PART I

GENERAL

DEVELOPMENT OF TRAWLING IN INDIA

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Of the three main methods of capturing fish, namely luring, attacking and snaring, the last mentioned has hitherto proved to be relatively more effective and apparently yielded better returns. Trawling falls under this method. The trawl is an economic gear, in terms of investment and yield, even in spite of the fact that the total trawl catches come only second to that of the seines. Commercial trawling in Indian seas is of recent origin and seems to have been initially introduced for the purpose of ground resources survey.

The trawling surveys hitherto conducted in this country can be conveniently grouped into two distinct periods; namely, (i) those undertaken during the pre-war days and (ii) those of the post-war period. The former covers roughly three decades from 1900 to 1930 and the latter commenced from 1946. Although the results are not known the earliest attempt for the exploration of the trawling grounds was done by PREMIER in 1900. Later, the Ceylon Company for pearl fishing (1906-07) carried out some exploratory trawling in the seas between India and Ceylon. The surveys conducted off Calcutta, off Madras and off Bombay deserve particular mention as they were also of an exploratory nature under unfamiliar conditions.

During the post-war period a rennaisance in the trawling surveys is clearly visible. Thereto accepted concept that only large vessels could undertake trawling was definitely given up. Small boat trawling was introduced and has come to stay. Similarly starting from the simple beam trawl more sophisticated otter trawling gear have been developed.

Beam trawls are probably the simplest among dragged gear. On the coast of Travancore the gear was used to survey the bottom fauna. A design of a beam trawl was developed on Bombay coast for low powered vessels. The CIFT also developed the design of a 10′ Beam Trawl and made detailed studies with the same. Its efficiency to exploit population of the substratum was increased by the attachment of tickler chain. Although beam trawl has limited application, it can be effectively used as 'try-net' to assess the potentiality of the ground.

In the wake of large scale commercial exploitation of the prawn resources the demand for trawling gear of greater capa-

city increased considerably and paved the way for the introduction of otter trawls. The first attempt with a small otter trawl was made by Mr. G. S. Illugason on the Malabar coast (Tellicherry). This was followed up by more intensive study by the CIFT under the guidance of Dr. H. Miyamoto. Small trawls were also tried by the INP and Off-shore Fishing Stations.

Since its introduction in Indian waters, various experiments were conducted to improve the design, rigging and operation of otter trawls to suit to the local conditions. The design of trawls introduced earlier were either Japanese or Mexican types or a combination of these two concepts. Limited use of the Russian designs can also be noticed in this development. Due to the importance of prawn for export and ready return for the catch landed, several experiments were conducted to increase the prawn catch. These include reducing the vertical lift of trawl; use of a tickler chain on the ground rope of the net; and extension of the wings to cover more ground area. Improved rigging patterns commencing with the simple Hoover rigging to the more complicated ones, with long sweep wires, were also tried.

The size of the trawl is indicated by the length of the head rope. This size is arrived at in proportion to the power of the engine. Similarly, the various parts of the trawl are also proportional to its size.

The trawl designs are designated according to the number of panels that constitute the construction of the trawl bag. In the earlier years two-seam trawls predominated. In the post war period greater use of four seam trawls particularly by the small boats, can be clearly seen. Trawls having six panels are also under trial. A more recent development is the concept of Bulged Belly trawl.

The opening of the trawl mouth, both in the horizontal and vertical directions, the length of warp in relation to the depth of water and the speed of tow are possibly the three important parameters that affect the efficiency of the gear during operation. A reliable apprisal of the horizontal spread of the trawl can be made by mesauring the distance between the warps at two equidistant points and estimating the spread according to the length of warp released. At optimum warp length the mouth opening of the trawl reaches its maximum, after which further increase of the length of warp tends the spread to become erratic. The scope ratio for deep waters is about three times the depth while at lower depths it is up to even eight times. Similarly, the speed of tow is an important factor as far as the species of fish and type of ground are concerned. The trawling speed required at the Bay of Bengal is about 3 to 4 knots while for the Arabian sea it is between 2.5 to 3.0 knots.

For otter trawling the flat rectangular wooden otter boards are the general type in use. The popularity of these boards may be due to its simplicity in construction and operation. The most common pattern of this board is with 2:1 length breadth ratio and rigged with collapsible or fixed type of brackets. The Russian type oval otter boards are favourable on the East coast for the uneven rocky grounds. The superiority of the horizontal curved boards for bottom trawling has been established both in the East and West coasts. But perhaps due to its constructional difficulty, it has yet to attain its deserving popularity. V- form boards are another type introduced in Indian waters. The use of kites in trawling has been used very sporadically for investigational purposes only.

Though the trawling technique has now been well established in India, the majority of the trawlers are small and medium sized vessels, exploiting the inshore

region. This has resulted in the decrease of the per capita yield of the vessel. Hence it has become imperative to introduce larger vessels for the exploitation of deeper waters. The survey conducted hitherto of bottom contour and trawling grounds indicate the existence of intensive trawlable grounds between 150 and 200 fathoms where the catch per hour has been rated even up to 800 kg.

Operation of the double rigged otter trawls have also been successfully introduced in India. But mid-water trawling though much advanced elsewhere, here it is conducted very meagrely which may mainly be due to the active nature of the local tropical fishes. Isolated mid-water trawl operation have been carried out by the CIFT as well as the Indo Norwegian Project authorities along the Kerala and Konkan coasts. Pair trawling was done by the Tayo Fishing Co. (P) Ltd. and by the Deep-Sea Fishing Station, Bombay, during the years 1947-53 and have since been abandoned probably due to the better economic results achieved by otter trawling.

Adequate deck equipments are a necessary pre- requisite for the success of trawling. Most of the smaller vessels employ hand operation technique. Manila or Coir rope is used as the towing warp and the shooting and hauling are rendered through stern posts. This method, besides being hazarduous, consumes, most of the precious trawling time. The warping winch designed by the CIFT can be advantageously used by these vessels.

The necessity and advantage of winch operation for trawling is well known. Design of winches suitable for use by the different classes of vessels are now available readily in India and for this the CIFT has also contributed much.

From the winch, the towing warp are guided through pulleys fixed on the gallows. For stern trawling "Single gallow" or "double gallow" is used. When the single gallow is used it is fixed amid the stern of the vessel and the double gallow constructed as a pair, is fixed one on each stern quarter. Some of the bigger vessels use arch gallows or gantry. For side trawling, two gallows are required, fixed one at the fore and the other at the aft of the same side of the vessel. In some smaller vessels instead of gallows, the stern rollers fitted at the stern gunwale are used. The CIFT has also designed different types of gallows to suit the different classes of vessels.

Instrumentation in trawl fishing has just been commenced in India. The mechanical trawl warp tension meter is perhaps the first Indian instrument used to measure the resistance of the trawl system on board the vessel. The dynamic performance of the trawl system is measured elsewhere by electric or electronic instruments. In India such instruments are still in its infant stage only, although the CIFT has developed various electronic equipments for measuring the various parameters of the trawl gear. Some of them are:- the underwater tension meter used to measure the resistance of the gear, the trawl depth meter used for measuring the operational depth of the trawl and the tilt meter and the angle of attack meter used for measuring the tilt and angle of attack respectively of otter boards. All these instruments are capable of communicating the data to the trawler while the gear is in operation. Thus though a beginning has been made, much more is needed to be accomplished in this important branch of gear technology.
