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STRATEGIES FOR THE DEVELOPMENT AND MANAGEMENT OF PURSE SEINE FISHING IN INDIA

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ABSTRACT

Purse seine, an important bulk catching method was first evolved in the Atlantic Coast during the last quarter of the 19th century and in India the developmental efforts were initiated by the Indo-Norwegian Project in 1954 and the operations on commercial lines were taken up from 1976 onwards. Enterprising fishermen of Karnataka were the first to introduce this modern method of fishing, switching over from the traditional rampani nets. The purse seines spread to Kerala and Goa later. Initially boats of different length and deck arrangements were tried and after gaining competency, 15 m boat emerged as the suitable vessel with deck arrangement for portside operation of purse seine net of 600 m length and 55 m depth.

Competition and conflict arose between traditional fishermen and purse seine operators as their gears are operated in the inshore region and for the same pelagic species of fishes. Regulations were formulated delimiting the activity of purse seiners to avoid conflict resulting in the reduction of catch. In the light of the above situation the paper deals with the recommended strategy for management of resources and development of purse seine fishery in India.

INTRODUCTION

Some species of fishes aggregate to form large shoals, not staying near the bottom but found pelagically up to the surface. Such shoals were exploited before the introduction of modern methods of fishing only when they come to the sea surface or if they come near the shore, large fisheries occur and are caught by using simple fishing techniques. Instances of these are common around the world, also in Indian waters for sardine, mackerel, anchovy etc.These fishes are caught by indigenous fishing gear like the shore seine 'Rampani' when the shoals approach the shore and by boat seines like 'Iraguvala', 'Kollivala' and 'Thanguvala' and gill nets of encircling types when they appear near surface. During operation in deep waters when the lower edge of the nets do not reach the bottom, such methods cannot be fully successful as the encircled shoal will dive and escape from the zone of action of the gear unless the predatory fishes below the net prevent the fish from diving. This downward escapement can be prevented by surrounding the fish from all sides as well as from the bottom by hauling the foot rope of the net faster as in 'Lampara' net which is akin to the 'Kolli vala' of the Kerala coast. Quite different in construction and operation but with the same effect of closing the bottom horizontally, are the purse seines, by hauling the purse line. Purse seine is the most important gear for catching pelagic fishes and produces the highest percentage of the total catch of the world and considered as the most efficient bulk and energy saving fish catching method.

Purse Seines are made of long wall of netting with a float line and a sinker line of equal or slightly longer length. With this form of construction a deep bag as in 'Kolli vala' cannot be added and unlike the 'Kolli vala' the escapement of fishes from the lower side is prevented by closing the bottom by hauling the purse line which is passing through the purse rings hanging from the sinker line.

Purse seines are considered to be of recent origin in large scale fisheries for pelagic fishing. It is said to have been evolved from beach seines.

improved and used in the fjords of Rhode Island in 1826. Yet others think, a fisherman of Maine invented this net in 1837 (Scofield, 1951; Brandt, 1984). Later on, the purse seines were distributed to other parts of the world, to Sweden, Norway, Japan etc. In India this gear was first tried by Norwegians off Quilon around in 1956 (Mukundan and Hakkim, 1980)and Portuguese off Goa in 1957-58 (Sadanandan *et al.* 1975). Department of fisheries of Goa conducted Purse seinging from 1964 and results are discussed by Dhawan (1976). Intensive and systematic purse seineing was conducted by the erstwhile I.N.P (Menon, 1970). Shallow water purse seines were developed by I.N.P. after extensive fishing operations from 7.6 and 10.9 m. vessels, Thus it can be seen that purse seine is a comparatively new introduction and in fact the industry has taken up only in 1976, first in the state of Karnataka followed by Kerala. Since then any small developed or improvement made in the design of net or operation was carried out by the fishermen themselves.

