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**Expanding exploitation of Indian mackerel in Maharashtra**

During the last decade Maharashtra has emerged as a major exploiter of Indian mackerel. From a total of 884 tonnes in 1985 the mackerel catch in Maharashtra shot up to 38355 tonnes by 1996 with an annual average (1985-2000) of 20364 tonnes, indicating an increase of 43.4 fold, whereas, during the same period its increase in Kerala was only 7 fold.

After 1996 a slight decline was observed and the lowest catch was 32140 tonnes in 2000, when the state's contribution to the all India catch (24.16%) was second only to Kerala (25.45%). The overall contribution of Maharashtra to the total mackerel catch in India during 1985-2000 was 12.13% which increased to 17.38% during 1996-2000 (Fig. 1).

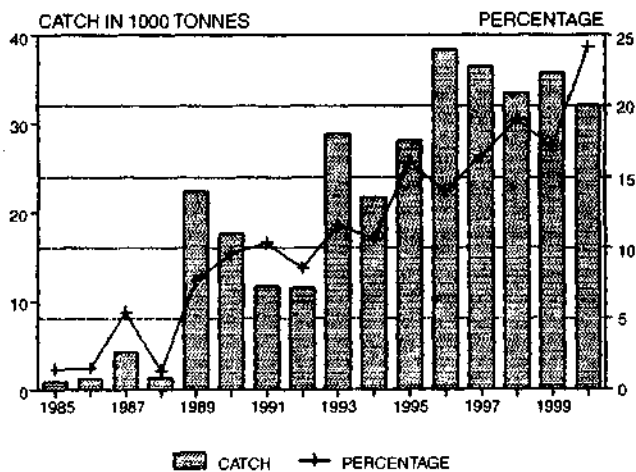


Fig. 1. Annual catch of mackerel from Maharashtra and the percentage contribution to the total catch of the species in India

**Purse seine fishery for mackerel:** It was the introduction of purse seines that slowly brought this state into prominence in mackerel fishery of the country. The contribution of this gear was 13.59% in the second half of 1980s which increased to 79.89% by the second half of 1990s (Fig.2). The effort increased from 1540 in 1986 to 21565 by 1996 with corresponding catch of

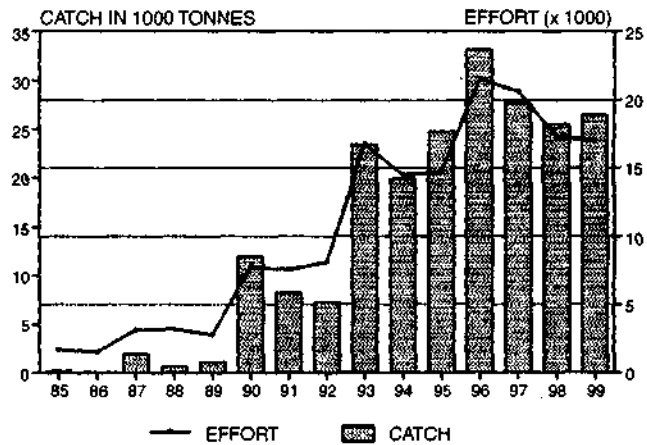


Fig. 2. Annual purse seine effort and catch of mackerel

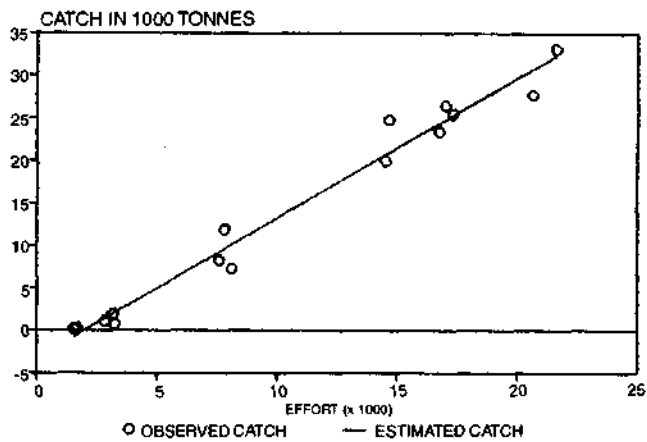


Fig. 3. Relation between purse seine effort and catch of mackerel

128 tonnes and 33141 tonnes. Fig.3 gives the relation between the purse seine effort and catch of mackerel indicating a direct relation with effort. The estimated regression of catch on effort gives.

