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MADRAS FISHERIES DEPARTMENT

ADMINISTRATION REPORT

FOR THE YEAR

1929-30

1059/88

BY

DR. B. SUNDARA RAJ, M.A., PH.D.

Director of Fisheries

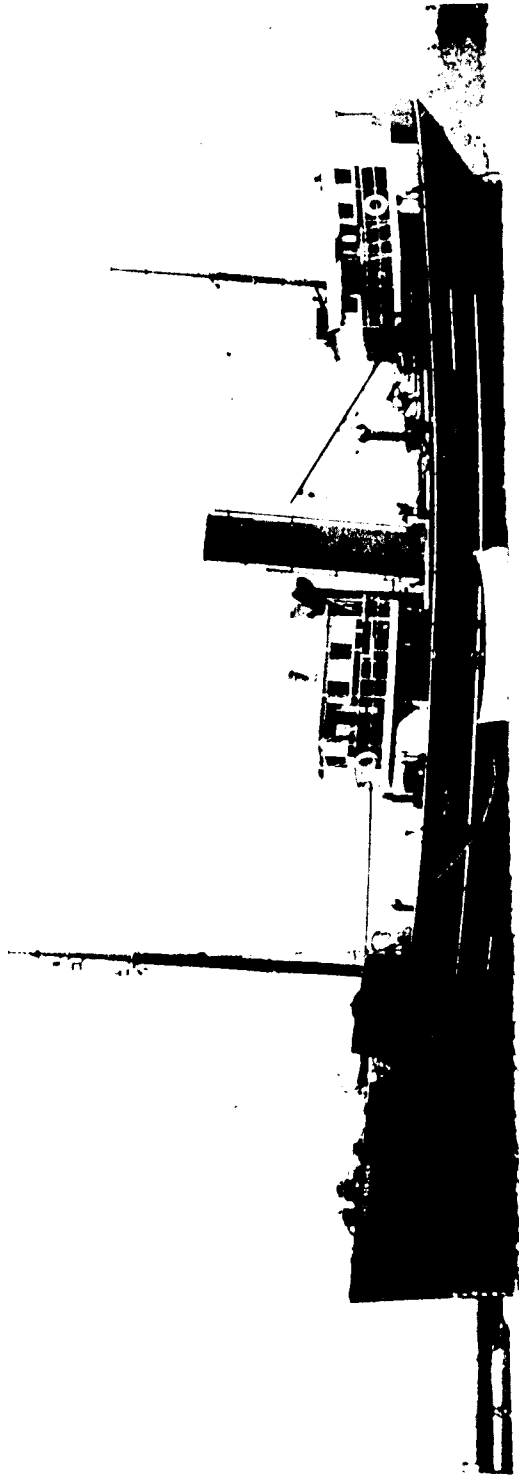
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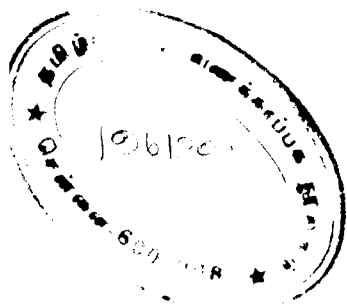
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Report No. 1 of 1931

ADMINISTRATION REPORT OF THE DEPARTMENT
OF FISHERIES FOR THE YEAR ENDING
30TH JUNE 1930

BY

DR. B. SUNDARARAJ, M.A., Ph. D.
Director of Fisheries

I have the honour to submit the annual report of the Fisheries Department for the year ending 30th June 1930.

2. During the year under review the whole work of the Department has received a great impetus as a result of the report of the Committee on Fisheries published last year. The outstanding achievement of the Committee was to bring back to the Department and the public the realization of the true purpose and aim of a technical Fisheries Department, viz., the material amelioration of the lot of the sea-going fishermen. The activities of the past 25 years, remarkably successful as they were under the able and disinterested guidance for the greater part of that period of Sir F. A. Nicholson, seemed in later years somewhat to obscure what should be the primary object and policy of the Department. The tendency to assess the value of any achievement by its financial returns has once for all been corrected. The purpose underlying the acquisition of the trawler has been recognized. Exploration and survey, not commercial trawling, are now the avowed objects in view. Technological improvements in curing, canning, refrigeration and allied industries should follow ultimately in the wake of improved catches. Socio-economic and humanitarian endeavours, however necessary and important in view of the caste system of India which relegates fishing as an occupation to one caste, and that among the lowest and poorest of the population, could not directly add one fish to the actual catch of the fishermen.

Efforts, therefore, to improve the professional knowledge of the sea-going fishermen and the catching powers of his craft and tackle must necessarily occupy the first place in the departmental programme.

3. The most important feature of the year's work reviewed in the report is the value and importance of research done towards immediate practical ends. Directly resulting from a clear definition of its aim and policy, the sphere of the trawler's operation has been precisely fixed, the area she will explore, the nature of the investigations and survey she will conduct have been clearly laid down. Accurate scientific observations and correct analysis and record of hauls made as well as their subsequent study and compilation into charts and reports have become possible with the appointment of a qualified Biologist on board and the provision for the full equipment of the two biological stations at Calicut and Krusadai Island. Intensive work with a settled programme has been carried on since June last, notwithstanding the great delay in the receipt of drift and seine nets and the motor cable for the complete survey contemplated by the trawler.

4. The long-needed reforms for improving the sanitation of the gutting shed and the efficiency of the drier at Tanur and the further vitamin tests of the sardine oil have been made, despite one of the worst fishing seasons ever encountered.

5. Fish statistics for three years have been compiled and brought up-to-date. Concentrated research on oysters enabled us to correct old and erroneous ideas and has opened up possibilities of working the natural resources without risk of depletion which has arrested operations at Pulicat and Ennur. The rapid decline of the trout fisheries on the Nilgiris due largely to the ill-advised closure of the Avalanche hatchery has been partially remedied by the timely resuscitation of the trout hatching and breeding operations in January last. Tangible results have rewarded the patient and prolonged catla stocking operations of nine years. The Mopad reservoir under strict departmental scrutiny both as regards stocking and fishing has yielded such invaluable data about the manner and method as well as duration of stocking and the possibilities of establishing this valuable exotic food fish that the departmental operations in extending the distribution of this species to the Cauvery River and further south can now be carried out with knowledge and certainty. Finally, mention must be made of the success that has attended the venture to introduce innovations in

the age-long methods of pearl and chank divers, by the introduction of simple and inexpensive diving devices. The possibility of keeping the local diver submerged for about a quarter of an hour instead of the customary fraction of a minute, has already been ascertained in shallow water in the course of ten days' experiments. The scheme, if successful in deep water, will revolutionize the time-honoured methods of this ancient industry to the benefit of the diver and the State alike.

6. The fishing season on the West Coast in the year under review has been the worst within living memory. The depression caused had an adverse effect upon transactions in fish-curing yards, work of the Tanur Station, and even on the socio-economic activities of the Department. On the other hand the East Coast on the whole enjoyed a more than usually prosperous year. The Chank Fisheries were particularly successful; the number of chanks fished increased nearly 50 per cent and the revenue rose from one lakh eight thousand to one lakh sixty-three thousand rupees.

7. This report is a record of progress in many directions.

PART I

ACTIVITIES OF THE DEPARTMENT

I. MARINE FISHERIES

A.—RESEARCH.

(a) Scientific Research.

8. The survey of the deep-sea fishing banks by the trawler "Lady Goschen," the analysis and study of collections and observations made both by her and locally at the four stations at West Hill, Krusadai Island, Madras and Vizagapatam, and the compilation of fish statistics from fish-curing yard returns, constituted the bulk of the research work on marine fisheries. The reorganization of the research section of the Department received considerable attention from Government as a result of the report of the Committee on Fisheries. Important additions to the staff and equipment were made; a new gazetted post of Assistant Biologist was created; a laboratory attendant was sanctioned for the Krusadai Island station and the services of the temporary statistical clerk

at West Hill entertained in 1929 were continued for a further year. Rs. 11,440 was sanctioned for equipping the West Hill and Krusadai Island biological stations with the minimum of apparatus and fittings for the conduct of research.

9. A whole-time officer for research on board the trawler and two well-equipped biological stations on shore to deal with collections and observations made at sea and ashore will enable the Department to make far more systematic and through research than has been possible hitherto under my personal supervision.

10. (i) TRAWLER.--In previous annual reports for 1924-25 and 1926-27 and in the report of the Committee on Fisheries (pp. 210-215) the aims and objects of the Department in purchasing a full-sized trawler for deep-sea research have been explained. Nevertheless the trawler being the most expensive experiment that the Department has so far launched, its purchase has come in for a good deal of unmerited and unsympathetic criticism, possibly resulting from ignorance and misunderstanding on the part of the critics. It seems, therefore, necessary to detail here even at the risk of some repetition the reasons that led to the purchase of this vessel, larger in size than any used by the Department before, and the work it is expected to do.

11. In the course of the last quarter of a century during which the department has worked, the improvement of sea-fishing methods has rightly been recognized as its primary duty, although no immediate success crowned its efforts in this direction. Fishermen in India are an extremely poor, ignorant and conservative caste. They consequently have neither the initiative nor the capital to develop the industry. The more enlightened and wealthy castes are precluded from entering the fishing profession which is not their parental occupation. Fishing craft and methods have, in consequence, remained extremely primitive in spite of the great strides made in other professions in recent times. The dug out canoe and the catamaran (a raft) are the only fishing craft in the country. On account of the small sized nets and appliances used and the total absence of mechanical power or labour-saving devices, the area fished by local fishermen is the strictly inshore belt of the sea up to an extreme limit of ten miles from the shore. In western countries and in Japan and Australia, on the other hand, powerful vessels equipped with stern or motor power and the latest labour saving-devices in fishing gear of every description

exploit the seas over hundreds of miles from the home ports. It will, therefore, be self-evident that efforts to improve the indigenous craft and tackle and to extend the local fishermen's range of operations should occupy the front rank in the Department's programme of development. Since improvements in preservation methods are dependent on catches, and educational and co-operative work, however helpful and necessary, cannot add a single fish to the catch of the fishermen, an attempt to augment catches is the only radical solution of the fishermen's economic problem and this should be the primary aim of the Department, both for the uplift of the fishermen and the advancement of the industry.

12. Many different types of vessels have been tried without success. Motor boats of different designs ranging from 5 tons ("Pearl") up to 20 tons ("Sea-Scout") and larger fishing craft from Ratnagiri drifters, a schooner with auxiliary motor ("Lady Nicholson") and a small steamer ("Margarita") have been tried. All in their turn proved their unsuitability and the one unmistakable lesson of the past has been the need for the services of an expert Master Fisherman for conducting experiments and for a vessel of approved pattern and sufficient size and sea-worthiness to stand weather conditions in India. The trawler is the minimum sized steamer that can withstand the monsoon in India and is suitably designed for fishery research of every description. For this reason the Fishery Departments in all other countries who engage in deep-sea research employ only trawlers for such investigations. A smaller vessel will not only run great risks in monsoonish weather but will not give the necessary accommodation and facilities for a scientific staff and Master Fisherman on board who has to be a European in the absence of deep-sea fishing anywhere in India. The choice of a trawler for investigation and the entertainment of an expert sea fisherman was therefore the inevitable logical consequence of the abortive efforts of the Fisheries Department in the past, and was the next step in advance indicated by past experience.

13. The most casual enquiry is sufficient to convince one that the professional knowledge on which the sea-going fishermen depend for the successful prosecution of their trade is a fairly certain knowledge of the nature of the fisheries of their coast at different seasons obtained by actual experience in the course of centuries. It is on the knowledge of the occurrence of the different classes of food fish at different seasons and times according to wind, weather, sea and sea-bottom that the fisherman trades. The local fisherman's

fund of information on all these matters pertaining to his industry in inshore waters is fairly complete and there remains little to be discovered or taught to him. But he now knows practically nothing about the contents and character of our seas outside the ten mile range. Unless similar knowledge regarding the deeper sea beyond is made available to the fisherman, he will obviously never be able by himself in his present state of ignorance and poverty to extend his field of operations or exploit deep-sea fisheries. The whole aim before the trawler is to obtain and make available such knowledge. So far as the department and the Government are concerned, this knowledge of the deep-sea fisheries is the only safe and sure foundation on which any intelligent and useful scheme of fishery development can be based.

14. Unfortunately the acquisition of a full-sized trawler for investigation has led many to believe that the department's programme of development contemplates revolutionary reforms. That no such sudden jump from the catamaran or canoe to steam trawl is possible and even if possible would be inadvisable, was recognized years ago (vide Madras Fisheries Bulletin, Volume I, page 84). The reason then for the acquisition of the trawler as explained above is that experience for the last quarter of a century has proved vessels of smaller size to be useless for deep-sea exploration and experiment. But the aim is not to test the suitability of the trawler to Indian conditions or to ascertain whether steam trawling will or will not pay in Madras waters. In establishing new industries it is essential that work should begin with *investigation* and *experiment*. The *investigation* in this case will consist of the survey of deep-sea fishing grounds and the determination of the kinds and quantities of the marketable fish available at different seasons and depths. The latter involves the systematic use of the best known methods of capture, the long line especially in rocky areas, drift nets for surface shoals, seine and wall nets for mid-water dwellers, and the trawl for bottom fish, and thus incidentally provides *experiments* to test western apparatus and methods in our seas. At present we know nothing of our deep-sea fisheries and until we ascertain the fishable contents of our seas beyond the range of the local fishermen, we are not in a position to take the further step of entering on *industrial* or *commercial* work. The immediate work of the trawler has, therefore, been strictly limited to survey and investigation. The financial failure of commercial trawling attempted in Bengal and Bombay before the necessary

knowledge of the nature of our deep-sea fisheries had been gained, the fitness of steam trawl as an instrument of capture had been tried, and rapid transport facilities and a market had been created, is a striking object lesson. We have not yet therefore, the requisite knowledge for undertaking experiments in commercial steam trawling as a remunerative industry and any experiment in commercial trawling must await the results of the survey now in progress for providing the data.

15. The accepted general principle, therefore, in pioneering new industries, that investigation and experiment should always precede industrial and commercial work, is reason sufficient for the decision that the trawler should, for the present, confine herself to exploration and research. Besides indications are not wanting which seem to show that steam trawling is not immediately practicable in Madras. Indeed, even if for any area the presence of large quantities of edible bottom fish had been ascertained, and the steam trawl had been proved the best method of capture, still there are other conditions essential for rendering steam trawling remunerative, such as port and harbour accommodation, the market, transport facilities and trade organization for distribution, all of which are very poorly developed in Madras. The marketing side of the enterprise is an even more difficult undertaking than the discovery of rich trawling grounds. Unless a ready market with reasonable high prices and an elaborate distributing trade is available, steam trawling, which is, perhaps, the most expensive method of capture known, may not pay. This raises the question, about which opinion is divided, whether Government should undertake fishing on a commercial scale and enter the business market as producers and sellers in order to bring into existence such a market and trade.

16. Presuming for the sake of argument that trawling proves a successful commercial proposition there is a further important objection to its immediate introduction in India. Fishing is still an ancestral profession. Any sudden increase in supply of fish without a simultaneous enlargement of the fresh fish market, adequate transport facilities into the interior, and distributing agencies, will certainly glut the coast markets and deprive the fisherfolk of their only means of livelihood without any compensating benefit to the country of providing an increased food supply to the masses.

17. On all accounts, therefore, it is premature to commence experiments in commercial deep-sea fishing, especially steam trawling, and Government have accepted for financial and administrative reasons the recommendations of the Committee on Fisheries that the trawler should, for the present, engage only in exploration and research which is the first step in pioneering the new industry. She will survey systematically the offshore belt up to 100 fathoms, up to which the local fishermen with slightly improved boats and nets may be persuaded to extend their operations. She will compile a fisherman's chart of this offshore belt on the model of Close's Chart of the North Sea for the information of the local fishermen and trade. Nothing more seems immediately necessary if the gradual development of the sea fishing industry and not an industrial revolution is the accepted policy of Government. With a single trawler, a small staff and limited funds available for fishery research, the work outlined above is the maximum that can be done. Even so, it is anticipated that the investigation will bring to light the existence of vast resources and possibilities within easy reach of our fisherman, of which he is at present totally ignorant. The survey has already shown on both the coasts the presence of fish in deeper water where the local fishermen complain of a dearth of fish inshore.

18. The first report on the trawler's survey for the year 1927-28 is now in the press. A second report covering the year 1928-29 is nearing completion.

19. In accordance with the decision to do intensive work on two selected sections of the East and West Coasts in the south-west and north-east monsoons, so as to complete the monthly observations for a full fishing season within 1932, the period for which Captain Cribb has been re-entertained, the coast from Pigeon Islands to Calicut and Point Calimere to Madras have been chosen. The trawler, remodelled and equipped with a laboratory commenced the systematic survey in the northern section of the West Coast from Pigeon Islands to Mangalore in March 1930. She was docked in Cochin for annual repairs and quarterly boiler certificates in April. At the advent of the south-west monsoon in May she came to the East Coast and surveyed the southern section from Point Calimere to Porto Novo in June.

20. The drift and seine nets ordered from Europe not having arrived, the survey consisted as usual of trial hauls for bottom fish. Most of the 35 hauls made in the Mangalore section were within 70 fathoms, as the sea bottom beyond the 70 fathoms to the

100 fathom line was found to be rocky and unsuitable for trawling. The trawling ground within 70 fathoms on this section consisted mostly of mud. In only one instance was the net badly torn within 70 fathoms. This was in 29 fathoms due to out-crop of rocks. Numerically cat fish were the commonest. Sharks and rays though second in point of numbers were easily the first in weight. Among the latter were four large saw fish. Horse mackerel (Carangidae) ranked third in numerical importance. Besides fish, two green turtles were also caught.

21. A total of 40 hauls was made in the section from Point Calimere to Porto Novo. Between 10 and 20 fathom lines rocks were frequently encountered. A greater variety of food fish was found, and cat fish were practically absent. Good class edible fish of large size including rock cods, sea perches and breams, horse mackerels, snappers, etc., were much more common than in the case of the West Coast hauls. Though it may be premature to draw conclusions, the survey on the East and West Coasts in March and June respectively seems to show that the prevailing impression that the West Coast is far more productive of fish than the East is probably true only of strictly inshore grounds. The offshore fisheries tested for the first time by trial hauls in the Negapatam area have proved the abundance of better class fish than was available in the corresponding area on the West Coast. This, if true, is an important new discovery which is likely to have far-reaching effects in the development of the East Coast fisheries.

22. June being the height of the season for the flying fish fishery off Negapatam Coast, the trawler came across several fleets of catamarans engaged in this fishery with their bundles of leaves (*Tephrosia purpurea*) which are employed by the fishermen to lure the breeding fish. Besides flying fish, large shoals of small surface fish were seen but could not be captured for want of drift and seine nets of suitable mesh.

23. To contrast the catches made by the trawler in offshore waters with those made by local fishermen in the adjacent shore area, the fish-curing yards in the section surveyed by the trawler have been asked to report the daily catches of local fishermen. In addition, whenever the trawler puts into port for landing fish the research staff invariably visit the local market and note the kinds and quantities of fish obtained by local fishermen. In the detailed reports on the survey which will be issued from time to time, a detailed comparison on the above lines will be made.

24. As usual a large quantity of marine organisms, sponges, alcyonarians, gorgonids, sea-pens, corals, crabs, molluscs and echinoderms were got up by the trawl and have been preserved for future study.

25. *Catches sold*.—Since the trawler is engaged in exploration and survey, as in the previous year, no attempt to fish prolific areas and sell the fish to advantage in the market was made. On the few occasions when the trawler called at a port and happened to have fresh fish on board they were sold, but on several occasions when she could not return to port the fish captured after noting kinds and weights were dumped into the sea. The statement below gives details of hauls and the catches sold:—

Locality.	Month.	Number of hauls.	Weight of fish caught.	Amount realized.		Value per lb.
				RS.	P.	
1. Off Malpe ...	March 1930...	35	6 tons 16 cwt. fresh and salted together.	392	14 0	Nearly 5 pies.
2. Off Negapatnam.	June 1930	40	6 tons 18 cwt.	263	4 0 for 2 tons 14 cwt. of fresh and salted.	Nearly 8 pies.

26. (ii) WEST HILL LABORATORY, CALICUT.—The systematic examination of sardine and mackerel, and the bi-weekly plankton collections were continued as in previous years. At the request of the Professor of Oceanography, Liverpool University, the plankton collections stored in the laboratory were sent to Mr. Ramaswami Nayudu for detailed study and report in connection with his course in Oceanography.

27. Only 39 sardines and 65 mackerels could be examined on account of the very poor season. Plankton was collected on 85 days.

28. With the appointment of the Assistant Biologist and the consequent increased work in the laboratory, additional accommodation will be required. An abandoned oil and guano factory which is close to the West Hill Fisheries Station and which is the only suitable building will be hired for this purpose.

29. (iii) KRUSADAI ISLAND BIOLOGICAL STATION.—The collection and identification of Pamban fishes was continued as in the previous year. Specimens preserved were sent from

time to time with notes to the Director for further study in connection with the bulletin on the marketable fish of Madras now under preparation. The Research Assistant has also continued his inspection of all the important fisheries in the Pamban area. Interesting results have already been obtained from these studies. Besides the discovery of a large sardine fishery—the first of its kind recorded on the East Coast—which was mentioned in last year's report, the occurrence of another important fishery has been reported relating to *Hemirhamphus georgii* (Tamil "Murrel"). The fishery starts in the latter half of March in the Palk Bay from Rameswaram to Mandapam where Theedai is the most important centre for this fishery.

30. It has been observed that in June and July the high tide which enters a portion of the swamp in the centre of the island brings into the basin thus formed the fry chiefly of milk fish (*Chanos chanos*). The milk fish, which is held in high esteem, is the species found in Hyder's ponds in Coondapoor, South Kanara, and the same fish is extensively cultivated in lagoons and brackish ponds in Java. The possibility of a marine fish farm for *chanos* on the island is under investigation. About a dozen young *chanos* caught in the swamp were transferred to a well adjacent to the research station where they have survived and become acclimatised to brackish water.

31. The daily collection and examination of plankton from the Kundugal channel were continued as before, with improvements in the method of collecting and preservation for future quantitative study.

32. (iv) VIZAGAPATAM STATION.—The collection and identification of the common food fishes of this coast is progressing. In the absence of research staff and laboratory facilities no systematic research has been possible.

33. Investigations at Nizampatam seem to show that the fisheries of the Guntūr coast are so peculiar as to justify the separation of this section of the coast from the Circars as a distinct area by itself. This matter will be further investigated.

34. (v) MADRAS AQUARIUM LABORATORY.—Dr. D. W. Devanesan completed the research on the early stages of the edible oyster. A collection of sea urchins from the Ennore station was worked out by him and resulted in the discovery of a species new to science. A description of the new species was communicated to the Science Congress held in 1930.

35. My studies on the incidence of spat fall, growth and mortality of the Madras edible oyster in its natural environments were continued. The samples of seawater collected by the trawler in her cruises were analysed by the Laboratory Assistant who has been specially trained for the work.

36. (vi) FISH STATISTICS.—The statistical report for the year 1926-27 was sent to the Press. Though the number of statements included in the report was nine as in the previous year and the same headings were retained several of them have undergone radical revision in the treatment and presentation of facts and figures. Statements of statistics for 1927-28 and 1928-29 have been compiled. It is proposed to add to the usual nine statements of fish statistics three more census statements of the fishing population, their craft and tackle. These latter are under preparation. No attempt has been made to discuss the statistics or draw conclusions, as such discussions and conclusions are not of much value unless they are borne out by the statistics of several years. At the end of ten years it is hoped to review the statistics with a view to drawing general conclusions which could be safely formulated with some pretence to accuracy.

37. The preparation of the West Coast statistical reports fell into arrears as the Research Assistant, West Hill, found it impossible to cope with all the duties at the station single-handed. The provision of a statistical clerk has enabled him to bring the work up to date. It is hoped that the reports for 1926-27, 1927-28 and 1928-29 will be published before the end of the current year. During the year a beginning was made in analysing and tabulating the statistics relating to the East Coast returned by the fish-curing yards at Krusadai Island, Ennur and Vizagapatam.

(b) Technological Research.

38. (i) FISHING METHODS.—Captain Cribb while in England on leave made enquiries for suitable drift and seine nets and a motor boat for operating the Danish seine net for the trawler. The following nets and boat recommended by Captain Cribb were indented for on 1st April 1930 from the Director-General of Stores, London:—

- (1) Mackerel drift net. 32/12 ply, N.T. 50 yards $\times$ 8 score $\times$ 41 rows per yard. Guarded 4 $\times$ 4 included in the depth.
- (2) Sardine drift net. 31 score deep by 60 yards long $\times$ 90 rows per yard. 32/9 ply corded and osselled top and bottom (tanned).

- (3) Danish seine net. Special size $\frac{3}{4}$ " square mesh or 48 rows to the yard in wings and mouth suitably tapered down in the sack.
- (4) Seine net warps. 4 strand 35 coils.
- (5) 23 feet square stern motor coble equipped with 6 to 8 H.P. Ailsa Craig Kid Junior motor.

39. Without the above equipment mid and surface water fish, which include some of the best known Indian food fish, cannot be captured. The trawler survey has therefore been necessarily limited to bottom fishing by the trawl.

40. For the preliminary experiments in improving the indigenous sardine and mackerel nets and fishing methods of the West Coast, Captain Cribb designed a new net which is now available for experiments. Since the survey more or less continuously occupies the Assistant Director's time, it has not been so far possible for him to carry out any demonstration with this new net. The sardine and mackerel fisheries for 1929-30 have also been exceptionally poor.

41. (ii) TANUR EXPERIMENTAL STATION.—The canoes and drift nets at the station could not be used as hitherto as labourer fishermen who used to work the boats on the customary system of sharing the catches equally were not available. The series of poor years has reduced this class to a deplorable state of indebtedness to the capitalist and they are no longer available as independent labourers. Attempts were made to secure fishermen from Chaliyam and Beypore. But the conditions there were no better.

42. The research work at the station in preservative methods and in the Manufacture of oil, guano and fish-meal are at a standstill pending the appointment of a Fisheries Bio-Chemist, which has been postponed by Government. The extremely poor fishing season also prevented the manufacture of cured fish, oil and meal on the usual lines.

43. *Vitamin D in sardine oil*.—A further test of the Malabar sardine oil for Vitamin D was however made through the kind offices of Dugmer Curjel Wilson, Esq., M.D., D.P.H., in charge of Osteo-malacia Enquiry, Indian Research Fund. Dr. Wilson offered to test the sardine oil for Vitamin D by experiments in the first place on rats at the Central Research Institute, Kausauli, and later if indications were satisfactory, on clinical cases of rickets of Osteo-malacia at Amritsar, Lahore. Eight ounces of first-class sardine oil from an old stock in the possession of a private manufacturer at Mangalore was purchased and sent to Dr. Wilson for

test in January 1930. Mr. Wilson reported that the 8 ounces of sardine oil was made into emulsion 1:3 and tested on cases of Osteo-malacia (Late Rickets). Even in the emulsion form, it was extremely unpalatable and it was very difficult to persuade the patients to continue the treatment. After three weeks' treatment, there seemed to be some improvement but on such a small number of cases the results are inconclusive. In the absence of sardines on the West Coast during the last few years, the manufacture of oil has practically ceased. Unless the oil is refined and made palatable and a constant supply on a large scale cheaper than the imported cod liver oil be assured, it is not worth while for him to continue the tests. If the sardine season this year proves favourable, the question will be further examined.

44. *Experiment with cement vats for curing.*—Attention was devoted to structural improvements in the curing plant. With the "Char-Minor" cement recommended by the Harbour Engineer-in-Chief, with the proportion of 2.56 of lime to silica and alumina, vats were constructed but in the absence of fish little or no use could be made of the vats.

45. *Improvements to artificial drier.*—The prawn fisheries of the East and West Coasts are worth several lakhs of rupees. The height of the prawn fishing season in many parts of the coast coincides with the south-west monsoon. The customary method of curing is to sun dry the prawns fresh or after an initial boiling. In the Northern Circars and in the Chilka lake, the prawns are first boiled before they are dried in the sun. As the south-west monsoon and the fishing season synchronize, much loss occurs on days when inclement weather prevents the sun drying of prawns. To solve the difficulty Sir F. A. Nicholson devised an artificial drier, which is a tiled shed, with two fire places in front and tunnels under the floor leading from the fire place to a chimney at the back of the shed. Above the floor inside the chamber are arranged two racks along either side for trays of shelled prawns. A series of vents along the bottom on either side of the chamber admits fresh air which on being heated by the floor kept hot by fires rises through the rows of trays above and escapes through the tiles. This drier was only an experiment and had never worked satisfactorily since its construction. The two principal defects noticeable were: (1) uneven drying, i.e., the trays of prawns near the fire chamber dried far too quickly and were often charred while the top trays in the drier showed little or no sign of drying; (2) uneven heating; while there was extreme heat immediately

above the fire chamber, the heat was imperceptible at the top. Both the defects were traced to imperfect circulation of air in the chamber. In Europe and elsewhere power-driven fans are employed for effecting a rapid circulation of air through a drier. Both on account of the expense involved and the mechanical skill required, such arrangements are not suitable for the Indian curer. Efforts were, therefore, made to effect the necessary circulation by convection currents set up by the fire chamber. A small inexpensive structural alteration to improve the air circulation within the chamber was tried this year. The alteration has resulted in substantial improvement in the working of the drier. Thus the problem of uneven drying appears to have been solved to an appreciable extent but that of uneven heating still remains and will be the subject of experiment in the ensuing season.

46. *Improved gutting platform.*—The gutting and dressing of fish for curing used to be done in an open tiled shed with cement floor. The fisher-women who were employed for the purpose had to walk over the floor on which the fish were heaped for gutting. The sanitation of the gutting chamber consequently was not all that was to be desired. The women workers are accustomed to squat on the floor and gut and dress the fish on knives held by their feet at one end and propped on a stone or other support at the other end. Being job-workers any interference in their customary method, such as the introduction of a gutting table or new style of gutting knives, entailed hardship, as they could not work as quickly and efficiently under the new conditions, and so deprived them of part of their wages. The problem was to effect improvements in sanitation without altering the tools or the customary posture of the workers. Two parallel platforms of polished Cuddapah slabs raised only a few inches above the floor and sloping towards each other along the mid line was finally decided on as the most suitable for the purpose. Closed gutters to drain the platform and the baskets of fish on either side of the worker have been provided to carry away any effluent fluid to a closed cemented pit at one end of the platform. The women sit along the edge of the platform on either side on special wooden seats carrying their usual knife the free end of which rests on the edge of the Cuddapah slab-platform. The feet of the workers are under the elevated edge of the slab. The baskets of fish to be gutted are placed in circular pits alongside each worker, the bottom of the pit being kept in communication with the main central gutter. Thus all

possible pollution of fish by dirt and filth brought in by walking on the floor is wholly prevented. This improved hygienic platform came into use during the year.

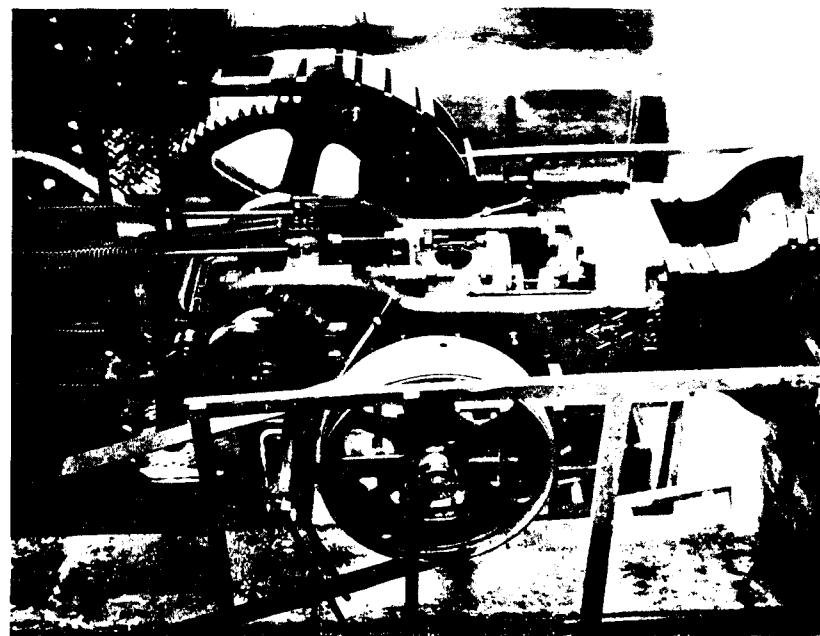
47. *Purchase and manufacture.*—13,299 lbs. of fresh fish for curing was purchased for Rs. 399 0-6 (at an average price of 5'77 pies per lb.) as against 20,499 lbs. of fresh fish for Rs. 684 15-10 (at an average price of 6'41 per lb. in the previous year. 11,869 lbs. out of this, were prawns, 1,365 lbs. "podimeen" (small miscellaneous fish) and the remaining 65 lbs. of larger food fishes. The total output for the year was only 2,394½ lbs. of cured fish and 1,855 lb. of fish-meal valued at Rs. 702-6-8. During the year 760 lbs. of fresh fish for Rs. 22-1-6 was purchased for manufacturing 159 lbs. of fish-meal. The balance of meal was manufactured out of prawn shells and old stock of cured "podimeen."

48. *Sales.*—During the year 2,200½ lbs. of cured fish and 6,866¾ lbs. of fish-meal and other miscellaneous products were sold for Rs. 3,766-7-8 as against 11,408½ lbs. of cured fish, 13,437 lbs. of fish-meal, 824 lbs. of manure and 784 lbs. of fish oil and other miscellaneous products sold for Rs. 7,745-5-11 in the previous year. The demand for prawns, high class fish and cheap fish-meal was greater than the output. For want of stock many customers had to be disappointed. The cheap variety of fish-meal has become very popular among the poultry breeders.

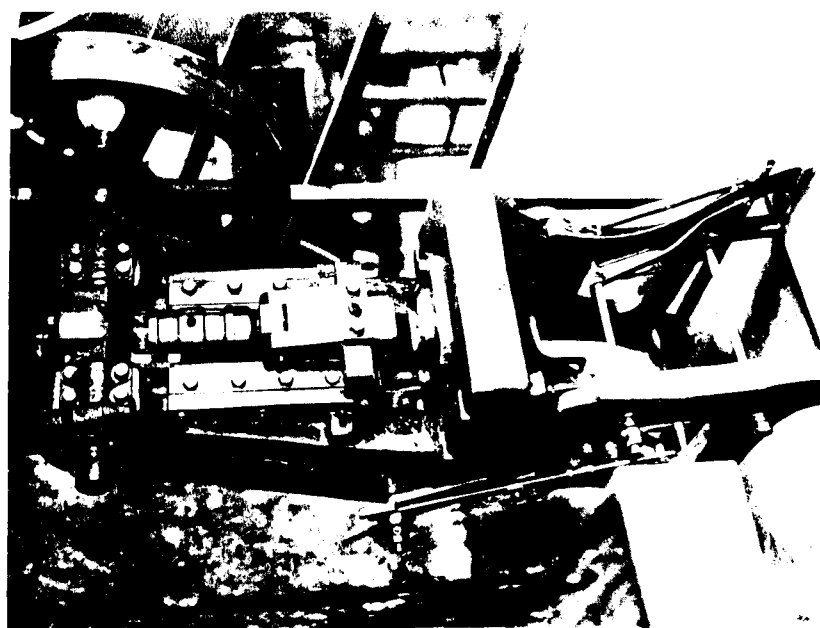
49. *Stock.*—The year closed with a low stock of 122 lbs. of prawns, 4 lbs. of "podimeen," 155 lbs. of prawn shells and 23 lbs. of bones.

50. *Factors limiting manufacture.*—The year under review proved an exceptionally poor fishing season. Sardine and mackerel were scarce. The catches of prawns and big fishes were also very meagre.

51. *Receipts and Expenditure.*—The total receipts for the year amounted to Rs. 3,907 6-11 as against Rs. 9,042 6-0 in the previous year and the expenditure, excluding Rs. 2,529 7-0 establishment charges, came to Rs. 8,144-3-4, as against Rs. 4,970-11-5 in the previous year. The expenditure shown above includes a sum of Rs. 5,709-10-9 spent on new works and repairs to buildings and sheds, etc. Deducting this, the ordinary expenditure amounted to only Rs. 2,434-8-7. This low figure under running charges is partly due to reduced manufacture and partly due to strict economy.



The Canery, Chidambaram. Can-making machine.