A detailed description of the net is given by Scofield (1951), Green *et al.* (1971) of the American tuna purse seine, of the Norwegian and Icelandic purse seines by Thorsteinsson (1971) and of the Japanese type by Inoue (1971). The design details of the net used in Goa is described by Sadanandan *et al.* (1975) and the nets developed by I.N.P. suitable for 10.9 and 17.3 m vessels are given by Verghese (1974). Mukundan *et al.* (1980) give design and construction details of net made of materials available in the country and suitable for 13.2 vessel and Mukundan and Hakkim (1980) described a 400 m net suitable for vessels of 13.2 to 15 m length. Presently vessels engaged in commercial operations are using nets weighing about 1 to 1 1/2 tonnes having a length of 600 m and 55 m depth.

Theory of design for purse seine is described by Fridman (1973) and method of fabrication by Green *et al.* (1971), Hamre and Nakken (1971), Iitaka (1971), Inoue (1971) and McNeely (1961). The purse seines operated in this country are however designed based on exprience because size of the shoal, swimming speed and behaviour of fishes are not adequately understood. For the shallow water opertions the length /depth ratio is 10:1 and the main consideration while deciding the mesh size is the prevention of gilling of the prey and too small a mesh size would increase the weight of the net. The mesh size for the main body of the net is 16 to 18 mm and for the bunt is 12 mm for upper and lower selvedges or guardings mesh size are 20 and 60 to 70 mm respectively. Larger mesh size for the lower selvedge is to allow filtering of mud likely to pile up while pursing the sinker line to close the bottom.

Nylon, although lighter than cotton which is having a good sinking speed, is prefered because of its excellent properties. In Japan combination twines are used to improve sinking speed of nets (Iitaka, 1971). Material used for selvedges is polyethylene as it is cheaper , Knotted netting is used for the bunt and also for main body as against the common paractice of knotted for bunt and knotless for the main body. It is reported that the knotless netting made in this country is not strong and its service life is short and due to the difficulty in mending it is not used. Although mending is not a serious problem, the strength of the knotless netting require further investigation to improve the properties. If knotless netting is used the weight of the netting can be reduced. Hexagonal netting is used in Norwegian purse seine fisheries with many advantages, it is not yet tried even though it can be made in the country. The twine used is nylon 210D X 4 X 3 for the bunt 210D X 2 X 3 for the main body and polyethylene 1.5 mm dia. for the upper and 1.75 to 2 mm dia. for the lower selvedges. Polypropylene is used for various ropes including the purse line. About 3500 PVC cylinderical floats and 3000 sinkers each weighing 200g. are used. An ingenious modification effected by the fishermen themselves was the use of an additional line 30 to 40 cm above the sinker line and from this line hung the purse bridles supporting the rings. During hauling of purseline, it is found

advantageous because the sinker line will not get lifted from the ground thus preventing the escape of fish below the line. The estimated cost of the gear is around Rs. 4.5 lakhs. The size of the vessel ranges from 13.2 to 15 m and costs over Rs. 8.0 lakhs and are powered by engines 65 to 110 hp.

The deck equipment and deck arrangement are described by many authors (Scofield, 1951 and Green *et al* 1971). The deck arrangement of purse seiners of Goa was given by Sadanandan *et al.* (1975) and of Cochin by Verghese (1976) and Mukundan and Hakkim (1980). The hydraulic deck machinery is considered as one of the most important requirement for efficient and speedy hauling of the gear and contributed to the success of this fishing method in advanced countries. However, because of the prohibitive costs, it is not yet been used in the commercial seiners of India. C.I.F.N.E.T. has developed, installed and used for a long time, without any trouble an hydraulic winch for its 13.2 m vessel. The hauling of the purse line is by a mechanised gypsy (Hameed and Asok, 1987) and the hauling of the net is done by the crew.

Typical purse seine operations, sinlge boat, two boats, mother ship, starboard and port operations are described by Sadanandan *et al.* (1975), Verghese (1976) and and Mukundan and Hakkim (1980). In earlier years both starboard and port operations were found in Cochin, presently port opertaion is found most acceptable. The visual scouting is done eventhough in advanced countries Sonar and Echo sounders are indispensible for fish location and some cases aircrafts are employed for aerial scouting of shoal and guidance in setting the gear.

