertaken during the ensuing season.

The head quarters of the Wing is located in the sea port of Cochin in South India. While obviously the main problems in gear technology appears to be common, each Indian State has to implement the mechanisation project in its own way taking into account the existing status of the Industry and the conditions prevailing and controlling each area. As conditions are somewhat different, the results obtained by fishing experiments at Cochin cannot be directly transplanted at the other centres. The Institute has, therefore, organised two marine Sub-stations and one Unit for field trials of the different gear. The first Sub-station is at Veraval on the North-West coast. The sea of the area is subjected to great tidal variation, swift

water currents and a totally different faunistic pattern. The field experiments undertaken are on shrimp trawls, pomfret and lobster gill nets and simple long lines. Two distinct prawn fishing grounds off Kathiawar coast could be located for commercial exploitation.

The second Sub-station for marine investigation is located at Kakinada on the East Coast. This coast is characterised by a narrow continental shelf, strong sea currents and sparse fish population. The field experiments undertaken are on shrimp and fish trawls, seer gill nets and simple long lines. Experimental shrimp trawling has revealed large scope for this fishery in that area.

The Unit for marine work is situated in Goa on the West coast. The place is of strategic importance in the fishing field as it is characterised by large pelagic schools as well as rich shrimp grounds. The experiments undertaken are, therefore, on shrimp trawls, gill nets, trolling lines and mackerel set net.

The Institute has also organised one Sub-station and a Unit for tackling important problems pertaining to inland fishing. The Sub-station is located in Burla (Orissa) on the banks of the Hirakud Dam Reservoir. The reservoir, even though extensive, is shallow at most places. In addition, it has many submerged obstructions, which make the operation of active fishing gear impossible. The investigations undertaken at the Sub-station are mainly on gill nets, particularly framed and trammed nets. A number of potential fishing grounds have been located in the middle reaches of the reservoir.

The Unit for inland gear work is located at Nangal (Punjab) near Gobindasagar Reservoir. The reservoir being deep has many peculiar problems in fishing.

The investigations undertaken at the Unit are on simple gill nets made of monofilament and multifilament twines and simple trap nets. Fishing operations have resulted in locating highly productive grounds in the upper and lower reaches of the reservoir.

A Mobile Unit of the Wing attends to short-term exploratory and experimental gear work at various places in the country. The Unit has successfully completed experimental investigations in the Brahmaputra river system in Assam, the Sunderbans in West Bengal and Gandhisagar in Madhya Pradesh.

One handicap, which the Institute has to face in its work is lack of suitable trained personnel and many testing equipments. The former has been largely solved by conducting intense training in the

Institute itself as well as deputing persons for training in foreign laboratories. As regards the latter, no effective solution has yet been found. Some equipments have been imported and some others fabricated in this Institute's own workshop. A Section to deal with electronic testing equipments is also functioning.

Although initially the development was accelerated, the complexity of modern technology, the inter-action of science and technology resulting in the emergence of new techniques, the demand for more complicated and sophisticated testing equipments and the need for a large number of well trained personnel have all apparently retarded the progress in later years. This is what could be expected, for technology in and associated with fishing gear embraces several different scientific disciplines.