AS Sherlock Holmes might have said, so long as man has to eat to live, he will look around for food suitable to eat; this, my dear Watson, is elementary. But how many really 'elementary' ideas are acted upon? Fish provides a rich and palatable food. How far can fish be used to solve India's food problem?

The average annual per capita consumption of fish in India as a whole is 3.9 lbs as against 3.4 lbs in 1940. This includes the quantity consumed as fresh fish and as fish products. But actual consumption in different tracts varies widely from this all-India figure mainly because transport bottlenecks and the problem of refrigeration have not been satisfactorily solved. How much fish can an individual consume a year? The per capita consumption of fish in the fishing villages of Konkan and Kanara districts was estimated in 1931 to be as high as 81.61 pounds. This could conceivably be higher today. One estimation is that India's population needs at best 40.5 lakh tons against 11 lakh tons produced now.

Consumption Higher in Cities

Obviously, then, a large proportion of people would like to have fish included in their diet, if only it were available. It is interesting to note that in urban areas, where people are comparatively well-to-do, the demand for fish is higher. Organised trade in fish exists mostly in urban areas. The per capita annual consumption of fish in Bombay city was 16.02 lbs but the corresponding provincial consumption (1941) was only 6.85 lbs. For Calcutta, it was 21.38 lbs and for the province 6.73 lbs. For Madras the figure was 38.57 lbs, and for the province 8.16 lbs. Enquiries have shown that in every State there is hardly a town which does not receive some supply or fish, however small, for consumption, while there are vast tracts of rural areas where no fish is ever seen.

Some peculiarities in the tastes of people may perhaps be mentioned here. It is known, for instance, that in the southern parts of Bombay State, and generally everywhere in Madras, sharks and other cartilaginous fishes are popular. Catfish and eels, which possess no scales, are rejected by Jews and Shia Muslims, and so forth. Another peculiarity about the consumers is that those accustomed to eating fresh water fish have no liking for sea fish and vice versa.

India ranks fifth among the fishing nations of the world, despite the fact that we have a coast line of over 3,500 miles and a fishable area of 1,10,000 square miles. According to the FAO Yearbook of Fishery Statistics (1957), the following seven countries caught more than 1,000,000 tons of fish in 1957: Japan, 5,399,000 tons; the United States of America, 2,741,100 tons; the Chinese mainland, 2,640,000 tons (1956), USSR, 2,535,000 tons. Norway, 2,410,000 tons. India, 1,738,900 tons. India, 1,233,000 tons and the United Kingdom, 1,014,000 tons, India topped the million mark for the first time in 1956 and moved two places up in 1957 revealing what can be achieved if sustained efforts to increase fishing are made.

Problem of Availability

Custom, religion and prejudice play a big part in determining the demand for fish. According to the 'Report on Marketing of Fish in India', published by Government in 1948, in Delhi and the upper parts of Uttar Pradesh, Hindus and even Muslims refuse to eat fish, unless they happen to be living on the banks of a large fishing river. In Bihar, lower Bengal and in Assam, on the other hand, fish is very largely consumed, whilst in Orissa, Madras, Andhra Pradesh, Madhya Pradesh and Bombay, a very great many people would eat fish if they could get it. Taking India as a whole, Brahmans (except the Kashmiri pandits and those resident in Bengal), certain parts of Bihar, and of the Konkan), certain sections of caste Hindus (for example, Bhabras, Vaishnavas, followers of Siva, Deva Samajists and Jains) reject fish as food.

The net available supply of fish and consumption in important areas are given in Table 1 below. The estimated number of persons who have no objections to eat fish is calculated by deducting from the total population of each tract the number of (1) Jains, (2) Buddhists, (3) 15 to 35 per cent of the total Hindu population, depending on the tracts, (4) children under the age of 5 (13 per cent) and people aged 65 and over (2 per cent) and (5) Hindu widows in Bengal.

