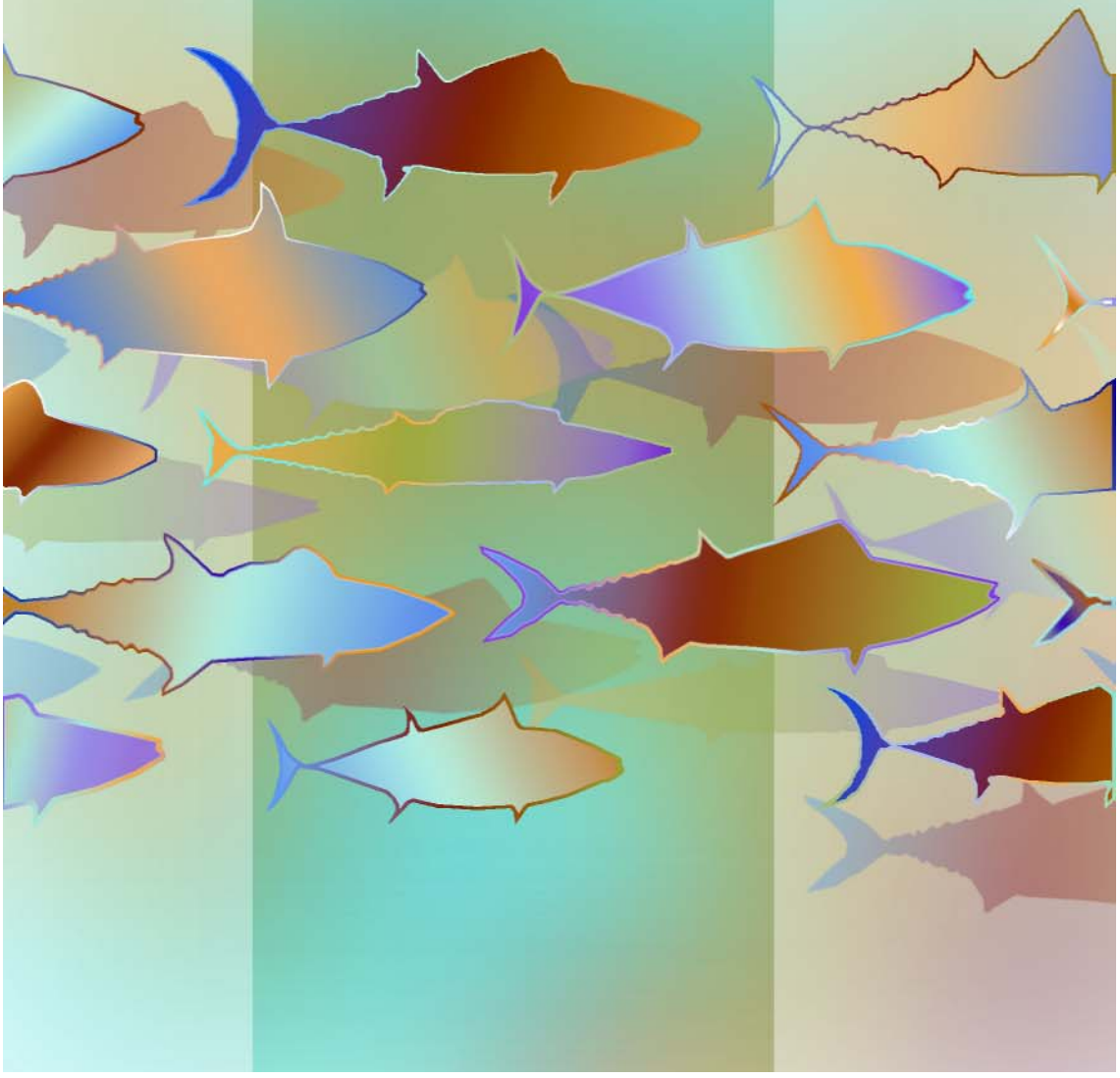
Status of Exploited Marine Fishery Resources of India



