MARINE FISHERIES INFORMATION SERVICE

Technical and Extension Series

No. 36

MARCH 1982

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE

COCHIN, INDIA

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

THE MARINE FISHERIES INFORMATION SERVICE: Technical and Extension Series envisages the rapid dissemination of information on marine and brackish water fishery resources and allied data available with the Fishery Data Centre and the Research Divisions of the Institute, results of proven researches for transfer of technology to the fish farmers and industry and of other relevant information needed for Research and Development efforts in the marine fisheries sector.

Abbreviation - *Mar. Fish. Infor. Serv. T & E Ser., No.* 36 : 1982.

CONTENTS

Cover photo: Purse seine catches of whitebait being loaded into lorry for transportation from Mangalore.

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.

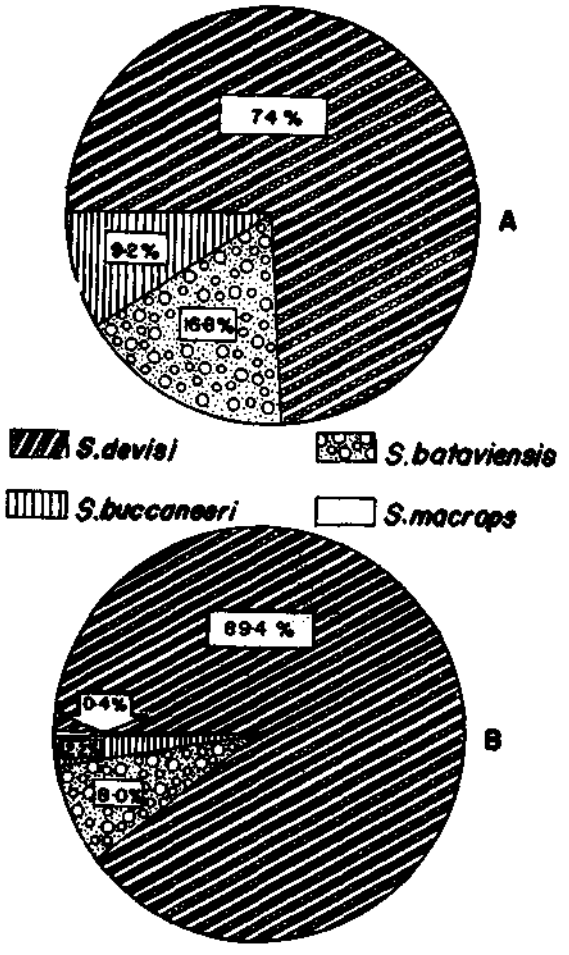

Fig. 2. Species composition (% wt.) of whitebait landings during October-November 1980. A. At Cochin, B. At Mangalore.

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).

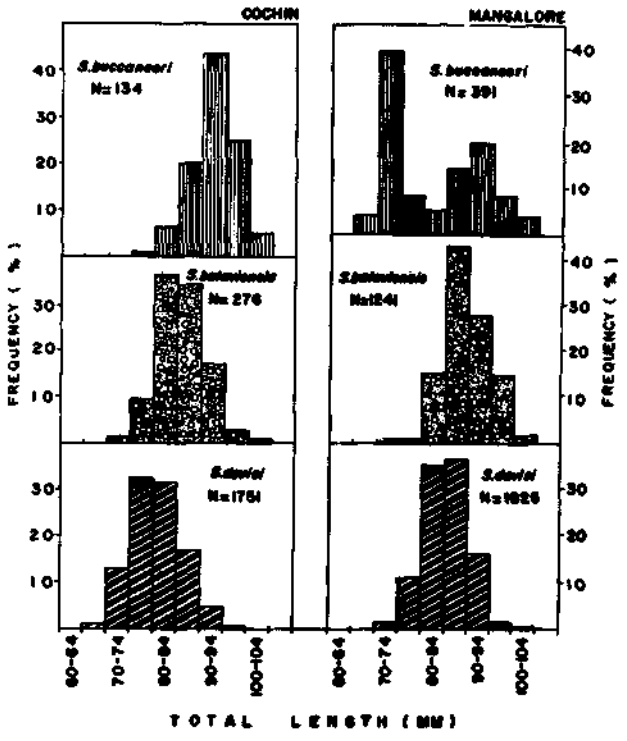

Fig. 3. Length distribution of the dominant species of whitebait at Cochin and Mangalore during October-November 1980.

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					
	S. devisi		*S. bataviensis*		*S. buccaneeri*	
	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.

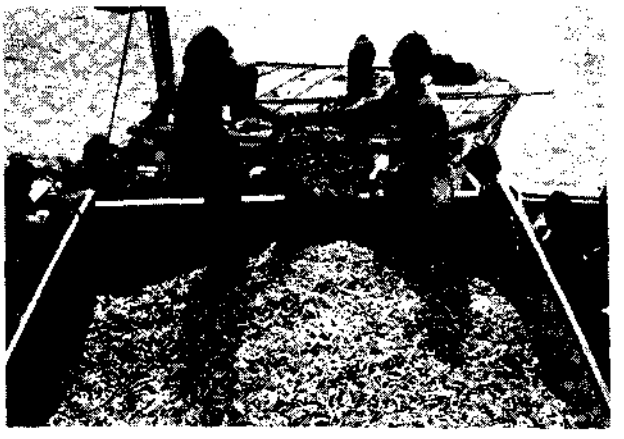

Fig. 4&5. Whitebait being loaded into lorry from the boat at Mangalore for transport to distant markets outside the state.

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

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

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)*

	Kerala				Karnataka			
	Cochin		Mangalore		Malpe		Gangoli	
Month	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.

DISTRIBUTION OF THE INDIAN MACKEREL, *RASTRELLIGER KANAGURTA* (CUVIER) ALONG THE COASTS OF INDIA IN 1979 AND 1980*

Introduction

Mechanisation of the exploitation of the pelagic fishery resource in the country is slowly setting in. It is imperative in such a situation to identify areas and seasons of abundance of the resource to plan economic and judicious dispensation of the effort required to exploit them. Areas of good catches and times of abundance of the Indian mackerel, *Rastrelliger kanagurta* (Cuvier) along the Indian coasts for the year 1979 and 1980 are presented here, as an addition to the data for 1978 already published (*Mar. Fish. Infor. Ser. T & E Ser.*, No. 8: 1–11, 1979).

Annual production

The total landings of the mackerel in India from its pinnacle of 2,04,575 tonnes in 1971, gradually declined in the following 3 years to a poor figure of 37,462 t in 1974, whence except a small dip in 1977 it increased to 85,233 t in 1978. This upward trend subsequently reversed in the following years and the landings decreased to 71,514 t in 1979 and 55,279 t in 1980 (Fig. 1).

Mackerel in relation to total marine fish production

The country recorded 14,03,607 t of marine fish in 1978. Of this, the mackerel formed 6.1%. In 1979, the total marine fish catch in India was 13,88,380 t of which the contribution by the mackerel was 5.2%. The total marine fish catch in the country in 1980 was only 12,49,837 t, 4.4% of which being mackerel (Fig. 1).

Mackerel landings in the east and west coast of India

The landings in the east coast down to Kanyakumari in 1978 was 4,049 t forming 4.8% of the all-India total. In the west coast from Kanyakumari up, the landings were 81,184 t forming 95.2% of the year's total. In 1979, the catch and the corresponding percentage in the east and west coasts were 6,129 t forming 8.6% and 65,385 t forming 91.4%. In the subsequent year, the catch and its percentage in the east coast have increased further to 13,187 t and 23.9% respectively. In the west coast the catch concurrently reduced to 42,092 t forming only 76.1% (Fig. 1). When the landings and their percentages significantly increased during 1978 – 80 period in the east coast, in the west coast it greatly dwindled.

Distribution of the mackerel along the states of India

West Bengal

As in 1978, there was no mackerel landing along this coast during 1979 and 1980 also.

Orissa

The mackerel catch in Orissa in 1978 was 196 t, forming only 0.2% in the country's total landings. It, however, formed 0.5% in the state's annual marine fish catch. In 1979, the mackerel landings in the state increased to 306 t (Fig. 1). In the country's total mackerel production of the year the state's share was 0.4%. In the total marine fish landings of the state in the year, the mackerel contributed to 0.6%. Subsequently, there was a decline in the mackerel catch in 1980, dropping the landings to 265 t. However, in the country's total mackerel catch for the year it formed 0.5%, and in the state's marine fish landings it accounted for 0.7%. In spite of the reduction in the catch, the percentage of the mackerel in 1980 at both levels showed improvements (Fig. 1).

Within the state, as in 1978, no mackerel occurred along the coast of Balasore district in the north (Fig. 2 - or 1) in 1979 and 1980 also. In 1978, high catches accounting for 55.5% of the state's total occurred in Puri and northern part of Ganjam coasts. The southern area of Ganjam coast accounted for the remaining 44.5%. In 1979, the southern coasts of Ganjam district (Fig. 2 - or 3) accounted for 74.5% of the mackerel catch. Puri and northern coasts of Ganjam district (Fig. 2 - or 2) had the rest. In 1980, again more or less the 1978 condition existed with 58.9% of the landings occurring along the coasts of Puri and northern part of Ganjam district and only 41.1% occurring along the coast of the southern part of Ganjam district.

