



# समुद्री मात्स्यकी सूचना सेवा MARINE FISHERIES INFORMATION SERVICE

No. 120

MARCH, APRIL 1993



तकनीकी एवं विस्तार अंकावली TECHNICAL AND EXTENSION SERIES

केन्द्रीय समुद्री मात्स्यकी अनुसंधान संस्थान  
कोचिन, भारत CENTRAL MARINE FISHERIES RESEARCH INSTITUTE  
COCHIN, INDIA

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INDIAN COUNCIL OF AGRICULTURAL RESEARCH

# THE STATUS OF CARANGID FISHERY AT VIZHINJAM, TRIVANDRUM COAST DURING 1979-'88

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## Introduction

The carangid fishery in India during the decade 1979-'88, which had been yielding 64,877 tonnes annually, formed 4.3% of the average annual marine fish production of the country. The statewise analysis during the period showed that 25% of the country's carangid catch came from Kerala state, where its average annual catch was 11,176 t forming 3.4% of the total fish production. At Vizhinjam in Thiruvananthapuram district, where fishing activities are carried out thorough out the year, carangids are landed during all the months in one or the other types of gears. It formed one of the major pelagic fish resources in this area constituting 13.5% of the centre's total marine fish catch during 1979-'88. Some earlier studies had shown that carangids formed 13.3% in 1968-'79 and 15.5% in 1981-'85 periods. The status of carangid fishery at Vizhinjam during the decade 1979-'88 is evaluated in the present account.

## Fishing crafts and gears

The crafts used at Vizhinjam were traditional catamarans, dugout canoes, plankbuilt boats, etc. A few 32' boats with inboard engines were also engaged in drift net fishing since 1981. In 1983 traditional crafts fitted with outboard motors started operation, and their number increased considerably in the subsequent years. Consequently, a decline in the effort by non-motorised traditional crafts was noticeable from 1984 onwards. As a result of motorisation, the area of fishing was extended to 20-25 km off Vizhinjam coast at a depth range of 60-80 m, whereas the traditional crafts were confined to the 10 km range from the shore at a depth of 40-50 m.

In the absence of trawl fishing, a variety of traditional gears were operated in this centre to exploit the fish resources, both pelagic and demersal, in different seasons depending on the types of fish available and the seasonal climatic

changes. These included drift nets, other gill nets, hooks & lines, shore seines and boat seine. Each unit of hooks and line consists of 25-50 hooks, the size of which depends on the size of the target species. In drift nets, generally large sized carangid species were caught. In addition to these, boat seines, shore seines, *chala vala* (gill net) and *konchu vala* (bottom set gill net) were also operated every year depending on the seasons. Of all these, hooks & line and drift nets were found to be the effective gears in carangid fishery. In the present account, a fishing trip was considered as a unit of effort and hooks & line of the non-motorised sector, which was operated in all the years and fetched relatively higher catch rate, was selected as the standard gear for carangids.

## Annual production

The fishery data on carangids collected over a period of ten years during 1979-'88 from Vizhinjam fish landing centre were analysed and the results are presented in Fig. 1, which shows the trend of annual standard effort, catch and catch per standard effort (C/SE) along with annual averages and the annual percentage of carangids in relation to total fish catch.

The total catch during the decade was estimated to 9,214 tonnes forming 13.5% of the total fish landing of the centre (Fig. 1C). The annual catch ranged from 559 t in 1979 to 1,494 t in 1983 with the annual average at 921 t. From 1979 to 1982 the catch fluctuated between 559 t and 652 t and thereafter, a drastic increase was noticeable in 1983 forming 1,494 t. In 1984, again it evinced a slight decline to 1,088 t and afterwards remained without much change till 1987. In 1988 it again declined to 963 t.

The percentage contribution of carangids ranged from 9.6 in 1979 to 23 in 1984 (Fig. 1B) and the annual C/SE from 3.5 kg in 1987 to 10 kg in 1984. The reason for the increased catch, noticed from 1983 onwards, may be attributed to the motorisation of traditional crafts.