STATUS OF EXPLOITED MARINE FISHERY RESOURCES OF INDIA

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Indian Mackerel

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1. Introduction

The Indian mackerel, Rastrelliger kanagurta is one of the most important pelagic fish resources of India in the context of national food security. The vernacular name of the species is Bangada in Gujarati, Banguda in Kannada, Ayila in Malayalam, Kumla in Tamil and Kanagurta and Kangadathalu in Telugu. Its fishery is second in importance to that of oil sardine in the multispecies marine fishery of India exploiting hundreds of species commercially. The resource contributed on an average 8.6 % to the total marine fish production in the country during 1985-2000. During the last decade (1990-99) the average annual catch of this species amounted to 0.19 million tonnes. Though distributed all along the Indian coast, the resource supports a fishery of high magnitude along the west coast where it contributed 10.2 % of the total marine fish catch during 1985-2000 whereas the contribution from the east coast was only 4.9%. Being a planktivore, the fish enjoys a very important status in the marine food chain playing a major role in converting the abundant primary and secondary production in the coastal waters and form effective links to higher carnivores that support major fisheries in the ecosystem. Notwithstanding the

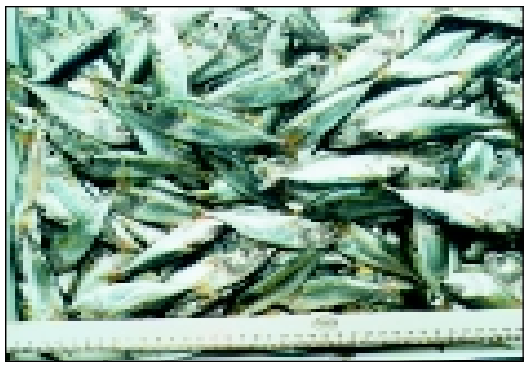

Fig. 1. Rastrelliger kanagurta

wide fluctuations in the annual catch of these species, the production shows an upward trend with increasing rate of exploitation consequent on modernization of fishing units.

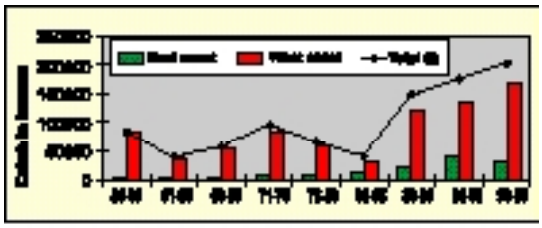

Fig. 2. Average catch of mackerel in India during five yearly periods from 1956-2000

In addition to R.kanagurta (Fig.1), two other species, R.faughni and R.brachysoma are also reported from our waters. R.faughni is reported from the east coast and R.brachysoma from Andaman and Nicobar Islands. But they are not yet reported from the west coast. Since their fishery is not significant, separate catch statistics are not available.

2. Production trends

Figure 2 shows the production trends of Indian mackerel in India and the contribution by west and east coasts during the years 1956 to 2000 compressed into annual average catch for 9 five-yearly periods depicting the cyclical fluctuations in its landings. It may be seen that the pattern observed upto 1981-85 changed subsequently. Catches suddenly scaled up to new peaks from an annual average catch of 42,063 tonnes in 1981-85 to 2,02,625 tonnes in1996-2000. Along the west coast where on an average 84.6% of the total landings were made, the fluctuations showed almost a similar pattern. But, along the east coast wide fluctuations are not observed.

Areawise production

Figure 3 gives the trend of catches from west coast. Kerala-Goa is the richest area from where maximum exploitation of the resource takes place. Barring a short period from1961-65 the Karnataka-Goa area was dominating in production till 1986-90. There was a quantum leap in the mackerel landings in Kerala from a low figure of 13,875 tonnes in 1981-85 to a record catch of 77,734 tonnes in 1996-2000 surpassing the production from Karnataka-Goa belt where the fishery was experiencing a slight decline. A similar increase in catches was recorded from Maharashtra-Gujarat area where the fishery was traditionally weak.

