THE MARINE FISHERY RESOURCES OF INDIA AND THEIR UTILISATION

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India has a long coastline of nearly 6,000 km with the Andaman and Nicobar Islands and the Laccadive Archipelago lying far beyond its shores. It occupies a central position in the Indian Ocean with extensive oceanic waters on three sides and with hardly any inhabited land towards the south as far as the Antartica with the exception of Ceylon and the Maldives. In spite of this locational advantage fishing activity is mostly limited to within about 20 fathoms of the coastal belt, will within the continental shelf. The average annual catch varies from 0.6 to 0.85 million tonnes of fish of all kinds. Of the above, about 80 per cent is accounted for by the west coast of India which has richer stocks of pelagic shoaling fishes and prawns than the east coast. The major part of the catches are still by indigenous craft in spite of the fact that mechanized craft has come to increasing use in the recent years. In the present paper the extent of exploited resources is indicated and the potential resources are discussed. The need for taking advantage of the latter is pointed out so that a part of our food problem especially in the matter of protein deficiency could be solved.

The geographical position of India with the peninsular portion extending deep into the central part of the Indian Ocean, gives it a locational advantage over other countries of the region for playing a dominant role in marine fishing activities. It has a long coastline of about 5000 km with extensive oceanic waters on three sides. Practically the entire Indian Ocean stretches across the south with hardly any inhabited landmass as far as the Antartica except Ceylon and the Maldive Islands. The far-flung Andaman and Nicobar group of islands towards the east in the Bay of Bengal and the islands of the Laccadive Archipelago in the Arabian Sea bordering the indian Ocean proper form part of the Indian Union and are Ideally suited to be developed with advantage to serve as bases for offshore fishing operations.

Despite all this most of the fishing activity in the country is restricted to within about 20 fathoms of coastal belt which is well within the continental shelf. The total shelf area up to the 100 fathoms line covers extensive fishable grounds of about 300,000 km^2 but only about a quarter of this area is being exploited at present, the extensive oceanic waters remaining untouched including certain areas lying immediately beyond the 100 fathom line that offer scope for trawling. Figure 1 shows the areas in the Indian Union where marine fishing is carried out at present. This exploitation along the coastal belt is by fishermen using a large number of indigenous non-powered craft operated from the small widely dispersed and coastal fishing villages in which they live. Table I furnishes for each maritime state, the number of fishing villages, the

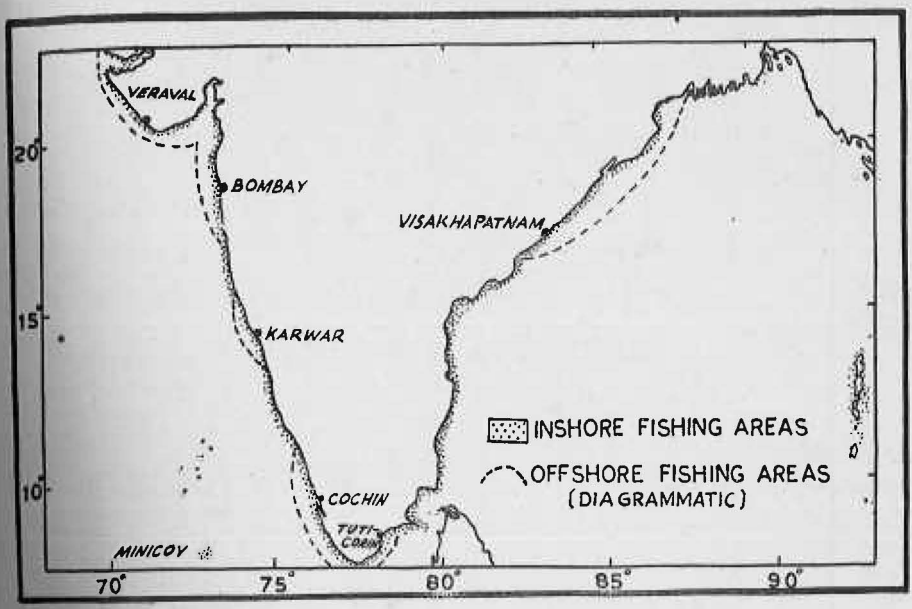

FIG. 1. Marine fishing areas.

fishermen population and fishing craft, based on the figures collected by the Central Marine Fisheries Research Institute.