$$\begin{aligned}
 a &= -3233.75 \\
 b &= 1.6482 \\
 r &= 0.99
 \end{aligned}$$

Fig.4 shows the relation between the effort and catch per unit effort (CPUE). The linear regression of CPUE on effort had the following parameter values:

a = 0.2928  
 b = 0.000069  
 r = 0.86

In both these estimates b had positive values. The regression of catch on effort indicated an average catch increase of 1.65 tonnes per effort. Surprisingly Fig.4 shows that the CPUE also showed a direct relation with effort though there is not much of an increase beyond an effort level of 16000 and CPUE level of 1.5 tonnes. The fishery also seems to adjust the effort to this level. After a peak figure of 21565 in 1996 the effort is slowly limping back to 16000 with a corresponding improvement in CPUE.

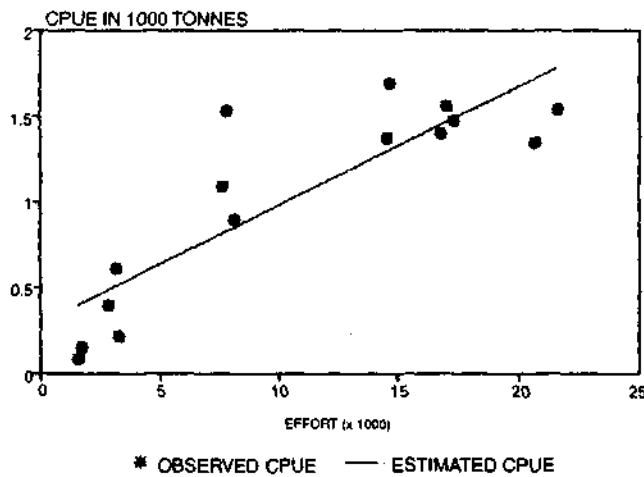


Fig.4. Relation between purse seine effort and catch per unit effort of mackerel

**General remarks:** The mackerel fishery in Maharashtra seems to be still in developing stage. An increase of annual purse seine effort from zero to 21565 with increasing catch and CPUE in the last two decades indicate a high potential. Data on the biology and population characteristics of the resource from this area are scanty. Even the surplus production models can not be fitted to the catch and effort data available because the

increasing effort has not yet caused a decline in CPUE. Hence, a study of maximum sustainable yield is not possible. The catch from this state can still be considered low in spite of its high rate of growth because the catch per km of its coast line is much lower to that of the southern states of west coast like Goa, Karnataka and Kerala (Table 1).

Table 1. The average annual catch of mackerel (in tonnes) per km. of coastline

State	1989-1995	1996-2000
Kerala	60.76	131.70
Karnataka	131.26	125.09
Goa	168.22	160.99
Maharashtra	8.38	48.91

When the contribution of Maharashtra increased from 4.90% in the second half of '80s to 17.35% in '90's, the contribution from Karnataka-Goa declined from 46.25 to 26.78%. The percentage contribution from Kerala increased from 29.15 to 38.36% during the same period.

It is probably not the increase in the availability of mackerel that has resulted in the shooting up of the catch along the Maharashtra coast. It can only be due to the recent spreading of surface fishery using purse seines. Fig.3 indicates scope for further increase in exploitation and Fig.4 indicates the increasing efficiency of purse seiners.

Perhaps, Maharashtra with its low exploitation rate might have served as a natural refuge of the mackerel resource, hence the increasing exploitation will have to be monitored closely as there is already a decline in the contribution by Karnataka and Goa to the mackerel fishery of India.

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