The Canery, Chidambaram. Trimming and flensing machine.

52. The station during the year under review has shown a debit balance of Rs. 7,273-7-4. This includes a sum of Rs. 5,709-10-9 spent on repairs and a sum of Rs. 113-6-0 represents travelling allowance paid to the Research Assistant for his visits to Chaliyam etc., to attend to Cannery work. If these are excluded the debit balance is reduced to Rs. 1,450-6-7.

53. A Profit and Loss Account is attached (Appendix II). In G.O. No. 1054, Development, dated 22nd May 1930 it has been ordered that the accounts of this station are, with effect from 1st April 1930 to be audited by the Assistant Director of Commercial Audit, Madras. The figures are therefore subject to audit.

54. *Training.*—As usual the pupil teachers of the Fisheries Training Institute went to the Tanur station for practical instruction for a short period. The Sub-Inspectors Kunhianandan, Abdul Hamid Khan and Leggett underwent a course of training, at the station.

55. *Buildings and sheds.*—Extensive repairs had to be done to the buildings and sheds at a cost of Rs. 5,709-10-9. This large sum had to be spent this year as repairs had not been done in the past.

56. *Residential quarters.*—Plans and estimates have been prepared by the Executive Engineer, West Coast Division, for constructing quarters for the Research Assistant and it is expected that the building will be ready before the close of the next year.

57. (iii) CHALIYAM CANNERY.—Pending a decision regarding its future the Cannery continued closed during the year. The Committee on Fisheries recommended that the cannery should be continued but that any offer of a satisfactory nature from any private agency for the lease of the factory would be worth considering, provided the lessee will agree to such conditions as will ensure proper departmental research being done there at the same time. They also recommended that these researches should be pushed to the point of commercialization and added that the Government may even give the lessee if needed a gradually decreasing bounty disappearing when the industry has found its feet and is able to look after itself. The Government however decided that the cannery should be closed down and its assets disposed of. Accordingly, its sale was advertised on 21st March 1930. Till the close of the year, no good offer for out-right purchase had been received.

B—ADMINISTRATION.

(a) Licences for fixed engines.

58. During the year under report 122 free licences for fishing with submerged trees in Palk Bay off the Ramnad District coast were issued under section 6 (3) (a) of the Indian Fisheries Act.

(b) Public Fish-curing Yards.

59. *a. EAST COAST (NORTH).*—The number of yards in this section continued to be 30 as in the previous year. The continuance of the high issue price of salt has led to a further increase in private curing with little or no salt. The Civil Disobedience movement affected two yards in this section. Danger to the salt stored at Konapapapeta and Mulapeta yards north of Cocanada was apprehended and a Police guard was provided for about a week at the end of May.

60. *Transactions.*—There was a very satisfactory increase in transactions especially in the northern yards of this section. However, some of the central and southern yards fared badly, viz., Gangavaram, Pudimadaka, Pentakota in the Vizagapatam District, and Konapapapeta and Mulapeta in the East Godavari. The increased transactions are due to a very favourable fishing season. The chief fish captured were *sardine* and *ribbon* fish. The decrease in the transactions at Pundi, one of the northern yards, is reported to be due to communal strife between two sections of fishermen. From the statement appended, it will be seen that 93,188·33 maunds of raw fish were brought to the yards, 12,495·38 maunds of salt were issued and Rs. 15,619 15 0 was realized by the sale of salt, as against 76,911·19 maunds of fresh fish, 10,032·8 maunds of salt issued and Rs. 12,540 4 0 realized in the year previous.

61. *Supply of salt.*—The yards did not suffer from scarcity of salt as in some previous years. The quantity of salt purchased from Government factories this year rose from 8,452 maunds last year to 10,454 maunds, and the excise salt from 1,400 maunds to 2,000 maunds. The value paid for the former was Rs. 2,632 3 0 and for the latter including the cess Rs. 1,410 15 0. The rate per maund of Government salt varied from Re. 0 3 3 to Re. 0 6 0 and that of excise salt from Re. 0 9 0 to Re. 0 12 0. As usual all the yards (excepting Mukkam, Bimlipatam, Kothuru and Montgomari-peta, which are supplied by Excise Factories) obtained their supply of salt regularly from Government factories. The modified excise factory at Balacheruvu continued this year to supply salt to Gangavaram, Jalaripeta and Lawson's Bay fish-curing yards.

62. *Balance stock of salt.*—The balance of salt on 30th June 1930, in the yards of this section was 1,466 maunds 16 seers.

63. *Improvements.*—The only improvements to yards effected were the construction of a well in Prayagi yard and the preparation made for the construction of an asbestos model shed at Uppada. The shed will be completed in the current year. Satisfactory progress was made with the contemplated improvements in curing utensils. As glazed pots are not locally available and the European ware is far too costly, negotiations were made with the local manufacturer at Bezwada for vats of various sizes made of reinforced ferro-concrete. Private makers use a minimum of cheap quality cement plastering which in consequence deteriorates rapidly. The remedy is to manufacture the vats departmentally or through contractors with "Char-minar" cement in correct proportion. Coating the existing earthenware tubs in yards with a thin coat of cement or with pitch boiled and mixed with turpentine was experimented on and found to be costly and not lasting.

64. The Bimlipatam yard like Uppada was provided with drying flakes made of split bamboos.

65. *β. EAST COAST (CENTRAL).*—The number of yards in this section continued to be ten.

66. *Yards closed or opened.*—Through Government in their order G.O. Ms. No. 1695, dated 7th October 1929, ordered the retention of Pulicat and Sattankuppam fish-curing yards, the transactions in the Pulicat fish-curing yard practically came to a standstill subsequently and the yard had to be closed once for all on 11th June 1930 as enquiries showed that there was no prospect of the yard reviving in the near future.

67. *Transactions.*—From the statements appended it will be seen that the transactions in the fish-curing yards on the whole considerably improved during the year, resulting in a gain of Rs. 1,968 11 6 against a gain of Rs. 1,208 11 6 in the previous year. The total quantity of fish brought to the yards for curing was 71,222 maunds 19 seers against 64,207 maunds 1 seer in the previous year.

68. *Supply of salt.*—Again this year the Collector of Salt Revenue could not arrange for the supply of monopoly salt to the yards and so excise salt was purchased and supplied as in the previous years. The unusually heavy rain in May last interfered with the manufacture of salt and the price of salt rose abnormally.

Consequently Rs. 50 per garce had to be paid instead of the usual price of Rs. 22-8-0 in the Krishnapatam Circle and Rs. 108-12-0 per garce instead of Rs. 22-8-0 in the case of the Kadapakkam fish-curing yard.

69. *Wastage of salt.*—There was a wastage of 25 seers of salt in the Pulicat fish-curing yard due to long storage. This was written off the accounts as it was within the limit allowed as normal wastage in storage.

70. *Balance stock of salt.*—The balance of salt on 30th June 1930 in the yards of this section was 666 maunds 14 seers.

71. *Improvements.*—In the yards of this section the curing utensils are baked clay pots. Being porous they become highly insanitary after a few days' use. Coating the pots with cement was experimented on and found favour with some of the curers.

72. *γ. EAST COAST (SOUTH).*—All the 14 yards in this section worked satisfactorily during the year. In the Vanagiri yard the sea has encroached further. Government have been requested to sanction the removal of the yard to another site in the same village. For want of a suitable site the removal of the Nambuthalai yard to a position close to a place where fish is landed has not yet been effected.

73. *Yards closed or opened.*—The fishermen of Kuttankuli in the Tinnevely District have petitioned for the reopening of the yard there, which, was closed for want of operations in the year 1910 by the Salt Department. The fisherfolk of the place are very poor and are unable to meet the cost of the site and the erection of buildings. The Tranquebar yard has not been working satisfactorily. The opening of the railway line between Tranquebar and Mayavaram has so increased the trade in fresh fish as to affect the transactions in the yard adversely. The working of the yard will be watched closely.

74. *Transactions.*—Transactions in the yards this year were not quite so satisfactory as in the previous year. The fall in transaction is attributed to unfavourable weather conditions. A total quantity of 85,249 maunds 17 seers of fish was brought to the 14 fish-curing yards for curing against 93,662 maunds 26 seers in the previous year. The weight of cured fish removed from the yards was 59,748 maunds 8 seers against 64,916 maunds 13 seers in 1928-29.

75. A total quantity of 17,975 maunds 19 seers of salt valued at Rs. 22,469 5 6 was issued to the curers against 19,121 maunds 20

seers of salt valued at Rs. 23,901-14-0 in the previous year. The total expenditure came to Rs. 24,386-14-0, thus yielding a net revenue of Rs. 1,000-5-7 against Rs. 8,614-3-8 in 1928-29.

76. *Supply of salt.*—Total quantity supplied to all the 14 fish-curing yards was 17,208 maunds. To Idinthakarai, Ovari, Sippikulam and Mukkur yards which could be served by sea from Tuticorin, 10,500 maunds of salt was transported by boats from Tuticorin salt factories, the cost being cheaper than buying salt at the factories near these yards and transporting it by land. The freight varied from As. 2-5 to As. 2-9 per maund. The supply of salt to the remaining ten yards amounting to 6,708 maunds was made from the nearest salt factories by land route as this was convenient and cheap. The transport rate varied from As. 1-10 to 6 annas per maund.

77. *Wastage of salt.*—A consignment of 600 maunds of salt was sent by boat No. 96 from Tuticorin to Mukkur fish-curing yard in October 1929. Strong winds and adverse weather prevailed enroute with the result that the boat sank. This quantity was written off the accounts.

78. *Balance stock of salt.*—The balance of salt in the 14 yards on the 30th June 1930 was 3,851 maunds 5 seers.

79. *Improvements.*—The use of aluminium measures for the issue of salt in some yards was stopped and wooden salt measuring trays were substituted.

80. Cactus fencing in all the yards in the Tinnevely and Rāmnād districts has been affected by cochineal insects. Efforts are being made to grow screw pine to serve as fencing here as in the yards in the Tanjore District.

81. The construction of a well with cement rings has been arranged at a cost of Rs. 38 in the Sethubavachatram yard.

82. *δ. WEST COAST.*—There were 61 fish-curing yards including Agathi in this section at the end of the year against 59 at the beginning. Three were private fish-curing yards which worked only during the fishing season.

83. Due to sea encroachment the Parappanangadi yard was transferred to a new site. On the new site which is a compact symmetrical block the necessary buildings have been erected. The buildings cost Rs. 11,098 and are constructed with strong wooden walls and tiled roofing.

84. Quilandy is another yard which is suffering from the effects of sea erosion. It may have to be shifted in the near future.

85. Mattool yard is now only a few feet from the sea. This year the tidal waves actually entered the yard premises. Unless there is a considerable recession of the sea, which is probable, the yard will have to be transferred to a new site.

86. Tellicherry yard also has steadily been encroached on by the sea. There has, however, been no serious erosion during the year.

87. Information has been received that in spite of the fact that the Government have fixed a maximum fee of one rupee for each store shed of fish outside the fish-curing yard and a maximum of Rs. 5 for each fish-curing yard, the Coondapur Taluk Board has been levying a fee of Rs. 5 for each shed situated within the Gangoli yard. The President of the Taluk Board who was addressed by the Assistant Director of Fisheries (Coast) replied that the levy of Rs. 5 on each curing shed at the yard is in conformity with the orders of Government. The matter is under correspondence.

88. Isolated cases of excessive taxation of curers and fishermen by the Taluk Board of Ernad and Calicut continued to occur.

89. *Yards closed or opened.* In the place of the Uppala fish-curing yard closed on 1st November 1928 a new yard was opened at Baikampady on 15th September 1929, but the yard was run as a private yard since there was no budget provision to run it as a Government yard. The yard has, however, been taken over by Government from 1st April 1930.

90. The Kirimanjeshwar yard which commenced work on 18th November 1927 was made permanent.

91. The Kizhur yard showed a consumption of 184 maunds 4 seers of salt in 1928-29 and 187 maunds 26 seers this year. The yard does not seem to justify its existence. Proposals for closing the yard are under consideration.

92. The old Madakara yard, which was closed in 1915 owing to sea encroachment, was re-opened this year on another site at the urgent request of the local curers who were curing on a large scale with duty paid bazaar salt.

93. A new yard at Edakkad, Kadapuram was sanctioned by Government to be opened at the beginning of the year. There is, however, much difficulty in getting possession of the site selected for the location of the yard and the matter is under correspondence with the Revenue authorities and the Jenmi.

94. *Transactions.* Operations in the northern yards of Gangoli and Hungareutta have been satisfactory though not so good as in

the previous year. Catches of fish this year were very unsatisfactory between Malpe and Bekal in the South Kanara District. In the Hosdrug and Thaikadapuram yards to the south of Bekal the consumption of salt has been more than that of last year. Catches being poor, the price of fish was high but still the actual income of fishermen was very much less than what it would have been in the normal year.

95. In Malabar, sardine shoals did not appear again this year and mackerel appeared at intervals in small numbers. Other heavily shoaling fish like "Manthal," "Thalayan" and "Mullan" appeared only in smaller shoals.

96. Since the Fisheries Department took over charge of the fish-curing yards there has never been a year so poor in the quantity of fish caught as the year under review.

97. Mattool, Thalayi and Meladi showed an increase in operations due to special causes. A proposal had been made to move the Mattool yard to the opposite bank of the Baliapatam river. On receipt of information of this, the Mattool fishermen made special efforts to improve operations and the large quantity of miscellaneous small fish that appeared at this part of the coast was taken full advantage of by them. Thalayi yard was declining owing to the failure of the co-operative society on which the prosperity of the yard depended. During the year a capable Sub-Inspector was posted to the yard who revived the society and put it in efficient working order. The members of the society have, since then, done a large amount of curing work which increased the operations in the yard. Meladi which is a yard reserved for Hindu fishermen was not self-supporting in the past as the fishermen sold their catches of fish to the fish merchants of Quilandy and Badagara. It was therefore proposed either to close the yard or admit into it a few enterprising Mopla fishermen. This roused the local curers who, this year, brought a larger proportion of their catches to their own yard.

98. Calicut South and Beypore North yards seem to be declining owing to their proximity to Calicut town, where fresh fish finds a ready sale.

99. Transactions in the yard at Quilandy also are waning as the convenient train services are carrying much of the local fish to Calicut fresh.

100. In Badagara more fish is cured outside with bazaar salt than in the yard with duty free salt. The privately cured fish is

unwholesome as the same brine is used again and again even after it has become foul, but owing to its comparative cheapness, this fish is ousting the better product of the fish-curing yards from the market. The public are forced to get accustomed to the high flavoured, putrid product of private curers. Reduction in the price of fish curing salt will alone enable the yard curers to recapture the market.

101. The two new yards opened last year at Puthiakadapuram and Nattika did not come up to expectation.

102. The Vekkode yard, the retention of which as a temporary measure was sanctioned by Government till 31st March 1931, showed improvement in operations during the year inspite of the fact that the season was poor. Its consumption of salt during the year, viz., 675 maunds, was higher than that of any other yard of similar status.

103. *Supply of salt.* Owing to unexpectedly heavy catches of fish and small storage space in the Cannanore yard, salt ran out of stock on 16th July 1929, but the stock was replenished within 24 hours. There was depletion at Gangoli between 22nd October 1929 and 24th October 1929, 12th November 1929 and 15th November 1929, at Hungarcutta between 16th November 1929 and 17th November 1929, 28th November 1929 and 30th November 1929; and at Malpe I yard between 4th November 1929 and 18th December 1929. 600 maunds of salt would have been consumed at Gangoli, 400 maunds at Hungarcutta and 4,000 maunds at Malpe I, if salt had been available.

104. *Wastage of salt.*—A wastage of 56 maunds 20 seers of salt occurred during transport in the South Kanara District, and of 322 maunds 24 seers in the Malabar District yards. Out of this a wastage of 101 maunds 10 seers was due to wetting of bags consequent on the erosion of the sea at the Vadanapalli yard.

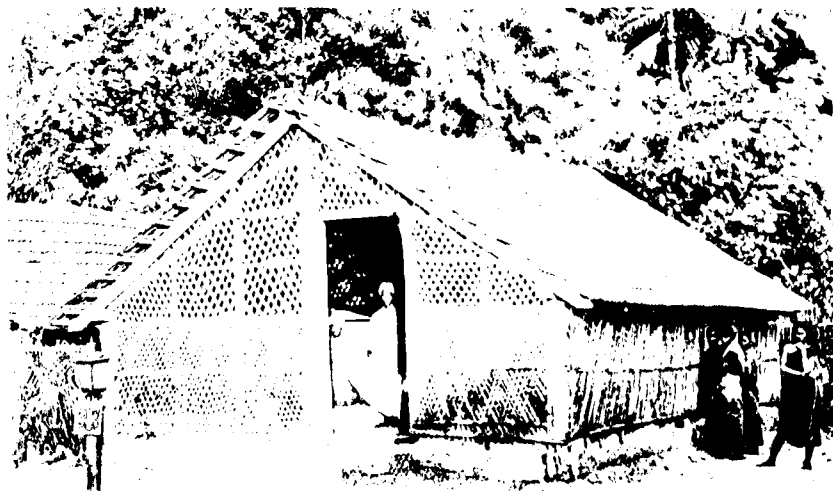
105. *Balance stock of salt.* The balance of salt in the yards of the section in stock was 168,471 maunds 3 seers.

106. *Improvements.* The combined guard and store shed of the Manjeshwar yard was destroyed by fire on 2nd September 1929. It was rebuilt with tiled roof, masonry pillars and mango-wood plank walls at a cost of Rs. 1,820.

107. In the demonstration curing shed at Malpe, 20,500 mackerel was cured by the yard staff at a cost of Rs. 95 4 9 and the cured product was sold for Rs. 128-2-0 resulting in a net return of Rs. 32-13-3. In the model curing shed at Calicut operations were



Hosdurg Yard. The old type of salpin-roofed ventilated curing shed (Hoslung). The sun-dried and the curing process, the curing is soaked with stale brine year after year and sink with the cultured and putrid fish rendering the fish cured unsightly and insanitary.



Gangoli Yard. The improved design of curing shed introduced in malabar fish curing yards by the Fisheries Department since 1925. They have a tiled roof, lattice sides for ventilation, cement vats for curing and cement floor. This improved type is replacing the old type in several yards on the West Coast.

conducted on three days during the year. On 10th November 1929, 18 seers of fish caught by the Fisheries Training Institute students was cured with 3 seers of salt (cost Re. 0-1-6) and sold for Re. 1, realizing a profit of Re. 0-14-6. The next operation was on 6th March 1930 when Rs. 6-4-0 worth of Palameen and Shark was purchased and cured at an expense of annas 8. The cured fish was sold for Rs. 7-0-6. The last operation was conducted on 28th May 1930 when Shark worth Rs. 2-8-0 was cured with special salt. The cured fish was preserved at the Fisheries Training Institute.

108. *Construction of sanitary curing sheds.*—There has been a further increase by 33 in the number of improved curing sheds of approved design with cement floors and vats and better ventilation.

109. *Permanent store sheds.*—Permanent tiled store sheds were constructed in South Kanara during the year, one for the Bekal yard to hold 250 bags of salt and one for the Gangoli yard to hold 500 bags of salt. Proposals for the construction of similar store sheds at Malpe, Udayavar and Thaikadapuram are under consideration.

110. In the Malabar District permanent additional store sheds were constructed at the following yards:—

Yard.					Capacity.	Cost.
					Mds.	RS.
1.	Madai	...	...	...	2,000	1,859
2.	Cannanore	...	...	...	3,000	2,043
3.	Tellicherry	...	...	...	2,000	1,800
4.	Elathur...	...	...	...	500	738
5.	Tanur North	...	...	...	16,000	12,600
6.	Paravanna	...	...	...	500	790
7.	Palapati	...	...	...	2,000	1,848
8.	Mannalamkunnu	...	...	...	500	800
9.	Blangad	...	...	...	2,000	1,860
10.	Chowghat	...	...	...	2,000	1,850

Additional store sheds are still required at Madai and Kootayi. At Madai there is no space on the existing premises where more sheds can be built and there is no scope for the extension of the yard except at a very high cost.

111. *Distinguished visitors.*—The Honourable Mr. M. R. Sethurathnam Ayyar, Minister for Development, visited Malpe I, Cannanore, Thalayi, Calicut and Tanur North fish curing yards on the West Coast during the year.

(c) Private Oil and Guano Factories.

112. One hundred and thirty factories in the South Kanara District and 195 factories in the Malabar District took out licences during the year. Eighty factories in the South Kanara worked during the year manufacturing about 223 tons of guano and 24 tons of fish oil. No factories in Malabar did any work. The out-turn of beach-dried manure in South Kanara is estimated at 711 tons. In Malabar 400 maunds of fish of low manurial value was beach-dried at Madai. The price of guano varied from Rs. 100 to Rs. 125 per ton, fish oil from Rs. 300 to Rs. 450 per ton and fish manure from Rs. 80 to Rs. 125 per ton. The scarcity of sardines continued to handicap the working of oil and guano factories.

II. MINOR MARINE AND ESTUARINE FISHERIES**A.—Prawns.**

113. The prawn fishery at the Collair Lake was a failure. Other lagoons and swamps near Pandraka and adjoining villages where also the prawns occur in great abundance were inspected during the year.

B.—Edible Oysters.

114. The Ennur beds are completely depleted of oysters of saleable size. The Pulicat farm which was destroyed by a shell contractor in 1922 has not fully recovered. Therefore it was decided to make the supply to the public from the Gokulapalli beds, transferred to this Department for two years in G.O. No. Mis. 283 I, dated 31st January 1929. These beds are 17 miles from Talamanchi which is the nearest railway station. In the absence of a direct road communication slow and expensive transport by country carts had to be arranged making the daily supply of oysters difficult and the working charges high. Supply had therefore to be limited to customers in Madras, Ootacamund and Bangalore and restricted to two days in the week. To cover the increased working expenses, the rates charged to customers were raised as follows:—

			100 oysters.			300 oysters.			500 oysters.		
			RS.	A.	P.	RS.	A.	P.	RS.	A.	P.
Madras ..	Old rate.		1	6	0	3	8	0	5	8	0
	New „		1	12	0	4	8	0	7	0	0
Bangalore ...	Old rate.		1	12	0	4	8	0	7	0	0
	New „		2	2	0	5	8	0	8	8	0
Ootacamund.	Old rate.		2	10	0	6	9	0	10	8	0
	New „		3	0	0	7	0	0	12	0	0

115. The supply commenced on 22nd March 1930 and is expected to continue till the end of September. Up to 30th June, 159,200 oysters were sold to the public for Rs. 2,766-3-0. Deducting the working expenses, the net revenue was Rs. 228-9-9—vide Statement 2, App. II, appended.

116. The exhaustion of the Pulicat and Ennur beds one after the other necessitated a review of the departmental methods of culture and exploitation. The edible oyster fisheries of Madras were studied by Mr. Hornell in 1909. The absence of an appreciable trade in this valuable article of food, which is capable of great commercial development, and the fact that the little trade that existed consisted of the occasional collections of oysters from foul sewage-polluted waters for supply to clubs and hotels in Madras and was fraught with the danger of causing enteric epidemics, he urged the necessity for the early assumption by the Government of the control over the principal oyster beds near Madras. A site for an oyster farm free from sanitary objections was found in the seaward section of the Pulicat Lake. Here Mr. Hornell pursued his studies on the breeding habits of the Madras oyster and as a result of such studies commenced operations in the culture of the local oyster on simplified Archachon methods. Though no accurate record of the early investigations by Mr. Hornell are available, his main conclusions are noted in Annual Reports and Bulletins—vide Madras Fisheries Bulletin, Vols. V, VIII, Report I, and Annual Reports.

117. After a time Mr. Hornell appears to have given up the elaborate and expensive methods of providing white-washed tiles for collecting spat and transferring the spat detached from the tiles to special beds for growth and fattening. Experience proved that for the existing demand the supply from natural beds was more than sufficient. In recent years little cultural work was done beyond conserving the beds from poaching, especially the collection of dead shells for lime burning, and fishing the beds in moderation during the oyster season, till the present investigations commenced in 1925-26 as the direct result of the destruction of the Pulicat beds in 1922 and the resultant dearth of marketable oysters.

118. In September 1926 research on the breeding and development of the Madras oyster was resumed at my instance by Dr. D. W. Devanesan. Eggs from mature oysters were fertilized artificially and placed in varying salinities ranging from almost fresh

water to concentrations above that of sea water, for development and hatching. The percentage of salinity favoured by breeding oysters, their eggs and larvæ, was found to range from 8.42 ‰ to 24.99 ‰ with the specific gravity from 1.007 to 1.020. Mr. Hornell however states on page 87 of Madras Fisheries Bulletin No. 5, apparently on the analogy of the native English oyster (*O. edulis*), that "no culture can be successful if the specific gravity of water bathing the beds falls appreciably lower than 1.015 for any considerable period." The present research has therefore enabled us to correct certain erroneous ideas that had been entertained in the past regarding the optimum salinities required by the local edible oyster. While the oyster in England (*O. edulis*) thrives and breeds in high salinities 24 ‰—45 ‰* the Madras oyster seems to flourish only in low salinities 8.42 to 24.99 ‰ which is much below that of the adjoining sea. The freshets in rivers, far from damaging oyster beds as was supposed before, apparently provides the most favourable conditions for spawning and development of the local oyster. Maximum spawning therefore occurs during the monsoon (September–November).

119. This research has also thrown considerable light on the character of the early stages and the period of development of the Madras oyster.

120. Simultaneously, experiments in the collection of spat by tiles and their subsequent transference to beds for growth, on the lines adopted by Mr. Hornell, were also conducted. It is fairly clear that the Archachon method of culture is hardly practicable for want of skilled labour, and even if it were practicable too expensive for remunerative commercial practice in Madras under the present conditions, such as the existence of extensive natural beds, limited demand, and low market price. Attention was therefore immediately devoted to the task of determining such measures for culture and proper exploitation of natural beds as are compatible with the existing labour and market conditions and which would nevertheless preclude risks of over-fishing and depletion. The destruction of brood oysters at Pulicat in 1922 and the indiscriminate fishing of the Ennur beds subsequently undoubtedly led to the exhaustion of those beds. The question therefore was how a natural bed was to be commercially worked or fished without unduly lowering the stock of brood oysters.

* Ikusaku Amemiya. Journal Marine Biological Association, Plymouth. New series, Vol. XIV, No. 1, page 172.



Oysters from a natural bank showing rate of growth, mortality and spat fall at different depths—

- A. Surface layer of oysterlings on the bank above the permanent low tide level.
- B. Half grown oysters in the zone at and just below low tide level.
- C. Large oysters showing full and free growth well below the permanent low tide level.

121. A field study of the extensive natural beds available at Gokulapalli showed that the spat fall, mortality and growth of oysters on the bed varied strikingly according to depth. The presence of three zones, one below the other, which were sufficiently defined although they necessarily merged into one another, was discovered. At or near the very top of the bed is an oyster rock of comminuted shell fragments and sand composed for the most part of shells of small yearling oysters. This is the most exposed section of the bed which especially during summer is left high and dry, except for a few hours during high tides. Necessarily, therefore, the spat deposited at this level grow only for part of the year and generally die out in large numbers in summer when water does not reach them for sufficient length of time. Below this is a zone washed frequently by the daily rise and fall of the tides in summer and where the bank is exposed for considerably shorter hours. Here the oysters are mostly alive but growth is necessarily stunted as the feeding hours are limited to the flow tide. Even in this zone the size of the oyster and the proportion of live oysters to dead ones increases perceptibly with depth. At or near the summer low tide level occur the larger oysters which suffer less mortality than those above. Lastly there are a large number of oysters well below the summer low tide level constituting a third zone. Even in summer (June) when the backwater was at its lowest these oysters extended to a depth of 4 feet and more below the low tide level. In this permanently submerged zone the oysters exceed all others in size and their shells show free growth. Comparatively fewer were dead in this zone, than in the two zones above it. I was, therefore, led to conclude that the position of the oyster on the bank in relation to the tides is the all important factor which determines (1) the rate and growth of the oyster, (2) its size and (3) its length of life. As growth is at its maximum below the summer low tide level (zone 3) where the oysters are permanently submerged and consequently feed and grow continuously, our cultural operations on the beds should involve the transference of the young oysters ultimately to this zone for growth.

122. A second and also very important observation for cultural work which I was able to make, relates to the incidence of spat fall in the three zones. Spat fall seems most abundant at the top of the bank (zone 1) judged by the young oysters crowded together at this level. Below this down to the summer low tide level (zone 2) spat fall was considerable but not so good as in zone 1. Scarcely

any small spat were found attached to the large oysters which were permanently submerged (zone 3). This is probably due to the fact that larvæ are pelagic.

123. In broad outline the measures for the culture and proper exploitation of the oyster beds in future should be as follows :—

(1) Only the surface of oyster beds (zone 1 and the upper part of zone 2) should be culched before monsoon floods from September to November.

(2) The cultch with the attached spat should be transferred to zone 2 in spring and finally to zone 3 in summer.

(3) Oysters should be collected and marketed from zone 3 only.

124. The cultch will then be automatically removed with the clusters of full grown oysters from zone 3 and systematic cultching could be done annually without permanently raising the level of the oyster beds which now happens with indiscriminate cultching. The *modus operandi* thus determined is a distinct advance on the empirical methods hitherto employed.

III. INLAND FISHERIES

A—Research.

125. (i) DEEP WATER TANK FISHING EXPERIMENTS.—Further progress was made in deep water fishing at Mopad with interesting results and increased revenue. The level of water in the reservoir continued low in the early part of the fishery year for about four months but during the North-east monsoon, it received almost a full supply and at the end of June 1930, it had 12 feet of water over the sill of the irrigation sluice. The reservoir was closed for irrigation purposes on 1st June 1930. The deep water fishing experiments were continued throughout with satisfactory results as in the previous year and fish was regularly supplied all the year round to the adjoining towns through contractors as well as directly to the public. As in the previous year, the drift nets of different meshes and the Ennur net were more successful than cast nets. Details of the number

of fish caught, their weight per net and the amount realized are given below :—

Annual consolidated statement of fish statistics of Mopad fish farm from the 1st July 1929 to 30th June 1930.

Year and month.	Number of fish caught.	Weight of fish.	Amount realized.	Name of nets used and weight of fish by each.			
				Ennur.	Drift.	Cast.	Night line.
1929.		LB.	RS. A. P.	LB.	LB.	LB.	LB.
July ...	766	1,034½	106 1 8	...	1,034½	...	...
August ...	856	1,068½	96 12 6	...	1,068½	...	...
September ...	826	1,044½	96 7 2	...	1,044½	...	...
October ...	1,009	1,169½	115 12 3	...	1,169½	...	...
November ...	834	1,146½	104 2 10	...	1,146½	...	...
December ...	1,102	1,147	108 11 8	...	1,144	...	3
1930.							
January ...	1,137	1,181½	114 1 2	...	1,181½	...	...
February ...	785	1,032½	95 2 10	86	871½	75	...
March ...	892	1,149	111 2 9	...	1,147½	1½	...
April ...	874	1,125	105 3 0	212	841½	71½	...
May ...	807	1,096	101 4 8	...	1,055½	36	4½
June ...	575	839	77 6 4	...	775	44	20
	10,463	13,033½	1,232 4 10	298	12,480½	228	27½

126. It will be seen from the above statement that the total weight of fish caught was 697 lb. more, though the number of fish caught was smaller by 480, and the amount realized was Rs. 46-12-9 more than in the previous year. The increase in weight in spite of the decrease in number indicates that the fish were larger this year. The reservoir has been stocked with fingerlings of *Etroplus*, *Mahseer*, which is the largest local carp, and *Catla* which is the quickest growing local carp and one which attains a large size. It is therefore not surprising that the fish caught during the year were older and therefore of larger size than those caught in 1928-29. Incidentally this proves the success of stocking operations. Another interesting fact brought out by the experiments is the absence of catla in the hauls made by the drift net. They occur only in the catches made by the Ennur net and cast nets. Drift nets are surface nets whereas the Ennur nets and cast nets descend to the bottom. It is possible that catla are bottom dwellers and are therefore caught by the latter nets. Further study on the habits of catla is proceeding.

127. (ii) FISH BREEDING.—*Avalanche hatchery for trout.*—In view of the rapid decline of trout in the Nilgiri streams, since the transfer of these fisheries to the Nilgiri Game Association in October 1926, the Association imported 50,000 rainbow trout ova from New Zealand for reviving the hatchery at Avalanche. The consignment arrived on the 11th October 1929 in charge of Mr. Fraser deputed by the Association to accompany the consignment from Colombo to Ootacamund, but the eggs were found on arrival dead and in an advanced stage of putrefaction. The attempt to import eggs having failed, the game association adopted the department's suggestion to net wild trout breeders from the streams and resuscitate the hatchery with eggs obtained from them. The likely streams were closely watched for redds. Between 19th to 21st January the Avalanche stream was netted and the fish were stripped. Over a thousand ova obtained were fertilized and placed in the hatchery for development. About 1,000 fry which hatched are now in the nursery pond. As Mr. Wood deputed by the game association, failed to catch trout from the Parson's Valley stream on 31st January the Inspector had to take charge of the netting operations. On the 12th and 13th March, 585 adult trout were caught from Parson's Valley stream out of which 560 trout were released in Krurmund and 25 select breeders were placed in the Avalanche breeding ponds. Early in May the Billithedahulla stream was netted and 150 adult trout were transferred to Bhavanipuzha and Bangitapal streams and another 150 to Arokiampuzha.

128. *Inland—Hilsa investigation.*—Experiments in hatching hilsa eggs were again not satisfactory as in the previous year for want of ripe hilsa. However a few attempts were actually made on three days, but as the eggs were not quite ripe, they did not hatch.

129. The Government were addressed for the reservation of the Lock Bungalow at Bezwada Anicut for the Hilsa hatchery.

130. *Gourami.*—These are thriving well at Sunkesula, Mopad, Vellore and Praema fish farms.

131. As the Ippur farm ran completely dry during the early part of the year, the stock had to be transferred to Vellore. All previous efforts at remodelling the gourami pond in order to conduct the proposed experiments—vide pages 29 and 33 of Administration Reports for 1924-25 and 1925-26 respectively—for determining the adverse factors which had interfered with the

normal breeding of the fish in the farm have failed. The experiments were also constantly interrupted by the annual scarcity of water. I inspected the farm in December and have designed two deep ponds with effective safeguards against the ingress of predaceous enemies such as murrel and snakes which abound in the farm and are among the suspected deterrent causes.

132. In the Powder Factory, the stock of Gourami are not breeding well; they have apparently become too old as it is nearly 17 years since they were obtained from Java. The question of disposing of them and substituting younger fish is under consideration.

133. At Praema the fish are breeding well owing to good water supply and freedom from congestion, which latter is a serious handicap in the case of the older fish farms.

134. At Sunkesula the fish are breeding fairly well though they suffer from overcrowding. With the installation of an oil-engine for pumping purposes, additional ponds will be brought under water making it feasible to thin out the stock in the older ponds. An unfavourable factor which had escaped attention previously was detected and remedied in the course of the year. The Gourami in the breeding pond No. 2 have not been breeding properly during the past 3 or 4 years. Though the pond suffered from overcrowding it was not a sufficient cause for the failure. The fact that the shade trees on its bund had overgrown and were preventing direct sunshine and heat on the weedy margins of the breeding pond where the fish build their nests was finally discovered to be the real cause. In January last, a large number of (Margosa) trees were cut down to provide for more sunshine. When the pond was examined in June, a large number of young ones of various stages of growth were seen; from young fry to 2 months old fish. This experiment clearly shows the importance of sun light and heat to promote breeding.

135. At Mopad, Gourami was introduced in the fish ponds for the first time last February and the fish are thriving well.

136. In the Vellore Fort moat farm the fish are continuing to do well.

137. *Mullets.*—As usual mullets from natural sources were utilized for stocking several provincialized waters in the Chingleput and Nellore districts. The experiment in mullet culture in fresh water is still largely empirical as the characteristics of the fry of large fresh water species with which the tanks should be stocked remain yet to be determined. Sections of the Chingleput

and Vellore Fort Moats were stocked with mullet fry during the year, as they were found in previous experiments to grow to a marketable size in a year and were favoured by the local people.