Table 1—Availability and per capita Consumption of Fish in India in 1941

<table>
<thead>
<tr>
<th>State</th>
<th>Available for Consumption (000 maunds)</th>
<th>Per capita Annual Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>On the basis of total population</td>
<td>On the basis of estimated number of fish eaters</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Assam</td>
<td>483</td>
<td>3.64</td>
</tr>
<tr>
<td>Bengal</td>
<td>5,027</td>
<td>6.73</td>
</tr>
<tr>
<td>Bihar</td>
<td>883</td>
<td>2.00</td>
</tr>
<tr>
<td>Bombay</td>
<td>1,737</td>
<td>6.85</td>
</tr>
<tr>
<td>Cochin</td>
<td>252</td>
<td>17.19</td>
</tr>
<tr>
<td>Delhi</td>
<td>10</td>
<td>0.90</td>
</tr>
<tr>
<td>Madras</td>
<td>4,946</td>
<td>8.16</td>
</tr>
<tr>
<td>Mysore</td>
<td>101</td>
<td>1.28</td>
</tr>
<tr>
<td>Orissa</td>
<td>657</td>
<td>3.48</td>
</tr>
<tr>
<td>Punjab</td>
<td>37</td>
<td>0.09</td>
</tr>
<tr>
<td>Travancore</td>
<td>1,087</td>
<td>14.71</td>
</tr>
<tr>
<td>United Provinces</td>
<td>140</td>
<td>0.20</td>
</tr>
</tbody>
</table>

The dress of the people...

Costumes, whether they are for occasions or for daily wear, vary all over the world. Climatic conditions, natural materials available, religious demands and individual idiosyncrasies are some of the factors that determine the dress of a people.

Many varied costumes are worn in India, but different costumes need different qualities of cloth. The Mafatlal Group of Mills manufactures a wide range of cloth for everyday use in all parts of the country.

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primitive methods of fishing. Another reason is that caste restrictions hamper fishing activities. It is not generally known that in the Malabar district men who capture fish with hooks and lines cannot take part in fishing operations with nets, and vice versa. In the Chilka Lake, certain castes are permitted by their rules to fish only with bamboo screens and traps but not with nets. Again, some castes only catch fish, while certain other castes only market it.

Twelve Zones

Although these caste restrictions are slowly vanishing, their existence serves as a reminder of the huge problems confronting what should be a simple industry to develop. According to the 1931 census--the magnitudes are not likely to have changed greatly--the fishing population of India was not more than 0.5 per cent of the total population, and today a large part of it is concentrated on the West Coast, especially in two areas.

The coast of India can be divided into twelve natural fishing zones. These are:

(1) West Bengal and Orissa,
(2) Andhra coast (from south of Gopalpur to north of Vishakapatnam),
(3) Andhra coast (from Vishakapatnam to Masulipatnam),
(4) Andhra coast (from south of Masulipatnam to north of Pulicat Lake),
(5) Coromandal coast (from Pulicat Lake to Cuddalore),
(6) Coromandal coast (south of Cuddalore to Devipattam),
(7) Palk Bay and Gulf of Mannar, (south of Devipattam to north of Cape Comorin),
(8) Travancore, Cochin and Malabar (Cape Comorin to Ponnani river),
(9) South Kanara (north of Ponnani river to Mangalore),
(10) Kanara, Karwar and Konkan coast, (north of Mangalore to south of Ratnagiri),
(11) Bombay and Gujerat, (Ratnagiri to Broach), and
(12) Kathiawar coast, (north of Broach).

It will be seen from Table II that the west coast by far gets the bigger catch. This may also be seen from statistics of landings of the important shoaling fishes of the west and east coasts of Madras, for the year 1955-56, prior to re-organisation of States:

