

TRENDS IN DEVELOPMENT IN THE PRAWN FISHING TECHNIQUE IN INDIA—A REVIEW

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[The paper provides some background information about the developments in the prawn fishing technique.

The important indigenous gear for prawns are the filtering type nets like the stake nets, boat seines and beach seines with bag. The only indigenous net, which can be compared in design with the modern bottom trawling gear, is the "Thuri. Valai" of the Madras Coast. Prawns have also been reported from the catches of gill nets and cast nets.

Dredges and beam trawls are simplest among the dragged gear. Even though several earlier attempts were made with the beam trawl, in 1959 season a detailed experiment was made to study the fishing features of this gear. The subsequent experiments conducted were for comparison with otter trawl, towing of 2 beam trawls one behind the other and the use of tickler chain.

The initial experiments with otter trawls were mainly directed towards operational aspects. The experiments were to evaluate the effectiveness of fully mechanised and partially mechanised operation, the effect of extra buoyancy of floats and the use of tickler chain.

Subsequent developments had been on the structure and design of prawn trawling gear. Effect of long wings and sweeps were tested. Catches of Nylon and cotton nets were compared. The size of meshes of the cod-end have also been increased.]

The history of the developments in the prawn fishing technique in India is not well documented. Hand, noose and pots were probably the instruments introduced initially in shallow water regions. Erection of simple weirs may have followed these particularly during the period of inundation of low lying lands. The art of prawn culture in the paddy fields may be a successor to this technique. The use of textile devices of netting is perhaps the next step. The introduction of the more elaborate implements would have obviously extended the area of operation and

at the present day many indigenously evolved nets are in vogue for the capture of prawns. With the increase of the demand by the processing industries, modern gear like the trawls have been successfully introduced in recent years. New grounds are being explored and the production of prawns has increased considerably more than ever before. Kuriyan et. al., (1962) have conducted many experiments with the prawn fishing gear. The purpose of the present communication is to provide some back-ground information about the developments in the prawn fishing technique in this country.

Indigenous Prawn Fishing Gear

Apart from nooses and pots, the important indigenous gear are the filtering type nets like the stake nets, boat seines and beach seines (with bag). In the stake net the capture of prawn is dependent mainly on the flow of tide and current (Mathai and Sathiaraj, 1964). The boat seines are effective at a time, when the prawns 'shoal' at the surface or midwater, possibly due to some disturbances of the mud banks below. Hornell (1938) in his description of the fishing methods of the Malabar coast of the Madras Presidency has included the designs of several two boat seines, which are effectively used in prawn fishing during the south-west monsoon and the premonsoon periods. Kuriyan et. al., (1962 (b)) described the design and operation of 'Thangu vala' a single boat seine operated in the central zone of the Kerala coast.

Beach seines with bag are more popular on the East coast, more particularly the Gulf of Mannar and Palk Bay region, the Coromandel and Telugu coasts (Hornell, 1925; Thyagarajan and Thomas, 1962; Rao, 1964). The beach seines while in operation, to a certain extent, drag on the ground.

Probably the only indigenous net, which can be compared in design with the modern bottom trawling gear, is the 'Thuri vala' of the Madras zone of the Coromandel coast (Thyagarajan and Thomas, 1962). It is a two craft (Cataraman) bottom drag net. Hornell (1925) has indicated its design and method of operation.

Prawns have also been reported from the catches of gill nets and cast nets (Rao, 1964).

Introduction of Modern Gear

Panikkar and Menon (1955), while reviewing the prawn fisheries of India, have indicated that there are reasons to believe the existence of large stocks of prawns in the Arabian Sea and the need to exploit them with modern gear like the trawls. Several attempts have been made for the introduction of trawl fishing method (Hornell, 1916; Raj, 1929; Chidambaram, 1952; Gopinath, 1954; John, et. al. 1959; Jayaraman et. al. 1959).

