

FISHERIES OF THE WEST COAST OF INDIA

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AMONG the various marine food fishes which contribute largely to the commercial catches on our coasts, the Indian mackerel, *Rastrelliger canagurta*, holds the premier rank by virtue of the volume of its landings. The average annual mackerel catch for the eight-year period of 1950-57 is estimated at 62,415 metric tons, worth about a crore of rupees at the production centres. The mackerel fishery of India is even more important quantitatively than the fishery of the oil-sardine, *Sardinella longiceps*, the average landings of which are estimated at 47,583 metric tons over the same period. *Rastrelliger* spp. also contribute to fisheries of considerable magnitude in various other parts of the Indo-Pacific Area. Studies on mackerel fisheries have therefore received much attention from the scientific workers of the concerned countries and efforts are being made towards establishing collaborated research projects and to help formulation of development programmes for rational exploitation of these fisheries.

R. canagurta is very widely distributed in the Indian and the Pacific Oceans. It is known to occur along the African coast north of Durban, in the seas bordering on Arabia, Iraq, Iran, Pakistan, India, Ceylon, Burma, Thailand, Malaya, Indo-China, China, Japan, Philippines, Indonesia, New Guinea, and Northern Australia and around the Melanesian, Micronesian and Polynesian groups of islands.

There appear to be three species of mackerel in the Indo-Pacific Area, all belonging to the genus, *Rastrelliger*, viz., *R. canagurta*, *R. neglectus* and *R. brachysoma*. Fisheries comprising one or the other of these species are of importance on the west coast of India, southern coasts of Thailand, west coast of Malaya, southern coast of Indo-China, in Indonesia and around certain islands of the Philippines.

The mackerel are pelagic fish occurring in shoals which are visible from a distance as patches, dark with ripples during day, and phosphorescent during night. Each shoal is composed of individuals of almost the same size suggesting that mackerel of the same age-group move together.

The food of the Indian mackerel consists of microscopic zooplanktonic and phytoplanktonic organisms. The composition of the food of the mackerel varies from season to season according to fluctuations in the occurrence of various planktonic elements. There seems to be a certain amount of selectivity in feeding, and the intensity of feeding is observed to be high when mackerel are maturing but low when they are in an advanced state of sexual maturity. Feeding intensity is also said to be poor in juveniles entering the coastal waters at the commencement of the fishing season and in the adults during the spawning season. Along the west coast of Borneo, mackerel shoals are said to follow the highest densities of plankton. The shoreward movement of the mackerel shoals at the commencement of the fishing season on the west coast of India, is probably due to the crop of plankton being richer in the inshore waters than in the offshore waters, even though, it must be admitted that our present knowledge of the plankton of Indian offshore waters is rather meagre.

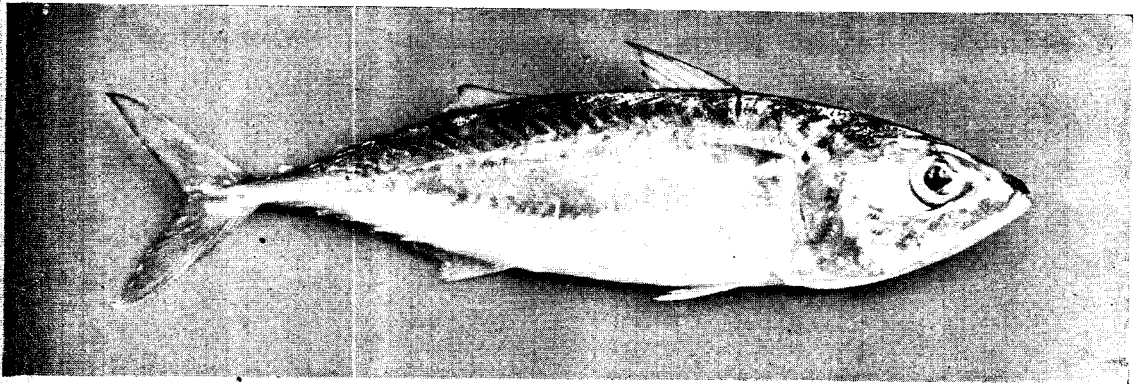
There are no external indications demarcating the sexes in mackerel, but in specimens about 12 cm. in length distinct differentiation of the gonads into spermeries and ovaries is noticed. The minimum size attained at first spawning is 22.4 cm. On the west coast of India the mackerel seems to spawn from April to September as revealed by the studies on the gonadic condition of the adults. The Indian species like the European mackerel, *Scomber scombrus* L. spawns in succession over a prolonged period with only a small percentage of mature ova liberated at each time. As the time intervals between the discharge of successive batches of ripe ova and the number of batches involved in a spawning season are not known, it becomes difficult to estimate the total number of mature eggs that would have been spawned during a season. No information is available on the eggs and early larvæ of the Indian mackerel. These stages are probably pelagic. The occurrence of the very early stages of mackerel and quite small-sized mackerel recorded off Trivandrum indicates that the spawning grounds of the Indian species are not far off from the southern coasts of India. In regard to the rate of growth, the available information is too inadequate to draw any definite conclusions, but it may very tentatively be stated that the mackerel attains a length of about 10 cm. in the first year and 18 cm. or more at the end of the second year, and that individuals in commercial