Catch per set is reckoned in the case of purse seines instead of catch per hour for trawling and the average works out to be 800 Kg per set, 3500 - 6000 kg per day is a very modest estimate. Verghese (1977) has described the details of conversion of a 10.9 m trawler to a purse seiner and has a projected surplus of Rs. 83,700/- for seine/trawl combintion operation. Mukundan and Hakkim (1980) from the information collected from a commercial vessel found a net profit of over 2.0 lakhs. This can be many times more in a good fishing season. Dhulkhed *et al*, (1982) worked out the break even point of a purse seiner to be Rs. 5.0 lakhs. Hameed and Asok (1987) found a profit of Rs. 3.5 lakhs per year and a pay back period is about two and half years.

As there is no reliable information, a detailed study would give more information on the quantity of fish landed and the economics of operation including the earning of the crew in comparison with other fishing techniques.

The sardines and mackerel constitute the major catches of purse seine and the new resources exploited are catfishes , anchovies and carrangids.

For the years 1960-71, Sekharan (1975) estimated the total stock of 9,50,000 t of oil sardine and mackerel with a standing stock of 4,60,000 t. The pelagic fisheries project has estimated a potential of 4,00,000 , 3,00,000 and 5,00,000 of sardines, mackerel and anchovies respectively on the west coast. Besides, there are other resources of catfishes, tuna etc. vulnerable for purse seining. The major species like sardine and mackerel have exhibited marked year to year fluctuations probably due to variations in year class strength caused by other factors.

During 1984-85, 1,65,537 t of sardines, 40,411 t of Indian mackerel and 1,10,373 t of anchovy were landed (CMFRI, 1986). A comparison of the available resources and the landings indicates that the resources are not fully exploited. Advantages of the available resources need to be tapped and fully utilized to achieve nearly all the national objectives.

The resources in the inshore region were exploited by the traditional fishermen with their indigenous craft and gear. With the introduction of modern fishing techniques like trawling, two boat mid water trawling and purse seining a new situation has arisen as both groups have to depend on the same resources more or less in the same area leading to conflict between them. Traditional fishermen mainly depending on the bottom and pelagic resources near to the shore

feel that their catches have decreased resulting in lower income (Kalawar *et al.*, 1985). The introduction of purse seining added one more dimension to the problem that is competetion for price for the same species. The unpleasant encounters created law and order problems leading to barring of fishing activities and delimitation of fishing zones. During the last 40 years, since independance, significant strides have been made in the overall development of fisheries both marine and inland and at present a plateau has been reached at least in marine sector. Therefore, it is imperative to give more attention for increasing fish production maintaining sustainable yield of the exploited resources, diversification of fishing and exploitation of new resources, for which new strategies have to be evolved to achieve the national goals, which are:

1. Our knowledge of the biology and dynamics of fish populations is far from adequate, therefore need further detailed study taking into consideration also the multispecies interaction.

2. There is very little information of the total effort and landings in the traditional and the mechanised sectors. It should be made obligatory to furnish the fishing data, where ever possible otherwise intensive action should be made to collect the same.

3. This would enable to predict the sustainable yield, the required number of vessels to be deployed, delimitation of the fishing zones and the banning of the fishing ativities during the breeding seasons.

4. The traditional fishermen who are engaged in fishing, should be encouraged to mechanise their craft to enable them to fish far from shore and to increase their fishing time and catch.

5. Employment opportunities may be made available to them in purse seining and other diversified fishing vessels.

6. Efforts should be made to improve the preformance of purse seine nets and boat to enable them to fish in deeper waters where sonar surveys may be conducted to enable catching of submerged shoals.

7. Anchovy resources are not fully exploited and research should be directed to exploit these resources by purse seining.

8. As purse seining is introduced very recently, much research work is not done for its improvement. Since it is an energy efficient method there is need for further development and Improvement.

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