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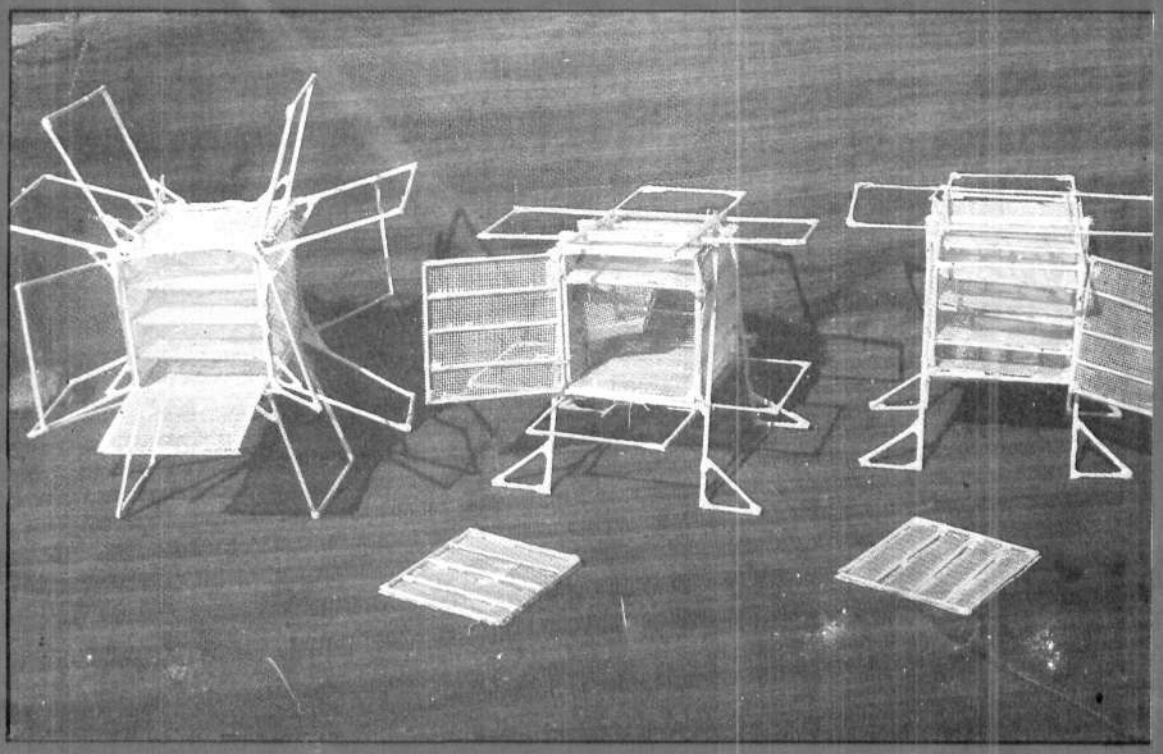

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865 CHANGING PATTERNS IN THE MACKEREL FISHERY OF THE MALABAR AREA

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Introduction

Radical changes have occurred in the methods of the traditional mackerel fishery of Malabar during the last four decades. From the inefficient methods as observed by Nicholson *(Bull. Madras Fish. Bureau,* **1** : 9-50, 1915) the fishery metamorphosed into dexterity by the end of 1980s with huge, small-meshed nets being operated from large and faster boats. The present study is an attempt to evaluate the consequences of this transformation in the harvesting.

Data base

Detailed data collected regularly on catch and effort in the mackerel fishery from Beypore, Vellayil, Puthiangadi and Puthiappa (important landing centres in Calicut) during 1994-'96 and data on the length-frequency distribution in the commercial catches of mackerel in these centres during the same period form the basis of this study. Occasional visits were made to different landing centres in the Malabar area (from Malappuram to Kasaragod districts) to study variations in the fishery. Data presented by the Madras Fisheries Department in the Fish Statistics of the west coast and Madras for the years from 1931-'37, the Madras Fisheries Administrative Reports for the years from 1935-'37 and by various workers on the mackerel fishery of the area were also reanalysed for comparison with the past.