catches range mostly from 18 to 22 cm. in length, indicating that the catches are composed very largely of the second year class only. Specimens of *R. canagurta* measuring up to about 31 cm. in total length have been reported from the Indian waters. It is noteworthy that the fishery is largely composed of immature mackerel only, although mature specimens occur in small numbers towards the close of the fishing season.

The mackerel fishery of India is composed of a single species, *Rastreliger canagurta*. A second species appears to occur around the Andamans where it does not constitute a regular fishery. The main fishery is confined to the west coast of India from Ratnagiri, south of Bombay, to Quilon in Kerala. Malvan, Karwar, Malpe, Tellicherry, Calicut, Cochin and Alleppey are the most important mackerel fishing centres. Shoals appear sporadically on the east coast of India near Mandapam, Nagapattinam, Madras, Kakinada, Visakhapatnam and some parts of Orissa. The data computed by the Central Marine Fisheries Research Station on the landings of mackerel for the eight-year period of 1950-57 are given in Tables I and II. The magnitude of the mackerel fishery is well indicated in Table I by the scale of landings as well as by the high percentage proportion of mackerel in the total landings.

TABLE I
Landings of mackerel and other marine fish in India during 1950-57

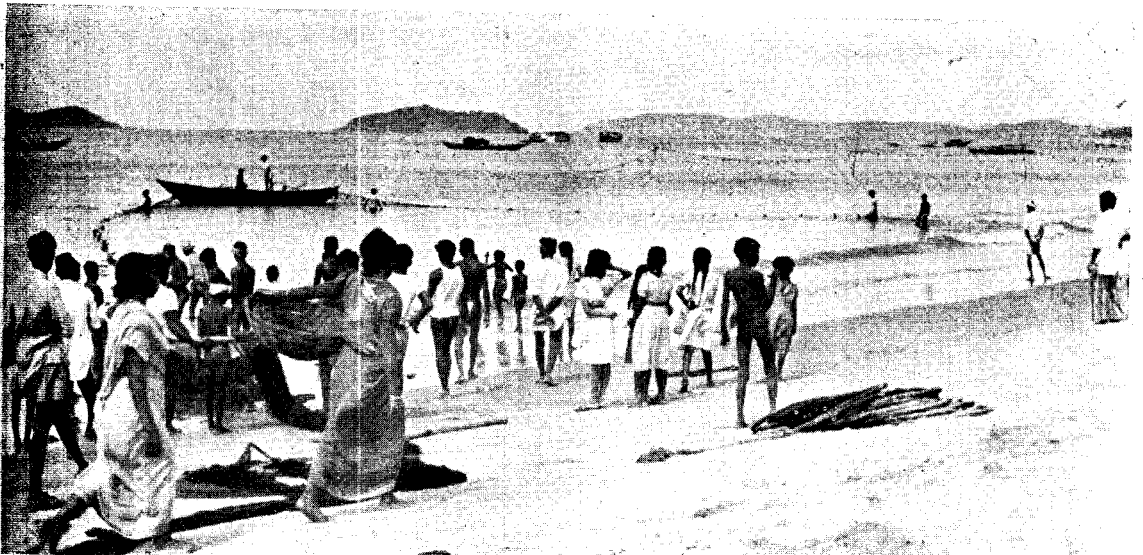
Year	Total landings in metric tons		Percentage of total landings contributed by Mackerel
	Mackerel	All Marine Fish	
1950	89,163	580,021	15.37
1951	104,900	533,916	19.65
1952	78,014	528,346	14.77
1953	70,754	581,460	12.17
1954	28,258	588,257	4.80
1955	22,795	595,722	3.83
1956	16,426	718,702	2.29
1957	89,006	875,420	10.17
Average ..	62,415	625,230	9.98