138. *Catla*.—In anticipation of the scheme for rural pisciculture which was inaugurated in June an experiment was made to determine the growth of catla in a small pond similar to a village pond without artificial feeding or other special attention which the fish received in protected ponds in fish farms. A pond in the Bentinck school compound, Vepery, with very limited supply of natural food was stocked in January 1930. The fish measuring 4" to 9" attained 13" to 17" in 4 months' time. From the experiments at Vellore it has been ascertained that catla grow up to 13 to 14 inches in a year's time and 23 inches in two years' time; they weigh 6 lbs. after the first year and 15 lbs. after 2 years and are sold for Rs. 1-4-0 and Rs. 4 8-0 respectively. It will be seen from this that catla is eminently suited for profitable rural pond culture.

139. *Tench and English carp*.—Early in February, 345 tench and 75 carp fingerlings were obtained from Ootacamund lake and were placed in the two ponds reserved for these fish at Praema.

140. *Mahseer*.—For the first time an experiment was started this year to study the rate of growth and habits of this fish which is the largest known Indian carp. In March last, the fish was introduced into specially prepared ponds at Mopad and Ippur, and in a section of the Chingleput Fort Moat, for observation and study.

B—Administration.

141. (i) FISH FARMS—*Sunkesula*.—A new oil-engine was installed in place of the old steam engine and started work on 19th June 1930. The change is expected to decrease the annual working cost of the farm and bring more ponds under water, which will relieve the present congestion felt in the Gourami ponds.

142. *Praema*.—There was considerable trouble during the year about the water-supply to the ponds. Owing to failure of rains the villagers of Kadamalakalva threatened the Department with a suit if the entire spring water was not allowed to their lands. The Sub-Collector visited the farm to study the ryots' grievances on the spot. In consultation with the officers of the Revenue Department and the ryots, three out of the four ponds were closed and only one pond was kept under water to accommodate the entire stock of fish. By this arrangement, almost the whole

discharge of water from the spring was made available to the people, which satisfied them. With a view to permanently solve the problem of an adequate supply to the ryots, the ponds were altered to ensure a continuous supply of water throughout the year to the ryots. Under the altered conditions, there should be no more trouble. After the completion of the alterations all the ponds were brought into use and the fish were re-distributed.

143. The extension to the Sub-Assistant Inspector's quarters and the construction of watchers huts sanctioned in G.O. Ms. No. 2118, Development, dated 28th November 1929, were under execution at the close of the year.

144. *Ippur Fish Farm*.—The farm passed through a crisis during the year, owing to the continued drought in the Nellore District and the consequent failure of water in the Surveyepalli reservoir. In September last, the farm ran completely dry and the Gourami were transferred to the Vellore moat farm. After the ponds received water, one pond was stocked heavily with *Etrophus* for breeding purposes and another with Mahseer as an experiment and a third with coarse fish. The introduction of Gourami has been postponed pending the construction of the two special ponds.

145. *Perambur Farm*.—The work of the farm progressed satisfactorily. The staff and equipment of this farm remained the same as in the year previous pending the construction of the farm in the Chetput Brickfields.

146. *Chetput Brickfields*.—The Committee on Fisheries on page 221 of their report recommended the establishment of a fully equipped farm in or near the headquarters of the Department in Madras which if constructed will replace the Perambur farm. Agreeably to this proposal Government sanctioned a sum of Rs. 11,050, out of a total of Rs. 22,050 required for the establishment of the farm at Chetput. The Executive Engineer, South Presidency Division, has been provided with full details of the work to be executed.

147. *Vellore Fort Moat*.—The northern section in which fish are grown for market purposes was closed for fishing during the year and the right of catching fish in all other sections and of gathering lotus leaves and grass in all the sections was auctioned in March. With regard to Gourami a restriction to put back all fish below 4 inches was imposed. There was good competition and a sum of Rs. 1,310 was realized against Rs. 2,465 in the previous year. The exclusion of the northern section which contains the largest

water area and the prohibition regarding the capture of small Gourami resulted in a decrease of Rs. 1,155.

148. *Mopad Fish Farm*.—Eleven ponds have been brought into use, three of which have been stocked with Gourami, six with Etroplus, one with Mahseer and another with Labeo (*L. fimbriatus*). The leakage water through the sluice is found sufficient for the ponds.

149. Government have sanctioned Rs. 5,060 in G.O. Ms. No. 2777 W., dated 3rd October 1929, for the construction of permanent buildings in the place of the present thatched office and store-room. Estimates have been prepared by the Public Works Department and the work is expected to be put under way at an early date.

150. *Chingleput Fort Moat Farm*.—The Public Works Department have not taken any action towards rectifying the defects in their original construction of this farm though it is seven years since they completed it.

151. (ii) STOCKING OPERATIONS AND RESULTS.—Though the monsoon rains were heavier than in the previous year, in the interior parts of the Presidency these rains were insufficient. In the marginally-noted taluks of the Chingleput and Nellore districts the tanks received only a partial supply. In the North Arcot district the two important tanks (Dusimamandur and Kaveripakkam) received very little water. In anticipation of subsequent rains all the tanks were stocked with etroplus, mullets and suitable varieties of carp, and the anticipations were realized in the unusually heavy downpour in May in all parts of the Presidency. This, as will be shown below, had a most disastrous result on fishery sales and affected the fishery revenue very appreciably.

152. *Catla*.—The fry are generally obtained from the Gōdāvari channels. The canal at Nidadavole selected last year was the centre for the collection of fingerlings. As usual the following waters were stocked with catla during the year at a cost of Rs. 1,974-1-6:—

				Number of fry planted.
Cauvery river below Hoginkal Falls	...	...	...	1,915
Vellore Fort Moat Fish Farm	...	...	...	1,200
Mopad Reservoir	...	...	...	550
Barur tank	...	...	...	300
Willingdon Reservoir	...	...	...	1,200

153. The Chingleput moat farm, Ippur farm and the Attigunta (Nellore district) were not stocked for want of an adequate supply of water in them at the time of stocking.

154. Some of the wells in the Anakapalle Sugarcane Farm were stocked with a few catla this year and the fish are reported to be thriving well.

155. As mentioned in last year's report, an examination of the Cauvery was made for catla in May and June from very near the Hoginkal Falls down to Bhavani town. The river was netted in several places with cast nets and enquiries were made of the local fishermen about the occurrence of the fish. No catla was caught by the cast nets. Excepting a solitary fisherman, who averred to have seen such a fish measuring 18 inches, all denied knowledge of the fish. Further investigation made at Nerinjipettai and Bhavani showed that in November and December, the fishermen at Bhavani, Nerinjipettai and other places fix fine meshed cruives right across the river and capture young fish in basket loads. An examination of these catches should definitely prove the availability or otherwise of catla. Fishermen near Mettur complained that this reckless destruction of immature fish above Nerinjipettai has depleted the river. There is much force in this representation and if in the course of investigation for catla, these fixed engines are found detrimental to the fishery of the river, effective steps should be taken to prevent this type of fishing either by putting into force the newly amended Fishery Act or by suitable alterations in the fishery sale conditions. One thing or the other will have to be done next year.

156. The construction of the Mettur Dam will considerably facilitate the scheme for the improvement of the fisheries of the Cauvery by catla stocking.

157. As a result of our stocking the Mopad reservoir for some years, catla have established themselves in this vast lake successfully as is evidenced by the different sizes of fish that occur in the daily catches. In August last catla measuring 12" to 18" were caught. Again in February about 50 young catla measuring 6" to 7" were secured and released. From the month of April this year a few catla usually measuring 12" or above have commenced to figure in all catches, whenever the Ennur and cast nets are used. For the first time therefore in the history of catla stocking operations positive evidence of success in establishing the fish in an entirely new area is available. There is now tangible proof that

the stocking operations during the last nine years has achieved the object of establishing this valuable pond fish in the Mopad reservoir where it was not found before. This experiment has further provided us with accurate scientific data concerning the number and size of fish, the period during which stocking must be continued, and the time required for the fish to establish themselves in a perennial water area such as the Mopad reservoir. There are invariably new difficulties and problems which arise in the acclimatization of animals in new areas and catla stocking has not proved an exception to the rule. Some large-sized catla have been found dead on the margin of Mopad lake. Some of the largest examples caught were found to be out of condition and on dissection revealed the prevalence of a curious parasitic worm of large size in their *alimentary canal*. The worm has been sent to the Liverpool University Laboratory for identification. The symptoms and the extent of the prevalence of the disease are under observation and study at Mopad. At present the few fish caught are released, but when the fish became sufficiently common it is hoped to put them on the market.

158. In the case of the Willingdon Reservoir also it is reported by both the fishery contractor and the Public Works Department staff that catla are being caught in the reservoir in addition to etroplus, another exotic fish introduced by the Department which has thoroughly established itself. Investigations will be made next year to see whether young catla are really available. If catla establishes itself in the reservoir it is sure to find its way into the Coleroon and the Cauvery via Vellar and the Viranam tank. When this happens the Cauvery fishery will improve considerably.

159. *Mahseer*.—The “mighty Mahseer” as Mr. Thomas calls it, is a magnificent fresh water Indian carp. It grows to enormous size in rivers. Encouraged by the success achieved by the Anamalais Game Association in stocking their waters with the fish supplied by the Department, the undermentioned waters were stocked during this year at a cost of Rs. 218-2-10 with Mahseer fingerlings from Sunkesula where they are available in large numbers in February and March.

	Fry planted.			
Mopad Reservoir	...	...	...	1,500
Vellore Fort Moat Fish Farm	...	...	...	1,000
Chingleput Fort Moat Farm	...	...	...	250
Ippur Fish Farm	...	...	...	180

160. *Etroplus*.—The Mopad reservoir was stocked successfully with 3,000 *Etroplus*.

161. A few wells in the Anakapalle Sugarcane Farm and a pond in the Agricultural Farm, Samalkot, were stocked with *Etroplus* during the year.

162. *Gourami*.—A pond in the Agricultural Farm at Samalkot was stocked with 12 *Gourami* fingerlings as an experimental measure at the request of the Deputy Director of Agriculture, Vizagapatam.

163. *Megalops*.—The *Megalops* fingerlings supplied to the Anamalais planters last year are reported to be thriving splendidly and to have weighed 2 to 3 lbs. each in February. This is a remarkable rate of growth. The President of the Anamalais Game Association is pressing for a further supply of this fish but the fish are rare and difficult to obtain.

164. (iii) FISHERY LEGISLATION.—*The Bhavani Conservancy*.—There was a marked decrease in the number of cases of poaching reported in the conserved area of the Bhavani above Neralai. Three cases were reported of which two were prosecuted and one was withdrawn. One case ended in the conviction of the accused who were fined Rs. 10 each and the other in the acquittal of the accused for want of evidence. The withdrawn case was one of fishing in the leased area of the Bhavani; it was withdrawn by the President of the Fishermen Co-operative Society of Sirumugaipudur on the accused paying the usual licence fee and enlisting themselves as members of the above society.

165. The Fishery Act of 1899 has been amended with a view to protect the lessees and Government against poachers. But in actual experience the process of obtaining redress under the Act has proved very expensive. The crimes committed under the Act being non-cognizable, the Police do not take action in the matter and the lessees concerned have to take the initiative. Some fishermen societies had to incur much expenditure in their prosecution ventures and came out unsuccessful in the end. The question seems to require consideration.

166. (iv) FISHERY SALES.—As usual fishery sales were a source of considerable anxiety especially in the Nellore District owing to determined combination among and opposition by the villagers. The situation was rendered worse as a result of the civil disobedience movement and the unsympathetic attitude assumed by the local Public Works Department officers towards the activities of

this Department. This led to much complication and unnecessary correspondence, resulting to some extent in financial loss to the Government. The Government have directed that orders passed in G.O. No. 339, Development, dated 24th February 1928, to the effect that the officers of the Public Works Department should consult the Director of Fisheries before confirming the sales of the waters stocked by the Department should be strictly followed and that the presence of a subordinate of the Fisheries Department at an auction sale does not dispense with the necessity of consulting the Director of Fisheries or his Assistant Director before confirming it.

167. Two tanks, Kalivetapalem and Vegur had to be fished departmentally, owing to meagre rentals obtained in public sales. A sum of Rs. 75 was realized against the highest bid of Rs. 30 2 0 in the public auction.

168. On the whole the result of sales was not as satisfactory as it might have been. The political situation, the trade depression, the heavy fall in price of agricultural produce, the inadequate supply of water received by several tanks in the interior of the Nellore district and excess of water in the fishing season in several important tanks of the Chingleput district resulted in reduced rents.

169. A list of tanks, which includes those that fetched no rentals during the year and those that fetched low rentals due in some cases to inadequate and in others to excess of water and partly to a combination among bidders at the auction sales, is given in Appendix IV.

170. (v) DISPOSAL OF FISHERIES BY PRIVATE TENDER.—With a view to combat local combinations the fisheries of several tanks in the Nellore and the Chingleput districts were disposed of privately. The Kavali Criminal Settlement helped this Department considerably in the matter and through their kind efforts several tanks were leased out to the depressed classes. A list of tanks disposed of privately is given in Appendix IV.

171. The suit instituted against the tenderer for the Kanigiri-Duvvur fishery referred to in last year's report is still pending.

IV. CROWN MONOPOLIES (PEARL AND CHANK FISHERIES)

A—Research.

172. (i) CHANK MARKING EXPERIMENTS.—Marking undersized live chanks with brass tags has been started with a view to study

the rate of growth and migration of chanks. Two sets of undersized shells with tags have been placed at Thalai Kalam opposite the Chank Fisheries Office, Tuticorin, in 3 feet depth of water under observation.

173. (ii) DIVING APPARATUS.—The projected experiments with the Japanese diving mask were conducted at Sethubavachatram by the Industrial Engineer and myself from 21st to 28th May 1930. Hand power was found insufficient for compressing the air to a pressure of 200 lbs. It was found necessary to employ a 3 H.P. Oil Engine for the purpose. The engine and the compressor were purchased at a cost of Rs. 532. The engine was installed on the shore and cylinders were charged as often as necessary in the course of the experiments. In the tests made out of water the diver was able to remain without access to open air for a period of 30 to 45 minutes. In water, however, it was found that he used far more air and exhausted the cylinders within 12 minutes, which was the longest period he was able to keep under water. To avoid risks the initial experiments were conducted in depths up to 4 feet. The sea at Sethubavachatram is shallow for a considerable distance from the shore and is exceptionally calm, being in a sheltered bay, both of which conditions are highly favourable for conducting the diving experiments. Even 12 minutes, the maximum time up to which a diver has been able to keep under water with the help of this apparatus is a great advance over the maximum of 109 seconds which is the record for naked diving. The apparatus showed some serious defects; the inferior Japanese air valves leaked all the time and the rubber face mask was scarcely water-tight. With improved type of valves, etc., there is every hope of the time being increased to $\frac{1}{4}$ hour or more. The Industrial Engineer is carrying out the required improvements for experiments in deeper water.

B—Administration.

174. (i) INSPECTION OF PEARL BANKS.—There was no pearl fishery this year. In accordance with the scheme of dividing the pearl banks into three sections and inspecting one section a year, the second section from Tuticorin to Pamban was inspected during the year, from February to April on board "Lady Nicholson".

175. The 15 pearl banks from Vembar Par to Pamban Par had not been examined for nearly 25 years. They were last inspected in the spring of 1904 by Mr. James Harnell—vide Madras Fisheries

Bulletin, Volume XVI. The Par Mandadi did not know anything of these banks and could not help the Assistant Director, Pearl and Chank Fisheries, in locating them. They were located with the help of the land marks and compass bearings given by Captain G. A. Phipps and Captain G. W. Wicks who were Superintendents of Pearl and Chank Fisheries half a century ago. As these banks were not inspected for more than a quarter of a century, full details as to depth and bearings have been recorded for future guidance. There were no live pearl oysters on any of these banks.

176. Thirteen banks from Vaippar Par to Pathu Par form the second group of banks in this section. These banks also were barren of oysters.

177. Of the banks examined last year, 11 banks were also inspected this year; but no oysters were found. The following is the list of banks inspected:—

(a) Second Division—Northern Group.

I. Pamban Group—

1. Pamban Karai Par.
2. Pamban Vilangu Par.
3. Pamban Peria Par.

II. Musal Tivu Group—

4. Musal Tivu Par.
5. Musal Tivu Cholava Karai Par.

III. Kilakarai Group—

6. Kilakarai Vellai Malai Vilangu Par.
7. Kilakarai Vellamalai Karai Par—Fishermen call this par as Vellian Malai Par.
8. Anna Par—Called by fishermen—Anai Par.

IV. Tanni Tivu Group—

9. Valinukam Par. Mr. Hornell does not make mention of this bank.
10. Valinukkam Tundu Par.
11. Nalla Tanni Tivu Par.
12. Uppu Tanni Tivu Par.

V. Vembar Group—

13. Kumulam Par.
14. Vembar Karai Par.
15. Vembar Periya Par.

Second Division—Southern Group.

VI. Outer Vaippar Group—

16. Vaippar Peria Par.

VII. Inner Vaippar Group—

17. Vaippar Karai Par.
18. Devi Par.
19. Pernandu Par.
20. Padutta Marikan Par.
21. Padutta Marikan Tundu Par.
22. Katti Thirukkai Par.

VIII. Crucian Group—

23. Crucian Par.
24. Crucian Tundu Par.
25. Van Tivu Arupagam Par.
26. Tuticorin Kuda Par.
- 27 and 28. Karai Par and Pathu Par.

(b) Banks of first division inspected during 1929 but again examined this year.

IX. Utti Group—

- 29 and 30. Nagarai and Petha Pars.
- 31 and 32. Utti and Uduruvi Pars.
33. Kilatti Par.
34. Attivai Arupugam Par.
35. Kovil Muntha Par.
- X. 36. Tholayiram Par.

XI. Puli Pundu Group—

37. Vada Onpathu Par.
38. Saith Onpathu Par.
39. Pulipundu Par.

178. *Window-pane Oyster Fishery.*—Opposite to the Pearl and Chank Fisheries Office and the Harbour Office, Tuticorin, extensive beds of window-pane oysters were discovered. This year many of them were fished by fishermen and others for the seed pearls found in them. The matter was referred to Government to enquire if the fishing might be prohibited. As suggested by them the Harbour authorities were referred to. The latter replied that they had no powers to prohibit the fishing. A detailed report on the quantity of oysters available, the oysters daily gathered, the pearls obtained together with samples of pearls and shells and a chart of the area in which oysters were found was submitted to Government.

A draft of the rules for prohibiting the fishing of every kind of pearl oyster including window-pane oysters, and chank are now under consideration of Government.

179. *Pearl oyster shells*.—A sample consignment of two tons was sent to Mr. M. J. Emden Shone of Hamburg. But the quality of the shell was not approved.

180. (ii) **TINNEVELLY CHANK FISHERY**.—The results of this year's fishery were very satisfactory. The catches and revenue obtained are the highest on record since 1801 when the chank fisheries came under British Administration. The previous record was in 1928-29 when 431,127 chanks were fished and this number was exceeded during the year under report (1929-30) when 612,362 chanks were fished. The gross revenue realized this year was also the greatest on record, viz., Rs. 2,43,626-14-0 against Rs. 1,68,919-12-10 in 1928-29.

181. *Advance to divers*.—In the beginning of the season 1929-30 a sum of Rs. 811-5-1 was outstanding with the divers of Tinnevelly and Rāmnād districts. Of this, a sum of Rs. 646-15-0 was written off the accounts as irrecoverable under the orders conveyed in G.O. Ms. No. 1452, Development, dated 22nd August 1929 and G.O. Ms. No. 1599, Development, dated 25th September 1929. Of the balance of Rs. 164-6-1 a sum of Rs. 100-12-1 was due from the Tinnevelly divers and Rs. 63-10-0 from the Rāmnād divers. During the season advances amounting to Rs. 61 were issued Rs. 20 to Tinnevelly and Rs. 41 to Tanjore district divers—a sum of Rs. 108 was recovered and the balance outstanding at the close of the 1929-30 season was Rs. 117-6-1 (Rāmnād Rs. 42 and Tinnevelly Rs. 75 6-1).

182. *Boat loan to divers*.—Balance outstanding at the commencement of the season was Rs. 219. This amount was recovered in full during the season. No fresh loan was granted.

183. *Increased rate for chanks*.—The rates for chanks on the Indian Coast are influenced by those prevailing in Ceylon. The enhanced rate of 1 anna 6 pies per chank sanctioned in G.O. Ms. No. 1849, Development, dated 1st November 1928, has to be continued in order to retain the services of the divers in Tuticorin.

184. *Recruitment of divers*.—Efforts to recruit divers from Kilakarai and other places met with unprecedented success during the year under report. Two hundred and fifty-eight foreign divers were recruited for the chank fishery. In addition, the Assistant Director was able to recruit a greater number of local divers. In

all 18 canoes and 18 dhonies participated in the fishery. They consisted of—

1. Kilakarai and Periapatnam Muhammadan divers	243
2. Arabs from Persian Gulf	15
3. Local Christians	41
4. Local Palla Hindus	13
	312

The Palla divers worked in two canoes of their own. The Arabs who came from the Persian Gulf worked in the chank fishery and made satisfactory earnings.

185. *Quarters for divers*.—It was essential to provide quarters for foreign divers in close proximity to the sea and the chank godowns just outside the town. Accordingly, a suitable site measuring about 3 acres was obtained on a monthly rent of Rs. 15 and three temporary cadjan sheds—two measuring 80' × 15' × 6' at a cost of Rs. 95 each and third measuring 100' × 10' × 6' at a cost of Rs. 125 were constructed on the said site for their accommodation.

186. *Fishing operations*.—There were 164 working days in the year. Twenty-three days were lost on account of bad weather. There was fishing on all days in the week; the Muhammadan divers who did not work on Fridays went to sea on Sundays and the Christians fished on Fridays but rested on Sundays. The highest catch for any one day was 12,072 which is a record. The largest earning per day per diver was Rs. 6-5-0, the average being Rs. 2-13-10. The Par Mandadi (the local pilot) daily accompanied the boats to sea and located fishing grounds. Gauging the shells fished was usually done in two sections, and on days when there were heavy catches in four sections, to facilitate quick work.

187. The following are the details of shells fished for the three years ending 1929-30 :—

	1929-30.	1928-29.	1927-28.
Full sized ...	612,362	431,127	95,172
Undersized ...	16,025	15,090	9,240
Wormed ...	44,274	11,417	2,658
	672,661	457,634	105,070

188. *Immature shells*.—Great vigilance was exercised in dissuading divers from bringing ashore immature chanks. As many as 36,382 undersized shells were returned alive to the beds but the

rest could not be put back into the sea as the divers had extracted the flesh in them.

189. *Valampuri shells*.—One was obtained during this season in the chank grounds near the Nagarai Par off Tuticorin. This is the first occasion known when a Valampuri chank was fished in the Gulf of Mannar. It is a perfect shell and belongs to the superior class called "JADHI". The shell is $5\frac{1}{2}$ " long, has a circumference of 9" and weighs 35 tolas. A sum of Rs. 93-12-0 being the value of 1,000 ordinary chanks was paid to the finder; also a special bonus of Rs. 50. The shell is expected to fetch Rs. 750 to Rs. 1,000.

190. *Idinthakarai chank*.—As many as 498 shells were collected in nets against 344 during the previous season.

191. *Contract for purchase of shells*.—The season under report was the third and last year of the contract granted to the Dacca Industrial Union.

192. *Casualties*.—One Aboobaker, a Muhammadan diver of Kattanur village in the Rāmnād District, died of cholera. His funeral expenses of Rs. 10 were defrayed by the Department.

193. *Weather*.—The weather was good for operations throughout the fishing season. There were no long interruptions in work on account of bad weather. The south-west monsoon did not break till the 19th May 1930. Consequently, the chank fishery season under reference was a long one and was carried on from 31st October 1929 to 20th May 1930.

194. (iii) *TANJORE CHANK FISHERY*.—The departmental survey and investigation of chank beds with divers commenced in July 1929 opposite the coast from Adirampatnam to Manamelkudi, a distance of 19 miles. This portion of the coast was chosen for the purpose as it was here that the lessees made some attempts to carry on diving. A detailed examination of the sea bottom up to four fathoms was made and in all an area of 55 square miles was investigated. During the course of this examination a total of 4,311 chanks was collected.

195. *Character of the coast*.—The Adirampatnam coast is at the extreme northern end of Palk Strait. Being sheltered the sea is calm. The five-fathom line is nearly 8 miles from the shore. The bottom of the sea up to four fathoms is sandy, covered with a light deposit of clay here and there. Most of the area up to three fathoms is covered by a luxuriant growth of sea weeds *Enhalus acoroides* (Linn.), Zoll. (Tamil: Vattalai) and other forms. The bottom is muddy beyond four fathoms and a search made gave no indication

of chank grounds. The area covered by sea weeds is a sparsely populated chank ground and experimental dives made all over this region resulted in an average catch of about 30 chanks per boat per day, giving an earning of 5 annas per head at the rate of one anna per chank.

196. Weeds are deplorably absent on our coasts and this section of Palk Bay is the only exception known. The sea weeds here are a permanent feature of this coast and are reported to be subject to destruction whenever there is a large influx of fresh water consequent on heavy rains. It is understood that the last occasion when the weeds were so destroyed was in 1920. The weeds are now very thickly grown.

197. *New chank beds*.—During the investigations two chank beds were located off Puthupatnam and Adirampatnam in 2 to $3\frac{1}{4}$ fathoms of water. They are fairly prolific and are about 3 square miles in extent. Work is possible for about 5 months in a year. During the rest of the year the water is turbid and visual conditions are poor for fishing.

198. The survey of the adjoining section of the Tanjore coast from Manamelkudi to Puthukuda will be undertaken this year. The open coast from Point Calimere to Tirumalaivasal also awaits investigation.

199. *South Arcot Chank Fishery*.—The right to collect chanks from nets was leased for three years for a rent of Rs. 1,670. This was the third year of the lease.

200. *Chingleput and Nellore Districts' Chank Fishery*.—The third year's rental of Rs. 1,003-5-4 has been paid by the lessee. This also was leased for three years.

V. BIOLOGICAL SPECIMEN SUPPLY

201. A list of institutions supplied with zoological specimens is appended (Appendix VI). Among the new customers this year are:—

- The Government College, Ajmere;
- The Women's Intermediate College, Bangalore;
- St. Andrew's College, Gorakpur;
- Murray College, Sialkot; and
- H. H. the Maharaja's College for Women, Trivandrum.

202. The Catholic Bishop of Tuticorin, Right Reverend Father Francis T. Roche, was supplied with one case each of shells and

of Crustaceans for presentation to the Papal Museum at Rome and for the Vatican Exhibition held this year.

203. More study materials were supplied to the various universities and colleges for class work and zoological research. For stimulating the study of Natural History in secondary schools, advantage was taken of the exhibition held in connection with the Educational Conference of the All India Federation of Teachers' Association in Triplicane, Madras, during the last week of December 1929, and the secondary school set of biological specimens was exhibited. As a result of this, a number of enquiries were received. Three institutions have been supplied with such sets (Ajmere Government College, London Mission High School, Salem, and Bihar and Orissa Veterinary College, Patna).

204. Accessions to the named collection at Ennur consisted of a collection of Molluscs (Nudibranchs) and sea crabs collected at Ennur.

205. The Research Assistant went on tour in April and May 1930 to Tuticorin, Pamban, Rameswaram and Krusadai Island and made large collections of material required for supply.

206. During the year the Research Assistant was deputed for training under Dr. Gravely in the methods of collecting and preserving organisms for microscopical preparations.

207. At Dr. Hora's request a special collection of fish scales from fish of different ages in the fish farms was supplied to the Calcutta Museum for the study of growth rings and markings.

208. The Bombay Natural Society was supplied with live freshwater turtles from South India in connection with the collection it is forming for the proposed revision of the volume on reptiles in the Fauna of India Series.

VI. ANTI-MALARIAL WORK

209. The annual anti-malarial operations in the Nallamalais were carried out as usual and twenty-seven permanent water holes were stocked with 7,100 larvicidal fish.

210. The Vellore and Chingleput Fort Moats were heavily stocked with larvicidal fish during the year to keep down mosquito nuisance. There was no recurrence of malaria in the Reformatory and Police Training Schools.

211. The wells in the American Arcot Mission Hospital compound, Vellore, were stocked with larvicidal fish at the request and cost of the Mission last year. This had a most beneficial effect

and during the year there was a further request from Dr. Pauline Jeffreys to stock some more wells with similar fish. This also was done.

212. In appreciation of the results of anti-malarial stocking at Vellore, the American Mission at Chittoor requested that some wells on their lands might be stocked—and this was done.

213. The Madanapalli Mission wanted some wells in the Tuberculosis Hospital compound stocked with fish; but the request unfortunately came too late in the season for compliance.

214. A well in the Theosophical Society compound, Adyar, was stocked with fish at the request of the Ex-Minister Mr. Ranganatha Mudaliyar.

215. A request was made by the District Health Officer, Nellore, to stock some waters in Udayagiri town with larvicidal fish. A joint inspection of the water has been arranged as a preliminary to stocking.

216. Larvicidal fish for anti-malarial stocking was supplied to following institutions and persons:—

- | | | | |
|---|-----|-----|-------------|
| (a) Municipality, Cocanada | ... | ... | 2,000 fish. |
| (b) Railway (Personal Assistant to Chief Engineer, S.I.Ry.) | ... | ... | 200 „ |
| (c) Buckingham Mills, Madras | ... | ... | 5,000 „ |

217. *Gambusia Affinis*.—In the specially prepared pond on Krusadai Biological Station this American fish multiplied rapidly. But in the inundations caused by the unusual cyclonic rains from 6th to 9th May, a specimen of the predaceous fish *Megalops* gained access to the pond unnoticed and destroyed all the *gambusia* except a dozen fish before it was discovered and netted out. The dozen specimens which escaped destruction have bred since and a stock of a few hundred *gambusia* are now available. Proposals to extend the pond and protect it from the influx of predaceous species are under consideration.

VII. SOCIO-ECONOMIC WORK

A—Education.

218. (i) FISHERIES TRAINING INSTITUTE, CALICUT.—The Fisheries Training Institute re-opened after the monsoon vacation

on 5th August 1930 and closed for the year on 20th June 1930. The Institute was provided this year with a masonry wall all round the compound at a cost of about Rs. 1,600 and the improvements to the garden are now possible. Library books costing nearly Rs. 150 were bought. The apparatus supplied this year included two nets and some instruments for teaching Navigation. The school museum was also improved, but the necessary enlargement is prevented by lack of space. Work was carried on along the usual lines. Proposals for the reorganization of the Institute, based on the recommendations of the Fisheries Committee, were submitted to Government as a Part II scheme for 1930-31. But the Government postponed the consideration of these pending the decision of the question of the management of the fisheries elementary schools. The postponement of the reorganization question which is becoming more and more urgent has affected the efficiency of the Institute. Since the close of the year Government have called for a further and fuller report on the whole question.

219. *Pupil teachers.*—The total number of pupil teachers under instruction in the year under report was 36. Of these eight were students deputed by the Cochin State to undergo special training in Fisheries subjects so as to qualify them to serve as teachers in the vocational schools for fishermen intended to be opened in that State. They were paid stipends by the Government of Cochin. The remaining 28 students were paid stipends by the Department. Thirty-two out of the 36 students were fishermen Hindus, two were Muhammadans, one was a Christian and one a non-fisherman Hindu belonging to the backward class of Chaliyas. Seventeen students out of the total of 36 were of the secondary grade and 19 of the higher elementary grade. In addition to the ordinary students undergoing teachers' training, a student deputed by the Bihar Government, Babu Chandra Sekhar Prasad Varma, B.Sc., by name, also attended Technological courses in the Institute this year as part of his special training in Fisheries.

220. Nine students sat for the final examination, of whom one passed in the first class, six in the second class and two failed in some of the subjects. Four old students completed their certificates by passing in the subjects in which they had failed in previous years.

221. The Selection Committee held its meeting at Mangalore on 6th July 1929, and at Calicut on 8th July 1929 and selected four Kanarese and eleven Malayali pupil teachers. One of the selected Kanarese students was, however, disqualified at the medical examination. The members of the Committee were appointed in 1927 for a period of three years. The period of their appointment, therefore, expired in 1929. The Government were pleased in G.O. Ms. No. 1351, dated 6th August 1929, to renominate all the outgoing members for a further period of three years, except Mr. Kurukkankandy Abdulla, in whose place Khan Sahib T. M. Moidu Sahib, M.L.C., was nominated.

222. *School work.*—The normal work was carried on and fairly satisfactory results were achieved. The District Educational Officer inspected the Institute on 2nd February 1930 and remarked "The work of the training school is on the whole fair . . . The teachers are taking fair interest in their work and the teaching is conducted on fairly up-to-date lines . . . The work of the model school can be said to be fair." The Inspector of Industrial Schools who inspected the carpentry training class on 4th June 1930 however remarked: "The standard of this year's work is much below that of last year." The scale of pay sanctioned for the carpentry instructor, compares unfavourably with the scale prevailing in other institutions. Mr. Gaston, the carpentry instructor, who was refused an increased scale of pay has since secured a better paid post in the Industrial School at Calicut and has left the Institute. Government have since the close of the year, granted his request for a higher scale of pay, but even so the scale sanctioned is not equal to that of the post in the Industrial School. The practical classes in fishing were carried on as usual. The fish caught was generally sold fresh but occasionally cured by the students themselves. The price realized by the sale of fish both fresh and cured amounted to Rs. 222-5-6. The lessons in Navigation started last year were not continued this year. The "Sutherland" which was placed at the disposal of the Institute for practical work in the subject started from Tuticorin, but was unable to reach Calicut on account of the unusual adverse weather and therefore returned to Tuticorin. Dr. V. K. Vydyer, L.M.S., gave a course of lessons for the students of the Institute on rural sanitation and first-aid. The school co-operative society functioned as usual. The literary society also worked but with far less enthusiasm than last year. The students did not care to

celebrate the valedictory meeting of the society as was done in previous years. The scout-troop also did not show much activity. The Fisheries Training Institute Magazine, which began publication in January 1929, published eleven monthly issues but came to an end in November. The students' interest in games also showed a marked decline this year and they did not participate in any of the tournaments held in the town. The second year students went on excursion to the Trout Hatchery at Avalanche from 12th to 19th October 1929. The whole school visited the Fisheries Experimental Station at Tanur from 28th January to 2nd February 1930. But they could not benefit much by the visit as there were no large scale operations at the station owing to the failure of the fishing season.

223. *Visitors*.—The Hon'ble the Minister for Development visited the Fisheries Training Institute in April last.

224. (ii) VILLAGE SCHOOLS.—There were 43 fisheries elementary schools maintained by Government on the West Coast against 41 at the end of last year. This number includes the model school attached to the Fisheries Training Institute and the Vellayil Night School, which are under the control of the Headmaster of the Fisheries Training Institute.

225. Kundazhiyur, Mannalamkunnu, Palapatti and Veliangode schools in the Malabar District and the schools at Kumbala, Kapu and Baidoor in the South Kanara District are badly housed in old and shabby sheds.

226. The Bangar-Manjeshwar school is conducted in the upper storey of a shop which is inconvenient as a school-house where there is hardly room for three teachers to conduct the classes. The owner of the building has however promised to put up a separate building after the monsoon.

227. Spacious, well-lighted, permanent buildings to accommodate 150 pupils were constructed in March last for the Kuriyadi and the Chaliyam schools. Large well-built thatched sheds were constructed during the year for the Parappanangadi, Pudiappa and Naduvattam schools.

228. The night school at Tanur was closed for want of attendance. Sanction for converting it into a day school and locating it in the fishing village has been accorded by Government

but the school shed is not yet ready and therefore it has not been possible to start the school.

229. The night school at Kadalundi did not show sufficient progress and has therefore been transferred to Pudiappa.

230. The Vellayil Night School, which has been closed for want of pupils, was revived during the year, but so far there has been no improvement in the number of pupils.

231. The Naduvattam school was taken over by Government on 1st July 1929.

232. A new school for Navunda in the Coondapoor Taluk in South Kanara has been sanctioned in G.O. No. 688, Development, dated 1st April 1930. But it was not possible to open it before the commencement of the new year.

233. The fisherfolk of Bengre Hungarcutta Kodi village in the Udipi Taluk have submitted a petition asking the Department to take over the management of a school started by them for the benefit of fisher-children on 17th August 1928. As the Educational authorities objected to the taking over of the school nothing could be done, but I understand that the District Educational Officer is likely to reconsider his decision in view of the growing unpopularity of the school.