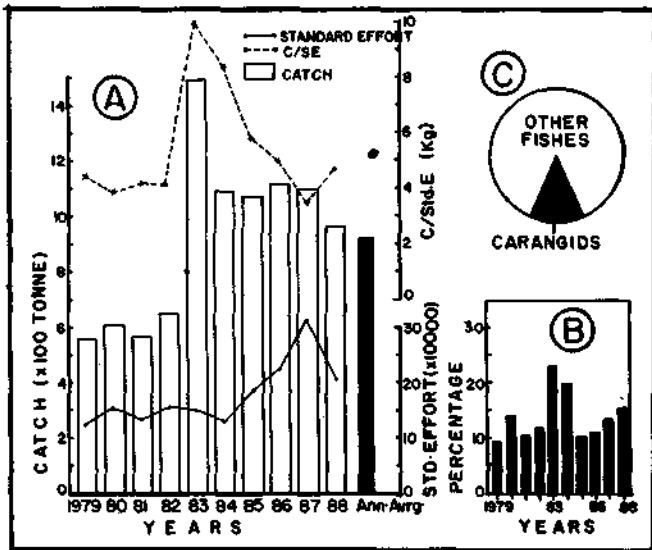


Fig. 1. Annual carangid landings at Vizhinjam : A - Catch (Tonnes), standard effort (SE) and C/SE (kg) in different years; B - Percentage of carangids in total fish catch; C - Percentage of average annual carangid catch.

### Seasonal trend

Carangids formed a fishery throughout the year at Vizhinjam. The monthwise average catch, standard effort and C/SE are shown in Fig. 2. The average monthly catch ranged from 36 t in February to 164 t in September with an estimated catch rate of 77 t per month. The fishery, which fluctuated between 36 t in February and 81 t in May during the first half of the year (January to June), showed a steady increase from July onwards and reached the peak in September. Thereafter, it again decreased to 108 t in October and 50 t in November. December recorded a slight increase over that of November. The monthly contribution to the annual catch (Fig. 2-inset) shows that more than 50% of it was landed in four months period, from July to October, indicating the peak season for the fishery. The C/SE ranged from 2.3 kg in February to 9.7 kg in September with an overall monthly C/SE of 5.4 kg. The seasonal abundance of total carangid catch, as indicated by C/SE, is presented in Fig. 8A.

### Gearwise production

Carangids were caught in all types of gears such as drift nets, hooks & line (both traditional and motorised sectors), boat seine, shore seine and gill nets (*chala vala* & *konchu vala*). The percentage contribution by these gears to the annual carangid catch is presented in Fig. 3. More than 50% of the average annual catch

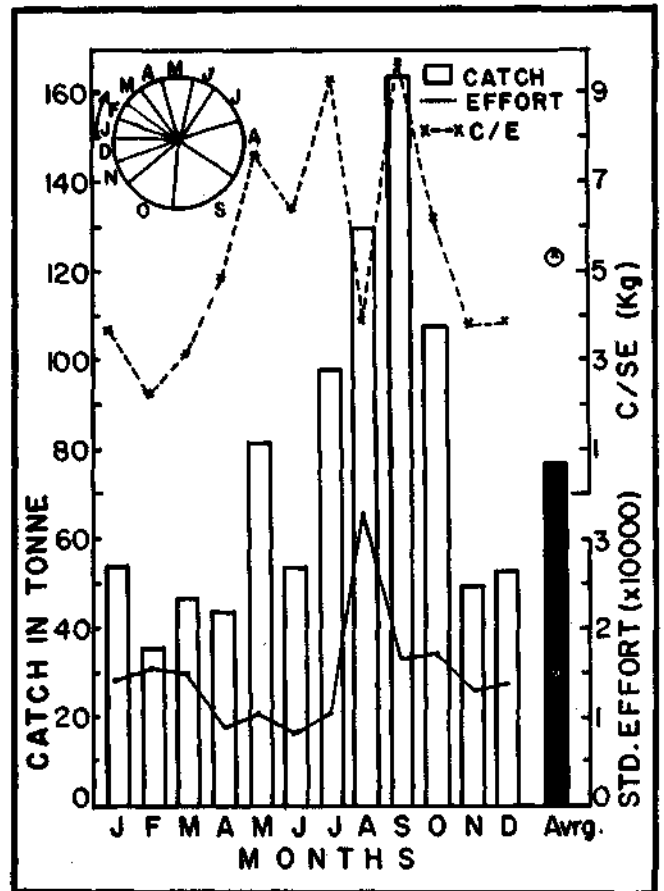


Fig. 2. Seasonal trend of carangid catch during 1979-'88. Inset - monthly percentage contribution.

(53.6%) came from hooks & lines and there too the traditional sector contributed to 33.7%. This was followed by boat seines (21.1%) and drift nets (20.6% - with 7.8% and 12.8% by the traditional and the motorised sectors respectively). The rest of the catch was contributed by *konchu vala* (2.8%), *chala vala* (1.1%) and shore seines (0.8%). The trend in the gearwise annual catch, effort and C/SE and their seasonal fluctuations are presented in Figs. 4-7.