TABLE I

State-wise statistics of marine fishing villages, fishermen population and fishing crafts

State	*No. of marine fishing villages*	*Marine fishermen population*	*No. of active marine fishermen*	*No. of fishing craft*
West Bengal	26	2,311	606	108
Orissa	156	33,630	8,828	2,786
Andhra Pradesh	321	136,893	47,700	19,772
Madras and Pondicherry	363	214,868	56,586	29,661
Kerala	279	333,822	74,241	20,667
Mysore	131	51,636	8,963	6,357
Maharashtra	265	103,535	20,698	7,894
Gujarat	256	82,242	11,732	3,179
Total :		958,937	229,354	90,424

From Table II which gives the variety-wise landings for the country from 1960 to 1966, it will be seen that the annual landings for 1960 to 1966 vary from 0.64 to 0.89 million tonnes with annual average of about 0.78 million tonnes. Taking the 1961 census population of 439 millions, the per capita availability

TABLE II

Marine fish landings in India from 1960 to 1966, variety-wise

1	2	3	4	5	6	7	8	9	10	11
S. No	*Name of fish*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*	*Average*	*Percentage*
1.	Flasmobranchs	35,568	33,554	43,761	42,997	34,890	32,054	37,361	36740.12	4.72
2.	Eels	6,140	11,380	8,872	8,685	2,225	2,473	2,426	6,740.71	0.78
3.	Cat fishes	25,041	10,928	19,327	17,577	22,729	18,915	22,572	19,582.71	2.52
4.	Chirocentrus	5,320	6,748	8,898	7,645	7,565	7,347	7,884	7,343.86	0.94
5.	(a) Oil sardine	189,016	167,884	110,299	63,647	274,333	261,863	247,214	187,750.86	24.14
	(b) Other sardines	32,003	19,764	19,551	27,173	40,398	42,770	64,643	35,186.00	4.52
	(c) *Hilsa ilisha*	3,345	1,050	1,649	2,754	3,441	1,536	1,068	2,120.43	0.27
	(d) Other *Hilsa*	8,443	6,475	9,044	5,312	6,519	9,038	8,906	7,676.71	0.99
	(e) *Anchoviella*	35,885	22,103	19,768	28,672	25,199	24,377	26,679	26,011.86	3.34
	(f) *Thrissocles*	7,522	4,962	5,872	5,704	6,619	4,811	8,837	6,332.43	0.81
	(g) Other clupeids	20,654	15,256	12,054	14,485	16,752	18,770	23,262	17,319.00	2.23
6.	(a) *Harpodon nehereus*	108,564	93,844	83,933	91,870	81,342	73,894	77,363	87,258.57	11.22
	(b) *Saurida & Saurus*	482	865	1,307	660	1,545	540	2,204	1,086.14	0.14
7.	*Hemirhamphus & Belone*	213	493	149	3,443	1,527	1,188	1,819	1,261.71	0.16
8.	Flying fish	6,470	1,206	4,154	962	920	437	3,676	2,546.43	0.33
9.	Perches	9,804	15,377	8,958	8,597	12,563	8,544	12,033	10,839.43	1.39

TABLE II *(Contd.)*

1	2	3	4	5	6	7	8	9	10	11
10.	Red mullets	2,568	2,165	1,596	2,395	5,027	2,011	4,674	2,919.43	0.37
11.	Polynemids	6,649	5,920	2,802	4,389	2,155	1,750	4,596	4,037.29	0.52
12.	Sciaenids	24,947	29,917	32,439	22,570	25,197	23,673	26,032	26,396.43	3.39
13.	Ribbon fish	17,467	19,515	20,586	16,452	25,891	41,921	45,124	26,708.00	3.43
14.	(a) *Caranx*	21,583	22,551	7,364	17,513	26,923	17,688	19,664	19,040.86	2.45
	(b) *Chorinemus*	4,212	3,517	3,517	3,195	2,448	3,094	3,475	3,351.14	0.43
	(c) *Trachynotus*	9	7	14	14	115	20	22	28.57	0.00
	(d) Other *carangids*	154	113	537	22	51	11	111	142.71	0.02
	(e) *Coryphaena*	190	138	172	25	90	64	199	125.43	0.02
	(f) *Elacate*	310	185	255	170	203	195	115	204.71	0.03
15.	(a) *Leiognathus*	15,760	15,763	18,104	17,748	28,301	27,147	37,972	22,970.72	2.95
	(b) *Gazza*	634	201	164	85	35	66	48	176.14	0.02
16.	*Lacrarius*	14,502	8,898	7,656	8,654	6,506	5,983	5,873	8,296.00	1.07
17.	Promfrets	21,850	16,488	25,678	17,256	19,580	17,892	17,845	19,512.71	2.51
18.	Mackerel	133,655	34,485	29,103	76,980	23,863	43,096	31,959	53,305.86	6.86
19.	Seer fish	8,650	11,449	10,941	9,116	11,160	9,436	10,053	10,115.00	1.30
20.	Tunnies	5,615	7,805	2,297	4,454	5,002	3,698	2,850	4,531.57	0.58
21.	Sphyraena	1,985	1,389	1,120	1,258	1,662	1,924	1,065	1,486.14	0.19
22.	*Mugil*	912	862	880	1,505	2,916	1,413	1,488	1,425.14	0.18