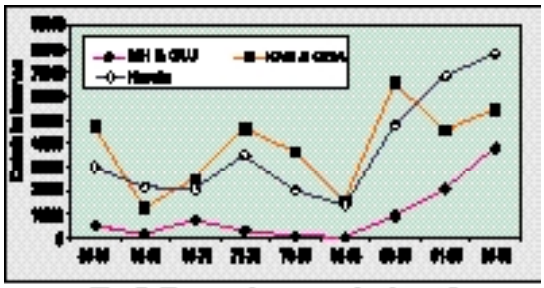

Fig. 3. Five-yearly average landings of mackerel during 1956-2000 from west coast

Along the east coast from where 15.4% of the catch is realized, Tamil Nadu-Pondicherry area dominated with peak catches (22,180 t) in 1991-95. Andhra Pradesh followed closely with peak catches (17,346 t) in the same year (Fig. 4). The catches from Orissa-West Bengal area were

insignificant. Table 1 gives the average percentage contribution by different areas to the mackerel fishery during 1956-2000 and catch per km. of coastline. The catch per km of coastline varied from 1 t to 96 t, the minimum being from West Bengal-Orissa and maximum from Karnataka-Goa area. It can be seen that the exploitation is heavy in Kerala-Goa area and they contribute about 73% of the production.

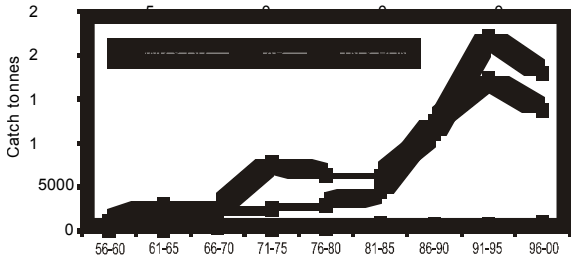

Fig. 4. Five yearly average landings of mackerel during 1956-2000 from east coast

Table 1. Percentage contribution to the mackerel fishery by different areas during 1956-2000

Area	Percentage contribution	Catch per km of coastline (tonnes)
Kerala	35.9	63
Karnataka-Goa	37.4	96
Maharashtra-Gujarat	9.4	4
Tamil Nadu-Pondicherry	10.6	11
Andhra Pradesh	6.2	7
West Bengal-Orissa	0.5	1

Figure 5 gives the area wise increase in the annual average catch from 1956-60 to 1996-2000. There was an increase in catch along east and west coast, the increase being more along the west coast. Along both the coasts the increase was more towards south. In Kerala, the growth was to the tune of 47,565 t. The most interesting observation was the growth in the catch from Maharashtra-Gujarat area (32,586 t.), which was second only to the growth in Kerala. Barring West Bengal and Orissa the lowest growth was observed in Karnataka and Goa area (7,169 t).

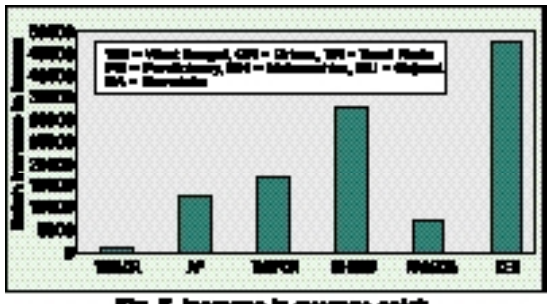

Fig. 5. Increase in average catch from 1956-60 to 1996-2000

Gearwise contribution

Along the upwelling zone from where bulk of the catch is made, the exploitation is largely by large seines. Ring seines dominate in Kerala and purse seines in Karnataka-Maharashtra area. These gears contributed 62.3% of the total mackerel catch in India. In other states, these gears are not operated and the dominant

gear is gill net. Trawl net is slowly emerging as an important gear in mackerel fishery in recent years.

Seasons

Along the Kerala-Maharashtra area, the fishery season starts by August and last till December. Along the east coast where gill nets are the major gear, the exploitation starts by December and last till May with peak catches in March-April.

Length frequency distribution

Figure 6 shows the average length frequency distribution along the east and west coast of India. Along the west coast, the catch is constituted by the size groups 110-150 mm with a mode at 145 mm. Along the east coast larger size groups of 175-215 mm form the mainstay with a mode at 195 mm.

