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THE EMERGING PURSE SEINE FISHERY FOR ANCHOVY (WHITEBAIT) RESOURCES OF THE WEST COAST OF INDIA*

Introduction

One of the most significant developments in the marine fisheries sector, in recent years is the large scale introduction of purse seine fleets along the coasts of Karnataka and Kerala, for the commercial exploitation of pelagic fish resources. This development may be considered as significant as the introduction of mechanized trawling in late fifties in Indian waters for the exploitation of shrimp resources.

Though purse seining was introduced about a decade ago by the state authorities in Goa and by the erstwhile Indo-Norwegian Project in Kerala for exploratory fishing, the recent development of big fleets of purse seiners, with the introduction of about 200 boats in Karnataka and 60 in Kerala in a matter of 2-3 years only has created considerable management problems. Some of these have been lucidly brought out by Silas *et al.* (*Mar. Fish. Infor. Serv. T & E Ser. No. 24, 1980*). One of the disquietening features of the purse seine fleets presently operating, however, is that they employ gear with a mesh size of about 12-13 mm, both for small as well as big pelagic species. As a result increased amounts of very young fish of important pelagic species like oil sardine, mackerel, horse mackerel and scad are being caught year after year. This, besides being a wasteful utilisation of the resources, will lead to decreased catches. Appropriate mesh regulation is, therefore, a rational approach in the exploitation of these fisheries.

It may also be stated further that the present infrastructure available for handling, processing and marketing of the fish landings has built-in capacity only to meet the requirements of the artisanal fishery, but inadequate to meet the demands of a far more efficient purse seine fishery that brings in tremendous amounts of pelagic fish catch. Consequently, there is considerable waste in utilization, fluctuations in price structure and a serious impact on the traditional (artisanal) fishery in a complex manner.

The purse seine fleets of Karnataka and Kerala, in addition to exploiting the resources of oil sardine, mackerel and horse mackerel of the areas, have since been able to fish increased quantities of whitebait (*Stolephorus*) resources during the months October-December, resulting in unprecedented landings especially off Karnataka coast in 1980 fishery season. An account of this emerging whitebait fishery is presented here based on the observations made during October, November 1980.

Purse seine fishery for whitebait

From the point of development of this new fishery, Mangalore in Karnataka and Cochin in Kerala occupy prominent places. From 73 tonnes landed by purse seines during 1978 at Mangalore, the annual whitebait catch rose to about 721 tonnes in 1979 and shot up to 4,588 tonnes in 1980. The fishery yielded an estimated catch of 2,240 tonnes in 1981. Although the whitebait landings at Cochin, compared to Mangalore, were of lower magnitude, the same trend in the increased production at this centre also was evident over the years. Thus, from a meagre catch of about 4 tonnes in 1979, the whitebait landings rose to 255 tonnes in 1980 and 319 tonnes in 1981 (Table 1). In these years especially in 1980 the bulk of the catches was landed during a short period of three months (October - December) at both the centres as evident from Table 2. It may be seen from the data that during the main fishery season, peak landings were obtained in October at Cochin and October November at Mangalore.

The unprecedented landings of 1980 season

The unprecedented landings of whitebait during October November 1980 at the purse seine landing centres at Cochin in Kerala and at Mangalore, Malpe and Gangoli in Karnataka were closely monitored. The centre-wise data on the catch and fishing effort during the above period are presented in Table 3. The peak landings were obtained in October at all the observation centres. It is to be mentioned, however, that the peak fishery started by 1st October off Cochin, and only by about 22nd October at most of the centres in Karnataka.

Table 1. Annual whitebait landings (in tonnes) by the purse seine fleet at Cochin and Mangalore Centres

Year	Cochin	Mangalore	Total
1979	4.3	720.9	725.2
1980	255.3	4588.3	4843.6
1981	319.0	2239.7	2558.7
Total	578.6	7548.9	8127.5

*Prepared by K. V. Narayana Rao, G. Syda Rao, G. Luther and M. N. Kesavan Elayathu.

Table : 2. Whitebait landings (in tonnes) by purse seine fleet during the period October - December

Year	Mangalore				Cochin			
	Oct.	Nov.	Dec.	Total	Oct.	Nov.	Dec.	Total
1979	152.2	321.8	65.2	539.2	0.8	0.2	-	1.0
1980	2255.0	2071.0	133.0	4459.0	175.4	55.0	22.6	253.0
1981	98.6	950.2	322.1	1370.9	31.0	19.0	13.0	63.0
Total	2505.8	3343.0	520.3	6369.1	207.2	74.2	33.6	317.0

Table : 3. Estimated total landings (in tonnes) of Whitebait by the purse seine at main centres in Kerala and Karnataka

State	Centre	Period	No. of purse seine units	Whitebait	Other fish
Kerala	Cochin	Oct. 1980	53	175.4	3.8
		Nov. 1980	26	55.0	6.1
Karnataka	Mangalore	Oct. 1980	358	2255	166
		Nov. 1980	372	2071	33
	Malpe	Oct. 1980	423*	653	765
		Nov. 1980	218*	272	1098
	Gangoli	Oct. 1980	271*	193	1185

*This number includes the units employed both for Whitebait and other pelagic fishes.