Retrospect

The crafts : Until 1984 dug-out canoes with lengths varying from 6.5 to 9.8 m were used in the mackerel fishery of the area except in a small area in Malappuram Disctrict between Kootai and Vadakekadappuram where plank built boats were also in use. These crafts were being propelled by men using oars. Hence, most of the time and energy were being used for going to the fishing area, searching for shoals and return jurney, restricting the fishing operations to a distance of less than 10 miles out in the sea. In the 1984-'85 season outboard engines were used for the propulson of these dug-out canoes. The use of outboard engines revolutionised the indigenous fishery of the area. The fishermen started with an engine of 7 hp which soon became obsolete when they went for engines of 25 hp. The engines helped them to save time to go to the fishing area, search for shoals, trap the fish and return to land their catch. They could go well beyond 10 miles searching for fish. By 1987 all the country crafts were fitted with out-board engines.

In the meantime, due to the high cost of wood the dug-out canoes became very costly which resulted in the entry of plank built boats in a big way to replace them. These plank built boats had a length of 8.5 m, a width of 1.55 m and a depth of 0.8 m. They were flat bottomed and with a transom stern to fit the out board engines conveniently, but were not sturdy as the dug-outs. This problem was solved by coating the boats with fibreglass. Later the wooden planks were replaced by marine plywood.

In 1988 the ring sienes were introduced. The operation of this large net needed a crew of more than 25. Large *kettuvallam* was introduced for this purpose. *kettuvallam* is a large plank built boat with a length of upto 20 m and a width of 1.5 m. Heavy net, increased the number of crew and the large boat made the unit very cumbersome and needed more power for propulsion. This problem was solved by the use of 3 nos of 25 hp outboard engines which was later improved by 3 nos of 40 hp engines. Still the craft had no space for bringing the catch. Hence, the unit started the practice of taking one carrier boat with them to land the catch quickly as the unit continued the fishing. The carrier boat also needed an outboard engine of 25 hp. Now the fibreglass coated *kettuvallam* with a transom stern is being made using marine plywood to which the 3 outboard engines can be fitted conveniently. All these changes in the craft and gear happened in the later half of 1980s.

The gear: The change in the gear was much slower than that of the crafts. The most important gear in the mackerel fishery till the middle of 1960s were differnt kinds of boat seines made of cotton and hemp fibres, with a mesh size of above 35 mm at the mouth and wings. *Ayilakolli* was the most important boat seine. *Ayilachalavala*, a gill net with a mesh size of above 50 mm was also popular. By the middle of 1960s, when nylon fibres revolutionised net making, a new boat seine called *pattenkolli* made of nylon fibres and with much smaller mesh replaced the old *ayilakolli*. The nylon fibre was also used for making the *ayilachalavala*. These gear dominated the mackerel fishery till 1988 when ring seines with a length of 540 m and a depth of 80 m and a mesh size of 18-20 mm were introduced. The ring sienes became an instant success and soon made all the existing gear in the fishery obsolete. Only *ayilachalavala* survived with much reduced importance.

Capital : In 1984 a *pattenkolli* unit was costing around Rs.1,10,000/- and an *ayilachalavala* unit around Rs. 60,000/-. In 1989 the ring seine unit was costing around Rs.5,50,000/-. With further improvisations the cost of a ring seine unit in 1994 was as detailed below :

1	No. of *kettuvallam*	Rs. 900.00
2	Nos. of 40 hp engine	Rs. 2,10,000
1	No. of 25 hp engine	Rs. 70,000
1	No. of ring net	Rs. 2,25,000
	Total	Rs. 5,95,000
1	No.of carrier boat	Rs. 52,000
1	No. of 25 hp engine	Rs. 70,000
	Total	Rs. 1,22,000
	Grand total	Rs. 7,17,000

Fuel per one fishing trip

Kerosene	150 ltr
Petrol	30 ltr
Engine oil	15 ltr

Later, with the use of 3 nos of 40 hp engines the initial cost and running cost increased further. Besides, the repairs to engines, boats and net are very costly. All these made the indegnous mackerel fishery capital intensive.