### Drift nets

This was operated in the traditional as well as motorised sectors. Its operation in the latter sector was started in 1981, and it contributed 62% to the total drift net catch (Fig. 4E).

**Traditional sector :** The annual effort in this sector of drift net ranged from 2,097 units in 1987 to 21,802 in 1980 with an average of 11,664 units per year. From 1980, it gradually declined in successive years to a minimum in 1987 and thereafter increased slightly in 1988. Maximum catch (132.8 t) was recorded in 1980 and

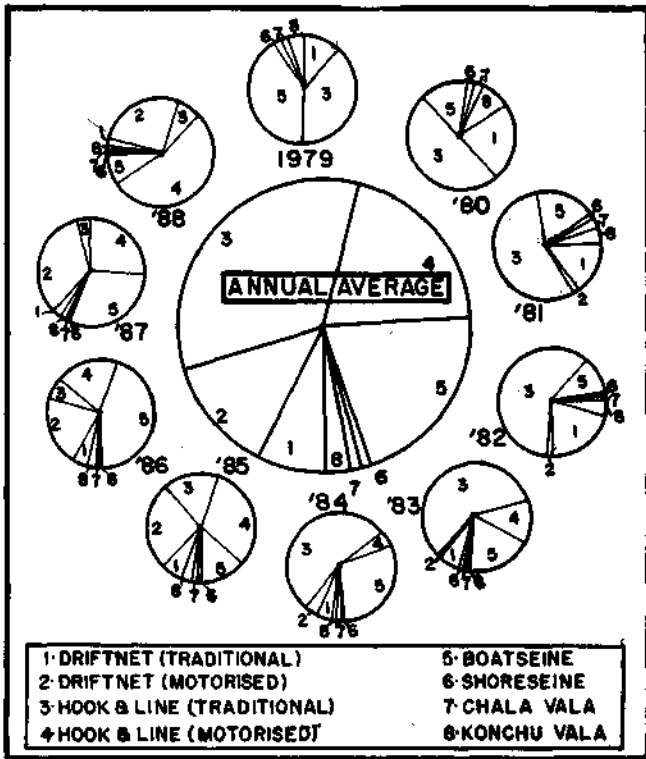


Fig. 3. Annual gear-wise contribution to carangid catch during 1979-'88 with annual average in the centre.

minimum (20.6 t) in 1988 with the annual average at 72.2 t. The catch showed a downward trend from 1983 onwards concomitant with the decrease in effort. The C/E fluctuated till 1984 and showed a steady increase thereafter, except for 1988. The C/E ranged from 4.5 kg in 1981 to 12.3 kg in 1987 with an annual average value of around 6.2 kg (Fig. 4A). Carangids formed 15.9% of the total fish catch in drift net of this sector (Fig. 4A - inset).

During monsoon season (July-August) this fishery was not in operation. The seasonal trend (Fig. 4B) showed minimum and maximum catches in June (1.7 t) and in October (17.6 t) respectively. During January to May, the catch was higher than the monthly average value. The catch as well as the catch rate showed significant increase during September to November. The season of abundance, as may be seen in Fig. 8B, was from September to January.

**Motorised sector:** The drift net operation in this sector started in 1981, and the number of effort showed a sharp increase since 1985 (Fig. 4C). Similar increase in catch as well as C/E was noticed in these years. The effort was minimum in 1982 (657 units) and maximum in 1988 (28,387 units), with annual average of 13,784

units. The minimum and maximum catches were observed in 1982 (4.1 t) and 1987 (371.9 t) respectively, with average at 147.4 t per year. During 1985 to 1988 the annual catch was much higher than that of the previous years. The C/E ranged between 6.3 kg in 1982 and 13.8 kg in 1987. 16.4% of the total catch in this sector was constituted by carangids (Fig. 4C - inset).

The seasonal trend (Fig. 4D) showed that the catch and catch rates declined steadily till March, and thereafter fluctuated till August. During September to November, the catch was well above the level of monthly average with a peak in October. The catch rate fluctuated between 5 kg in June and 18 kg in January. The effort was higher in September to November with a maximum in October. The seasonal abundance (Fig. 8C) showed greater catch rates from July to January.

