The Marine Fisheries Information Service (Technical and Extension Series) envisages dissemination of information on marine fishery resources based on research results to the planners, industry and fish farmers, and transfer of technology from laboratory to field.


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Front cover photo: *Cassis cornuta* (Horned helmet) — the largest and heaviest ornamental shell of the family cassidae found abundant in the Gulf of Mannar, southern India.

Back cover photo: The seed of green mussel *Perna viridis* collected from the natural habitats along the sea shore are being segregated sizewise and cleaned for seeding on ropes for culture purpose in the estuarine environment at Kasaragod in northern Kerala.

**Mukh Aavaran Chitra**: दक्षिण भारत की मानसी खादी में प्रमुख मात्रा में विकाश पाने या वाला कल्सिस कोर्नुटा का आलंकारिक कल्चर—यह फामिली कासिडे में सब से बड़ा और भारी है।

**Pust Aavaran Chitra**: उत्तर केरल के कासरागोद ज्वातरक्षुम में रसिदिया में रोपण केलिए प्राकृतिक आवासों से संप्रभृत हस्त शंख पेनिस बिझिग्स आवाम के अनुसार आयाम करते साफ़ करते है।
The Marine Fisheries Information Service: The Marine Fisheries Information Service envisages dissemination of information on marine fishery resources based on research results to the planners, industry and fish farmers, and transfer of technology from laboratory to field.


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903 केरळ की समुद्री मछलियों की जीवनसार्थी व्यवस्थान: केरळ की समुद्री मछलियों की जीवनसार्थी व्यवस्थान पर आधारित अनुसंधान परियोजनाओं का आयोजन, मत्स्य उद्योगों और मत्स्य पालन के बीच प्रसार करना और तकनीकी का प्रयोगहरू में श्रमशाला तक हस्तलिपित करना है तकनीकी और वित्तराष्ट्रीय अंदाजली का लक्ष्य है।

Front cover photo: Cassis cornuta (Horned helmet) — the largest and heaviest ornamental shell of the family cassidae found abundant in the Gulf of Mannar, southern India.

८०३ पृष्ठ आवश्यक: दक्षिण भारत की मान्यता खाद्री में प्रचुर मात्रा में दिखाये पड़ने वाला आमसाफ कोस्तुटा का आलंकारिक कदम—यह फामिली कासिडा में सब से बड़ा और भारी है।

Back cover photo: The seed of green mussel Perna viridis collected from the natural habitats along the sea shore are being segregated sizewise and cleaned for seeding on ropes for culture purpose in the estuarine environment at Kasaragod in northern Kerala.

८०४ पृष्ठ आवश्यक: उत्तर केरळ के कासरागोड ज्यांवरनमूख में रसिदियों में रोपण के लिए प्राकृतिक आवश्यक के संप्रभुत हरित अंबु परमा चिकित्सा आयाम के अनुसार अलग करके साफ करते है।
Introduction

The 1980s was an important period in the development of marine fisheries in Kerala. In the first half of this period rapid motorisation of the indigenous crafts with outboard engines made the traditional sector more efficient. Outboard engines became an integral part of the indigenous fisheries and the fishers could extend their activities to more distant and deeper waters. Slowly they started discarding their old dugouts and going for plank-built boats with transformed stern to fix their outboard engines conveniently. In the latter half of the 1980s a new gear called ringseine became very popular in exploiting the pelagic resources and replaced the boatseines to a very great extent. Huge size of the new net (450 to 900 m long) and large number of crew (30 to 40) needed for its operation necessitated larger boats and more outboard engines. Thus the large plank-built ‘kettuvallam’ became the common craft to which 3 outboard engines were fitted. The smaller plank-built boats used in the operation of boatseines and gillnets, were coated with fiberglass. During the peak ringseine fishing period these boats are being used as carrier boats to land the catch from ringseines so that the fishing can continue for a longer duration. Now even the ‘kettuvallam’ is being made of marine plywood coated with fiberglass. Thus a new sector called motorised sector was added to the existing mechanised sector and the remaining being non-mechanised indigenous sector. The motorised sector grew rapidly and in 1988 it became the most important sector yielding the maximum catch.

In 1988 a partial ban on trawling during the monsoon was introduced along the coast of Kerala through a Government Order. Thereafter, the ban was enforced every year at varying intervals during the southwest monsoon period. This was based on the recommendations of the expert committee appointed by the Government of Kerala to study the fisheries of the state and to suggest resource management measures for reviving the marine fisheries which was suffering a set back during the 1968-80 period. The ban was recommended for the southwest monsoon in order to protect the spawners and the new recruits, on the ground that most of the commercially important fish species have their peak spawning and recruitment along the Kerala coast during this period. It was also aimed to protect the interests of the traditional fishermen.

In the meantime, infrastructural facilities like the fisheries harbour helped the fishers to land their catches safely even during the rough monsoon season. This resulted in an increased fishing activity during the monsoon which greatly improved the catches of pelagic resources. With the increased export market for cephalopods, in addition to prawns, there was an intensification of trawling by increasing the size of the crafts, extending the fishing area and the fishing time. These developments resulted in an increase in the annual average catch.

Data base

Data collected by the Fisheries Resources Assessment Division of the Central Marine Fisheries Research Institute (CMFRI), Cochin on the fisheries of Kerala during the period from 1980 to 1996 form the basis of this study. By 1988 the ringseines got established in exploiting the pelagic resources. Partial ban on trawling during the monsoon was initiated and an upward trend in the marine fish catch was also observed in the same year. Hence, 1988 is taken as an year of transition in the marine fisheries of Kerala and the fishery for the years before 1988 was compared to that during the years thereafter to study the changing characteristics of the fishery.
Characteristics of the growth of marine fisheries in Kerala

Fig. 1 representing the annual marine fish catch in Kerala from 1980-'96, shows two distinct periods. The first period is from 1980-'87 with an average catch of 3,33,577 tonnes and the second from 1989-'96 with an annual average catch of 5,85,224 tonnes. With a catch of 4,70,000 tonnes, 1988 stands as a year of transition. The increase from the former period was 2,51,648 tonnes which is 75.40 % of growth.

Fig. 1. Total marine fish catch in Kerala (1980-'96).

Fig. 2 gives the changing prominence of the different sectors of the fishery. The traditional sector dominated the fishery till 1983 and thereafter it declined with the fast development of the motorised sector. In 1985, the traditional sector contributed only 24 % of the fish catch in the state when the contribution by the motorised sector was 43 % and the mechanised sector 33 %. In 1989 the contribution by the motorised sector increased to 63 % and the traditional sector declined to 5 %, but the mechanised sector maintained its contribution at 32 %. In 1994 the contribution by the mechanised sector increased to 57 %, pushing down the contribution by the motorised sector to the second place at 39 %. The traditional sector suffered further decline. In 1996 the motorised, mechanised and the traditional sectors contributed 51, 44 and 5 %, respectively.

The effort, catch and the catch per unit effort of the individual gear in the different sectors during 1993 - '96 are given in Table 1. It can be seen that the mechanised sector was dominated by trawl nets which contributed 97.40 % of the catch in this sector. The peak catch per unit effort was realised by purseseines. Purseseines are operated only at Cochin whereas trawl nets are operated along all along the coast except in the Trivandrum District. With 71.10 % of the total catch in the motorised sector, ringseine is the most important gear with the maximum catch per unit effort in the motorised sector.

Table 1. Effort, catch and catch per effort in different fisheries sectors in Kerala (average for 1993 - '96).

<table>
<thead>
<tr>
<th>Gear</th>
<th>Effort (nos)</th>
<th>Catch (tonnes)</th>
<th>%</th>
<th>C/E (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECHANISED SECTOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trawl net</td>
<td>6,13,085</td>
<td>2,77,291</td>
<td>97.88</td>
<td>452.29</td>
</tr>
<tr>
<td>Gill net</td>
<td>6,776</td>
<td>876</td>
<td>1.08</td>
<td>129.28</td>
</tr>
<tr>
<td>Purse seine</td>
<td>3,124</td>
<td>5744</td>
<td>0.50</td>
<td>1,828.86</td>
</tr>
<tr>
<td>Hooks &amp; line</td>
<td>3,349</td>
<td>998</td>
<td>0.53</td>
<td>268.27</td>
</tr>
<tr>
<td>Total</td>
<td>6,26,333</td>
<td>2,84,809</td>
<td>100.00</td>
<td></td>
</tr>
<tr>
<td>MOTORISED SECTOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ringseine</td>
<td>2,28,607</td>
<td>1,75,964</td>
<td>71.10</td>
<td>769.72</td>
</tr>
<tr>
<td>Gillnet</td>
<td>5,67,381</td>
<td>34,713</td>
<td>14.03</td>
<td>61.18</td>
</tr>
<tr>
<td>Trawl</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Minitrawl)</td>
<td>1,40,188</td>
<td>10,164</td>
<td>4.11</td>
<td>72.35</td>
</tr>
<tr>
<td>Boats seine</td>
<td>39,669</td>
<td>13,590</td>
<td>5.49</td>
<td>342.59</td>
</tr>
<tr>
<td>Hooks &amp; line</td>
<td>1,76,114</td>
<td>11,325</td>
<td>4.58</td>
<td>84.31</td>
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<tr>
<td>Disco net</td>
<td>55,975</td>
<td>1,734</td>
<td>0.70</td>
<td>30.97</td>
</tr>
<tr>
<td>Total</td>
<td>12,08,340</td>
<td>2,47,490</td>
<td>100.00</td>
<td></td>
</tr>
<tr>
<td>TRADITIONAL SECTOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gillnet</td>
<td>5,17,674</td>
<td>10,054</td>
<td>56.33</td>
<td>39.66</td>
</tr>
<tr>
<td>Shoreseine</td>
<td>55,529</td>
<td>7,725</td>
<td>6.04</td>
<td>139.00</td>
</tr>
</tbody>
</table>
Hooks & line 3.02,449 32.91 3.515 13.87 12.00
Boat-seine 27,921 3.03 3.256 12.64 117.00
Others 15,420 1.68 800 3.16 51.88
Total 91,889 100.00 25,350 100.00

Table 2 gives the growth of the marine fisheries in Kerala from 1985-87 period to 1993-96 period. The average annual increase in catch was 2,20,024 tonnes. 74.9% of this increase was made by ringseines, 64.5% by trawls, 5.9% by motorised gillnets and 0.2% by purse seines when the catches of motorised boatseines registered a decline of 31.2%, the mechanised gillnet 3.5% and the other gear 10.8%. Only ringseines and trawls had an improved catch per unit effort whereas all other gear suffered a decline in catch per effort.

Table 2. Increase in the total average annual catch from 1985-87 period to 1993-96 period and the percentage contribution by the important gear

<table>
<thead>
<tr>
<th>Gear</th>
<th>Increase</th>
<th>Increase in Percentage</th>
<th>Increase in Catch (t)</th>
<th>Percentage</th>
<th>Increase per Catch per Effort (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no. of operations</td>
<td>to total effort</td>
<td></td>
<td>contribution</td>
<td>per effort</td>
</tr>
<tr>
<td>Ring seine</td>
<td>1,78,483</td>
<td>1,64,832</td>
<td>74.92</td>
<td>356.78</td>
<td></td>
</tr>
<tr>
<td>Trawl</td>
<td>1,16,174</td>
<td>1,41,936</td>
<td>64.51</td>
<td>195.82</td>
<td></td>
</tr>
<tr>
<td>OB gilnet</td>
<td>2,70,303</td>
<td>12879</td>
<td>5.85</td>
<td>9.46</td>
<td></td>
</tr>
<tr>
<td>Purse seine</td>
<td>398</td>
<td>4,95</td>
<td>0.22</td>
<td>9.67</td>
<td></td>
</tr>
<tr>
<td>Mech. gilnet</td>
<td>-56,594</td>
<td>-7,708</td>
<td>3.50</td>
<td>3.18</td>
<td></td>
</tr>
<tr>
<td>OB boatseine</td>
<td>-1,77,585</td>
<td>-68,695</td>
<td>31.22</td>
<td>59.70</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>-23,716</td>
<td>10.78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total 2,20,024 100.00

Fig. 3 gives the growth of trawl fisheries during 1986-96. A steady increase in catch was observed from 1986 to 1994 followed by a minor decline. The peak effort was in 1988 with the lowest catch per effort. Subsequently there was a decline in effort and an increase in catch per effort. The second peak in effort was in 1994 with a decline in catch per effort. The relation between the relative growth in effort and catch per effort from 1986 to 1996 is shown in Fig. 4. There is a clear trend of decrease in relative growth in catch per effort with the relative growth of effort.

Similar analysis of the ringseine fishery is shown in Fig. 5. A sharp increase in effort and catch of ringseines after 1998 is evident. But the fishery could not maintain the catch level. It steadily declined till 1994 followed by a minor improvement. This fishery attained its
full strength and efficiency by 1989. Hence, the relation between the relative growth of effort and catch per effort was studied only for the period from 1989 to 1996. Fig. 6 shows the inverse relation between these two characteristics more clearly than in the trawl fishery.

Fig. 6. Relation between export and cpue ringseine (Kerala 1989-96).

The annual catch trends in the marine fisheries of Kerala are set by these two gear. The growth of the average catch after 1988 is influenced by the ringseines and trawl. The increase in effort by both these gear was found to result in a reduction in their catch per effort.

Table 1 shows that the trawl fishery is the most important in terms of effort and catch, followed by ringseine. Though the effort in gill net fishery is much higher than in the ringseine fishery the catch and catch per effort are not comparable to the trawl and ringseine fishery. Fig. 7 shows the relative growth in catch, effort and catch per effort of major gear from 1985-'88 period to 1993-96 period. Maximum increase in effort and catch is observed in ringseine fishery. But its increase in cpue is second to that of trawl fishery in which the growth in effort was the least. The growth was poor in the purse seine and motorised gillnet fishery with a decline in catch per effort. Mechanised gillnet and motorised boatseine fisheries declined. The boatseine fishery declined on the onslaught of ringseine fishery because they were competing for the same resources.

Comparison with all India marine fish catch

During 1989-'93 the annual average marine fish catch in Kerala was 6,02,012 tonnes which was 25.34 % of the total marine fish catch in India (Fig. 8). The increase in the annual average catch from 1985-'88 to 1989-'93 is

Fig. 9. Statewise increase in total catch 1985-88 to 1989-93
'93 period is shown in Fig. 9. Kerala contributed 41.6 % of the increase followed by Gujarat (26.4 %), Tamil Nadu (12.5 %), West Bengal (8.3 %), Maharashtra (6.8 %), Goa (5.3 %), Andhra Pradesh (0.5 %) and Odisha (0.2 %). The catches from Karnataka and Pondicherry showed a minor decline. Kerala tops in the average fish catch per kilometer of coastline (Fig. 10) and per area of the continental shelf (Fig. 11). Thus the coastal waters of Kerala are the most productive around the Indian coast and intensively exploited, and the increase in exploitation with time is much faster. The decline in the catch of Karnataka the nearby state along the same coastline, has to be considered against this background. Such increase in the intensity of exploitation can destroy the natural refuges of the fish stocks in space and time resulting in damaging their renewability. As Kerala leads the development of marine fisheries in India the state has the responsibility to initiate conservation and management of the resources seriously.

**Changing fishery resources**

Table 3a to 3e give the annual average catch of different varieties of fish during 1985-'88 and 1993-'96. The relative growth in the total fish catch from the former period was 50.8 %. 51.7 % of the total increase was contributed by pelagic fishes, 17.8 % by demersal finfishes, 13.5 % by molluscs, 9.4 % by crustaceans and 7.5 % by miscellaneous groups. The catch variations are depicted in Fig. 12. The maximum increase and decline in catch of different varieties of fishes were experienced by the pelagic fishery with maximum net increase, followed by demersal finfishes. Catches of molluscs did not show any decline. Among crustaceans there was a minor decline only in the catch of non-penaeid prawns. The maximum relative growth was registered in the molluscan fisheries due to sharp increase in the catch of cephalopods with the increased export demand. The minimum relative growth was registered in the crustacean fisheries in spite of the export demand.
Table 3a. Growth in the average landing (tonnes) 

PELAGIC FISHES

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>1993-'96</th>
<th>1985-'88</th>
<th>Differ-</th>
<th>Rel.</th>
<th>% of total growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ence</td>
<td></td>
<td>growth</td>
</tr>
<tr>
<td>Indian mackerel</td>
<td>83,189</td>
<td>23,495</td>
<td>59,694</td>
<td>254.1</td>
<td>31.7</td>
</tr>
<tr>
<td>Scads</td>
<td>56,120</td>
<td>16,492</td>
<td>39,628</td>
<td>240.3</td>
<td>21.1</td>
</tr>
<tr>
<td>Lesser sardines</td>
<td>28,477</td>
<td>8,201</td>
<td>20,276</td>
<td>247.2</td>
<td>10.8</td>
</tr>
<tr>
<td>Stolephorus</td>
<td>39,290</td>
<td>31,495</td>
<td>7,795</td>
<td>24.7</td>
<td>4.1</td>
</tr>
<tr>
<td>Other clupeids</td>
<td>11,988</td>
<td>6,991</td>
<td>4,997</td>
<td>71.5</td>
<td>2.7</td>
</tr>
<tr>
<td>Horse mackerel</td>
<td>5,203</td>
<td>1,816</td>
<td>3,387</td>
<td>186.5</td>
<td>1.8</td>
</tr>
<tr>
<td>Thryssa</td>
<td>5,655</td>
<td>3,364</td>
<td>2,291</td>
<td>68.1</td>
<td>1.2</td>
</tr>
<tr>
<td>Barneudas</td>
<td>3,510</td>
<td>1,257</td>
<td>2,253</td>
<td>179.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Auxis spp.</td>
<td>4,565</td>
<td>3,791</td>
<td>774</td>
<td>20.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Half beaks &amp;</td>
<td>1,476</td>
<td>810</td>
<td>666</td>
<td>82.2</td>
<td>0.4</td>
</tr>
<tr>
<td>full beaks</td>
<td>1,370</td>
<td>716</td>
<td>654</td>
<td>91.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Wolf berring</td>
<td>5,879</td>
<td>5,340</td>
<td>539</td>
<td>10.1</td>
<td>0.3</td>
</tr>
<tr>
<td>S. commerson</td>
<td>7,388</td>
<td>7,212</td>
<td>176</td>
<td>2.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Other shads</td>
<td>130</td>
<td>17</td>
<td>113</td>
<td>664.7</td>
<td>0.1</td>
</tr>
<tr>
<td>Other tunnies</td>
<td>806</td>
<td>747</td>
<td>59</td>
<td>7.9</td>
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</tr>
<tr>
<td>Mullets</td>
<td>520</td>
<td>486</td>
<td>34</td>
<td>7.0</td>
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<td>Hilsa shads</td>
<td>38</td>
<td>15</td>
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<td>Flying fishes</td>
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<tr>
<td>Billfishes</td>
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<td>167</td>
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<td>Acantophycibum</td>
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</tr>
<tr>
<td>Leather jackets</td>
<td>342</td>
<td>344</td>
<td>-2</td>
<td>-0.6</td>
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</tr>
<tr>
<td>Colla</td>
<td>0</td>
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<td>-100.0</td>
<td>0.0</td>
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<td>T. tongol</td>
<td>117</td>
<td>200</td>
<td>-83</td>
<td>-41.5</td>
<td>0.0</td>
</tr>
<tr>
<td>K. pelamis</td>
<td>1</td>
<td>92</td>
<td>-91</td>
<td>-98.9</td>
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</tr>
<tr>
<td>S. guttatus</td>
<td>186</td>
<td>1,824</td>
<td>-1,638</td>
<td>-89.8</td>
<td>-0.9</td>
</tr>
<tr>
<td>Other carangids</td>
<td>6,545</td>
<td>19,914</td>
<td>-13,369</td>
<td>-16.9</td>
<td>-1.8</td>
</tr>
<tr>
<td>Ribbon fishes</td>
<td>9,122</td>
<td>15,317</td>
<td>-6,195</td>
<td>-40.4</td>
<td>-3.3</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>1,519</td>
<td>56,266</td>
<td>-54,747</td>
<td>-61.8</td>
<td>-18.5</td>
</tr>
<tr>
<td>Total</td>
<td>3,03,610</td>
<td>2,06,869</td>
<td>97,237</td>
<td>47.1</td>
<td>51.7</td>
</tr>
</tbody>
</table>

Table 3a further indicates that the resource that contribute maximum (31.75 %) to the growth of fish catch from 1985-'88 period to 1993-96 period was the Indian mackerel. Fig. 13 shows the annual catch of Indian mackerel in Kerala from 1980-'96. The increase in the catch of mackerel is almost concomitant with the increase in the total fish catch, but at a higher rate and with sharper fluctuations. 73 % of the mackerel catch in Kerala is contributed by the ringseine fishery which has been maintaining the prominence since 1989.