<table>
<thead>
<tr>
<th>Fishing Villages</th>
<th>Total Fishermen Population</th>
<th>Catamarans</th>
<th>Boats</th>
<th>Canoes</th>
<th>Computed Landing of Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Bengal and Orissa</td>
<td>127</td>
<td>33,640</td>
<td>2,391</td>
<td>792</td>
<td>18,842</td>
</tr>
<tr>
<td>Andhra coast — zone 2</td>
<td>139</td>
<td>83,404</td>
<td>9,034</td>
<td>850</td>
<td>54,273</td>
</tr>
<tr>
<td>Andhra coast — zone 3</td>
<td>145</td>
<td>28,885</td>
<td>5,995</td>
<td>5,442</td>
<td>24,426</td>
</tr>
<tr>
<td>Andhra coast — zone 4</td>
<td>108</td>
<td>8,870</td>
<td>2,578</td>
<td>474</td>
<td>1,308</td>
</tr>
<tr>
<td>Coromandal — zone 5</td>
<td>123</td>
<td>51,329</td>
<td>7,874</td>
<td>543</td>
<td>336</td>
</tr>
<tr>
<td>Coromandal — zone 6</td>
<td>55</td>
<td>9,138</td>
<td>2,086</td>
<td>303</td>
<td>---</td>
</tr>
<tr>
<td>Palk Bay and Mannar Gulf</td>
<td>55</td>
<td>35,268</td>
<td>1,502</td>
<td>482</td>
<td>228</td>
</tr>
<tr>
<td>Travancore &amp; S Malabar</td>
<td>45</td>
<td>1,59,248</td>
<td>982</td>
<td>---</td>
<td>13,387</td>
</tr>
<tr>
<td>Malabar and S Kanara</td>
<td>108</td>
<td>85,115</td>
<td>---</td>
<td>36</td>
<td>6,488</td>
</tr>
<tr>
<td>Kanara, Karwar, etc</td>
<td>145</td>
<td>85,057</td>
<td>---</td>
<td>2,670</td>
<td>3,439</td>
</tr>
<tr>
<td>Bombay and Gujerat</td>
<td>---</td>
<td>1,61,945</td>
<td>---</td>
<td>3,949</td>
<td>652</td>
</tr>
<tr>
<td>Total</td>
<td>1,331</td>
<td>7,41,899</td>
<td>32,442</td>
<td>15,571</td>
<td>25,330</td>
</tr>
</tbody>
</table>
The change-over to the Metric System of Weights and Measures will benefit us in two important ways. At home, there will be an end to the confusion and loss arising from innumerable systems.

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and since these districts are, so far as concerns fishing, given cinderella treatment by both the central and the State Governments, we must discuss them in greater detail.

In Kanara

These districts together have a coast line of 200 miles, with 25 fishing harbours, 200 fishing villages, some 8,000 fishing boats, 40,000 fishing nets and 20,000 fishermen. Annually some 1,55,000 tons, or 10 per cent of the Indian catch, worth Rs 1.25 crores, are harvested by two districts. (Figures supplied by the Kanara District Development and Welfare Board.) About Rs 83 lakhs worth of fish is exported annually.

Between them the two districts have 48 curing yards, 80 fishermen’s cooperatives, 30 fishery schools, two fish meal and oil plants, 10 mechanised boats and three transport vans. Though abundant fish is available off these districts, little is done to harvest it and transport it to such rich markets as Bombay city in the north or Bangalore in the east.

Opposition to Mechanisation

In the first place, it would seem, there is some hesitancy among fishermen to use mechanised fishing boats. Shri B Vaikunt Baliga, former Labour Minister of Mysore, quotes one of the better-known leaders among fishermen, Shri Monappa Thingala.ya, as saying that, mechanised fishing may not be advisable in the tropics, but only in cold zones where fish grow bigger and are more plentiful. Shri Thingala.ya’s objections have not been fully detailed and it might be that there are other reasons as well, such as a fear that mechanisation might displace the illiterate fisherfolk from their livelihood, and allow the more literate communities to take over the fishing business. Indeed, it is interesting to note that the very first experiment in catching fish in Indian waters with steam vessels as early as 1902 by a private trawling company had to be abandoned owing to the hostility of the fisherfolk.

During the last fifty years, over nine trawler experiments have been carried out, the first official one in 1907-08 the steam boat “Margarita” did some prospecting off the coast of Malabar, but the boat was small, the gear of insufficient power, and there were no con

eduvated vessels, and more valuable work has been done. In 1931 Dr H T Sorely recommended that the existing type of small fishing boats of 4 to 5 tons be decked and fitted with auxiliary engines and local fishermen be taught to work them. G L. Keaetven in his report, on Fisheries in Pakistan, India and Ceylon (1948) suggested vessels of smaller dimension, powered mostly by diesel engines. Mr Zeiner, the F A O expert, who was commissioned to help build boats in Mangalore in 1957-58 had come to the same conclusion.