### Hooks & line

This was identified as the effective gear for carangids, landing 53.6% of its total annual catch. Operation of this gear from the motorised

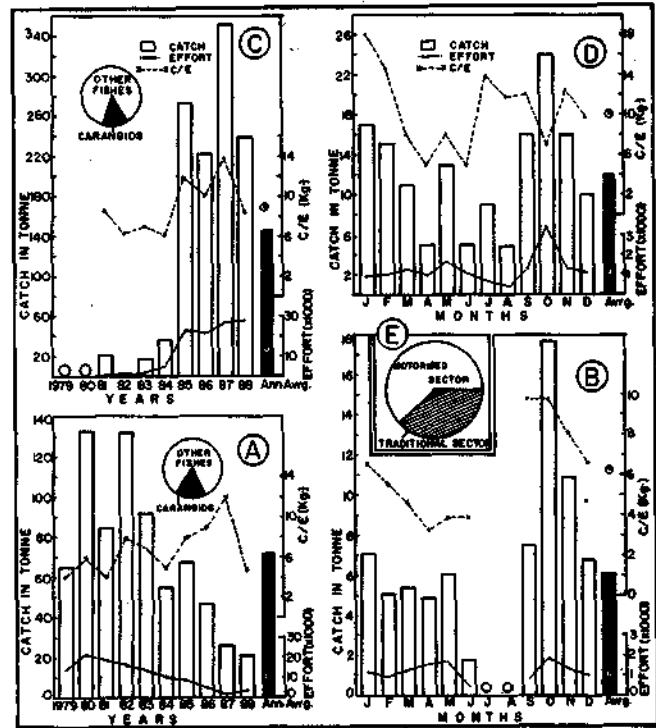


Fig. 4. Carangid catch in drift net : A - Annual catch in traditional sector (inset - % of carangids); B - Seasonal trend in traditional sector; C - Annual catch in motorised sector (inset - % of carangids); D - Seasonal trend in motorised sector; E - Percentage contribution of carangids by traditional and motorised sectors.

crafts was started in 1983. Nearly 63% of the carangid catch of hooks & line came from its traditional sector and the rest from motorised sector (Fig. 5E).

**Traditional sector:** The annual effort, catch and C/E (Fig. 5A) show that this gear was operated in all the years. The minimum and the maximum effort was noticed in 1987 and 1982 respectively with an average of 50,363 units per year. Since 1983, the effort showed a declining trend because of the increase of effort in its motorised sector from 1983 onwards. The annual catch ranged from 49 t in 1987 to 886 t in 1983. The estimated catch per year was 310 t which formed nearly 35% of the total catch of the gear (Fig. 5A - inset). From 1979 to 1983 the trend of catch was increasing and thereafter it declined. The average catch rate was estimated to be 6.2 kg per year, and it ranged between 4.3 kg in 1979 and 10.5 kg in 1983.

The seasonal trend (Fig. 5B) show that the average monthly effort ranged between 265 in June and 5,154 in August with monthly value of 4,199 units. Effort, higher than the mean, was noticed in February to April and August to October. The average catch was 26 t per month which ranged from 12 t in November to 45 t in September. Higher catch, than the mean, was recorded in April, May and July to October. The C/E ranged from 3.1 kg in February to 10.8 kg in July, and it was higher than the mean in May to October. The seasonal abundance in terms of C/E (Fig. 5D) showed May to September as the peak season.

**Motorised sector:** After starting in 1983, a steady increase was noticed in the number of effort in this sector since 1985. The annual effort ranged from 5,195 in 1983 to 50,894 in 1988. The average catch was 306 t per year forming 19.9% of the total carangid catch and 20% of the catch of the gear (Fig. 5C - inset). The annual catch ranged from 178 t in 1983 to 573 t in 1988. The average annual C/E was 10.6 kg, which ranged from 6.4 kg in 1986 to 34.3 kg in 1983 (Fig. 5C).

The seasonal trend of carangid fishery is presented in Fig. 5D. The average monthly effort varied from 1,527 in April to 3,224 in July with a mean effort of 2,410 units per month. Effort, was higher than the monthly average which could be noticed in July to December. The catch was minimum in February (5 t) and maximum in

September (58 t) with a mean of 25.5 t per month and catch higher than this was recorded in January, August-September and in December. The monthly C/E fluctuated irregularly between 2.7 kg in February and 18.5 kg in September. March to June and September-October were the main carangid fishery seasons (Fig. 8E).