234. The Hon'ble Minister for Development visited the Malpe school in April last.

235. The condition of the day schools has been generally satisfactory though in the South Kanara District the schools do not seem to be as well attended as in Malabar. There has been a steady improvement in the strength of the schools which will be seen in the following census:—

Year.	Strength.	Boys.	Girls.
1924-25	2,456	1,759	691
1925-26	2,294	1,681	613
1926-27	2,440	1,737	703
1927-28	3,000	2,132	868
1928-29	3,443	2,368	1,075
1929-30	3,637	2,573	1,064

236. (iii) OTHER EDUCATIONAL WORK.—*Marine Aquarium—Improvement*.—The 4 newly constructed tanks in the aquarium

were fitted with pipes, air tubes, etc. One of the 3 big *Epinephalus* (two having died) was transferred to one of these newly constructed tanks. The two Hawksbill turtles were placed in another of the new tanks. They have become adapted to life in the aquarium. They feed freely now on fish like the other inmates of the aquarium and have much improved in general health.

237. The number of visitors for the year was 99,970 as against 96,042 in the previous year. The record attendance was as usual on the Kannupongal day, but only 3,495 visited the aquarium as against 3,660 in the previous year.

238. The daily average attendance for the year is 274 as against 260 in the previous year.

239. One thousand six hundred and nineteen students from different schools and colleges accompanied by their teachers visited the aquarium. Out of this number 905 students were from the Madras Corporation schools who were admitted free. The aquarium was twice reserved for special parties. Among the distinguished visitors were the Hon'ble Barbara Stanley; Her Excellency Lady Irwin; Lord and Lady Stanley, Sir Vincent Baddeley; Professor B. Richard Goldschmidt, Director of Kaiser Wilhelm Institute for Biology, Berlin; Lord Peel; His Excellency the Rear Admiral E. J. A. Fullerton, C.B., D.S.O., Commander of the British East Indies Squadron; Her Highness the Maharani Sahib of Kapurthala and the Maharajkumar of Bikanir.

240. The disturbances on the marina early this year and the general political situation have caused an appreciable fall in the number of visitors during the last 8 months.

241. The total gate collections for the year was Rs. 7,726-3-6 as against Rs. 7,604-7-0 in the previous year. The amount realized by the sale-proceed of 566 copies of English Aquarium guides, 226 Tamil guides, 231 packets of picture post-cards, 5 copies of "The Common Molluscs of South India", 11 copies of "A note on Edible Oysters" and a few loose picture cards, was Rs. 179-0-0. The rental from the aquarium restaurant was Rs. 408.

242. After much discussion the Port Trust declined to increase the number of fishing passes for the collection of aquarium specimens in the Harbour from 4 to 8 per month as they felt the

additional passes will affect their revenue from the sale of fishing rights in the Harbour.

243. (iv) MISCELLANEOUS.—The Government of Bihar and Orissa deputed Mr. Babu Chandra Sekhar Prasad Varma for training in this Department for a period of one year. This student arrived on the 5th August 1929. He spent about 7 months at the Fisheries Training Institute and received theoretical instruction in fisheries technique. He worked at Tanur Experimental Station, the refrigeration station at Malpe and at the fish farms and research stations where he obtained his practical training in all the methods and operations of the Department. He completed his one year's training in the Department and left for Patna on 4th August 1930.

B—Co-operative Societies.

244. (i) WEST COAST.—An important event of the year was the appointment of three Co-operative Inspectors to assist the Assistant Director of Fisheries (Coast) in intensive work among fishermen. The need for special efforts to promote co-operation among fishermen and to renew and stimulate co-operative societies to more efficient work has been recognized by Government for some years. The Committee on Fisheries recommended that all co-operative work among fishermen both on the West and East Coasts in the Presidency should be done by the Fisheries Department and that on the analogy of the system in vogue in the Labour Department the special staff of Inspectors of Co-operative Societies should work under the Fisheries Department, the Co-operative Department supplying trained Inspectors and auditing the books of the societies. The Government partially accepted the recommendations. As the Fisheries Department has at present adequate supervising staff only on the West Coast, they sanctioned the deputation of three Inspectors of Co-operative Societies for exclusive work among fishermen under the Department. The three Inspectors have each been attached to an Inspector of Fisheries.

245. Since 1924 the fishing industry has suffered decline owing to the scarcity of fish in inshore waters. Consequently, fishermen have been gradually becoming poorer. Very few of the backward societies would have survived the scarcity of fish during the last five years, but for the fostering care of the Fisheries Department.

Even in more prosperous times, it is difficult to induce fishermen to save money or invest in a co-operative society. It has always been a hard task to run co-operative organizations efficiently in a fishing village; but when fish are scarce and earnings are low and fishermen can hardly afford to get a decent meal, the task of reviving defunct or dormant co-operative societies of fishermen becomes infinitely more arduous. The year was the poorest fisheries year within the last decade. On the whole, however, owing to the devoted and persistent efforts of fishery officers the condition of fishermen societies has improved. Their chances of revival have increased with the appointment of special co-operative Inspectors for fishermen societies towards the close of the year.

246. The Upper Mogayars' Co-operative Society has been liquidated. Orders have been issued to close the Gangoli Kharvis' Society. The Udayavar society has practically ceased to exist and now consists of only five members. The Coondapur Kharvis', Sri Gnanodaya, Kasargod Mogayars', Cheerambakam fishermen and Moolky Mogayars' have had no transactions during the year. Heavy bank loans stand against Kottikulam (Rs. 1,778), Kasargod Arayajana (Rs. 4,310), Kizhur Fishermen (Rs. 4,018) and Hosabettu Moideenpalli (Rs. 1,381) Co-operative Societies. The affairs of the Moolky society are so bad that it is hardly possible to revive the society. The Sri Gnanodaya Co-operative Society has ceased to function. Overdue loans of this society amount to Rs. 1,881-6-9.

247. The position of the following societies in Malabar is satisfactory :—

Pudiappa Co-operative Society.	
Kollam Arayajana	„
Kuriyadi Arayajana	„
Thalayi Curers'	„
Thiruvani Arayajana	„
Muzhappilangad Mogayars',	„
Cannanore Women Curers'	„

248. The present dormant condition of the small Meladi Curers' Society is due to the loss of all its money by the death of its Secretary in whose possession the money was kept. Arrangements, however, have been made to recover the amount in small instalments from the father of the deceased. The Vellayil Society

was hard hit by the steady decline in fishing during the last five years. Overdues are heavy and attempts made to effect recovery have not been altogether successful. The society can, however, be improved by persistent efforts and these efforts are not being spared. It is hoped that during the coming year substantial improvement will be effected.

249. There have been serious mistakes in the accounts of the Co-operative Society at Kadalundi which alone stand in the way of reviving the society. All the members except a very few have agreed to repay their loans and give a new and more vigorous life to the society. The Inspector is striving to win over the few who stand out and hopes to include in a few months this society among the satisfactory societies.

250. The President of the Thayyil Arayajana Society has persistently refused to allow officers of the Fisheries Department to inspect the books of the society and to make themselves cognizant of its affairs. The Assistant Director of Fisheries (Coast) and the Inspector of Fisheries have been empowered by the Government and the Registrar of Co-operative Societies respectively to summon the production of the records of fishermen co-operative societies and to inspect them. The President and Secretary of the above society nevertheless refused to produce the books before the Assistant Director of Fisheries (Coast) in spite of a summons issued in due form. The prosecution of the office bearers became unavoidable and they were both convicted and fined.

251. The Arekere Bhaghavathi, Kundhazhiyur, Chettuvayi and Puthenkadapuram Societies did not do any work owing to communal strife in the villages. The President of the last society has been keeping a heavy cash balance. He has been advised to deposit it in the District Bank.

252. The President of the Blangad Society is an influential man of the locality but he could not revive the society as the fishing season was poor.

253. The remaining societies are in a better condition than last year.

254. The Pudiappa Society entered on a new lease of life in 1929 through the efforts of the local Fishery Officers, especially the Headmaster of the Pudiappa Fisheries School, who has been appointed as its Secretary.

255. Kollam Society also dates its revival from last year, Sub-Inspector of Quilandy yard being responsible for its present improved condition.

256. There is a split between the President and the members of the Madapalli Mogayars' Co-operative Society. Attempts are being made by the Inspector of Fisheries, Calicut, to heal this breach. If the breach is healed the society will function as one of the best societies on the coast as the members are Mogayars who manage their affairs in a much more business-like manner than any other class of professional fishermen. It was a very efficient society in the first few years of its existence before the aforesaid split occurred.

257. The societies at Vekkode, Perinjanam, Kaipamangalam, Pallipuram and Nattika did some transactions in spite of the fact that fishing was poor.

258. *Industrial societies.*—Of the two societies started, one at Blangad and the other at Palapatti, for fishing with boats and nets purchased with loans obtained from Government, the Blangad Society did satisfactory work and was able to pay back Rs. 250 towards loan and Rs. 30-8-4 towards interest. The balance of the loan to be discharged at the end of last year was Rs. 500 (Rs. 150 arrears of 1928-29 and Rs. 350 due in the year under report). On a representation made by the society on the ground that its failure to clear off the debt by the stipulated period (31st March 1930) was due to an extremely poor fishing season, an extension of time by six months for repayment was allowed by Government. No loan from others was received by the society. The members in spite of the poor fishing season were prompt in paying their instalments towards share capital.

259. The working of the Palapatti Society when compared with that of the Blangad Society was not so satisfactory. The members had not paid any instalment either towards share capital or towards the loan taken by them from the society. The society was able to repay only Rs. 100 towards the balance of the loan (Rs. 300 arrears of 1928-29 and Rs. 350 due in 1929-30) due to Government and Rs. 12-7-6 for interest. In addition it owes Rs. 300 to the District Bank.

260. Though intensive supervision was exercised by the Departmental Officers over this society as at Blangad, nothing better could be done owing to the poor income of the society boats. This society has been allowed by Government an extension of time by one year for the repayment of the loan.

261. The sale-proceeds of the catches of the Blangad and Palapatti Societies were Rs. 1,396 and Rs. 801-6-0 respectively during the year under report as against Rs. 1,725-8-0 and Rs. 1,212-12-0 in 1928-29 and Rs. 2,177-3-0 and Rs. 2,150-8-0 in 1927-28 respectively. The society's share in the catches was Rs. 284-8-0 for the Blangad Society and Rs. 162-8-0 for the Palapatti Society during 1929-30 as against Rs. 426-13-0 in 1928-29 and Rs. 642-2-0 in 1927-28 for Blangad Society and Rs. 324-14-0 in 1928-29 and Rs. 659-7-6 in 1927-28 for the Palapatti Society. The above figures show the poor catches of the Palapatti Society as compared with the catches obtained by the Blangad Society.

262. (ii) INLAND.—The organization of co-operative societies is progressing satisfactorily notwithstanding the many difficulties with which the societies have to contend. The Government realizing the low financial position of these societies gave them concessions which go a great way in helping them to gain their feet. As stated in last year's report intensive supervision and constant scrutiny of the societies' accounts are essential if they are to lay by something every year, so that in course of time they may be able to compete successfully in open auction with rich capitalists. The department has been doing everything in its power to help the growth of these societies but without special staff the efforts which have been made are quite inadequate. As stated above, the Government have postponed the transfer of the Co-operative staff on the East Coast for want of sufficient number of controlling officers. Until the necessary staff are available more intensive and systematic work is impossible, the sea-going fishermen of the East Coast especially as a class have not received any attention. The societies in existence are working well and in addition the following three new societies were formed during the year through the good offices of the Co-operative and Labour Departments. Important inland fisheries were leased out to them.

Name of Society.	Locality.	Fishery leased.	Rent.
1. Murungapettai Fishermen Co-operative Society.	Trichinopoly District.	Trichinopoly Taluk Fishery.	RS. 8,000
2. Vallampadugai Fishermen Co-operative Society.	South Arcot ...	South Arcot District Coleroon Fishery.	4,000
3. Vemalakota Fishermen Co-operative Society.	Kurnool District ..	Markapur tank ...	100

The fishermen of Sriperumbudur have applied to the Deputy Registrar of Co-operative Societies, Madras, for the formation of a society for them and the matter is under enquiry. The fishermen were, however, given the lease of the Sriperumbudur tanks as a preliminary step for a year, and Government had promised to extend the lease for another two years as soon as a society is formed. The proposals for the formation of societies for the Conjeeveram and Wallajabad fishermen did not materialize during the year, as the Deputy Registrar of Co-operative Societies did not find the conditions favourable. The matter will further be investigated.

263. The Deputy Registrar of Co-operative Societies, Nellore, whom the Assistant Director (Inland) interviewed during the year, is keen on this uplift work and it is hoped that by his efforts some more societies will be established next year.

264. A list of societies now working and the fisheries leased out to each are given in Appendix V.

C—Other Socio-economic work.

265. (i) WEST COAST.—The temperance movement does not seem to have made as much headway as might be desired. The anniversary meeting of the Sri Gnanodaya Association of Mangalore was presided over this year by Mr. Ramakrishna Punja, the President of the Temperance Propaganda Committee in South Kanara. Other associations also continued to do good work. All the maritime local boards in South Kanara, except Coondapoor, have a fishermen member.

266. Special activities were shown in centres like Calicut, Quilandy, Thalayi and Cannanore. Very useful work was done by the two Vellayil and South Beach Child Welfare Centres. Several Fishery Officers were members of the Managing Committee and for nearly the whole year the Sub-Inspector of the Calicut North yard was the Secretary of both the institutions. His transfer out of the division necessitated by administrative exigency has been a severe blow to the well-being of these institutions in Calicut. The daily attendance of the children averaged 125 at these two centres.

267. With the help and co-operation of Fisheries Officers, a reading room is being run in Vellayil village entitled the "Swabhimani Reading Room." Most of the newspapers obtained are subscribed for by the Fisheries staff. Under the auspices of the Reading Room, special lectures to fisher people on temperance

and social and moral improvement, and magic lantern shows are given. Cosmopolitan dinners in which Muhammadans, Fishermen Christians, Nayars, Thiyyas and Adi-Dravidas take part are held and occasional free distribution of rice is made to poor fishermen.

268. The Sub-Inspector of the Quilandy yard and the teachers of the Quilandy Fisheries School are the inspiration of the social improvement activities in that important fishing village. In addition to improving the co-operative societies, the Fisheries staff has helped in starting a reading room for fishermen in the heart of the village. Useful and informing lectures on subjects like temperance, sanitation and health, illustrated by lantern slides and music parties are all being held by the Reading Room Managing Committee and the Institute is exercising much beneficial influence in the village, and creating a growing thirst for knowledge and information relating to the world at large. The Reading Room is drawing a large number of fishermen. The Inspector of Fisheries, Calicut, presided over one of the temperance meetings when the temperance propagandist delivered a lecture. There was a serious outbreak of small-pox in this village. The Fisheries staff co-operated with the Health authorities in bringing it under control. In some fishing accidents which occurred the Fishery Sub-Inspector took the injured people to hospital and rendered all assistance in getting the people proper treatment.

269. By the intervention of a Fisheries Officer, a fisherman who lost his boats and nets representing his entire worldly fortunes received a donation of Rs. 40 from the Collector's discretionary grant.

270. The Sub-Inspector of the Thalayi Co-operative yard is doing a good deal of social work in that village. As a result of the efforts made by him and his predecessor, drinking is reported to have practically disappeared except among the very old. The Sub-Inspector is using special efforts to dislodge the toddy shop in the village. He has also started games among the young men who being of good physique readily take to sports, and their spare time, instead of being spent near or in toddy shops, is being devoted to acquiring proficiency in games of skill. The foundation of a music room has been laid and the building when completed will also house a reading room. Very useful work was also done by the Sub-Inspector in improving the local fishermen's co-operative society.

271. A drink prohibition league established by local fisherfolk in the Cannanore fishing village with the help of the Fisheries

Sub-Inspector has been so successful that drinking has greatly decreased and the renter of the local toddy shop is complaining of diminishing sales.

272. A Kerala Mogayar's Samaj has been constituted at Madapalli fishing village to effect many sided improvements in the condition of Mogayar fishermen.

273. A meeting shed has been erected by the Azhicode fishermen in their village from which an anti-drink propaganda is being conducted. A reading room was opened in their shed in June 1930.

274. The economic condition of fishermen in Ponnani was bad owing to poor fishing in spite of their efforts to earn something by other means such as working on plantations, coir making, etc.

275. A boy belonging to this Ponnani fishermen community has come out successful in the B.A. Degree examination and another in the Intermediate examination.

276. The failure of fishing this year coming on the top of a series of bad years has reduced the material condition of the fishing population to a very low state. Their reserve of wealth, never large, represented by household utensils, jewellery of their women-folk, etc., their huts and house-sites have been drawn upon to the utmost limit and their credit in the bazaar has been exhausted. Owing, however, to the high prevailing price of fish, the catches, though small, fetched enough to keep the fishermen from starvation and there have been no reports of acute distress or famine during the year. As the year was closing some good catches of fish have obtained in several villages and the coming year holds promise of a better fishing season.

277. On the whole the improvement in the social, moral, physical and intellectual conditions of the fishing community in the coast has been substantial during the year and has been helped on and accelerated by the officers of the Fisheries Department. It is true that these officers have come into conflict with a few members of the fishermen community who, abandoning their ancestral occupation, live by exploiting their hard working brethren, but on the whole the relations between the officers of the Fisheries Department and the members of the fishing community have been entirely cordial.

278. *Assignment of land to fishermen for house-site purposes.*—A piece of Government waste land in Chitrap village, Mangalore Taluk, South Kanara District, for which fishermen had applied over three years ago, has now been finally assigned to them by

the Collector of South Kanara. The poor destitute fishermeh and women about 16 in number, in the Uppala and Pallikere villages have encroached upon foreshore Government waste land and made improvements by constructing dwellings and planting cocoanut trees. Recommendations have been made to the Revenue authorities that the sites encroached upon may be formally assigned to the fishermen. I understand that arrangements are being made at Kizhur Kalnad, Kasaragod Taluk, for assigning Government land to Kizhur fishermen.

279. (ii) EAST COAST.—At Pinnakayal, a large fishing village of the Tinnevely District, a dispute arose between the fishermen and the Parish Priest on one side and the "Tharagars" (fish brokers) and fish merchants of the surrounding villages on the other. The latter effectively boycotted fish from Pinnakayal for 20 days and caused serious privation among the fishermen. The Assistant Director, Pearl and Chank Fisheries, when on a visit to the local fish-curing yard was approached by both parties and asked to arbitrate. This he did to the complete satisfaction of all concerned. Normal conditions have prevailed there since.

280. There were similar disputes among the fishermen and merchants of Srivaikuntam, Alwartirunagari, Arumuganeri, Mukkani and other villages in the neighbourhood. Hearing that the Assistant Director, Pearl and Chank Fisheries, had settled a similar dispute at Pinnakayal, the disputants in these villages also invited him to settle their differences. As he was unable to visit each village, Eral was fixed as the meeting place. The Assistant Director, Pearl and Chank Fisheries paid an unofficial visit to this village and was able to settle all these disputes satisfactorily.

281. An Association of Telugu fishermen—the Agnikula Kshatriya Mahasangam—complained to the Hon'ble Minister that the ryots and rich landlords of Mori and other villages adjoining the Sankaraguptam Drain in East Godavari District by means of a prohibition order obtained from the Revenue Department obstructed the fishermen of these villages from fishing in the Drain to which they have immemorial rights. The plea of the ryots was, that fishing fences across the drain prevented a free flow of water and their lands were consequently subject to inundation. On a departmental enquiry conducted with the assistance of the local Revenue officers it was shown that the fishing causes no undue obstacle to the flow of flood water and that the level of some of the fields was so low that rain water naturally stagnated in

them. Therefore the Collector agreed to cancel the order prohibiting fishing in the drain and to watch results.

VIII. PROPAGANDA

A—Rural Pisciculture.

282. The Royal Commission on Agriculture in paragraph 415 of their report stated that the addition of fish to the diet of the cultivator seems to be the most promising way of securing that improvement in his nutrition which is so much needed, and recommended that all measures practicable to this end should be taken. In explaining this recommendation the Commission observed that they were fully aware that if material progress was to be made in augmenting in this way the food supply of rural areas it would be essential for the District Boards and rural communities generally to play their part in the stocking of local waters and in their conservancy, and suggested that the Fisheries Department should be strengthened for the purpose. With reference to the Commission's recommendations as a Member of the Local Agricultural Advisory Committee I placed before them a scheme for propaganda for rural pisciculture in village ponds, tanks and private waters.

283. The objects and details of the scheme were briefly as follows:—

With the possible exception of portions of the Northern Circars Malabar and South Kanara, every village in the Presidency has one or more tanks or ponds for drinking and bathing and for cattle or attached to shrines; in the southern districts many large irrigation wells also exist in addition; in Malabar and South Kanara every house has a bathing pond. The village ponds and wells are individually small and scattered but in the aggregate they form a vast potential area for the culture of food fish. There must be at least 106,050 village ponds in the Presidency, i.e., over a lakh of acres of water of more or less permanent character available for fish culture. The fish in very few of these ponds are utilized. They contain some quantity of coarse and bony fish of small size, which get netted to the point of extinction whenever the ponds run dry. Of large irrigation wells there are nearly 650,000. The smallest of them measures 20' x 20' and if carefully stocked and tended each should make a welcome addition to the owner's domestic food supply. The Fisheries Department is now in a position to advise, demonstrate to the public the cultural methods and processes so far ascertained and tested and in some districts

actually to supply the fry of superior varieties of local and exotic fish from the fish farms at a nominal price. The nature of the food supply in a pond, its fauna and flora and other conditions should be investigated before the exact requirements in fish and fish food for developing its fisheries can be ascertained. Also on such data have to be based the methods of culture to be adopted. All this can only be done by a technically qualified officer of the department who will also help in procuring a supply of suitable fish, weeds, etc., for stocking the pond. This officer is necessary to ascertain conditions in villages and examine scientifically the village ponds, decide on the kinds of fish and fish food (weeds, molluscs, etc.) needed for improving their fisheries to clear the ponds of predaceous fish, strengthen inlets and outlets and assess the possibility of extending the fisheries by cultural methods; in the second place if he finds it necessary, to demonstrate and teach the operations decided on to the villagers concerned and subsequently guide them in tending, stocking and fishing the ponds in moderation, lastly to keep an accurate record of work done and results obtained which will be valuable knowledge for his own future work and for departmental and Government purpose.

284. I therefore suggested to the Committee the appointment of an officer not lower in rank than an Assistant Director of Fisheries possessing sufficient training, experience and local knowledge, with an Inspector of Fisheries, a Laboratory Assistant, a clerk and a trained Fieldman and two peons to assist him in his work. In G.O. No. 830, Mis., Development, dated 12th April 1930, the Government approved of the scheme outlined by me for propaganda for rural pisciculture in village ponds, tanks, etc., and sanctioned the creation for a period of one year of a post of Assistant Director on a pay of Rs. 250 and the following establishment:—

One Inspector on Rs. 70 per mensem.

One Laboratory Assistant on Rs. 65 per mensem.

One Clerk on Rs. 40 per mensem.

One Fieldman on Rs. 23 per mensem.

Two Peons on Rs. 15 per mensem each.

285. Mr. S. T. Moses, Research Assistant, West Hill, was appointed to act as Assistant Director, Rural Pisciculture, for three months from 10th June last pending the selection of a suitable candidate by the Public Services Commission.

286. After a careful study of the taluk and village maps of the Chingleput Taluk, a preliminary survey of 17 villages on the

Chingleput-Sadras road was undertaken in the last week of June, with a view to (1) examining ponds and irrigation wells and judging their suitability for stocking purposes; (2) inspecting adjoining rivers, lakes and backwaters in order to ascertain if they could serve as sources of supply of young food fish for stocking village ponds and (3) propounding the scheme of rural pisciculture to villagers in order to induce them to work it individually in the case of private wells and tanks, and on a co-operative basis in the case of communal ponds.

B—Fisheries Exhibition.

287. The Inland Section participated in the following Exhibitions during the year:—

(1) The Industrial Exhibition held at Katpadi in November 1929 under the auspices of the Arcot Mission. Besides exhibiting live specimens of Gourami, Etroplus and Haplochilus, papers were read on the utility of Gourami. Etroplus and their suitability for small pond culture and also on the value of Haplochilus for anti-malarial stocking work. They were much appreciated by the people and the Madras Mail expressed similar sentiments in the course of a lengthy article on 11th November 1929.

(2) The Park Fair Exhibition held during Christmas 1929.

(3) The Baby Week Exhibitions held in Madras in April 1930.

288. The Ennur Station exhibited mounted museum specimens at the Park Fair Exhibition. In addition the special collection of about two dozen selected specimens in bottles and shell cases were sent to Kodaikanal for the Exhibition held there in May in connexion with a Missionary Conference. In December 1929 a secondary school set of biological specimens was exhibited at a Conference of the All-India Federation of Teachers Association in Triplicane.

C—Miscellaneous.

289. *Advertisement*.—Only one advertisement, in the Villagers' Calendar of the Agricultural Department, was tried this year and some enquiries were received in response for guano, etc., which could not be supplied for want of stock. As usual samples were exhibited at the Madras Park Fair Exhibition.

290. The scientific Fishery Farming Association, Ltd., Chittagong, were advised about rearing fish in ponds for market purposes.

291. The Warden, The Punjab Fisheries, was furnished with detailed information regarding the care and culture of Etroplus, as he desired detailed advice regarding the stocking of saline lakes in the salt ranges of the Punjab, the temperature and salinity of the lake, were ascertained and the backwater food fish, mullet, Etroplus, Therapon, Megalops and Chanos were recommended as species that are likely to suit the waters in question. He was also provided with specimens to enable him to ascertain their availability in the Punjab.

292. The Y.M.C.A., Coimbatore, which has taken up rural reconstruction work, was furnished with short notes on fish suited for pond culture and on the advantages of taking up fish culture as a cottage industry.

293. Information about fish breeding was also furnished to one Mr. Lokanatha Mudaliyar, B.E., of Sattur (South India) and to Mr. A. W. Charter of Calcutta.

IX. PUBLICATIONS

294. *Bulletin on marketable fish*.—On account of the many demands on my time and the absence of any staff for technical assistance at headquarters the preparation of the bulletin on marketable fishes of Madras, for which Rs. 4,575 was sanctioned, has made very slow progress.

295. Day's "Fishes" in the "Fauna of India," which is the last standard work on the subject, is half a century old; considerable work on the classification and nomenclature of fish has been done since his time and every one of his fish has to be critically examined and the name modernized. In the absence of several important reference books in the Madras Library they have to be obtained from Calcutta and elsewhere. The type specimens of some doubtful species are available only in the collections of the Calcutta Museum, some of which have been sent to me through the courtesy of the Zoological Survey of India. The daily collection of fish from typical localities on the coast are rapidly accumulating in my office for identification and study. Even the identity of some of the South Indian food fishes is in grave doubt, and I have been so far able to work out only part of the Krusadai Island collection.

296. After an accurate determination of the species and their correct modern names has been made, the available items of information regarding their habits, life histories and economic

importance to this Presidency have to be culled from scattered publications spread over many years, personal observations and notes, and the valuable fund of information now buried in the archives of the fish curing yards. Shorthanded as the office has been, most of this clerical work also has devolved on me in my tours to the fish curing yards and the delay that has ensued was inevitable.

297. Not only are names different in the five different languages spoken in the Presidency (Telugu, Tamil, Malayalam, Kanarese and Tulu), but the same fish is often called by different names in adjacent localities in the same language area. Unless collections are made at many points on the coast and the fish correctly identified, it is impossible to compose a glossary of all the vernacular names, and what is even more important, to gather the facts and figures relating to their occurrence and economic importance on the different sections of the coast.

298. Rs. 3,800 out of the amount sanctioned for the Bulletin is towards *coloured* plates and *illustrations*. Unfortunately Mr. Samuel, the Survey Assistant, who is a professional painter and has had long training in the Department in such work fell seriously ill after completing only a few pictures. Though exhaustive enquiries were made in the School of Arts and through the Secretary of the Fine Arts Exhibition a suitable candidate was not found. Mr. Fernandez from Tuticorin, who has had training in painting at Trivandrum has been recently entertained as the best out of the applicants. Some progress has since been made with the illustrations for the Bulletin.

299. Copies of the Departmental Bulletin No. 3 "The Preservation and Curing of Fish" by Sir F. A. Nicholson having been exhausted it was reprinted during the year. This report has proved a very useful and popular work for fish-curers, departmental officers and the public at large, and the first issue of 500 copies was exhausted years ago. The continued demand for this volume and the general revival of interest in fisheries and allied industries in Bengal, Bombay and other provinces since the Great War and the depression which immediately followed, have necessitated the issue of a reprint.

300. Fisheries Bio-Chemistry and Technology have made considerable progress during the last twenty years and many experiments have also been conducted at the Government station at Tanur, all of which would appear to warrant the preparation of

a new edition which would embody the latest facts and most approved methods. However, no such attempt to revise the report in the light of recent researches could be made in the absence of an expert technologist in the Department, whose appointment has had to be postponed largely for financial reasons.

301. *Bulletin on Pearl Fisheries*.—Government have decided that all the interim reports on the several pearl fisheries from 1926 to 1928 should be published. The bulletin is under preparation.

302. *Statistical Report for 1926-27*.—This has been sent to the Press and will be issued as a supplement to the Annual Report for 1927-28.

PART II FINANCE

303. *Summary of financial results*.—The total expenditure of the Department for the year was Rs. 9,36,378 and the revenue Rs. 7,57,795. The Chank Fisheries brought in an unprecedented nett revenue of Rs. 1,63,180 which is a record in the annals of the Chank Fishery. The corresponding figure for the previous year was only Rs. 1,07,811. The gate collections, etc., at the Marine Aquarium for the year were Rs. 8,313 and exceeded expenditure by Rs. 970 as against Rs. 1,273 of the previous year. The oyster supply resulted in a nett revenue of Rs. 229 against a debit balance of Rs. 814 in the previous year. The fishing season on the West Coast was a disastrous failure and resulted in an expenditure of Rs. 29,081 over receipts from all the yards in the Presidency, the loss in the preceding year being Rs. 12,804. The Tanur station for the same reason suffered a loss of Rs. 7,273 against a loss of Rs. 2,447 in 1928-29. The accounts of the Inland section showed a debit of Rs. 7,617 against a nett revenue of Rs. 7,880 in the previous year. This is due to a capital expenditure of Rs. 6,600 and to a fall in revenue of Rs. 8,800 from tank rentals due in some cases to inadequate and in others to excess water-supply. The accounts of the Cannery which remained closed throughout the year were audited at the end of the year and the usual debit of interest over investments, etc., resulted in a loss of Rs. 4,751. The receipts of the Specimen Supply Section, Ennur, was less than its expenditure by Rs. 2,743.

304. The usual financial statements are appended.

PART III

STAFF

305. A list of Gazetted staff of the Department is given in Appendix I.

I. BIOLOGICAL

Assistant Biologist.

306. The newly sanctioned Assistant Biologist (Dr. D. W. Devanesan, M.A., PH. D.) assumed charge on 9th June 1930, of the Biological Research work on board the trawler and at the two biological stations at Krusadai Island and West Hill, Calicut, where intensive research in connexion with the investigations in deep-sea fisheries are to be undertaken.

307. *Inspector*.—Mr. E. K. Madhavan, B.A., who was Inspector, on board the trawler, was transferred as Research Assistant, Krusadai Island, on 20th February 1930, and Mr. V. John, B.A., Research Assistant, Krusadai Island, was appointed as Inspector on board the trawler with effect from 22nd February 1930.

308. (i) WEST HILL RESEARCH STATION, CALICUT.—Mr. S. T. Moses, M.A., was in charge of the station till 5th June 1930 when he was transferred to act as Assistant Director, Rural Pisciculture, Madras. He was relieved by Mr. S. Varadarajan, B.A. (Hons.), on the afternoon of the same day.

309. (ii) KRUSADAI ISLAND RESEARCH STATION.—Mr. V. John, B.A., continued to be in charge of the station till 17th February 1930, when he was transferred as Inspector of Fisheries (Marine) on board the trawler. Mr. E. K. Madhavan, B.A., Inspector of Fisheries on board the trawler took his place on 28th March 1930. Mr. V. John underwent training from 21st October to 20th December 1929 under Dr. Gravely at the Government Museum.

310. (iii) MARINE AQUARIUM.—During the year there was no change in the staff.

II. TECHNOLOGICAL

A—Tanur Experimental Station.

311. Mr. Baratan continued to act as Research Assistant throughout the year. From 22nd January 1930 to 5th February 1930 he was on leave having had an attack of typho-malaria. The Sub-Inspector of the Tanur North Yard in addition to his own duties attended to the current duties of the station during his absence.

B—Chaliyam Cannery.

312. A further reduction in staff at the cannery was made on 1st January 1930 as the stock of canned fish was disposed of during the year. The only staff entertained was

1 cooly on Rs. 13 per mensem.

1 watchman on Rs. 12 per mensem.

III. EDUCATIONAL

313. *Fisheries Training Institute*.—There was no change in the staff during the year.

314. *Village schools*.—One hundred and thirty-nine teachers were employed in these schools of whom 104 were trained in the Fisheries Training Institute and 26 were trained in ordinary training schools. The corresponding figures for last year were 121.75 and 34 respectively. A statement showing the names and location of fisheries schools, the strength of each class in the several schools, the number of pupils that passed out of each school, the number of teachers employed with their qualification and the cost of the up-keep of each school is appended as required in G.O. No. 1895, Development, dated 8th November 1928.

IV. NAUTICAL

315. "*Lady Goschen*."—Captain T. G. Cribb, the Assistant Director of Fisheries (Marine) was on leave from 15th June to 14th December 1929 during which period the "*Lady Goschen*" was sent to Bombay for alterations. From 4th June to 15th December 1929 she was in the Royal Indian Marine Dockyard, Bombay, where she had only a skeleton crew.

Full strength			Skeleton crew.		
		RS.			RS.
Mate	...	1 150	Mate	...	1 150
Syrang	...	1 110	Syrang	...	1 110
Driver	...	1 130	Driver	...	1 130
Drivers	...	2 75 each.	Sukkanies	...	2 35 each.
Sukkanies	...	3 35 "	Lascars	...	3 25 "
Oilman	...	1 30	Firemen	...	2 25 "
Firemen	...	3 25 each.	Bhandari	...	1 20
Lascars	...	5 25 "			
Cook	...	1 35			
Bhandari	...	1 20			
Asst. Bhandari	...	1 20			
Coal trimmers...	2	20 each.			

The work was completed and the vessel was handed over to Captain Cribb on 15th December 1929 when the full complement of the crew was recruited.

316. Captain Cribb, Assistant Director of Fisheries (Marine), returned from leave out of India and resumed charge at Bombay on 14th December 1929.

317. *Mate*.—Proposals for the appointment of an European mate for the "Lady Goschen" were submitted to Government on two occasions. On pages 214-215 of their report, the Committee on Fisheries, in dealing with the staff of the trawler, set forth in full the reasons for the entertainment of a qualified and experienced European mate on board the trawler. Again when Captain Cribb fell ill in Bombay on 23rd January 1930 he urged the need for a qualified mate to take charge and Government were addressed on 4th February 1930 for the appointment of an European mate. But Government have postponed consideration of the proposal till 1932 when the present contract with Captain Cribb terminates. The difficulty felt by Captain Cribb still continues to exist and it is feared that the want of a proper mate may adversely affect his work.

318. On 26th March defects developed in the trawler's tail-end-shaft. The trawler was docked at the Government Dry Docks, Cochin, from 1st to 17th May 1930 for her quarterly cleaning and overhaul and boiler test, when the tail-end-shaft was also drawn and refixed.

319. The Harbour Engineer, Cochin, was of opinion that the old shaft should be replaced by a new one as early as possible. Although a new shaft sanctioned in G.O. Mis. No. 2002, Development, dated 14th November 1929, was indented for in January 1930, owing to protracted correspondence with the Director-General of Stores, the shaft has not been delivered.

320. "*Lady Nicholson*."—The Committee on Fisheries suggested that the engine and oil tanks in the "Lady Nicholson" should be taken out and sold and the vessel retained as a floating store or depot vessel. In G.O. Mis. No. 498, Development, dated 10th March 1930, Government ordered that this vessel should be retained intact for the present, and that as the work connected with the inspection of pearl banks will be carried on for only three months in the year the full complement of the crew should be retained only for that period. The running cost during the year amounted to Rs. 5,699 7-9 against Rs. 12,717-1-6 in the previous year. She was used only for the inspection of pearl banks.

321. "*Sea Scout*."—The Committee considered that this vessel was necessary for chank fishery work and the Government agreed with the Committee and in their order quoted above sanctioned the retention of "Sea Scout" with full complement of crew from the beginning of October to the end of May and a reduced crew during the remaining months. The total cost of maintenance amounted to Rs. 4,373-15-3 against Rs. 4,786-2-8 in 1928-29.