During the peak whitebait season it was generally observed that the purse seine units exploiting this resource off Mangalore were able to get pure catches amounting to 2-10 tonnes, usually 5-6 tonnes, per haul (Fig. 1), while off Cochin usually 2-3 tonnes with very little amount of miscellaneous catch. These characteristics of the purse seine fishery are to be taken into consideration while estimating the catch and effective effort for the exploited resource both for the day and the season. It is also observed that at Mangalore, where the largest fleet of purse seiners is operated, the purse seine fishermen seem to exercise some sort of selective fishing in favour of those resources that fetch higher and more remunerative prices.



Fig. 1. Purse seiner with whitebait catch at Mangalore Fisheries Harbour.

Fishing grounds

During the peak season, purse seining for whitebait is carried out mostly in depth of 10-20 m at Mangalore and in 15-25 m at Cochin, within a distance of about 5-8 km from the shore during day time. While the purse seine fishery is confined to the limited area off Cochin in Kerala, it is more widespread in Karnataka, from Manjeswar in the south to Bindur in the north, extending over a stretch of 150 km.

Fishermen generally are able to identify the whitebait shoals from the presence of sea-gulls diving for fish, as well as from the appearance of moving shadowlike light-brown tinged patches on the sea surface. The number of hauls made during a day varied from 1 to 3, each haul taking about 1½ to 2 hours for an average-sized shoal of fish.

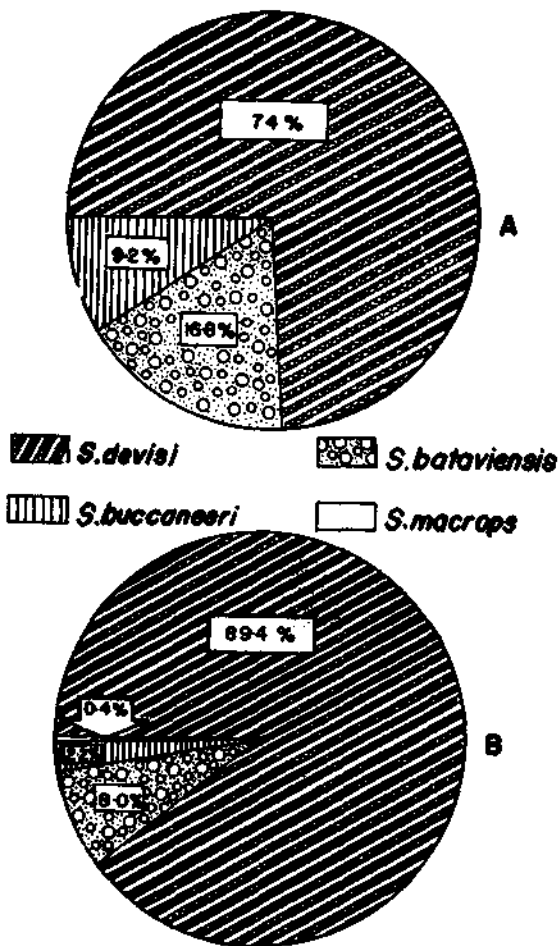


Fig. 2. Species composition (% wt.) of whitebait landings during October-November 1980. A. At Cochin, B. At Mangalore.

Species composition

The peak whitebait fishery during the period was mainly sustained by three species, viz., *Stolephorus*

devisi, *S. bataviensis* and *S. buccaneeri*. Among these, *S. devisi* was the chief contributor both at Mangalore and Cochin, accounting for 89.4% and 74% respectively followed by *S. bataviensis* (8% and 16.8%) and *S. buccaneeri* (2.2% and 9.2%). Small quantities of *S. macrops* were also landed at Mangalore (Fig. 2).