### Boat seine

This gear was operated almost throughout the year, with one or two months gap in some years. The annual and seasonal fluctuations of effort, catch and C/E are presented in Fig. 6 A & B. The average annual effort was 32,665, and it ranged from 14,760 in 1988 to 47,794 in 1979. Boat seine contributed 21.1% to the annual carangid landings and the average catch was 194 t forming 6% of the gear's total catch (Fig. 6A-inset). It fluctuated between 34 t in 1988 and 50 t in 1986. The C/E ranged between 1.9 kg in 1982 and 15 kg in 1986, with the annual average at 6 kg.

The average monthly effort was 2,722 units with a range of 104 in November to 10,916 in July. The peak fishing season was from July to September, and the monthly catch fluctuated

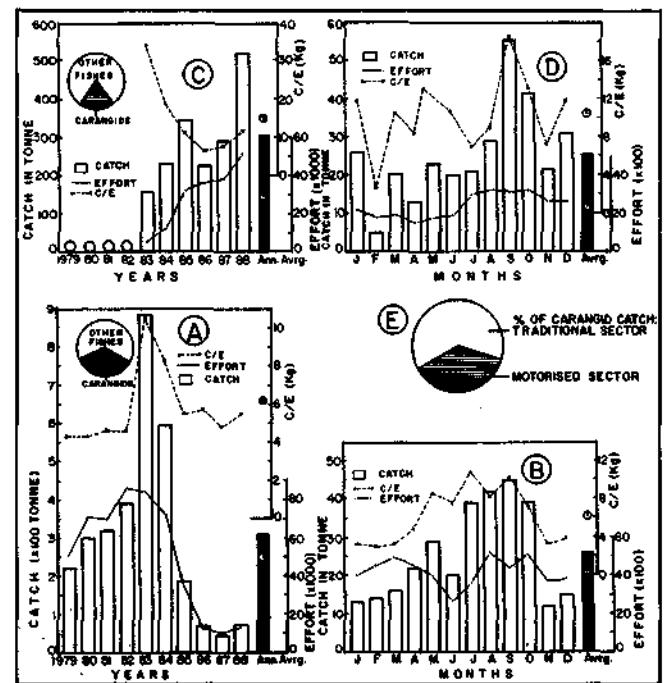


Fig. 5. Carangid catch in hooks & line: A - Annual catch in traditional sector (inset - % of carangids); B - Seasonal trend in traditional sector; C - Annual catch in motorised sector (inset - % of carangids); D - Seasonal trend in motorised sector; E - Percentage contribution by traditional and motorised sectors.

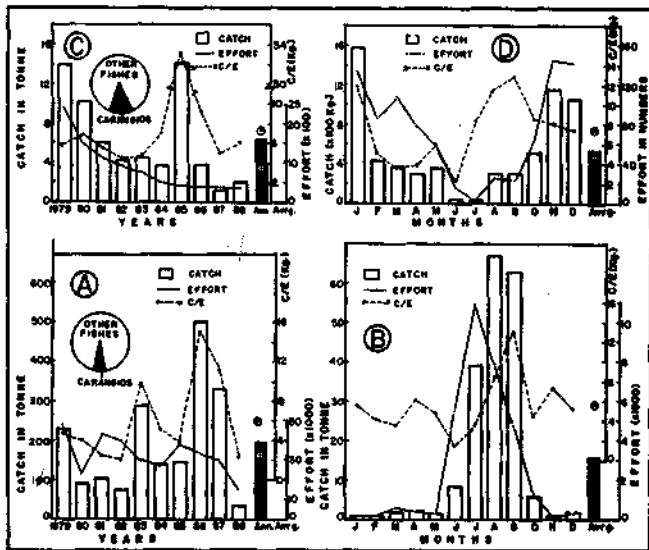


Fig. 6. A - Annual carangid catch in boat seine (inset - % of carangids), B - Seasonal trend in boat seine, C - Annual catch of carangids in shore seine (inset - % of carangids), D - Seasonal trend in shore seine.

between 0.8 t in November and 67 t in August at a rate of 16 t per month. During July to September the catch was more than the monthly mean. The C/E was minimum in June (1.5 kg) and maximum in September (13 kg). Catch rates higher than the annual values were noticed in April, August, September and November. The season of abundance was August-September (Fig. 8F).

### Shore seine

During the south-west monsoon period shore seine operation was normally suspended due to the rough sea conditions, but a few exceptions were noticed in some years. The average annual effort was 882 units, which ranged from 346 in 1988 to 2,416 in 1979. A reduction in the number of effort could be noticed every year (Fig. 6C). The average catch was 6.4 t forming 0.7% of the annual carangid catch and 13.1% of the gear's total catch (Fig. 6C - inset). The maximum and minimum catches were recorded in 1985 (14 t) and in 1984 (1.9 t) respectively. The catch decreased from 1979 to 1988, except for a marked increase in 1985 when the C/E also raised to 33.2 kg. In all other years C/E fluctuated between 4.5 kg and 9.2 kg. The average annual C/E was 7.3 kg (Fig. 6C).