Andhra Pradesh

The mackerel landings in this state in 1979 and 1980 were 2,621 t and 6,203 t respectively (Fig. 1) against 2,520 t of 1978. There was thus an increase of about 2.4 times in the landings in 1980 over that of the preceeding 2 years. The percentages of the mackerel landings of the state in the country's total in

*Prepared by A. Noble, in association with the staff of Fishery Resources Assessment Division.

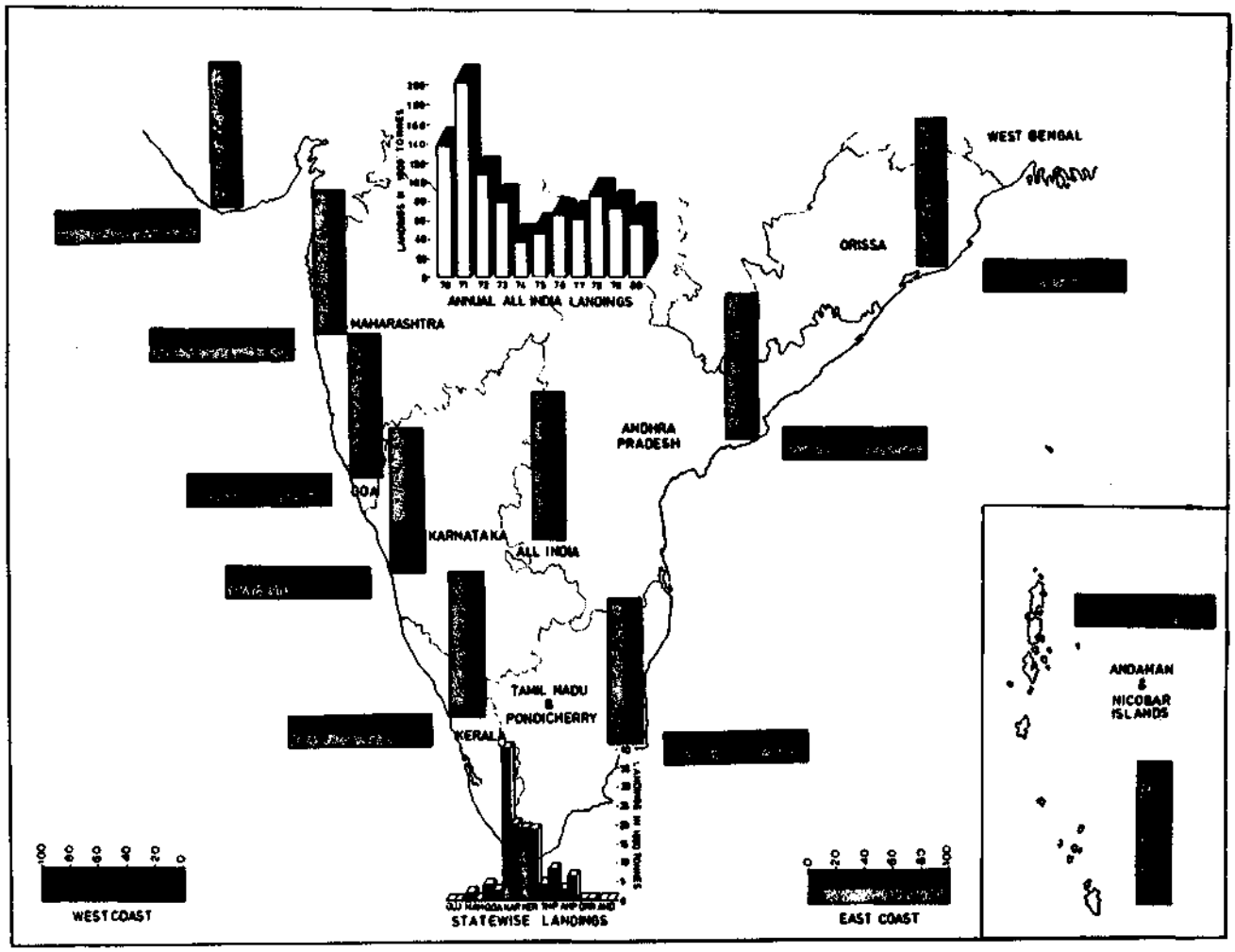

Fig. 1. All India annual landings of mackerel during 1970-80, statewise landings in 1979 and 1980, statewise and coastwise percentage landings of mackerel in the all India total (horizontal bars), and percentage of mackerel in the marine fish production (vertical bars). The stippled bars stand for 1979 and the striated for 1980.

1978 and 1979 were 3.0 and 3.7 respectively. The increase in the landings here in 1980 was so substantial as to register a high value of 11.4% in the all-India annual catch. In the state's marine fish landings, the mackerel formed 3.1%, 2.9% and 5.3% in 1978, 1979 and 1980 respectively (Fig. 1).

There was no mackerel catch along the Srikakulam coast in the northern most part of the state in 1978. In 1979 and 1980, respectively 27.8% and 29.1% of the mackerel landed in the state, came from this area (Fig. 2 - Anp. 1 & 2). In fact, the increasing trend seen in the catches along the southern Orissa coast reached a climax in the Srikakulam coast followed by a little fall along the Visakhapatnam coast (Fig. 2 Anp. 3). The Kakinada coast in East Godavari district (Fig. 2 Anp. 4) had the peak landings accounting for 46.0%, 53.4% and 33.0% of the state's total in 1978, 1979 and 1980 respectively. In fact, three-fourth (77.8%) of the mackerel landings in 1979 occurred in the northern half of Andhra Pradesh stretching from Srikakulam to East Godavari coast. The landing in the southern half was 47.8% in 1978. It, however, reduced to just 22.2% in 1979, and 34.2% in 1980. In the southern half of Andhra Pradesh, the important place for mackerel landings was the Guntur-Prakasam area (Fig. 2 - Anp. 7).

In 1978, mackerel in the state actually occurred in 2 clusters of places, the first one along the coasts of Visakhapatnam and Godavari districts and the second along the coasts of Guntur, Prakasam and Nellore. In 1979 and 1980, there were 3 areas along the coast where the mackerel catches were comparatively good namely, the northern most part of Srikakulam district, the East Godavari district, and the Guntur - Prakasam districts. Along the coasts of Visakhapatnam (Fig. 2 - Anp. 3), West Godavari - Krishna (Fig. 2 - Anp. 5 & 6) and Nellore (Fig. 2 - Anp. 8 & 9) districts the mackerel catches were poor

in 1979 and 1980.

Tamil Nadu and Pondicherry

The mackerel catch here was 1,632 t in 1978. In 1979, the catch increased to 3,945 t and in 1980 it further rose to 7,674 t (Fig. 1). As in Andhra Pradesh, there was an increasing trend in the mackerel landings along Tamil Nadu - Pondicherry coast also.

The percentage landings of the mackerel in the coast in respective all-India annual total mackerel landings were 1.9 in 1978, 5.5 in 1979 and 14.1 in 1980 (Fig. 1). In the state's total marine fish catches, the mackerel landings formed 0.7% in 1978, 1.6% in 1979 and 3.4% in 1980 (Fig. 1).

Immediately after the poor mackerel zone of Nellore coast in Andhra Pradesh (Fig. 2 - Anp. 9), the catch in Tamil Nadu coast in the northern most part of Chengalpattu district (Fig. 2 - Tnp. 1) was slightly better. After a small drop along the rest of the coast of this district (Fig. 2 - Anp. 2 to 4) the catch was comparatively good in the South Arcot and Pondicherry area (Fig. 2 - Tnp. 5). The landings in Thanjavur - Pudukottai area (Fig. 2 - Tnp. 9) in 1980 were very high (26.3%). In 1978 also, the area from South Arcot to Thanjavur districts accounted for 47.0% of the total mackerel landings of the Tamil Nadu - Pondicherry coast.

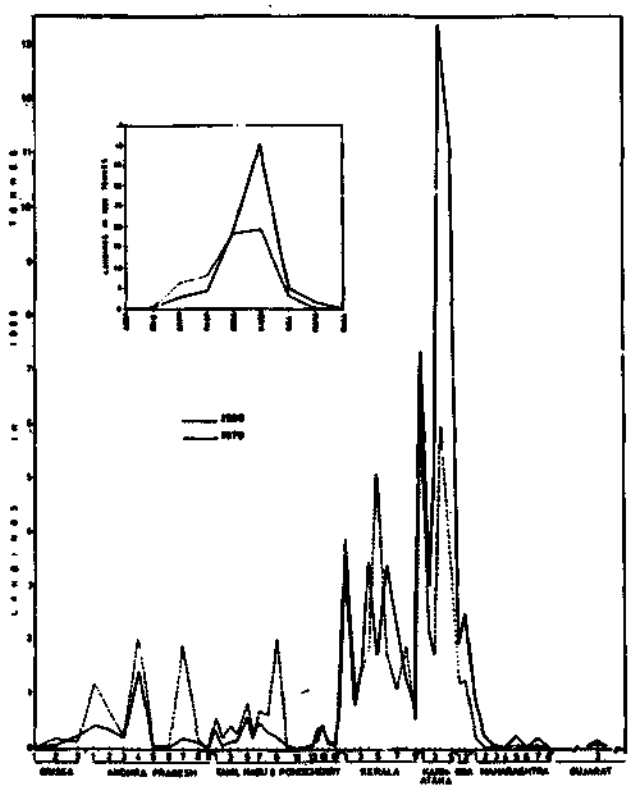

Fig. 2. Distribution of mackerel landings within the states in 1979 and 1980.