Other facilities : Fishing harbours and jetties made the landing of catch easy and safe even during the rough monsoon season. The Puthiappa Fisheries Harbour facility made available in the beginning of 1990s increased the operation of ring seines during monsoon. Auctioning shed, gear shed and road facilities here helped the fishermen to keep their units safe and also sell the catch during this rough weather.

Trawl fishing : By early 1990s the trawl fishing spread to areas beyond the depth of 40 m in search of cephalopods. With larger boats and powerful engines the period of a single trawling trip increased to 2 to 3 days. Mackerel catch by trawls remarkably increased, especially during summer from depths beyond 35 m. In the 1994-'96 period 39.4 % of the total mackerel catch of the area was landed by trawls.

Consequences

The fishery : Table 1 gives the average annual catch of mackerel, month of peak catch and the dominant gear used during different periods. In the earlier period (1931-'37) the peak catch was in January with *ayilakollivala* as the dominant gear. In 1965-'67 when *pattenkolli* became the major gear the peak catch was in October. In 1984-'88 when outboard engines were introduced the peak catch was in September. In 1988-'92 when ring nets replaced all the earlier gear in the fishery the peak catches continued to be in September, with catch before September increasing than that after September. In the present period (1994-'96) with Puthiappa fisheries harbour facility available, the peak catch is in August with a sharp decline afterwards. The average annual catch showed a declining trend from the earliest period until the outboard engine period, from where it showed an increase. The catch data given here is collected from Vellayil which was the most important mackerel landing centre in Calicut. But, by the beginning of 1990s the harbour facility in Puthiappa was available, which provided a safe landing place for the ring net units during the rough monsoon weather. This caused an increase in the fishing activity during monsoon resulting in bumper catch of juvenile mackerel. The catch data collected in 1994-'96 includes the catch from Puthiappa also. The increasing mackerel catch by trawls landed in this harbour also is included in the total catch of this period. Hence, the annual average catch of this period is not comparable with that of the earlier periods. Vellayil lost its earlier importance as the major mackerel landing centre and comparison of the catch landed in Vellayil at present with that of the earlier period may not be justifiable. However, the annual average catch in Vellayil during the period is estimated as 497 tonnes. It can be said that, though the mackerel landings improved with the increasing efficiency of crafts and gear and better landing facilities, it is not much of an improvement over the earlier periods, when the primitive type of crafts and gear were in use. All the increase in the efficiency of fishing at a very high cost has not produced a corresponding improvement in the catch.

58.59 % of the total mackerel catch during 1994-'96 was contributed by ring nets, 39.51 % by trawls and the remaining 1.9 % by *ayilachalavala*. Fig. 1. shows the monthly percentage ccontribution by different gear. The ring nets dominated the fishery during monsoon months. In other months most of the mackerel catch was made by trawl nets.

Size groups : Another disturbing fact is that as the efficiency of fishing improves, the month of peak catch advances towards the monsoon sea

TABLE 1. *Comparison of the mackerel fishery during different periods*

Period	Average annual catch (t)	Month of peak catch	Dominant gear	Mesh size	Source
1931-'37	1,042	January	*Ayilakolli*	35mm	Madras fisheries Bulletin.
1957-'60	985	December	"		Pradhan & Reddy (*Indian J. Fish;* ***9A*** (1): 100-109, 1962)
1965-'67	339	October	*Pattenkolli*	23 mm	Venkatraman & Rao (*Indian J. Fish;* ***20*** (2): 448-475, 1973).
1984-'88	350	September	*Pattenkolli* with OBE		Yohannan & Balasubramanian (*J. Mar. biol. Ass. India,* ***33*** (182): 246-254, 1991).
1988-'92	970	September	Ring net with OBE	18 mm	Yohannan & Sivadas (*MFIS* No. 119, p. 1-3, 1993).
1994-'96	1,328	August	"		Present study

