

# Research in Fishing Craft and Gear At Central Institute of Fisheries Technology



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FISHING is one of the oldest professions with a large section of people living along the coastal areas of India. The 5000 km. of coastline bordering some of the richest fishing grounds in the world, mighty perennial rivers, extensive brackish water lakes and large inland water reservoirs all throw a challenge to the people in the country to exploit the water resources to augment the food supply and also to help in earning much needed foreign exchange through export of fishery products. Until very recently marine fishing had been restricted to near coastal waters because of the limitation in the area of operation imposed by the unmechanised country crafts which still form the bulk of our fishing fleet. Use of such boats also prevented the application of more efficient types of fishing gear. It was obvious that any substantial increase in the production of fish could not be hoped for until the fishing crafts and gear used

## **The Author.....**

Director of the Central Institute of Fisheries Technology, Ernakulam, Dr. A. N. Bose, is one of the leading Food Technologists in India. Calcutta born Dr. Bose, after taking his M. Sc. in Applied Chemistry from the Calcutta University, took his Ph. D. in Food Technology from the Massachusetts Institute of Technology. Till he joined the Central Institute of Fisheries Technology, as Director, he was Professor of Food Technology in the Jadhavpur University. He is a member of many Technical Committees set up by the Government of India, and member of many bodies like the Indian Standards Institution, the Indo-Pacific Fisheries Council etc. Dr. Bose has travelled widely and has published 39 technical/scientific papers and 13 other papers.

in India were made more suitable for exploitation of rich fishing grounds away from the coastline and made more efficient to increase the catch

per unit effort. The solution of the problems is the improvement in the existing crafts and gear and development of the more effective and more suitable ones for the Indian fishing industry requires sustained careful investigations. In recognition of this requirement the Government of India decided to establish the Central Institute of Fisheries Technology to undertake studies amongst other things in the problems in improvement and development of fishing crafts and gears in order to exploit India's fishery resources more effectively. The Craft and Gear Wing of the Institute was started in 1957 with a Craft Branch and a Gear Branch. For intensive investigations in the specific fields the Craft Branch was divided into three sections — (i) Boat Designing (ii) Craft materials and (iii) Engineering. Similarly the Gear Branch has the following sections — (i) Gear Materials, (ii) Gear Designing and (iii) Fishing Methods.

#### MECHANISATION WAS GREAT NEED

It was clear that any significant improvement in the marine fish landing in India cannot be achieved without mechanisation of the fishing boats. As a first step, attempts were made to put engines in the existing indigenous fishing boats with the purpose of increasing the speed of these boats so that they could reach the fishing ground quickly and spend more time in actual fishing. Mechanisation with out-board motors for fishing boats employing mainly gill-nets yielded rich dividends along Gujarat and Maharashtra coast by improving the catch per unit effort of quality fish like pomfret, hilsa etc. But for mechanisation with in-board engines which is necessary for larger boats and also mechanised fishing, only a few of the indigenous fishing boats were found suitable. For efficient operation moreover, mechanisation of existing sail-boats offered no solution. The modern wooden fishing boats were introduced in India with the help of experts from the Food and Agricultural Organisation. However, for the sound development of the industry, the necessary

designs are to be evolved taking into account specific conditions of the fishery. The Boat Design Section of the Central Institute of Fisheries Technology has undertaken designs of such boats. Till now wooden boats of upto 50 feet length have been designed and constructed. Designs of longer boats made of wood or steel and also of boats for specific types of fishing have been undertaken. It is gratifying to note that most of the mechanised wooden boats now being operated from Indian coast are of C. I. F. T. designs. Efforts are being made to fix the scantlings of wooden fishing boats for their sea-worthiness and for effective operation.

#### IMPROVEMENTS IN BOAT DESIGN

Along with design of the boats the question of materials of construction of the boats, of substitution of imported components, of protection of boat's hull and accessories from biological, physical and chemical hazards etc.



*Boat Designing*

are to be considered as the materials which go into the construction of the boat will determine its cost and also time-schedule of construction. Craft Materials Section of the Institute is responsible for investigations in the above mentioned aspects. 'Teak' has been traditionally used as timber for sea-going vessels in India. Due to increasing demand and high cost of 'teak' another timber 'Aiyani' has been in use in recent years. But the price of 'Aiyani' also has registered steep rise pushing up the cost of construction of wooden boats. Experiments carried out at the Central Institute of Fisheries Technology have conclusively shown that 'Ventek' which is at present only one-third as costly as 'Aiyani' can successfully replace 'Aiyani'. A 30 feet boat built of 'Ventek' is in regular fishing operation for nearly three years and the boat continues to be in very good condition. A 50 feet wooden fishing boat, has been constructed of 'Ventek' at Central Institute of Fisheries Technology and will be used for fishing from the current season.

#### IMPORT SUBSTITUTION

The wooden hulls of fishing boats require a sheathing to protect the timber from marine borers and foulers. Metallic copper is one of the most effective materials for such protection and copper plates have generally been used in sheathing for protection of wooden hulls. But shortage of copper and necessity for importing it has reduced the supply of the material and has tended to slow down the programme for construction of boats. Earlier attempts to replace copper with aluminium had generally failed because of the failure to choose the proper composition of aluminium alloy and to guard against electro-chemical corrosion. Experiments carried out at the Central Institute of Fisheries Technology led to the recommendation on the composition of aluminium alloy to be used in sheathing, on the correct painting schedule including use of anti-fouling paints for the aluminium sheathing and on the arrangements for the electrochemical protection of the sheathing. For the purpose of demonstration



*Wooden test panel is being examined for the effect of Marine Borers and Foulers*

one 30 feet wooden boat at Central Institute of Fisheries Technology was given aluminium sheathing on the under-water portion of the hull according to the recommendations of the Institute. The boat has been on regular fishing operations for nearly three years and the aluminium sheathing on it is still in perfect condition.