In contrast, the oil sardine fishery which was the mainstay of the pelagic fisheries of Kerala sharply declined after 1990. Its decline from the annual average catch during 1985-'88 to 1993-'96 was 61.8 % (Fig. 13). The earliest success of the ringseine fishery was in netting this resource abundantly in 1989 and '90 along with mackerel. In 1989 this resource gave a record catch of 1.9 lakh tonnes which decline to 1,554 tonnes in 1994 (a decline of 99.2 %). The collapse of this very important resource after 1990 put a break in the fast growth of ringseine fishery. Fig. 5 shows almost a steady decline in the catch and effort in the ring seine fishery.

Another important resource which contributed substantially (21.1 %) to the increase in the pelagic fisheries is the scads (Table 3a). This resource showed its potential in 1986. After poor catches in 1987 the yield increased steadily till 1992 and started to fluctuate thereafter (Fig. 13).

In the demersal fisheries (Table 3b) the catch variations were not as strong as in the pelagic fisheries. The maximum increase was in the catch of threadfin breams accounting for 8.06 % of the increase in total fish catch. This was
followed by perches, soles, lizard fishes and croakers. The maximum relative increase was observed in the catch of Chinese pomfret and eel.

Conspicuous decline was observed in the catch of catfishes. The rate of decline is estimated as 93.4 %.

The cephalopod fishery (Table 3c) experience a major intensification with relative growth of 215.8 % in the catch of 1993-'96 period from 1985-'88 period. As in the case of scads this resource also exhibited its potential in 1986, declined in 1987 and started its steady and fast development (Fig. 14).

The crustaceans showed a relative growth of 30.5 % from 1985-'88 to 1993-'96 (Table 3d). The penaeid prawn catch increased by 18% during the period.

Table 3b. Growth in the average landings (tonnes)

DEMERAL FINFISHES

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>1993-'96</th>
<th>1985-'88</th>
<th>Difference</th>
<th>Rel. % of growth</th>
<th>% of total growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threadfin breams</td>
<td>42,854</td>
<td>27,702</td>
<td>15,152</td>
<td>54.7</td>
<td>8.1</td>
</tr>
<tr>
<td>Other perches</td>
<td>13,640</td>
<td>5,776</td>
<td>7,864</td>
<td>136.1</td>
<td>4.2</td>
</tr>
<tr>
<td>Soles</td>
<td>17,653</td>
<td>10,835</td>
<td>6,818</td>
<td>62.9</td>
<td>3.6</td>
</tr>
<tr>
<td>Lizard fishes</td>
<td>12,826</td>
<td>7,820</td>
<td>5,006</td>
<td>64.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Croakers</td>
<td>13,790</td>
<td>9,506</td>
<td>4,284</td>
<td>45.1</td>
<td>2.3</td>
</tr>
<tr>
<td>Rock cods</td>
<td>3,833</td>
<td>865</td>
<td>3,168</td>
<td>476.4</td>
<td>1.7</td>
</tr>
<tr>
<td>Silver pomfret</td>
<td>913</td>
<td>453</td>
<td>460</td>
<td>101.5</td>
<td>0.2</td>
</tr>
<tr>
<td>Chinese pomfret</td>
<td>405</td>
<td>22</td>
<td>383</td>
<td>740.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Rays</td>
<td>1,546</td>
<td>1,329</td>
<td>217</td>
<td>16.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Halibut</td>
<td>235</td>
<td>95</td>
<td>140</td>
<td>147.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Eels</td>
<td>141</td>
<td>19</td>
<td>122</td>
<td>666.7</td>
<td>0.1</td>
</tr>
<tr>
<td>Black pomfret</td>
<td>1,256</td>
<td>1,145</td>
<td>111</td>
<td>9.7</td>
<td>0.1</td>
</tr>
<tr>
<td>Pigface breams</td>
<td>342</td>
<td>244</td>
<td>98</td>
<td>40.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Skates</td>
<td>102</td>
<td>18</td>
<td>84</td>
<td>466.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Flounders</td>
<td>112</td>
<td>52</td>
<td>60</td>
<td>115.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Threadfin</td>
<td>71</td>
<td>80</td>
<td>-9</td>
<td>-11.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Big jawed jumper</td>
<td>868</td>
<td>990</td>
<td>-112</td>
<td>-11.4</td>
<td>-0.1</td>
</tr>
<tr>
<td>Snappers</td>
<td>202</td>
<td>387</td>
<td>-185</td>
<td>-47.8</td>
<td>-0.1</td>
</tr>
<tr>
<td>Silverbellies</td>
<td>4,900</td>
<td>5,486</td>
<td>-586</td>
<td>-10.7</td>
<td>-0.3</td>
</tr>
<tr>
<td>Sharks</td>
<td>3,162</td>
<td>4,464</td>
<td>-1,302</td>
<td>-29.2</td>
<td>-0.7</td>
</tr>
<tr>
<td>Goatfishes</td>
<td>1,015</td>
<td>2,708</td>
<td>-1,693</td>
<td>-62.5</td>
<td>-0.9</td>
</tr>
<tr>
<td>Catfishes</td>
<td>468</td>
<td>7,086</td>
<td>-6,618</td>
<td>-93.4</td>
<td>-3.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20,333</td>
<td>66,868</td>
<td>33,462</td>
<td>38.5</td>
<td>17.8</td>
</tr>
</tbody>
</table>

Table 3c. Growth in the average landings (tonnes)

MOLLUSCS

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>1993-'96</th>
<th>1985-'88</th>
<th>Difference</th>
<th>Rel. % of growth</th>
<th>% of total growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cephalopods</td>
<td>36,295</td>
<td>11,490</td>
<td>24,805</td>
<td>215.9</td>
<td>15.2</td>
</tr>
<tr>
<td>Gastropods</td>
<td>746</td>
<td>0</td>
<td>746</td>
<td>-</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>37,041</td>
<td>11,490</td>
<td>25,551</td>
<td>222.4</td>
<td>13.6</td>
</tr>
</tbody>
</table>

Table 3d. Growth in the average landings (tonnes)

CRUSTACEANS

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>1993-'96</th>
<th>1985-'88</th>
<th>Difference</th>
<th>Rel. % of growth</th>
<th>% of total growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penaeid prawns</td>
<td>54,361</td>
<td>46,059</td>
<td>8,302</td>
<td>18.0</td>
<td>4.4</td>
</tr>
<tr>
<td>Stomatopods</td>
<td>16,916</td>
<td>9,923</td>
<td>6,993</td>
<td>70.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Crabs</td>
<td>4,140</td>
<td>1,771</td>
<td>2,369</td>
<td>133.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Lobsters</td>
<td>193</td>
<td>99</td>
<td>94</td>
<td>94.9</td>
<td>0.0</td>
</tr>
<tr>
<td>Non-penaeid prawns</td>
<td>139</td>
<td>182</td>
<td>-43</td>
<td>-23.6</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>75,749</td>
<td>56,034</td>
<td>17,715</td>
<td>30.5</td>
<td>9.4</td>
</tr>
</tbody>
</table>
TABLE 36
Growth in the average landings (tonnes)
MISCELLANEOUS AND TOTAL CATCH OF FISH

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>1993-'96</th>
<th>1985-'88</th>
<th>Difference</th>
<th>Rel. growth % of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All varieties</td>
<td>5,58,133</td>
<td>3,70,105</td>
<td>1,88,026</td>
<td>100.0</td>
</tr>
<tr>
<td>Dolphin &amp; porpoise</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>0.0</td>
</tr>
<tr>
<td>Seacow</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>21,400</td>
<td>7,345</td>
<td>14,055</td>
<td>191.4</td>
</tr>
<tr>
<td>Total</td>
<td>21,400</td>
<td>7,345</td>
<td>14,061</td>
<td>191.4</td>
</tr>
</tbody>
</table>

The crab also showed maximum relative growth. Only the nonpenaeid prawn landings registered a relative decline by 23.8%. The prawn fishery though improved steadily from 1985 to 1988 fluctuated afterwards. But the general trend is that of improvement. The difference in the average catch of certain important groups during 1986-'88 and 1993-'96 along with percentage growth is given in Fig. 15.

Causes of growth

As stated earlier the average annual catch of the marine fish from Kerala in 1980-'87 increased by 75.4% during 1989-'96 period. The transitional period was 1988. Two important events of this transitional period are worth mentioning.

1. Growth of ringseine fishery and
2. Commencement of ban on trawling for varying periods during the monsoon to protect the resources and the interests of the traditional fishermen.

Table 2 gives an indication of the growth of the fisheries by different gear. A comparison is made between the average annual situation in 1985-'87 (being the pre-ringseine and pre-ban period) and 1993-'96 (being the ringseine and ban period). The increase in the total fish catch from former period to the latter was 2,20,024 tonnes. The ringseine with an increase of 1,78,483 operations, 1,64,832 tonnes of catch and 356.8 kg of catch per effort contributed 74.9% of this increase. Ringseine is a surface gear. This increase in the catch is offset by the decline of catch in other surface gear reducing the effective total increase in catch by surface gear to 78,087 which is only 35.5% of the total increase. But the increase in the catch by trawl amounts 64.5% of the total increase in the fish catch. Hence a major share of the average increase in catch was made by trawls. Similarly the increase in the catch per unit effort of trawls also can be considered as the maximum. But the relative increase in effort was less in the trawl when compared to all the other gear together. The effort of motorised gillnets increased most with a decline in the catch per effort. The question is whether monsoon ban on trawling was the reason for such an improvement in trawl catches. There is no method of verifying this as the fishery underwent a series of changes during this period apart from introduction of trawl ban-increase in the efficiency of trawlers, duration of fishing and range of exploited area. However, when the trawl fishery alone is considered the low relative increase in effort and significant increase in its catch and C/E (Fig.7) indicates that the introduction of trawl ban during monsoon has also played a key role in the enhancement of production. Moreover the penaeid prawn catches have improved and started fluctuating sharply and the cephalopod fishery has expanded. However, an uncontrolled
development of a fishery is always dangerous because continuous exploitation of the resources would violate their natural refuges in space and time and refuse them the opportunity to multiply and grow. On that ground the present duration of ban on trawling during the monsoon has to be considered as insufficient.

Analysis given in Figs. 4 and 6 indicates that the further growth of the ringseine and trawl operations will result in a reduction of catch per effort. These fisheries are the backbones of the marine fisheries in Kerala. We have perhaps reached a state of supersaturation of fishing effort in these sectors.

**Gearwise variations**

Table 4 gives the changes in the catch of different fish varieties in the major gear. In the trawl catches there was an average increase of 1,58,455 tonnes of fish in 1993-'95 when compared to 1985-'87 indicating a relative growth of 1,334 %. The increase in effort was only 35.3 %. Major varieties that contributed to this growth were cephalopods, scads, threadfin breams and penaeid prawns. A decline in the catch of catfishes, mullets and nonpenaeid prawns was observed. Table 5 shows the changes in catch per effort of these fishes. The cpue of penaeid prawns showed a slight decline, so also the cpue of silverbellies, non-penaeid prawns, threadfins, mullets, catfishes, etc. But cpue of most of the other species showed an increase with a total average relative increase of 72.5 %.

The average catch in the ringseine fishery increased by 1,30,650 tonnes which is 288.3 % of relative growth with 186.5 % increase in effort. (Table 4). Catch of Indian mackerel, scads, whitebaits and lesser sardines contributed to the bulk of the increase. Major decline was in the catch of other carangids, catfishes and oil sardine. The catch per unit effort of oil sardine and other carangids showed a decline. However, the total cpue showed a relative growth of 35.6 %.

It was the motorised boatseine fishery which declined considerably. The relative growth in catch was -84.3 % with a decline of 83.1 % in effort. All varieties of fishes except Indian mackerel, mullets, non-penaeid prawns and hilsa shad showed decline. Similarly there was a general decline in catch per effort. Considerable increase was observed in the catch of Indian mackerel and to a certain extent the mullets. The relative decline in the total catch per effort was -6.8 %.

**Biological basis of fisheries management**

A critical perusal of the fisheries in Kerala reveals that the single species resources are prone to sharper fluctuations than the multispecies fisheries. The fluctuations get more smoothened when we consider the total annual catches. The total fish catch is a product of the total productivity of the area fished. Variations in the total productivity are less pronounced and beyond our control. The decline in one species may help another species to increase due to their ecosystem interactions. But due to selective exploitation, the valuable species generally decrease and worthless species increase.

Most of the fish species that we exploit are short lived. They grow fast, reproduce at the age of one year and do not contribute to the fishery for more than two years. Table 6 gives the most successful spawning periods of some of the fishes we exploit. It can be noticed that a lot of spawning activity takes place in our waters during or immediately prior to monsoon. The spawning activity starts by around February and prolongs up to July.

---

**Table 4. Change in the fishery of major gear in Kerala between periods 1985-'87 and 1993-'95 (Average catch in tonnes)**

<table>
<thead>
<tr>
<th>Name of species</th>
<th>1985-'87</th>
<th>1993-'95</th>
<th>Relative growth</th>
<th>In catch</th>
<th>In %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cephalopods</td>
<td>6,169</td>
<td>33,521</td>
<td>27,352</td>
<td>443.38</td>
<td></td>
</tr>
<tr>
<td>Scads</td>
<td>1,277</td>
<td>29,672</td>
<td>19,395</td>
<td>1,518.79</td>
<td></td>
</tr>
<tr>
<td>Threadfin breams</td>
<td>27,833</td>
<td>42,955</td>
<td>14,822</td>
<td>53.40</td>
<td></td>
</tr>
<tr>
<td>Penaeid prawns</td>
<td>31,972</td>
<td>42,787</td>
<td>10,815</td>
<td>33.85</td>
<td></td>
</tr>
<tr>
<td>Other perchess</td>
<td>2,605</td>
<td>9,807</td>
<td>7,202</td>
<td>276.47</td>
<td></td>
</tr>
<tr>
<td>Lizard fishes</td>
<td>5,827</td>
<td>12,772</td>
<td>6,945</td>
<td>119.19</td>
<td></td>
</tr>
<tr>
<td>Stolephorus</td>
<td>2,402</td>
<td>9,219</td>
<td>6,817</td>
<td>283.81</td>
<td></td>
</tr>
<tr>
<td>Stomatopods</td>
<td>9,156</td>
<td>15,527</td>
<td>6,371</td>
<td>69.58</td>
<td></td>
</tr>
<tr>
<td>Name of species</td>
<td>1988-1993</td>
<td>Relative growth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------</td>
<td>-----------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indian mackerel</td>
<td>2,564</td>
<td>3,146</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mullet</td>
<td>58</td>
<td>310</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-penaeid prawns</td>
<td>43</td>
<td>67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hilsa shad</td>
<td>0</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halibut</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goatfishes</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. commersoni</td>
<td>11</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threadfin breams</td>
<td>8</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catfishes</td>
<td>1,113</td>
<td>202</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>4,454</td>
<td>17,361</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Fish</td>
<td>1,18,819</td>
<td>2,77,274</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort (units)</td>
<td>4,53,085</td>
<td>6,13,085</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of species</th>
<th>1987</th>
<th>1995</th>
<th>In catch</th>
<th>In %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian mackerel</td>
<td>2,564</td>
<td>3,146</td>
<td>584</td>
<td>22.78</td>
</tr>
<tr>
<td>Mullet</td>
<td>58</td>
<td>310</td>
<td>252</td>
<td>434.48</td>
</tr>
<tr>
<td>Non-penaeid prawns</td>
<td>43</td>
<td>67</td>
<td>24</td>
<td>55.81</td>
</tr>
<tr>
<td>Hilsa shad</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>-</td>
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<tr>
<td>Halibut</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>Goatfishes</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>S. commersoni</td>
<td>11</td>
<td>3</td>
<td>-</td>
<td>-100.00</td>
</tr>
<tr>
<td>Threadfin breams</td>
<td>8</td>
<td>0</td>
<td>-</td>
<td>-100.00</td>
</tr>
<tr>
<td>Catfishes</td>
<td>1,113</td>
<td>202</td>
<td>-911</td>
<td>-81.85</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>4,454</td>
<td>17,361</td>
<td>12,907</td>
<td>289.78</td>
</tr>
<tr>
<td>All Fish</td>
<td>1,18,819</td>
<td>2,77,274</td>
<td>1,58,455</td>
<td>133.36</td>
</tr>
<tr>
<td>Effort (units)</td>
<td>4,53,085</td>
<td>6,13,085</td>
<td>1,60,000</td>
<td>35.31</td>
</tr>
</tbody>
</table>
### Other clupeids
- Indian mackerel
- Silverbellies
- Other clupeids
- Other perches
- Penaeid prawns
- Ribbons
- Croakers
- Stolephorus
- Oil sardine
- Miscellaneous

### Other perches
- Silverbellies
- Indian mackerel
- Black pomfrets
- Soles
- S. commersoni
- Mullets
- Big jawed jumper
- Ribbon fishes
- Barracudas
- Cephalopods
- Rays

### Effort (units)
- Miscellaneous
- All fish

### III. Ringseine fishery

<table>
<thead>
<tr>
<th>Name of species</th>
<th>1985- '93</th>
<th>Relative growth 1985-93 1993-95 in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian mackerel</td>
<td>8.194</td>
<td>60.712</td>
</tr>
<tr>
<td>Scads</td>
<td>3.549</td>
<td>20.807</td>
</tr>
<tr>
<td>Stolephorus</td>
<td>3.250</td>
<td>22.409</td>
</tr>
<tr>
<td>Other sardines</td>
<td>2.702</td>
<td>20.480</td>
</tr>
<tr>
<td>Penaeid prawns</td>
<td>1.263</td>
<td>5.971</td>
</tr>
<tr>
<td>Other clupeids</td>
<td>1.610</td>
<td>5.777</td>
</tr>
<tr>
<td>Croakers</td>
<td>246</td>
<td>2.047</td>
</tr>
<tr>
<td>Other perches</td>
<td>695</td>
<td>2.397</td>
</tr>
<tr>
<td>Auxis spp.</td>
<td>0</td>
<td>1.404</td>
</tr>
<tr>
<td>Thryssa sp.</td>
<td>228</td>
<td>1.265</td>
</tr>
<tr>
<td>Silverbellies</td>
<td>75</td>
<td>737</td>
</tr>
<tr>
<td>Black pomfrets</td>
<td>174</td>
<td>579</td>
</tr>
<tr>
<td>L. affinis</td>
<td>168</td>
<td>417</td>
</tr>
<tr>
<td>Soles</td>
<td>27</td>
<td>220</td>
</tr>
<tr>
<td>Chinese pomfret</td>
<td>0</td>
<td>120</td>
</tr>
<tr>
<td>S. commersoni</td>
<td>76</td>
<td>145</td>
</tr>
<tr>
<td>Mullets</td>
<td>70</td>
<td>138</td>
</tr>
<tr>
<td>Big jawed jumper</td>
<td>11</td>
<td>77</td>
</tr>
<tr>
<td>Ribbon fishes</td>
<td>2</td>
<td>52</td>
</tr>
<tr>
<td>Barracudas</td>
<td>6</td>
<td>45</td>
</tr>
<tr>
<td>Cephalopods</td>
<td>2</td>
<td>38</td>
</tr>
<tr>
<td>Rays</td>
<td>1</td>
<td>27</td>
</tr>
</tbody>
</table>