Next area of good mackerel landings in the coast of Tamil Nadu was from the south end of Ramanathapuram to Kanyakumari districts contributing to 42.0% of the State's annual landings in 1978. In 1979 and 1980, Thirunelveli coast (Fig. 2 - Tnp. 14 & 15) had better catches in comparison to the Ramanathapuram coast (Fig. 2 - Tnp. 10 to 13) where the catches were very poor. All through the Tamil Nadu - Pondicherry coast from Chengalpattu district in the north to Thanjavur district in the south (Fig. 2 - Tnp. 1 to 9) the catches in 1980 were better than that of 1979. Along Ramanathapuram and Tirunelveli coasts (Fig. 2 - Tnp. 10 to 15) the 1979 catches were almost the same to that of 1980.

Kerala

In contrast to the ascend in the landings along the east coast, in the west coast beginning with Kerala State in the south, the landings descended during 1978-80 period.

The mackerel catch in Kerala State was 25,917 t in 1978, declining to 18,585 t in 1979 and 18,474 t in 1980 (Fig. 1).

The mackerel landings in Kerala in 1978 formed 30.4% of the all-India catch. In the following year it reduced to 26.0% but regained to a good position with 34.0% in 1980 (Fig. 1). In the state's total marine fish landings, the mackerel contributed to 7.0% in 1978, 5.6% in 1979 and 6.6% in 1980 (Fig. 1).

Within the state, the southern most part of Trivandrum coast (Fig. 2 - Ke. 1) had some amount of mackerel in all the years under review here. In 1978, even though it accounted only for 4.4% of the state's mackerel landings, it elevated to 18.9% in 1979 and 20.8% in 1980, similar to the trend seen in the east coast of the country. In 1980, in the northern coast of Trivandrum district and some contiguous portions of Quilon district (Fig. 2 - Ke. 2) the landings were poor. Along the coasts of Alleppey district to the southern part of Cannanore district (Fig. 2 - Ke. 3 to 8) the catches were comparatively high. On account of the operations of purse seiners in and around the coast of Ernakulam district (Fig. 2 - Ke. 5) there were exceptionally good landings at Cochin Fisheries Harbour. The Alleppey - Ernakulam - Trichur (Fig. 2 - Ke. 5) region thus had better catches than the Malapuram - Kozhikode - Cannanore area (Fig. 2 - Ke. 7 & 8) in 1980. In 1979, the Alleppey - Ernakulam - Trichur region had only lower landings. But the landings in Trichur - Malapuram section (Fig. 2 - Ke. 6) were very high. In the northern part of the state, along Cannanore coast (Fig. 2 - Ke. 9) the catch was low in 1979 and 1980. However, the mackerel was abundant along the Malabar coast of Malapuram - Cannanore districts (Fig. 2 - Ke. 7 to 9) in 1979, where 62.0% of the sta-

te's mackerel landings were accounted for.

Karnataka

Maximum mackerel landings of the country in 1978 came from this state, and it amounted to 50,704 t accounting for 59.5% of the total annual all-India catch. In 1979, the landings reduced to 40,084 t, yet contributing to the bulk (56.1%) of the total of the country. The landings subsequently crashed to a low level of 19,634 t in 1980, forming only 35.5% in the all-India catch for the year (Fig. 1). Thus the declining trend seen along the Kerala coast was reflected much more conspicuously in Karnataka during 1978-80 period.

The mackerel fishery is very important to the Karnataka state where it forms a sizable chunk in its total marine fish production. In 1978, the mackerel formed 33.2% in the state's total marine fish landings. In 1979, this percentage diminished to 31.7, and in 1980 it lowered further to 17.5 (Fig. 1).

In and around Mangalore (Fig. 2 - Ka. 1) the catches were good during 1978-80 period. North of Mangalore from Mulki to Kidiyoor (Fig. 2 - Ka. 2) the catch generally was low. The landings from Malpe to Coondapur (Fig. 2 - Ka. 3) in 1978 were very high, to the extent that it alone formed 32.4% in the state's annual total landings of the mackerel. In the following 2 years the landings here were lesser. Though it was better in comparison to the Mulki - Kidiyoor area in 1979, in 1980 it was poorer. Towards north, from Gangoli to Sasithal, the catches in 1978 were poor. However, in 1979, the catch in this area (Fig. 2 - Ka. 4) was very high forming 33.5% of the state's total. In 1980 also this region topped in the landings with 30.4% on its side. From Bhatkal to the north, the catches formed only 16.7% in 1978, increasing to 27.9% in 1979 and dropping to 18.8% in 1980 (Fig. 2 - Ka. 5).

The share of Dakshina Karnataka coast in the state's mackerel landings in 1978 was about 80.0%, the remaining 20.0% being from the coast of Uttara Karnataka. In 1979, and 1980, the catches in Dakshina Karnataka were respectively to the tune of 72.0% and 80.0% of the state's total landings, the rest being fished from Uttara Karnataka.

Purse seine operations along the coast of the state were rather wide spread especially from the bases at Mangalore, Malpe, Gangoli, Bhatkal and Karwar, with the traditional gear *Rampani* still in vogue.

Goa

The mackerel landings in Goa in 1978, 1979 and 1980 were 3,371 t, 4,391 t and 2,446 t forming 4.0%, 6.2% and 4.5% respectively in the respective annual total mackerel landings of the country as a whole (Fig. 1). In the territory's total marine fish landings, the mackerel formed 12.4% in 1978, 17.3% in 1979 and 10.0% in 1980 (Fig. 1).

The bulk of the catch in the territory came from its northern sector in 1978. In 1979 and 1980, the catch was more or less uniformly spread out, though in the northern region, it was slightly better (Fig. 2 - G. 1 & 2).

Purse seine continued to be the major gear operated along the coast from base at Panaji.

Maharashtra

The mackerel catch in Maharashtra state was 787 t in 1978. It increased to 1,455 t in 1979 but declined to a very low value of 288 t in the year next. In these 3 years, the mackerel landings in the state formed respectively 0.9%, 2.0% and 0.5% in the all-India total mackerel landings of the corresponding years (Fig. 1). In the marine fish landings of the state, the mackerel formed only 0.3% in 1978, 0.5% in 1979 and 0.1% in 1980 (Fig. 1).

The Ratnagiri coast (Fig. 2 - Ma. 1 & 2) adjacent to the Union Territory of Goa had 29.0% of the state's total mackerel landings to its credit in 1978. In 1979, this area had 77.0% catch, and in 1980 the percentage increased to 82.0. In 1979 and 1980, there were landings of respectively 13.0% and 14.0% of mackerel in the northern most part of the coast of Ratnagiri district (Fig. 2 - Ma. 5). The landings in Bombay coast in 1978 were 65.0% of the year's total catch. However, it reduced to just about 9.0% in 1979 and dwindled further to 4.0% in 1980 (Fig. 2 - Ma. 7).

Gujarat

There was no mackerel catch along this coast in 1978. However, 35 t of mackerel were landed in the state in 1979. (Fig. 1) along the Bhavanagar - Porbandar area (Fig. 2 - Gu. 3). In 1980, 112 t of mackerel were caught from this area.

The mackerel catch in Gujarat formed only 0.2% in the country's total mackerel production in 1980. In the state's marine fish catch it contributed to only 0.06%. In 1979, the landings were so poor in quantity as to register any significant percentage.

Andaman and Nicobar Islands

The mackerel catch in this area was 106 t in 1978. It reduced to 92 t in 1979 but increased to 112 t in 1980 (Fig. 1).

In 1978 and 1979, the landings formed only 0.1% of the annual totals in the country. In 1980, however, it increased to 3.0%. In the island's marine fish lan-

dings, the mackerel played an important role as it formed 6.7%, 5.3% and 10.2% respectively in the three years.

Lakshadweep

As usual there were no mackerel landings in these islands during the years under consideration.

Seasonal distribution of the mackerel

The season of 1978 which had the highest landings in September (26.2%) and October (28.7%) continued up to May 1979. During January - May 1979, the percentages of the monthly catch ranged between 5.4 in February and 11.0 in April (Fig. 3). In June the percentage fell to 2.9 and reached 0.4 in August. In September, with the commencement of 1979 season, the percentage rose to 9.9. In the subsequent 2 months, the monthly percentage landings were 19.9 and 16.2 respectively. Further it again reduced to 5.1% in December. In 1980 (Fig. 3), during January - March the monthly percentages ranged between 7.5 of February and 10.0 of January. After a fall in April (4.4%) it again rose to 11.5% in May 1980. As in the previous year the catch fell in June to 2.4% and reduced further to 1.2% by August. The mackerel season for the year 1980 commenced in September with 14.3% of the year's total landings and remained more or less the same in magnitude for the rest of the year within a range of 10.7% to 14.9% per month. In fact, December had the highest percentage (14.9) for 1980.

As the bulk of the landings occur along the west coast of India, the seasonal distribution on all-India level is only a reflection of what is happening in the west coast (Fig. 3).