322. "*Leverett*."—The Government agreed with the proposals of the Fisheries Committee that "Leverett" was necessary for chank fishery work off Tinnevely and Tanjore districts and sanctioned the retention of this vessel in their order Mis. No. 1093, Development, dated 27th May 1930. Cost of her upkeep amounted to Rs. 4,178-8-10 against Rs. 4,143-0-4 in 1928-29.

323. "*Sutherland*."—The Government in their order Mis. No. 791, Development, dated 8th April 1930, accepted the recommendation of the Fisheries Committee that this vessel should be assigned to the Fisheries Training Institute, Calicut, as a training boat. They also sanctioned the retention of one lascar on Rs. 20 per mensem for this vessel. For the navigation of this vessel from Tuticorin to Calicut, the Government accorded sanction to the employment of three additional lascars on Rs. 18 per mensem and one Bhandari on Rs. 12 per mensem. Accordingly the "Sutherland" left Tuticorin on the 31st March 1930, and reached Quilon on the 3rd April 1930. Owing to adverse weather the vessel could not proceed further and returned to Tuticorin on the 12th April 1930. About the beginning of November 1930 when favourable weather conditions will prevail, the "Sutherland" will be despatched to Calicut. Her maintenance charges amounted to Rs. 283-3-5 against Rs. 210-2-4 in 1928-29.

324. "*Pearl*."—The Fisheries Committee recommended that this vessel should be fitted with a new engine of the Ailsa Craig Kid type and stationed at Krusadai Island. They were also of opinion that a driver on Rs. 50, and a lascar on Rs. 25 per mensem should be sufficient for the vessel. The Government in their order Mis. No. 1003, Development, dated the 27th May 1930, requested me to submit proposals for the purchase of the engine and the entertainment of the requisite crew as a part II scheme for 1931-32. I have since submitted the proposals in my letter to Government No. 1654 V/30-1, dated the 8th July 1930. The upkeep of this vessel cost the department Rs. 649-13-0 against Rs. 770 9-4 in 1928-29.

V. PROPAGANDIST

325. *Assistant Director, Rural Pisciculture*.—Mr. S.T. Moses was appointed to act as temporary Assistant Director, Rural Piscicultural Section, and entered upon his duties on the 10th June 1930.

326. Mr. C. R. Natesa Pillai was appointed as Inspector and he joined duty on 23rd June 1930.

327. Mr. P. Sankunni Menon, Assistant Inspector of Vellore Fish Farm, was appointed as Laboratory Assistant.

VI. ADMINISTRATIVE

A—Director's office.

328. *Director*.—I continued to be in charge of the department throughout the year.

329. *Personal Assistant*.—Dr. D. W. Devanesan, M.A., Ph.D., who was Personal Assistant till 9th June, was appointed as Assistant Biologist. Mr. C. R. Natesa Pillai acted as Personal Assistant from 9th to 12th June on which date Dr. C. J. George, M.A., Ph.D., Assistant at the Agricultural College, Coimbatore, who was appointed to the post, took charge.

330. The clerical work of my office has been steadily on the increase since 1924 when the fish-curing yards were transferred to this department. By 1926 the work had so much increased that two clerks were asked for, an additional permanent clerk to relieve the camp clerk, and a temporary clerk to cope with the increased work, Government sanctioned only the temporary clerk. Since then the request for additional clerks has been repeated every year as the purchase of a trawler and the launching of deep sea fishing experiments and research, the establishment of a biological station at Krusadai Island and the transfer of the control of the Nilgiris fisheries have added to the work. With the appointment this year of an Assistant Biologist for work at the existing research stations and on board the trawler, and an Assistant Director for work connected with rural pisciculture, the need for yet another temporary clerk has become urgent. Proposals will therefore be submitted to Government as a part II scheme for 1931-32 for the permanent retention of the temporary clerk sanctioned in 1926 and for the entertainment in addition of a permanent and a temporary clerk.

B—East Coast (North).

331. Both in the executive and in the clerical staff there has been no change in this section during the year under report.

332. Though it is two years since the Government recognized the need for better accommodation for the office and laboratory of the Inspector of Fisheries, Vizagapatam, the accommodation has not as yet been provided, with the result, that the scientific work of this section is at a standstill.

C—East Coast (Central).

333. *Assistant Director*.—Mr. C. G. Chakrapani Ayyangar was in charge of the section throughout the year.

334. *Staff*.—In place of the Assistant Inspector, Vellore, transferred, a zoology graduate Mr. Thangayya, has been posted. There was no change in the executive staff except the transfers of a Fieldman and an Assistant Inspector to the office of the newly created Assistant Director, Rural Pisciculture, in June.

D—East Coast (South).

335. *Assistant Director*.—Rao Bahadur J. A. Fernandez, continued to be in charge of the section throughout the year.

336. *Staff*.—Government in their order Mis. No. 588, Development, dated 20th March 1930, were pleased to sanction the retention for a further period of one year from 1st April 1930, of the post of Inspector of Fisheries sanctioned in Development Department G.O. Mis. No. 616, dated 31st March 1928. Mr. Somayaji who had filled the post was transferred to Sethubavachatram as Inspector in charge of investigations in Tanjore. Mr. D. D. Peter Devadoss, a zoology graduate, was then appointed on 18th December 1929.

337. For the investigation of the chank beds of the Tanjore coast the Government in their order Mis. No. 602, Development, dated the 27th March 1929, sanctioned the post of an Inspector of Fisheries on Rs. 70-250 for a period of two years from 1st July 1929. Mr. A. Somayaji was appointed to this post.

338. The Government in their order Mis. No. 588, Development, dated the 20th March 1930, sanctioned the retention for another year of the clerk sanctioned in Development G.O. Mis. No. 616, dated the 31st March 1928.

E—West Coast.

339. *Assistant Director*.—Mr. U. Karunakara Menon continued as Assistant Director throughout the year except for a break in January, February 1930, when he was on leave. Mr. A. K. Krishnan, the Inspector of Fisheries, Calicut, held charge of his office from 15th January to 2nd February 1930, but owing to his inability to combine the Inspector's work with the work of the

Assistant Director, he was relieved of the office of the Assistant Director by Mr. S. T. Moses, the Research Assistant, West Hill, on 3rd February 1930.

340. *Inspectors*.—Messrs. U. Nagappa and A. K. Krishnan were in charge of the South Kanara and Calicut sections respectively throughout the year and Mr. K. Ambadi was in charge of the Ponnani section except for a period of about one month from 20th May to 18th June 1930, when he was on leave owing to ill-health. During this period the Sub-Inspector Mr. K. Gopalan Nayar was in charge of his office.

341. As it was found impossible to review the inspection notes submitted by Sub-Inspectors, the Assistant Director was obliged to issue orders that the submission of these reports to him should be discontinued. Even then he found he could not take full cognizance of the other inspection reports. The accounts section in his office continues to be over-worked. The receipt of acquittance rolls from fish-curing yards and Fisheries schools is not checked promptly but only at intervals when the cash-keeper finds time to do so.

342. Proposals for the appointment of an additional clerk will be submitted as a part II scheme for 1931-32.

343. The Inspectors of Fisheries are not given any clerical establishment. The itinerating Sub-Inspectors attached to each section is expected to perform the clerical work of the section. The result is that arrears are accumulating and delays are being treated as if they were incidental to their work. The scheme of posting a literate peon under the Inspector of Fisheries to assist the Sub-Inspector has been tried and found unsatisfactory.

344. There has been also a great deal of grievance felt by the Sub-Inspectors regarding their pay and prospects in the Department of Fisheries. In compliance with the recommendations of the Committee on Fisheries Government have called for proposals for the reorganization of the staff relating to the fish-curing yards. A reorganization scheme will be submitted to Government as a part II scheme for 1930-31.

345. The Assistant Director of Fisheries (Coast) inspected as usual the Fisheries Training Institute and all the village schools and the fish-curing yards except the Calicut South yard which was inspected by the Inspector of Fisheries, Calicut, when he held charge of the office of the Assistant Director of Fisheries.

346. *Office*.—The office of the Assistant Director of Fisheries (Coast) continued at the West Hill Research Station. The proposal for the construction of an office for the Assistant Director of Fisheries (Coast) has been postponed.

347. For the location of the Assistant Biologist's office Government have sanctioned the hiring of a suitable building. An abandoned oil and guano factory close to the West Hill Station is the only suitable building for the purpose.

I have the honour to be,

Sir,

Your most obedient servant,

B. SUNDARA RAJ,

Director of Fisheries.

APPENDIX I.

Staff of the Fisheries Department.

Post.	Incumbent.	Period.
Director	Dr. B. Sundara Raj ...	1st July 1929 to 30th June 1930.
Assistant Director (Marine).	Captain T. G. Cribb ...	15th December 1929 to 30th June 1930. Was on leave from 1st July to 14th December 1929.
Assistant Director (Coast)...	M.R.Ry. U. Karunakara Menon Avargal.	1st July 1929 to 15th June 1930 and 1st March to 30th June 1930.
	M.R.Ry. A. K. Krishnan Avargal.	15th January to 2nd February 1930.
	M.R.Ry. S. T. Moses Avargal.	3rd to 28th February 1930.
Assistant Director (Inland).	M.R.Ry. C. G. Chakrapani Ayyangar Avargal.	1st July 1929 to 30th June 1930.
Assistant Director, Pearl and Chank Fisheries.	M.R.Ry. Rao Bahadur J. A. Fernandez Avargal.	1st July 1929 to 30th June 1930.
Assistant Director (Rural Pisciculture).	M.R.Ry. S. T. Moses Avargal.	10th to 30th June 1930.
Assistant Biologist	Dr. D. W. Devanesan Avargal.	9th to 30th June 1930.

APPENDIX II.—FINANCIAL STATEMENTS.

STATEMENT I.—Summary of Expenditure and Revenue of the Fisheries Department for 1929-30.

Particulars.	Expenditure.	Revenue.	Difference.
	RS. A. P.	RS. A. P.	RS. A. P.
I. Direction	35,018 2 1	.....	- 35,018 2 1
II. Assistant Director, Pearl and Chank Fisheries ...	1,02,338 15 5	2,72,163 9 3	1,69,824 9 10
III. Assistant Director (Marine)	1,04,822 15 4	565 1 6	- 1,04,257 13 10
IV. Assistant Director (Coast)	13,765 6 1	61 0 0	- 13,704 6 1
V. Church Island Fish-curing Station ...	183 12 6	.....	- 183 12 6
VI. Tanur Station	11,084 1 10	3,810 10 6	- 7,273 7 4
VII. Fisheries Training Institute	16,523 15 3	352 7 6	- 16,171 7 9
VIII. Schools for fishermen ...	61,005 4 11	65 12 0	- 60,939 8 11
IX. Assistant Director (Inland)	1,12,126 2 10	1,04,509 1 3	- 7,617 1 7
Assistant Director, Rural Pisciculture ...	20 0 0	.....	- 20 0 0
Nilgiri fisheries	6,070 1 0	575 1 6	- 5,494 15 6
X. Oyster Farm, Pulicat ...	2,537 9 3	2,766 3 0	228 9 9
XI. Aquarium	7,343 9 10	8,313 3 6	969 9 8
XII. Marine Biological Section—			
(a) Zoological Supply Section, Ennore ...	6,218 6 11	3,475 5 0	- 2,743 1 11
(b) Research Section, West Hill	6,842 8 9	.....	- 6,842 8 9
(c) Research Section, Krusadai Island ..	7,663 15 5	.....	- 7,663 15 5
XIII. Fish-curing yards—			
(a) Voted	4,36,987 11 3	3,60,573 9 5	- 76,414 1 10
(b) Non-voted—Agathi Island	575 7 6	65 8 6	- 509 15 0
Fisheries Cannery (1st April 1929 to 31st March 1930) ...	5,250 1 9	498 10 0	- 4,751 7 9
Total	9,36,378 3 11	7,57,795 2 11	- 1,78,583 1 0

APPENDIX II—cont.

STATEMENT 2.—Details of Expenditure.

Particulars.	Salaries.	Establishment.	Allowances.	Supplies and services.	Contingencies.	Total.
i. Direction	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
ii. Assistant Director, Pearl and Chank Fisheries	(1) 10,543 8 0	13,591 11 0	(2) 4,938 8 0	790 0 7	5,154 6 6	35,018 2 1
iii. Assistant Director (Marine)	(3) 3,468 15 9	(4) 15,292 12 5	(5) 1,615 13 9	78,833 11 7	3,127 9 11	1,02,338 15 5
iv. Do. (Coast)	5,741 1 0	10,473 0 0	3,615 14 0	83,686 0 11	1,306 15 5	1,04,822 15 4
v. Church Island Fish-curing Station	(6) 3,940 15 1	3,285 5 0	1,977 1 0	...	4,562 1 0	13,765 6 1
vi. Tanur Station	(7) 562 15 11	(8) 952 2 0	...	3 12 6	180 0 0	183 12 6
vii. Fisheries Training Institute	...	6,383 1 0	584 5 0	4,273 8 11	5,112 0 0	11,084 1 10
viii. Schools for fishermen	...	41,428 11 0	421 8 0	5,192 6 4	4,363 2 11	16,523 15 3
ix. Assistant Director (Inland)	4,475 0 0	12,679 1 0	7,834 8 0	1,289 6 9	17,865 11 2	61,005 4 11
Assistant Director, Rural Pisciculture	...	...	...	82,640 12 9	4,596 13 1	1,12,126 2 10
x. Nilgiri fisheries	...	2,648 0 0	20 0 0	...	...	20 0 0
x. Oyster Farm	...	(9) 278 12 0	2,126 5 0	...	1,295 12 0	6,070 1 0
xi. Aquarium	...	2,471 9 0	...	2,255 13 3	3 0 0	2,537 9 3
xii. Marine Biological Section—	...	...	...	1,896 2 9	2,975 14 1	7,343 9 10
(a) Zoological Supply Section, Ennore	...	(10) 3,598 6 0	646 7 0	1,379 10 7	593 15 4	6,218 6 11
(b) Research Station, West Hill.	...	(11) 5,742 13 0	348 10 0	526 7 9	224 10 0	6,842 8 9
(c) Research Station, Krusadai Island	(12) 1,120 13 3	(13) 92,090 0 5	(14) 11,896 1 3	3,685 0 4	1,662 6 1	7,663 15 5
xiii. Fish-curing yards,	...	...	...	2,74,534 7 7	57,346 4 9	4,36,987 11 3
Do. (Agathi)	...	(15) 547 7 0	259 15 0	66 8 6	...	575 7 6
Fisheries Cannery (for year ending 31st March 1930).	...	...	...	4,031 11 9	650 15 0	5,250 1 9
Total	29,753 5 0	2,15,629 15 10	36,866 11 0	5,45,105 10 10	1,11,022 9 3	9,36,378 3 11

- (1) Excludes Rs. 106-8-0 being 1 per cent of the salary of the Director debited to the Chank Fisheries, being 1 per cent of the travelling allowance of the Director. Excludes Rs. 33-12-0 being 1 per cent of the travelling allowance of the Director debited to Chank Fisheries.
- (2) Includes Rs. 106-8-0 being 1 per cent of the salary of the Director and excludes Rs. 1,120-13-3, being 25 per cent of the salary of the Assistant Director, Pearl and Chank Fisheries, debited to fish-curing yards.
- (3) Includes Rs. 1,120-13-3, being leave and pensionary contribution of the permanent staff.
- (4) Includes Rs. 33-12-0 being 1 per cent of the travelling allowance of the Director and excludes Rs. 110-13-3, being 25 per cent of the travelling allowance of the Assistant Director, Pearl and Chank Fisheries, debited to fish-curing yards.
- (5) Excludes 12½ per cent of the salary of the Assistant Director (Coast) debited to Tanur Station.
- (6) Represents 12½ per cent of the salary of the Assistant Director (Coast).

- (8) Excludes 50 per cent of the pay of the Tanur Establishment debited to Research and Rs. 220 being 15 of the pay of the Research Assistant debited to Cannery.
- (9) Represents 25 per cent of the pay of the Laboratory Assistant, Ennur.
- (10) Excludes 25 per cent of the pay of the Laboratory Assistant, Ennur, debited to Oyster Farm.
- (11) Includes Rs. 1,172-2-0 being 50 per cent of the pay of the Tanur Establishment and Rs. 920-3-0 being 50 per cent of the pay of the Inspector of Fisheries, Vizagapatam.
- (12) Represents 25 per cent of the salary of the Assistant Director, Pearl and Chank Fisheries.
- (13) Excludes 50 per cent of the pay of the Inspector of Fisheries, Vizagapatam, debited to Research but includes Rs. 7,217-12-5 for pensionary contribution in respect of permanent establishment.
- (14) Includes 25 per cent of the travelling allowance of the Assistant Director, Pearl and Chank Fisheries.
- (15) Includes Rs. 220 being 15 of the pay of the Research Assistant, Tanur.

APPENDIX II—cont.

STATEMENT 3.—Details of Supplies and Services.

Sub-head.	Amount. RS. A. P.	Sub-head.	Amount. RS. A. P.
(ii) Assistant Director, Pearl and Chank Fisheries—		(ix) Assistant Director (Inland)—	
A. Chank fisheries—		A. Tank stocking—	
(1) Tinnevely chank fisheries ...	63,159 8 7	(1) Compensation to District Boards ...	62,300 0 0
(2) Ramnad chank fisheries ...	720 9 9	(2) Stocking of tanks ...	2,784 6 9
(3) Tanjore Chank fisheries ...	1,914 14 10	(3) Chingleput tank stocking scheme ...	761 2 5
B. Pearl fisheries—		(4) Nellore tank stocking scheme ...	1,310 15 6
(1) Examination of pearl banks ...	625 14 6		
(2) Pamban pearl farm ...	148 8 0	B. Other works—	
(3) Pearl fishery charges ...	5,215 6 8	(1) Sunkesula fish farm ...	8,329 15 3
C. Fisheries vessels—		(2) Ippur fish farm ...	1,506 5 1
(1) "Lady Nicholson" ...	1,751 2 9	(3) Powder Factory fish farm ...	515 2 6
(2) "Sea Scout" ...	3,169 5 3	(4) Chingleput Fort moat fish farm ...	372 9 0
(3) "Leverett" ...	2,603 3 10	(5) Vellore Fort moat fish farm ...	443 12 0
(4) "Sutherland" ...	130 5 5	(6) Mopad fish farm ...	2,347 8 9
(5) "Pearl" ...	294 12 0	(7) Nallamalais scheme ...	819 11 0
	78,833 11 7	(8) House boat maintenance ...	288 11 0
		(9) Hilsa hatchery experiments ...	800 9 6
			82,640 12 9
(iii) Assistant Director (Marine)—		(xiii) Fish-curing yards—	
Alterations to the vessels ...	51,329 5 0	(1) Purchase of salt ...	41,991 6 11
Apparatus and materials ...	3,755 0 8	(2) Charges for conveyance of salt ...	29,517 2 1
Coal, and oil fuel ...	10,781 5 6	(3) Export and import of salt ...	76,598 15 7
Provision allowance ...	3,534 8 0	(4) Apparatus and materials ...	18,836 14 11
Deck stores ...	760 12 3	(5) Clothing and equipment ...	2,391 8 6
Water ...	300 8 10	(6) Opening stock of salt on hand on 1st July 1929 ...	1,05,198 7 7
Pilotage ...	33 7 1		2,74,534 7 7
Repairs ...	7,221 7 11		
Engine room spares ...	67 8 0		
Miscellaneous ...	821 14 6		
Europe stores ...	3,999 14 2		
Customs duty ...	781 5 0		
	83,686 0 11		

APPENDIX II—cont.

STATEMENT 4.—Details of Revenue.

Sub-head.	Amount. RS. A. P.	Sub-head.	Amount. RS. A. P.
(ii) Assistant Director, Pearl and Chank Fisheries—		(x) Oyster Farm—	
(1) Revenue from all chank fisheries as per Statement No. 5. ...	2,50,867 3 2	Sale of Oysters ...	2,617 12 0
(2) Revenue from Pearl fishery section as per Statement No. 6. ...	1,004 10 1	Sale of oyster shell grit ...	148 7 0
(3) Revenue from lease of right of fishing in salt factory channels ...	20,291 12 0		2,766 3 0
	2,72,163 9 3		
(iii) Assistant Director (Marine)—		(xi) Aquarium—	
Deep-sea fishing receipts ...	565 1 6	(1) Gate collections ...	7,726 3 6
(iv) Assistant Director (Coast)—		(2) Sale-proceeds of guides, picture post-cards, etc. ...	179 0 0
Miscellaneous receipts ...	61 0 0	(3) Aquarium shop rental ...	408 0 0
			8,313 3 6
(vii) Fisheries Training Institute—		(vii) Marine Biological Section—	
Miscellaneous receipts ...	352 7 6	(1) Zoological supply section, Ennur—	
(viii) Schools for fishermen—		Sale of zoological specimens ...	3,415 5 0
Miscellaneous receipts ...	65 12 0	Rent recovered from the Research Assistant, Ennur, for occupation of Ennur bungalow ...	60 0 0
			3,475 5 0
(ix) Assistant Director (Inland)—			
(1) Rentals from Cauvery, Coleroon, tanks and canals ...	77,975 4 4		
(2) Rentals from the tanks in the Chingleput district ...	3,544 0 0		
(3) Rentals from the tanks in the Nellore district ...	12,251 3 4		
(4) Rentals from the tanks and canals in other districts ...	7,553 12 0		
(5) Receipts from fish farms by sale of fish, grass and miscellaneous receipts including rent of buildings ...	3,184 13 7		
	1,04,509 1 3		

APPENDIX II—cont.

STATEMENT 5.—Expenditure and Revenue Account of the Chank Fisheries for the season 1929-30.

EXPENDITURE.	Amount.	REVENUE.	Amount.
	RS. A. P.		RS. A. P.
Chank Fisheries—		By value of Chanks—	
Tinnevelly	74,952 4 7	Tinnevelly	2,43,626 14 0
Tanjore	3,917 9 6	Rāmnād	...
Rāmnād	616 6 5	Tanjore	764 7 10
Leave and pension contribution	753 8 11	„ Chank rentals real-ized—	
Interest on capital outlay	1,152 6 6	Tanjore district	3,755 8 0
Depreciation on fixed assets	3,332 2 6	South Arcot dis-trict	1,670 0 0
Supervision charges, viz., 50 per cent of the pay and travelling allow-ance of the Assistant Director, Pearl and Chank Fisheries	2,463 5 0	Chingleput and Nellore dis-tricts	1,003 5 4
Direction charges	140 4 0	„ Miscellaneous re-ceipts—	
Law charges: Fees to Government Pleader in connexion with the application of Messrs. J. B. Dutt and Sons for execution of revised decree in O.S. No. 59/20 of the Rāmnād Sub-Court	109 8 4	Sale-proceeds of divers' sheds at Tuticorin	47 0 0
Audit fees	250 0 0		
Nett Profit	87,687 7 9		
	1,63,179 11 5		
Total	2,50,867 3 2	Total	2,50,867 3 2

NOTE.—The figures adopted are subject to audit by the Assistant Director of Commercial Audit.

APPENDIX II—cont.

STATEMENT 6.—Trading and Profit and Loss Account of the Pearl Fisheries of the season 1929-30.

EXPENDITURE.	Amount.	REVENUE.	Amount.
	RS. A. P.		RS. A. P.
Examination of the Pearl Banks	625 14 6	Miscellaneous receipts such as sale of unserviceable stores, empty oyster shells, hospital linen, etc.	354 12 11
Pamban Pearl Farm—Running expenses.	148 8 0	Rental for the usufruct of Krasadai Island coconut trees	150 0 0
Contingencies	1,036 7 0	Towage charges for a canoe at Pinnakayal	17 4 0
Pay and travelling allowance of the establishment	2,217 2 0	Salvage fees	9 15 2
Share of running expenses of fisheries vessel "Lady Nicholson"	3,799 10 6	By adjustments—	
Leave and pension contribution of permanent staff	376 12 6	Loan of fisheries vessels to Assistant Director (Marine) during 1928-29 and adjusted in 1929-30	378 0 4
Interest on capital outlay	2,695 0 6	Loan of fisheries vessels to Director, Zoological Survey of India, Calcutta	64 9 8
Depreciation on fixed assets	3,404 10 11	Cost of 1 hand sprayer pump supplied to the Headmaster, Fisheries Training Institute, Calicut	30 0 0
Part sale-proceeds of empty pearl oyster shells remitted to Mr. M. J. Emden Shone, Hamburgh	285 7 9		
Supervision charges—25 per cent of pay and travelling allowance of the Assistant Director, Pearl and Chank Fisheries	1,231 10 6		
Less value of expendible stores on hand	15,821 4 2	Nett loss	13,646 13 7
Total	14,651 7 8	Total	14,651 7 8

NOTE.—The figures adopted are subject to audit by the Assistant Director of Commercial Audit.

APPENDIX II—*cont.*

STATEMENT 7.—Trading Account of the Tānūr Station for the year ending 30th June 1930.

Particulars.	Amount. RS. A. P.	Particulars.	Amount. RS. A. P.
To stock—30th June 1929.		By sales—	
Cured products	841 5 2	Cured fish	953 14 4
Service stamps...	76 7 0	Fish meal	1,391 14 8
	917 12 2		
Purchases—		To stock—30th June 1930—	2,345 13 0
Boats and nets	139 8 0	Cured products	64 1 6
Service stamps	200 0 0	Service stamps	82 15 0
	339 8 0		
Manufacturing cost	2,191 15 5	Profit and Loss account (Gross loss).	956 6 1
	3,449 3 7	Total ...	3,449 3 7

NOTE.—The figures adopted are subject to audit by the Assistant Director of Commercial Audit.

APPENDIX II—*cont.*

STATEMENT 8.—Profit and Loss Account of the Tānūr Experimental Station for the year ending 30th June 1930.

Particulars.	Amount. RS. A. P.	Particulars.	Amount. RS. A. P.
To Trading Account		By Miscellaneous	698 15 1
Furniture and tools	...	Packing	581 6 2
Experiments	...	Rent	184 8 3
Coconut garden	...	Nett loss to balance sheet	7,273 7 4
Packing	...		
Repairs	...		
Railway freight	...		
Advertisement	...		
Petty coolie	...		
Overtime	...		
Miscellaneous	...		
Salary, 25 per cent	...		
Travelling allowance	...		
Interest on capital at 5·3 per cent.	...		
Direction charges, 12½ per cent of Assistant Director's pay.	...		
Depreciation—			
Buildings and sheds (10 per cent).	324 7 10		
Plant machinery, etc. (10 per cent).	352 13 11		
	677 5 9		
Total ...	8,738 4 10	Total ...	8,738 4 10

NOTE.—The figures adopted are subject to audit by the Assistant Director of Commercial Audit.

APPENDIX II—cont.

STATEMENT 9.—Statement showing the Operations of the Fish-curing yards of the Madras Presidency with Revenue and Expenditure for the year ending 30th June 1930.

Division.	Districts.	Particulars of operations.							Revenue.		
		Number of applica- tions for salt.	Weight of fish brought to be cured.	Weight of salt issued.	Value of salt issued.	Quantity of salt issued to each maund weight of fish.	Weight of cured fish removed.	Actual amount credited into Treasury.	Value of stock on hand on 1st July 1930.	Total revenue.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
East Coast.	Ganjam, Vizagapatam and Godavari, East ...	43,355	93,188 33	12,295 38	15,619 15 0	11'0	54,301 30	15,693 9 6	778 5 6	16,471 15 0	
	Nellore and Chingleput ...	7,428	71,222 19	10,180 22	12,725 11 0	11'8	3,810 39	12,807 1 0	406 5 0	13,213 0 0	
	Tanjore, Tinnevely and Ramnad ...	14,792	85,249 17	17,975 19	22,469 5 6	17'4	59,748 8	22,521 7 9	1,865 6 3	24,386 14 0	
	Total, East Coast ...	65,575	249,660 29	40,651 39	50,814 15 6	13'4	118,850 37	51,022 2 3	3,050 0 9	54,072 3 0	
West Coast.	Malabar and South Kanara ...	98,609	770,966 5	128,261 28	1,60,327 2 0	13'7	475,093 21	1,72,251 0 5	1,34,250 6 0	3,06,501 6 5	
	Grand total, East and West Coasts ...	164,184	1,020,626 34	168,913 27	2,11,142 1 6	13'6	627,444 18	(a) 2,23,273 2 8	1,57,300 6 9	3,60,573 9 5	

(a) Excludes cess collections of Rs. 1,879-12-4 on the West Coast, and Rs. 47-7-9 on the East Coast.

APPENDIX II—cont.

STATEMENT 9.—Statement showing the Operations of the Fish-curing yards of the Madras Presidency with Revenue and Expenditure for the year ending 30th June 1930—cont.

Division.	Districts.	Expenditure.										Difference between columns 11 and 20.
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
		Establishment pay, travel, overtime fees and supervision charges.	Pensionary contribution for permanent establishment.	Purchase of salt.	Export and import of salt.	Conveyance of salt.	Contingencies.	Clothing and equipment.	Value of salt on hand on 1st July 1929.	Total expenditure.		
East Coast.	Ganjam, Vizagapatam and Godavari, East ...	16,774 1 0	948 3 1	4,043 2 0	...	2,579 6 2	1,916 14 4	407 12 8	1,272 15 5	27,942 6 8	11,470 7 8	
	Nellore and Chingleput ...	4,865 5 0	305 13 9	2,714 14 5	...	1,550 14 9	1,025 5 9	174 3 6	507 14 6	11,244 10 6	1,648 11 6	
	Tanjore, Tinnevely and Ramnad ...	8,794 7 6	744 11 0	3,401 12 2	...	4,682 15 4	1,065 13 0	375 6 6	4,461 6 11	23,386 8 5	3,400 5 7	
	Total, East Coast ...	30,433 13 6	1,998 11 10	10,159 12 5	...	8,813 4 3	4,008 4 1	957 6 8	6,332 4 10	60,573 9 7	8,501 6 7	
West Coast.	Malabar and South Kanara ...	67,545 5 0	5,219 0 7	31,831 10 6	76,598 15 7	20,603 13 10	24,841 6 7	1,484 1 10	98,866 2 9	3,27,080 8 8	20,579 2 3	
	Grand total, East and West Coasts ...	97,889 2 6	7,217 12 5	41,991 6 11	76,598 15 7	29,517 2 1	28,849 10 8	2,961 8 6	1,05,198 7 7	3,89,654 2 3	29,080 8 10	

(a) Excludes Rs. 999-3-0 being 50 per cent of the pay of Inspector, Vizagapatam, debited to "Research."

(b) Includes Rs. 1,231-10-6 being supervision charges—25 per cent of pay and travelling allowance of the Assistant Director, Pearl and Chank Fisheries.

(c) Excludes Rs. 19,385-9-0 being expenditure on repairs in the fish-curing yards and Rs. 27,948-0-0 being the cost of construction of additional storage sheds in the West Coast.

APPENDIX II—cont.

STATEMENT 10.—The Madras Government Fisheries Cannery, Chaliyam—Trading and Profit and Loss account for the year ended 31st March 1930.

PART I.

	Amount. RS. A. P.	Amount. RS. A. P.	Amount. RS. A. P.
To opening stock— 249—Canned fish	...	4 7 0	...
To expenses during the year—			
Railway freight	13 14 0	...	53 14 8
Postage and telegrams	25 12 6	...	...
Petty stores consumed	50 9 7	...	7 8 0
Salaries (including proportion of Research Assistant's pay)	547 7 0	...	1,733 15 4
Wages	395 13 11	...	...
Miscellaneous expenses	114 5 0	...	...
Repairs to buildings	276 11 0	...	...
Advertisement charges	1,430 9 0	...	...
	360 6 0	...	...
Total	1,795 6 0	Total	1,795 6 0

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PART II.

To balance—loss for the year b/d	1,733 15 4	...	210 0 0
Depreciation on buildings	566 3 0	...	34 0 0
do. on plant and machinery	572 4 3	...	25 10 4
depreciation on furniture	72 0 6	...	...
do. on empty cans	84 10 0	...	...
loose tools written off	61 1 0	...	269 10 4
By other adjustments—	1,353 2 9	...	172 0 0
Audit fee	250 0 0	...	4,751 7 9
Interest on capital	1,856 0 0	...	...
Total	5,193 2 1	Total	5,193 2 1

APPENDIX III.

Comparative statement of salt transported to West Coast Fish-curing yards from the year 1924 to 1930.

Year.	Total quantity of salt trans- ported.	Quantity by contractor.	Cost.	Rate per maund.	Quantity by rail.	Cost.	Rate per maund.	Quantity by trawler.	Cost.	Rate per maund.
1924-25	MDS. 168,952	MDS. 158,952	RS. A. P. 63,911 15 0	RS. A. P. 0 6 5.2	MDS. 10,000	RS. A. P. 6,510 6 8	RS. A. P. 0 10 5	MDS. Nil.	RS. A. P. Nil.	RS. A. P. Nil.
1925-26	203,366	180,150	72,435 5 0	0 6 5.2	23,216	15,114 9 4	0 10 5	Nil.	Nil.	Nil.
1926-27	100,322	40,910	16,449 2 0	0 6 5.2	46,414	25,040 15 4	0 8 10	12,998	4,627 12 0	0 5 8.2
1927-28	231,080	21,396	8,604 0 3	0 6 5.2	147,430	77,554 5 2	0 8 5	62,254	22,113 2 2	0 5 8.2
1928-29	220,038	143,498	58,880 1 0	0 6 3	76,540	30,630 2 0	0 7 8	Nil.	Nil.	Nil.
1929-30	181,712	162,296	59,112 9 2	0 5 9.9	19,416	14,665 12 0	0 12 1	Nil.	Nil.	Nil.

APPENDIX IV.

Tanks not leased or leased on special terms.

1.—TANKS THAT FETCHED NO RENTALS IN 1929-30.

Name of the district and tank.	Average rental usually obtained.
	RS.
<i>Kurnool District—</i>	
Belegal and Badaikhan tanks	60
Kocheruvu	15
<i>Nellore District—</i>	
Tummalapenta	80
Arumakondapalem	100
Kanumalla	20
Somarajupalle Rajulu Cheruvu	50
Old and new Pakala tanks	80
Binginipalle	100
Bhimavaram tank	10
Rajavolu	35
Janakiamma tank	250
Nayudu tank	
Nadimi tank	
Udayagiri anicut and Big tanks	
Venkatarowpalle Cheruvu	
	800

2.—TANKS WHICH FETCHED LOW RENTALS.

Name of the district and tank.	Average rental usually obtained.	Rentals obtained in 1929-30.
		RS. A. P.
<i>Nellore District—</i>		
Bitragunta	80	2 0 0
Chevuru	100	1 1 0
Chiramana	60	0 8 0
Tatiparti	20	0 12 0
Anamasamudram	70	1 1 0
Purini	70	23 0 0
<i>Chingleput District—</i>		
Vadamadurai	250	80 0 0
Tinnanur	1,000	470 0 0
Chembarambakkam	1,600	915 0 0
	3,250	1,493 6 0

3.—TANKS WHICH FETCHED NO RENTAL OWING TO TOO MUCH OF WATER.

Name of district and tank. Average rental usually obtained.

Chingleput District—

	RS.
Oratti tank	75
Madurantakam tank	3,000
Oragadam	25
Sirukundram	75
Kondangi	250
Guruvenmedu hissa	50
Uttiramerur	1,000
Edamachechi	500
Velathur	50
Perumbedu	200
Kattur	75

Cuddapah District—

Nagavaram tank and supply channel	40
	5,340

4.—TANKS THAT WERE DISPOSED OF PRIVATELY FOR FAVOURABLE RENTALS.

Name of tank.	Highest bid in auction.	Amount obtained by private tender.	Gain.
	RS. A. P.	RS. A. P.	RS. A. P.
<i>Chingleput District—</i>			
Sriperumbudur tank.	...	150 0 0	...
<i>Nellore District—</i>			
Kavali	...	30 0 0	...
Bhogvalu	60 0 0	100 0 0	40 0 0
Kadanuthala	15 0 0	75 0 0	60 0 0
Mungamurn	...	40 0 0	...
Gavaravaram	...	45 0 0	...
Musunur	...	200 0 0	...
Juttur or tallapalem.	...	70 0 0	...
Anamadugu	...	60 0 0	...
Chennayapalem	...	150 0 0	...
Mannangidine	...	200 0 0	200 0 0
Bramhana kraka (Krakkamma)	...	30 0 0	...
Chinnakraka	...	25 0 0	...
Papireddicheruvu	...	122 0 0	...