### Blasombranchs
- Sharks
- Bill fishes
- Wolf herring
- Clupeids
- Rockcods
- S. guttata

### Threadfin brads
- Threadfins
- Skates
- Seer fishes
- Other shads

### Silver pomfrets
- Oil sardine
- Leather-jackets
- Half beaks & Full beaks
- Catfishes
- Horse mackerel
- Other carangids
- Miscellaneous

### All Fish
- Effort (units)

### II. Trawl fishery

<table>
<thead>
<tr>
<th>Name of species</th>
<th>1985- '93</th>
<th>Relative growth 1985-93 1993-95 in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cephalopods</td>
<td>13.61</td>
<td>54.68</td>
</tr>
<tr>
<td>Scads</td>
<td>2.82</td>
<td>33.72</td>
</tr>
<tr>
<td>Threadfin brads</td>
<td>61.43</td>
<td>69.64</td>
</tr>
<tr>
<td>Penaeid prawns</td>
<td>70.57</td>
<td>69.79</td>
</tr>
<tr>
<td>Other perches</td>
<td>5.75</td>
<td>16.00</td>
</tr>
<tr>
<td>Lizard fishes</td>
<td>12.86</td>
<td>20.83</td>
</tr>
<tr>
<td>Stolephorus</td>
<td>5.50</td>
<td>15.04</td>
</tr>
<tr>
<td>Sclanotopods</td>
<td>20.21</td>
<td>25.33</td>
</tr>
<tr>
<td>Ribbon fishes</td>
<td>4.94</td>
<td>13.98</td>
</tr>
<tr>
<td>Soles</td>
<td>15.61</td>
<td>21.27</td>
</tr>
<tr>
<td>Species</td>
<td>'87</td>
<td>'95</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Indian mackerel</td>
<td>10.92</td>
<td>79.35</td>
</tr>
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<td>Mullet</td>
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<td>7.81</td>
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<tr>
<td>Non- penaeid prawns</td>
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<td>1.68</td>
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<tr>
<td>Hilsa shad</td>
<td>0.00</td>
<td>0.14</td>
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<tr>
<td>Halibut</td>
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<tr>
<td>Auxis spp.</td>
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<td>0.00</td>
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<tr>
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<td>0.07</td>
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<tr>
<td>Goutfishes</td>
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<td>0.00</td>
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<tr>
<td>S. guttatus</td>
<td>0.02</td>
<td>0.00</td>
</tr>
<tr>
<td>Rays</td>
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<td>0.20</td>
</tr>
<tr>
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<td>0.02</td>
<td>0.00</td>
</tr>
<tr>
<td>Crabs</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Bill fishes</td>
<td>0.03</td>
<td>0.00</td>
</tr>
<tr>
<td>S. commersoni</td>
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<td>0.08</td>
</tr>
<tr>
<td>Threadfin breams</td>
<td>0.03</td>
<td>0.00</td>
</tr>
<tr>
<td>Catfishes</td>
<td>0.05</td>
<td>0.08</td>
</tr>
<tr>
<td>Black pomfrets</td>
<td>0.32</td>
<td>1.50</td>
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<tr>
<td>Sharks</td>
<td>0.09</td>
<td>0.02</td>
</tr>
<tr>
<td>Barracudas</td>
<td>0.28</td>
<td>1.10</td>
</tr>
<tr>
<td>Statopods</td>
<td>0.19</td>
<td>0.00</td>
</tr>
<tr>
<td>Silver pomfrets</td>
<td>0.30</td>
<td>0.56</td>
</tr>
<tr>
<td>Unicorn cod</td>
<td>0.19</td>
<td>0.00</td>
</tr>
<tr>
<td>Half beak &amp; full beaks</td>
<td>0.42</td>
<td>1.13</td>
</tr>
<tr>
<td>Big-jawed jumper</td>
<td>1.16</td>
<td>1.59</td>
</tr>
<tr>
<td>Horse mackerel</td>
<td>1.35</td>
<td>0.00</td>
</tr>
<tr>
<td>Other sardines</td>
<td>7.62</td>
<td>35.50</td>
</tr>
<tr>
<td>Cephalopods</td>
<td>1.93</td>
<td>0.73</td>
</tr>
<tr>
<td>E. affinis</td>
<td>2.02</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Thryssa sp 3.97 10.44 6.47 162.97
Leather-jackets 2.56 1.09 -1.47 -57.42
Soles 2.41 0.18 -2.23 -92.53
Other perches 6.82 13.62 27.28 22.28
Silverbelles 12.34 3.80 -2.22 -36.88
Other clupeids 12.34 13.62 27.28 221.07
Ribbon fishes 9.19 3.22 -5.97 -64.96
Croakers 15.31 28.80 13.49 88.11
Penaeid prawns 17.74 3.65 -14.09 -79.43
Scads 33.19 24.71 -8.48 -25.55
Other carangids 35.55 9.02 -26.53 -74.63
Stolephorus 56.51 40.12 -16.39 -29.00
Oil sardine 137.17 28.83 -106.34 -78.08
Miscellaneous 1.33 2.71 1.38 103.16

All Fish 367.67 342.59 -25.08 -6.82
Effort (units) 23,468 39,669 -185,009 -83.10

III. Ringarine fishery

<table>
<thead>
<tr>
<th>Name of species</th>
<th>1985-87</th>
<th>1993-95</th>
<th>Relative growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian mackerel</td>
<td>103</td>
<td>266</td>
<td>163 158.25</td>
</tr>
<tr>
<td>Scads</td>
<td>44</td>
<td>135</td>
<td>91 206.82</td>
</tr>
<tr>
<td>Stolephorus</td>
<td>41</td>
<td>98</td>
<td>57 139.02</td>
</tr>
<tr>
<td>Other sardines</td>
<td>34</td>
<td>90</td>
<td>56 164.71</td>
</tr>
<tr>
<td>Penaeid prawns</td>
<td>16</td>
<td>26</td>
<td>10 62.50</td>
</tr>
<tr>
<td>Other clupeids</td>
<td>20</td>
<td>25</td>
<td>5 25.00</td>
</tr>
<tr>
<td>Croakers</td>
<td>3</td>
<td>9</td>
<td>6 200.00</td>
</tr>
<tr>
<td>Other perches</td>
<td>9</td>
<td>10</td>
<td>1 11.11</td>
</tr>
<tr>
<td>Auxis spp.</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Thryssa spp.</td>
<td>4</td>
<td>6</td>
<td>2 50.00</td>
</tr>
<tr>
<td>Silverbelles</td>
<td>1</td>
<td>3</td>
<td>2 200.00</td>
</tr>
<tr>
<td>Black pomfrets</td>
<td>2</td>
<td>3</td>
<td>1 50.00</td>
</tr>
<tr>
<td>E. affinis</td>
<td>2</td>
<td>2</td>
<td>0 0.00</td>
</tr>
<tr>
<td>Soles</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Chinese pomfret</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S. commersoni</td>
<td>1</td>
<td>1</td>
<td>0 0.00</td>
</tr>
<tr>
<td>Mullets</td>
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<td>1</td>
<td>0 0.00</td>
</tr>
<tr>
<td>Bigjawed jumper</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ribbon fishes</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Barracudas</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Cephalopods 0 0 0
Rays 0 0 0
E拉斯mbranchs 0 0 0
Sharks 0 0 0
Bill fishes 0 0 0
Wolf herring 0 0 0
Clupeids 0 0 0
Rockcods 0 0 0
S. guttatus 0 0 0
Threadfinn beams 0 0 0
Threadfins 0 0 0
Skates 0 0 0
Seer fishes 0 0 0
Other shads 0 0 0
Silver pomfrets 0 0 0

Oil sardine 203 71 -132 -65.02
Effort (units) 79,800 2,28,607 1,48,807 186.47

<table>
<thead>
<tr>
<th>TABLE 6. Intensive spawning period of major pelagic fishes along the Kerala coast</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sardina longiceps May to July</td>
</tr>
<tr>
<td>2. S. gibbosa March to May</td>
</tr>
<tr>
<td>3. S. albella April to June</td>
</tr>
<tr>
<td>4. S. jenbiata May to June</td>
</tr>
<tr>
<td>5. Dussumieria spp. April to July</td>
</tr>
<tr>
<td>6. Stolephorus desii January to March</td>
</tr>
<tr>
<td>7. S. bataniensis January to March</td>
</tr>
<tr>
<td>8. Euthynnus affinis May to July</td>
</tr>
<tr>
<td>9. Auxis thazard May to July</td>
</tr>
<tr>
<td>10. Rastrelliger kanagurta May to July</td>
</tr>
<tr>
<td>11. Trichiurus lepturus April to June</td>
</tr>
<tr>
<td>12. Decapterus russellii April to June</td>
</tr>
<tr>
<td>13. Megalaspis cordyla May to August</td>
</tr>
</tbody>
</table>
There is a phenomenon termed as "bet-hedging" by Lambert and Ware. Some fishes release batches of eggs over an extensive area during a protracted spawning period which is adaptive in situations where prey availability is unpredictable and the risk of total recruitment failure is avoided by many independent spawning bouts. This phenomenon is prevalent in Indian waters. Indian mackerel starts spawning by February and reaches a peak by May-July. Spawning is observed even in November but peak recruitment is confined to the products of spawning in May-July. This is due to the repetitive phenomenon called "upwelling" in our coastal waters. The process of upwelling starts by around March, reaches a peak by August/September and starts sinking by October/November. The upwelled water rich in nutrients causes plankton bloom in the coastal waters. The nutrients brought in by the river inflow during the monsoon also intensify the bloom. This plankton bloom is favourable to the successful survival of the planktonic larvae of the fishes reducing their death due to starvation especially during their critical stage in development and helps better recruitment. Hence, the spawning activity during the upwelling period becomes most successful. The spawning during May-July is very crucial to recruitment. During the pre-outboard and pre-ringseine period the fishing activity using the traditional units was very little in the monsoon period because of the unfavourable weather conditions and lack of safe landing facilities. With the introduction of powerful outboard engines and better landing facilities like fishing harbours, the fishing activity during the monsoon has become easier resulting in increased exploitation of spawners and early juveniles of many fish species. The length frequency distribution of mackerel and oil sardine in Kerala along with their mean length during 1993-'94 in respect of mackerel and during 1985-'88 and 1993-'96 in respect of oil sardine are given in Figs. 16 and 17. Figs. 18 and 19 give the mean length and mean weight of mackerel and oil sardine. Juveniles of Indian mackerel of size below 155 mm and weight below 35 g are exploited abundantly during the period from July to September. In
Fig. 19. Monthly mean length and weight oil sardine (1993-'96).

the case of oil sardine juveniles of length below 120 mm and weight below 15g are exploited during the period from July to October. Table 7 gives the monthly catch details of oil sardine and mackerel in different districts of the state. On an average, from 1993 to 1996 almost 50.3 % of the catch of mackerel was landed during July-September. Oil sardine catch during the period of low mean length (July-October) comes to 50 %. These are the rates at which early juveniles of most of the pelagic fishes are being exploited. As a result the fish stocks decline very fast. This growth overfishing is the result of uncontrolled development in the fishery due to intensified ringseine operations during monsoon season.

If growth overfishing is the problem caused by monsoon fisheries, the exploitation during the premonsoon period is on the spawning stocks. As the peak spawning is in May-July, exploitation during April-July is on the spawning stocks. The intensity of this kind of fishery is more towards the southern districts of Kerala (Trivandrum to Alleppey). From Table 7 it can be assumed that the new recruits of mackerel enter the fishery in full strength in September and that of oil sardine in October when they are of age less than 4 months and 5 months respectively.

Table 7. Month-wise and district-wise mackerel catch (t) in Kerala (Average for 1993-'96)

<table>
<thead>
<tr>
<th>Months</th>
<th>TVM</th>
<th>QLN</th>
<th>ALP</th>
<th>EKM</th>
<th>TCR</th>
<th>MAL</th>
<th>CLT</th>
<th>KNR</th>
<th>KSD</th>
<th>Total</th>
<th>Percentage Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan.</td>
<td>215.75</td>
<td>329.25</td>
<td>138.75</td>
<td>287.00</td>
<td>37.60</td>
<td>687.00</td>
<td>758.75</td>
<td>59.50</td>
<td>3.75</td>
<td>2,514.75</td>
<td>1.36</td>
</tr>
<tr>
<td>Feb.</td>
<td>187.25</td>
<td>310.00</td>
<td>68.50</td>
<td>128.00</td>
<td>23.25</td>
<td>64.25</td>
<td>108.50</td>
<td>97.00</td>
<td>5.50</td>
<td>992.25</td>
<td>0.58</td>
</tr>
<tr>
<td>Mar.</td>
<td>803.25</td>
<td>288.50</td>
<td>89.50</td>
<td>197.25</td>
<td>46.50</td>
<td>123.25</td>
<td>302.00</td>
<td>171.25</td>
<td>13.50</td>
<td>2,015.00</td>
<td>1.18</td>
</tr>
<tr>
<td>Apr.</td>
<td>446.50</td>
<td>827.25</td>
<td>199.50</td>
<td>469.75</td>
<td>7.75</td>
<td>330.25</td>
<td>272.00</td>
<td>203.50</td>
<td>65.25</td>
<td>2,621.75</td>
<td>3.47</td>
</tr>
<tr>
<td>May</td>
<td>1,561.25</td>
<td>1,444.50</td>
<td>448.00</td>
<td>1,154.25</td>
<td>388.00</td>
<td>67.50</td>
<td>213.50</td>
<td>29.00</td>
<td>147.75</td>
<td>5,453.75</td>
<td>4.01</td>
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<tr>
<td>Jun.</td>
<td>50.25</td>
<td>211.00</td>
<td>1,088.00</td>
<td>815.50</td>
<td>1,150.00</td>
<td>228.75</td>
<td>2,005.50</td>
<td>468.50</td>
<td>1,630.25</td>
<td>7,645.75</td>
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<tr>
<td>Jul.</td>
<td>148.00</td>
<td>72.50</td>
<td>2,078.25</td>
<td>311.75</td>
<td>1,690.00</td>
<td>172.25</td>
<td>6,124.50</td>
<td>515.00</td>
<td>865.00</td>
<td>11,977.25</td>
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<tr>
<td>Aug.</td>
<td>128.50</td>
<td>672.00</td>
<td>4,530.00</td>
<td>1,223.00</td>
<td>348.50</td>
<td>855.2</td>
<td>3,524.2</td>
<td>844.00</td>
<td>235.25</td>
<td>5,491.75</td>
<td>17.62</td>
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<tr>
<td>Sep.</td>
<td>244.00</td>
<td>820.00</td>
<td>7,300.00</td>
<td>4,761.25</td>
<td>2,269.25</td>
<td>223.25</td>
<td>3,196.25</td>
<td>1,452.50</td>
<td>710.25</td>
<td>20,976.75</td>
<td>24.08</td>
</tr>
<tr>
<td>Oct.</td>
<td>240.50</td>
<td>636.50</td>
<td>5,029.25</td>
<td>3,385.75</td>
<td>1,753.50</td>
<td>1,754.75</td>
<td>1,900.75</td>
<td>936.25</td>
<td>1,591.00</td>
<td>17,228.25</td>
<td>14.23</td>
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<tr>
<td>Nov.</td>
<td>791.75</td>
<td>362.75</td>
<td>777.50</td>
<td>808.00</td>
<td>634.75</td>
<td>714.50</td>
<td>370.75</td>
<td>244.00</td>
<td>42.75</td>
<td>4,746.75</td>
<td>3.24</td>
</tr>
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<td>Dec.</td>
<td>281.00</td>
<td>375.75</td>
<td>1,146.50</td>
<td>658.25</td>
<td>29.00</td>
<td>423.00</td>
<td>1,419.50</td>
<td>183.00</td>
<td>28.50</td>
<td>4,544.50</td>
<td>3.59</td>
</tr>
</tbody>
</table>

**TABLE 7. Month-wise and district-wise mackerel catch (t) in Kerala (Average for 1993-'96)**

Table 8. Month-wise and district-wise oil sardine catch (t) in Kerala (average for 1993-'96)

<table>
<thead>
<tr>
<th>Months</th>
<th>TVM</th>
<th>QLN</th>
<th>ALP</th>
<th>EKM</th>
<th>TCR</th>
<th>MAL</th>
<th>CLT</th>
<th>KNR</th>
<th>KSD</th>
<th>Total Percentage Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan.</td>
<td>1.50</td>
<td>123.25</td>
<td>424.00</td>
<td>80.25</td>
<td>449.25</td>
<td>0.00</td>
<td>122.50</td>
<td>21.50</td>
<td>7.50</td>
<td>1,229.75</td>
</tr>
<tr>
<td>Feb.</td>
<td>0.25</td>
<td>384.25</td>
<td>291.25</td>
<td>88.00</td>
<td>25.25</td>
<td>0.00</td>
<td>383.25</td>
<td>104.25</td>
<td>0.00</td>
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<td>50.25</td>
<td>19.75</td>
<td>0.50</td>
<td>646.60</td>
</tr>
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<td>285.50</td>
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<td>0.00</td>
<td>0.00</td>
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<td>3,139.25</td>
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<td>7.75</td>
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<td>0.00</td>
<td>0.00</td>
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<td>30.75</td>
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<td>0.00</td>
<td>47.50</td>
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<td>453.00</td>
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<td>17.75</td>
<td>361.00</td>
<td>0.00</td>
<td>59.75</td>
<td>182.00</td>
<td>0.25</td>
<td>695.00</td>
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<td>340.75</td>
<td>19.75</td>
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<td>556.50</td>
<td>224.25</td>
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<td>800.25</td>
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<td>469.25</td>
<td>284.75</td>
<td>109.00</td>
<td>543.25</td>
<td>4.75</td>
<td>2,993.25</td>
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<td>1,430.50</td>
<td>210.75</td>
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<td>0.00</td>
<td>228.75</td>
<td>98.50</td>
<td>0.00</td>
<td>2,472.75</td>
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<td>6,535.75</td>
<td>3,385.25</td>
<td>1,846.25</td>
<td>3,202.75</td>
<td>997.00</td>
<td>5,342.00</td>
<td>1,758.75</td>
<td>379.75</td>
<td>23,739.75</td>
</tr>
<tr>
<td>%</td>
<td>1.23</td>
<td>27.53</td>
<td>14.26</td>
<td>7.78</td>
<td>13.49</td>
<td>4.20</td>
<td>22.50</td>
<td>7.41</td>
<td>1.60</td>
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</table>

Present scenario

During 1993-'96 out of an average catch of 5.5 lakh tonnes of fish landed in Kerala, 48.4 % was contributed by mechanised trawls, 30.8 % by large seines (purses>eine and ringseine), 4.1 % by boatseines, 9.2 % by gill nets, 3.8 % by hooks & line and the remaining 1.9 % by other gear (Table 9). Trawl fishery dominates in Kollam, Ernakulam and Kozhikode districts. In other districts the motorised crafts land maximum catch (Table 10). The minitrawl landing is maximum in Alleppey. The contribution by the non-mechanised fishery is of importance only in Thiruvanantha-puram district where neither the trawls nor the ringseines are operated. Even here, the non-mechanised fishery is on the decline with the spreading of motorisation. Fig. 20 shows the monthly average total catch along with the catches of ringseines and trawls. Peak catches are made in August. This is mainly due to the increase in the catches of trawl and ring seines. The poor catch during June is perhaps due to the non-operation of trawls during banperiod.

![Fig. 20. Monthly catch in Kerala average 1993-'96.](image)

Subsequently the ringseine catch increased to a first peak in July. Fig. 21 shows that the peak catches of ringseine are made during monsoon and subsequently there
was a steep decline in its catches. Due to lifting of the thermocline with upwelling the surface mixed layer during monsoon is very narrow where the new recruits of the pelagic fishes get locked and become highly vulnerable to the pelagic ear. Besides the incursion of the poorly oxygenated bottom water of the entire shelf during this period push most of the demersal fish stocks to the surface (Banse, 1959). Hence, intensive exploitation by ringseines during monsoon is on the new recruits resulting in early stocks decline. However, in the trawl fishery this trend of fast decline in catches after monsoon is not observed.