(i) Beam trawls: Dredges and beam trawls are possibly the simplest among the dragged gear. Being simple in operation they are

still in use in many South-east Asian countries; West European and Mediterranean coasts (Morgan, 1956; Miyamoto, 1956; Miyazaki, 1957; Deshpande, 1960; Kuriyan, 1964). Scofield (1948) while reviewing the trawling gear of California dates the origin of the beam trawl over 500 years back. According to Miyamoto (1956) beam trawls could be conveniently operated from even sailing vessels. Miyazaki (1962) reports of the operation of 3 to 5 beam trawls from a single sailing boat in Japan.

The first attempt for exploration of fishing grounds with a beam trawl was possibly made in 1900 off the Bombay coast (Chidambaram, 1952). Subsequently, Kurien, (1953) used a 6 ft. beam trawl for the survey of the bottom fauna of the Travancore coast. Burroughs (1958), on the basis of experiments conducted at Bombay, suggested the design of a beam trawl suitable for operation from low powered vessels. The attempts of Deshpande (1960) with the 10' beam trawl in the 1959 season is probably first detailed experiment to study the fishing features of this gear.

The results of this experiment have shown that:—

- (a) the catch per hour of the beam trawl and indigenous gear (Thangu vala), although more or less equal, the catch per head per day is more in the case of the beam trawl — about 19 kg. in the case of beam trawl and 6 kg. in the case of indigenous gear.
- (b) the catches of the beam and otter trawls on the basis of volume of water filtered did not show much difference.

Comparative fishing tests with a 15 ft. beam trawl and a 45 ft. nylon four seam overhang otter trawl were subsequently conducted in the Cochin backwaters (Kuriyan, et. al. 1962). The qualitative and quantitative analysis made on the basis of the horizontal opening and the towing speed showed that bottom burrowing forms including prawns, were more in the catches of the beam trawl, while bottom swimmers dominated the catches of the otter trawl.

To further assess the effectiveness of the beam trawl, investigations were conducted by using simultaneously two beam trawls (10 ft. and 5 ft.) from a single motorized

boat (Despande et. al, 1964). The nets were towed by a single warp. The 5 ft. net was secured immediately behind the 10 ft. net. Since the smaller net was attached behind the bigger one, it was assumed that a portion of the catch, which escaped the first net, was picked up by the second one. However, as the second net was only just half the size of the preceding net, the quantity of catch that escaped was calculated by doubling the total catch of the second net. The experiment showed that on an average about 21% of prawns and 11% of fish escaped a beam trawl net during operation (Kuriyan et. al, 1962).

To increase the efficiency of the beam trawl in the capture of prawns, a tickler chain was attached to a 10 ft. beam trawl net. Comparative hauls with and without chain showed that, while the chain had no apparent effect on the fish catch, the catch of shrimps increased by 47% (Despande and Sivan, 1962).

Beam trawls were also tried at Veraval (Gujarat State) and Kakinada (Andhra Pradesh). At these centres the net has been used more as a try net in search of new prawn grounds.

(ii) Otter trawl : It has already been indicated that several attempts have been made in earlier years with otter trawls. Very little information is however available about the gear used in these surveys. Shariff (1961) and Poliakov (1962) in their reports on the surveys conducted in the Bay of Bengal have indicated the designs of trawling gear tried. In the survey conducted by Mr. Illugason on the West coast, he is reported to have used a 30 ft. flat trawl from a small boat of 10 H.P. (John et. al. 1959). Organised commercial otter trawling for prawns commenced from 1958 with Cochin as base. Several new designs of otter trawling gear evolved have been introduced (Satyanarayana et. al. 1962; Kuriyan et. al. 1964). Miyamoto et. al. (1963) reviewed the trends in the development of the prawn fishing methods on the West coast of Peninsular India.

The initial experiments were mainly directed towards the operational aspects of the other trawling gear. To compare the landings of the nets operated from partly and fully mechanised crafts, an investigation was conducted by using two identical boats having

engines of same H.P. and both boats using similar designs of net. The catch per hour of trawling was found to be more in the case of the fully mechanised vessel. The catch of prawns and fishes landed by this vessel was more by 43% and 145% respectively (Deshpande, 1960 b).