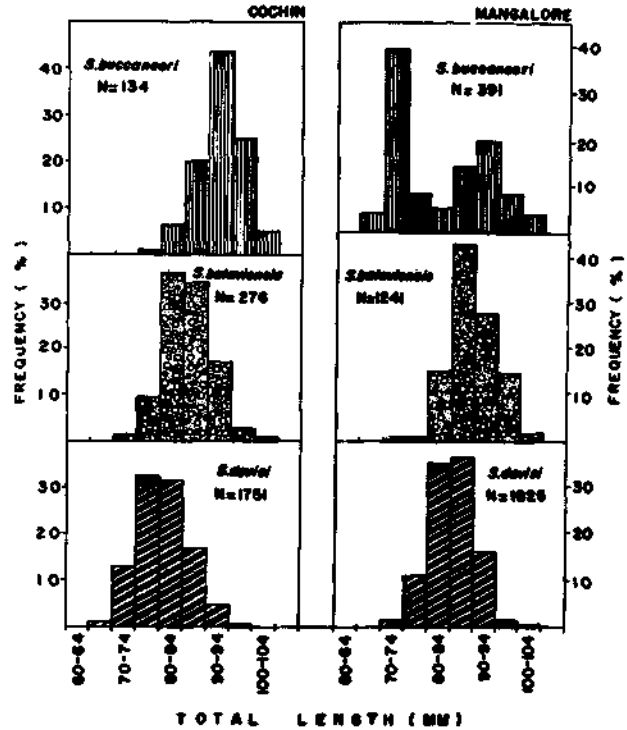


Fig. 3. Length distribution of the dominant species of whitebait at Cochin and Mangalore during October-November 1980.

Biological aspects

The length composition of the three dominant species at Cochin and Mangalore during the period Oct/Nov 1980 is given in Fig. 3. The dominant size of fish in respect of each species were: 75-84 mm at Cochin and 80-89 mm at Mangalore for *S. devisi*; 80-89 mm at Cochin and 85-94 mm at Mangalore for *S. bataviensis*; and 90-99 mm at Cochin and 70-74 mm as well as 85-94 mm at Mangalore for *S. buccaneeri*.

It is evident from the above size distributions that except in the case of *S. buccaneeri*, larger fish appear to be more abundant in the fishery at Mangalore than at Cochin. From the information available on the growth, maturity cycle, mortality and longevity of whitebait it may be assumed that this Oct - Dec. phase represents the second breeding in the species concerned and thus the fish that support the peak fishery at the two centres are at the fag end of their life and are subjected to high natural mortality.

Table : 4. Sex-ratio & Maturity condition (%) of the dominant Whitebait species off Mangalore and Cochin

Sex ratio and Maturity stage	October/November 1980					
	<i>S. devisi</i>		<i>S. bataviensis</i>		<i>S. buccaneeri</i>	
	Mangalore	Cochin	Mangalore	Cochin	Mangalore	Cochin
Female	50.5	66.4	54.5	70.4	51.6	64.3
Male	49.5	33.6	45.5	29.6	48.4	35.7
I	-	0.2	4.0	-	-	-
II	-	12.0	23.5	13.7	45.2	-
III	0.5	21.5	26.6	22.3	9.7	5.4
IV	7.6	30.0	10.9	26.2	0.0	50.0
V	1.3	10.8	5.5	24.9	0.0	1.8
VI	57.1	15.9	19.3	9.0	6.4	28.6
VII	33.5	9.6	10.2	3.9	38.7	14.2
No. of fish	1,307	576	443	233	131	56

In the case of *S. devisi* one kg of fish was found to have 265 numbers at both the centres, while for *S. bataviensis* the number of fish per kg was 217 at Mangalore and 219 at Cochin. For *S. buccaneeri* it was 193 at Cochin and 232 at Mangalore where smaller size groups of the species were also caught during the period.

In Table 4, the data on the sex-ratio and the maturity condition of the dominant species are given. It is seen that female fish generally dominated in the catches. Further, fish in gravid and spent condition were predominant, indicating that the fishery at both the centres is based on stock that is breeding for the second time.

Sharing of the catch

No salary is paid to the boat crew employed in the purse seining operations, the sale proceeds of the catch being shared by the share holders/boat owners and the crew as under:

- a) Towards capital cost and share holders - 70%
- b) The crew, including the share holder who may work on the boat during the fishing season - 30%

The crew, however, will receive only 85% of what is due to them and the rest paid at the close of the fishing season. This is done in order to prevent the fishing crew from changing one boat to another during the fishing season. Those leaving in the middle of the season forfeit the balance amount, which is then shared by the remaining crew.

Disposal, utilization and marketing of the catch

The whitebait catches are auctioned while the

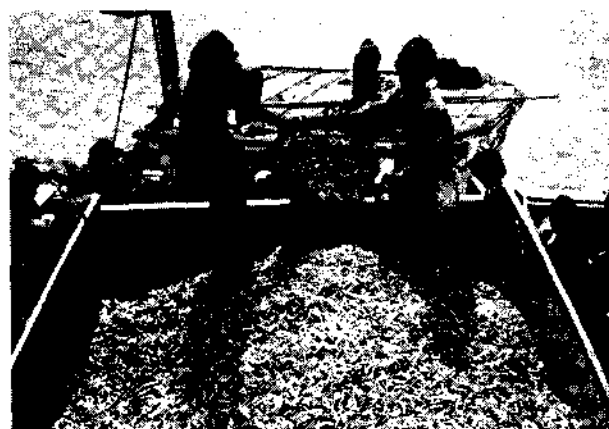


Fig. 4&5. Whitebait being loaded into lorry from the boat at Mangalore for transport to distant markets outside the state.