Table 9: Average gearwise catch (1993-'96) in tonnes in coastal districts of Kerala.

<table>
<thead>
<tr>
<th>Gear</th>
<th>TVM</th>
<th>QLN</th>
<th>ALP</th>
<th>EKM</th>
<th>TCR</th>
<th>MAL</th>
<th>CLT</th>
<th>KSD</th>
<th>Total</th>
<th>Percentage</th>
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<td>1,831</td>
<td>58,953</td>
<td>3,124</td>
<td>12,38</td>
<td>82,717</td>
<td>7,032</td>
<td>2,66,632</td>
<td>48.4</td>
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</tr>
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<td>4,90,35</td>
<td>18,250</td>
<td>22,168</td>
<td>10,975</td>
<td>38,401</td>
<td>7,766</td>
<td>1,61,959</td>
<td>29.4</td>
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</tr>
<tr>
<td>OBDGN</td>
<td>13,265</td>
<td>15,083</td>
<td>994</td>
<td>279</td>
<td>2,085</td>
<td>664</td>
<td>3,470</td>
<td>607</td>
<td>36,444</td>
<td>6.6</td>
</tr>
<tr>
<td>OBDG</td>
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<td>0</td>
<td>9,331</td>
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<td>7</td>
<td>25</td>
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<td>5,970</td>
<td>341</td>
<td>123</td>
<td>74</td>
<td>2</td>
<td>538</td>
<td>48</td>
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<td>265</td>
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<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
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Fig. 21: Seasonwise catch in Kerala average 1993-'96.
TABLE 10. Districtwise total catch in average

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<tr>
<th>District</th>
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<th>Effort (N)</th>
<th>Total</th>
</tr>
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<td>Trivandrum</td>
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<td>0.00</td>
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Kannur

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<th>Effort (N)</th>
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</tr>
</thead>
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<td>Motorised</td>
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Kasaragod

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<th>Total</th>
</tr>
</thead>
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<td>Total</td>
<td>14,794.5</td>
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Discussion

The marine fisheries of Kerala is dominated by trawls. Trawl landings are concentrated at Calicut, Ernakulam and Quilon districts due to the availability of harbour facilities. Trawls are contributing to 48.84% of the marine fish catch in Kerala and the catch is composed of more fish varieties than any other gear. The increase in fish catch after 1988 was largely due to the increase in the catch of this gear. There was an increase in the intensity and the area of fishing operations. The ban on trawling during varying periods of monsoon since 1988 also might have had a beneficial effect on the fishery as this provided favourable conditions for spawning and recruitment of fish species during the peak period of these activities.

The ringseine fishery which started in the second half of 1980s intensified in 1988 and the gear contributed substantially to the increase in catch. But the progress in ringseine fishery was partly at the cost of other surface gears like boat seine and gillnets. As the development of this fishery was uncontrolled, the exploitation was more during monsoon season on the early juveniles of pelagic fishes of age less than 5 months; as the intensive spawning and recruitment of major pelagic resources are observed during monsoon. This caused an early decline of the stocks of these species.
The major changes that took place in the fisheries of Kerala during the 1980s are the increased efficiency of exploitation and extended area of operation. Larger trawlers are going to deeper waters and were engaged in stay over fishing. The ringseine units fitted with powerful outboard engines were also exploiting deeper waters. The situation can be detrimental to the fish stocks unless they are provided with certain amount of protection in space and time for rebuilding. The ban on trawling enforced during a limited period in monsoon can be considered as a right step in this direction for the benefit of the demersal fish stocks. But the pelagic fish is still left in an unprotected condition. It is high time certain refuges are provided for the species supporting ringseine fishery also.

In an open access exploitation system as ours, conservation of stocks is beset with a lot of problems. The exploitation cannot be expected to be prudent. The gear are used according to their effectiveness without considering the biological implications or sustainability of fish stocks. The United Nations Convention of the Law of the Sea in 1982 entrusted the responsibility of protecting the fish resources of the Exclusive Economic Zone to the corresponding coastal states by judicious exploitation. Many of the coastal states signatory to this convention have not yet taken up this responsibility earnestly. In India, the Government of Kerala state has issued some orders in this direction but many are with poor enforcement record.

It is difficult to suggest methods of managing the multispecies and multigear fisheries of Kerala. A method of successional fishing can be initiated on an experimental basis. By this method, varieties of gear are used in space and time according to the biological characteristics of the fishes with an aim of protecting their spawning stock and early juveniles. As the successful spawning period of most of the fishes is during May-July, the fishing during this period has to be regulated to protect the spawning stock. During this period all gear other than large meshed (above 80 mm) drift gill nets and hooks and line that exploit larger fishes like seerfishes, tunas, sharks, perchies, etc. should be strictly controlled. After July operation of gill nets of mesh size above 40 mm may be encouraged to catch the post-spawners. This will avoid the exploitation of new recruits from the May-July spawning. If the fishermen prefer seines or purse seines the mesh size has to be regulated to 40 mm. All kinds of gear that are presently used may be allowed to operate during October-March under strict vigil. Trawling (including minitrawling) in the inshore waters should be controlled from May to September to protect spawners, spawning activity and the juveniles of fishes.

Under the present condition of the marine fisheries in Kerala with a long history of uncontrolled development these measures may seem to be extremely rigorous. But the fishery will get adapted to the controls. Reduction in the juvenile fishery can cause a surge in the drift net and hooks and line fishery due to predator-prey relationship. By allowing optimum growth of the new recruits the quality and quantity of the yield can be improved many fold and can sustain the production. Besides this will facilitate the maximum use of the productivity of our waters by taking full advantage of the plankton bloom with upwelling. The food chain of plankton/detritus, plankton feeders/detritus feeders and the carnivores will not get interrupted. Bottom trawling is a destructive way of fishing. Many countries have banned trawling in their coastal waters. It affects the benthos and the production of meroplankton. However, the amount of yield from trawl fisheries and its economic importance cannot be overlooked. Its operation has to be restricted to areas with a depth more than 35 metres.

Management of the fisheries can be made more effective if the actual fishermen are involved in the decision making. Fishermen cooperatives can be formed which can be vested with the responsibility of protecting the fish-
eries resources they exploit. They can be made aware of the biological and environmental basis for sustainability of fish stocks by constant interactions with the scientific community. Such interactions will be beneficial to the fishermen, fisheries, the fishery scientists and the policy makers. Besides it will make the implementation of the management options smooth and effective.

Fishery management policies are seldom final. We are dealing with a highly dynamic biosphere where upheavals can take place without our knowledge. Hence, any management strategy should be reviewed and corrected from time to time.

Acknowledgment

The authors are thankful to Dr. M. Devaraj, Director, Central Marine Fisheries Research Institute, Cochin for suggesting this study. We are also grateful to Mr. K.N. Kurup, Head, Fisheries Resources Assessment Division, CMFRI for making available the marine fish landing data used in this analysis, also for critically going through the manuscript and making valuable comments.

Table 5. Change in the fishery of major gear in Kerala between periods 1985- '87 and 1993- '95. (average catch in tonnes).

<table>
<thead>
<tr>
<th>Name of species</th>
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<th>1993- '95</th>
<th>Relative growth</th>
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## II. Outboard boatseine fishery

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<th>1993- '95</th>
<th>Relative growth In %</th>
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### Miscellaneous

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<th>Relative growth In %</th>
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## III. Ringseine fishery

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<tr>
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<td>77</td>
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</tr>
<tr>
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<tr>
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Seer fishes          0  1  1  1
Other shads         11  11  0  0.00
Silver pomfrets     89  65  -24  -26.97
Oil sardine         16,228 16,151 -77  -0.47
Leather jackets     169  63  -106  -62.72
Half beaks & full beaks 267  124 -143  -53.56
Catfishes           574  9  -555  -98.43
Horse mackerel      1,558 430  -1,128  -72.40
Other caarrangids   3,768 2,477  -1,291  -34.26
Miscellaneous       220  619  399  181.36

All fish            45314 1,75,964 1,30,650 288.32
Effort (units)      79,800 2,28,607 148,807 188.76

Table 5. Change in catch per effort (kgl) of major gear in Kerala between the periods 1985-87 and 1993-95

I. Trawl fishery

<table>
<thead>
<tr>
<th>Name of species</th>
<th>1985-87</th>
<th>1993-95</th>
<th>Relative growth in catch</th>
<th>Relative growth in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cephalopods</td>
<td>13.61</td>
<td>54.68</td>
<td>41.07</td>
<td>301.76</td>
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<tr>
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<td>33.72</td>
<td>30.90</td>
<td>1,095.74</td>
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<tr>
<td>Thread fin breams</td>
<td>61.42</td>
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<td>8.21</td>
<td>13.36</td>
</tr>
<tr>
<td>Penaeid prawns</td>
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</tr>
<tr>
<td>Other perchises</td>
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</tr>
<tr>
<td>Lizard Fishes</td>
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<td>61.98</td>
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<td>25.33</td>
<td>5.12</td>
<td>25.33</td>
</tr>
<tr>
<td>Ribbon fishies</td>
<td>4.94</td>
<td>13.98</td>
<td>9.04</td>
<td>183.00</td>
</tr>
<tr>
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<td>21.27</td>
<td>5.66</td>
<td>36.26</td>
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<td>5.18</td>
<td>4,316.67</td>
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<td>Crabs</td>
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<td>6.21</td>
<td>3.11</td>
<td>100.32</td>
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<td>4.77</td>
<td>3.07</td>
<td>180.59</td>
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<tr>
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<td>3.04</td>
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<td>3.45</td>
<td>2.56</td>
<td>287.64</td>
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<td>Other clupeids</td>
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<td>1.94</td>
<td>293.94</td>
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<td>1.45</td>
<td>1.45</td>
<td>287.64</td>
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<td>1.19</td>
<td>371.88</td>
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<td>0.97</td>
<td>153.97</td>
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<tr>
<td>Rays</td>
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<td></td>
<td></td>
<td>1.64  2.20  0.56  34.15</td>
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<td>1.01</td>
<td>0.98</td>
<td>3,266.67</td>
</tr>
<tr>
<td>Silver pomfret</td>
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<td>0.97</td>
<td>0.69</td>
<td>246.43</td>
</tr>
<tr>
<td>Chinese pomfret</td>
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<td>0.45</td>
<td>0.44</td>
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<td>Black pomfret</td>
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<td>0.40</td>
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<tr>
<td>Halibut</td>
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<td>0.37</td>
<td>0.29</td>
<td>302.50</td>
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<td>6.80</td>
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<td>-22.08</td>
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<td>0.17</td>
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<tr>
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<td>0.18</td>
<td>-1.00</td>
</tr>
<tr>
<td>S. gullatus</td>
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<td>0.15</td>
<td>0.14</td>
<td>1,400.00</td>
</tr>
<tr>
<td>Skates</td>
<td>0.01</td>
<td>0.15</td>
<td>0.14</td>
<td>1,400.00</td>
</tr>
<tr>
<td>Other sardines</td>
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<td>0.17</td>
<td>0.10</td>
<td>142.86</td>
</tr>
<tr>
<td>Eels</td>
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<td>0.11</td>
<td>0.10</td>
<td>1,000.00</td>
</tr>
<tr>
<td>Flounders</td>
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<td>0.18</td>
<td>0.04</td>
<td>28.57</td>
</tr>
<tr>
<td>Snappers</td>
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<td>0.06</td>
<td>0.06</td>
<td>-1.00</td>
</tr>
<tr>
<td>E. affinis</td>
<td>0.00</td>
<td>0.01</td>
<td>0.01</td>
<td>-1.00</td>
</tr>
<tr>
<td>Pig-face breams</td>
<td>0.00</td>
<td>0.01</td>
<td>0.01</td>
<td>-1.00</td>
</tr>
<tr>
<td>Flying fishes</td>
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<td>0.01</td>
<td>0.01</td>
<td>-1.00</td>
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<tr>
<td>Hilsa shad</td>
<td>0.00</td>
<td>0.01</td>
<td>0.01</td>
<td>-1.00</td>
</tr>
<tr>
<td>Other tunnies</td>
<td>0.00</td>
<td>0.01</td>
<td>0.01</td>
<td>-1.00</td>
</tr>
<tr>
<td>AwaX spp.</td>
<td>0.00</td>
<td>0.01</td>
<td>0.01</td>
<td>-1.00</td>
</tr>
<tr>
<td>Other shads</td>
<td>0.03</td>
<td>0.00</td>
<td>0.03</td>
<td>-100.00</td>
</tr>
<tr>
<td>Non-penaeid prawns</td>
<td>0.03</td>
<td>0.00</td>
<td>0.03</td>
<td>-100.00</td>
</tr>
<tr>
<td>Threadfin breams</td>
<td>0.12</td>
<td>0.05</td>
<td>-0.07</td>
<td>-58.33</td>
</tr>
<tr>
<td>Big-jawed jumper</td>
<td>0.98</td>
<td>0.65</td>
<td>-0.33</td>
<td>-33.67</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>0.20</td>
<td>0.02</td>
<td>-0.18</td>
<td>-90.00</td>
</tr>
<tr>
<td>Mulletts</td>
<td>0.41</td>
<td>0.04</td>
<td>-0.37</td>
<td>-90.24</td>
</tr>
<tr>
<td>Catfishes</td>
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<td>0.33</td>
<td>-2.13</td>
<td>-86.59</td>
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<td>Miscellaneous</td>
<td>9.83</td>
<td>28.32</td>
<td>18.49</td>
<td>188.10</td>
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</table>

II. Outboard boatseine fishery

<table>
<thead>
<tr>
<th>Name of species</th>
<th>1985-87</th>
<th>1993-95</th>
<th>Relative growth in catch</th>
<th>Relative growth in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian mackerel</td>
<td>10.92</td>
<td>79.35</td>
<td>68.43</td>
<td>626.65</td>
</tr>
<tr>
<td>Mulletts</td>
<td>0.25</td>
<td>7.81</td>
<td>7.56</td>
<td>3,024.00</td>
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<tr>
<td>Non-penaeid prawns</td>
<td>0.18</td>
<td>1.68</td>
<td>1.50</td>
<td>833.33</td>
</tr>
<tr>
<td>Hilsa shad</td>
<td>0.00</td>
<td>0.14</td>
<td>0.14</td>
<td>-1.00</td>
</tr>
<tr>
<td>Halibut</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-1.00</td>
</tr>
<tr>
<td>AwaX spp.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>-1.00</td>
</tr>
<tr>
<td>Lizard fishes</td>
<td>0.01</td>
<td>0.07</td>
<td>0.06</td>
<td>600.00</td>
</tr>
<tr>
<td>Goat fishes</td>
<td>0.01</td>
<td>0.00</td>
<td>-0.01</td>
<td>-100.00</td>
</tr>
</tbody>
</table>

All fish                  262.24  452.26  190.02  72.46
Effort (units)           4,53,085 6,13,085 1,60,000 3,31
### III. Ringedine fishery

<table>
<thead>
<tr>
<th>Name of species</th>
<th>1985-87</th>
<th>1993-95</th>
<th>Relative growth in catch</th>
<th>Relative growth in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian mackerel</td>
<td>103</td>
<td>266</td>
<td>183</td>
<td>158.25</td>
</tr>
<tr>
<td>Scads</td>
<td>44</td>
<td>135</td>
<td>91</td>
<td>206.82</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of species</th>
<th>1985-87</th>
<th>1993-95</th>
<th>Relative growth in catch</th>
<th>Relative growth in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other sardines</td>
<td>34</td>
<td>90</td>
<td>56</td>
<td>164.71</td>
</tr>
<tr>
<td>Penaeid prawns</td>
<td>16</td>
<td>26</td>
<td>10</td>
<td>62.50</td>
</tr>
<tr>
<td>Other clupeids</td>
<td>20</td>
<td>25</td>
<td>5</td>
<td>25.00</td>
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<tr>
<td>Croakers</td>
<td>3</td>
<td>9</td>
<td>6</td>
<td>200.00</td>
</tr>
<tr>
<td>Other perches</td>
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<td>10</td>
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</tr>
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<td>Auxis spp.</td>
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</tr>
<tr>
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<td>200.00</td>
</tr>
<tr>
<td>Black pomfrets</td>
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<td>3</td>
<td>1</td>
<td>50.00</td>
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<td>-1</td>
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<tr>
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<td>-1</td>
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<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Mullets</td>
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<td>1</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Big-jawed jumper</td>
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<td>0</td>
<td>0</td>
<td>-1</td>
</tr>
<tr>
<td>Ribbon fishes</td>
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<td>Cephalopods</td>
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<td>0</td>
<td>-1</td>
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<tr>
<td>Rays</td>
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<tr>
<td>Bill fishes</td>
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<tr>
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<td>-1</td>
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<td>Seer fishes</td>
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<td>-1</td>
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<td>Silver pomfrets</td>
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<td>3</td>
<td>0</td>
<td>0.00</td>
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</table>

<table>
<thead>
<tr>
<th>Name of species</th>
<th>1985-87</th>
<th>1993-95</th>
<th>Relative growth in catch</th>
<th>Relative growth in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All fish</td>
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<td>79,800</td>
<td>2,28,607</td>
<td>1,48,807</td>
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</table>
Kerala has been the forerunner in the adoption of technological innovations in fishing operations. The latter part of the sixties and the early seventies witnessed spectacular spread in the mechanised trawling. Purse seineing was introduced in the latter part of the seventies though did not pick up as in the neighbouring state of Karnataka for some reason or other. However, in the hindsight even this did not make such a conspicuous impact as has been made by the popular motorization of the indigenous craft in the early eighties and the consequent changes brought about in the structure of Kerala fisheries. The ring seine which was introduced in 1986 by its popularity became the mainstay of the artisanal fisheries of Kerala in a very short time.

Adoption of these technologies has no doubt, resulted in tangible growth in the marine fish production. But amidst the euphoria there lurks a cold truth of intersectoral competition for the same reason with its economic and social dimension constraining the Governmental agencies to sieve out a solution. Apparently conflicting views were expressed by the artisanal fishers and the trawl operators while the former expressed their apprehension that trawling during monsoon was detrimental to the commercially important pelagic fish stocks which have their nursery in the inshore areas during monsoon, the latter claims that it was not so from the early seventies. A good monsoon trawl fishery for prawns existed in Kerala especially with Quilon and Cochin as the bases of operation. While the artisanal fishers wanted trawling to be banned throughout the monsoon season, according to trawler operators, such measures would tend to the erosion of benefits especially through export of prawns. However, seized of the problem, Kerala Government decided to ban monsoon trawling in the territorial waters of Kerala and has been implementing the ban from 1988 onwards. In view of the divergent views expressed by different sectors, it is felt that it would be a welcome proposition to assess the present status of marine fish production in Kerala vis-a-vis the production before ban was introduced. Attempt made here is only to present the status of production without venturing to highlight any specific issues nor answering any specific questions nor drawing inference on a set of hypotheses.

Apparently there has been unprecedented growth in the marine fish production in Kerala during the last decade which incidentally coincides with the period during which ban on trawling during monsoon has been in vogue. Comparison of the average landings during 1981-'87 and 1988-'97 indicate an increase of 69% in overall landings in the state and surprisingly two points which deserve consideration are

1. The Increase (69%) has been uniform in pre-monsoon, monsoon and post monsoon periods.
2. The relative intensity of landings during the three seasons remain the same during preban and ban period (26% during pre-monsoon, 24% during monsoon and 50% during post monsoon)

This may apparently indicate that the influence of that factor which contributed to the increase has been uniformly felt in all the seasons. However, a detailed analysis is called for, before drawing a conclusion.

The Table 1 gives the percentage realization of landings of important groups in the three seasons and the relative increase/decrease in the ban period. Indian mackerel which was abysmally low in 1982 and 1983 made a splendid recovery by 1989 and on an average during the ban period registered a growth of 43% over that during pre-ban period. The level of pro-
duction attained by mackerel during 1989 and subsequent years, though remarkable was not unprecedented. But the landings of carangids which rose by 368% has been unprecedented and spectacular and may be the one single prominent feature of the ringseine revolution in Kerala fisheries. Though lesser sardines showed an increase of 165% the production reached a substantial level only in 1995. It may be worth observing that there are resources primarily exploited by traditional (motorised) sector. There has been a matching increase in the landings of prime resources exploited by trawlers as well. It is worth mentioning that during ban period the landings of penaeid prawns has shown a conspicuous increase of 82%. Besides the prawns, perches and cephalopods made remarkable growth by 143 and 365% which might be the result of accentuated thrusts on these owing to new market potentials available.

