Lessons from the Fish Markets of Calcutta.

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DURING my brief visit to Calcutta last April, I devoted much time to visiting the markets of that great centre of Indian life and activity. All the markets of Calcutta were visited at least once, and some of them were inspected repeatedly. In addition, a number of markets scattered over the Gangetic Delta, were also visited.

In every case the purpose of these trips to the markets was for observing the number and kinds of fishes, both fresh-water and marine, displayed for sale. Specimens were taken of every kind of fish seen, except in the case of a very few large species, too long and bulky to be preserved in any available container.

For a good many years I have been visiting the fish markets of the great rice-and-fish-eating countries of the Pacific Coast of Asia. The principal fish markets along the coasts of Japan, China, the Philippines, Malaya, and the Dutch East Indies are all familiar to me, and in all of them I have seen a large and extremely varied assortment of both marine and fresh-water species of fish.

When one visits one of the largest Calcutta fish markets for the first time he is surprised by the relatively small quantity of fish seen, the limited variety of species exposed for sale, and as a natural sequence, the comparatively high price of fish.

In the markets of Tokyo, Shanghai, Hong Kong, Manila, Cebu and Singapore, one may see vast quantities of both fresh- and salt-water fish, representative of a great variety of species. Any number from fifty to a hundred and fifty species may be seen at almost any time of the year, except during the typhoon season when the range of species may be comparatively limited, owing to the fact that the fishermen are unable to visit their accustomed fishing grounds. In the Dutch East Indies such markets as those of Batavia, Surabaya, Makassar, or Menado are also notable for their quantities of fish and the great variety of species on sale.

In the markets of Calcutta one sees a few high-priced marine fish, shipped in by train from Puri and Balasore. All the rest are mainly fresh-water fishes, with a much smaller number of brackish-water fishes. These are all taken in the rivers, tanks, swamps, and tidal creeks. Apparently in the Calcutta District proper there are no native sea-going fishermen who go out with hook and line, nets, or trawls, to get truly marine fishes. Those fishes which can obtain oxygen directly from the air are brought to market alive, often from very considerable distances. Yet the total quantity of fresh-water fish in the Calcutta markets on any day during the time I was there was evidently totally inadequate to properly feed more than a part of the teeming population. Hong Kong, a city of about 600,000 population, or approximately a little more than a third that of Calcutta, and situated on a rock in the sea, daily receives a larger quantity and greater variety of good-sized to large fresh-water fish than does Calcutta. The markets of Canton abound with a variety of fresh-water fishes, many of which are kept alive very successfully by the ingenious Chinese. The quantity of fresh-water fish daily marketed and consumed in Canton, a city of a million, far exceeds that of Calcutta with a population of a million and a half. As a consequence, the Cantonese and the rest of the natives of South China are well nourished. Any group of people consuming a generous supply of rice and fish is well fed and therefore strong and energetic.

To a considerable degree, the large supply of fish in the Chinese, Javanese and Manila markets is due to the very extensive systems of pond culture developed in China, Java and the Philippines. In China seven or eight species belonging to the carp family are cultivated. In Java carp and gurami, especially the latter, are very successfully grown, so that everywhere there is an abundant supply of fish at a low price. In addition, a great many farmers, and townspeople too, in both Java and South China, have a small pool by the house. In Java these ponds are stocked with young gurami, in China with three or four kinds of carp. The fish are fed on vegetable scraps and grow rapidly. After a few months, a fish can be dipped out whenever the family needs demand.

I introduced gurami from Java into the Philippines in 1927. As soon as the parent stock matured and began to reproduce in quantity, the fry were distributed to people who were in a position to take care of them properly. By 1931 gurami were becoming known to many, and by the end of 1936, gurami ponds were in successful operation in over half of the Philippine Provinces. By the end of another decade gurami will notably augment the food supply of the Philippines.

In addition, the region about Manila Bay is supplied with fish grown in salt water ponds. More than 25,000,000 American dollars are invested in these highly developed ponds, which must be placed where they can be supplied by tides with fresh sea-water. The fry of bangos, *Chanos chanos*, are caught along sandy shores in incredible quantities. These fry are at first placed in nursery ponds, and later transferred to the larger ponds. These fish are vegetarians in diet, and feed on the green algæ which grow naturally in the ponds.

There is another factor which now supplies the greater part of the larger marine fishes seen in such huge quantities in the great fish markets of Manila, Singapore and the Dutch East Indies. I refer to the presence of Japanese fishermen and the great hold they have obtained on these markets.

Politicians and patriots may rave and "point with alarm", but the fact remains, the daring and intensely hard-working Japanese fishermen have supplied a real need. They have caught fish by methods which the native fishermen either could not or would not adopt. They use ocean-going launches, and in some cases trawlers, in their work, while the native fishermen stick to their canoes. It is self-evident that canoes are only adapted to in-shore fishing at shallow depths. As a result of the efforts of Japanese fishermen, the common people have a much greater supply of good edible sea-fish, at a much lower price than formerly, for their sustenance.

The Japanese obtain this supply, first, by using methods unknown to the native fishermen, thereby bringing in excellent kinds of fish not before obtainable in the city markets; and second, by going great distances to catch fish wherever they abound.