The Mackerel, *Rastrelliger canagurta* (Cuv.)



The Shore-Seine, 'Chavittu Vala' used for Mackerel and other Fishes in some parts of Malabar



Impounding of Mackerel shoals with Rampan net in the North Kanara Coast

TABLE II

Landings of mackerel during 1950-57 shown separately for the west coast and the east coast

Year	West Coast		East Coast	
	Metric tons	Percentage of total fish landings	Metric tons	Percentage of total fish landings
1950	86,736	97.27	2,427	2.73
1951	103,574	98.74	1,326	1.26
1952	77,295	96.56	719	3.44
1953	69,597	98.36	1,156	1.64
1954	27,892	98.70	367	1.30
1955	21,848	95.84	947	4.16
1956	15,023	91.46	1,403	8.54
1957	86,741	97.46	2,265	2.54
Average	61,089	97.87	1,326	2.12

On an average about 10% of the total catch of the marine fish consists of mackerel, but there are marked fluctuations from year to year, the catches ranging from about 2 to 20%. The causes of the fluctuations in the yield of fisheries are at present beyond our comprehension. As shown in Table II, on an average, about 98% of the mackerel landings are from the west coast and only about 2% from the east coast.

In the region of the main fishery from Ratnagiri to Cape Comorin, three zones are recognisable, depending upon the intensity of fishing, the types of craft and gear employed, and the duration of the fishery. In the zone from Ratnagiri to Mangalore the catches are very high; the duration of the fishing season is short commencing by about October–November and lasting till February–March; the types of nets used are specialized shore-seines called *Rampans* and gill-nets known locally as the *Patte Bale*; the fishing crafts employed are the out-rigger boats called *Pandi*, *Hodi* and *Doni*. In the next zone from Mangalore to Ponnani River, the

in the three different zones. It may be seen from the foregoing account that in the region as a whole comprising all the three zones, the fishery lasts from August to February or March. It commences early in the southern zone and late in the northern one, with a longer duration in the southern and the central zones than in the northern zone. The mackerel catches are usually poor in the beginning as also towards the close of the fishing season.

Year	I. Cape Comorin to Ponnani River	II. Ponnani River to Mangalore	III. Mangalore to Ratnagiri
1950	8,826	73,018	4,891
1951	4,660	62,757	36,157
1952	2,325	25,952	49,018
1953	80	15,302	54,215
1954	704	7,856	19,331
1955	1,794	4,816	15,238
1956	2,254	7,742	4,214
1957	7,786	18,624	57,858
Average ..	3,479	27,008	27,615

Mackerel catch in metric tons in Zones I-III

Landings of mackerel in different zones on the west coast of India during the years 1950-57

TABLE III

amount of the catches is pretty high; the fishing season commences in August-September and lasts till March-April; boat-seines called *Odam vala*, *Patthu vala* and *Ayila Kollu vala* and gill-nets known as *Ayila Chala vala* are operated with dugout canoes. In the third zone extending from Ponnani River to Cape Comorin, the fishing is poor or moderate; the catches are obtained at irregular intervals during the months of August to February; generally boat-seines are used for fishing together with dugout canoes. In Table III the landings of the mackerel are shown for the period 1950-57