The increase observed in the overall trawl landings is mainly in the post monsoon period when before ban, 34% of annual landings was realised while during the ban period, it rose to 44% with a matching reduction from 33 to 21% during monsoon period. Table 2 gives the percentage contribution of landings of important gear in the three seasons and relative abundance decrease during the ban-period. Trawl landings registered an increase of 160%. This was mostly owing to the selective fishing of cephalopods because of its export potential. Remarkable growth of 601% was noticed in the ringseine landings. It may be stressed that the ringseines were launched in Kerala only just two years prior to the introduction of ban on trawling and they were just beginning to get established in these two years of pre-ban period. Mechanised hooks and line earned 339% increase eventhough their operation during monsoon was comparatively less. 295% increase was observed in the landings of other OB units whose mainstay were minitrawlers, disco vala and hooks and line. Drift/gillnet units registered an increase of about 84%. Non-mechanised sector showed a decline of about 72%. Mechanised drift/gillnets (79%), purseseines (32%). OB boatseine and non-mechanised (72%) (62%) declined during the ban period.

Table 3 depicts the seasonwise total landings during 1981- '97 Table 4 a-q give the seasonwise and species wise landings during the respective years from 1981 to '97. Table-5aI represent the seasonwise landings in different years by different gear during the pre-ban and ban periods. Table 6 a-l show the seasonwise landings in different years of different groups of fishes during the pre-ban and ban periods.

<table>
<thead>
<tr>
<th>Name of gear</th>
<th>Preban period</th>
<th>Ban period</th>
<th>Increase/Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mec. trawlnet</td>
<td>33</td>
<td>33</td>
<td>34</td>
</tr>
<tr>
<td>Mec. drift/gillnet</td>
<td>22</td>
<td>21</td>
<td>57</td>
</tr>
<tr>
<td>Purse seine</td>
<td>40</td>
<td>4</td>
<td>56</td>
</tr>
<tr>
<td>Mec. hooks&amp;line</td>
<td>28</td>
<td>4</td>
<td>68</td>
</tr>
<tr>
<td>Ob. purseseine</td>
<td>7</td>
<td>36</td>
<td>57</td>
</tr>
</tbody>
</table>

* Average annual landings.
### TABLE 3
Kerala season-wise landings during 1981-1997 (tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-ban period</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>54,900</td>
<td>52,642</td>
<td>1,75,729</td>
<td>2,83,271</td>
</tr>
<tr>
<td>1982</td>
<td>92,381</td>
<td>68,709</td>
<td>1,82,738</td>
<td>3,43,828</td>
</tr>
<tr>
<td>1983</td>
<td>1,00,238</td>
<td>71,197</td>
<td>1,99,233</td>
<td>3,70,668</td>
</tr>
<tr>
<td>1984</td>
<td>1,12,356</td>
<td>96,108</td>
<td>1,68,168</td>
<td>3,76,630</td>
</tr>
<tr>
<td>1985</td>
<td>97,369</td>
<td>88,902</td>
<td>1,50,807</td>
<td>3,37,078</td>
</tr>
<tr>
<td>1986</td>
<td>81,571</td>
<td>1,03,263</td>
<td>1,85,445</td>
<td>3,70,279</td>
</tr>
<tr>
<td>1987</td>
<td>87,218</td>
<td>97,492</td>
<td>1,18,391</td>
<td>3,03,101</td>
</tr>
<tr>
<td>Ban period</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>93,262</td>
<td>1,17,157</td>
<td>2,82,844</td>
<td>4,93,263</td>
</tr>
<tr>
<td>1989</td>
<td>1,30,195</td>
<td>1,36,074</td>
<td>3,71,567</td>
<td>6,37,836</td>
</tr>
<tr>
<td>1990</td>
<td>1,96,312</td>
<td>1,36,948</td>
<td>3,40,487</td>
<td>6,73,747</td>
</tr>
<tr>
<td>1991</td>
<td>1,81,248</td>
<td>1,29,986</td>
<td>2,49,294</td>
<td>5,60,528</td>
</tr>
<tr>
<td>1992</td>
<td>1,42,084</td>
<td>1,27,356</td>
<td>2,87,439</td>
<td>5,56,879</td>
</tr>
<tr>
<td>1993</td>
<td>1,71,467</td>
<td>1,57,416</td>
<td>2,46,544</td>
<td>5,75,427</td>
</tr>
<tr>
<td>1994</td>
<td>1,47,624</td>
<td>1,74,700</td>
<td>2,42,276</td>
<td>5,64,600</td>
</tr>
<tr>
<td>1995</td>
<td>96,489</td>
<td>1,53,814</td>
<td>2,76,353</td>
<td>5,26,656</td>
</tr>
<tr>
<td>1996</td>
<td>1,38,496</td>
<td>1,60,395</td>
<td>2,98,238</td>
<td>5,97,129</td>
</tr>
<tr>
<td>1997</td>
<td>2,13,597</td>
<td>1,01,309</td>
<td>2,43,694</td>
<td>5,58,060</td>
</tr>
<tr>
<td>Average</td>
<td>89,433</td>
<td>82,516</td>
<td>1,68,644</td>
<td>3,40,694</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perches</td>
<td>1.395</td>
<td>4.574</td>
<td>2.991</td>
<td>8.960</td>
</tr>
<tr>
<td>Croakers</td>
<td>975</td>
<td>913</td>
<td>1,103</td>
<td>2,991</td>
</tr>
<tr>
<td>Robben fishes</td>
<td>24</td>
<td>4.107</td>
<td>2.903</td>
<td>7.034</td>
</tr>
<tr>
<td>Carangids</td>
<td>1.616</td>
<td>496</td>
<td>3.441</td>
<td>5.553</td>
</tr>
<tr>
<td>Mackeral</td>
<td>7.865</td>
<td>1,053</td>
<td>6,129</td>
<td>15,047</td>
</tr>
<tr>
<td>Seer fishes</td>
<td>431</td>
<td>74</td>
<td>3,129</td>
<td>3,634</td>
</tr>
<tr>
<td>Tuna</td>
<td>3,050</td>
<td>556</td>
<td>2,309</td>
<td>5,915</td>
</tr>
<tr>
<td>Penaid prawns</td>
<td>4,316</td>
<td>1,078</td>
<td>3,280</td>
<td>21,674</td>
</tr>
<tr>
<td>Cephalopods</td>
<td>163</td>
<td>386</td>
<td>2,182</td>
<td>2,731</td>
</tr>
<tr>
<td>Others</td>
<td>9,243</td>
<td>8,750</td>
<td>10,166</td>
<td>28,159</td>
</tr>
<tr>
<td>Total</td>
<td>54,900</td>
<td>52,642</td>
<td>1,75,729</td>
<td>2,83,271</td>
</tr>
</tbody>
</table>

### TABLE 4a
Kerala, season-wise, species-wise landings during 1982 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>1,178</td>
<td>485</td>
<td>2,790</td>
<td>4,372</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>1,644</td>
<td>2,911</td>
<td>5,064</td>
<td>9,619</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>42,681</td>
<td>15,310</td>
<td>95,698</td>
<td>153,680</td>
</tr>
<tr>
<td>Other sardines</td>
<td>2,425</td>
<td>71</td>
<td>5,662</td>
<td>8,158</td>
</tr>
<tr>
<td>White baits</td>
<td>7,645</td>
<td>2,208</td>
<td>3,717</td>
<td>13,570</td>
</tr>
<tr>
<td>Perches</td>
<td>1,724</td>
<td>7,624</td>
<td>1,343</td>
<td>10,691</td>
</tr>
<tr>
<td>Croakers</td>
<td>1,082</td>
<td>1,630</td>
<td>1,142</td>
<td>3,854</td>
</tr>
<tr>
<td>Riboon fishes</td>
<td>38</td>
<td>7,615</td>
<td>3,992</td>
<td>11,045</td>
</tr>
<tr>
<td>Carangids</td>
<td>5,833</td>
<td>1,035</td>
<td>7,077</td>
<td>13,945</td>
</tr>
<tr>
<td>Mackerel</td>
<td>6,480</td>
<td>739</td>
<td>3,358</td>
<td>10,577</td>
</tr>
<tr>
<td>Seer fishes</td>
<td>1,342</td>
<td>144</td>
<td>4,248</td>
<td>5,734</td>
</tr>
<tr>
<td>Tuna</td>
<td>3,328</td>
<td>1,129</td>
<td>2,340</td>
<td>6,797</td>
</tr>
<tr>
<td>Penaid prawns</td>
<td>4,787</td>
<td>12,781</td>
<td>14,109</td>
<td>31,677</td>
</tr>
<tr>
<td>Cephalopods</td>
<td>522</td>
<td>714</td>
<td>1,976</td>
<td>3,212</td>
</tr>
<tr>
<td>Others</td>
<td>11,672</td>
<td>14,313</td>
<td>30,912</td>
<td>56,897</td>
</tr>
<tr>
<td>Total</td>
<td>92,381</td>
<td>68,709</td>
<td>182,738</td>
<td>343,828</td>
</tr>
</tbody>
</table>

### TABLE 4b
Kerala, season-wise, species-wise landings during 1983 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>1,652</td>
<td>1,171</td>
<td>4,875</td>
<td>7,698</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>1,649</td>
<td>2,569</td>
<td>11,672</td>
<td>15,890</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>52,836</td>
<td>3,026</td>
<td>86,733</td>
<td>142,395</td>
</tr>
<tr>
<td>Other sardines</td>
<td>2,424</td>
<td>365</td>
<td>2,112</td>
<td>4,901</td>
</tr>
<tr>
<td>White baits</td>
<td>5,996</td>
<td>18,860</td>
<td>31,298</td>
<td>56,154</td>
</tr>
<tr>
<td>Perches</td>
<td>2,065</td>
<td>5,509</td>
<td>2,917</td>
<td>10,491</td>
</tr>
<tr>
<td>Croakers</td>
<td>1,075</td>
<td>3,100</td>
<td>2,409</td>
<td>6,585</td>
</tr>
<tr>
<td>Name of fish</td>
<td>Premon.</td>
<td>Mon.</td>
<td>Postmon.</td>
<td>Total</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
<td>------</td>
<td>----------</td>
<td>---------</td>
</tr>
<tr>
<td>Shark</td>
<td>3,187</td>
<td>678</td>
<td>2,079</td>
<td>5,944</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>2,632</td>
<td>3,046</td>
<td>4,917</td>
<td>10,595</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>59,987</td>
<td>12,309</td>
<td>62,609</td>
<td>134,905</td>
</tr>
<tr>
<td>Other sardines</td>
<td>1,722</td>
<td>1,326</td>
<td>4,448</td>
<td>7,496</td>
</tr>
<tr>
<td>White baits</td>
<td>2,399</td>
<td>16,883</td>
<td>21,153</td>
<td>40,435</td>
</tr>
<tr>
<td>Perches</td>
<td>3,956</td>
<td>17,867</td>
<td>4,958</td>
<td>28,811</td>
</tr>
<tr>
<td>Croakers</td>
<td>2,217</td>
<td>3,706</td>
<td>3,331</td>
<td>9,254</td>
</tr>
<tr>
<td>Ribbon fishes</td>
<td>184</td>
<td>5,903</td>
<td>383</td>
<td>6,470</td>
</tr>
<tr>
<td>Carangids</td>
<td>5,481</td>
<td>2,042</td>
<td>5,872</td>
<td>13,395</td>
</tr>
<tr>
<td>Mackerel</td>
<td>3,878</td>
<td>1,533</td>
<td>6,214</td>
<td>11,625</td>
</tr>
<tr>
<td>Seer fishes</td>
<td>816</td>
<td>644</td>
<td>4,546</td>
<td>6,006</td>
</tr>
<tr>
<td>Tuna</td>
<td>2,486</td>
<td>1,062</td>
<td>2,503</td>
<td>6,051</td>
</tr>
<tr>
<td>Penaeid prawns</td>
<td>7,689</td>
<td>14,572</td>
<td>12,974</td>
<td>35,235</td>
</tr>
<tr>
<td>Cephalopods</td>
<td>637</td>
<td>891</td>
<td>4,000</td>
<td>5,528</td>
</tr>
<tr>
<td>Others</td>
<td>15,085</td>
<td>13,646</td>
<td>28,149</td>
<td>56,880</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>11,2356</td>
<td>96,108</td>
<td>168,166</td>
<td>376,630</td>
</tr>
</tbody>
</table>

Table 4e. Kerala, season-wise, species-wise landings during 1984 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>1,194</td>
<td>360</td>
<td>3,511</td>
<td>5,056</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>882</td>
<td>1,233</td>
<td>3,087</td>
<td>5,202</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>37,106</td>
<td>9,415</td>
<td>40,854</td>
<td>87,375</td>
</tr>
<tr>
<td>Other sardines</td>
<td>1,471</td>
<td>161</td>
<td>1,908</td>
<td>3,540</td>
</tr>
<tr>
<td>White baits</td>
<td>3,490</td>
<td>11,342</td>
<td>21,506</td>
<td>36,338</td>
</tr>
<tr>
<td>Perches</td>
<td>5,061</td>
<td>18,870</td>
<td>6,859</td>
<td>30,790</td>
</tr>
<tr>
<td>Croakers</td>
<td>3,394</td>
<td>2,745</td>
<td>2,295</td>
<td>8,434</td>
</tr>
</tbody>
</table>

Table 4f. Kerala, season-wise, species-wise landings during 1986 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>1,021</td>
<td>473</td>
<td>3,065</td>
<td>4,579</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>320</td>
<td>903</td>
<td>7,277</td>
<td>8,500</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>16,291</td>
<td>59</td>
<td>8,973</td>
<td>25,323</td>
</tr>
<tr>
<td>Other sardines</td>
<td>2,751</td>
<td>1,621</td>
<td>4,516</td>
<td>9,088</td>
</tr>
<tr>
<td>White baits</td>
<td>4,866</td>
<td>7,964</td>
<td>14,265</td>
<td>27,095</td>
</tr>
<tr>
<td>Perches</td>
<td>4,392</td>
<td>29,569</td>
<td>12,777</td>
<td>46,758</td>
</tr>
<tr>
<td>Croakers</td>
<td>1,678</td>
<td>1,676</td>
<td>9,648</td>
<td>13,002</td>
</tr>
<tr>
<td>Ribbon fishes</td>
<td>635</td>
<td>3,941</td>
<td>7,298</td>
<td>11,874</td>
</tr>
<tr>
<td>Carangids</td>
<td>3,048</td>
<td>19,546</td>
<td>49,464</td>
<td>72,058</td>
</tr>
<tr>
<td>Mackerel</td>
<td>9,196</td>
<td>1,221</td>
<td>11,815</td>
<td>22,232</td>
</tr>
<tr>
<td>Seer fishes</td>
<td>483</td>
<td>307</td>
<td>3,762</td>
<td>4,552</td>
</tr>
<tr>
<td>Tuna</td>
<td>570</td>
<td>511</td>
<td>8,395</td>
<td>9,476</td>
</tr>
<tr>
<td>Penaeid prawns</td>
<td>11,500</td>
<td>17,575</td>
<td>8,175</td>
<td>37,250</td>
</tr>
<tr>
<td>Cephalopods</td>
<td>1,464</td>
<td>1,714</td>
<td>12,271</td>
<td>15,449</td>
</tr>
<tr>
<td>Others</td>
<td>23,356</td>
<td>15,963</td>
<td>23,724</td>
<td>69,043</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>81,571</td>
<td>1,03,263</td>
<td>185,445</td>
<td>370,279</td>
</tr>
</tbody>
</table>

Table 4g. Kerala, season-wise species-wise landings during 1987 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>1,487</td>
<td>553</td>
<td>1,171</td>
<td>3,211</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>162</td>
<td>2,070</td>
<td>2,359</td>
<td>4,591</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>1,712</td>
<td>17,762</td>
<td>25,486</td>
<td>44,960</td>
</tr>
<tr>
<td>Other sardines</td>
<td>4,860</td>
<td>554</td>
<td>3,915</td>
<td>9,329</td>
</tr>
<tr>
<td>White baits</td>
<td>3,356</td>
<td>2,787</td>
<td>10,606</td>
<td>16,798</td>
</tr>
<tr>
<td>Perches</td>
<td>8,032</td>
<td>15,930</td>
<td>6,484</td>
<td>30,446</td>
</tr>
<tr>
<td>Croakers</td>
<td>2,233</td>
<td>3,049</td>
<td>2,851</td>
<td>8,133</td>
</tr>
<tr>
<td>Name of fish</td>
<td>Premon.</td>
<td>Mon.</td>
<td>Postmon.</td>
<td>Total</td>
</tr>
<tr>
<td>-------------</td>
<td>---------</td>
<td>------</td>
<td>----------</td>
<td>-------</td>
</tr>
<tr>
<td>Shark</td>
<td>1,538</td>
<td>1,687</td>
<td>1,912</td>
<td>5,117</td>
</tr>
<tr>
<td>Cat Sardine</td>
<td>362</td>
<td>3,609</td>
<td>6,017</td>
<td>9,988</td>
</tr>
<tr>
<td>Oil Sardine</td>
<td>2,223</td>
<td>7,948</td>
<td>66,036</td>
<td>76,807</td>
</tr>
<tr>
<td>Other Sardines</td>
<td>1,195</td>
<td>2,067</td>
<td>9,671</td>
<td>12,993</td>
</tr>
<tr>
<td>White Baits</td>
<td>5,155</td>
<td>15,065</td>
<td>25,853</td>
<td>46,073</td>
</tr>
<tr>
<td>Perches</td>
<td>6,602</td>
<td>16,067</td>
<td>7,163</td>
<td>31,832</td>
</tr>
<tr>
<td>Croakers</td>
<td>1,922</td>
<td>1,829</td>
<td>5,196</td>
<td>8,947</td>
</tr>
<tr>
<td>Ribbon Fishes</td>
<td>2,810</td>
<td>928</td>
<td>5,189</td>
<td>8,927</td>
</tr>
<tr>
<td>Carangids</td>
<td>7,229</td>
<td>9,847</td>
<td>31,657</td>
<td>48,733</td>
</tr>
<tr>
<td>Mackerel</td>
<td>4,108</td>
<td>13,257</td>
<td>27,260</td>
<td>44,625</td>
</tr>
<tr>
<td>Seer Fishes</td>
<td>1,694</td>
<td>615</td>
<td>8,063</td>
<td>10,372</td>
</tr>
<tr>
<td>Tuna</td>
<td>3,294</td>
<td>3,123</td>
<td>7,127</td>
<td>13,544</td>
</tr>
<tr>
<td>Penaeid Prawns</td>
<td>19,539</td>
<td>20,346</td>
<td>29,309</td>
<td>69,194</td>
</tr>
<tr>
<td>Cephalopods</td>
<td>4,779</td>
<td>2,358</td>
<td>8,049</td>
<td>15,186</td>
</tr>
<tr>
<td>Others</td>
<td>28,818</td>
<td>18,431</td>
<td>43,742</td>
<td>90,991</td>
</tr>
<tr>
<td>Total</td>
<td>93,268</td>
<td>1,17,157</td>
<td>2,82,844</td>
<td>4,93,269</td>
</tr>
</tbody>
</table>