4.—TANKS THAT WERE DISPOSED OF PRIVATELY FOR
FAVOURABLE RENTALS—*cont.*

Name of tank.	Highest bid in auction.	Amount obtained by private tender.	Gain.
	RS. A. P.	RS. A. P.	RS. A. P.
<i>Nellore District—cont.</i>			
Kovurpalle ...	16 0 0	45 0 0	29 0 0
Chagollu large tank.	...	125 0 0	...
Vasili tank and vagu.	135 0 0	183 5 4*	48 5 4
Idimipalle tank ...	...	120 0 0	120 0 0
Kaluvoy ...	64 0 0	107 0 0	43 0 0
Mypad ...	...	30 0 0*	...
Punnur ...	6 12 0	25 0 0*	18 4 0
Komarica ...	18 0 0	40 0 0*	22 0 0
Chinnacherukuru ...	9 0 0	30 0 0*	21 0 0
Zuvaladinne ...	31 0 0	50 0 0	19 0 0
Alluru large and Mut- turu tank, Ram- manna tank ...	...	1,520 0 0*	...

APPENDIX V.

Inland fisheries leased to fishermen co-operative societies,
1929-30.

Name of society.	Year of forma- tion.	Fishery leased out.	Period.	Annual rental.
1. Hampapuram Fishermen Co-operative Society, Coimbatore district.	1921	Three items relating to the Cauvery river in Kollegal taluk.	One year ...	RS. 70
2. Komarapalayam Society, Coimbatore district.	1925	Five items relating to the Cauvery in Gobichettipalai- yam taluk.	Three years ending 31st Mar. 1931.	650
3. Vemulakota Fishermen Society, Kurnool dis- trict.	1929	Markapur tank and supply channel.	One year from 1st Apr. 1930.	100
4. Sirumugaipudur Society, Coimbatore district.	1927	Bhavani river ...	One year ...	225
5. Sunkesula Society, Kurnool district.	1924	Sunkesula Anicut and Edurur Swamp Fisheries.	Three years ending 31st Mar. 1931 and 31st Dec. 1930.	750

* Per year for three years.

APPENDIX V—*cont.*

Inland fisheries leased to fishermen co-operative societies,
1929-30—*cont.*

Name of society.	Year of forma- tion.	Fishery leased out.	Period.	Annual rental.
6. Nandyal Society, Kurnool district.	1926	Nandyal Tank Fishery	Three years from 1st Apr. 1930.	RS. 520
7. Mandalam Society, Kurnool district.	1929	Tangadencha tank ...	One year from 1st Apr. 1929.	300
8. Vallampadugai Fisher- men Society, South Arcot district.	1929	Coleroon Fishery, South Arcot dis- trict.	Three years from 1st July 1930.	4,000
9. Chidambaram Society, South Arcot district.	1926	Nine items relating to the Lower Anicut System, South Arcot district.	Three years from 1928 to 1930.	386
10 and 11. Udayangudi and Lalpet Societies, South Arcot district.	1926	Two items relating to the Lower Anicut System, South Arcot district.	Two years from 1st July 1929.	1,800
12. Lower Anicut Society, Tanjore district.	1927	(a) Two items relating to the Lower Anicut System, South Arcot district. (b) Coleroon river in Kumbakonam taluk.	Three years from 1928-30. Three years from 1st July 1930.	271 4,100
13. Karunthattangudi Society, Tanjore district.	1928	(a) Perar Fishery, Mannargudi taluk. (b) Vennar-Vettar Fishery, Tanjore district.	Two years from 1st July 1929. Three years from 1st July 1928.	3,000 5,850
14. Tirumalavasal Society, Tanjore district.	1928	Four items in Shiyali taluk.	Three years from 1st July 1929	1,387
15. Pappakoil Society, Tanjore district.	1925	Perar Fishery, Nega- patam taluk.	Three years from 1st July 1930.	1,650
16. Trichinopoly Muham- madan Society.	1928	Cauvery river in Trichinopoly taluk and one item in Kulittalai taluk.	One year from 1st Apr. 1929.	8,275
17. Murungapettai Hindu Fishermen Society, Trichinopoly district.	1930	Do.	One year from 1 Apr. 1930.	8,300

APPENDIX VI.

List of institutions supplied with zoological specimens during 1929-30.

			RS.	A.	P.
Agra	...	St. John's College	24	0	0
Ajmer	...	Government College	256	12	0
Aligarh	...	Muslim University	54	0	0
Allahabad	...	The University	220	13	0
Bangalore	...	Central College	235	12	0
		Intermediate College	260	8	0
		Medical College	24	0	0
		Women's Intermediate College	20	0	0
Benares	...	Hindu University	28	4	0
Calcutta	...	University	42	0	0
Cawnpore	...	The Second Economic Botanist to Government, U.P.	22	0	0
Gorakpur	...	St. Andrew's College	70	4	0
Hyderabad	...	Oosmania University College	18	8	0
Lahore	...	Government College	196	8	0
		The Punjab Veterinary College	28	8	0
		The Upper India Scientific Works	124	4	0
Lucknow	...	University	189	8	0
Mysore	...	Intermediate College	41	0	0
Nagpur	...	College of Science	325	0	0
Patna	...	The Prince of Wales' Medical College	87	0	0
		Bihar and Orissa Veterinary College.	92	8	0
Poona	...	Sir Parasurambhau College	227	0	0
Rawalpindi	...	Gordon College	140	0	0
Sialkot	...	Murray College	165	4	0
Srinagar	...	S. P. College	43	8	0
Sheffield	...	University (England)	80	8	0
Changanacherry	...	St. Berchman's College	60	0	0
Cocanada	...	Pittapuram Raja's College	23	8	0
Madras	...	Presidency College, Chepauk	24	12	0
		Government Training School for Mistresses	67	0	0
		Women's Christian College, Nungambakkam	8	8	0
		Madras Club (Live turtles)	22	8	0
Trivandrum	...	H. H. the Maharaja's College for Women	130	8	0
Tuticorin	...	The Bishop of Tuticorin (for the Papal Museum at Rome)	58	0	0
		Miscellaneous items	3	4	0
		Total	3,415	5	0

APPENDIX VII.

Statement showing the names of schools (district, taluk and village in which they are situated), strength, number of teachers, cost of upkeep, etc., West Coast.

APPENDIX

Statement showing the names of schools (district, taluk of teachers, cost of

Serial number.	Name of school.	Taluk.	Village.	Strength			
				I	II	III	IV
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>South Kanara District.</i>				B. G.	B. G.	B. G.	B. G.
1	Byndoor ...	Coondapoor ...	Tarapati ...	16 1	12 3	9 0	7 0
2	Kiriman-jeshwar.	Do. ...	Kodiyeri ...	35 13	11 3	7 0	4 1
3	Malpe ...	Udipi ...	Malpe ...	42 11	13 1	6 5	13 2
4	Uppoor ...	Do. ...	Kallianpur ...	30 9	4 3	13 1	6 2
5	Polippu ...	Do. ...	Polippu ...	27 5	10 1	6 0	8 0
6	Udayavar ...	Do. ...	Kanakoda ...	24 7	1 2	2 0	...
7	Kaup ...	Do. ...	Kaup ...	13 5	12 3	9 0	5 2
8	Hooode ...	Do. ...	Hooode ...	17 9	8 3	6 0	4 1
9	Kodi ...	Do. ...	Kodi ...	28 4	11 0	12 0	12 1
10	Sri Gananodaya ...	Mangalore ...	Hoige Bazaar ...	26 24	9 6	11 7	4 4
11	Sandspit ...	Do. ...	Sandspit ...	18 11	6 2	1 3	5 3
12	Bangaraman-jeshwar.	Kasaragod ...	Bangaraman-jeshwar.	34 16	6 2	...	...
13	Kumbla ...	Do. ...	Arekadi ...	28 15	11 7	8 2	5 1
14	Kizhur ...	Do. ...	Kizhur ...	28 20	3 6	3 4	4 4
15	Malpe Night ...	Udipi ...	Malpe ...	Closed temporarily.			
<i>Malabar District.</i>							
16	Kavayi ...	Chirakkal ...	Kavayi ...	11 9	1 5	2 2	2 2
17	Azhicode ...	Do. ...	Azhicode ...	9 15	5 7	4 6	5 2
18	Madapalli (H.E.)...	Kurumbranad.	Madapalli ...	30 17	24 9	20 6	15 2
19	Kuriyadi ...	Do. ...	Kuriyadi ...	26 37	8 8	6 3	9 5
20	Quilandy ...	Do. ...	Kovilkandi ...	36 18	19 14	17 12	11 4
21	Kannankadavu ...	Do. ...	Kannankadavu ...	25 16	3 5	5 3	3 2
22	Korapuzha ...	Do. ...	Korapuzha ...	6 8	7 3	8 5	8 2
23	Pudiappa Day ...	Calicut ...	Pudiappa ...	38 45	10 22	19 14	11 2
24	Do. Night ...	Do. ...	Do. ...	27 0	24 0	19 14	11 2
25	Naduvattam ...	Ponnani ...	Naduvattam ...	39 27	18 8	3 1	4 1
26	Chaliyam Day ...	Ernad ...	Chaliyam ...	41 11	15 5	14 3	10 2
27	Do. Night ...	Do. ...	Do. ...	3 0	1 0	5 0	5 0
28	Kadalundi Day ...	Do. ...	Kadalundi ...	34 19	10 5	4 1	4 3
29	Do. Night ...	Do. ...	Do. ...	Closed with effect			
30	Calicut Model school.	Calicut ...	Vellayil ...	35 13	19 0	12 3	10 5
31	Do. Night ...	Do. ...	Do. ...	10 0	16 0	14 0	...
32	Parappanangadi Day	Ernad ...	Parappanangadi.	35 2	21 2	17 1	13 0
33	Do. Night ...	Do. ...	Do. ...	13 0	3 0	8 0	...
34	Kadavanad ...	Ponnani ...	Kadavanad ...	18 12	18 9	19 7	14 3
35	Veliangode ...	Do. ...	Velinagode ...	49 29	5 0	3 0	3 2

VII.

and village in which they are situated), strength, number upkeep, etc., West Coast.

V	VI	VII	VIII	Total number of teachers.	Fisheries Training, Higher Elementary.	Fisheries Training, Lower Elementary.	Fisheries Training, Secondary Grade.	Ordinary Training, Secondary Grade.	Ordinary Training, Higher Elementary.	Ordinary Training, Lower Elementary.	Untrained.	Number passed out of each school.	Cost of upkeep.
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
B. G.	B. G.	B. G.	B. G.									B. G.	R5. A. P.
7 1	...	...	...	2	...	...	...	...	2	...	...	19 5	664 1 6
...	...	...	...	2	2	...	...	...	...	...	...	17 5	954 1 5
5 2	...	...	...	4	4	...	...	...	...	...	...	19 4	1,221 3 6
4 1	...	...	...	2	1	...	...	...	1	...	...	7 3	1,219 5 0
3 1	...	...	...	3	2	1	...	...	...	...	...	18 4	1,055 10 0
...	...	...	...	1	...	...	...	...	1	...	...	10 5	450 3 6
5	...	...	...	1	...	...	...	...	...	...	1*	26 5	448 14 0
3	...	...	...	2	1	...	...	...	1	...	...	4 3	841 6 6
2	...	...	...	2	2	...	...	...	...	...	...	11 0	752 9 7
5 4	...	...	...	4	3	...	...	...	1	...	...	34 17	1,281 12 0
5 1	...	...	...	2	2	...	...	...	...	...	...	6 6	930 10 0
...	...	...	...	2	...	...	...	...	...	...	2†	24 14	692 15 3
7 0	...	...	...	3	1	1	...	...	1	...	...	14 4	701 5 0
...	...	...	...	3	1	2	...	...	...	...	...	24 19	1,077 8 6
...	...	...	...	2	1	1	...	...	...	...	...	12	833 10 0
2 6	...	...	...	3	2	...	...	...	1	...	...	25	734 4 6
9 1	7	6	5	7	3	3	...	...	...	...	...	78	2,912 2 10
5 4	...	...	...	4	1	2	...	...	1	...	...	37	5,643 4 8
8 2	...	...	...	6	4	2	...	...	...	...	...	79	2,206 15 0
5 1	...	...	...	2	2	...	...	...	...	...	...	19	790 12 9
9 2	...	...	...	2	...	...	...	...	1	...	1	46	700 14 0
5 1	...	...	...	5	4	...	...	...	1	...	...	68	2,615 0 0
effect from 26th May 1930.				3	1	2	...	...	...	...	...	65	4 8 0
8 0	...	...	...	4	2	1	...	...	...	...	...	60	2,311 13 8
...	...	...	...	2	1	...	...	...	...	...	...	1	5,655 8 0
2 1	...	...	...	3	1	1	...	...	...	...	...	1	148 2 0
from 26th May 1930.				3	1	1	...	...	...	...	...	39	1,277 8 6
4 0	...	...	...	6	3	...	1	...	2	...	...	...	68 5 7
...	...	...	...	...	...	...	...	...	...	...	...	...	2,089 12 0
...	...	...	...	2	2	...	...	...	...	...	...	...	377 11 6
10 0	...	...	...	3	2	...	...	...	1	...	...	46	2,143 5 8
...	...	...	...	1	...	...	...	...	...	...	...	8	79 7 8
7 3	...	...	...	4	4	...	...	...	...	...	...	...	1,883 15 0
...	...	...	...	2	1	...	...	...	...	...	...	3	877 14 0

* Higher Elementary.

† Lower Elementary.

APPENDIX

Statement showing the names of schools (district, taluk of teachers, cost of

Serial number.	Name of school.	Taluk.	Village.	Strength			
				I	II	III	IV
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Malabar District—cont.</i>				B. G.	B. G.	M. G.	B. G.
36	Palappatti ...	Ponnani ...	Ayiroor ...	32 16	39 16	23 6	11 1
37	Mannalam-kunnu.	Do. ...	Punnayur ...	36 24	10 7	3 1	3 0
38	Puthankada-puram.	Do. ...	Thiruvatra ...	45 24	15 4	6 2	2 1
39	Blangad ...	Do. ...	Manathala	50 30	11 6	13 4	2 1
40	Kottakada-puram.	Do. ...	Engandi-yur.	44 32	10 9	9 8	5 7
41	Kundazhiyur.	Do. ...	Thoyakkavu.	13 15	23 10	7 2	5 3
42	Talikulam ...	Do. ...	Talikulam ...	45 43	20 10	17 7	9 3
43	Nattika ...	Do. ...	Nattika ...	49 38	22 5	5 2	11 3
44	Kaipaman-galam.	Do. ...	Kaipaman-galam.	45 28	22 6	14 12	24 0
Total ...				1,210 578	516 217	370 133	276 84

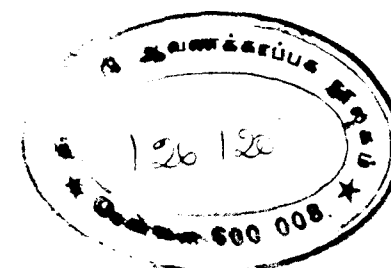
VII—cont.

and village in which they are situated), strength, number upkeep, etc., West Coast—cont.

V	VI	VII	VIII	Total number of teachers.	Fisheries Training, Higher Elementary.	Fisheries Training, Lower Elementary.	Fisheries Training, Secondary Grade.	Ordinary Training, Secondary Grade.	Ordinary Training, Higher Elementary.	Ordinary Training, Lower Elementary.	Untrained.	Number that passed out of each school.	Cost of upkeep.
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
B. G.	B. G.	B. G.	B. G.									B. G.	RS. A. P.
...	...	...	...	4	2	...	...	...	2	...	...	...	1,430 7 11
1 0	...	...	...	3	1	...	...	...	...	...	...	2	1,124 13 0
...	...	...	...	4	4	...	...	...	...	...	...	...	1,134 5 8
...	...	...	...	5	2	1	...	...	1	1	...	6	1,633 1 6
6 2	...	...	...	6	3	1	...	...	1	...	1*	3 2	1,938 10 9
5 1	...	...	...	4	1	2	...	...	1	...	...	1 1	1,140 3 0
8 2	...	...	...	6	5	1	...	...	...	...	...	4 2	2,110 3 6
5 1	...	...	...	5	1	2	...	...	1	...	1†	4 1	1,815 3 3
14 12	12 1	7 ...	5 2	8	7	...	1	...	...	...	...	2 1	2,968 3 0
159 49	19 1	13 0	10 2	139	78	24	2	1	21	4	9	841 101	60,941 12 3

* Higher Elementary.

† Lower Elementary.



Order—No. 2170, Development, dated 8th December 1930.

Recorded.

2. A considerable amount of important research work was done in the year under review. The sphere of operations of the trawler has been precisely fixed; the area she will explore and the nature of the investigation and survey she will have to conduct have been clearly laid down. Accurate scientific observations and correct analysis and record of hauls made as well as their subsequent study and compilation into charts and reports have become possible with the appointment of a qualified Assistant Biologist on board the trawler and the provision of the full equipment at the two Biological stations at Calicut and Krusadai.

3. As a result of the recommendations of the Fisheries Committee the Government considered the possibility of working the fisheries cannery at Chaliyam but decided that it should be closed down, and its assets disposed of. Accordingly, its sale was advertised but as no advantageous offers were received for the outright purchase of the concern, proposals for leasing it are under the consideration of the Government.

4. The operations at the Tanur Experimental Station were hindered by the extremely poor fishing season on the West Coast and the station worked at a loss of Rs. 7,273-7-4 during the year. Improvements have been effected to the gutting shed and the artificial dryer used for drying prawns. Further vitamin tests on sardine oil have been conducted. The scarcity of sardines was a handicap to the working of the oil and guano factories. Only 80 out of 325 licensed factories worked during the year, the output being 223 tons of guano and 24 tons of fish oil against 1,100 tons of fish-guano, 70 tons of fish oil and 15,000 tons of fish manure manufactured during the previous year.

5. There was no Pearl fishery during the year under review. The lease of the Rāmnād chank fisheries which expired on 30th June 1928 was not renewed. The department was thus able to concentrate its attention on the working of the Tuticorin chank fishery. The chanks fished during the year reached a record figure of 612,362 and fetched a handsome revenue of Rs. 2,43,627. The departmental survey and investigation of the Tanjore chank beds commenced in July 1929 opposite the coast of Adirampatnam to Manamelkudi. During the investigation two chank beds three miles in extent were located off Puthupatnam and Adirampatnam. Experiments have been made with the Japanese diving apparatus

to test the possibility of keeping the divers under water for about quarter of an hour. It is hoped that this will improve the industry to a large extent.

6. The revenue from inland fisheries fell from Rs. 1,13,351 in 1928-29 to Rs. 1,04,509 in the year under review while the expenditure rose from Rs. 1,05,472 to Rs. 1,12,126 resulting in a net loss of Rs. 7,617. Deep-water fishing experiments were continued in the Mopad farm with satisfactory results and fish was supplied regularly to adjoining areas. The Ippur farm ran completely dry owing to continued drought during the year. A new oil engine has been installed in the Sunkesula fish farm and it is hoped that as a result more ponds will be filled with water in the current year and will thus relieve the congestion in the existing ponds. The Director is requested to give in future reports an approximate estimate of the cost of anti-malarial work done by the department.

7. The operations in the fish-curing yards on the East Coast were satisfactory, while on the West Coast the fishing season was disappointing and thus adversely affected transactions in the fish-curing yards. The working of the yards resulted in a revenue of Rs. 3,60,574 while the expenditure amounted to Rs. 4,36,988, thus resulting in a loss of Rs. 76,414.

8. Captain Cribb who was on leave from 1st July 1929 joined duty at Bombay on the 14th December 1929. The trawler remodelled and equipped with a laboratory commenced systematic survey in the northern section of the West Coast.

9. There was a slight increase in the number of visitors to the Marine Aquarium at Madras. The net profit during the year amounted to Rs. 970.

10. The systematic examination of sardines and mackerel and the biweekly plankton collections were continued as in previous years in the West Hill Research station, while in the Krusadai research station the collection and identification of the Pamban fishes were carried on. At Vizagapatam common food fishes continued to be collected and identified.

11. In the absence of sufficient stock of saleable oysters at Ennur and Pulicat, attempts have been made to supply oysters to the public from Gokulapalle beds transferred to the Fisheries department in 1929. The supply had however to be limited to customers in Madras and at Ootacamund and Bangalore for two days in the week for want of transport facilities. The net revenue from them was Rs. 229 during the year. The Zoological specimen section sustained a loss of Rs. 2,743 during the year.

12. On the socio-economic side the Government note with satisfaction the increasing interest evinced by fishermen in the education of their children. There was not sufficient progress in the matter of co-operation. Owing to the poor fishing season it was found difficult to keep the existing societies in good working order. The Government hope that with the placing of the fishermen societies on the West Coast in charge of co-operative inspectors under the direct control of the Fisheries department a fillip will be given to the progress of the movement among the fishermen community.

(By order of the Government, Ministry of Development)

S. V. RAMAMURTI,
Secretary to Government.

Press

MADRAS FISHERIES DEPARTMENT

ADMINISTRATION REPORT

FOR THE YEAR

1930-31

BY

DR. B. SUNDARA RAJ, M.A., PH.D.,
Director of Fisheries

Report No. 1 of 1932

Madras Fisheries Bulletin, Vol. XXVI, pages 1 to 109

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1932

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Report No. 1 of 1932

ADMINISTRATION REPORT OF THE DEPARTMENT OF FISHERIES FOR THE YEAR ENDING 30TH JUNE 1931.

BY

DR. B. SUNDARARAJ, M.A., PH. D.

Director of Fisheries.

I have the honour to submit the Administration Report of the Department of Fisheries for the year ending 30th June 1931.

INTRODUCTION.

2. The year's work chronicled in the report below records steady and substantial progress along all the lines already well established, besides two new additions to the Department's activities, Organized Fishery Research and Propaganda for Rural Pisciculture.

3. The duties of the trawler having been clearly defined, systematic survey was possible for five and a half months in the year after which the steady deterioration of the defective boiler reached a climax and the vessel was permanently disabled for work. Even so, the extremely short survey by the trawler and the study of the data and material gathered in the course of her investigation have yielded some unexpected and remarkable results. Not all research work, especially of such magnitude as the survey and exploration of fishing banks of nearly two thousand miles of coast line, could claim to have yielded such quick and tangible returns in the brief space of a few months. The fact, however, that the survey by the

trawler in such short time should have disclosed fishery resources altogether unsuspected before, is proof sufficient of the appalling ignorance that now exists concerning the off-shore fishery resources of the Presidency. It also points to the imperative need for the continuance of the survey even if nothing more is to be acquired than better and more accurate knowledge of the Madras fisheries. Indications are however not wanting that in the wake of the systematic survey of the off-shore fisheries which the trawler has set out to make, will follow momentous developments in the fishing industry which may rush to avail itself of the potentialities thereby disclosed, provided assistance and technical advice are afforded by the State. Such assistance is given even in advanced countries with enlightened, wealthy and enterprising fishermen and trade, and is indispensable in India for the development of the industry under the ignorance, poverty and conservatism prevailing among local fishermen.

4. The world-wide economic depression notwithstanding, the year under review has been one of the most eventful in the history of fishery development throughout the world. The modern trend in world development has important lessons for Madras. Intensive ocean research and exploration of fishery grounds are the outstanding features of the year in all leading countries. Japan has built a research ship "Hakuyo Maru" of 1,300 tons for fisheries training and research; America has launched a 410 tons research ship "The Atlantis" to explore the ocean floor; while the largest research vessel "Challenger" for fishery exploration and discovery of new fishing grounds has been launched by Great Britain. The "Challenger" is an oil-driven vessel of 1,400 tons and was built on the recommendations made by the Committee of Civil Research appointed in 1929, at a cost of £80,000, and her running expenses at £34,000 a year have been sanctioned by the British Exchequer for the next five years. Further, the Empire Marketing Board in England in collaboration with the Newfoundland Government has founded two new fishery research stations, the Bay Bulls station, St. Johns, Newfoundland, and Torry station, Aberdeen, Scotland, with their research trawlers "Cape Agullas" and "City of Edinburgh" respectively, for fishery investigation and research in the northern Atlantic and the Arctic oceans. Besides these leading countries, the advance made by other nations during the year is equally significant. Russia has earmarked a milliard roubles for fishery development in her five years' programme up to 1934; nearly half

the amount (41½ million roubles) is to be spent on the construction of steam fishing vessels. Norway, in collaboration with the Ulster Government in Ireland, has launched the world's largest whaler "Kosmos II." Canada has established a new fishery research station at Prince Rupert, British Columbia, for research on the Pacific Halibut fisheries and for the survey of the Hudson Bay fisheries of the Atlantic coast; she has voted 65,000 dollars and the Dominion Government has chartered the steam trawler "Louborne" for the purpose. The Union Government of South Africa have built a new fishery survey and research vessel "Africana" at Aberdeen which was launched on the 23rd September 1930. Egypt has reorganized her Fisheries Department and has adopted for the first time motor-powered vessels on a considerable scale, for working her fisheries. Even Turkey has appointed Dr. J. J. Simpson, a well-known Zoologist who investigated in 1906 the Pearl fisheries of the Murgui Archipelago for the Indian Government, as her fishery officer to advance her fishing industry and has established a fishery research station in the Sea of Marmora and has provided it with a research vessel. As much for the immediate development of the Madras Fisheries, therefore, as for ensuring her steady progress on approved lines in conformity with rest of the world, the continuance of the modest research that has been commenced by the trawler "Lady Goschen" seems to be the only course indicated and is to be strongly recommended.

5. In the course of the quarter of a century during which the Department has endeavoured to develop the inland fisheries of the Presidency, several large irrigation tanks, the Cuddapah-Kurnool Canal, and one of the larger river systems (the Cauvery and its tributaries) have come under cultural treatment. Judged even by the very imperfect test of fish-rentals and revenues—for want of a better criterion—which are apt to vary through local factions and combinations more perhaps than through any correct knowledge among the bidders of the values of the fisheries auctioned, the research in the fish farms and the cultural operations of the Department have produced rapid and unmistakable proofs of the vast improvement in the quantity and quality of fish yielded by the waters concerned. The public have not been blind to the benefits accruing to the fisheries of large irrigation tanks under the control of the Department since they have been taking on lease such fisheries for progressively higher rents. Several enquiries from owners of neighbouring private ponds

have been received asking for technical assistance and advice of the Department for dealing with their ponds and pools. In past years no direct help to such enquiries was possible for want of staff, funds and equipment, though a number of landlords and game associations who were in the happy position to afford the necessary funds, have been helped with advice and suitable fish for rearing. In the year under report, arising directly out of a recommendation made by the Royal Commission on Agriculture in India, the Department obtained a minimum of staff and equipment for piscicultural propaganda in rural areas. The information obtained through experimental work, the fish acclimatized and bred in the fish farms, in fact all the resources at the disposal of the Department for inland pisciculture were thus brought to the door-step of the cultivator. In spite of an inexperienced staff, the obstructions and difficulties arising from the prejudice and superstition of the villager and the limitations imposed on his choice and sphere of action by poverty and the numerous technical problems arising in the prosecution of a novel scheme, the department made in twelve months appreciable headway in the direction of rural pisciculture. The response from the local bodies and the public was remarkable. It is unfortunate that financial stringency should have led to the abandonment, since the close of the year, of so hopeful a line of work. Had the scheme been given a chance to continue, there is little room for doubt that before long pisciculture would have become a remunerative cottage industry, and in the course of years, the great multitude of village wells and ponds forming in the aggregate a vast potential water area for the cultivation of fish, would have begun to contribute their share to the food supply of the Presidency. With the return of more prosperous times it is hoped that Government will be in a position to revive the scheme.

6. As in the previous year, the most important feature of the normal work of the department this year also was the volume and importance of research done towards immediate practical ends. The discovery of several new fisheries unknown to fishermen and of the superior quality of economic fish in the off-shore waters of the East Coast compared with that of the West Coast in the section of the two coasts surveyed by the trawler are invaluable additions to our knowledge which are bound to lead to great economic developments.

7. Arrears in the completion of fish statistics have been cleared. The report for 1926-27 has been printed and that for 1927-28 is in the press.

8. The study of the records in the fish-curing yards of Palk Bay unexpectedly revealed the occurrence of hilsa fisheries at sea regularly in the months in which they disappear from the rivers. Regular hilsa fisheries at sea were hitherto unknown anywhere in India or Burma. This unexpected discovery has opened up an entirely new avenue for research. The habits of hilsa which ascend the rivers during the south-west monsoon have been studied closely both in Bengal and Madras for the last twenty years and more. In 1917 when hilsa eggs were successfully fertilized and hatched at the Lower Anicut hatchery an important advance in hilsa investigations was made. Since that year studies on the eggs and their development have been pursued. As Lower Anicut does not offer facilities for further experiments in rearing hilsa fry, efforts have been made to establish a hatchery at Bezwada. With the discovery now made of hilsa shoals at sea the research is expected to enter on a new phase. If the hilsa marking experiments inaugurated this year succeed, much of the mystery surrounding the hilsa once it leaves the rivers for the sea could be solved.

9. The data obtained at Mopad by the patient and prolonged experiments in catla stocking have enabled the department to revise its methods for introducing this valuable fish into the Cauvery system.

10. Tangible proof of the great advance made in the method of fishing deep and perennial water tanks has been obtained by the success of the methods so far evolved in the Mopad reservoir, in fishing the reservoir more or less at its full level this year, and continuing the distribution of fish throughout the year to the surrounding markets without appreciable reduction in the size or quantity of the fish supplied.

11. The survey of the Tanjore Coast has enabled the Department to locate six new chank beds in Palk Bay of great economic importance to the chank fisheries of the Presidency.

12. Substantial advance has been made in the direction of marking chanks and thereby studying their rate of growth and migration, two things a knowledge of which is essential for the scientific development of the chank fishery.

13. Accurate experiments with the remodelled drier at Tanur have revealed possibilities of further improving the efficiency of this plant. This, if successful, is expected to augment materially the profits of the curers from the extensive prawn fisheries all round the coast which are worth

several lakhs of rupees. On a single day at Tanur in July 1913 Sir F. A. Nicholson observed that prawns worth Rs. 15,000 were caught in the monsoon—vide page 84 of Bulletin X, 1913-14. The loss inflicted by inclement weather on prawn-curing is far greater than is ordinarily realized. Such loss could be entirely obviated if the experiments which seem to give every promise of success are brought to a fruitful conclusion.

14. Lastly, the further and more or less complete success that has attended the experiments with the Japanese diving apparatus in deep-water deserves mention. The possibility of introducing and popularizing the device among divers has been fully ascertained. The capacity of the air bottles alone requires to be increased and this will form the subject of future research.

15. The fishing season on the West Coast was even worse than the last, which was considered the worst within living memory. The depression caused has checked transactions in fish-curing yards, the work of the Tanur station and the socio-economic activities of the department.

16. The year under review has closed under the shadow of a great financial crisis. Time alone will show the extent to which the activities of the department will emerge uncrippled from this period of economic depression.

PART I.

ACTIVITIES OF THE DEPARTMENT.

I. MARINE FISHERIES.

A.—RESEARCH.

(a) Scientific Research.

17. (i) **TRAWLER.**—The fishery survey of the East Coast was continued from July to October between Point Calimere and Madras, the selected section on the East Coast. In November, the trawler resumed work on the West Coast section (Pigeon Islands to Calicut) and continued it till the middle of December when she went to Colombo for boiler repairs. Towards the end of January, she was deputed for the inspection of the Laccadives. But on the 5th of February when returning from Androth to Calicut the boiler developed serious leakages and the trawler since that date has been laid up at Cochin Harbour in a disabled condition. The fishery survey by the trawler, therefore, covered only five and a half months in the year under review.

18. **Fishing tackle.**—The trawl net was employed regularly as usual on both the East and West Coasts. In addition, drift nets and long lines and hooks were employed for the first time this year. The Ratnagiri drift nets and long lines were tried on the East Coast, but the Ratnagiri drift nets proved defective. Long lining was attempted on fourteen days on the East Coast. The lines when baited with the flesh of the squat-nosed lobster, cuttle fish or small fish and used as a bottom line, captured only molluscs and crabs which abound at the bottom in this area. Surface lining was next attempted with greater success. Mostly young sharks, a few porgies (*Lethrinus* sp.) and occasionally a queen fish (*Chorinemus* sp.) were hooked.

19. The British drift nets for sardine and mackerel arrived subsequently and were employed in the survey on the West Coast. Drift net fishing with Ratnagiri nets and the sardine and mackerel nets received from England was attempted sixteen times between Pigeon Islands and Kasaragod in the course of twelve days. Only on two occasions north of Gangoli were specimens of oil-sardine, *Sardinella longiceps* (C. *longiceps*, Day), secured by the sardine net. On all other occasions large hauls of the allied sardine *Sardinella gibbosa* (C. *imbriata*, Day) were made, proving the alleged scarcity of the oil sardine and the comparative abundance of the latter species on the coast this year. The Tunny, *Thynnus thunnina* employed in the manufacture of 'Massmeen' or 'Bonito' was caught on five occasions out of the sixteen and consisted of young specimens hardly over a foot in length. Long lining on the West Coast was attempted on two days, but was not successful on account of the comparative scarcity of large fish.

20. **Fishing grounds found.**—On the East Coast section good trawling grounds were located in the following places:—

(1) between Point Calimere and Karaikal from 10 to 50 fathoms,

(2) between Karaikal and Thirumalaivasal from 10 to 20 fathoms,

(3) between Porto Novo and Mahabalipuram from 10 to 30 fathoms.

21. The bottom at 100 fathoms and its vicinity was found to be rocky and destructive to nets. Soft muddy bottom was also very common between the 10 and 20 fathom lines. On eight occasions the net was caught in rocks but only once was the cod end lost. On the other occasions, the net was

successfully disentangled. At times, soft mud proved an obstacle to trawling, as the net partly sank in the mud. Loose mud besides endangering the net occasioned considerable loss of time and labour in washing the net subsequently free of mud.

22. On the West Coast, the survey lasted only six weeks till the middle of December. Consequently, the portion of the coast from Pigeon Islands to Kasaragod alone was explored. The nature of the bottom in this area was generally muddy throughout. Rocks were met with on two occasions on and near the 100-fathom line.

23. *Fish caught*.—An analysis of the chief fish caught on the East and West Coasts is given below:—

EAST COAST:

I. *Sea Perches*—

1. *Epinephelus* (Serranus, Day).
2. *Pomadasys* (Pristipoma, Day).
3. *Diagramma*.
4. *Lutjanus*.
5. *Dentex* (Synagris, Day).

II. *Dories*—

1. *Ephippus*.
2. *Drepane*.

III. *Goat fish or red-mullet*—

1. *Upeneoides*.
2. *Upeneus*.

IV. *Porgies*—

1. *Lethrinus*.
2. *Sparus* (Pagrus, Day).

V. *Surgeon fish or spine-tail*—

1. *Acanthurus*.

VI. *Horse mackerel or yellow tail*—

1. *Caranx*.

VII. *Silver bellies*—

1. *Leiognathus* (Equula, Day).

WEST COAST:

I. *Sea Perches*—

1. *Dentex* (Synagris, Day).
2. *Pomadasys* (Pristipoma, Day).

II. *Cat-fish*—

1. *A. ...*

III. *Sardine*—

1. *Sardinella gibbosa* (C. timbriata, Day).

IV. *Pomfret*—

1. *Stromateus*.
2. *Alectes*.

V. *Flat-fish*—

1. *Psettodes*.

VI. *Horse mackerel*—

1. *Caranx*.

24. The catches were sold only when an opportunity occurred. The landing of fish at frequent intervals for marketing purposes was not done as it was likely to interfere with the continuity of the survey. Consequently out of 18 tons 17 cwt. 56 lb. of fish caught, only 5 tons 0 cwt. 74 lb. were sold for Rs. 287-2-0.

25. Besides fish, three specimens of the green turtle (*Chelonia mydas*), one specimen of the Loggerhead (*Caretta caretta*) seven feet long, and one Hawksbill (*Eretmochelys imbricata*) were caught on the East Coast. Two green turtles (*Chelonia mydas*) were caught on the West Coast.

26. *Statistics of landings furnished by fish-curing yards and observation of fish in the coastal markets*.—More accurate and thorough biological research was possible during the year due to the appointment of the Biologist and staff. Besides the statistics of landings furnished by the fish-curing yards on the East and West Coasts, at the coastal towns at which the trawler called, the catches made simultaneously by the local fishermen and brought to the markets were studied with a view to determine the nature and extent of the new fisheries discovered by the survey.