State Aid Needed

But ten mechanised boats are hardly sufficient to cope with the work, if it is undertaken seriously. This fleet needs to be expanded. The Kanara districts can easily under take to meet the fish requirements of the entire Karnata hinterland because of the easy ghat roads which permit heavy traffic. There are three major ghat roads leading away from south Kanara to the hinterland and these need not only to be broadened and kept in good repair, but the State since private agencies can hardly be expected to do this should organise and establish storing centres along the routes and expand the production of ice. Happily, the new network of electricity made possible by the Jog enterprise makes this both easy and cheap.

It is interesting to note that the Fish Market Society, Mangalore, has already made over 9 trips with in ulated vans to such places as Puttur, Mervaca, Suntippola, Somavarpet, Mysore and Sakleshpur and six trips along the coastal villages, transporting 49,000 of mackerel in fresh condition. Difficulties can be surmounted, if there is adequate State interest.

In fact, in his address to the Kanara District Welfare Board, Shri Baliga had this to say: “Without waiting for expansion of the fishing industry on the catching side, one can usefully organise the handling, transporting and marketing - sides. Proper facilities for storage are woefully lacking. Catches made by rampain or smaller nets find no adequate space for handling and storage. Ice should be made available at every landing place, even at cost price or lower government-subsidised prices. There ought to be ice factories alongside the coast at appropriate places within a distance of 10 to 15 miles between any two factories. Transport vans should be ready to take fish from landing place to factories or processing places. Export trade in fish has vast possibilities. Last year alone about 5 tons of processed prawns were sent to America fetching about Rs 5 lakhs. . . .”

Refrigeration, Canning and Curing

One of the greatest shortcomings of the fishing industry is the lack of refrigeration facilities. For example, in the financial year 1957-58 which witnessed one of the largest mackerel hauls on the Kanara coast, large quantities were allowed to rot in Karwar harbour alone. Prices fell from Rs 50 to Rs 5 per thousand. Had it been possible to move the mackerel catch fast enough, not only would Bombay and the Karnatak hinterland have been supplied with good fresh fish, but the fishing community itself would have stood to gain tremendously. It is not enough to catch fish; it has also to be used most efficaciously, if the catch is to mean anything to anyone. In India it is estimated that only 43 per cent of the total production is consumed as fresh fish. On the West Coast 40 per cent is salted.

Naturally this would mean an increase in canning facilities and in fish curing. Mr Bomguist, of Sweden, an expert in these matters, has also suggested that surplus fish available on the Mysore coast be processed into fish balls in a canning plant. The fish balls should constitute a very cheap supplementary food, that can be easily transported and to which, during the processes of manufacture, spices could be added in order to popularise the product.

Whether canning of fish in India will be a feasible proposition is, however, a doubtful matter. The demand for canned fish is small. In the past it was met by excellent imported goods. Canning factories, it was feared at one time, may have to be inoperative for over 260 days a year owing to such factors as the long non-fishing seasons. But these days greater attention is being given to fresh water fish and pisciculture. To give but one instance, in Mysore State alone there are as many as 4,000 major tanks and over 30,000 minor tanks, besides some of the tanks of really major dimensions, such as the Krishnarajasagara dam, the waters of the Tungabhadra project, Bhadra project, Ghatapraba 331 February 28, 1959
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(L. B. C) Tunga project, Nugu project, Rajolibunda, Ambiligola, Kolchi, Ramanahalli tank, Narnapura anicut, Areshankar tank, Kalaskope tank, Karlyala tank and a host of reservoirs at Nagathna, Ghataprabha, Dharena, Hagari Bommahalli, Jambadahalli, Arkavathi, Kanakanal, Hathikonl, Kabini, Chikole, Hebhanahalla and so on. It is possible to use the waters for systematic culture of the right type of fish. Canning can be profitable, despite many difficulties if the right kind of assistance is given to the industry.

Exchange Earner

For fishing to be profitable, it will, of course, be necessary to make the maximum of any given catch. India has an export trade in preserved fish with Ceylon, Burma, Straits Settlements and Hong Kong. Valued at over Rs 75 lakh a year. This could be increased, if more curing facilities are given, if the loss in assembly is minimised and a steady supply is assured. Mention has not been made of the production of shark liver oil, nor of the possibility of smoking fish; at most fishing sites quantities of fish often come too late at night for government fish curing stations. Instead of throwing them away as taintted, or drying them for fertilisers, they might be turned into palatable food by light "smoking". The process can be carried out in the most adverse circumstances. Experiments in Madras in the past have shown that sardine, mackerel and small seer, pomfrets, ribbon fish etc give excellent results. And, it is reported, Hilsa will probably give the best result which may well stand comparison with the bloaters, red herrings and kipper of England.