TABLE II *(Concld.)*

1	2	3	4	5	6	7	8	9	10	11
23.	*Bregmaceros*	6,096	3,900	3,164	5,407	3,721	5,499	2,659	4,349.43	0.56
24.	Soles	14,108	7,730	17,645	8,781	6,146	9,835	7,431	10,239.43	1.32
25.	(a) Penaeid prawns	31,759	39,083	48,251	41,071	53,389	38,085	56,146	45,397.72	5.84
	(b) Non-penaeid prawns	36,271	23,685	34,984	40,522	31,506	41,415	34,768	34,735.86	4.47
	(c) Other crustaceans	2,571	2,038	1,031	2,061	4,565	2,392	3,716	2,624.86	0.34
26.	Cephalopods	467	94	96	260	463	265	952	371.00	0.05
27.	Miscellaneous	12,287	13,782	19,852	23,408	24,100	25,648	22,867	20,277.71	2.61
	Total :	879,681	683,569	644,244	655,484	859,582	832,777	889,651	777,855.71	100.00

of marine fish works out to about 1.77 kg per annum as compared to about 70 kg per annum for Japan. Even if the inland fish production is taken into consideration, the per capita availability will not exceed 2.7 kg per annum. This is about one of the lowest per capita availability in the world. The average share of landings per craft is only about 8.60 tonnes per year and 3.39 tonnes per year per active fisherman. These figures speak for the very dismal picture of the Indian marine fishing. The tremendous growth in our papulation together with the almost chronic shortage of traditional food makes it imperative that we formulate plans for developing and exploiting our marine resources.

Any successful development programme will require a scientific and rational appraisal of the marine fisheries resources of the country. First, it is necessary to evaluate and assess the currently exploited resources and to see it

TABLE III

State-wise average landings (1960-66), important varieties of fish and shelf area exploited

State	*Average annual landings (tonnes)*	*Shelf area exploited (km^2)*	*Important group of fishes in order of landings*
West Bengal, Orissa	9,623	3,610	Other sardines, prawns, other clupeids, anchovies, white-balts, Bombay-duck and ribbon fish
Andhra Pradesh	66,508	12,480	Other sardines, white-baits, prawns, jew fish, sharks and rays, other clupeids, seer fish, cat fish, ribbon fish and silver bellies
Madras, Pondicherry	119,658	15,450	Ribbon fish, white-baits, other sardines, sharks and rays, carangids, jew fish, perches, *Lactarius*, silver belly, cat fish and prawns
Kerala	287,844	4,500	Oil sardine, mackerel, other sardines, prawns, white-baits and soles
Mysore	63,047	4,050	Mackerel, oil sardine, jew fish, cat fish, other sardines, sharks and rays
Goa	10,919*	450	— —
Maharashtra	128,209	11,600	Prawns, Bombay-duck, jew fish, other clupeids, mackerel, eels, ribbon fish, pomfrets, *Bregmeceros* and cat fish
Gujarat	96,157	28,960	Bombay-duck, prawns, pomfret, jew fish and other clupeids
Andaman, Nicobar	182	—	— —
Laccadives	450*	—	Tuna

*Based on 4 years' average.

we are getting the optimum yield through the rational exploitation of these resources and make reasonable estimates of how much can be obtained from these without depleting them. Apart from fishing, the dynamic environments influence these resources continuously and hence the assessment of the resources should necessarily be on a continuing basis, so that not only would a clear understanding of the trend of changes in the resources be obtained but the environmental conditions that cause these changes could also be understood.