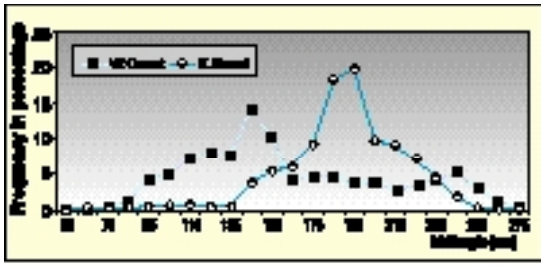

Fig. 6. Average length frequency distribution of mackerel from east and west coasts

3. Biology

The intensive spawning of mackerel starts by April/May. The spawning continues till around July. The products of spawning are recruited to the fishery by August when they are around 3 months old. They swarm in large shoals in the upper mixed layer to feed on the abundant plankton bloom caused by upwelling. By around December they start maturing. They become mature and start spawning by February. The spawning intensity increases and reaches a peak by May, the age at first spawning being around one year. They grow to a size of around 230 mm by the end of first year of their life. The Indian mackerel normally grows to a maximum size of 285 mm and weighs 270 g, though an unusually large specimen of 480mm was recorded from the Karnataka-Goa area.

4. Stock assessment

Bulk of the catch from west coast is constituted by juveniles of age below 1 year, of size between 11 and 16 cm when they are around 4 months old. They appear in the fishery during July/August at a size of 6 cm when they are less than 2 months old. Along the east coast, larger size groups of around 19 cm form the mainstay. Their effective life span in the commercial fishery is around 1.6 years after which they are caught only in stray numbers. Being a plankton feeder they form effective link in the food chain with larger carnivores and hence their natural mortality is high (2.64). Along the west coast they are heavily exploited when they are just 3 months old indicating high fishing mortality (2.5). Thus the total mortality is around 5.14. On an average, the annual total stock available along the Indian coast is estimated as 4 lakh tonnes of which 1.9 lakh tonnes are exploited. Exploitation beyond this level may not be economical under the present fishing efficiency. Moreover, the vulnerability of the stocks to the existing fishing fluctuates

from year to year due to variations in stock density, which is related to fishery independent, and fishery dependent factors. Under the present age at capture, the maximum sustainable yield from the resource is 2.2 lakh tonnes.

5. Management

There are no signs of any serious decline in the mackerel catches in spite of constantly increasing pressure of exploitation. Along the Karnataka – Goa belt the fishery seems to have reached the full potential. In Kerala where the exploitation was fast increasing during the last decade, the fishery seems to show the same pace in approaching its limit. In Maharashtra, the recent surge in the exploitation of mackerel may continue for some more time without much adverse effect. The situation along the east coast is still not clear. Here the exploitation is of a much lower scale. Perhaps due to the difference in the environmental conditions, the catchability is not comparable to that along the southwest coast and hence the catch may not be taken as good index of resource availability.

However, considering the importance of the species in the marine food chain, certain management measures are advisable. Being a plankton feeder, the species plays a vital role in exploiting the primary and secondary production of the coastal waters and sustaining the carnivores in the food chain. Bulk of the mackerel production is by the large seines operated along the west coast of India. The success of the fishery largely depends on the intensity and duration of upwelling that pushes the resource to the surface area and makes them vulnerable to exploitation by these surface gears. Early upwelling can push the early juveniles to the shallow mixed layer and make them susceptible to destructive exploitation as happened during many years. This results in over fishing of the resource. It also affects the fishery resources in general in two ways (1) under utilization of the primary productivity and (2) food scarcity to the carnivores. The important factor that limits the yield from the mackerel stock is the large-scale exploitation of the juveniles along the west coast. Fishes below the size of 15 cm form almost 42% of the catch from the west coast. Increasing the size at first capture from 140mm to 160 mm by controlling exploitation during the recruitment or increasing the mesh size of the large seines to a minimum of 35 mm can resolve both these problems. The peak recruitment to the mackerel population of the west coast takes place during July-September period. The non-selective large seines operated during this period heavily exploit the early juveniles. But, September is the month of most effective seine fishery. Hence, mesh size regulation will be more practical method for the control of growth over fishing than the total ban on this gear during the recruitment phase.

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