Table 4. Kerala, season-wise, species-wise landings during 1989 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>962</td>
<td>286</td>
<td>1,715</td>
<td>2,965</td>
</tr>
<tr>
<td>Cat Sardine</td>
<td>290</td>
<td>254</td>
<td>2,317</td>
<td>2,861</td>
</tr>
<tr>
<td>Oil Sardine</td>
<td>56,652</td>
<td>31,639</td>
<td>90,729</td>
<td>179,020</td>
</tr>
<tr>
<td>Other Sardines</td>
<td>1,833</td>
<td>278</td>
<td>11,956</td>
<td>14,067</td>
</tr>
<tr>
<td>White Baits</td>
<td>9,100</td>
<td>6,743</td>
<td>11,440</td>
<td>27,283</td>
</tr>
<tr>
<td>Perches</td>
<td>18,018</td>
<td>39,115</td>
<td>11,404</td>
<td>68,537</td>
</tr>
<tr>
<td>Croakers</td>
<td>2,647</td>
<td>4,200</td>
<td>4,057</td>
<td>10,904</td>
</tr>
<tr>
<td>Ribbon Fishes</td>
<td>246</td>
<td>92</td>
<td>9,411</td>
<td>9,749</td>
</tr>
<tr>
<td>Carangids</td>
<td>13,379</td>
<td>11,551</td>
<td>45,292</td>
<td>70,222</td>
</tr>
<tr>
<td>Mackerel</td>
<td>11,117</td>
<td>11,233</td>
<td>59,994</td>
<td>82,344</td>
</tr>
<tr>
<td>Seer Fishes</td>
<td>1,193</td>
<td>411</td>
<td>3,633</td>
<td>5,237</td>
</tr>
<tr>
<td>Tuna</td>
<td>9,863</td>
<td>3,305</td>
<td>20,645</td>
<td>33,813</td>
</tr>
<tr>
<td>Penaeid Prawns</td>
<td>26,130</td>
<td>8,458</td>
<td>10,015</td>
<td>44,603</td>
</tr>
<tr>
<td>Cephalopods</td>
<td>7,406</td>
<td>3,869</td>
<td>14,185</td>
<td>25,460</td>
</tr>
<tr>
<td>Others</td>
<td>37,476</td>
<td>15,512</td>
<td>43,694</td>
<td>96,682</td>
</tr>
<tr>
<td>Total</td>
<td>1,96,312</td>
<td>1,36,948</td>
<td>3,40,487</td>
<td>6,73,747</td>
</tr>
</tbody>
</table>

Table 4h. Kerala, season-wise, species-wise landings during 1990 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>603</td>
<td>683</td>
<td>641</td>
<td>1,927</td>
</tr>
<tr>
<td>Cat Sardine</td>
<td>296</td>
<td>849</td>
<td>588</td>
<td>1,733</td>
</tr>
<tr>
<td>Oil Sardine</td>
<td>74,626</td>
<td>12,625</td>
<td>17,984</td>
<td>105,235</td>
</tr>
<tr>
<td>Other Sardines</td>
<td>14,607</td>
<td>562</td>
<td>8,316</td>
<td>22,885</td>
</tr>
<tr>
<td>White Baits</td>
<td>5,440</td>
<td>9,952</td>
<td>30,175</td>
<td>45,567</td>
</tr>
<tr>
<td>Perches</td>
<td>5,854</td>
<td>13,150</td>
<td>21,247</td>
<td>40,261</td>
</tr>
<tr>
<td>Total</td>
<td>1,60,015</td>
<td>3,40,487</td>
<td>3,40,487</td>
<td>1,37,982</td>
</tr>
</tbody>
</table>

Table 4j. Kerala, season-wise, species-wise landings during 1991 (tonnes)
### Table 41. Kerala, season-wise - species-wise landings during 1992 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>705</td>
<td>469</td>
<td>1,020</td>
<td>2,214</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>394</td>
<td>60</td>
<td>456</td>
<td>912</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>26,676</td>
<td>6,300</td>
<td>18,068</td>
<td>51,044</td>
</tr>
<tr>
<td>Other sardines</td>
<td>1,821</td>
<td>48</td>
<td>14,689</td>
<td>16,558</td>
</tr>
<tr>
<td>White baits</td>
<td>7,936</td>
<td>20,848</td>
<td>19,127</td>
<td>47,911</td>
</tr>
<tr>
<td>Perches</td>
<td>8,308</td>
<td>23,088</td>
<td>20,608</td>
<td>52,004</td>
</tr>
<tr>
<td>Croakers</td>
<td>2,328</td>
<td>2,820</td>
<td>11,017</td>
<td>16,165</td>
</tr>
<tr>
<td>Ribbon fishes</td>
<td>101</td>
<td>1,320</td>
<td>4,825</td>
<td>6,246</td>
</tr>
<tr>
<td>Carangids</td>
<td>11,899</td>
<td>20,489</td>
<td>52,212</td>
<td>84,600</td>
</tr>
<tr>
<td>Mackerel</td>
<td>12,653</td>
<td>10,600</td>
<td>13,831</td>
<td>37,094</td>
</tr>
<tr>
<td>Seer fishes</td>
<td>1,356</td>
<td>271</td>
<td>6,926</td>
<td>8,553</td>
</tr>
<tr>
<td>Tuna</td>
<td>3,572</td>
<td>1,556</td>
<td>11,245</td>
<td>16,373</td>
</tr>
<tr>
<td>Penaeid prawns</td>
<td>19,375</td>
<td>14,411</td>
<td>13,051</td>
<td>46,837</td>
</tr>
<tr>
<td>Cephalopods</td>
<td>10,137</td>
<td>3,919</td>
<td>16,887</td>
<td>30,943</td>
</tr>
<tr>
<td>Others</td>
<td>34,813</td>
<td>21,137</td>
<td>83,475</td>
<td>139,425</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,42,084</td>
<td>1,27,356</td>
<td>2,87,439</td>
<td>5,56,879</td>
</tr>
</tbody>
</table>

### Table 42. Kerala, season-wise - species-wise landings during 1994 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>1,926</td>
<td>373</td>
<td>1,527</td>
<td>3,826</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>81</td>
<td>186</td>
<td>215</td>
<td>482</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>302</td>
<td>525</td>
<td>754</td>
<td>1,581</td>
</tr>
<tr>
<td>Other sardines</td>
<td>822</td>
<td>219</td>
<td>15,436</td>
<td>16,477</td>
</tr>
<tr>
<td>White baits</td>
<td>9,191</td>
<td>15,089</td>
<td>7,354</td>
<td>31,634</td>
</tr>
<tr>
<td>Perches</td>
<td>15,913</td>
<td>27,586</td>
<td>16,308</td>
<td>59,807</td>
</tr>
<tr>
<td>Croakers</td>
<td>3,690</td>
<td>8,102</td>
<td>6,127</td>
<td>17,319</td>
</tr>
<tr>
<td>Ribbon fishes</td>
<td>1,867</td>
<td>1,008</td>
<td>12,239</td>
<td>15,114</td>
</tr>
<tr>
<td>Carangids</td>
<td>17,313</td>
<td>21,144</td>
<td>21,475</td>
<td>59,932</td>
</tr>
<tr>
<td>Mackerel</td>
<td>9,864</td>
<td>44,977</td>
<td>56,086</td>
<td>111,047</td>
</tr>
<tr>
<td>Seer fishes</td>
<td>1,521</td>
<td>259</td>
<td>3,555</td>
<td>5,235</td>
</tr>
<tr>
<td>Tuna</td>
<td>4,083</td>
<td>1,253</td>
<td>9,086</td>
<td>14,422</td>
</tr>
<tr>
<td>Penaeid Prawns</td>
<td>30,697</td>
<td>24,439</td>
<td>16,410</td>
<td>71,546</td>
</tr>
<tr>
<td>Cephalopods</td>
<td>12,576</td>
<td>6,942</td>
<td>18,471</td>
<td>37,999</td>
</tr>
<tr>
<td>Others</td>
<td>38,258</td>
<td>22,596</td>
<td>78,333</td>
<td>1,18,189</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,47,624</td>
<td>1,74,700</td>
<td>2,42,276</td>
<td>5,84,690</td>
</tr>
</tbody>
</table>

### Table 43. Kerala, season-wise - species-wise landings during 1993 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>1,218</td>
<td>427</td>
<td>1,669</td>
<td>3,314</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>25</td>
<td>197</td>
<td>414</td>
<td>636</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>13,205</td>
<td>5,590</td>
<td>28,455</td>
<td>47,250</td>
</tr>
<tr>
<td>Other sardines</td>
<td>3,375</td>
<td>333</td>
<td>19,116</td>
<td>22,824</td>
</tr>
<tr>
<td>White baits</td>
<td>23,647</td>
<td>12,729</td>
<td>13,082</td>
<td>49,458</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 44. Kerala, season-wise - species-wise landings during 1995 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>1,150</td>
<td>310</td>
<td>916</td>
<td>2,376</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>84</td>
<td>94</td>
<td>181</td>
<td>359</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>129</td>
<td>60</td>
<td>14,715</td>
<td>14,904</td>
</tr>
<tr>
<td>Other sardines</td>
<td>1,245</td>
<td>259</td>
<td>44,503</td>
<td>46,007</td>
</tr>
</tbody>
</table>

---

29
### Table 4. Kerala, season-wise: species-wise landings during 1996 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mun.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>1,486</td>
<td>391</td>
<td>2,521</td>
<td>4,398</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>94</td>
<td>96</td>
<td>118</td>
<td>308</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>1,782</td>
<td>4,661</td>
<td>19,943</td>
<td>26,386</td>
</tr>
<tr>
<td>Other sardines</td>
<td>1,782</td>
<td>1,588</td>
<td>3,608</td>
<td>6,978</td>
</tr>
<tr>
<td>White baits</td>
<td>6,900</td>
<td>6,971</td>
<td>16,446</td>
<td>30,317</td>
</tr>
<tr>
<td>Perches</td>
<td>12,893</td>
<td>27,884</td>
<td>31,507</td>
<td>72,284</td>
</tr>
<tr>
<td>Croakers</td>
<td>3,269</td>
<td>4,604</td>
<td>9,752</td>
<td>17,625</td>
</tr>
<tr>
<td>Ribbon fishes</td>
<td>703</td>
<td>4,078</td>
<td>17,548</td>
<td>22,329</td>
</tr>
<tr>
<td>Carangids</td>
<td>23,829</td>
<td>8,706</td>
<td>32,575</td>
<td>65,110</td>
</tr>
<tr>
<td>Mackerel</td>
<td>19,809</td>
<td>48,887</td>
<td>66,422</td>
<td>135,118</td>
</tr>
<tr>
<td>Seer fishes</td>
<td>2,133</td>
<td>348</td>
<td>2,552</td>
<td>5,033</td>
</tr>
<tr>
<td>Tuna</td>
<td>9,040</td>
<td>2,674</td>
<td>6,285</td>
<td>17,999</td>
</tr>
<tr>
<td>Penaeid prawns</td>
<td>14,910</td>
<td>19,118</td>
<td>15,669</td>
<td>49,697</td>
</tr>
<tr>
<td>Cephalopods</td>
<td>6,895</td>
<td>8,054</td>
<td>18,321</td>
<td>33,270</td>
</tr>
<tr>
<td>Others</td>
<td>32,971</td>
<td>22,335</td>
<td>54,971</td>
<td>110,277</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,38,496</td>
<td>1,60,395</td>
<td>2,98,238</td>
<td>5,97,129</td>
</tr>
</tbody>
</table>

### Table 4q. Kerala, season-wise: species-wise landings during 1997 (tonnes)

<table>
<thead>
<tr>
<th>Name of fish</th>
<th>Premon.</th>
<th>Mun.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark</td>
<td>1,504</td>
<td>652</td>
<td>1,672</td>
<td>3,828</td>
</tr>
<tr>
<td>Cat fishes</td>
<td>13</td>
<td>16</td>
<td>180</td>
<td>209</td>
</tr>
<tr>
<td>Oil sardine</td>
<td>45,209</td>
<td>8,698</td>
<td>38,854</td>
<td>92,761</td>
</tr>
<tr>
<td>Other sardines</td>
<td>2,329</td>
<td>205</td>
<td>13,855</td>
<td>16,389</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,93,890</td>
<td>3,00,555</td>
<td>82,787</td>
<td>8,76,222</td>
</tr>
</tbody>
</table>

### Table 5a. Kerala, season-wise, trawl landings during 1982-1997 (tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mun.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>13,311</td>
<td>21,939</td>
<td>29,243</td>
<td>64,939</td>
</tr>
<tr>
<td>1983</td>
<td>20,491</td>
<td>19,476</td>
<td>1,99,909</td>
<td>59,876</td>
</tr>
<tr>
<td>1984</td>
<td>25,854</td>
<td>36,995</td>
<td>29,013</td>
<td>90,862</td>
</tr>
<tr>
<td>1985</td>
<td>33,091</td>
<td>36,995</td>
<td>28,398</td>
<td>98,420</td>
</tr>
<tr>
<td>1986</td>
<td>34,044</td>
<td>47,119</td>
<td>36,857</td>
<td>118,020</td>
</tr>
<tr>
<td>1987</td>
<td>59,475</td>
<td>36,847</td>
<td>47,696</td>
<td>144,186</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>31,044</td>
<td>33,219</td>
<td>31,686</td>
<td>95,949</td>
</tr>
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</table>

### Table 5b. Kerala, season-wise, m.e. drift/gillnet landings during 1982-1997 (tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mun.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>5,837</td>
<td>5,126</td>
<td>7,102</td>
<td>18,065</td>
</tr>
</tbody>
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30
### Table 5c. Kerala, season-wise, purse seine landings during 1982-1997 (tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>4,841</td>
<td>0</td>
<td>6,335</td>
<td>11,176</td>
</tr>
<tr>
<td>1983</td>
<td>3,546</td>
<td>1,783</td>
<td>9,415</td>
<td>14,744</td>
</tr>
<tr>
<td>1984</td>
<td>6,440</td>
<td>0</td>
<td>1,380</td>
<td>7,820</td>
</tr>
<tr>
<td>1985</td>
<td>3,802</td>
<td>0</td>
<td>6,428</td>
<td>10,230</td>
</tr>
<tr>
<td>1986</td>
<td>768</td>
<td>0</td>
<td>3,749</td>
<td>4,517</td>
</tr>
<tr>
<td>1987</td>
<td>208</td>
<td>0</td>
<td>696</td>
<td>904</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>3,268</strong></td>
<td><strong>297</strong></td>
<td><strong>4,667</strong></td>
<td><strong>8,232</strong></td>
</tr>
</tbody>
</table>

### Table 5d. Kerala, season-wise, mechanical hooks & line landings during 1982-1997 (tonnes)

<table>
<thead>
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<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>27</td>
<td>0</td>
<td>266</td>
<td>293</td>
</tr>
<tr>
<td>1983</td>
<td>24</td>
<td>0</td>
<td>235</td>
<td>259</td>
</tr>
<tr>
<td>1984</td>
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<td>0</td>
<td>65</td>
<td>251</td>
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<td>1985</td>
<td>11</td>
<td>0</td>
<td>99</td>
<td>110</td>
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<tr>
<td>1986</td>
<td>123</td>
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<td>336</td>
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</tr>
<tr>
<td>1987</td>
<td>287</td>
<td>92</td>
<td>599</td>
<td>978</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>110</strong></td>
<td><strong>16</strong></td>
<td><strong>266</strong></td>
<td><strong>392</strong></td>
</tr>
</tbody>
</table>

### Table 5e. Kerala, season-wise, OB boat seine landings during 1982-1997 (tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>13,712</td>
<td>13,132</td>
<td>28,690</td>
<td>65,534</td>
</tr>
<tr>
<td>1983</td>
<td>29,608</td>
<td>12,139</td>
<td>34,267</td>
<td>76,014</td>
</tr>
<tr>
<td>1984</td>
<td>17,500</td>
<td>26,234</td>
<td>60,266</td>
<td>103,000</td>
</tr>
<tr>
<td>1985</td>
<td>26,987</td>
<td>25,091</td>
<td>39,540</td>
<td>91,529</td>
</tr>
<tr>
<td>1986</td>
<td>9,910</td>
<td>39,540</td>
<td>63,629</td>
<td>132,079</td>
</tr>
<tr>
<td>1987</td>
<td>4,665</td>
<td>20,850</td>
<td>22,894</td>
<td>48,409</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>17,064</strong></td>
<td><strong>22,664</strong></td>
<td><strong>37,366</strong></td>
<td><strong>77,114</strong></td>
</tr>
</tbody>
</table>

### Table 5f. Kerala, season-wise, OB boat seine landings during 1982-1997 (tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>3,454</td>
<td>32,791</td>
<td>54,858</td>
<td>91,103</td>
</tr>
<tr>
<td>1983</td>
<td>7,218</td>
<td>16,799</td>
<td>24,051</td>
<td>48,068</td>
</tr>
<tr>
<td>1984</td>
<td>10,674</td>
<td>12,630</td>
<td>19,251</td>
<td>42,555</td>
</tr>
<tr>
<td>1985</td>
<td>3,545</td>
<td>16,099</td>
<td>4,956</td>
<td>24,600</td>
</tr>
<tr>
<td>1986</td>
<td>860</td>
<td>12,444</td>
<td>5,574</td>
<td>18,878</td>
</tr>
<tr>
<td>1987</td>
<td>1,703</td>
<td>10,899</td>
<td>473</td>
<td>13,075</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>1,574</strong></td>
<td><strong>29</strong></td>
<td><strong>3,956</strong></td>
<td><strong>5,559</strong></td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>74</td>
<td>133</td>
<td>404</td>
</tr>
<tr>
<td></td>
<td>8.669</td>
<td>9.208</td>
<td>9.177</td>
<td>7.655</td>
</tr>
<tr>
<td></td>
<td>5.044</td>
<td>4.669</td>
<td>314</td>
<td>11.223</td>
</tr>
<tr>
<td>Average</td>
<td>2.810</td>
<td>13.637</td>
<td>13.041</td>
<td>29.488</td>
</tr>
</tbody>
</table>

**Table 5f. Kerala, season-wise, OB ring seine landings during 1986-1997 (tonnes).**

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>0</td>
<td>1.104</td>
<td>22.894</td>
<td>23.998</td>
</tr>
<tr>
<td>1987</td>
<td>4.056</td>
<td>18.379</td>
<td>7.955</td>
<td>30.390</td>
</tr>
<tr>
<td>Average</td>
<td>2.028</td>
<td>9.742</td>
<td>15.424</td>
<td>27.194</td>
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</tbody>
</table>

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**Table 5g. Kerala, season-wise OB drift/gillnet landings during 1982-1997 (tonnes).**

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>448</td>
<td>1.943</td>
<td>2.087</td>
<td>4.478</td>
</tr>
<tr>
<td>1983</td>
<td>815</td>
<td>905</td>
<td>15.417</td>
<td>17.137</td>
</tr>
<tr>
<td>1984</td>
<td>6.499</td>
<td>4.666</td>
<td>27.218</td>
<td>37.783</td>
</tr>
<tr>
<td>1985</td>
<td>5.699</td>
<td>2.988</td>
<td>12.958</td>
<td>21.645</td>
</tr>
<tr>
<td>1986</td>
<td>13.367</td>
<td>1.774</td>
<td>15.728</td>
<td>30.869</td>
</tr>
<tr>
<td>Average</td>
<td>5.238</td>
<td>2.924</td>
<td>14.109</td>
<td>22.282</td>
</tr>
</tbody>
</table>

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**Table 5h. Kerala, season-wise, OB others landings during 1982-1997 (tonnes).**

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>14.114</td>
<td>3.936</td>
<td>17.431</td>
<td>35.481</td>
</tr>
<tr>
<td>1984</td>
<td>9.010</td>
<td>2.514</td>
<td>16.114</td>
<td>27.638</td>
</tr>
<tr>
<td>1985</td>
<td>8.017</td>
<td>3.259</td>
<td>27.719</td>
<td>38.995</td>
</tr>
<tr>
<td>1986</td>
<td>10.548</td>
<td>8.742</td>
<td>14.159</td>
<td>33.449</td>
</tr>
<tr>
<td>1987</td>
<td>21.050</td>
<td>13.606</td>
<td>17.724</td>
<td>52.380</td>
</tr>
<tr>
<td>Average</td>
<td>23.674</td>
<td>10.100</td>
<td>13.266</td>
<td>47.340</td>
</tr>
</tbody>
</table>

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**Table 5i. Kerala, season-wise, non-mechanised landings during 1982-1997 (tonnes).**

