

species in future years. Here again, the results obtained are comparable to those already known in the case of Herring Fisheries of the Norwegian waters. By far the most creditable piece of research accomplished is to trace the life-history of the most valuable anadromous fish of India, the well-known *Hilsa* of Bengal and the *Palla* of Sind. These researches will no doubt enable in years to come the propagation of the species artificially as is being done in the case of the American Shad.

Through technological research considerable advances have been made in the methods of fish-curing and preservation; in increasing the manurial value of seaweed compositions and in devising means of wood preservation.

Other research items include plankton investigation, fish-marking experiments, hydrographical investigations, pearl fisheries, research on *Gourami*, *Catla*, *Chanos*, and *Etroplus*, etc., etc.

Attention is also directed in the Report to such activities as the supply of Biological Specimens, Anti-Malaria Work, Socio-Econo-

mic Work, Propaganda, Fishery Legislation and Publications of the Department. Among publications are mentioned Fish Statistics, Fishing Methods on the Malabar Coast, Bulletin on Pearl Fisheries, Bulletin on Marketable Fish, Trawlers' Report and a report on the brackish water perch *Therapon jarbua*.

In Part II of the Report reference is made to the sound financial stability of the Department which showed a surplus of one lakh of rupees of income over expenditure. In the final part, the Director deals with the Staff and equipment of the Department.

On the whole, the Report, as in the previous years, marks a distinct advance in the development of fisheries in the Presidency of Madras and for this achievement great credit is due to Dr. B. Sundara Raj, the Head of the Department. The working of the Department under great limitations and severe handicaps has demonstrated all the same that fisheries can pay well in this country provided they are properly organised and have a scientific staff to direct and guide the working of the fisheries.

Indian Fisheries.

THE developement of the fishery resources of India is of the greatest importance for the improvement of the health of its teeming millions. In our recent article on 'Indian Fisheries and Japanese Enterprise' (May 1937, 5, 573-77) attention was directed to the present unhappy state of affairs and suggestions were made for its improvement. Our readers will be glad to note that *Nature* in its issue of August 14, 1937, made favourable comments on our editorial and added further details to indicate the gravity of the situation. Our Calcutta contemporary *Science and Culture* also published an article from Lt.-Col. R. B. S. Sewell, F.R.S., on "Sea-Fisheries in Indian

Waters" in its issue of October 1937. Finding a certain amount of awakening of public interest in this matter, we requested Rai Bahadur Dr. S. L. Hora to obtain for us the views of persons who have had first-hand knowledge of Indian fishery conditions and we are glad to publish elsewhere in this issue an article from the pen of Dr. A. W. Herre, formerly chief of the Bureau of Fisheries, Manilla, Philippines. We hope to publish further articles as they become available and later to summarise the views of experts for the benefit of the general public. We take this opportunity to extend to Dr. Hora our sincerest thanks for his valuable co-operation.

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.