As an example, note the manner in which they supply the markets of Singapore. From that city their boats work both the east and west coasts of Malaya. Their boats go northward into the Gulf of Siam, eastward through all the shoals, reefs, and isles of the South China Sea, and obtain a great catch along the western coast of Borneo. They fish the east coast of Sumatra, the islands south of Singapore, the reefs of the Java Sea, the Flores Sea, the isles of the Banda Sea, and even go as far eastward as the Aru Islands, south of New Guinea. No wonder Singapore gets a vast supply of fish at relatively low prices. No matter whether people prefer fresh-water fish or not, if they see an abundance of choice fresh sea fish, at a price which they can afford to pay, they will soon try to supplement their rice. Once having tried it, they will continue to buy.

Since rice and fish are foods which make a well-balanced diet, and since one has but to look at many of the common people of Calcutta to see that they are not properly nourished, it necessarily follows that Calcutta needs more fish and more kinds of fish, and cheaper fish.

The next step is to see what may be done to bring about this desirable, indeed necessary condition. I understand that Bengal has no fisheries department, truly a reprehensible state of affairs. It would seem that with the need for fish and the amount of fish obtained from fresh-water in Bengal, and the vast potentialities of the Bay of Bengal, teeming with desirable food fish, that there should be a strong fisheries department, adequately staffed and maintained. The Zoological Survey has highly competent ichthyologists on its staff, who have specialized on fresh water fish. A fisheries department could utilize their services to great advantage. The fisheries department should also have a thoroughly competent marine biologist and ichthyologist, familiar with pond culture, and with the fishes of the Indo-Pacific waters. Above all, the department should be administered by a scientific man, and not a clerk. More than one scientific governmental project has been wrecked by placing a clerk at the head as administrator. No matter how laudable his intentions, he is necessarily incompetent to pass on matters or formulate policies so remote from his previous environment and training.

I suggest that the improvement of the Calcutta supply of food fish be undertaken along lines somewhat as follows:

First, the establishment of a fisheries experiment station. Here a study should be made of pond culture under Indian conditions.

A. Brackish-water ponds should be constructed along tidal creeks and the culture of bangos (*Chanos chanos*) and mullet attempted. In this connection it is well to note that Sir Francis Day says (*Fishes of India*, 1878–88, p. 651) that *Chanos chanos* was introduced into both fresh and brackish-water tanks in South Canara by Hyder Ali. He also stated that these tanks still contained this fish. There is, therefore, little doubt that *Chanos chanos* will thrive in India, wherever properly cared for.

B. Fresh-water ponds should be developed for the culture first, of native carps; second, of various Chinese carps; third, and probably most important of all, gurami.

C. The study of the fishes of the Bay of Bengal should be intensified and amplified. The distribution and relative abundance of food fishes in the Bay of Bengal should be known.

Second, the development of trawling and other methods of off-shore fishing should be vigorously encouraged. If local capital cannot be interested in such projects, fall back on the Japanese fishermen, and let them supply in part the hungry millions of Bengal. Already, I understand Japanese trawlers are at work in the Bay of Bengal. On my recent visit to Rangoon, the markets gave evidence of the activity of Japanese fishermen.

If the Government were to back such projects properly, grant licenses to Japanese with regulations and restrictions concerning the employment and training of Indians, and otherwise safeguard the embryonic industry, it would lead in time to a fleet of modern fishing vessels manned and controlled by Indians.

The open sea is available to any or all nations with men and ships. Japanese, or fishermen of any other country, are therefore free to fish in the Bay of Bengal outside territorial waters. They should be allowed to dispose of their catch in Calcutta, and thus benefit the general run of fish consumers. If they are not allowed to do this, they will dispose of their catch in Rangoon, Singapore, and even ship the more desirable kinds back to Japan.

But it is not an unmixed blessing to have any great industry or source of food under the control of aliens, living in and owing allegiance to another country. However, it would do no harm, but would be a public benefaction to allow the development of a new industry in a country by aliens, if, at the same time, a body of citizens was trained and financed to take over the bulk of the industry ultimately.

Third, before anything else is done *in re* marine fisheries, arrangements should be made for the proper distribution and marketing of the fish obtained. These require an abundant supply of cheap ice, and ample cold storage facilities. The logical agency to supply such need is, of course, the Government itself. There is no great public service rendered if the catch is brought in half putrid or even just stale, and then left to haphazard devices or agencies to get it to the consuming public.

Fourth, there should be no false ideas about having a fishery department "pay its own way". We are dealing with a food supply necessary for supplying protein to rice-eating populations, with vast potentialities of increase in quantity and reduction in cost. To feed the people is a necessity and a fisheries department should no more be called on to pay its way, or show a profit, than to expect the public health service to get rich from epidemics. For example, to successfully introduce the culture of gurami into India, and thus augment the food supply of generations to come, would add untold lakhs of rupees to the wealth of India. This would be true even though it cost the Government many thousands of rupees, and the fry were distributed *gratis* until private individuals had bred ample stocks, sufficient to meet all demands.

There is no question that the Government of Bengal needs to develop fisheries, marine as well as fresh-water. This can only be accomplished by long-time planning. A programme should be laid out for ten years ahead and for twenty-five years, and every effort made to carry out the plans outlined. The plans should be drawn up by the best trained scientists, with long and successful experience, and a scientific man of broad training and experience should be placed at the helm to see that they were properly executed. He should, likewise, be authorized to amend, amplify, or otherwise adapt the programme to meet changing conditions, public prejudices, and other deterrents of such character as to be unforeseen.