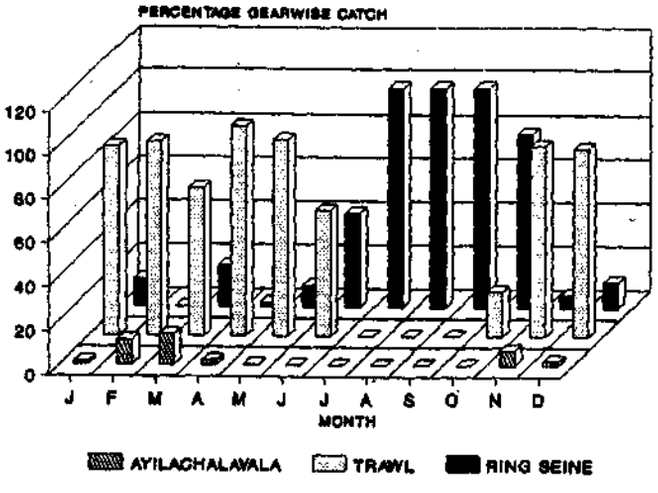

Fig 1. Average gearwise percentage catch in different months during 1994-'96

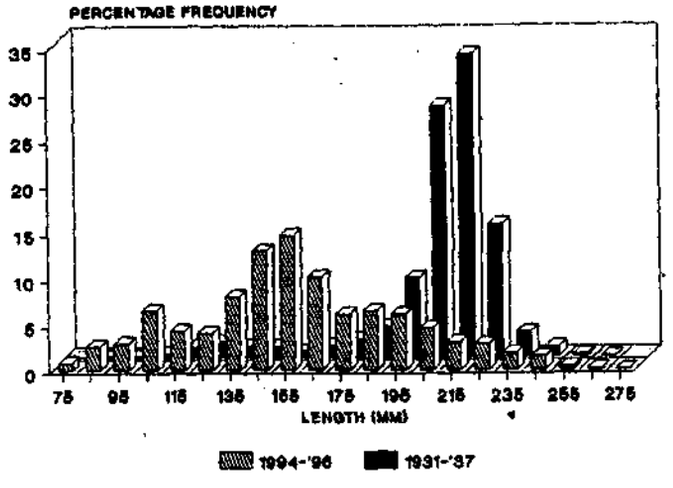

Fig. 2. Average length-frequency distribution in 1931-'37 and 1994-'96.

son and the mean length of the fish in the commercial catches decreases. Fig. 2 shows the percentage frequency of different length groups in the catches of 1931-'37 and 1994-'96. In the 1931-'37 period the peak catch was from 20-23 cm size group and mean length was 204.93 mm, whereas in 1994-'96 the dominant group was of the size from 13-16 cm, the mean size being 161.78 mm. The reason for this is evident from Fig. 3 in which the mean size of the fish caught during different months are given. In 1931-'37 the smallest size groups were caught in July. The size of the fish gradually increased from Jully and reached a peak by May, with minor ups and downs in between. In 1994-'96 period also, the smallest size group appeared in July, the mean size reaching a peak in January. From Fig. 4 it can be seen that the peak catches in 1931-'37 was in December-January when the mean size

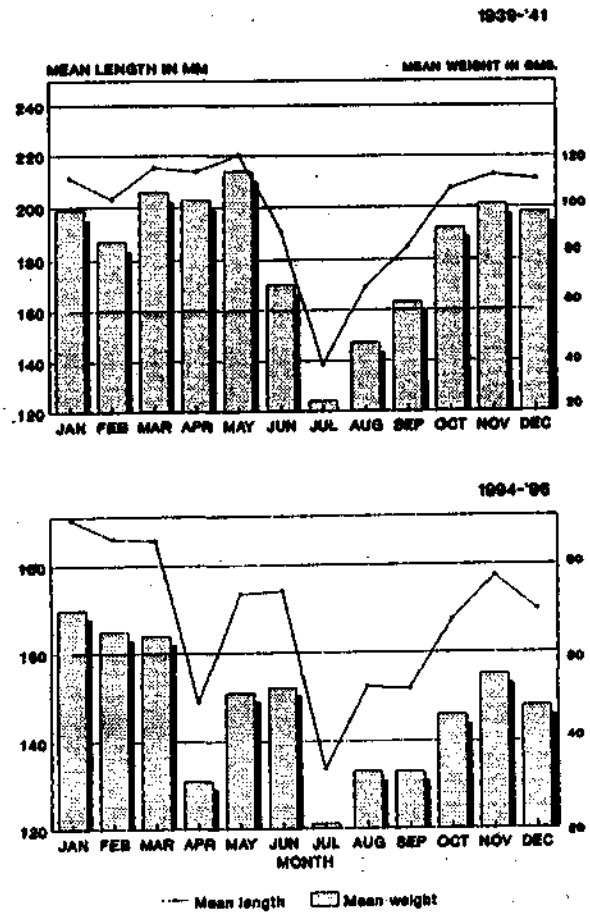

Fig. 3. Monthly mean length and weight of catch during 1931-'37 and 1994-'96.