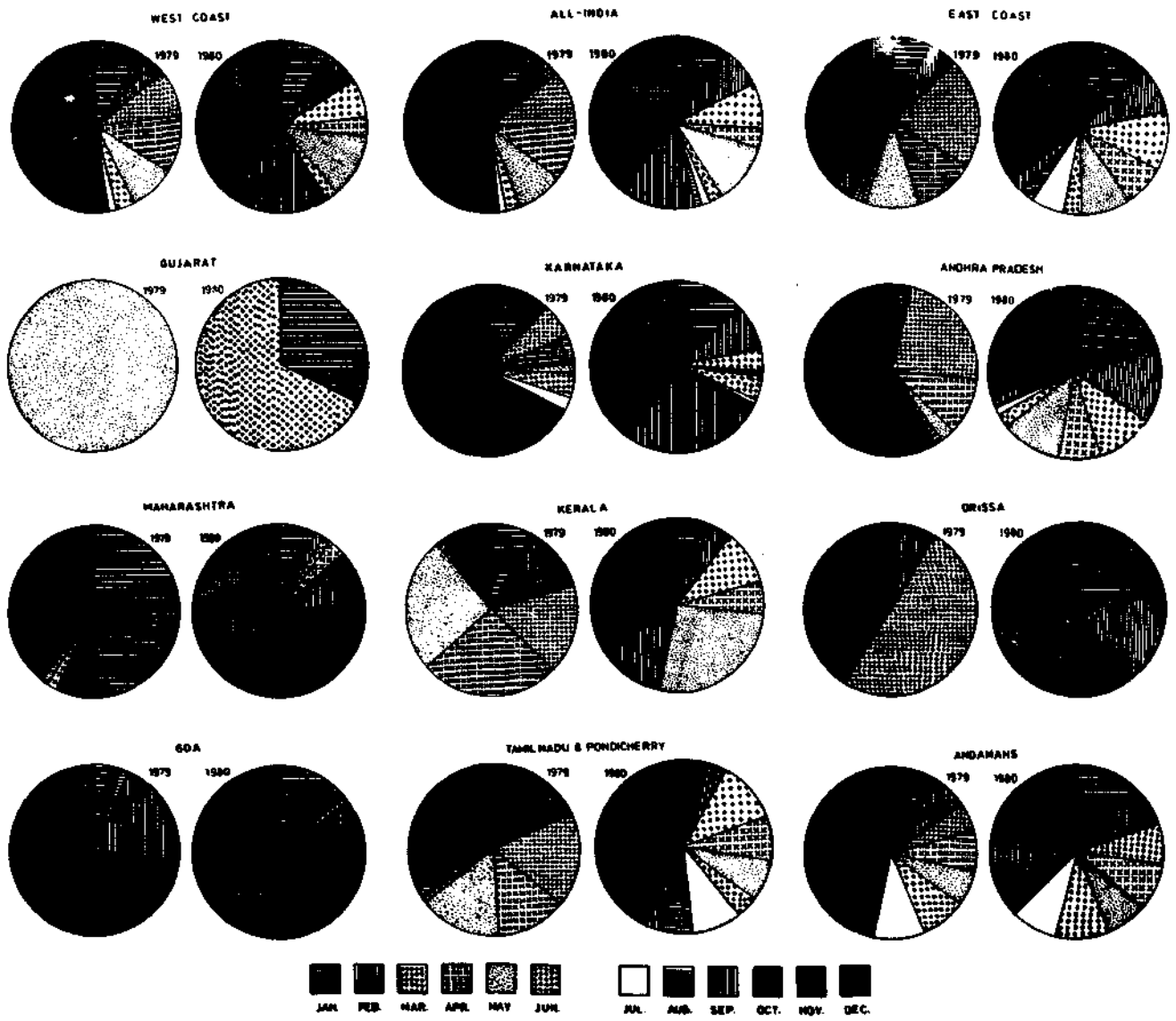

Fig. 3. All India, statewise and coastwise seasonal distribution of the mackerel landings in 1979 and 1980.

The picture in the east coast (Fig. 3), nevertheless, is quite different. In 1978, the maximum landings along the east coast occurred in February (34.5%) and March (29.9%). In 1979 (Fig. 3), it was the highest in March (20.7%) and more or less good in the following 2 months registering respectively 11.8% and 10.0% of total landings. As in the west coast, the landings in June - August were very low (0.8 - 1.2%) in the east coast also. In October - December 1979, the catches were better, the monthly percentages, ranging from 9.0 to 16.8. The percentage in December was the highest. Subsequently in 1980 up to May, the catches were only moderate with 8.1% to 12.9% range in monthly values. This was followed by low values during June - September (2.9 - 6.1%). As in the west coast the catch was important here in October in this year with the percentage at 14.3. After a lull in November (5.5%), the landing went up to 16.0% in December which incidentally is the year's peak month in mackerel landings along this coast.

Statewise seasonal distribution in the mackerel landings

Orissa

In 1978 the maximum landings in the state occurred in February (35.3%) and March (23.1%). There was a secondary peak in November (17.3%). In the next year the major peak occurred in March when 50.3% of the state's catches were landed (Fig. 3). As in the previous year, the secondary peak occurred in November (22.6%). This was more or less the story of the southern coast of Ganjam district (Fig. 4 - Or. 3) from where the state's major mackerel contributions came. Deviating from this pattern, the landings in January and February 1980 were respectively only 21.9% and 18.5% having the peak shifted to December when 55.5% of the year's catch were recorded. It was a projection of the bulk landings in the north along Puri and northern coast of Ganjam districts (Fig. 4 - Or. 2).

The mackerel was absent in the state during May - September in 1978 and April - July in 1979. In the next year it was practically nil during March to September period (Fig. 4 - Or. 1 to 3).

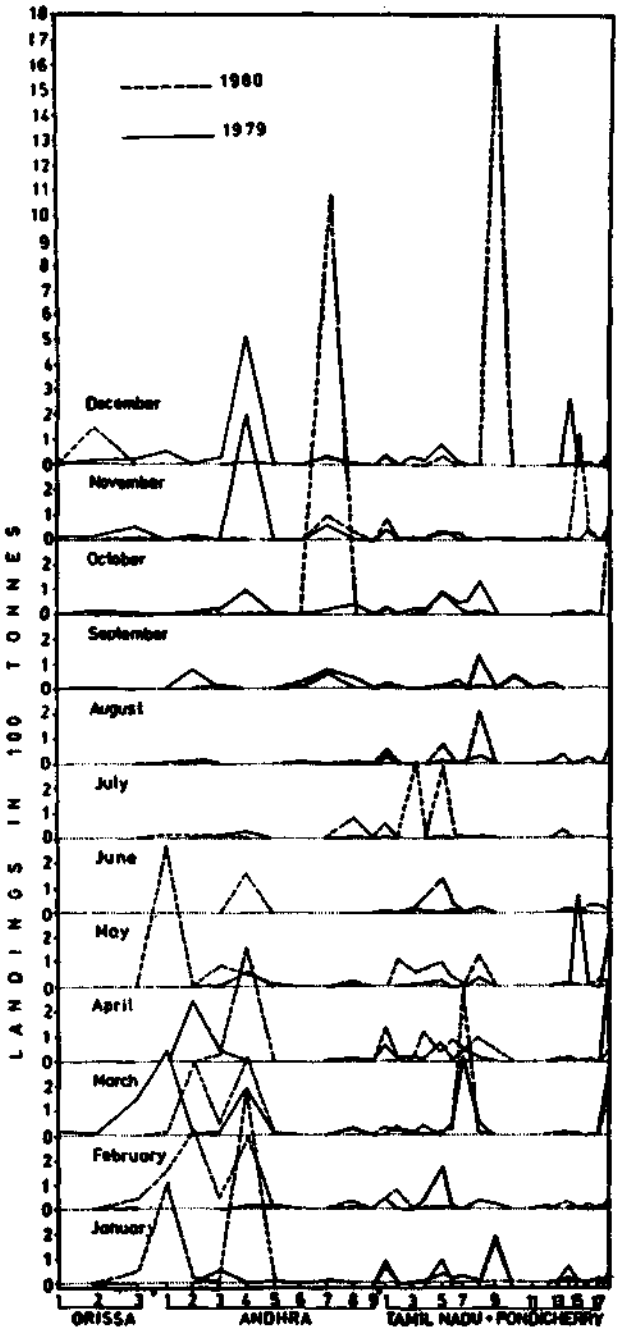

Fig. 4. Seasonal distribution of mackerel landings within Orissa, Andhra Pradesh and Tamil Nadu-Pondicherry states in 1979 and 1980.

Andhra Pradesh

The bulk of the landings in 1978 occurred here in February (52.1%) and March 42.5%). There was no mackerel catch in May and June and it was extremely poor for the rest of the year with the percentages ranging between 0.2 to 2.0. In 1979 (Fig. 3), the catch was good in March when 22.6% of the fish in the year were landed. Subsequently during June - August, the fishery was practically absent. In November and December, the catches again shot up to respectively 22.1% and 24.7%. This tempo was carried over to January 1980 (Fig. 3) when 19.7% of the year's landings were accounted for. Subsequently the landings up to May was appreciably good in quantities resulting in the monthly percentages to range between 7.9 to 13.2. The catch was the highest in the year in October with 27.2%. Unlike the previous years, the mackerel landings were much less in the state during June - September also. The peak landing in October 1980 was due to an unusually high catch in the Guntur - Prakasam area (Fig. 4 - Anp. 7).