fish are still on board the vessel at the landing centres. At Cochin most of the catch, mixed with crushed ice, is sent to marketing centres for consumption in fresh condition. At Mangalore, Malpe and other centres in Karnataka, however, only a portion of the catch, about 10%, finds ready market for consumption as fresh fish. This is mixed with crushed ice and transported by lorries to the nearby and far flung markets within and outside the State (Figs. 4 & 5). The remaining 90% of the catch was quickly transpor-



Fig. 6. Whitebait being sundried on the beach at Malpe.

ted by the same boats that landed the catch or by lorries to the adjacent vast and sandy beaches for sundrying. Thus during the 1980 whitebait fishing season in Karnataka most of the whitebait landed could be sun dried and marketed as dried fish, as sunny weather prevailed during the period (Figs. 6 & 7). Only in a single instance, on 19th November, the catch could not be beach-dried owing to cloudy weather, and the fish amounting to about 70 tonnes had to be converted into fish meal.



Fig. 7. Whitebait being sundried on the beach at Ullal.



Fig. 8. Sun-dried whitebait at Gangoli ready for packing and transport to distant markets outside the State.

Table: 5. Average price structure (in Rs/tonne) of Whitebait in fresh and beach dried condition at the landing centres in Kerala and Karnataka (Oct/Nov 1980)

Month	Kerala		Karnataka					
	Cochin		Mangalore		Malpe		Gangoli	
	Fresh	Dried	Fresh	Dried*	Fresh	Dried	Fresh	Dried
Oct 1980	1125	-	1018	4250	1400	3850	1150	4500
Nov 1980	1012	-	944	4250	-	3850	-	4500
Average	1069	-	981	4250	1400	3850	1150	4500

*Price of dried fish at Ullal.

After letting the fish dry for about fortyeight hours, it is heaped over coir mats for packing in gunny bags for storage and marketing (Fig. 8). By this process, a tonne of dry whitebait is obtained from about three tonnes of fresh fish. The dry fish is sent to markets in Kerala, Tamilnadu and Orissa where there is great demand for the product. A good quantity of this dry fish is also exported to Sri Lanka through Tuticorin Port. Local demand for dry whitebait in Karnataka is mostly during the south west monsoon period.

Price structure

The monthly variations in the prices of fresh and sundried whitebait per tonne at the different purse seine landing centres are given in Table 5.

It is seen that the average price per tonne of fresh fish was Rs 1,069 at Cochin, Rs 981 at Mangalore, Rs 1,400 at Malpe and Rs 1,150 at Gangoli, whereas the average price of beach-dried whitebait was Rs 3,850 at Malpe, Rs 4,250 at Mangalore (Ullal) and Rs 4,500 at Gangoli. Based on the average price structure for the fresh and dried fish at Cochin and Mangalore the estimated value of the whitebait catch by purse seine at the above two centres alone during the period October - December 1980 works out to 0.27 million and 4.84 million rupees respectively.

General considerations

From the foregoing account it is clear that with the introduction of purse seiners exploitation of whitebait resource in these areas has commenced in an increasing manner and great scope exists for enhanced landings of the fish by purse seine fishery during the peak months of abundance (October - December) along the west coast. However, due to the limitations

of the infrastructure facilities for handling, storage, transport and marketing, the concentration of large number of purse seiners at a single base will bring about serious management problems.

Besides, such a situation being a disincentive for realising the full potential of the purse seine fishery, they also create serious glut conditions in the market resulting in unremunerative prices. But for the facility to beachdry bulk (90%) of the catches during 1980 season, and to market them at fairly remunerative prices, utilization of such a large catch would have posed very serious problem. Cloudy weather conditions during the season and the absence of clean sandy beaches at the landing sites are two of the serious constraints in this method of utilization of the whitebait resources.

It is, therefore, necessary to redeploy the purse seiners engaged in whitebait fishery, at the major centres spread over Karnataka coast and to develop simultaneously at those bases infrastructure facilities capable of handling, storing, processing and marketing, realising the full potential of the purse seine fishery, in order to obtain remunerative prices for the huge whitebait catches landed during a short period of about three months.

Based on the biological considerations too, increased and judicious exploitation of this stock, which has completed one breeding cycle and is at the fag end of its life during the period of its abundance along the west coast (October - December), particularly along the Karnataka coast, may be desirable, as this size group may no longer be available on account of the very high natural mortality that the fish may be subjected to beyond this size.