Before discussing the potentialities of the untapped resources, it would be pertinent to examine the salient features of the currently exploited resources and the yield derived from these. Table III gives for each State the average annual landings during the seven-year period from 1960 to 1966, together with the important varieties of fish landed in each State and also the approximate shelf area exploited for obtaining the yield.

It will be seen from the above table that currently exploited marine resources are not uniform throughout the coast. About 75 per cent of the total landings come from the west coast. In terms of area exploited also, it will be seen that the waters off the maritime States on the west coast are more productive, because of the rich concentration of pelagic fishes and prawns there. The coastal waters off the east coast are not so productive and support smaller stocks of diversified fisheries.

Sardines and Mackerel

Among the edible marine fishery resources, the fishes and crustaceans occupy a premier position by virtue of the quantity caught and their economic importance. From Table II, it will be seen that oil sardine constitutes about 24.14 per cent of the average total annual landings during the 1960-66 period. During this period, the annual catch has varied from 63,647 to 274,333 tonnes. In fact, such wide fluctuation in the annual catch is one of the most peculiar characteristics of this fishery. The question naturally arises whether the intensity of fishing is high enough to affect the oil sardine resources inducing thereby the observed fluctuations in the catch. If fishing is the major factor influencing the sardine resource, and the effects of other environmental factors are small and of random nature, then theoretically it is to be expected that the relative abundance of oil sardine (reflected by the catch per unit effort) should linearly decrease with increasing fishing effort. From the studies conducted in the Central Marine Fisheries Research Institute, no such relation has been observed between the relative abundance and effort, indicating thereby that the fishing has very little effect on the stock. The growth rate of the fish is extremely rapid in the first year of its life and then the growth slows down substantially. The instantaneous fishing mortality rate is only about 0.12 compared with the natural mortality coefficient of 1.47. It is thus clear that our fishing efforts could be substantially increased to get a very much larger yield of oil sardine, without in any way overfishing or depleting the stock.

The mackerel is another pelagic fish which contributed about 6.85 per cent of the total marine fish catch. Like oil sardine, the annual catch of

mackerel also shows a great deal of fluctuation. The catch varied from 33,863 tonnes to 1,33,655 tonnes during the seven-year period. Similar studies as in the case of oil sardine indicate that a substantially larger yield can be obtained without causing any damage to our mackerel resources. In the case of both these fisheries it is believed that oceanographical factors are the main causative factors of the observed fluctuations in their abundance. The Bombay-duck (*Harpadon nehereus*) is another fish of major importance contributing about 11.22 per cent of the total landings in India. The catch and input of associated effort have remained more or less stable during the past years.

CRUSTACEANS

The crustaceans, comprising prawns (shrimps), lobsters and crabs form 10.65 per cent of the total fish landings, the contribution of the latter two being only 0.34 per cent. It may be of interest to mention here that prawn fishery has assumed major importance in recent years and India has attained the position of the world's second largest exporter of this commodity netting foreign exchange to the tune of about 150 million rupees a year. As will be seen from Table II prawns are widely distributed and are caught along the entire coast of India. The major prawn fishing grounds are, however, confined to the west coast which accounts for over 90 per cent of the catches. The large-sized species are comparatively more abundant in the southern section of the west coast from where the maximum quantity of the exportable varieties are caught. The substratal conditions here with nutrient-laden mud banks are ideal for prawn life and this area consititutes one of the richest prawn fishing grounds in the world. Investigations carried out have shown that the component of fishing mortality is negligibly small in relation to the total mortality in this area and hence there is scope of further increasing our effort to catch more prawns from the area. Landings are fairly high on the Maharashtra coast also but an appreciable part of the catches is contributed by the smaller varieties. On the east coast regular fishing is restricted to areas mostly close to river mouths and off deltaic regions. From the available data, it is clear that optimum exploitation is not carried out and there is further scope for increasing our efforts. Recent observations made by the Institute have shown that some of the penaeids and carideans are frequent in deeper waters within the continental shelf outside the range of coastal fishing in the south-west coast of India.

The lobster fishery is confined to some of the rocky areas mainly in the southern section of the west coast of India. The catch is small but very important from the commercial point of view. A good lobster fishing ground is reported to have been discovered recently by the Gujarat Fisheries Department along the Saurashtra coast between Veraval and Okha.