was high. But in 1994-'96 the peak catches were in July-August when the mean size was very low. There is a gradual decline in mean size from January in 1994-'96 which is very sharp in April. The dips in the mean size in figure indicates the recruitments to the fishery. The major brood to the fishery was recruited in July in both the periods. The minor dips in the mean size from the gradual increase indicates that minor recruitments occurred in December, February and April of 1931-'37. But, in 1994-'96 recruitment is indicated in all those months as well as in September. The recruitments in this period seems more prominent, especially in April. It is perhaps not

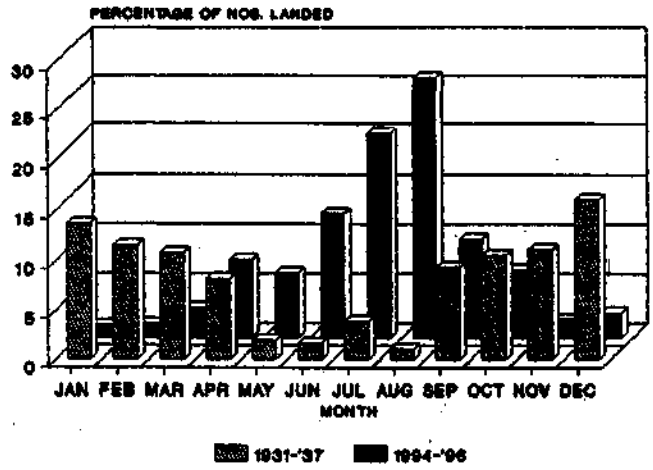

Fig. 4. The monthly percentage of catch in numbers during 1931-'37 and 1994-'96.

real but an illusion created by the increased exploitation of early juveniles due to the reduction of mesh size of the major gear employed and the increase in fishing activity during the monsoon. In 1939-'41 the major gear was boat seines with a mesh size of 35 mm at the mouth and wings avoiding the catch of smaller size groups. But in 1994-'96 major gear, ring seine, with a mesh size of 18-20 mm did not allow the escape of any small size groups. Fig. 3 also shows that in 1931-'37 the mean length and weight of the fish caught during the peak fishing period was above 200 mm and around 90 g respectively. In 1994-'96 the values came down to around 150 mm and 30 g respectively. Fig. 4 shows the monthly percentage contribution of the catch in numbers during 1931-'37. The figure shows that in 1931-'37 the fishery was active during October-March with peak catches in December-Jaunary, the period when large size groups dominate the fishery. But, in 1994-'96 the fishery was active in July-September period (monsoon months) especially in July-August when smaller size groups dominated the fishery and peak was very much prominent than in 1931-'37 period.

Summing up

The increasing efficiency of the mackerel

fishery by way of increasing size of the net and decreasing mesh size, increasing speed of the crafts, range of fishing operations and landing facilities do not seem to move in the right direction. These are used only for harvesting the stock early and fast. In the absence of proper management and the open access system the present motorised indegenous fishing fleet is bound to increase. The fall in catches after August is very sharp indicating an early decline of stocks available to the fishery. The present growth-over fishing can soon develop into recruitment overfishing and the stock would collapse. The monsoon fishery do not allow a large portion of the new recruits to grow beyond 16 cm when the size at the first maturity of the fish is above 20 cm.

In the past the rough monsoon season protected the new recruits from over-exploitation and allowed growth during its fast period. During the postmonsoon and summer, they had the protection of deeper depths. These refuges are now being violated. Observations indicated that the situation is same all along the Malabar area. The indications are ominous for the stock of the species that sustain the pelagic fishery of the area.

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