27. Between Point Calimere and Madras, there are six fish-curing yards, viz., Point Calimere, Muthupet, Arcot Thurai, Tranquebar, Vanagiri and Kadapakkam. A scrutiny of the returns of fish landings received from these yards for the months of July, August and September 1930 (the period during which this coast was surveyed by the trawler) shows that the following fish were captured by the local fishermen:—

Mullet (Mugil).

Mackerel (Scomber).

Seer (Scomberomorus).

Indian Salmon (Polynemus).

Dorab (Chirocentrus dorab).

Hilsa (Hilsa ilisha).

Sardine (*Sardinella gibbosa*).
 Cat-fish (*Arius*).
 Pomfret (*Alectes* and *Stromateus*).
 Ribbon fish (*Trichiurus*).
 Cock-up (*Lates*).
 Horse mackerel (*Caranx*).
 Gar-fish (*Hemiramphus*).
 Flying-fish (*Cypsilurus*).
 Red-mullet (*Upeneoides*).
 Jew-fish (*Sciaenidae*).
 Sharks.
 Rays.

28. Except the horse mackerels, red mullets, sharks and rays, the other kinds captured by fishermen in the inshore fishing grounds were not caught by the trawler*. Of the fishes brought to the fish-curing yards, the more important ones were Sardine (*Sardinella gibbosa*), Cock-up (*Lates*), Horse mackerel (*Caranx*), Hilsa (*Hilsa ilisha*), Flying fish (*Cypsilurus*), and sharks and rays. On the other hand the fish caught by the trawler in offshore waters consisted mostly of Snappers (*Lutjanus*), Rock cod (*Epinephelus*), Porgy (*Lethrinus* and *Sparus*), Dory (*Drepane*), Perch (*Diagramma* and *Dentex*), Spine-tail (*Acanthurus*) and Grunter (*Pomadasys*). With the exception of *Dentex* all were large adult fish measuring over 2 feet and of great economic and food value.

29. The market at Negapatam when visited on 20th June 1930, had eight baskets of fish all below 9 inches in length comprising Pomfrets, *Sciaenidae*, *Sardinella gibbosa*, Flying fish and *Caranx leptolepis*. There were, besides, a few specimens of young *Epinephelus pantherinus* and *Diagramma punctatum*, measuring 18 inches. The trawler's catch on the previous day consisted of large specimens of *Epinephelus pantherinus*, *Diagramma punctatum*, *Diagramma pictum*, *Lutjanus dodecacanthus*, *Acanthurus lineatus*, *Dentex tolu*, *Sparus spinifer* and *Sciaenidae*. Most of the specimens of *Epinephelus pantherinus* caught by the trawler measured 2 feet 4 inches to 2 feet 8 inches in length and the specimens of *Diagramma* were nearly 2½ feet long. Many of the specimens of *Lutjanus*, *Lethrinus* and *Acanthurus* caught by the trawler were about 2 feet in length. The only fish of small size caught was *Dentex tolu*. Again at the Cuddalore fish market which

* Occasionally half a dozen seer, a few mackerels or a dozen pomfrets were caught but they were very few in number.

was visited on 22nd July 1930, there were twelve baskets of fish consisting mostly of small specimens of *Caranx leptolepis*, *Caranx kurra*, *Dentex tolu* and *Therapon spp.* The trawler's catch for the previous day weighed 1,930 lb. of fish comprising large specimens of *Lutjanus dodecacanthus*, *Caranx melampygus*, *Caranx armatus*, *Caranx malabaricus*, *Caranx gallus*, *Caranx kulla*, *Pomadasys hasta*, *Chorinemus sanctipetri*, *Drepane punctatum* and *Sciaena maculata*. On 25th July 1930, when the same market was visited again, there were about fifteen baskets of fish consisting mostly of fishes below 9 inches in length. The chief kinds were *Caranx leptolepis* and *Caranx kurra*, *Opisthopterus*, *Therapon*, *Dentex* (young), *Scomboromorus*, a few cat fish and half a dozen sharks. Very young *Caranx nigrescens* and some prawns also were sold. The catches made by the trawler the previous day in offshore waters weighed about 1,265 lb. and consisted of *Caranx*, *Diagramma*, *Lethrinus*, *Epinephelus*, *Lutjanus*, *Dentex* and *Acanthurus* all of which except *Dentex* measured nearly 2 feet and more in length. On the East Coast, in every place without exception the fish obtained by the survey were of larger size than those locally caught by the fishermen and in many cases consisted of species unknown to the local market.

30. On the West Coast, there are fourteen fish-curing yards between Pigeon Islands and Kasaragod. The inshore fish caught and landed by the local fishermen during the weeks the trawler surveyed this coast consisted chiefly of Pomfrets (*Stromateus* and *Alectes*), Mackerel (*Scomber*), Tunny (*Thynnus*), Seer (*Scomberomorus*), Mullet (*Mugil*), Oil-sardine (*Sardinella longiceps*), and Sergeant or Butter-fish (*Elacate nigra*), all good table fish and of fair size and value. The bulk of the fish caught by the trawler in the offshore waters on the other hand consisted of large-sized cat-fish and small fish such as *Dentex tolu*, small horse mackerels and a fair number of Pomfrets and Flat fish. Cat-fish are of inferior quality and the rest were young fish of no great size or value.

31. The fish market at Mangalore was visited on the 27th November 1930. The fish offered for sale were mostly Mackerel (*Scomber*), Seer (*Scomberomorus*), Cat-fish (*Arius*), *Opisthopterus* and young sharks. The trawler's catch for the previous day consisted of *Dentex*, Horse Mackerels (*Caranx*), Cat-fish (*Arius*), Pomfrets (*Stromateus* and *Alectes*) and *Sciaena*. The fish market at Malpe was visited on 1st December 1930. The fish seen there consisted of *Lactarius*, Pomfret (*Stromateus* and *Alectes*), *Dentex*, Cat-fish (*Arius*) and

young sharks. The trawler's catch for the previous day consisted of *Lactarius*, Pomfrets (*Strometeus* and *Alectes*), *Dentex*, Cat-fish (*Arius*), Horse Mackerels (*Caranx*), Young Grunters (*Pomadasy*s) and *Small Sciæna*. There was thus no striking contrast between the off and inshore fisheries in quality while in quantity the inshore fisheries were superior to the offshore fisheries. The results of the survey seem to point to a comparative poverty of the West Coast offshore waters.

32. *New fisheries discovered by the survey.*—The occurrence of the following extensive fisheries of which the fishermen are totally ignorant, have been noted on the East and West Coasts:—

(1) Off Point Calimere, a valuable and extensive shark ground was discovered. The trawl hauls in this area generally included a large number of young or small sharks of different varieties. Two large saw-fish (*Pristis*) measuring over 11 feet were also caught. With specially designed shark nets, it should be possible to capture large sharks of several varieties on this ground.

(2) An entirely new fishery which the survey has disclosed is that of the squat-nosed lobster (*Thenus orientalis*). The flesh is delicious and the shell and other refuse will yield valuable manure. From Point Calimere to Cuddalore these lobsters occurred in abundance but from Cuddalore to Madras they showed a decrease. They were prolific in the hauls made off Negapatam, Karaikal, Porto Novo, Cuddalore and Pondicherry between the 10 and 30 fathom lines. On the West Coast they were practically absent.

(3) The offshore belt between Point Calimere and Pondicherry so abounds in large sea-perches that this area may be said to constitute a Perch Fishing Ground.

(4) Likewise, the offshore belt between Pondicherry and Madras was characterized by the preponderance of large horse-mackerels.

(5) A cuttle-fish fishery of some magnitude was found to exist off Coondapoor on the West Coast where in one haul alone 390 lb. of large cuttle-fish (*Sepia singalensis*) were obtained and, in another, almost the entire haul filling the cod-end of the net consisted of large specimens of the same cuttle-fish.

33. The most important fact brought out by the survey is the striking contrast between the offshore fisheries of the East and West Coast sections surveyed. The offshore fish on

the East Coast are far superior in quantity and value to those on the West Coast. The prevailing belief that the fisheries of the West Coast are more valuable than those of the East Coast is apparently true only of the strictly inshore grounds fished by fishermen. As these offshore grounds of the East Coast immediately adjoin the area now fished by local craft, this discovery opens up possibilities for fishery development on the East Coast. If subsequent surveys definitely establish the great disparity noticed this year between the offshore fisheries of the East and West Coasts, it is bound to have far-reaching effects on the development of the East Coast fisheries.

34. *Scientific work on board the trawler.*—With the Assistant Biologist on board, a more intensive study and identification of the fishes caught by the trawler was undertaken. Besides the fish already determined, 15 species of sharks and 11 kinds of rays, 17 species of *Caranx* and 10 species of *Lutjanus* were identified during the cruises.

35. The wealth and variety of the marine invertebrate fauna—jelly-fish, sponges, sea-pens, sea-fans, alcyonarians, antipatharians, prawns, lobsters, crabs, molluscs, cuttle-fish, star-fish, brittle stars, sea-urchins, sea-cucumbers, feather-stars—generally encountered on the East Coast offshore grounds were not represented on the West Coast, except cuttle-fish and jelly-fish. The difference is doubtless associated with the nature of the sea-bottom on the two coasts. While the sea-floor on the East Coast explored till now appears to consist largely of sand, or rock, that on the West Coast is mostly mud. The invertebrates of economic importance are the squat-nosed lobster on the East Coast and the cuttle-fish on the West Coast. The invertebrate collections made are awaiting further identification and detailed study.

36. Jelly-fish (specially a species of *Cephea*) were frequently met with on the West Coast. They occurred in 9 hauls out of 24 and in 8 of them in such abundance as to handicap trawling. On the East Coast, jelly fish were met with only in 8 out of 68 hauls, and never in such numbers as on the West Coast. In the absence of specialists in India, specimens of sponges dredged by the trawler have been sent to the British Museum for identification. Mr. Govindakutti Menon, M.A., Research Scholar, University of Madras, is working on the trawler collection of jelly fish, in the Madras Aquarium Laboratory.

37. *Hydrographical work*.—The surface temperature was ascertained every day on which fishing took place. Forty-four surface samples of sea-water from the area fished were collected and the determination of their salinity, etc., is in progress in the Laboratory of the Marine Aquarium, Madras. The Knudsen's Reversing water bottle with the connected winch, meter-wheel and bronze wire was employed on eight occasions for procuring water samples and ascertaining temperature in depths ranging from 7 to 35 fathoms.

38. (ii) WEST HILL BIOLOGICAL STATION, CALICUT.—Bi-weekly plankton collections having been found insufficient to furnish full data, four collections a week are now made. The stomach contents of 72 specimens of *Sardinella longiceps*, (the oil-sardine) were examined. The oil-sardine being scarce in Calicut, this year, an attempt was made to study the feeding habits of *Sardinella gibbosa*, as at Krusadai station. This allied species affords a fishery of considerable value on the East Coast though it is of minor importance to *Sardinella longiceps* on the West Coast. Three hundred and ninety-six specimens of this species were examined and their stomach contents have been preserved after a cursory examination, for further intensive study and comparison with the food of *Sardinella longiceps*.

39. The other routine work of the station consisted of the identification of local fish of economic importance, enquiries and study of fish landings and the recording of the information obtained on the habits, food value and breeding season of the different species. A standard fish register was devised for the purpose in which all the data obtained are now systematically recorded.

40. The Assistant Biologist has devoted considerable time to the equipment, fittings and routine work of the station as a result of which the laboratory work of the station has now been placed on working basis.

41. (iii) KRUSADAI BIOLOGICAL STATION.—Here also better equipment and more systematic work have resulted through the closer supervision that has become possible by the appointment of a Research Officer. The important economic fishes of the Pamban area were regularly collected, provisionally identified and sent to the Director for verification. Information regarding the season for the various fisheries, the nets and methods of capture employed, food of the fish, state of gonads, etc., was obtained and recorded in the standard fish register maintained at the station.

42. The Assistant Biologist worked in this station from 30th March to 9th June on fish eggs and on the feeding habits of *Sardinella gibbosa*, the most important East Coast sardine. The investigation, though brief, has shown the difference between the food of this sardine and the West Coast oil-sardine. The former prefers diatoms and dinoflagellates rich in oil, which are unicellular plants, while the latter favours crustacean larvæ, which are small animals. The difference in food possibly accounts for the abundance of fat in the West Coast sardine.

43. The construction of a cement over-head tank during the Kundugal channel was poor in fish eggs compared with the plankton collected along the channel; two collections, one along the channel and another across the channel, are now made.

44. The construction of a cement over-head tank during the year facilitated the regular working of the Aquaria on the front verandah. A good beginning has been made in Aquaria studies on fish and animals. Live specimens of a large star-fish of the genus *Pentaceros* which is very common in the sea off the Island formed the subject of an experiment in the Aquarium. They were found to thrive in captivity on the common edible clam, *Meretrix meretrix*, and one specimen lived for four weeks but died when transported to the Madras Aquarium. The following studies on live fish and other marine organisms in the Aquaria have commenced:—

(1) A selection by actual experiment of the species that are naturally adapted to live in Aquaria.

(2) A study of the colours of fish with a view to their ready identification in nature.

(3) A study of the food and habits of fish in captivity.

45. The Assistant Engineer, and the Supervisor, Public Works Department, Madura Subdivision, inspected the saline swamp where it is proposed to construct a small marine fish farm for the cultivation of the milk-fish (*Chanos*) the fry of which abound round the island. Their report with specifications, plans and estimates is awaited. A rough calculation showed that as many as 6,000 *chanos* fry may enter the swamp with the high tide at a time.

46. *Visitors*.—In the year under report the following parties of professors and students visited the station for the purpose

of collecting specimens and studying the Krusadai littoral fauna and flora:—

(1) Dr. F. H. Gravely, Superintendent of the Madras Museum, with a party of Zoology students of the Madras Christian College early in September 1930.

(2) Professor S. G. Manavala Ramanujam, with a party of Zoology students of the Presidency College, Madras, late in September 1930.

(3) Professor S. Narayana Rao, Central College, Bangalore, with a party of Botany students in the last week of September.

(4) Professor A. Narayana Rao, Central College, Bangalore, with a party of Zoology students in the first week of October.

(5) Professor Ekambaram, with a party of Botany students of the Presidency College, Madras, towards the middle of October.

(6) Professor B. Thirumalachar, Intermediate College, Mysore, with his Assistant and Laboratory Attendant in April 1931.

The Honourable Minister for Education and Excise and party visited the station on 18th April 1931.

47. (iv) VIZAGAPATAM STATION.—Research as far as possible was attempted but the want of laboratory accommodation handicaps work. The collection of specimen and notes on fish and fisheries was continued. Many more species were identified and added to the growing collection of fish of the Northern Sircar. The Collector of Vizagapatam, at a conference of local officers held on 3rd December 1930, has allotted the Taluk Office building shortly to be vacated for the department. When the new Court buildings are occupied and the consequent transfer of the Taluk Office is effected, the Fisheries Office and Laboratory will shift to the Taluk Office building on the beach where suitable accommodation for laboratory work exists. The site on the beach road, Vizagapatam, for the proposed Aquarium and Biological station consisting of 1 acre and 75 cents was handed over to this department by the Revenue Department. The four corners of the plot have been marked by survey stones set in concrete.

48. (v) MARINE AQUARIUM LABORATORY.—About 75 samples of sea-water collected by the trawler 'Lady Goschen' were analysed and the salinity determined. Two Research students of the Madras University worked at the laboratory

during the year. The artist is continuing his sketches and paintings of the common Madras fish intended for the Bulletin on Madras Fish.

49. (vi) FISH STATISTICS.—The statistical report for the year 1926-27 was published and the report for 1927-28 is in the press. The statistics for 1928-29 and 1929-30 have been prepared and are being scrutinized. The proposed three census statements of fishermen, craft and tackle were added for the first time to the statistical report for 1927-28. The analysis and tabulation of statistics started last year of fish collected at the various fish-curing yards on the East Coast was continued.

(b) Technological Research.

50. (i) FISHING METHODS.—Two mackerel drift nets, 2 sardine drift nets, 2 Danish seine nets and 5 trawl nets ordered through the Director-General of Stores, and 1 double sardine net ordered by Captain Cribb direct from England were received during the year. In addition, 50 pieces of Ratnagiri drift nets were bought in Mangalore and 1,027 fishing hooks for long lining were obtained in Madras. In addition to the trawl which collects bottom fish these nets and hooks intended for midwater and surface fish were also used in the fishing survey this year.

51. The coble for conducting experiments with the Danish seine nets also arrived in the course of the year.

52. (ii) EXPERIMENTS TO IMPROVE EAST COAST CURING METHODS.—In connexion with the introduction of reforms in curing methods in the East Coast fish-curing yards, experiments were conducted with tarred, cemented and ordinary mud pots, to test the comparative merit of these utensils for curing purposes. It was found that fish cured in cemented pots need less salt than fish cured in the other two vessels. Two cemented pots were prepared and sent to two fish-curing yards, Sippikulam and Mukkur, for demonstration, in the hope that the curers would realize the economic and hygienic benefits accruing from the use of the cemented pots instead of the usual mud pots.

53. Wire-netting was tried as an economical and efficient substitute for split bamboo in the construction of drying flakes in Uppada and Bimlipatam fish-curing yards. Wire-net is cheaper per unit of area covered and being much thinner than split bamboo permits of better aeration and dryage of fish. On the other hand, bamboo is practically indestructible while the wire-net is likely to rust. The durability of wire-net for the purpose must therefore be determined by experiment

54. (iii) TANUR EXPERIMENTAL STATION.—No drift net fishing experiment was tried during the year, on account of the poor fishing season. There was also difficulty in getting fishermen to work on the usual share basis as most of them were indebted to boat-owners or money-lenders on account of the succession of poor fishing seasons. The canoe and nets are also very old and will have to be repaired.

55. *Artificial drier*.—Three experiments in drying prawns were conducted in the drier during the year, to test the superiority of the remodelled side of the drier to the unaltered side and to estimate the advantages of coconut husks over firewood as fuel. In all these experiments the side not remodelled compared badly with the side remodelled. The temperature in the chambers was lower on the side not remodelled than on the opposite side. The time taken for drying was also considerably reduced by the alterations made; while a quantity of the prawns took 7 hours 9 minutes to dry in the old half of the drier, the same quantity dried in 4 hours 11 minutes in the remodelled half when firewood was used and in 2 hours 45 minutes when coconut husk was employed as fuel. The weight of coconut husk used was 198 lb., while the weight of firewood required for drying the same quantity of prawns varied from 274 to 277 lb. The difference is in favour of coconut husk. Further experiments are in progress.

56. *Purchase and manufacture*.—7,591½ lb. of fresh fish for Rs. 193-5-6 for curing (at an average price of 4.89 pies per lb.) and 21,272 lb. of fresh fish for Rs. 155-15-6 for the manufacture of oil and guano and fish manure (at an average price of 1.40 pies per lb.) were purchased during the year. The total output for the year was 1,477½ lb. of cured fish and 4,090 lb. of fish meal, 24 gallons of first class, 64 gallons of second class and 88 gallons of third class oil valued at Rs. 815-12-0. The corresponding figures for 1929-30 were 2,394½ lb. of cured fish and 1,855 lb. of fish meal valued at Rs. 702-6-8.

57. *Sales*.—1,230½ lb. of cured fish, 4,214½ lb. of fish meal, 22 gallons of second class and 3½ bottles of first class fish oil and other miscellaneous products were sold for Rs. 2,092-3-9. The corresponding sale proceeds of the previous year were Rs. 3,766-7-8. As the fishing season was a poor one the output was limited and many customers had to be disappointed.

58. *Stock*.—The year closed with a stock of 681¾ lb. of bones, 22 gallons, 3½ bottles of first class oil, 37½ gallons of second class oil and 87 gallons 2 bottles 4 oz. of third class oil, 50¾ lb. of cured fish (cat-fish) and 179¾ lb. of prawns and 10 lb. of fish meal.

59. *Advertisement*.—The Villagers' Calendar of the Agricultural Department continued to be the medium of advertisement for Tanur goods and as a result some enquiries were received for guano, fish meal, etc.

60. *Receipts and expenditure*.—The total receipts for the year amounted to Rs. 2,132-8-11 as against Rs. 3,050-10-8 in the previous year. The expenditure excluding the establishment charges of Rs. 2,265-14-4 was Rs. 3,824-6-7, as against Rs. 5,648-7-1 in the previous year. The expenditure in the year includes the sum of Rs. 544-0-6 spent on repairs to existing buildings, fence, etc., of the station. A sum of Rs. 1,513 spent on repairs to the travellers' bungalow has also been included by the Assistant Director of Commercial Audit in the accounts of the Tanur station. This amount should legitimately be excluded from the expenditure of the station. If this amount is deducted the expenditure of the station will amount only to Rs. 2,311-6-7.

61. *Training*.—The pupil teachers of the Fisheries Training Institute, Calicut, received their usual instructions at the station in fish-curing methods. The students of Cochin State undergoing training in the same Institute were also given training at the station for a period of four weeks in November 1930.

B.—ADMINISTRATION.

(a) Licences for fixed Engines.

62. During the year 51 free licences for fishing with submerged trees in the Palk Bay were issued under section 6 (3) of the Indian Fisheries Act.

(b) Public Fish-curing Yards.

63. *a EAST COAST (NORTHERN SECTION)*.—The number of fish-curing yards in this section remained the same (30) as last year. Private curing in places with little or no salt continued owing to the high issue price of salt in the yards. The concessions of the Gandhi-Irwin pact do not seem to have had any effect on the operations of the yards. The transactions in the two temporary yards, Pukilinetta and Mulapetta, improved during the year especially in the latter where the consumption of salt was nearly double. The permanent retention of this yard is under consideration.

64. *Transactions.*—The total quantity of fish brought to the yards in this section is 84,602 maunds 1 seer against 93,188 maunds 33 seers in the previous year. The total quantity of fish landed in the area within the jurisdiction of the yards is estimated roughly from statistics gathered at 3,07,507 maunds. The quantity of sale issued in the year was 11,815 maunds 17 seers, which is less than that in 1929-30 by 679 maunds 26 seers. Of the 30 yards, ten (Pattisonapur, Althada, Pundi, Guppidiipetta, Komaravanipetta, Pukkiliipetta, Bimlipatam, Pudimadaka, Konapapetta and Mulapetta) have had more transactions than in the previous year.

65. The causes for the decreased operations in the yards are attributed to the comparative absence of shoaling fish during the year and reduced catches due to epidemics among fishermen in some villages. Increasing facilities for the transport of fresh fish also affects operations in yards adversely.

66. *Supply of salt.*—The yards received as usual 'monopoly,' 'excise,' and 'dittom' salt. The total quantity of monopoly salt purchased was 7,410 maunds and excise salt 3,628 maunds against 10,454 maunds and 2,000 maunds respectively in 1929-30. The value of the monopoly salt was Rs. 1,994-3-0 at 3 annas 3 pies a maund, of excise salt including cess, Rs. 1,819-9-8 at 3 annas 6 pies to 12 annas a maund. The price of dittom salt was Rs. 185 at 4 annas per maund.

67. *Balance stock of salt.*—The stock of salt on 30th June 1931 in the yards was 1,428 maunds 39 seers against 1,466 maunds 16 seers in 1929-30.

68. *Buildings.*—The construction of a store shed with asbestos roofing on the approved design is in progress at Uppada. Damages to the sheets during transit and their replacement by the supplying firms caused some delay in the work. The shed has been completed except for a portion of the roof for which more sheets have now been ordered. A well was sunk at the Uppada yard.

69. *Occurrence of shoal fish.*—Shoals of white bait or anchovies which were heavy wherever they occurred all along the coast from November to January were absent at Battigalluru, from Konapapetta to Mukkam, and from Konapapetta to Uppada in November, at Prayagi and Mukkam in December, and in Gopalpur, Pukkiliipetta, Mukkam, Mulaipetta and Uppada in January. Sardines were likewise abundant in the north in December but rare or absent elsewhere. In April sardine shoals visited Mukkam, Pundi and Reziapeta but were absent or occurred in very small shoals in

other places. In May they visited many places but were absent from Pundi, Komaravanipetta, Mukkam and Mulaipetta. Jew fish were abundant in the southern portions of the Northern Circars in October. In February and March they were extraordinarily abundant in Calingapatam and Uppada but practically absent elsewhere. Bombay duck were extensively caught in the south in July and September and in August at Bimlipatam and adjacent areas.

70. *β EAST COAST (CENTRAL SECTION).*—The conditions under which the nine fish-curing yards worked were more or less abnormal during the year. The inordinate increase in the price of salt during the early part of the fishery year unduly enhanced the expenditure on the yards. The prevalence of a malignant type of malaria among fishermen during the greater part of the year in the vicinity of Pulicat lake impaired fishing operations, and dislocated work in the yards as the staff had to be granted leave frequently. In addition, the silting up of the Buckingham Canal between Krishnapatam and Kothapatnam yard and the shifting of the salt depot in Madras to the Harbour for some months during the year resulted in the payment of heavy transport charges on consignments of salt.

71. So far, the Gandhi-Irwin pact has not had any appreciable effect on the working of the yards in this section.

72. The fish-curing yard at Maipad was abolished on 15th May 1925 for want of transaction. During the severe cyclone in 1927, the fishermen of Maipad suffered badly. A Rural Reconstruction Society formed with a view to help the poor fishermen has applied for the re-opening of the yard at Maipad. The proposal is under consideration.

73. *Supply of Salt.*—The Collector of Salt Revenue was unable to arrange for the supply of monopoly salt during the year. Excise salt was therefore purchased and supplied to all the yards. Towards the beginning of the year, the price of excise salt rose very high. Against the normal rate of Rs. 25 per garisa (120 maunds) the cost per maund of salt rose from Re. 0-3-3 to Re. 0-5-8-8 at Krishnapatam, from Re. 0-5-7-5 to Re. 0-9-4-5 at Madras and from Re. 0-3-0 to Re. 0-6-9 at Cheyyur. In addition to the high price, heavy transport charges had also to be paid at Madras and Krishnapatam.

74. *Wastage of salt.*—There was a wastage of 5 seers of salt at Mangodu due to wear and tear in transit.

75. 186 maunds 31 seers out of 300 maunds consigned by boat for the yards at Mangodu and Medicalkuppam was

lost before it left the precincts of the Madras depot owing to the sinking of the boat. The boat had a licence for carrying 20 tons of cargo, issued by the Public Works Department only two days previous to this accident and yet foundered when loaded with 300 maunds or 11 tons. This has been brought to the notice of the Executive Engineer, North Presidency Division.

76. *Transactions*.—In spite of adverse and abnormal circumstances the yards worked at a profit of Rs. 25-11-8. The corresponding figure for 1929-30 was Rs. 1,968-11-6. The total quantity of fish brought to the yards for curing was 61,843 maunds 5 seers against 71,222 maunds 19 seers in the previous year. The decrease in transactions was due to a fall in operations in the Mangodu, Medicalkuppam and Kondurpalayam yards, partly due to malaria and partly to the poor fishing during the latter half of the year.

77. *Balance stock of salt*.—The stock of salt on 30th June 1931 was 1,041 maunds 30 seers against 666 maunds 14 seers last year.

78. *γ EAST COAST (SOUTHERN SECTION)*.—As in the previous year there were 14 fish-curing yards in the southern section. In the Vanagiri yard, there was a further encroachment of the sea on account of a severe cyclone on 27th November 1930 which resulted in the complete destruction of the fence on the eastern side and the submersion of about 3,340 square feet of the compound in a single night. The yard had to be closed pending its removal to another site. With the permission of the landlord the new site selected was occupied on 6th December 1930 pending its acquisition by the Collector of Tanjore. A temporary salt store shed and weighing shed were erected and the operations in the yard recommenced on 10th December 1930.

79. As regards the removal of the Nambuthalai fish-curing yard to a position close to a place where fish is landed, a suitable site has been selected and negotiations are proceeding for its acquisition.

80. The re-opening of a yard at Kuttankuli is still under consideration. During the year transactions in the fish-curing yard at Tranquebar showed an increase. Transactions may further improve if this yard is shifted to a site nearer the kuppam where fish is landed. A Government poramboke land has been selected for this purpose and the matter is under correspondence with the Revenue Department. If the new

site becomes available and the curers agree to construct the buildings on the new site, proposals for the transfer of the yard will be submitted to Government.

81. *Transactions*.—Transactions in the yards of this section during the year were not as satisfactory as in the year before. The fall in transactions was due to very unfavourable weather conditions. During the year 65,550 maunds 11 seers of fish was brought to the fish-curing yards; the weight of cured fish removed from the yards was 45,518 maunds 6 seers; corresponding figures for 1929-30 were 85,249 maunds 17 seers and 59,748 maunds 8 seers. 13,513 maunds 19 seers of salt valued at Rs. 16,891-13-6 was issued to the curers which was 4,462 maunds costing Rs. 5,577-8-0 less than what was issued in the previous year.

82. *Supply of salt*.—The total quantity of salt supplied to all the fish-curing yards in the section was 15,832 maunds. To Idinthakarai, Ovari, Sippikulam and Mukkur yards, which could be served by sea from Tuticorin, 10,500 maunds purchased at a uniform rate of Re. 0-2-10 per maund were transported by boats from Tuticorin salt factories, the cost being cheaper than buying salt at the factories near these yards and transporting it by land. The supply of salt to the remaining 10 yards amounting to 5,332 maunds was made from the nearest salt factories by land route as this was convenient and cheap. The cost of salt varied from Re. 0-1-10 to Re. 0-6-0 per maund.

83. *Wastage of salt*.—On 21st May 1931, a shortage of 3 seers of salt due to long storage was noticed in the fish-curing yards at Mukkur and was written off the accounts.

84. *Balance stock of salt*.—The balance of salt in the 14 yards on 30th June 1931 was 6,169 maunds 23 seers.

85. *Improvements*.—The use of aluminium measures for the issue of salt was stopped and wooden salt measuring trays were substituted in all the 14 yards.

86. Cactus fencing in all the yards in the Ramnad, Tinnevely and Tanjore districts has been affected by cochineal insects. Efforts are being made to grow screw pine, if available in the vicinity of these yards. The fish-curing yards at Adirampatnam alone has been provided with a barbed wire fence and a live fence of screw pine is also being planted. All the yards have been supplied with standard weights of one maund and half maund in iron. The fish-curing yards at Ovari and Muthupet have each been supplied with a portable platform weighing machine.

87. A well with cement rings has been constructed at a cost of Rs. 40-8-0 in the Adirampatnam yard. Efforts to sink a well at the Sethubavachatram yard did not succeed as no water was available up to 20 feet and any that may be found below this level was likely to be brackish.

88. Individual ticket-holders at Idinthakarai and Point Calimere have been persuaded to erect curing sheds for themselves as on the West Coast. In the latter yard, improved cement-curing vats have been built. A small garden has been raised by the petty yard officer in the Nambithalai fish-curing yard.

89. **8 WEST COAST.**—Last year there were 61 fish-curing yards, including the yard at Agathi, and the three private yards were opened only during the fishing season. One of the yards, viz., Kizhur, was closed on 14th December 1930 owing to lack of operations. Thus at the end of the year under review there were only 60 fish-curing yards, 26 of these are in charge of sub-inspectors, one in charge of a sub-inspector during the fishing months and a petty yard officer during the monsoon months, 25 are in charge of petty yard officers and the rest in charge of peons. One petty yard officer's yard was converted into a peon's yard under the orders of Government and owing to increase of operations three sub-inspectors from smaller yards were posted to the yards at Ullal, Manjeshwar and Hosdrug in the South Kanara district. It has, however, been found difficult to find peons to man these yards and consequently a great deal of inconvenience is felt.

90. On more than one occasion in the past the sub-inspectors of the Department have memorialized Government for the improvement of their pay and prospects, which are admittedly inadequate. The Government recognized the grievances of these subordinates but were unable to redress them for want of funds. The reorganization of the sub-inspectors is a necessity in the interests of efficient work and it is hoped that Government will consider the question immediately their financial conditions improve.

91. As reported last year the yards that are subject to sea erosion continue to be exposed to this menace. The Mattool yard had a very narrow escape from being washed away by the sea this year. The store shed inside the yard was damaged and salt had to be shifted to another shed, hastily constructed by the curers. By next year the yard should be shifted to a new site if the encroachment by the sea continues. Telli-cherry yard already encroached upon by the sea, suffered

further loss this year. One of the salt store sheds was in danger and most of its contents were transferred to other sheds. The sea invaded the premises of the Madakara yard but no serious damage occurred. Quilandy yard was also threatened but the sea receded after inflicting minor damages to the western fence. Vadanapalli was another yard that the sea threatened to destroy. The shifting of the yard has been sanctioned by Government but the land required for the purpose has not yet been acquired.

92. In the last administration report (paragraph 87) reference was made to the fact that the Coondapoor Taluk Board has been levying a fee of Rs. 5 for each shed situated within the Gangoli yard although the Government had fixed a maximum fee of Re. 1 for each store shed of fish outside fish-curing yards and a maximum of Rs. 5 for each fish-curing yard. On representation made to the President of the Coondapoor Taluk Board he has cancelled the excess levy. The Kadalundi fishermen continue to be harassed by the unfair profession tax levied by the Ernad Taluk Board. Allegations of excessive levy of licence fees on store sheds constructed by the Mattool curers on foreshore lands were also received. In Kuriyadi, in the Kurumbranad taluk, and Elathur, in the Calicut taluk, the fishermen are paying an unduly high rate of profession tax. In the Ponnani taluk the Valan fishermen living near Chettuvayi were compelled to pay profession tax on the scale applicable to those who derive an income of two to three thousand rupees a year though their income cannot possibly exceed Rs. 200 a year. The fishermen have had to sell their nets to pay their dues. On representation having been made to the President of the Taluk Board by the Assistant Director (Coast), he stated that the levy was made on the recommendation of village officers. On a complaint made to the Revenue Divisional Officer, Palghat, he has warned the village officers concerned. The matter has also been brought to the notice of the President of the District Board.

93. *Yards opened.*—The opening of a yard at Edakkad was sanctioned by Government with effect from July of last year but the site required for the yard was taken possession of only in March of this year and the construction of the yard was proceeding at the end of the year. The yard has since been opened for operation.

94. *Transactions.*—The important shoal fishes on which the transactions of the West Coast yards and the prosperity of the fishing population depend, viz., sardine and mackerel,

were exceedingly scarce. Valuable fishes like seer were hardly obtainable and even shark and cat-fish, which are extensively cured every year, were available only in moderate quantities. In spite of the scarcity of fish there was not much demand for cured fish which is attributed to the general slump in trade. Merchants and fishermen both suffered, and if the financial depression continues and the fishing season proves a failure next year also it is doubtful if fishermen will continue to be financed by middlemen.

95. In the last year's report (paragraph 96) it was stated that there was never so poor a fishing season as 1929-30, since the Fisheries Department took over charge of the fish-curing yards, but 1930-31 has proved to be a poorer year. The following are the weights of fresh fish, cured and salt issued since 1924-25 :—

Year.	Weight of fish.		Weight of salt.	
	MDS.	SRS.	MDS.	SRS.
1924-25	1,095,457	36	173,830	9
1925-26	1,150,492	13	187,375	33
1926-27	890,868	1	146,160	24
1927-28	1,507,736	..	244,081	1
1928-29	1,171,847	37	194,860	26
1929-30	770,966	5	128,261	26
1930-31	725,704	7	119,883	28

Of the two yards opened two years ago, the operations at Puthiakadapuram showed improvement as the consumption of salt was 1,103 maunds 3 seers against 620 maunds 13 seers in the previous year, but the transactions at Nattika yard were disappointing as the salt consumed was only 388 maunds 4 seers against 503 maunds 15 seers in the previous year. This is probably due to the fact that fish shoals did not appear on this part of the coast and the little fishing that the fishermen had, was confined to prawns most of which did not go to the yard for curing. The temporary yard at Vekkode also suffered in operations as only 423 maunds 24 seers of salt was consumed against 675 maunds in the previous year. Even some of the older yards like Kodumbi, Kaipamangalam and Tanur South fared very badly.

96. There was a remarkable increase of operations in Madai which had a record consumption of salt during the year owing to heavy catches of Thalayan (Ribbon fish) during the early part of the year. The same fish contributed to the improvement in operations in Mattool and Baliapatam. Pudiappa and Calicut (North) cured large quantities of cat-fish in

March and Beypore (North) and Beypore (South) obtained good catches of cat-fish in May.