The *rampani* net of the Konkan, North Kanara and South Kanara coasts which is used in the mackerel fishery, deserves special mention. The net, capable of encircling large shoals of fish in the inshore waters, is made of hemp or cotton yarn, with 400 to 600 pieces joined end to end and operated like any other type of shore-seine. With the help of ^{five}~~six~~ outrigger boats, viz., ^{one}~~two~~ *pandi* and four *donies*, about 80 men operate the net. When catches are good, over two million fish are landed in a single operation. In North Kanara the *rampani* is also used for impounding the mackerel, an efficient method devised to keep the fish alive up to about a week after they are caught. This helps to prevent a glut in the mackerel trade when the catches are particularly high. In impounding the mackerel, the dragging of the net is stopped when the two ends are about 500 ft. apart and the head rope is raised to a height of four or five feet by means of crutches fixed on the sandy shore. The head rope of the portion beyond the range of the breakers is fastened to boats which are anchored to keep the net in position. The mackerel from the impounded area are removed by means of small nets when required. The practice of impounding the mackerel by *rampani* net or other suitable means can be extended to other intensively fished areas, where the surplus catch of mackerel has often to be converted to manure, there being no other means for its immediate disposal.

Out of the large quantities of mackerel landed on our coasts, only a small fraction is consumed in the fresh state. The mackerel is a much-appreciated food-fish and is in good demand in the fresh condition, but owing to the inadequacy of transport and cold storage facilities, the supply of the fresh fish from the production centres to the consuming centres is very limited. It is of interest to note that since the introduction of the carrier launches in 1936 for transport of mackerel, there has been a steady increase in the fleet of the launches and at present about forty of them ply regularly between Bombay and the fishing centres on the Konkan and Kanara coasts during the mackerel season, effecting supplies to the Bombay market to the extent of over 2,000 metric tons of mackerel preserved in ice. Being a lean fish with comparatively low fat content, the mackerel is particularly suitable for curing. More than 60% of the mackerel catches are salt-cured, by dry or wet process, or pickled according to the Colombo method. The cured fish after meeting the local demand is exported mostly to Ceylon. Canning of mackerel and oil-sardines is practised on a small scale at a factory in Chaliyam near Calicut, and the product has been reported to be good, but owing to the high costs involved in the processing and packing in suitable containers, canned mackerel is not within the reach of the common man. For neat packing in small cans, the oil-sardine being

preferred to the mackerel, the canning of the latter is done in insignificantly small amounts. During World War II smoked mackerel was prepared and supplied to the troops stationed in India, but with the cessation of war, the production of smoked fish was discontinued, there being no demand for it from the local fish-eating population. Conversion of mackerel into manure for use in cocoanut, coffee and tea plantations is an uneconomic proposition although unavoidable when the catch is surplus and cannot be cured or marketed in fresh state. Large amounts of guts, gills and other parts of the viscera of mackerel, often discarded from the curing yards, are sometimes utilized in the preparation of fish meal used as cattle and poultry feed or as manure for agricultural farming.

The Marine Biological Station at West Hill, Calicut, which was opened by the erstwhile Madras Government, did pioneer work on the biology of the mackerel. Later, the various methods of curing mackerel, practised on the east coast and west coast were studied and this information is available. Subsequently, the Research Substation at Calicut and the Research Unit at Karwar, of the Central Marine Fisheries Research Station have contributed much to our knowledge of the biology and fishery of the mackerel on the west coast. Studies have been made on the early stages of mackerel by the Research Units at Madras and at Vizhingam. At the headquarters of the Central Marine Fisheries Research Station at Mandapam, racial studies on mackerel have been undertaken to ascertain the different populations entering the commercial stocks.

The research programmes of the Central Marine Fisheries Research Station envisaged under the Second Five-Year Plan aim at furnishing information on the life-history, habits, rate of growth, racial stocks, and migrations of the mackerel, besides the ecological factors controlling movements of their shoals. Such knowledge is very essential for rational exploitation of the fishery without causing any detrimental effects on the potential resources. With the expansion of the Fisheries Development Schemes sponsored by the Central Government there is every scope for increasing the total output. The introduction of improved types of craft and gear will possibly help exploration of new fishing grounds of mackerel beyond the zone of operations conducted at present. Also, with the advancement of technological knowledge and the introduction of suitable machinery for transport, storage, and processing of fish, we may hope that there will soon be a more satisfactory utilization of the mackerel catches landed on our coasts than is found at present.