Most of the other fisheries are constituted by a large number of species along different coastal parts and do not individually contribute much to the total landings. In fact, a peculiar characteristic of exploited fisheries resources of Indian waters is that apart from mackerel, oil sardine and Bombay-duck which

move in dense shoals, the other stocks with reference to a single species are not of large magnitudes. Instead, there exists a large number of smaller fisheries composed of many species, especially along the east coast. An efficient programme of exploitation of these species may bring in a large increase in the total yield of marine fish. This probably requires development of technological methods where by the sparse populations of miscellaneous groups can be exploited economically. A brief survey of these resources shows that in most cases even these within the narrow coastal belt are not being fully exploited and there is further scope of augmenting our catch from these resources without depleting them. Obviously, such augmentation can come either by increasing the present type of fishing effort or by increasing the efficiency of effort by technological research on craft and gear after taking into account the behaviour of various species of fish involved.

Molluscs

Apart from fishes and crutaceans there is quite a large variety of marine resources in our waters that could be used as food by man, but the most important amongst these deserving special mention, are the molluscs and the sea-weeds. The molluscs consisting of mussels, oysters, clams, whelks, etc., are rich in protein and are fished and utilised only to a limited extent. Many of these at present are only of local importance and form a sustenance fishery on a minor scale especially among the poorer classes of people. The extensive mussel beds along the rocky coasts of peninsular India and the oyster beds in some of the estuarine and backwater areas offer great scope for development assuring food resources of considerable importance.

With regard to sea-weeds, though based on the work done at the Central Marine Fisheries Research Institute, a sea-weed industry and an export trade in sea-weeds in substantial quantities have been developed in the country, it may be stated that very little headway has been made regarding the utilization of edible sea-weeds which are rich in minerals, mainly due to the conservative deitary habits of the people. With some propaganda and extension work it should be possible to effect a break-through and popularise the consumption of sea-weed among our people.

Potential Yield

What has been discussed so far is based on direct observations on the fisheries concerned. Studies on the environmental aspects of the seas present the complementary picture. The waters up to the 50-fathom line on the west coast, considered as potential fishing area, cover an area of about 155,400 km^2 and the standing crop of phytoplankton in this area has been estimated as 1813 million tonnes. The average quantity of commercial catch landed is about 0.6 million tonnes. Thus the ratio of phytoplankton production to fish landed works to about 0.03 per cent. This ratio is about half that of the corresponding figure of North Sea, which is one of the most intensively fished

areas in the world. Considering the fact that the rate of turnover in the tropical environment is much more than in temperate waters, it is thus clear that our fish landings can be increased at least two times, if not more. By studying the organic production by 14 C method, it has been estimated that the catch in the south-west coast of India can be increased about five times. An analysis of fishing data obtained by the exploratory fishing done by the Government of India vessels on the west coast of India shows, on an average, that the catch per hour between 20 and 50 fathoms is approximately half the corresponding catch up to 20 fathoms. The area up to 20 fathoms is roughly 50,000 km^2 (Table III), while the area between 20 and 50 fathoms is about 100,000 km^2. Since the catch rate in this latter area is about half, the area is double that under 20 fathoms, an equal amount of catch is possible from this area. Thus, even from the experience of exploratory fishing, the conclusion is that the area up to 50 fathoms on the west coast can support at least double the amount of present catch. Besides, the area beyond 50-fathom line up to about 100-fathom line can also produce some yield.

The above account gives a general indication of the level of potential yield that can be obtained by exploiting the waters within the continental shelf. Now, this can be attained in two ways, namely, by intensifying our fishing effort in the already exploited narrow coastal belt and also by extending the fishing to areas beyond the present fishing range and exploiting the untapped resources. It has already been pointed out that with our present method of fishing and the present magnitude of fishing, even the exploited resources are not being fished at the optimum level and they can be further exploited by increasing either our efforts or their efficiency. The search for untapped resources can proceed in two ways. The first is by carrying on exploratory fishing in different areas in a systematic way and comparing the relative productivity of the areas. This method of exploration has already given some good results. Good trawling grounds off Kutch and Dwarka for *ghol*, *dara* and *koth* fisheries have been discovered. Good shrimp grounds were also located off south-west coast in this way. Similarly, potential fishing grounds off Mandapam Camp for silver bellies were discovered. Some of these new grounds are now being commercially exploited with good results. But the exploratory survey of a vast area still remains to be done. Experimental fishing operation from the research vessels Kalava and Varuna by the Central Marine Fisheries Research Institute indicate fruitful possibilities of exploiting the recently observed resources of penaeid and caridean prawns at about 150-180 fathoms on the continental slope of the south-west coast. In this connection it may be mentioned that the potentialities of the east coast grounds are not fully known and detailed survey of these grounds may prove fruitful.