The seasonal trend is presented in Fig. 6D. The effort was maximum in November (145 units) and minimum in July (3 units) with monthly average at 74 units. Effort higher than the mean

was noticed in January to April and November-December. The catch ranged from 27 kg in July to 1.6 t in January at a rate of 0.5 t per month. The C/E was between 2.3 kg in June and 12.8 kg in September. The seasonal abundance (Fig. 8G) indicated July to January as the major season for carangid fishery.

### Chala vala

The contribution of chala vala to the annual carangid catch was 1.1%, though the average annual effort was 13,938 units. Operation of this gear was normally suspended in July-August months due the impact of the south-west monsoon, but 1988 was an exception when a few units were operated during this period. The annual effort fluctuated between 7,825 in 1987 and 19,746 in 1981. The average carangid catch was 10.5 t per year forming 3.4% of the total fish caught in the gear (Fig. 7A - inset). The effort as well as the catch fluctuated irregularly leading to a corresponding variation in the catch rates, which ranged from 0.2 kg in 1986 to 1 kg in 1988 (Fig. 7A).

While the monthly effort fluctuated from 16 units in July to 3,023 in May with a monthly average at 1,162 units, the catch varied from 76 kg in June to 2.8 t in May. Catch greater than the month's average (0.9 t) was recorded in

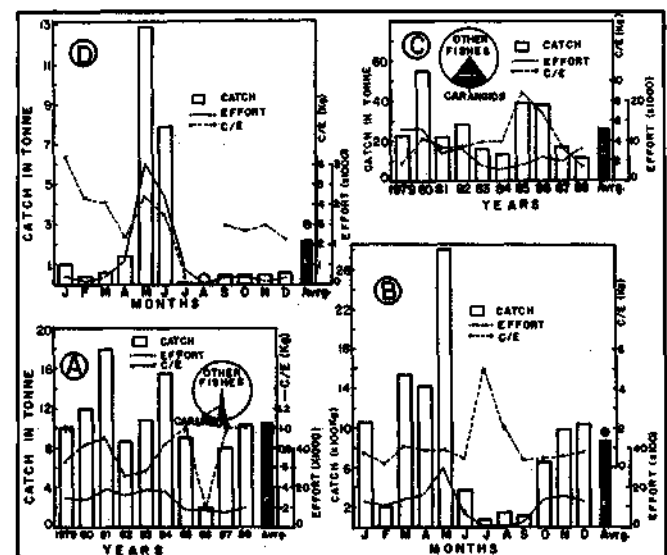


Fig. 7. A - Annual carangid catch in chala vala (inset - % of carangids), B - seasonal trend in chala vala, C - Annual carangid catch in korchu vala (inset - % of carangids), D - Seasonal trend in korchu vala.

January, March to May, November and December. The C/E varied between 0.2 kg in February and 4.9 kg in July. The catch rate of the gear was better in July-August period (Fig. 8H).

### Konchu vala

It is a seasonal bottom set gill net operated mainly to catch prawns during April to June. The average annual effort was 7,327 units with a range of 3,218 in 1984 to 13,373 in 1979. This gear contributed 2.8% to the annual carangid catch. On an average 2.6 t of carangids were annually landed which formed 20.5% of the gear's total catch (Fig. 7C - inset). The minimum and maximum catches were observed in 1988 (11 t) and 1980 (55 t) respectively. C/E fluctuated between 1.4 kg in 1988 and 8.8 kg in 1985 with annual average at 3.7 kg (Fig. 7C).

The seasonal trend of effort, catch and C/E is presented in Fig. 7D. Effort and catch were relatively high in May-June, whereas in other months they were far below the monthly averages, which were 611 units and 2.2 t respectively. The monthly effort ranged from 53 units in August to 2,952 in May and the catch from 0.1 t in July to 13 t in May, with nil catch in

August. The C/E ranged from 0.4 kg in July to 6.4 kg in January. The seasonal abundance in terms of C/E (Fig. 8-I) showed almost uniform trend in all months, except for August when catch was nil and for January and July when maximum and minimum catch rates were noticed respectively.