The fishery was good in the state from the coast of Srikakulam district in the north to East Godavari coast (Fig. 4 - Anp. 1 to 4) during January - May and in the remaining southern part of the state (Fig. 4 - Anp. 6 to 8) it was important during September - December.

Tamil Nadu and Pondicherry

The mackerel landings in Tamil Nadu - Pondicherry coast ranged in January - April between 10.9% to 15.4% of the annual total catch in 1978. The highest percentage during this period occurred in April. The percentages were 4.1 and 11.0 in May and June respectively. The catches were low during July - September with the monthly percentages ranging between 1.8 and 4.8. In October, the catch became 7.7% in the annual total, followed by 4.9% in November and 8.7% in December. In 1979, the bulk of the mackerel catch along the coast was accounted for in March with 17.6% of the fish (Fig. 3). In April and May, the landings had fallen to 13.3% and 15.8% respectively. During June - September the catches were very low, the percentages lying between 0.2 and 2.8. In October, the landings accounted for 10.5%, followed by 6.2% in November and 12.3% in December. In the beginning of the year also the landings were more or less of this order, apportioned as 10.5% to January and 7.8% to February. In January and February 1980 (Fig. 3), the percentage landings in Tamil Nadu - Pondicherry coast were 5.6 and 3.4 respectively to the year's total. During March - May the catches improved a little, ranging between 7.1 and 11.3. During June - November period the catches varied between 3.1% to 9.4%. December 1980 had the maximum landings to the tune of 25.5% of the annual total.

In Tamil Nadu - Pondicherry area, the coast of South Arcot, Pondicherry, Karaikkal and Thanjavur had the highest catch in June 1978. It was good in February - March and also October. Along the coasts of Tirunelveli and Kanyakumari districts, the season occurred during December - April, with the maximum in April. In 1979, the catch along the South Arcot, Pondicherry, Karaikkal and Thanjavur area (Fig. 4 - Tnp. 5 to 7) was the highest in March and good in October. Along Tirunelveli and Kanyakumari coasts (Fig. 4 - Tnp. 13 to 18) the catches were good in March - May. In 1980 also, the catch in general along the South Arcot, Pondicherry, Karaikkal and Thanjavur area was the highest in March. Along Tirunelveli and Kanyakumari coasts the mackerel landings were good during October and November. Because of unusually heavy mackerel catches, in Thanjavur - Pudukottai region (Fig. 4 - Tnp. 9) the landings registered substantial increase in December.

Kerala

The peak landings occurred in this state in September forming 33.1% of the annual total catch in 1978. In October, the landing was good (15.0%). During January - April, the catches were moderate except in March when 12.3% of the year's total were caught. The landings were meagre during July - August. In 1979 (Fig. 3), the fishery that continued from the previous year heading to the peak in April (26.4%) and an equally important catch in May (25.7%). After the usual off-season during June - August, the landings remained low during September-

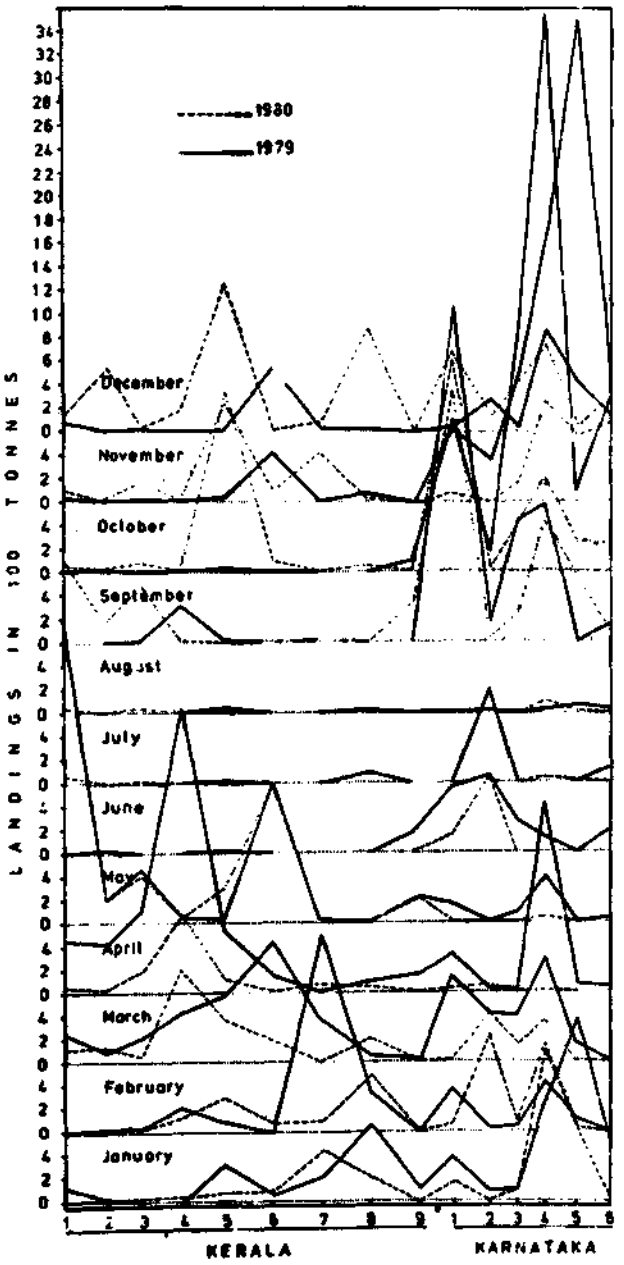

Fig. 5. Seasonal distribution of mackerel landings within Kerala and Karnataka states in 1979 and 1980.

- December within a monthly range of 0.9% to 3.4% only. This low landings limped through the beginning of 1980 also up to April. In May, there was a sudden spurt in the landings resulting in a high percentage of 26.7 of the annual total landings. Subsequently the fishery was almost absent during June - August. The 1980 season commenced in September when 11.0% of the fish were landed. In October and November the percentage of landings were 9.6 and 8.6 respectively only. But December realised 16.2% of the year's catch (Fig. 3).

In Kerala along the southern most part of Trivandrum coast, the landings were exceptionally high in May in 1979 and 1980 (Fig. 5 - Ke. 1). In 1978 also, the highest landings here were recorded in May. Along the coast of Ernakulam district and nearby areas of neighbouring districts, the fishery was excellent in September and good in February - April in 1978. Along the Malapuram - Kozhikode - Cannanore coast, the season of 1978 started in September with high catches and it was good in October also. The landings in January - March period of the year here were only moderate. The catch as already stated earlier was very high in the southern most part of the Trivandrum coast in May of both 1979 and 1980. Apart from this, in 1979, good catches were noticed along Alleppey coast (Fig. 5 - Ke. 4) in April, Trichur - Malapuram area (Fig. 5 - Ke. 6) in March and May and Malapuram - Kozhikode area (Fig. 5 - Ke. 7) in February. Such high catches were noticed in 1980 only in Trichur - Malapuram area in May, and Ernakulam and the neighbouring areas in October - December. The catch in Kozhikode - Cannanore area (Fig. 5 - Ke. 8) in December is also noteworthy. In short, the Alleppey - Ernakulam - Trichur region (Fig. 5 - Ke. 5) and the Malapuram - Kozhikode - Cannanore region (Fig. 5 - Ke. 7 & 8) showed the same seasonal trends in 1979 and 1980.

Karnataka

In Karnataka, in 1978, the mackerel season of the previous year lingered during January - April period. During May - August the fishery was practically absent. However, the season of 1978 commencing in September with good catches had the highest landings in October when 38.1% of the year's landings were recorded. This fishery as usual extended to the first half of 1979. The season of 1979 in turn started in September and the peak landing occurred in October with 26.0% of the total. In November, the landing was 23.9%. But by December it dwindled to 4.4%. The same story was repeated in 1980 also though the total landings in the state were comparatively much low. The fishery as usual started, in September, and bagged the highest landing (28.1%) of the year. After September, the catches gradually diminished from 13.9% of October to 11.8% of December.

Mangalore coast in Karnataka had very high landings in October - November in 1978 The landings were high along the other regions of the Dakshina Karnataka coast up to Coondapur during October - December. The highest mackerel landings of the year in the state occurred in October along Malpe - Coondapur region. Along the Uttara Karnataka coast good catches were noticed in September, October and December. In 1979, the landings along Mangalore coast (Fig. 5 - Ka. 1) were good in September and October. Along Malpe - Coondapur region (Fig. 5 - Ka. 3) it was good in September - November. Around Gangoli (Fig. 5 - Ka. 4) there were good landings in April and also September - December. In 1979, the highest catch in the state occurred here in October. Along the coast of Uttara Karnataka (Fig. 5 - Ka. 5 & 6) there were good mackerel catches in January and also October November. The highest monthly landing in the state in 1980 appeared in Mangalore in September. The landing in the Malpe - Coondapur coast was poor and around Gangoli it was better in January and September.