To increase the catch of prawns and relatively reduce the landings of fish, an experiment was conducted reducing the vertical height of the net by the adjustments of the floats on the head rope. The data on analysis showed that in each series of comparative tests the catch of shrimp was more when the number of floats attached to the net was less (Despande and George, 1964). This would be suggestive of the fact that for increasing effectiveness of the shrimp otter trawls heavy ground rope and less buoyancy on the head rope are necessary.

The use of a tickler chain for increasing the prawn catches of otter trawls was also experimented by Deshpande and George (1964 b), with a 55' shrimp trawl net. The attachment of the chain increased the prawn landings by about 71%. The increase in the prawn landings by the attachment of a tickler chain has also been reported from Veraval (Deshpande and Kartha, 1964).

Subsequent developments had been on the structure and design of the prawn trawling gear. Derigns of the common shrimp trawls used in Mexico (Robas, 1959) and Japan (Miyazaki, 1957; Miyamoto, et. al. 1963; Kuriyan, 1964) show an interesting feature. While the former has very short wings, the latter has long wings. Japanese fishermen believe that a long wing trawl would cover more horizontal distance on the ground and thus increase the prawn catches. To test the utility of long wings, a 45 ft. otter trawl was operated at Cochin with and without long wings (20 ft. each). The catches of prawns was noticed to increase by about 50% when the additional wings were provided to the net. However, in the experiments at Veraval (Deshpande and Kartha, 1964) the long wings had no apparent effect on the prawn catches.

A similar experiment was also conducted with and without long sweeps (hands) for the trawl net. The data gathered is presented in Table I below. The net used was a 55' shrimp trawl.

TABLE I

COMPARATIVE CATCH EFFICIENCY FOR 55' SHRIMP TRAWLS WITH SWEEPS AND WITHOUT SWEEPS (1962 -- 1963)

No. of hauls	With sweeps				No. of hauls	Without sweeps			
	Duration		Catch in kg			Duration		Catch in kg	
	Hrs.	Mts.	Prawn	Fish		Hrs.	Mts.	Prawn	Fish
157	139.20		4863.6	8160.4	135	112.40		2378.5	4268.2
Catch per hr. (kg)			34.9	58.5				20.1	37.9

It would be clear from the Table above that the long sweeps provided for the net increased the catch of prawns by about 50%.

Miyazaki, (1962 b) comparing the efficiencies between Amilan (Nylon) and cotton beam trawls reported that in the term of

General Remarks

Application of science and technology in the production process of fishing is more complicated than in other industries. Fisheries production is strongly affected by the gear and craft employed, the topographical conditions, micrological and ecological factors pre-

TABLE II

COMPARATIVE CATCH DATA OF COTTON AND NYLON TRAWL NETS EACH WITH 44' HEAD ROPE LENGTH (1963)

No. of hauls	44' Nylon trawl				No. of hauls	44' cotton trawl			
	Duration		Catch in kg			Duration		Catch in kg.	
	Hrs.	Mts.	Prawn	Fish		Hrs.	Mts.	Prawn	Fish
48	48.30		244.0	1268.0	51	53.30		650.0	1704.0
Catch per hour (kg.)			5.0	26.1				12.1	31.8

catch-per-drag the Amilan net had, in catching the bottom swimmers efficiency twice as high as the cotton net, while there was no significant difference for the bottom burrowers. Table II shows the comparative catch data of cotton and nylon trawl nets each having 44 ft. head rope length.

It should be clear from the Table II that there was no apparent effect on the catch of prawns by substituting nylon for cotton. In fact the cotton net caught more. Being a heavier material, the cotton net might have dragged more on the mud.

During the initial years of introduction of trawl nets, mesh sizes of the cod-ends ranged between 0.5 to 0.75 inch stretched measure. Since cod-end mesh has a direct influence on the size of prawns caught, in subsequent years the mesh size was increased in steps to 1.25 inches.

vailing in the specific area. Fishing methods borrowed from more advanced countries cannot be applied straight away without further experimentation in the different environments. There is therefore need to try out the various gear in actual fishing operations in the different localities.

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