### Species composition

Though a number of species, varying in sizes contributed to the carangid fishery at Vizhinjam, *Decapterus dayi* was the predominant species. Seasonally, for a short period, *D. macrosoma* and very rarely, a few numbers of *D. macarellus* were observed in the catch. Other important species were *Atule mate*, *Selar crumenophthalmus* and *Megalaspts cordyla* were also landed. Many species belonging to the genera *Caranx*, *Carangoides*, *Alepes*, *Alectis*, etc were landed, and these were grouped under a common head as 'other carangids'. The present observations are based on the data collected over a period of five years during 1984-'88.

### Annual trend

Yearly species composition is presented in Fig. 9A. *D. dayi* was the dominant single species fishery in all the years, except for 1985. It formed 44.7% of the annual catch with the annual percentage ranging from 20 in 1985 to 61.2 in 1988. *Atule mate* formed 14.1% annually, which varied from 4.2% in 1986 to 33.3% in 1984. *Selar crumenophthalmus* ranked third forming 12.3%. *Megalaspts cordyla* was poorly represented in the fishery and it formed only 0.4%, with a yearly range between 0.01% in 1988 to 0.8% in 1986. The 'other carangids' constituted 28.4% with the yearly values ranging from 18.8% in 1988 to 48.5% in 1985.

### Seasonal trend

The average monthly species composition during 1984-'88 is given in Fig. 9B. *Decapterus dayi* formed 15.1 to 73.2% (December and August respectively) whereas *Atule mate* formed 4% to 24.6% (January and October respectively). The occurrence of *Selar crumenophthalmus* was minimum in June (0.5%) and maximum in December (51.1%). *M. cordyla* was noticed from August to December in small quantities (0.04 - 2.2%). The occurrence of 'other carangids' was 11.7% in July to 41.4% in June.

### Gear-wise species abundance

The gear-wise analysis showed that (Fig.

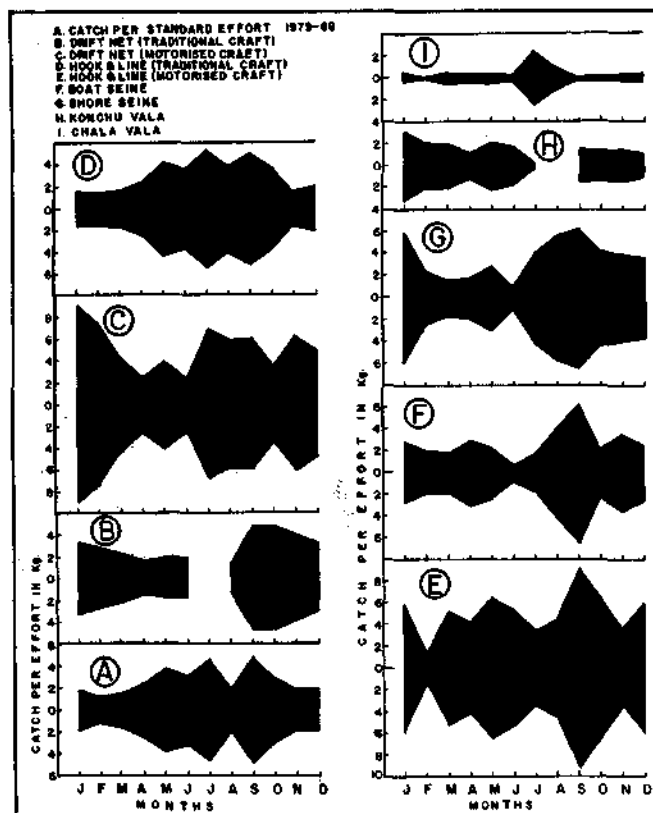


Fig. 8. Seasonal abundance of carangids in different gears - an index of catch per unit of effort.

9C) in drift gill net of the traditional sector, the 'other carangids' dominated forming 41%. *D. dayi* and *A. mate* formed 23 and 18.6% respectively. *S. crumenophthalmus* formed 17.3% and *M. cordyla* 0.1%. In the motorised sector of drift gill net, *S. crumenophthalmus* was the dominant species forming 26.9%, but only second to 'other carangids' (37.8%). This was followed by *D. dayi* (23.2%), *A. mate* (11.7%) and *M. cordyla* (0.5%).

In the hooks & line fishery, the dominant species was *D. dayi*. In its traditional sector *D. dayi* formed 38.5% followed by *A. mate* (36.2%), 'other carangids' (22.2%), *S. crumenophthalmus* (3%) and *M. cordyla* (0.1%). In the motorised sector *D. dayi* formed 53.1% whereas 'other carangids' ranked second (20.6%) followed by *S. crumenophthalmus* (14.6%), *A. mate* (11%) and *M. cordyla* (0.7%).