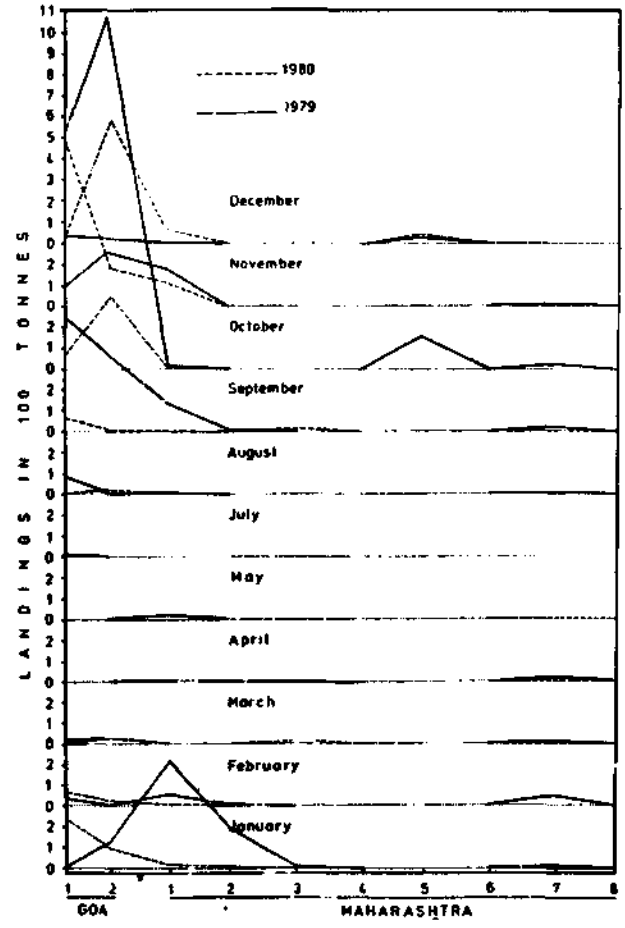

Fig. 6. Seasonal distribution of mackerel landings within the Union Territory of Goa and the state of Maharashtra in 1979 and 1980.

Goa

Good catches of mackerel were recorded here in September - December in 1978 with 32.2% occurring in October and the peak of 34.6% occurring in November. This fishery further continued in a low tone up to March 1979 (Fig. 3). The fish disappeared totally in the following quarter and appeared only sparsely in the next 2 months. The season for 1979 commenced in September and landed 20.6% of the year's total. The highest landings in the year (63.8%), however, occurred in October. During November 1979 to January 1980, the coast had only moderate landings, subsequently becoming poor till March. During April - July, the mackerel as usual was absent. In August - September the mackerel again started appearing and the catches during October - December were good with the peak monthly percentage of 38.6 occurring in November (Fig. 3).

Region-wise (Fig. 6 - Go. 1 & 2) the pattern of seasonal distribution in the mackerel was almost the same as that of the territory as a whole.

Maharashtra

In Maharashtra, although the mackerel landings occurred all through the year in 1978, November recorded the highest landing of 46.8%. In the first half of 1979, the landings occurred up to May and after a break in June - July occurred again in August - December (Fig. 3). The primary peak in the year was in January with 48.8% catch and the secondary peak in October with 13.5%. The landings in November was in par with that of October. In 1980, the mackerel was landed up to May in the first part with a small peak of 7.0% in January. After an absence during July - August, there was a landing of 8.7% of the year's total in September. The fish was absent again in October, but reappeared in November and December holding 39.9% and 36.8% respectively of the annual catch (Fig. 3).

In the state along Ratnagiri coast, the fishery commenced with high catches in October in 1978. In November also the fishery was good. The arrival of mackerel in Bombay was moderate in September but heavy in November and December. In 1979, the landing was the highest in January along the southern half of the Ratnagiri coast (Fig. 6 - Ma. 1 & 2). As in 1978, good landings occurred in the southern most part of Ratnagiri coast (Fig. 6 - Ma. 1) in November - December 1980. There was unusually good mackerel landing in the northern most region of Ratnagiri district (Fig. 6 - Ma. 5) in October 1979. In December of 1979 and 1980 also some mackerel were landed here though it was conspicuous by its absence in the same month in 1978.

Gujarat

Gujarat had no mackerel landing in 1978, and what little available in 1979 occurred in the month of May (Fig. 3). In 1980, two-third of the catch occurred in March and the rest in January.

Andaman and Nicobar Islands

A protracted fishery was observed in these waters where the mackerel landings were more or less equally distributed among all the months of the year ranging from 4.7% in September to 11.3% in December in 1978, 5.4% in March to 10.9% in December in 1979, and 6.6% in October to 11.5% in January in 1980.

General remarks

In the southern region of Tamil Nadu state around the peninsular India the mackerel seasons were almost similar to west coast. The South Arcot - Pondicherry - Karaikkal - Thanjavur area, having a protracted season, almost commensurate with that of Andaman and Nicobar Islands, appears to have more or less an intermediate status between the west and east coast in the seasonal distribution of the mackerel fishery in Indian coasts.

CRISIS IN FISHERIES HARBOUR, COCHIN*

Suspension of fish landings at the harbour

First week of January 1982

In the Cochin Fisheries Harbour, controlled by Cochin Port Trust, nearly 5,000 people are employed in various operations connected with the handling of fish catches from an average of 300 fishing vessels (42' purse seiners - 40, 32' purse seine carriers - 80, 24' gill net boats - 50 and 32' shrimp trawlers - 130). Fish worth about Rs. 8.0 lakhs are handled at the harbour daily. After the berthing of the vessels the catch is sold straight away or after unloading, by auction and the fish sold thus is packed with ice and removed from the harbour quay by the merchants. Each category viz: the owner, the agent or the merchant have freedom to engage their own labour for the work connected with the fish handling at the harbour. To have an effective control on the proper handling of fish, the harbour authorities have imposed some restrictions for the entry of merchants and persons connected with the trade. Licences for carrying out these works are being granted by the harbour authorities on payment of specified fees and this has been the practice from the time of the commissioning of the harbour in December 1978.

At present there are about 650 licenced merchants, who participate in auction and remove the fish by all modes of conveyance except by bicycles. Each one of them is provided with 3 entry passes; one for himself and the other two for his labourers. In addition to these, there are also about 400 licenced merchants who purchase fish and remove by bicyles and who are given one entrance pass each. There are also about 85 fish buying agents who are provided with 10 entry passes each for his use as well as his workers. Besides, a large number of other extra labourers also enter inside the harbour paying the prescribed entrance fee. The number of extra labourers depends mainly on the landings. Apart from these the authorities are collecting prescribed berthing charges for various types of fishing boats which come to the harbour for the disposal of the fish, as well as fixed toll charges for the different types of vehicles coming inside the harbour for transport of fish catches.

All these toll charges, licences fees and berthing charges remained unchanged till 31-12-1981. The rates of these licences and fees were revised recently and the implimentation of the revised rates from 1-1-1982 is understood to have triggered the crisis at the harbour from 1-1-1982. As a protest against the harbour authorities fish landings were boycotted by all the categories of people engaged in the trade. The old rates and the enhanced rates from 1-1-1982 are given in table 1.

Details concerning the agitation

On the morning of 1st January 1982 when the drift gill net boats arrived at the harbour as usual to dispose of the catch, the authorities claimed the enhanced berthing charge of Rs 5/- instead of the old rate of Rs 3/-. The boat crew refused to pay these enhanced rates. The merchants and the agents joined hands and did not participate in the sale of the fishes. Out of the 29 drift net boats berthed, a few that unloaded their catch did not get any reasonable price due to the non-cooperation of the agents and the merchants. So the remaining boats took their catches to the nearby private jetties and sold the fish. None of the boats paid the berthing charges.

In the afternoon of the same day 2 purse seiners and 12 carrier boats were observed at the harbour, with the catch iced and covered with coconut palm (Cudjan) leaves in the boat itself due to lack of agents and merchants for the sale. Their catch consisted of a total of 7.5 tonnes of *Caranx djeddaba*, 13.5 tonnes of Oil sardine (*Sardinella longiceps*), 200 kg of Seer fish (*Scomberomorus commerson*) and 100 kg of black pomfret (*Parastromateus niger*). By about 16.00 hrs all these boats left the harbour with the fish and disposed it at the nearby private jetties at Thoppumpady, Fort Cochin, Vypeen and Murukkumpadam area. A total of 14 purse seiners and 153 carriers as well as several shrimp trawlers that arrived at the harbour also had to take their catches to other areas for selling. A few boats that unloaded their catch at the harbour had to sell their fish at throw away prices.

On 2-1-1982 only drift net boats brought catches to the harbour. But all the 37 of them left the harbour without unloading and disposed the catches at the nearby jetties.

Next day being a Sunday none of the boats operated. On 4.1.82, 35 drift net boats, 24 purse seiners and 127 carrier boats and shrimp trawlers together, after bringing their catches to the harbour left without unloading to nearby areas for the sale of fish.

On 5-1-1982, out of a total of 26 drift net boats berthed at the harbour 9 sold their fish at the harbour without paying any berthing charges. The rest 17 numbers landed at the Amruth Ice and Cold Storage jetty at Thoppumpady after paying Rs 1/- each as landing charges. The agents and the merchants actively

*Prepared by R. Reghu, K. Balachandran and M. Abdul Nizar.