Along Gujarat and Maharashtra coast hulls of wooden boats have been traditionally coated with an imported resin named 'Damar Batu'. Experiments carried out by the Institute have clearly demonstrated that many indigenously available resins like Chenjilliam (available in Kerala), Andaman damar etc. can effectively replace the imported 'Damar Batu' and the import of this resin is no longer justified.

#### PREVENTION OF CORROSION

The Institute has come across of several cases of corrosion of propeller blades, propeller



*A section of the laboratory at the Institute where marine corrosion is being investigated*

shafts and metal components in the accessories. In many cases such corruptions have been traced to stray electrical currents. In some cases the materials used in the metal parts has been found to be responsible. From the results of the investigations carried out in this field it has been possible to recommend steps to be taken to prevent corrosion caused by stray current and on the type of materials to be used for different metallic components on the boat, particularly those exposed to sea water.

The Craft Materials Section is also actively engaged in developing anti-fouling paints using indigenous materials as far as possible. In the course of these investigations the Section is collecting very valuable data on the reaction of the various foulers and borers found in tropical waters to the different toxic compounds at different stages in the biological cycle for these organisms.

Due to foreign exchange difficulties and terms of credit obtained from other countries,

we have to import marine diesel engines of different makes. Four companies registered in India also have started or have programmes for manufacture of diesel engines in the country. The Institute is often called upon to test the suitability of such engines for the Indian fishing boats, to provide the installation drawings and to suggest specific steps as the provision of proper ventilation arrangements for air-cooled engines, for proper operation of the engines. The Engineering Section of the Institute has tested several such engines under actual conditions of operation in a fishing boat and has provided the necessary information to the parties concerned. The Engineering Section has also to prepare the designs for mechanical accessories like winches, gurdies, power-transmission systems, remote controls etc. for the smaller fishing boats which are employed in India. The section has thus helped the engineering industry to meet the specific requirements of the fishing boats and to accelerate the speed of mechanisation of fishing crafts and gear.

#### EFFICIENT GEAR NEEDED

A fishing craft will only be as much efficient as the gear it employs to catch the fish. Hence with the mechanisation and modernisation of fishing crafts the fishing nets are also to be designed so that optimum utilisation is made of the power and facilities provided by the craft. Gear Design Section of the Institute is engaged in the designing of the nets and other fishing gear operation from the mechanised boats. It has evolved the design for trawl nets for preferential catch of shrimps from different sizes of boats of upto 40 feet in length keeping in view the optimum utilisation of power available, design of troll lines for catching fish like seer and shark, of gill nets for pelagic fishery and also for use in inland reservoirs etc. have also been made. Investigation on mid-water trawl, trawls with higher vertical opening etc. have now been undertaken. The design of the otter-boards for the required opening of the trawl-nets and easier operation of the net with

less loss of power due to friction etc. is under study.

Fishing method is complementary to fishing gear. Actual conditions of operation for the best performance of the gear are to be worked out if the maximum benefit is to be derived from the improved crafts and gear. Fishing Methods Section is engaged in this important work. Scientific staff of the Institute posted at Cochin, Kakinada, Veraval, Burla (Hirakud), Goa and Nangal are collecting the valuable information on the operation of the fishing gear suitable for the fishery in the particular area and passing them on to the parties interested. For the scientific assessment of the operation of gear a number of under-water measurements are necessary. The equipment required for such measurements are not easily available and whenever available are to be imported at a high price. The Institute is working on and has under trial instruments for measuring warp tension, vertical opening, horizontal spread etc. Complementary effects with the input of electrical energy, sound or light on the efficiency of certain types of gear are also being studied and some very promising results have been obtained. Interesting results have been obtained on the effect of different colours of the webbings on the catch per unit area of gill nets.

The materials of construction of fishing gear is an important factor in its efficient and economical operation. Cotton twine is still the most important material for the fishing nets used by the fishermen in India. The strength of the twines depend on the method of twisting and number of twists given. The cotton twines used by the fishermen are often not of correct specifications and as such are not efficiently used. The Gear Materials Section of the Institute has worked out the optimum method and number of twists for cotton twines to be used for different types of gear. The method of preservation of the nets was also found to be defective and modified methods of treatment to increase the catch has been recommended to permit



*Properties of twines are being studied*

longer use of the nets. Synthetic-fibre twines are replacing cotton twines in rapidly many types of fishing gear. In India also synthetic twines are becoming increasingly popular and its use also is being encouraged to increase the catch of fish. Such twines required for fishing gear are being progressively manufactured in India. The Institute helped the new industry to make the twines of the proper specifications suitable for the Indian fishery. Recent work of the Institute in finding indigenous substitutes for imported Italian hemp used extensively for gill nets, has yielded very promising results. Varieties of hemp produced in India which can-replace the imported hemp in its specific use has been found out.

#### CONCLUSION

This account of the investigations in fishing crafts and gear being carried out at Central Institute of Fisheries Technology will show that

systematic studies on the technical problems connected with operation of fishing crafts and gear have been started in India. In fact this laboratory is one of the few laboratories in the world working in this very specialised field. Work of the Institute has had its impact in the development of the fishing industry in the country. However, the Institute can fulfil its

assigned job successfully and fully if there be close co-operation between the Institute on the one side and the manufacturers of different requisites of the fishing industry and their users on the other hand. The fishing industry in India is on the way to very rapid expansion and the Institute hopes to make its expected contribution in that expansion.

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