Apart from searching for potential fishing grounds by exploratory fishing, another line of work is by studying the oceanographic conditions which have close bearing on the location of fishery resources, particularly the mapping of areas of upwelling and the movement of low-oxygen areas. In fact, further exploratory and commercial fishing requires more critical evalua-

TABLE IV

Progressive total number of mechanised/motorised fishing vessels in various maritime States of India

Year	Gujarat		Maharashtra	Goa	Daman	Diu	Mysore	Kerala		Madras	Andhra	Laccadives	Pondicherry	Andaman	Government of India agencies	Total
	a	*b*						*c*	*d*						*e*	
1947-48			1													
1948-49			3													
1949-50																
1950-51			9													
1951-52			15													
1952-53																
1953-54																
1954-55									16							
1955-56			678								13					
1956-57											31					
1957-58											46					
1958-59											69					
1959-60									152		76					
1960-61	73		190	1286				64			109					
1961-62	209		419					67			162					
1962-63	274		567					141			216					
1963-64	367		612		7	1	10	179			249					
1964-65	419		633		9	5	15	225	590		366					
1965-66	476		671	1866	15	11	21	265	715	29	467	238	45	18	3	33
To date	488			2030	18	30	23									
		188	671		18	30	23		715	29						
			1159	2330		71		265		744	467	238	45	18	3	33 5073

a—mechanised fishing boats
b—motorised fishing boats
c—smaller mechanised and motorised boats
d—large to medium mechanised boats
e—includes large to medium exploratory fishing vessels operated by Government of India Deep Sea Fishing Station, Central Insitute of Fisheries Technology, Central Institute of Fisheries Education and Central Institute of Fisheries Operatives.

tion of physical and chemical data collected on a synoptic basis to make fishing operations in specified regions economical. Extensive work carried out from the Research Vessel Varuna on hydrological features of the offshore waters, mainly on salinity, oxygen content, temperature, phosphates and also on plankton and total organic production indicates that the south-west coast of India is a very productive area where fishing could be expanded. The prospect for increasing trawling lies in fishing beyond the marginal seas on the shelf and on the slope of the shelf.

Mechanization

It must be emphasised here that the present fleet of indigenous boats are incapable of going very far and hence for exploiting the further waters it is necessary to have more powerful mechanised vessels. The mechanization of the indigenous craft and building of other suitable vessels fitted with diesel engines started in a small way in 1947. It has made rapid progress subsequently and today there are over 5000 mechanised boats of all sizes in the country. Table IV gives the progressive total of mechanised/motorised boats in the various maritime States of India. Most of them are small and carry on fishing in the traditional grounds or a little beyond that and only a very few are big enough to go for fishing in distant waters. A great deal remains to be done in this sphere if we are to reap the benefits of untapped resources lying beyond the traditional fishing grounds.

Tuna Fishing

Lastly, mention must be made of the great oceanic fishery resources of the Indian Ocean consisting mainly of tunas and bill fishes. There are several species of tunas and they are widely distributed in all warm waters but the larger ones are of oceanic habitat. The only place in the Indian Union where there is an established tuna fishery is around the island of Minicoy in the Laccadive Archipelago where the skipjack, *Katsuwonus pelamis*, is caught in appreciable quantities. *Euthynnus affinis* and *Auxis* spp. which are common along the coastal waters are small in size and have poor quality meat and therefore are not very suitable for canning or freezing purposes. Other species like *Kishnoella tonggol* and *Thunnus albacares* occur only in limited quantities and in certain seasons. But the high seas of the Indian Ocean contain a large resource of bigger tunas and the Japanese are at present engaged in large-scale fishing of tunas and bill fishes throughout the length and breadth of the Indian Ocean, including the Bay of Bengal, Laccadive Sea and the Arabian Sea but outside our territorial waters. Even fishing boats from Taiwan are operating in the Eastern Indian Ocean and more than once they have been apprehended within our territorial waters in the vicinity of Andaman and Nicobar Islands. Russian vessels have started operating in the western section of the Indian Ocean from the Black Sea ports. Australia and the Union of South Africa are also rapidly developing their oceanic fisheries. Port facilities are being offered on

attractive terms by many of the African countries bordering the Indian Ocean. Several countries around India like Ceylon, Pakistan and Malaysia have established tuna fishing enterprises in collaboration with the Japanese. In spite of our advantageous position in the Indian Ocean region either due to our complacency or ignorance we have yet to make a beginning in this direction. It is rather amusing that we still think in terms of exploratory