Table 1. *Charges levied by the Harbour authorities at Cochin*

Items	Old rate from Dec. 1978 to 31.12.81	Enhanced rate from 1.1.'82	Revised rate after the agitation
A. *Berthing charges*			
i. Purse seiners	Rs 15/- per day with catch	Rs 25/- per arrival with catch	Rs 25/- per arrival with catch
ii. Trawlers & purse seine carriers	Rs 5/- "	Rs 7.50/- "	Rs 6/- "
iii. Gill net boats	Rs 3/- "	Rs 5/- "	Rs 4/- "
B. *Licence fees*			
i. Merchants who partake in auction in the harbour and remove the fish purchased by all modes of conveyance except by bicycles	Rs 30/- per month	Rs 50/- per month	Rs 50/- per month from March 1982 onwards only
ii. Merchants who purchase fish and remove by bicycle	Rs 10/- per month	Rs 15/- per month	Rs 15/- "
iii. Agents working in the Harbour	Rs 100/- per month	Rs 150/- per month	Rs 150/- "
C. *Toll for entry of vehicles* (from 6.00 AM to 6.00 AM next day)			
i. Hand cart	Rs 1/- per day	Rs 2/- per day	Rs 2/- per day
ii. Auto truck	Rs 1/- "	Rs 3/- "	Rs 2/- "
iii. Cycles with maximum 2 baskets	Rs 0.50 "	Rs 1/- "	Rs 1/- "
iv. Tempo van	Rs 2/- "	Rs 5/- "	Rs 5/- "
v. Lorry	Rs 4/- "	Rs 10/- "	Rs 10/- "
D. *Extra levy for vehicles for space utilised by the articles in connection with the handling, scales etc.*			
i. Hand cart/Auto truck	Nil	Rs 2/- per trip with materials such as creeper, baskets, cudjan leaves etc.	Nil
ii. Tempo vans with materials	Nil	Rs 4/- "	Nil
iii. Lorry with materials	Nil	Rs 5/- "	Nil
iv. Extra levy for the ice taken inside the harbour by any mode	Nil	25 paise per block of 50 kg (subject to a minimum of Rs 1/-)	15 paise per block of 50 kg (no minimum payment of Rs 1/-)
v. Entry fee for extra labour	Rs 2/-	Rs 1/-	Rs 1/-
E. *Berthing charges for crafts used for unloading materials*			
i. Boats other than gillnets	Nil	Rs 7.50/- per day	Rs 7.50/- per day
ii. Gill net boats	Nil	Rs 5/- "	Rs 5/- "
iii. Extra charges for space utilisation (for materials landed from the waterside)			
a) Materials like creepers, baskets, cudjan leaves etc unloaded from Trawl net boats	Nil	Rs 5/- per arrival	Rs 5/- per arrival
b) Materials like creepers, baskets, cudjan leaves etc unloaded from gill net boats	Nil	Rs 3/- "	Rs 3/- "
F. *Charges for utilising space for net repairs*			
i. Purse seine nets	Rs 15/- per day	Rs 25/- per day	Rs 25/- per day
ii. Gill nets	Nil	Rs 5/- per day	Rs 5/- per day
iii. Trawl nets	Nil	Rs 5/- per day	Rs 5/- per day
G. *Charges for using bath rooms & latrines*			
i. Bathrooms	20 paise per bath	20 paise per bath	20 paise per bath
ii. Latrines	10 paise per one use	10 paise per one use	10 paise per one use

participated in the selling and purchasing of the catch here.

From 5-1-1982 to 7-1-1982 the purse seine as well as the trawl catches were taken to different places for sale. It is understood that they have selected landing centres right from Alleppey in the South to Narakkal in the North and to Chambakkara in the east in the Vempanad lake area depending on availability of facilities for unloading and transportation of the catch.

Negotiation and restoration of normal activities

The enhanced toll charges and the other rates were intimated to the public by the harbour authorities through a notification in the Kerala Gazette published on 22-12-1981. The representatives of the

various categories of people engaged in the trade met and submitted a memorandum to the Chairman of the Cochin Port Trust who is also the Chairman of the Advisory Committee of the Cochin Fisheries Harbour on 31-12-1981, requesting for a stay in the implementation of the revised rates for sometime in order to enable them to discuss the matter in detail with the Chairman. The Chairman assured the representatives that due consideration would be given to their representation, at the meeting of the Board of Trusties and Advisory Committee.

Following a discussion of the representatives of the trade with the Chairman on 7-1-1982, (the 7th day of the agitation) in which the latter gave the assurance that their protest in the enhancement of the rates would be seriously considered and a positive decision in their favour taken in the next Advisory Committee Meeting, the normal functioning of the Fisheries Harbour was resumed from 8-1-1982. As assured by the Chairman, the Advisory Committee of the Cochin Fisheries Harbour met on 22-1-1982 and after discussions agreed to reduce some of the revised berthing charges for the boats, toll charges of some of the vehicles, the toll charges on ice etc. (vide table I).

First week of February 1982

Cochin Fisheries Harbour constructed at a cost of Rs 4.0 crores, although provided with the facilities for handling, packing and transport of the catch, lacks one of the vital facilities ie. an Ice Plant that could produce required quantities of ice for preserving the catches landed. Inside the Campus there is a small ice plant with a capacity of 25 tonnes per day managed by a private party and started functioning recently.

Lack of sufficient ice to preserve the catch has resulted in dumping large quantities of decayed oil sardine and other fishes on several occasions. On 28-1-1982 for instance, a total of about 1,000 tonnes of big sized oil sardine (180-215 mm) was caught off Cochin and brought to the harbour by the purse seiners and carriers. In addition, indigenous crafts fitted with out board engines were also hired by the purse seiners in the sea to carry the oil sardine catch to nearby centres.

As there was not sufficient ice available in the Fisheries Harbour to preserve the 1,000 tonnes of oil sardine landed there, the merchants were reluctant to purchase the fish. With the result the price came down from the usual rate of Rs 900 - 1,500 to Rs 400 - 500 per tonne. Even at the reduced price the whole catch was not taken. So nearly 25 tonnes of decayed oil sardine were dumped in the backwaters and several tonnes of decayed fish were transported for use as manure.

The ice required at the Fisheries Harbour has to be brought from nearby private Ice Factories in and around Cochin in 50 kg blocks by lorries, push carts and other transports and thus made available inside the harbour for purchase. Initially in 1978 the price of ice inside the harbour was Rs 70/- per tonne which later rose to Rs 100/- per tonne.

Till 31-12-1981, the harbour authorities were not levying any charges for bringing ice inside the harbour. But from 1-1-1982 onwards a levy of 25 paise per ice block of 50 kg subject to a minimum of Rs 1/- was introduced. As a result the ice merchants increased the price of ice from Rs 100/- to Rs 115/- per tonne.

In protest against this increase in the price of ice, the fish merchants started an agitation and struck work from 3-2-1982 demanding a reduction of the price of ice. Their demands also included commissioning of an ice Factory and a freezing plant inside the harbour. The grievance of the fish merchants was that the price of the ice was only Rs 45/- per tonne in the neighbouring places of Cochin.

Due to this strike by the fish merchants all the fishing boats operating from the harbour had to suspend their fishing operations.

The protest and the agitation by the fish merchants continued for 3 days from 3-2-1982 to 5-2-1982. However, normal fishing operations were resumed on 6-2-1982 onwards after the private ice plant owners at Cochin agreed to reduce the price of ice to Rs 95/- per tonne as a result of negotiations by the Sub-Collector of Ernakulam. The levy of 25 paise per ice block of 50 kg was reduced to 15 paise, without any fixation of minimum.

Problems of the purse seine boat crew

There are about 52 purse seine boats operating at Cochin Fisheries Harbour each having a crew of about 30 persons. The crew members of these purse seiners are understood to have started an agitation for getting increased share of their wages. Till recently the crew were given 30% of the amount realised from sale of catch as their share. (ie. 30% of the total price of the fish, after deduction of 5% commission for the auctioner or the agent). From December 1981 the purse seine boat owners are giving to the crew only 30% of the net amount realised (ie. after deducting the days expenses such as diesel, oil, mess expenses for the crew etc. from the total realised amount). The crew wants the original payment of the share of wages restored and are agitating for the same. Negotiations for an amicable settlement of the problem are under way and it is hoped that a settlement in the grievences of the crew will be found

soon, which would very much help in the smooth functioning of the purse seine fishing activity at Cochin. In resolving such problems in the various segments of the fisheries, more concern and involvement of the State Department of Fisheries would be helpful.

ILLEGAL FISHING IN INDIAN WATERS

As reported in September issue of Marine Fisheries Information Service, poaching by foreign vessels in India's Exclusive Economic Zone, particularly in the northern part of the Bay of Bengal, has become a grave problem. Five Thailand trawlers including one mother vessel were captured on 18-11-1981 by Indian coast guard from the sea close to the mouth of the river Ganges, 18 miles south of Sandhead. The crew of these vessels, 107 in number, were arrested and subsequently released on bail. The catch, mostly shrimps, was confiscated and handed over to Apex Co-operative Society of West Bengal.

Operations of Thai trawlers were reported by fishermen from Contai and Balasore coast. The number of trawlers operating in this area during 1981-82 are reported to be 75 to 100 and sometimes they are found to fish even at a distance of 30 km from the shore at depths 40-45 m. These operations close to the shore cause damages to the drift nets operated in these waters by local fishermen. These drift nets, varying in sizes from 3,200 to 4,800 ft long cost Rs. 20,000 to 30,000. From Digha area some of the fishermen have reported loss of their nets due to the operation of these trawlers. Large quantities of dead fish of different varieties floating in the waters in these areas indicate that these boats only keep the shrimp catch and throw away the by-catches, thereby wasting the resources.