In the boat seine catches, *D. dayi* dominated forming 67.9% and *A. mate* 1.2%. 'other carangids' with 29% was the second dominant group whereas *S. crumenophthalmus* and *M. cordyla* formed only 1.6% and 0.2% respectively. In shore seine 38.9% was formed by 'other carangids' and 48.4% by *S. crumenophthalmus*. *D. dayi* formed only 11.6% and *A. mate* 1%. In

*chala vala D. dayi* was the dominant single species forming 28.3% followed by *A. mate* (13.1%). The rest was contributed by 'other carangids'. In *konchu vala* 'other carangids' dominated (70.4%) followed by *A. mate* (18.5%), *D. dayi* (10.2%) and *S. crumenophthalmus* (0.9%).

### Impact of motorisation of traditional crafts

Motorisation of traditional crafts began in 1983 and its impact on the fishery at Vizhinjam was encouraging. A noticeable increase in the carangid catch was evident from 1983 onwards. The average annual catch, which was only 596.8 t in 1979-'82, increased to 1,137.8 t by 1983-'88 period registering 90.8% increase. This may be attributed to the motorisation of traditional crafts started in 1983. The catch rate of carangids in motorised drift net during 1983-'88 was 11.4 kg as against 6.9 kg in its traditional sector and 10.6 kg in motorised hooks & line as against 8.2 kg in its traditional sector. This clearly shows that motorisation has yielded more returns to the fishermen. The accessibility to far and new fishing grounds, beyond the traditional areas, coupled with less waste of time in navigational purposes seems to be the reasons for higher catch rates in motorised crafts.

### Conclusions

A conspicuous increase in the carangid catch was noticed since 1983. The average annual catch increased by 90.8% in 1983-'88 period than in 1979-'82. May to October was the peak season for carangid fishery at Vizhinjam. Motorisation of traditional crafts has resulted in an increase in the catch and catch rates, thereby fetching more income to the fishermen. *Decapterus dayi* was the dominant species (44.7%) followed by *A. mate* (14.1%) and *S. crumenophthalmus* (12.3%). The 'other carangids' contributed to a sizeable quantity (28.4%) to the fishery. *D. dayi* dominated in the catch during July to September, *A. mate* in March to June and *S. crumenophthalmus* in November to February.

The bottom topography in the fishing ground off Vizhinjam is mainly rocky and hence is unsuitable for trawl fishing. So, in order to trap the rich pelagic fishery resources, it is recommended that small sized purse seine or ring seine and modern types of synthetic gill nets with different mesh sizes to catch fishes of wide size ranges, may be introduced at this centre. These gill nets, if suitably set in, may be useful to exploit even the demersal resources, which otherwise remain under exploited.

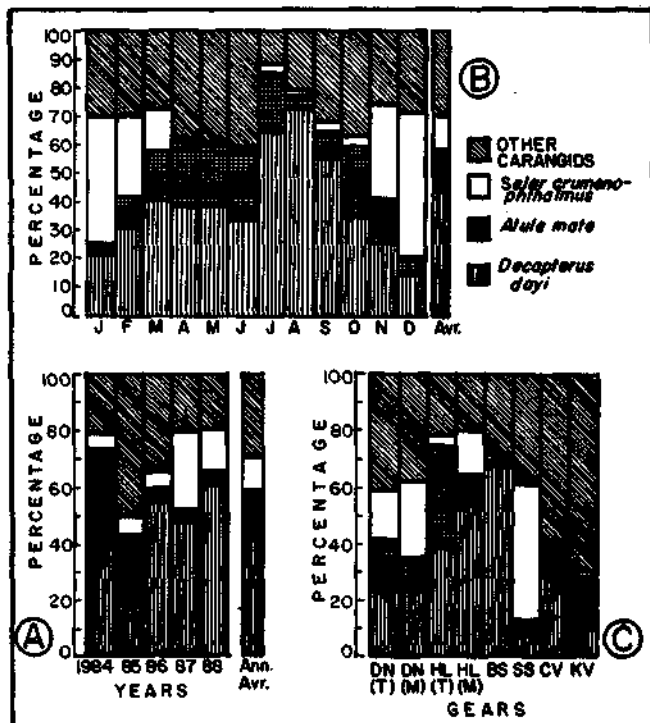


Fig. 9. Percentage species composition of carangids in : A - different years during 1984-'88, B - different months (average) and C - different gears.