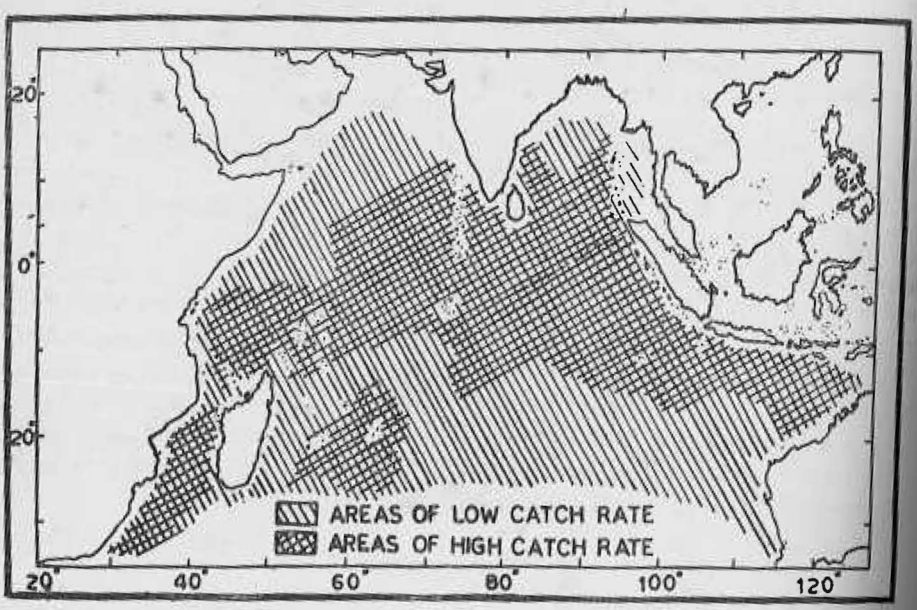

FIG. 2 Japanese long lining areas in the Indian Ocean.

fishing for tuna, a luxury we could ill afford. Figure 2 shows the areas of the Japanese long line fishery for tunas in the Indian Ocean. At present, an estimated quantity of about 150,000–200,000 tonnes of these valuable fishes is caught from the Indian Ocean and it is estimated that about three times the present magnitude of catch could be taken from the Indian Ocean on a sustainable basis. The removal of this quantity will not in any way affect the coastal fisheries. Only a decade ago, fish mortality of unheard-of magnitude estimated to involve nearly world's annual catch was reported from the central part of the Arabian Sea. In spite of this, no phenomenal reduction has been noticed in the fish catches of the countries around during the subsequent years. This shows that oceanic fishes do not contribute to any significant extent to the coastal fisheries and that fishing in high seas could therefore be undertaken without fear of any adverse effect on the fisheries of the coastal waters.

It may be said in conclusion that to take full advantage of the fishery resources of the seas around India a two-fold approach would be necessary. The first is the fuller utilisation of the resources within the continental shelf and in the gradient zone to a depth of about 200 fathoms and the second is

the exploitation of the oceanic fisheries. With regard to the first aspect, development of the fisheries within the 20 fathom limit does not offer a serious problem but to cover the areas beyond larger trawlers with better gear and well-trained personnel are necessary. It may be said that all the three form an integrated requirement, each as important as the other. Simultaneously with the above, shore establishments with all the requisite facilities for the vessels and for the proper handling and utilisation of the catches are also necessary. The position with regard to oceanic fisheries is still more complex and calls for foreign collaboration. Fishing for tunas and bill fishes in the high seas is an extremely specialised job and it would take a long time before our men could venture out on their own. The fishing has to be carried out far beyond the continental shelf and as such the question of any clash with our traditional fisheries does not arise. It is hoped that some initiative in this direction will be taken soon.