The skippers of Indian trawlers operating in this area often complain about the foreign trawlers that they do not abide by international rules, moving in zigzag routes and without navigational lights in the night. Shri G. Mayabhan, skipper of trawler '*Sunita Rani*' reported to his base at Visakhapatnam about citing 40 Thai trawlers operating along the coast between Sandhead and Dhamra river on 2-10-1981. The skipper of another trawler "*Blue Angel*" Shri C. M. A. Rashid reported to Visakhapatnam about seeing 30-40 Thai trawlers fishing at 40-45 m depth region in between Sandhead and Paradeep.

These foreign trawlers are mostly 25 m to 50 m in length and equipped with powerful radars, which help detection of Indian coast guard vessels at very long distance and enable escape to waters of neighbouring countries or deeper areas. With the limited number of patrol vessels and equipments at its disposal the coast guard is trying its best to cope up with the situation and the capture of these 5 vessels is an indication of the surveillance and vigilance kept by them.

Reported by S. S. Dan.

CYCLONE HAVOC ALONG SAURASHTRA COAST

A severe cyclone with gales of 100–120 km lashed the Saurashtra coast of Gujarat on 1/11/81 causing heavy damages. Cyclone warning centre in Bombay precisely predicted the course and intensity of the cyclone and warned the Gujarat Government. The State Government alerted the public and the administrative machinery was geared up to meet the eventuality. The cyclone crossed the land between Veraval and Porbandar in the early hours of 2/11/81. Throughout 1/11/81 heavy gales were experienced in these localities. In spite of all the precautionery measures the cyclone inflicted heavy damage to the region. The total loss was estimated between 50–70 crores of rupees. About 14 people were killed at different places either due to drowning or house collapses. Junagadh district was the worst affected. Although preliminary estimates of loss of life, boats, crops and other properties were staggering, it turned out to be not so damaging when full details were available.

The harbour towns of Veraval, Mangrol and

Table 1. *The damages at different fishing villages of Gujarat due to cyclone on 1/11/1981*

Fishing village	Total loss of boats		Damage to boats		Loss of nets		Damage to houses etc., in Rs.	Total damage in Rs.
	Nos.	in Rs.	Nos.	in Rs.	Nos.	in Rs.		
Rajpara	-	-	10	2,000	-	-	1,50,000	1,52,000
Madhwad	1	15,000	8	3,900	-	-	1,00,000	1,18,900
Mul-Dwarka	1	20,000	18	66,400	1,573	2,44,150	1,00,000	4,30,550
Dhamlej	5	85,000	6	24,000	95	17,250	-	1,26,250
Sutrapada	1	20,000	16	29,800	317	51,075	50,000	1,50,875
Hirakot	1	8,000	3	7,000	2,293	5,24,300	20,000	5,59,300
Vadodara Bara	-	-	-	-	60	9,000	-	9,000
Jaleshwar	2	40,000	4	11,000	2,136	5,75,000	1,00,000	7,26,000
Mangrol	1	2,50,000	60	1,86,600	-	-	2,50,000	6,86,600
Shil	-	-	-	-	219	44,600	50,000	94,600
Madhavpur	-	-	2	22,000	1,367	4,10,100	-	4,32,100
Veraval	-	-	83	3,38,400	53	21,600	15,000	3,75,000
Porbandar	-	-	124	1,89,850	463	3,07,800	2,02,654	6,99,304
Total	12	4,38,000	334	8,80,950	8,576	22,04,875	10,37,654	45,61,479

Porbandar suffered maximum. Electricity, telecommunication, water supply were disrupted completely and could be restored fully after a week only. The damage to crops like ground nut, cotton, Bajara was very extensive. A number of houses collapsed or were damaged in the coastal towns and villages, particularly fishing villages.

Loss to the fisheries sector of Junagadh district is given in table 1, from which it could be observed that the maximum number of boats were damaged at Veraval and Porbandar. But for the alertness of coast guard the damage would have been much more. Expecting the seriousness of the situation the coast guard guided all the boats moored in the open harbour into the sheltered pockets of the harbour. At Veraval 83 boats, mostly mechanised, were damaged and 53 nets were lost. The loss here to the fishing industry was estimated at Rs. 3.75 lakhs. Apart from this there was an extensive damage to the fishing harbour under construction with world bank aid. Due to high waves the breakwater wall under construction was wiped out about 80 m length on the eastern and western side of the fisheries harbour. The damage was estimated to Rs. 25 lakhs. Barges of the port department (5 in number) sank in the harbour and a dredger was damaged costing the port department an estimated 12.6 lakhs of rupees to float and then repair. About 8 people died in a house collapse and one cargo vessel ran aground in the harbour and another sank off shore. The crew of the vessel swam ashore except one, whose body was later washed ashore.

At Mangrol 60 boats were damaged and 1 trawler was missing. Loss to boats and nets was estimated at Rs. 6.86 lakhs. Damage to fishing harbour was also extensive and the loss was estimated at Rs. 25 lakhs. There was an extensive damage of houses at this place.

At Porbandar the maximum of 124 boats were damaged and 463 nets lost with an estimated loss of Rs. 7 lakhs. Apart from this the all-weather port at Porbandar suffered a damage coasting Rs. 10 lakhs.

From Rupan 348 boats left for fishing on 1/11/81 and drifted to different ports. Navy was asked to search for these boats. 6 Naval ships combed the Arabian sea and found that most of the vessels reached different ports along the coast. Still 3 fishing vessels with a total crew of 20 are reported missing.

The fishing industry of Junagadh district on the whole is estimated to have suffered a damage of about Rs. 45.6 lakhs. Measures are being taken by the State Government for the relief and rehabilitation of those affected, particularly the fishermen who lost their property.

Reported by G. Sudhakara Rao.

NEWS-INDIA AND OVERSEAS

Tropical Fisheries Consultancy Services

A multidisciplinary consultancy service in fisheries, entitled Tropical Fisheries Consultancy (TFC) Services has been started with headquarters at Delhi. The specializations are marine small scale and artisanal fisheries, fishing harbours and infrastructure development, fishing craft and gear, mechanised and deep sea fisheries, fish processing and product development, marketing, aquaculture, aquaculture engineering and inland capture fisheries. Intended to serve private enterprises, corporate bodies, including co-operatives, governmental agencies, international agencies, aid giving countries, aid receiving countries, financial institutions and research and development agencies, the services offered are socio-economic surveys, preinvestment surveys, operational projects, turn-key jobs, integrated area development projects, joint ventures, charters, designing, procurement and supply of equipment, training of personnel counselling, documentation, costing, finance and financial analysis, management and custom services. Dr. T. A. Mammen formerly Joint Commissioner (Fisheries), Government of India is the Managing Director and Mr. M. Devidas Menon, Mr. P. P. Dinglasan, Dr. G. P. Dubey, Miss Aye Aye Myaing, Mr. Fred H. Meyer, Mr. George P. Varghese and Dr. S. V. Gokhale consultants. For further particulars please contact Tropical Fisheries Consultancy Services, C12, Vivek Vihar, Delhi 110 032, India.

A rare marine crocodile landed at Thirumalai-rayanpattinam

On 3rd March 1982 a rare crocodile was caught in a gill net "thrukkai valai" operated by two fishermen Vairakkannu and Kalaivanan about 5 km off the coast of Thirumalairayanpattinam, nearly 330 km south of Madras and 16 km north of Nagapatnam. Fifty fishermen with two mechanised boats helped them to bring the giant reptile to the shore. The animal was tied up with ropes in an irrigation canal.

The crocodile (Photo) is dark yellow in colour with black patches all over the body and measured 2.62 m in length. It was identified as the coast crocodile, *Crocodilus porosus* Schneider, one of the rare among the 20 species recorded from India. It was reported earlier from the east coast of India, ascending rivers atleast up to tideway. It is the largest of the crocodiles and a notorious man-eater.

The reptile was transported to the snake farm near Kovalam in Madras in living condition and is being reared there. According to the farm manager Mr. Allan the skin of this species is very thin and soft and therefore highly valuable.

Reported by K. S. Krishnan

Shrimp roe processed

Shrimp roe is a luxury product fetching very high prices. An Icelandic company manufacturing fish processing equipment, Traust Ltd, has developed a shrimp gonad extraction plant for installation either on board ship or at the freezing plant.

The method of processing is an adaptation of their capelin roe extraction plant and at the moment at the prototype stage. Shrimp and water is pumped into a squeezer where the gonad is pressed out. A straining conveyer separates the roe-containing liquid from the shrimp which are then processed. The roe is then separated from the liquid, washed and weighed into boxes and frozen or salted.

World Fishing 30 (4): April 1981

Krill peeling machine prototype

Laitram Corporation has developed a prototype machine for peeling krill at sea. The machine is designed to peel 1000 lbs per hour of krill input with an output of 200 lbs per hour of peeled tail meat. The prototype weighs approximately 1 tonne but the final machine will weigh considerably less. The machine is being experimented in Antarctica and if successful Laitram hope to have machines ready for sale by November 1982. For onshore peeling a simplified version can be used. But shore-based peeling of fresh krill seems doubtful due to the four hour time limit in which the krill meat goes bad after capture.

World Fishing 30 (4): April 1981

Compiled and prepared by M. J. George and G. Subbaraju.
Published by Dr. M. J. George, Senior Scientist on behalf of the Director, Central Marine Fisheries Research Institute, Cochin-682 018 and printed at PAICO, Cochin 31