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>52.607</td>
<td>25.946</td>
<td>98.716</td>
<td>1.77269</td>
</tr>
<tr>
<td>1983</td>
<td>40.476</td>
<td>30.879</td>
<td>1.04262</td>
<td>1.75617</td>
</tr>
<tr>
<td>1984</td>
<td>44.135</td>
<td>24.791</td>
<td>39.590</td>
<td>1.08516</td>
</tr>
<tr>
<td>1985</td>
<td>21.084</td>
<td>21.492</td>
<td>40.796</td>
<td>83.372</td>
</tr>
</tbody>
</table>

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**Table 5j. Kerala, season-wise, non-mechanised landings during 1982-1997 (tonnes).**

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>52.607</td>
<td>25.946</td>
<td>98.716</td>
<td>1.77269</td>
</tr>
<tr>
<td>1983</td>
<td>40.476</td>
<td>30.879</td>
<td>1.04262</td>
<td>1.75617</td>
</tr>
<tr>
<td>1984</td>
<td>44.135</td>
<td>24.791</td>
<td>39.590</td>
<td>1.08516</td>
</tr>
<tr>
<td>1985</td>
<td>21.084</td>
<td>21.492</td>
<td>40.796</td>
<td>83.372</td>
</tr>
</tbody>
</table>

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**Table 5k. Kerala, season-wise, non-mechanised landings during 1982-1997 (tonnes).**
<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>1.535</td>
<td>801</td>
<td>2,864</td>
<td>5,200</td>
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<tr>
<td>1982</td>
<td>1.178</td>
<td>485</td>
<td>2,700</td>
<td>4,372</td>
</tr>
<tr>
<td>1983</td>
<td>1.652</td>
<td>1,171</td>
<td>4,875</td>
<td>7,698</td>
</tr>
<tr>
<td>1984</td>
<td>3.187</td>
<td>678</td>
<td>2,079</td>
<td>5,944</td>
</tr>
<tr>
<td>1985</td>
<td>1.194</td>
<td>360</td>
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<td>5,085</td>
</tr>
<tr>
<td>1986</td>
<td>1.021</td>
<td>473</td>
<td>3,085</td>
<td>4,579</td>
</tr>
<tr>
<td>1987</td>
<td>1.487</td>
<td>553</td>
<td>1,171</td>
<td>3,211</td>
</tr>
<tr>
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<td><strong>1,608</strong></td>
<td><strong>646</strong></td>
<td><strong>2,899</strong></td>
<td><strong>5,153</strong></td>
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</table>

<table>
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<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>1.538</td>
<td>1,667</td>
<td>1,912</td>
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<tr>
<td>1989</td>
<td>732</td>
<td>337</td>
<td>670</td>
<td>1,739</td>
</tr>
<tr>
<td>1990</td>
<td>962</td>
<td>288</td>
<td>1,715</td>
<td>2,965</td>
</tr>
<tr>
<td>1991</td>
<td>603</td>
<td>683</td>
<td>641</td>
<td>1,927</td>
</tr>
<tr>
<td>1992</td>
<td>705</td>
<td>489</td>
<td>1,020</td>
<td>2,214</td>
</tr>
<tr>
<td>1993</td>
<td>1,218</td>
<td>427</td>
<td>1,669</td>
<td>3,314</td>
</tr>
<tr>
<td>1994</td>
<td>1,926</td>
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<td>1,527</td>
<td>3,826</td>
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<tr>
<td>1995</td>
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<td>916</td>
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<td>1996</td>
<td>1,486</td>
<td>391</td>
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<tr>
<td>1997</td>
<td>1,504</td>
<td>652</td>
<td>1,672</td>
<td>3,828</td>
</tr>
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<td><strong>1,182</strong></td>
<td><strong>562</strong></td>
<td><strong>1,426</strong></td>
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</tbody>
</table>

Table 6b. Kerala, season-wise, catfish landings during 1981-1997 (tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3,357</td>
<td>2,161</td>
<td>3,747</td>
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<tr>
<td>1982</td>
<td>3,644</td>
<td>2,911</td>
<td>5,064</td>
<td>9,619</td>
</tr>
<tr>
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<td>3,649</td>
<td>2,569</td>
<td>11,672</td>
<td>15,890</td>
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<td>2,632</td>
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<td>4,917</td>
<td>10,595</td>
</tr>
<tr>
<td>1985</td>
<td>882</td>
<td>1,233</td>
<td>3,087</td>
<td>5,202</td>
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<tr>
<td>1986</td>
<td>320</td>
<td>903</td>
<td>7,277</td>
<td>8,500</td>
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<tr>
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<td>162</td>
<td>2,070</td>
<td>2,359</td>
<td>4,591</td>
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<tr>
<td><strong>Average</strong></td>
<td><strong>1,521</strong></td>
<td><strong>2,127</strong></td>
<td><strong>5,446</strong></td>
<td><strong>9,095</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>1989</td>
<td>500</td>
<td>760</td>
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<td>1990</td>
<td>290</td>
<td>254</td>
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<td>2,861</td>
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<td>1991</td>
<td>296</td>
<td>849</td>
<td>558</td>
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<tr>
<td>1992</td>
<td>394</td>
<td>60</td>
<td>458</td>
<td>912</td>
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<tr>
<td>1993</td>
<td>25</td>
<td>197</td>
<td>414</td>
<td>636</td>
</tr>
<tr>
<td>1994</td>
<td>81</td>
<td>186</td>
<td>215</td>
<td>482</td>
</tr>
<tr>
<td>1995</td>
<td>84</td>
<td>94</td>
<td>181</td>
<td>359</td>
</tr>
<tr>
<td>1996</td>
<td>94</td>
<td>96</td>
<td>118</td>
<td>308</td>
</tr>
<tr>
<td>1997</td>
<td>13</td>
<td>16</td>
<td>180</td>
<td>209</td>
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<tr>
<td><strong>Average</strong></td>
<td><strong>214</strong></td>
<td><strong>612</strong></td>
<td><strong>1,316</strong></td>
<td><strong>2,144</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Premon.</th>
<th>Mon.</th>
<th>Postmon.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>1.395</td>
<td>4.574</td>
<td>2.991</td>
<td>8.960</td>
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<tr>
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<td>1.724</td>
<td>7.624</td>
<td>1.343</td>
<td>10.691</td>
</tr>
<tr>
<td>1983</td>
<td>2.065</td>
<td>5.509</td>
<td>2.917</td>
<td>10.491</td>
</tr>
<tr>
<td>1984</td>
<td>3.956</td>
<td>17.867</td>
<td>4.988</td>
<td>26.811</td>
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<td><strong>18.764</strong></td>
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### Table 1. Kelda season-wise canna-fish landing during
1981-1987 (mtr)

<table>
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### Table 2. Kelda season-wise monsoon landing during
1981-1987 (mtr)

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<tr>
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</tr>
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</table>
### Table 6k. Kerala, season-wise, prawn landings during 1981-1997 (tonnes)

<table>
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<td>7,631</td>
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<td>4,866</td>
<td>4,595</td>
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<td>7,229</td>
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<td>1986</td>
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<td>11,899</td>
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<td>20,363</td>
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<tr>
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<td>14,226</td>
<td>16,149</td>
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The author is deeply grateful to Mr. K.N. Kurup, Head, FRA Division, CMFRI, Cochin, for kindly scrutinising the manuscript and offering suggestions for improvement and to Ms. K. Ramani, Technical Assistant for the help rendered.

***************
Aquaculture Europe 99 - AquaNor
Trondheim, Norway, August 7-10

The huge technological and developmental achievements for the past 30 years gave way to new hurdles facing the industry today. In view of these challenges, the European Aquaculture Society (EAS) will organise its next conference, Aquaculture Europe 99 - AquaNor in Trondheim, Norway, from August 7 to 10. Planning for this major event of the year is now at an advanced stage. The theme ‘Towards predictable quality’ has been largely welcomed and large numbers of proposals for oral and poster presentations have been submitted.

The sessions have been designed to deal with all the important topics. On each day, there will be plenary talks followed by three parallel sessions. A three days’ session will focus on larviculture. A renowned trio will chair the session: Yngvar Olsen (Norway), Elin Kjorsvik (Norway) and Patrick Sorgeloos (Belgium). Different aspects of the major theme, larval culture, will be covered on each of the three days, egg quality, rearing technology and larval-bacterial interactions.

A two days’ session chaired by Brit Hjeltnes (Norway) and Alain Le Breton (Malta) will focus on fish health. Jo-Ann Leong (USA) will introduce the first day focusing on the viral diseases and the co-chairman will introduce the second day dealing more particularly with bacterial and parasitic diseases.

Single days sessions will cover the remaining topics, including a session on marketing of aquaculture products chaired by Patty Clay (UK), a session on the quality of adults and the finished products chaired by Magny Thomassen (Norway) and Giuseppe Palleschi (Italy), a session on the environmental aspects of aquaculture chaired by Ian Davies (UK) and Arne Evrik (Norway), and session on genetics of farmed aquatic species chaired by Trygne Gjedrem (Norway).

To fulfill the needs of all involved in aquaculture, whether as scientists, producers, manufactures, veterinarians, etc. the scientific conference Aquaculture Europe 99 will be held during the days preceding the most important aquaculture trade show in the world, AquaNor 99. The combination of these two milestone events has been made possible thanks to the close collaboration between the European Aquaculture Society and the Nor-Fishing Foundation.

More information on the conference can be obtained from:
European Aquaculture Society. Aquaculture Europe 99 - AquaNor
Slijkensesteenweg 4
B-8400 Oostende, Belgium
Tel: +32 59 323859
Fax: +32 59 321005
E-mail: eas@unicall.be
or EAS homepage: http://www.easonline.org.
केल ती.एम. मालिका भारतीय समुद्री मालिका की अनुसंधान संस्थान, कोलकाता - 622 014, भारत

केल की समुद्री मालिका के विकास में 1980 का दशक बहुत महत्वपूर्ण है। इस अवधि के पूर्वावधि में देशी यानों का मोटोसीकरण बहुत लंबा था जिसके जरिए मालय प्रदेश और गहरी जलक्षेत्र में विस्तृत किया जा सका। इस अवधि के उत्तरार्ध में एक नया संभार कल्याण संपादन बेलगावी अंतर्गत के विदेशी केंद्र के बहुत मशहूर बन गया। इसके प्रचार के लिए बड़े जल (450 से 900 मी), अधिक कामकाजी दल (30 से 40), बड़े यानों और अधिक वाहन इंजनों की आवश्यकता पड़ी। इस प्रकार 3 बहरी इंजन लगाये गये "केंद्रस्थलस्थ" का प्रयासन शुरू हुआ। इस प्रकार वंशीय लोगों को फाइदा लाने रोके जाने के लिए वाहनों के सच में उपयोग करने लगे। इस प्रकार वंशीय लोगों के साथ मोटोसीकरण सेक्टर भी जोड़ दिया गया और वाहन अधिक लोगों में सेक्टर रह गया। 1988 में मोटोसीकरण सेक्टर की तेज़ बढ़ती हो गई और इस अधिक पकड़ देनेवाला प्रमुख सेक्टर बन गया।

वर्ष 1988 में मान्‌सुन के दौरान आनाधित समय में अतिकरण आज़बा द्वारा केल के विकास में उत्कृष्टता का अवधि विकास के अनुसार पुनःसंचालन के सुझाव के लिए निर्देशन और संस्थान के सुझाव के साथ इस प्रकार से गहरा लगाया गया। यह इसलिए कि केल के विकास में वाहन वाली संस्थान के इंजन और अंदां से बाहर जाना का श्रेयस्त कर दिया गया। परिपराम मालिका की हितों की पुलकी भी इसमें निहित है।

मालिका की लोकतान्त्रिक अवस्था अनुसार मान्‌सुन के अवस्था में भी पकड़ के अवस्था करते में सहायता दी। इसके जलालस्थल मान्‌सुन के मालय विख्यात करारों में विस्तृत हुई और द्वारकानाथ मालिका की पकड़ भी विश्वभर में बड़ी गई। इसके अतिरिक्त तेस्वकोड़ों को भी उच्च निर्णय नौका प्राप्त हुई और अन्य सेक्टरों के आयाम बढ़ाकर, मालय क्षेत्र और मालम कल विस्तृत करके आनाधि का भी तीव्रता कर दिया गया। इन प्रकाशों के विकास के परिपारम में आर्थिक औसत पकड़ में विस्तृत हुई।

सी एम एक आर आई, कोलकाता विकास मालिका के संष्टान निर्धारित प्रभाव द्वारा केल की 1980-1996 की मालिका के पर आवश्यक का आधार ठा। केल की समुद्री मालिका में वंशीय लोगों का प्रतिस्पर्धा, आनाधि में आर्थिक लोगों और पकड़ में विस्तृत वर्ष 1988 की विस्तीर्ण है। इसलिए वर्ष 1988 को केल मालिका के परिपराम कल माना जा सकता है।

केल में समुद्री मालिका की बढ़ती की विशेषताएं

केल की 1980-96 तक की आर्थिक मालय पकड़ के बिभिन्न अवधि विविधता है। पहली अवधि 1980-87 तक की अवधि है जब आर्थिक औसत पकड़ 3,33,577 टन थी और दूसरी 1989-96 तक की अवधि जब पकड़ 5,85,224 टन थी। 4,70,000 टन पकड़ के अंतर वर्ष 1988 विशेषता वर्ष के साथ बढ़ता है। इस अवधि में विस्तृत 2,51,648 टन थी जो बढ़ती के 75.4% है।

मालिका के विभिन्न सेक्टरों का परिपराम और एक विशेषता है। वर्ष 1983 तक परिपराम सेक्टर प्रमुख था जो मोटोसीकरण सेक्टर के धूल विकास के साथ घट गया। 1985 में परिपराम सेक्टर की योगदान वेट 24% था जब कि
मोटोरीक्षुत सेक्टर का योगदान क्रमशः 43% और 33% था। 1989 में मोटोरीक्षुत और तंत्रीक्षुत सेक्टरों द्वारा योगदान 63% तक बढ़ गया तो परिवर्तन सेक्टर द्वारा योगदान केवल 5% था। लेकिन तंत्रीक्षुत सेक्टर का योगदान 32% रहा। 1994 में तंत्रीक्षुत सेक्टर मोटोरीक्षुत सेक्टर (39%) को पीछे हटाकर 57% योगदान दिया। 1996 में मोटोरीक्षुत, तंत्रीक्षुत और परिवर्तन सेक्टरों का योगदान क्रमशः 51.44 और 5% था।

तंत्रीक्षुत सेक्टर में प्रमुख आनाव जाल था जिसके जरिए इस सेक्टर में 97.4% पकांस अपार हुई थी। इसका प्रायः पकांस में कोई संपान्त आया था। केह में का प्रकाश कोशीन में ही सीमित है जबकि विश्वसनीयम जिला को छेड़कर एक्रेल के सभी तरीकों में आनाव जालों का प्रवाहण ओर्थाता है। कुल पकांस के 71.1% के साथ मोटोरीक्षुत सेक्टर में बलय संपास प्रमुख संभार है।

केन्द्र के 1985-87 से 1993-96 तक की अवधि की समुद्री मालिकों की बढ़ती पर भी अध्ययन किया। इस दौरान के पकांस में अंशतः वार्षिक बढ़ती 2,20,024 टन थी। इसमें 74.9% बलय संपास के जरिए, 64.5% आनावों के जरिए, 5.9% मोटोरीक्षुत जिलाल के जरिए और 0.2% कोषलपांस के जरिए अपार हुई थी। मोटोरीक्षुत पोत संपास, तंत्रीक्षुत जिलाल और अन्य संभार क्रमशः 31.2, 3.5 और 10.8% की घटना अनुशसित की। बलय संपास और आनावों को छेड़कर बार्क किलोस की प्रति प्रबांस पकांस कम थी।

आनाव मालिकों - 1986 - 96
आनाव मालिकों में 1986 से 1994 तक की अवधि में निर्मित बुद्धि निकायों पड़ी। 1988 में प्रबांस अभिक और प्रति प्रबांस पकांस निम्न देखी गयी। प्रबांस का दूसरा स्फूर्त काल 1994 था जब भी प्रति प्रबांस पकांस कुप था। इस प्रकार 1986 से 1996 तक की अवधि में प्रबांस की बढ़ती के साथ - साथ प्रति प्रबांस पकांस आपेक्षिक घटती स्पष्ट है।

बलय संपासों के प्रबांस और पकांस में 1988 के बाद उच्च बुद्धि सुरम्य है। लेकिन पकांस तार बनाये रखने में यह मालिकों का असल रहा। वर्ष 1994 तक इस में निराकम पकांस हुई, जिसके बाद कुछ प्राप्ति शीघ्र पड़ी। लेकिन 1989 तक यह मालिकों की संख्या हुआ।

केन्द्र की समुद्री मालिकों के वार्षिक पकांस झुकाया उपयुक्त दो संभालों के आधार पर किया गया है। क्योंकि वर्ष 1988 के बाद के औसत पकांस बलयसंपासों और आनावों से प्रभावित है।

प्रबांस और पकांस की वृद्धि में आनाव मालिकों का बलयसंपास के आधार है। 1985 - 88 तक को अवधि की प्रबांस संभालों, पकांस, प्रबांस और प्रति प्रबांस पकांस की आपेक्षिक बढ़ती देखने पर प्रबांस और पकांस में अधिकतम बढ़ती वलय संपास मालिकों में देखी जाती है। लेकिन इसमें पकांस प्रति केन्द्र अधिकार आनाव मालिकों के कम है, जिसमें प्रबांस की बुद्धि निभाता है। केन्द्र संभाल, मोटोरीक्षुत मिल जाल, तंत्रीक्षुत मिल जाल और मोटोरीक्षुत पोतसंपास पीछे हटाई गयी।

अधिकार भारतीय समुद्री मालिकों का पकांस के साथ तुलना
वर्ष 1989 से 1993 तक की अवधि में केन्द्र की वार्षिक औसत समुद्री मछली पकांस 6,02,012 टन थी जो भारत की कुल समुद्री मछली पकांस के 25.4% थी। पकांस में 41.6% केन्द्र का योगदान था और दूसरा धार 26.4% के साथ गुणसता ने प्राप्त किया। यह रेफ्रे के प्रति किलोमीटर और विश्वव्यापी शेल्फ के प्रति केन्द्र पकांस में केन्द्र का धारण प्रमाण है।

इस प्रकार भारतीय तरीकों में अधिक नींवण से वित्तों के केन्द्र का तीर्थ क्षेत्र है। वित्तों में ऐसी तीन प्रकृतिक संभालों के नाम के साथ बोलते थे। भारत की समुद्री मालिकों के विकास के केन्द्र का गणनीय स्थान मानकर, संभालों के परिसंचार और प्रबांस के लिए आवश्यक कदम उठाना है राज्य की नियंत्रण है।
मालिकाओं का परिवर्तन

वर्ष 1985 - 88 और 1993 - 96 के दौरान की वार्षिक औसत पकड़ के मूल्यांकन करने पर पहली अवधि से 50.8% वृद्धि दृस्ती अवधि में देखी जाती है। कुल वृद्धि के 51.7% बेलापत्री मालिकाओं का योगदान था। इसके बाद आती है तलामी मालिकाओं (17.8%), मलक (13.5%), कवचपार (9.4%) और अन्य 7.5%। इन विभिन्न पकड़ की मालिकाओं की पकड़ में अधिकतम वृद्धि और घटती का अनुभव बेलापत्री मालिकाओं को हुआ था। मलक मालिकाओं की पकड़ में कोई घटती नहीं हुई। कवचपार में नौं- पेनिआइड श्रोंगों की पकड़ में छोटी सी घटती दीख पड़ी। अधिकतम आपेक्षिक घटती मलक मालिकाओं ने रिकार्ड की। सेफालोपोडों की पकड़ में और इसकी निर्यात भाग में हुई वृद्धि इसका कारण है। निर्यात भाग होने पर भी न्यूतम आपेक्षिक घटती कवचपाराओं की थी। यह अध्ययन यह भी व्यक्त करता है कि 1985-88 से 1993-96 की अवधि में अधिकतम योगदान भारतीय बौगड़ों का था। केंद्र की बौगड़ों पकड़ का 73% बलवानपाश मालिकाओं का योगदान था।