India and Japan

It must be remembered that Indian national income is annually enhanced by nearly Rs 30 crores from fisheries, both marine and inland, and that since 1949 there has been an increase—though not sufficiently large—in the number of fishing craft plying the seas. There are now more than 800 mechanised boats operating on the Indian coasts and new designs are being evolved for boats in Madras, Kerala and Andhra States. Experiments in improved types of fishing with small craft are also in progress.

The traditional opposition to mechanisation is being worn down slowly, but steadily. Perhaps some propaganda among Indian fishermen would be useful at this stage. Perhaps he should be told, graphically, how, while the Japanese are way ahead of us in their catch—as much as 80,000 pounds per man—we have an average of 2,600 pounds per man per year. Japan not only continues to be the world's foremost fishing country, but is actually widening the gap between her and the second country, the United States (including Alaska). In 1957 Japan caught 5,399,000 metric tons of fish, or just over 1 per cent of the world total fish catch. The U.S. caught 2,741,100 tons or a little over half the amount caught by Japan. The development of the Japanese fishing industry is easily one of the outstanding features of the world fishing scene. Japan harvested 3,000,000 tons in 1950, over 4,000,000 tons in 1952, and passed the five million mark in 1957. India catches just over a million tons.

Scope for Development

Under the Second Five Year Plan, a sum of Rs 10 crores is expected to be spent by the Central and State Governments on the development of fisheries. Of this, it is said, Rs 82 lakhs will be devoted to mechanisation and improvement in fishing crafts. A 30-member Central Board of Fisheries has now been formed by the Government of India to study the problem connected with fisheries research and development, and for coordination between the Centre and the States—a very necessary and vital task.

Meanwhile, the Central Fisheries Extension Units have assisted the State governments of West Bengal, Andhra Pradesh, Uttar Pradesh, Madhya Pradesh, Madras, Mysore and Delhi not only in locating spawn and fry collection centres, but in organising supply of fish-seed to deficit States, demonstrating improved methods of pisciculture, demonstrating techniques for induced spawning of major crops, demonstrating use of modern fishing gear and improved methods of fishing in reservoirs and inshore waters, and so on. And a Central Fisheries Technological Research Station has been established in Kerala and is already functioning at Cochin.

There is obviously so much to do, and so little is being done, though, of late, the State governments have been stirring themselves. In some respects, inter-State co-operation will be called for. It has been suggested that small suitably-equipped air-planes might be used to detect large shoals of fish and meanwhile, the service planes of the Indian Airlines Corporation might be used to report fish shoals as seen through the transparent blue waters of the Indian Ocean and the Arabian Sea. A whole new industry can be built in the next few years, while the necessary infrastructure (roads, bridges, storage facilities, technical education) gets established.

This is not so Ashy a tale, when one comes to think of it. All we need is a "tall ship" and a steady administrative star to steer her by.

Fisheries in Ceylon

SOME interesting problems arising from the development of the freshwater fisheries in Ceylon are reported by Dr Shao Wen Ling, a Chinese fisheries biologist, Dr Ling, who was sent to Ceylon by FAO to advise the Government on the development of brackish and fresh-water fish culture in Ceylon, reports:

"... Ceylon is predominantly a Buddhist country and the Buddhist religion objects to any form of killing, so we had some difficulty in finding people of the inland areas who would actually do the fishing. This problem has been partially overcome by persuading the coastal fishermen, who are not Buddhists, to move inland during their off season and try fishing in the inland waters. As they made good catches, some of them decided to remain working on the lakes, rivers and reservoirs which we have been stocking with carps and gourami.

"We found, however, that hatching, raising and harvesting the fish was not the end of our work and problems. Since people in the inland areas are not accustomed to eat fresh-water fish, a large proportion of the catch has to be processed and presented in diversified forms such as salted, dried or smoked fish. These products are now beginning to appeal to the potential consumers although a good deal of educational work and persuasion will be necessary to establish these fish products as commonly accepted food. But, no doubt, that will come about as the industry slowly expands."

The carp used by Mr Ling were imported from Thailand and gourami from Malaya.