केंद्र की बेलापत्री मालिकाओं के मुख्य आधार तारामणि मालिकाओं, वर्ष 1990 के बाद गिर गयी। 1989 - 90 में बलवानसाथ का विनय बौगड़े के साथ इस संपदा का भारी पकड़ थी। 1989 में यह संपदा 1.9 लाख टन की रिकार्ड पकड़ अभिलिखित की थी। 1994 में यह बटकर 1554 टन हो गयी। 1990 के बाद इस संपदा की घटती बलवानसाथ की आगे की बढ़ती में भी रोक लगा गई।

बेलापत्री मालिकाओं की बढ़ती के ओर एक प्रमुख संपत्ति है स्काफेल। 1986 में यह अपना शक्त था। 1987 की कम पकड़ के बाद घटकर 1992 तक बढ़ती विश्वासी और इसके बाद उत्तर-चब्बब विद्यार्थी लगा।

तलामी मालिकाओं में पकड़ की विविधता बेलापत्री मालिकाओं की जैसी उत्तमता दर्शाती नहीं। अधिकतम वृद्धि श्रेणियों की पकड़ के जोरिए हुई।

सेफालोपोड मालिकाओं 1993 - 96 से 1985 - 88 तक की अवधि में सीम्य आपेक्षिक घटती (215.8%) दिखाई थी। व्यवसाय संपत्ति जो 1986 में बढ़ता था, 1987 में पड़ती और इसके बाद नियमित बढ़ती दिखाई।

कवचपार मालिकाओं 1985 - 88 से 1993 - 96 तक की अवधि में 30.5% की आपेक्षिक वृद्धि दिखाई इस अवधि में पेनिआइड श्रोंगों भी 18% तक बढ़ गयी थी। कंटेन पकड़ भी अधिकतम आपेक्षिक घटती दिखाई। श्रोंग मालिकाओं के व्यवहार भी बढ़ती की ओर था।

बढ़ती का कारण

आनाप और व्यवसाय का आगमन पकड़ की बढ़ती के लिए सहायक निकला। मानवकृत के दौरान लगाये गये रोक भी एक हद तक उपहार बदने का कारण माना जा सकता है। पेनिआइड श्रोंगों की पकड़ में प्रगति और बाद में उत्तर-चब्बब और सेफालोपोडों की पकड़ में बढ़ती देखी गई।

यद्यपि एक मालिकाओं का अनियमित विकास निर्देशन विधेयक के रास्ता खोलेगा तब तक इसके आगे का विकास भी मना हो जाएगा। ऐसी स्थिति में मानसून के दौरान आनायजन पर लगाये गये रोक अपराधी ही मानता पड़ता।

विशेषता यह सुनाना देती है कि व्यवसाय और अनाइजन की ओर बढ़ती का परिणाम प्रति प्रायः पकड़ की घटती होगा।

संभारस्वयं विविधता

प्रमुख संभारों में विविध मालिकाओं का पकड़ परिवर्तन नीचे दिया जाता है। आनाप पकड़ों में 1985-87 की तुलना
में 1993-95 में 1,58,455 टन की बुद्धि हुई थी। इसमें प्रयास की बुद्धि केवल 35.3% थी। इस बुद्धि के लिए अधिकांश योगदान संख्यात्मक, स्थापत्य, अनुबंध और पेंशनाइज श्रीमा का था। लागू होने वाले में वर्तमान तक पर भी रही थीं। पेंशनाइज श्रीमा, मुलन, नान-पेंशनाइज श्रीमा, सूपरब्यूम, मलेसिया, लिंगिया व खाद्र की प्रति एक पकड प्रयास में कुछ घटनी दिखाई पड़ी। लेकिन अन्य जाति की प्रति एक पकड प्रयास कबीर दिखाई।

बलब संपादन मातिल्की 1,30,650 टन की बुद्धि दिखाई। इस बुद्धि का योगदान भारतीय बौंडे, स्क्राइन, क्षेत्रवेदन और लेसर सार्वजनिक था। अन्य कर्मचारी, लिंगिया और राजस्व की पकड कम थी। राजस्व और अन्य कर्मचारी की प्रति एक पकड प्रयास भी घटित होती। याफिं कुल पकड प्रति एक पकड प्रयास 35.6% की बुद्धि दिखाई।

विधानीय बौंडे मोडोरीवह कार्यसंघ मातिल्की की थी। भारतीय बौंडे, मलेसिया, नान-पेंशनाइज श्रीमा और हिलिया शाड को छोड़कर बाकी तमी मातिल्की की पकड कम थी। इसके अनुसार प्रति प्रयास पकड भी कम थी। भारतीय बौंडे की पकड में और कुछ हद तक मलेसिया की पकड में गणनीय बुद्धि देखी गयी थी।

मातिल्की प्रबन्धन का जैविक आधार

केंद्र की मातिल्की की ऐसी विशेषता है कि बुद्धिमत्त मातिल्की की अपेक्षा एक जाति की संख्या में उत्तर-पश्चिम अधिक होता है। मलेसिया की कुल पकड मत्त में कूल बुद्धि दिखाई होती है। इस कुल उपार्थकता में विविधता हमारे नियमक के परे है और इसलिए कम जताया जा सकता है। साधारणतया एक जाति की घटना से डूरी जाति की बुद्धि हो जाती है। लेकिन मूलभूत जाति मात्र के दिग्दर्द से इसकी घटना और बेकार जाति की बुद्धि हो जाती है।

हम विशेषता की जानेवाली अधिकांश मातिल्की जाति छोटे जीवनकाल की होती है। ये तेज़ बढ़तर एक वर्ष की आयु में पूर्णतयाब करते हैं और इनका योगदान केवल वो सालों तक रहता है। इसके अंतर्गत अनुपातिक अधिकांश प्रक्रिया मानपुन के त्रींक पहले वा मानपुन के दौरान होती है। अंडिजन की प्रक्रिया लागू हो जाती है प्रारंभ करते जुनाई तक जाती रहती है। आमंत्रित और दीर्घ के "वेट-हैंडविं" नामक एक तथा है। कुछ मातिल्कीं दीर्घकालिक अंडिजन विधि के दौरान विस्तृत क्षेत्र में अंड दलों को छोड़ते हैं। जहां बार्षिक उद्यय अनुभव है वहाँ यह रीति उपयोग है। भारत के जलों में यह स्थिति होती थी। भारतीय बौंडें की अंडिजन संबंधी प्रक्रिया प्रारंभ में प्रारंभ होकर मई-जुलाई में प्रथम सीमा प्राप्त करती है। नवम्बर में भी अंडिजन होता है। फिर भी शुरुआत मई-जुलाई माना जाता है। इसका कारण प्राचीन उत्तरीय जल क्षेत्रों के "उद्योग" है। उद्योग की प्रक्रिया नाथ में प्रारंभ होती है। अगस्त / सितंबर में उपर सीमा प्राप्त करती है और अक्टूबर / नवम्बर में कम हो जाती है। उत्तराभीत जल पोषण संधार है और तरीक जल क्षेत्रों के पकड़ को पुनर्जीवित करता है। मानपुन के दौरान निवृत्ति द्वारा लाये जानेवाले पोषक भी यह पूर्व प्रक्रिया को तेज़ बढ़ाता है। यह पकड़ पूर्व मातिल्कीं के पकड़ीय डिम्पियों की अभ्यंतितावर और आगे की बुद्धि के लिए अत्यन्त उपयोग है। अत: उद्योग के दौरान के अंडिजन संपन्न हो जाता है। मई-जुलाई के दौरान के डिम्पियों का बढ़ना अवसान आज विश्वसित है। क्योंकि बाहरी इंजन लगाए गएं और चलनित्यंत्रण के आगमन के पहले मानपुन के दौरान मत्त वास्तव में बहुत कम था। लेकिन आग सुखका बाहरी इंजनों और मातिल्कीं पोषकाथं का विवाह मानपुन के मत्त वास्तव को आसान कर दिया है। इसके फलस्वरूप अंडिजनों और किशोरों का अनिवार्य
विद्यालय हो जाता है। जुलाई से रिततंत्र तक की अवधि में 155 मी पी लंबाई और 35 मी से कम आयाम के भारतीय वाणिज्य का विद्यालय प्राप्त भाव में हो जाता है। इसी प्रकार जुलाई से अक्टूबर तक की अवधि में 120 मी पी लंबाई और 15 मी से कम भार के किशोर तालिकाओं को पकड़े जाते हैं। चर्च 1993 से 1996 तक की अवधि के जुलाई-सितंबर काल में लगभग 50.3% कम आयाम के वाणिज्य का और इसी अवधि में (जुलाई-अक्टूबर) 50% किशोर तालिकाओं का विद्यालय हुआ था। इसके फलस्वरूप मल्टी प्रचार की तेज़ पद्धति हो जाती है। मानव प्रयोग के दौरान कल्याण प्रजनन का अन्तिम स्तर का कारण है।

यदि मानव जीवन की घटना का कारण बन जाता है तो यह कहा जा सकता है कि मानव शीर्ष विद्यालय अंदर, वह प्रचार पर होता है। केलर के दशक जिला में इसकी प्रवृक्षता अधिक है।

कर्मनाय परिदृश्य

केलर में 1993-96 के दौरान औसत 5.5 टन मची अवतरण हुआ था जिसमें 48.4% श्रीमती, आन्यों का, 30.8% बड़े पोट्स (कोष संचाल और कल्याण संचाल) का, 4.1% पोट संचालों का, 9.2% ग्रिल जालों का, 3.8% कॉल्टेड डॉर्स का और बुध 1.9% अन्य संचालों का योगदान था। कोल्लम, एरण्कुलम, और कोत्तिकोट जिला में आन्य विळिक这ी में प्रचार थी। आन्य के जिले में अधिकतम पकड़ मोटरीक्स की झाड़ू के जरिए प्रचार हुआ था। कोल्लम में छोटे आन्य द्वारा अधिकतम अवतरण हुआ था। अन्य विषय में मची का प्रचार केलर विश्वविद्यालय जिला में सीमित है जहाँ आन्य के अधिक प्रचार का विद्यालय प्रचार नहीं होता है। जहाँ भी मोटरीक्स के प्रचार बढ़ने के बाद अव्यवहार मची की घटी की ओर है। वलय संचाल और अन्यों की महत्व अंतर्गत पकड़ के अनुसार अधिकतम पकड़ अगस्त में प्रचार हुई है। जून महीने की निम्नतम पकड़ का कारण अन्य के प्रचार रोप है। तदनुसार जुलाई में वालनसंचाल पकड़ में बृद्धि हुई है। मानवपुर की अधिकतम पकड़ के बाद वलय संचाल पकड़ में भारी घटी देखी गयी। उद्यान के साथ, नापोलियास का स्तर संकीर्णन में बन जाता है जिसमें छोटी वेलापक्षी मची को पकड़ा ही है और वेलापक्षी संचालों से आसानी से पकड़ी जाती है। यद्यपि तमी जगत की प्रागैतिहासिक काली विश्व तालिकाओं में पकड़ की प्रक्रिया हो जाती है। वहाँ में आन्य विळिक्ष के में मानव प्रयोग के बाद इस प्रकार तेज़ पद्धति नहीं दिखाई पड़ती है।

चर्चा

केलर की समुद्री मची की प्रभाव: आन्य के जरिए बढ़ती है। एरण्कुलम, कोल्लम और कोत्तिकोट में शीर्ष शीर्ष की युवा रहने के कारण आन्य अवतरण इन स्थानों में तीव्र है। केलर की समुद्री मची पकड़ में 48.4% आन्यों का योगदान है और यह प्रचार अधिक की मची की प्रभाव होती है। 1988 के बाद मची पकड़ में हुई बृद्धि प्राप्त होती है। इस संभाल की पकड़ में हुई बृद्धि के कारण है। 1988 तथा 1989 के बाद मानव प्रयोग के विश्व विषय में लगाये गए गोद मची के अंदर और अनुसार विभिन्न मची की जीव संख्या बढ़ने में सहयोग निकला।

वालनसंचाल जिसका प्रचार 1980 के दशक में राजनीतिक होकर 1988 में तीव्र बन गया था, पकड़ की बृद्धि में काफी योगदान किया। लेकिन इसकी प्रक्रिया एक बड़े तक पोट संचाल और ग्रिल जालों जैसे उपरीत संचालों पर आश्रित थी। इस मची की विकास अन्य अधिकतम की जाने पर
विभेदण अधिकांश मानसून के दौरान 5 महीने से कम आयु की बेलापत्तियों मालापत्तियों पर रहा और इसका पैरिमाण रहा इस कारण की शीघ्र घटनी।

विभेदण की घटना की वृद्धि और विस्तृत क्षेत्रों का प्रचालन 1980 वर्षों के केरल मात्रिकौं का मुख्य परिवर्तन है। बड़े बड़े आनाय गहरे जलों में दिनों तक चलकर थे। युगल सारी बाँध लगाए गए बलमसंग्रह एक भी गहरी क्षेत्रों में विभेदण करते थे। ऐसी स्थिति में कुछ सुरक्षा प्रबंधन के विभा मत्स्य का स्थिति निर्माण अन्तर्गत हो सकता था। मानसून काल के दौरान आनाय पर लगाए गए रेद इस हृदे से तलाशनी मालापत्तियों के लिए कुछ उपचार कदम भार जा सकता है। फिर भी बेलापत्ति मालापत्ति आया भी पुराना नहीं है।

हमारे यहाँ प्रचालित विभेदण शीतल ऐसा है कि प्रभावों की सुरक्षा करने में कई माध्यमों की सहायता करनी पड़ती है। यह विवेकपूर्वक विभेदण की आशा नहीं है जो सकती है। मत्स्य प्रभाव के जैविक ताराएं और अतिमार्जीन बेदें विभा प्रभाव के अनुसार संभाल को प्रभाव किया जाता है। “प्रूकपूर्व कीर्तिमान और फिर दो और दो” ने 1982 में अन्य अधिक संख्या में मालापत्तियों के उपाय प्रबंधण के दृष्टि सुनाया की नियोजित संक्षेप संलग्न तरंगें राख्यों को बाँट दिया। लेकिन इसका धीम अनुपालन अधिक तक नहीं किया गया है। भारत में, केरल रत्नाकर ने इस संबंधी कुछ आदेश जारी किया है परन्तु में कई, लागू किये दिवाल कार्यों में ही रहते हैं।

केरल की समुद्री मात्रिकौं अधिक तक अनियमित प्रवाहना से निकाल पा रही थी। ऐसा, उपयुक्त कारण इसके लिए जो किया जनता होता है। उहाँ जिसे कारण मालापत्तियों को अधिकतम आवाज देने के लिए और पुनरुद्धार तथा उत्पाद भी जारी किया जा सकेगा। यही नहीं इसके जरिए व्यवस्थापन पूर्ण उपयोग करके हमारे जल की उपचारकाल का भी अधिकतम उपयोग किया सकेगा। मत्स्य में तलाश आनाय की शीतल नितांत विशेषता के लिए लक्ष्य है। यथाप्रकार आनाय मात्रिकौं का अधिक पहल की उद्योग नहीं की जा सकती है। इसलिए 35 मी से अधिक गहराई के क्षेत्रों में इसका प्रचलन सीमित करना उचित होगा।

मात्रिकौं के सफल प्रबंधन के लिए निर्णय लेते समय महादुर्घाटन सहभागिता प्राप्त होगा। महादुर्घाटन का हमारे बिभेदित मात्रिकौं संपत्तियों की सुरक्षा निर्माण करने के लिए पुनरुद्धार सहकारी संबंध का पता भी किया जा सकता है। वैवाहिक के हर उन्नत मात्रिकौं संपत्त का अविनाशित तथा जैविक और वाशिक आधार समायोजन जा सकता है।
प्रकार के संकर प्रवचन के नियमित व प्रभावी कार्यान्वयन के लिये भी सहयोग होगा।

मात्रिकृत प्रवचन नीति कभी भी अंतिम नहीं हो सकती। यह अन्तिम गतिशील है कि इसमें परिवर्तन कभी भी आ सकता है। इसलिए प्रवचन प्रणालियों का पुनरीक्षण और सुधार समय समय पर करना अतिमार्ग्य है।

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904 मानसुन आनाय के रोक के प्रसंग में केरल की समृद्ध मात्रिकृत

श. एल. अभियंता

केंद्रीय समृद्ध मात्रिकृत अनुसंधान संस्थान, कोचीन

मात्रिकृत प्रवचन में नई तकनीकियाँ अपनाने के रोक सदा आगे रहने का उद्देश्य है। 1960 के अंतिम तथा 1970 के प्रारंभिक दशकों में दक्षिणी अनाय का गणनीय पैमाना था। कोष संस्थाओं का प्रस्तावित रूप में जब चाहिए तो उपयुक्त उपाय वहाँ हुआ था। कोष संस्थाओं का प्रस्तावित रूप में जब चाहिए तो उपयुक्त उपाय वहाँ हुआ था।

पर अन्तिम करण, प्रस्तावित रूप में जब चाहिए तो उपयुक्त उपाय वहाँ हुआ था। इन तकनीकियों को प्रस्तावित रूप में जब चाहिए तो उपयुक्त उपाय वहाँ हुआ था। पर विभिन्न मात्रिकृत सेक्टरों के बीच आधारित और सावधान समस्याओं को लेकर यथार्थ भी उद्धृत उपयुक्त उपाय वहाँ हुआ था। पर विभिन्न मात्रिकृत सेक्टरों के बीच आधारित और सावधान समस्याओं को लेकर यथार्थ भी उद्धृत उपयुक्त उपाय वहाँ हुआ था।

इन तकनीकियों को प्रस्तावित रूप में जब चाहिए तो उपयुक्त उपाय वहाँ हुआ था। पर विभिन्न मात्रिकृत सेक्टरों के बीच आधारित और सावधान समस्याओं को लेकर यथार्थ भी उद्धृत उपयुक्त उपाय वहाँ हुआ था। पर विभिन्न मात्रिकृत सेक्टरों के बीच आधारित और सावधान समस्याओं को लेकर यथार्थ भी उद्धृत उपयुक्त उपाय वहाँ हुआ था। पर विभिन्न मात्रिकृत सेक्टरों के बीच आधारित और सावधान समस्याओं को लेकर यथार्थ भी उद्धृत उपयुक्त उपाय वहाँ हुआ था।

पिछले दशक में केरल के समृद्ध मात्रिकृत उपाय में अपूर्व वृद्धि की और आक्रस्त कर यह मानसुन आनाय के रोक लगाने के समय रही। 1981-87 और 1988-97 के दो प्रारंभ अवधारण का कुल अवधारणा में 69% की वृद्धि दिखाई पड़ती है। इस में ध्यान देने की जरूरत है।

1. वृद्धि (69%) मानसुन पूर्व, मानसुन और मानसुनबांल अवधारणों में एक समान रही।
2. रोक लगाने के पूर्व और रोक लगाने के पूर्व और रोक लगाने के बाद की 3 मानसुन अवधारणों में अवधारण की आवश्यकता एक ही रही। (26% मानसुन पूर्व, 24% मानसुन और 50% मानसुनबांल)
The articles intended for publication in the MFIS should be based on actual research findings on long-term or short-term projects of the CMFRI and should be in a language comprehensible to the layman. Elaborate perspectives, material and methods, taxonomy, keys to species and genera, statistical methods and models, elaborate tables, references and such being only useful to specialists, are to be avoided. Field keys that may be of help to fishermen or industry are acceptable. Self-speaking photographs may be profusely included, but histograms should be carefully selected for easy understanding to the non-technical eye. The write-up should not be in the format of a scientific paper. Unlike in journals, suggestions and advice based on tested research results intended for fishing industry, fishery managers and planners can be given in definitive terms. Whereas only cost benefit ratios and indices worked out based on observed costs and values are acceptable in journal, the observed costs and values inspite of their transitionality, are more appropriate for MFIS. Any article intended for MFIS should not exceed 15 pages typed in double space on foolscap paper.