97. Operations in the newly opened yard at Madakara did not come up to expectations. The bags of salt in stock in this yard were found to be short in weight (viz., less than 1 maund 30 seers) and the principal curers refrained from resorting to the yard for some time preferring to use bazaar salt. The stock was consequently overhauled and the contents of short-weight bags were rebagged. In spite of this, private curing is reported to be still going on in the village. Badagara is another centre for private curing and more fish is cured outside with bazaar salt there than inside the yard. Kollam near Quilandy is another village where there is a good deal of private curing which has affected the operations of the Quilandy yard. Kadalundi, another new yard, has not been working satisfactorily. Ever since its establishment the fishing seasons have been abnormally poor. The fishermen of this place are men of poor physique and poor spirit and the Ernad Taluk Board seems to have been giving them trouble. Calicut South and Beypore North have no future unless sardine and mackerel reappear in abundance. It is doubtful also if Meladi will become a prosperous self-supporting yard in the near future.

98. *Improvements.*—Operations in the demonstration curing shed at Malpe were poor owing to scarcity of fish. Thirteen maunds of mackerel were cured in November 1930, at a cost of Rs. 42-8-0. The cured fish was sold for Rs. 50-6-0 the transaction resulting in a profit of Rs. 7-14-0. In the Calicut North yard operations were conducted on three days in the demonstration shed. On 16th December 1930, 3 maunds 18 seers of fish caught by the students of the Fisheries Training Institute were cured with 14 seers of salt and a net profit of Rs. 5-5-0 was realized by the sale of the cured fish. On 13th January 1931 and 11th February 1931 fish was purchased by the yard sub-inspector and cured at a cost of Rs. 18-5-6. The cured products were sold at a profit of Re. 0-12-6.

99. Sixteen more private curing sheds of approved design were constructed during the year by curers and two temporary thatched sheds were converted into semi-permanent sheds. But for the prevailing poverty among the curers the process of conversion of old insanitary sheds into permanent ones of approved design would have progressed much more rapidly.

Many of the curers solicit Government help for constructing masonry sheds but such applications are not encouraged.

100. *Wastage of salt*.—There was a wastage of 235 maunds 22 seers during the year against 379 maunds 4 seers during the previous year. Of this wastage Mr. Basappa, the owner of the Moolky private yard, is responsible for 4 maunds 2 seers and he has been asked to pay single duty and issue price. Issue price and duty have also been recovered on a wastage of 3 maunds 1 seer of salt caused by the carelessness of the salt transport contractor and on 2 maunds of salt for which the Sub-Inspector of Ponnani yard was responsible.

(c) **Private Oil and Guano Factories.**

101. (iii) *Private Oil and Guano Factories*.—Sixty-four factories in the South Kanara district and 172 factories in the Malabar district, took out licences during the year. No factory worked during the year in South Kanara; 22 factories worked in Malabar. The output of oil was 65 tons, of guano 157 tons and of fish manure 110 tons. Fish oil was sold at Rs. 200 to Rs. 300 a ton on the average, guano at Rs. 60 to Rs. 80 a ton on the average, and fish manure at Rs. 35 to Rs. 40 a ton. “Chala-Mathi” (*Sardinella gibbosa*) which abounded instead of the usual oil sardine does not make good manure, yet large quantities were converted into manure for private use in the northern parts of the Malabar Coast owing to lack of demand for this fish for domestic consumption either salted or fresh.

II. MINOR MARINE AND ESTUARINE FISHERIES.

A.—Prawns.

102. The investigation of the Collair lake prawn fisheries was continued. Collections of samples from the Upputeru at regular intervals throughout the year are being made with a view to examining their size, stomach contents, and condition of their gonads.

103. Two possible explanations for the extraordinary abundance of *P. monoceros* the common South Indian back-water prawn in the south-west monsoon floods in the lake are (1) they ascend into the lake for spawning as do the hilsa; (2) they assemble for feeding and growth; which of these is the true explanation cannot be satisfactorily settled without examining prawns from the lake at regular intervals. There is no fishery officer permanently stationed at the lake and only occasional visits by the Inspector at Vizagapatam were possible in the past. The local Public Works Department gumasta stationed at Kottadu has agreed now to make collections and

forward them to the Inspector at Vizagapatam for examination. Detailed instructions regarding preservation, labelling, etc., have been given to the gumasta.

B.—Edible Oysters.

104. (i) *Sonapur beds*.—When I camped at Berhampur last September, I noticed cart-loads of fresh oyster shells at the brick-kilns and traced it to the oyster beds of the Sonapur backwaters. The Inspector of Fisheries, Vizagapatam, who followed up the enquiry found that the shell contractor was again breaking up the oyster beds in spite of the prohibitory clause which was inserted into the shell lease agreement in 1927 at the instance of this Department. On examining the current year's lease agreement the Inspector of Fisheries found that the clause had been somehow omitted. The Tahsildar of Berhampur has since included the clause in the agreement and the oyster beds have been saved from complete destruction.

105. (ii) *Oyster supply*.—The 1930 season continued till 1st October 1930. The supply of oysters to the public in 1931 commenced on 1st April last. The supply was made from Gokulapalli beds as in the previous year. A local maistri instead of the Pulicat oyster staff was appointed to secure local coolies and supervise the collection and supply. The oyster boat and the Pulicat watchman who has experience of the work were sent for a month to Gokulapalli to start the work.

106. During the year under report $1\frac{1}{4}$ lakhs of oysters were sold for Rs. 2,365-6-0 against Rs. 2,766-3-0 in 1929-30. The net receipts from oyster fisheries was Rs. 281-0-7. The supply was limited as last year to customers at Madras, Bangalore and Ootacamund and the rates charged were slightly raised as shown in the statement below:—

				100 oysters.	300 oysters.	500 oysters.
				RS. A. P.	RS. A. P.	RS. A. P.
Madras—						
Old rate	..	..	..	1 12 0	4 8 0	7 0 0
New rate	..	..	..	2 0 0	5 0 0	8 0 0
Bangalore—						
Old rate	..	..	..	2 2 0	5 8 0	8 8 0
New rate	..	..	..	2 8 0	6 4 0	9 12 0
Ootacamund—						
Old rate	..	..	..	3 0 0	7 0 0	12 0 0
New rate	..	..	..	3 8 0	8 0 0	13 12 0

Under G.O. Ms. No. 4461, Public Works and Labour Department, dated 19th February 1931, the portion of the

Buckingham Canal between miles 123/4 and 133/7 containing the rich Gokulapalli oyster beds was transferred permanently to the Fisheries Department.

107. The Bar at Pulicat and Ennur was open through the greater part of the year and there has been a satisfactory spat fall at both places.

II. INLAND FISHERIES.

A.--Research.

108. (i) DEEP-WATER TANK FISHING EXPERIMENTS.—Experiments in fishing deep and perennial water-tanks continued in the Mopad reservoir. During the north-east monsoon, the water level in the lake rose 6 feet over the F.T.L. At no time of the year the depth of water over the sill of the sluice went below 11 feet. Thus the average depth of water in which fishing was conducted was about 15 feet deeper than in any year previously. The unusually heavy rains and stormy weather which occurred during the last north-east monsoon rendered fishing impossible in the reservoir for a short time. In spite of the greater depth of water this year's fishing was conducted successfully and fish was regularly supplied to the adjoining towns through contractors or sold direct to the public. By the indigenous fishing methods in freshwater tanks, the Mopad tank, full as it was this year, could never have been fished. This is therefore an achievement which was rendered possible solely by the successful fishing experiments conducted by this Department since 1918, by which gradually an efficient method of fishing deep and permanent water tanks continuously has been evolved. The Mopad reservoir has no encumbrances to fishing by nets such as submerged rocks or trees, besides being singularly free from weeds. It thus affords unique facilities for fishing experiments which have met with unprecedented success. The method evolved at Mopad may not be suitable for waters encumbered with submerged trees such as the Periyar reservoir or overgrown with weeds as the Collair lake.

109. For the first time this year it was possible to put catla from the reservoir on the market: 290 catla measuring 12 inches to 36 inches weighing 674 lb., were sold to the public. The fish is now fairly well established in the lake and is regularly caught along with other indigenous carp.

110. It will be seen from the statement below that the total number of fish caught is 4,546 less than last year, the total weight is less by 3,610 lb. and the total amount by Rs. 288-3-9. Fishing had to be conducted throughout the

year in unusually deep water and for some days fishing was interrupted by heavy rains which account for the slight decrease.

Results of fishing experiments in the Mopad reservoir for the year ending 30th June 1931.

Year and month.	Number of fish caught.	Weight of fish.	Amount realized.	Name of nets used and weight of fish by each.	
				Drift.	Cast.
1930.					
		LB.	RS. A P.	LB.	LB.
July	583	749½	78 1 2	500	249½
August	625	691½	72 0 0	461½	230
September ..	617	817½	87 6 10	283½	564
October	844	993½	101 14 10	993½	..
November ..	553	1,161	108 12 0	873	288
December ..	513	820½	79 7 6	772½	48
1931.					
January	445	597½	62 3 10	597½	..
February ..	520	707	70 2 4	707	..
March	614	777	73 13 0	777	..
April	505	676	65 3 8	642	34
May	481	705	72 6 8	595	110
June	557	697	72 9 8	545	152
	6,917	9,423	944 1 0	7,747½	1,675½

N.B.—The total number of fish includes 290 catla.

111. As the reservoir now holds 19 feet of water above sill level there is no chance of its running dry in the near future. With this assured water-supply the exotic fish introduced such as Catla, Mahseer and Etroplus are expected to thrive and multiply satisfactorily.

112. (ii) FISH-BREEDING—*Avalanche hatchery for Trout*.—Advice on the working of the trout hatchery and stocking of streams was sought by and given as usual to the Nilgiri Game Association during the year. The upper reaches of the Bhavani attracted a couple of sportsmen who fished for Mahseer with good results, the biggest Mahseer caught being one of 60 lb.

113. *Hilsa hatchery*.—The hilsa season at Bezwada this year was a failure. Ripe hilsa were not available and hatching experiments could not be continued.

114. The selection of the site for the hatchery is still under discussion with the Public Works Department. The room in the Lock Bungalow set apart for the use of this

Department as a store room still serves as the hatchery. The veranda is used during the hatching experiments and the high level water-tank is placed on a temporary stand in the compound.

115. *Hilsa marking experiments*.—The hilsa fisheries are among the most important fisheries in India from an economic point of view. From a single fishery at Lower Anicut on the Coleroon, the Government obtain several thousands of rupees annually. There are other extensive hilsa fisheries in all the important East Coast rivers like the Godavari and the Kistna. In Bengal it is easily the most important fishery of the Ganges and adjacent rivers. But till now the hilsa fisheries have been known only in rivers which the fish ascend in shoals for breeding purposes during the south-west monsoon floods and no hilsa fisheries at sea were known anywhere in India or Burma. In the Cauvery, for instance, the fish ascend from June to September and an extensive fishery takes place during these months at the Lower Anicut on the Coleroon, but after the fish leave the rivers for the sea nothing was known about them.

116. From the records of Palk Bay fish-curing yards recently scrutinized in connexion with the bulletin on fish that is under preparation, it was found that shoals of hilsa visit the Bay annually from November to May when a regular sea fishery takes place. This discovery that hilsa fisheries occur also in the sea (Palk Bay) from November to May after the fish have left the rivers therefore offers unique opportunities for investigating their movements, growth, and migration in the sea, regarding which nothing is at present known. With a view to study the growth and movements of hilsa in the sea it was decided to mark with specially designed metal tags bearing numbers as many fish as possible immediately after their capture at sea and liberate them alive. These fish if and when re-captured at sea or in the Cauvery or other rivers, will give information regarding their migration and rate of growth. This is an accepted method of fishery investigation and the Inspector of Fisheries stationed at Sethubavachatram was instructed to accompany boats engaged in hilsa fishing and mark as many fish as possible. On the days the Inspector went to sea hilsa were absent but three fish of the allied species *H. toli* was marked on the days the Inspector went to sea. Thus for the first time in the history of hilsa investigation an entirely new avenue for exploration and research has become available through the records in fish-curing yards. This is one

more instance where the fish-curing yards and the information gathered by them, though never suspected of being of use or of opening up economic and scientific possibilities, have given direct and invaluable assistance to fishery research.

117. *Gourami*.—At the Ippur farm, it was not possible to complete the construction of the two experimental ponds referred to in last year's report (paragraph 131) on account of the high water level in the fish ponds.

118. The very old stock of gourami in the Powder Factory fish-farm were sold. A fresh stock of adolescent fish will be introduced for breeding after cleaning the pond thoroughly.

119. At Sunkesula consequent on the installation of an oil-engine, the congestion experienced in the past was considerably relieved by bringing more ponds which used to be dry under water. The stock has been distributed in the ponds according to sizes. Fish are now thriving and breeding well. As in the Powder Factory farm the old stock of senile fish have been sold. At present there is also a large head of young fish for sale to prospective pisciculturists.

120. At the Mopad farm, gourami are growing rapidly and are expected to breed shortly.

121. At Vellore also they are thriving well, but unfortunately fish in the different section have got mixed up in the recent floods, which is undesirable and should be rectified as soon as the level of water in the moat permits.

122. At Præma, as hitherto fish are thriving well. Large and old fish are sold periodically in the Nandyal market.

123. *Catla*.—Catla are fairly well established in the Mopad reservoir and were sold in the adjacent markets for the first time this year. Among the catla that escaped from the Mopad reservoir during the north-east monsoon floods and were caught below the surplus weir, there were three weighing each 40 lb. They are also getting established in the new Willingdon reservoir and the Barur tank (Salem district) which have been stocked by the Department since 1926. In these two tanks fish ranging from 4 inches to 4 feet and 2½ feet respectively have been noted.

124. *Tench and English carp*.—The 345 tench and 75 carp fingerlings obtained from Ootacamund in February 1930 are thriving well at Præma. The rate of growth of the English carp has been very satisfactory.

125. *Mahseer*.—As stated in last year's report experiments in Mahseer culture were started at Ippur, Mopad and Chingleput fort-moat. At Ippur the experiment had to be abandoned subsequently for want of water and other causes. Both at Chingleput and Mopad fish are healthy and are thriving well. Fingerlings measuring $1\frac{1}{2}$ inches to $2\frac{1}{2}$ inches introduced in March 1930 measured 5 inches to $5\frac{1}{2}$ inches in August after a period of five months, but the experiments in the Chingleput fort-moat however came to an unfortunate end owing to the disastrous floods caused by the cyclone in November. In the Mopad farm by May 1931 after fourteen months, the fish had reached $9\frac{1}{2}$ inches to 11 inches. The rate of growth though rapid is second to that of catla. Experiments in Mahseer rearing were also started this year at Sunkesula in a specially prepared pond.

126. *Etroplus* continues to thrive and breed in the fish farms and all introduced waters.

B.—Administration.

127. (i) FISH FARMS—*Sunkesula*.—Three more ponds were brought under water. The congestion felt has been further relieved by the distribution of fish to the three additional ponds according to size.

128. Thirty-seven old gourami no longer of use as breeders, weighing $104\frac{1}{2}$ lb. were sold for Rs. 39-3-0 during the year. There is a fair demand for this fish.

129. *Præma farm*.—The villagers owning lands outside the reserve forest at Præma represented their grievances to the Collector of Kurnool who paid a visit to the farm in December last. His suggestion for the equal distribution of water to the ryots and the farm has been referred to the Industrial Engineer.

130. The extension of Sub-Assistant Inspector's quarters and the construction of watchmen's quarters sanctioned in G.O. Mis. No. 2118, Development, dated 28th November 1929, were completed during the year. The old quarters of the Assistant Inspector constructed by the Forest Department fifteen years ago are in a bad condition and require urgent repairs. Necessary estimates are under preparation. An old stock of gourami no longer of use as breeders measuring 14 inches and above were disposed of in the Nandyal market. Altogether 50 fish weighing $74\frac{3}{4}$ lb. were sold for Rs. 34-10-0. There is a great demand for this fish in the locality.

131. *Ippur fish farm*.—The experiment in growing Mahseer here proved a failure for several reasons. The newly

constructed special ponds could not be completed during the year owing to excessive water in the farm. Among the older ponds, excepting one in which *Etroplus* is grown for stocking purposes, the ponds are not giving satisfaction. A chemical examination of the water and the soil as well as other investigations are in progress for the detection and remedy of adverse factors.

132. *Powder Factory fish-farm*.—The old stock of 107 gourami weighing $518\frac{1}{2}$ lb. being too old and senile were removed and sold for Rs. 178-1-6. The pond will be cleaned and stocked with virile young breeders.

133. The two eastern ponds were stocked with catla fingerlings during the year, but the fish escaped in the exceptional floods caused by the cyclone last year. A fair number of *Etroplus* are still found in the pond.

134. *Chetput Model farm*.—Government in G.O. Ms. No. 496, Development, dated 31st March 1931, ordered the postponement of the scheme to 1932-33. The Brickfields Superintendent's quarters were handed over to the Department on 1st April 1931.

135. *Vellore Fort-moat farm*.—The exceptionally heavy rains last November caused unprecedented floods in Vellore and the moat overflowed. Consequently fish in the different sections got mixed up and some have escaped. The fishery lessee suffered heavy loss. To compensate the loss, the right of fishing in the moat has been extended to another year ending 31st March 1932, for Rs. 1,000. For a year or two till normal conditions are restored the sale of grass and lotus leaves is bound to fetch low sums.

136. *Mopad fish-farm*.—Fish introduced in the breeding ponds last year are all thriving well. In future the provincialized tanks in the neighbourhood of Mopad could be stocked with *Etroplus* from the Mopad farm. The risk and expense now incurred in transporting fish over long distances for stocking will then be obviated. The November rains caused only a slight damage to the fish ponds which were promptly repaired but the barrier wall across the Manneru has sustained more serious damage. Arrangements are being made to repair it at an early date. When the reservoir surplused, some big catla breeders escaped. Fish measuring 3 to 4 feet in length are reported to have been caught in the Manneru river below the reservoir after the floods.

137. Buildings to accommodate the office and stores and laboratory sanctioned in G.O. Mis. No. 2777 W., dated 3rd October 1929, are under construction and will be completed in the ensuing year.

138. *Chingleput fort-moat farm*.—Revised estimates for rectifying the defects in the construction of the moat and for the construction of the watchman's sheds were received from the Executive Engineer. It is hoped that the work will be completed during the ensuing year. The moat was stocked with catla and Mahseer during the year; but unfortunately last November the heavy floods in the Palar submerged the moat causing the escape of the fish. There was however no damage to the moat. The fish that were left were auctioned for Rs. 115.

139. (ii) *GANJAM TANK STOCKING SCHEME*.—The scheme originally drawn up in 1921–22 was revised and re-submitted to Government. With a view to economy suitable public buildings now lying vacant wherever available were chosen in place of new store sheds and office originally proposed. Government have however deferred the scheme but steps were taken to secure the buildings which would be otherwise dismantled or sold.

140. (iii) *PISCICULTURAL SURVEY*.—Perennial springs in the Chingleput and Chittoor districts were investigated during the year in the dry weather. The springs in the Kambakkam Hills of the Chingleput district near the Tada railway station were found to afford special facilities for pisciculture.

141. (iv) *THE METTUR PROJECT*.—At the suggestion of the Engineer-in-Chief, Cauvery-Mettur Project, I inspected the Mettur Project in July and October 1930 with a view to examining the possibilities of developing its fisheries. The development of the fisheries of the Mettur reservoir so far as can be judged at present, will include (1) the construction of a fish-farm with stocking, breeding and nursery ponds below the dam for the culture of suitable fresh water food-fish which will provide an adequate supply of fry and fingerlings for stocking the reservoir periodically; (2) fishing the reservoir with up-to-date tackle and gear so as to exploit its fisheries evenly and economically throughout the year as at Mopad; and (3) to introduce the best species of larvicidal fish to minimize mosquito nuisance and prevent the spread of malaria. A suitable area, roughly 1,015,000 square feet in extent, has been selected for the construction of a fish-farm and the Government have been addressed to reserve this area as well

as certain buildings for the use of the Fisheries Department. With a view to propaganda, a fairly large cement cistern was converted into a fish pond with the aid of the local officers of the Public Works Department and 18 Gourami fingerlings were planted in it. The fish are under the care and control of the Executive Engineer.

The project claimed the fishery revenue from its waters, but Government have decided in their order (G.O. No. 2921 I., dated 16th October 1929) that the fishery rentals should be credited to the Fisheries Department.

142. (v) *STOCKING OPERATIONS AND RESULTS*.—During the year under report the rainfall was excessive. All the acquired tanks, including Dusimamundur and Kaveripakkam, received an abundant supply of water. Only a few unimportant tanks breached, which did not affect fishery rentals appreciably.

143. *Catla*.—Catla breed in south-west monsoon and the fry are available from August till October in the Godavari channels wherefrom they are annually transported by the Department for stocking irrigation tanks in the Presidency. The following waters were stocked with catla during the year at a cost of Rs. 805.

	Number of fry planted.
1. Cauvery river below Hoginkal falls ...	2,525
2. Vellore fort-moat	942
3. Attikunta tank	200
4. Chingleput moat	1,800
5. Powder factory fish-farm	200
6. Barur tank	200
7. Wellington reservoir	478
8. Ippur farm	400

Along with the usual supply for stocking departmental tanks a special supply of 725 catla fry were obtained during the year for sale to villagers in connexion with the propaganda for developing rural pisciculture in the Chingleput district.

144. One of the principal aims in the annual catla operations conducted by the Department is the introduction of this valuable new fish into the Cauvery river and its extensive channels and connected tanks which yield nearly 66 per cent of the inland fishery revenue. Hoginkal Falls in the depth of the reserve forest with its perennial pool of deep water was selected as the most favourable spot for stocking as the fish were least likely to be molested. Their ascent into Mysore being effectively stopped by the falls it was hoped that the

fish when established in the pool at the foot of the falls will gradually spread downwards. Catla stocking operations commenced in 1922 have been continued with no apparent results. In the absence of any reports of capture the Assistant Director undertook an examination of the river in 1927-28. The investigation was continued in 1928-29 and a further search for catla was made in the Cauvery near Bhavani and Nerinjipet with no result. The investigation has, however, shown that the section of the river from the falls up to four miles though reserved as a sanctuary for fish is extensively poached, and a reckless destruction of young fish by the use of small meshed nets and fixed engines occur annually in the hot weather at Nerinjipet, Bhavani and other villages. Due probably to the above causes the efforts of the Department to establish catla have not yielded tangible results. But the success of the Department in introducing catla in the Mopad reservoir and the data thereby obtained has further elucidated the problem with reference to the Cauvery river. If it took nine long years to establish catla in a lake of confined water like the Mopad reservoir where fishing is absolutely controlled certainly the Cauvery with its running water, uncontrolled fishing, and its extensive net work of tributaries and tanks cannot be stocked in the same period. It is surely premature to expect tangible results in nine years and there is no need to despair of establishing catla in the Cauvery because the last nine years' stocking operations have yielded no tangible results. The Mopad experiment has actually shown the way towards improving and accelerating the operations. If catla is established in the Mettur reservoir as in Mopad, the introduction of this new and valuable food-fish into the Cauvery river seems a certainty. As soon as the Mettur dam is formed, efforts will be concentrated in stocking the reservoir heavily with the fish instead of the Hoginkal Falls. In addition, it is proposed to stock annually another reservoir, the Veeranam tank, which is also directly connected with the lower Cauvery system. The road communication to this tank has been restored, which will facilitate stocking operations. The progress of the experiment can then be intelligently watched in the Mettur reservoir where fishing will be strictly controlled by the Department.

145. Our anticipations in regard to the establishment of catla in the Mopad reservoir have been fully realized and since December last we are placing on the market this fish unknown in the locality before. Two hundred and ninety catla ranging in size from 12 inches to 36 inches and weighing

675 lb. were sold to the public in the fishery year ending 30th June 1931. Further, there is every possibility of this fish spreading along the Manneru river system into some of the provincialized tanks of the Kandukur taluk. The parasitic worm referred to in last year's report is not much in evidence this year and no dead fish had been found since last year.

146. In the Willingdon reservoir also the result of catla stocking is highly satisfactory. It was reported by the Supervisor, Public Works Department, that fish measuring 4 inches to 4 feet were caught in the reservoir. The President of the Lower Anicut Fishermen Society reported that catla worth one to two hundred rupees were caught in the Vellar river. As the improvement of the fishery of Vellar has followed the stocking operations of the Department, the question of acquiring its fishery is under consideration.

147. In the case of Barur tank (Salem district) also the Public Works Department Supervisor reports that catla measuring $2\frac{1}{2}$ feet were caught.

148. The improvement of inland fisheries falls under two heads (1) intensive cultivation of indigenous fish with a view to increased output; (2) introduction of exotic kinds with a view to improvement in quality. Under the second category the establishment of the trout on the Nilgiris was the first step taken by the Department. *Etiopius* was the second exotic fish the Department succeeded in establishing in inland tanks and lakes where it was unknown before. The catla is the third new fish which promises to yield tangible results.

149. *Mullets*.—A large stock of fry from natural sources were utilized for stocking provincialized waters in Nellore and Chingleput districts. Lessees of tank fisheries in the Kandukur taluk have reported the occurrence of mullets (9 inches to 12 inches) in some of their tanks which were stocked by the Department. An experiment to determine the growth of mullets in confined waters, has shown that mullet fry measuring $2\frac{1}{2}$ inches to 5 inches at the time of stocking (31st December 1929) attained a length of 19 inches in 19 months, i.e., by (24th July 1931). Mulletts are second only to catla in rapidity of growth.

150. *Etiopius*.—The Veeranam tank was stocked with 500 *Etiopius* at a cost of Rs. 45-15-0.

151. Fish stocked in some of the wells of the Coimbatore Agricultural College and at Samalkote are reported to be thriving well.

152. *Gourami*.—The fish supplied to the Agricultural Farm, Samalkote, and the Anamalais Association are reported to be thriving well; they have not yet bred.

153. *Megalops*.—The fingerlings of this well-known game fish of the plains supplied to the Anamalais Game and Fishing Association are reported to be thriving very well at an elevation of 4,500 feet. A further consignment of 1,500 *Megalops* were supplied to this Association during the year. The fish reached the destination in perfect condition to the entire satisfaction of the members.

154. (vi) DISPOSAL OF FISHERIES BY PRIVATE TENDERS.—With a view to combat successfully local combinations among bidders the fisheries of some tanks in the Nellore and the Chingleput districts were disposed of privately. The Kavali Christian Co-operative Society as usual came to the help of the Department and took a large number of tanks in the Kavali and Kandukur taluks on behalf of the depressed classes.

155. A list of tanks disposed of privately is given below:—

Tanks that were disposed of privately for favourable rentals.

Name of tank.	Highest bid in auction.	Amount obtained by private tender.	Compensation.
(1)	(2)	(3)	(4)
	RS. A. P.	RS. A. P.	RS. A. P.
Chingleput district—			
1. Kannigaipair	..	* 100 0 0	26 0 0
2. Sriperumbudur	..	† 125 0 0	23 0 0
3. Sevilimedu	..	241 10 8	17 4 0
4. Kattur	46 0 0	75 0 0	12 8 0
5. Neidavoyal	31 0 0	50 0 0	30 0 0
6. Madurantakam	No bid during sale.	1,000 0 0	228 0 0
Nellore district—			
1. Kavali	..	30 0 0	24 0 0
2. Gavaavaram	..	45 0 0	31 0 0
3. Musunur	..	200 0 0	180 0 0
4. Juttur or Thallapalem	..	70 0 0	54 0 0
5. Rudrakotta Pedacheruvu and Raja-cheruvu.	..	35 0 0	27 0 0
6. Mannangidine	..	230 0 0	218 0 0
7. Thumelapenta	..	100 0 0	59 8 0
8. Zaladanki	..	45 0 0	38 0 0

* Per year for three years.

† Per year for two years.

Tanks that were disposed of privately for favourable rentals—cont.

Name of tank.	Highest bid in auction.	Amount obtained by private tender.	Compensation.
(1)	(2)	(3)	(4)
	RS. A. P.	RS. A. P.	RS. A. P.
Nellore district—cont.			
9. Arumakondapalayam	..	75 0 0	97 4 0
10. Brahmanakraka	..	30 0 0	16 10 0
11. Chinnakraka	..	25 0 0	8 0 0
12. Ghattupalli	..	7 0 0	14 8 0
13. Pappireddi cheruvu	..	125 0 0	122 0 0
14. Mopad and Machavaram	..	700 0 0	352 0 0
15. Chagollu Large	..	135 0 0	25 8 0
16. Gangapatnam	..	90 0 0	53 0 0
17. Kalivetapalam	5 4 0	20 0 0	3 0 0
18. Brahmadevan—Tuticheruvu	3 12 0	* 20 0 0	1 12 0
19. Kovur	300 0 0	* 700 0 0	252 0 0
20. Kodavallur	..	* 62 0 0	58 0 0
21. Puduparti	Nil bid.	20 0 0	5 0 0

* Per year for three years.

156. (vii) FISHERY SALES.—With the exception of a few unimportant minor tanks, all were auctioned or otherwise leased during the year and some tanks in the Nellore and the Chingleput districts fetched high rentals.

157. Owing to the serious political agitation, and the unusual financial depression in the country the possible results of fishery sales were a source of considerable anxiety. The favourable north-east monsoon, the co-operation of the Public Works and Revenue Departments, the help rendered by the Co-operative Societies, notably the Kavali Christian Co-operative Society, and the zeal of the executive subordinates of the Department, helped to augment the fishery revenue. The total income for the year is Rs. 1,23,776-1-2 against Rs. 1,04,509-1-3 in the previous year and is the highest on record.

IV. CROWN MONOPOLIES (PEARL AND CHANK FISHERIES).

A.—Research.

158. (i) CHANK MARKING EXPERIMENTS.—Experiments started at Tuticorin by the Assistant Director, Pearl and Chank Fisheries, last year in marking chanks to determine their rate of growth and migration were not successful. The marked chanks with few exceptions died in a few months. The causes of mortality is suspected to be due to—

(1) poisoning by verdigris formed by the brass labels attached to the orifice of the shell;

(2) the shallow unsuitable location of the bed (Thalai Kulam) selected for the experiment.

159. After a personal investigation I have issued detailed instructions for the future conduct of the experiments. The Assistant Director has been instructed to keep a register where the length and diameter of the shells marked and the number of the label attached to each shell will be recorded. Whenever a marked shell is fished up on a subsequent date in the course of the chank diving operations the date, and place of capture and its measurements will be noted in the register against the original entry and the shell will be returned alive to the sea for further growth. Only when marked shells have attained to the maximum size, they will be fished. Such information on the growth and movements of individual chanks, marked and liberated on the natural chank beds will, it is hoped, in the course of a few years afford invaluable information regarding (1) rate of growth, (2) age and mortality, (3) the migration of chanks in their natural habitat, all of which are invaluable data for the scientific control and development of chank fisheries.

160. (ii) JAPANESE DIVING APPARATUS.—A second set of experiments with the Japanese diving apparatus was conducted by the Industrial Engineer and myself from the 13th to 18th May 1931 at Sethubavachatram, Tanjore district. The initial experiments in the year before were conducted in shallow water close to the shore but the experiments this year were carried out in $2\frac{1}{2}$ fathoms at a distance of $2\frac{1}{2}$ miles from the shore. The supply of air from the cylinders to the mask in the shallow water experiments was controlled by us and not by the diver, partly because he was new and nervous and partly because the air cock was not handy. It was, therefore, decided to make suitable alterations to the apparatus and cylinders to overcome this and other difficulties experienced before undertaking experiment in deep water. The suitable seasons at Sethubhavachatram for experiment are the spring and autumn. The required alterations undertaken by the Industrial Engineer at a cost of Rs. 75 to the apparatus could not be carried out before the autumn because the parts required were not available locally and the experiments had to be postponed to the spring of 1931. To facilitate control of the diver in deep water a sub-marine platform of casuarina posts was erected two miles out to sea in 14 to 16 feet depth of water. The engine and compressor were installed on a boat which was towed daily to the platform by the launch

“Leverett”. The same diver trained last year was employed to carry out the diving experiments. He was controlled from the platform by two ropes, one round his waist for hauling and the other round his wrist for signalling purposes. It was found that the diver could comfortably move about on the bottom of the sea and search for chanks, etc., and the signalling and hauling arrangements worked perfectly. Unlike the experiments in shallow water last year, in which the diver was stationary, he was able to freely move about on the bottom of the sea and could himself control the supply of air from the cylinders. The hauling was done by a single man easily without effort. The maximum time for which the diver was able to move about on the bottom of the sea was seven minutes. He was not distressed in any manner but stated that he could keep below water indefinitely provided the air supply was continued. The only reason for his return to the surface was found to be exhaustion of the air in the cylinders.

161. The experiments have proved beyond doubt that the apparatus is suitable for chank diving and that the average local diver would take to it kindly, if not from the beginning, after a little persuasion and training. But, before adopting it regularly in the departmental chank-fishing operations efforts should be made to prolong the period of submersion by increasing the supply of air by other simple devices without resorting to the full complement of the more complicated and expensive scaphander, air tubes and continuous pumping, which may not prove more economical or profitable than naked diving though more convenient to the diver. The problem that remains to be solved, therefore, is the prolongation of the period of submersion from seven minutes to as long a period as the simple diving apparatus will permit. The longer the diver is made to stay at the bottom the greater the advantage, economical and otherwise. The manufacturers of diving dresses including the Japanese firm who supplied the mask will be consulted especially as leading firms advertise cylinders of greater capacity as well as the use of oxygen which prolong the period of supply. The subject of investigation in the future will be the adoption of such methods which will prolong the supply of air to the diver and thus increase his stay on the bottom to the maximum period possible.

162. (iii) INVESTIGATION OF THE CHANK BEDS OF THE COAST OF TANJORE.—A brief account of the investigation conducted in 1929-30 was given in last year's report (paragraph 194). As

Government have decided since the close of the year to abandon the investigation for financial reasons (G.O. Ms. No. 1122, dated 29th July 1931) a detailed review of the survey which covered two years and its results are desirable.

163. *Survey of the Coast.*—For the purpose of this investigation the Coast was divided into four sections:—

Section A.—From the northern limits of the Tanjore district to Point Calimere.

„ *B.*—From Point Calimere to Adirampatnam.

„ *C.*—From Adirampatnam to Manamelkudi.

„ *D.*—From Manamelkudi to the limits of the Ramnad district.

164. *Section A.*—Off Vanagiri in $6\frac{1}{2}$ fathoms about $1\frac{1}{2}$ miles from the shore the bottom was light mud with deposits of large numbers of broken clam, cockle and placuna shells. This is not an improbable ground for chanks. But at the time of the inspection water was clear to a depth of only 5 fathoms; the remaining $1\frac{1}{2}$ fathoms, however, was muddy and divers were unable to work. If the survey is resumed it is advisable to work a dredge to investigate the area in times of turbidity.

165. The nature, position and extent of chank beds which are suspected to exist, especially off Tranquebar and Vanagiri where large beds of other shells abound, remain to be ascertained.

166. Off Thirumalaivasal and Adikuppam the sea bottom is of the same material as above. Off Negapatnam to Point Calimere the sea bed consists of light mud with patches of sand here and there. The inspection of this area was conducted only for a few days when turbid water prevailed. It remains to be found out whether at any time of the year water is clear for diving operations.

167. *Section B.*—The bottom here is muddy all along the Coast and shell life is absent except very close to Point Calimere. At Point Calimere the fishermen reported sandy ground in 4 to $4\frac{1}{2}$ fathoms where there are shell beds, but the water was turbid during the inspection and no diving was, therefore, possible. There is also a swell close to the shore and the current is fairly strong. Moreover saw-fish are numerous and diving would have been risky even if the water were clear. The divers in consequence were averse to work in this area.

168. *Section C.*—This section and the next are situated in the sheltered waters of the Palk Bay. The sea is shallow and

the bottom is covered with sea-weeds up to about 3 fathoms. The ground is muddy beyond the 4-fathom contour. Chanks were generally met with between two to three fathoms. Judged by the number of chanks caught accidentally in fishing nets along the Coast this section was considered from the beginning the most likely area where new and extensive chank-beds were to be expected. Intensive work was therefore done in this area and its detailed survey now completed has resulted in the discovery of the following six new chank-beds of considerable potential value to the fishery:—

Position of bed.	Depth. FATHOMS.	Extent. sq. Mls.
1. South-east of Adirampatnam ...	$2\frac{1}{2}$ to 3	3
2. Do. ...	Do.	$1\frac{1}{4}$
3. East of Pudupatnam ...	$2\frac{3}{4}$ to $3\frac{1}{4}$	1
4. South-east of Pudupatnam ...	2 to 3	$\frac{1}{2}$
5. East of Banderpatnam ...	2 to $3\frac{1}{4}$	1
6. North-east of Krishnapatnam.	2 to $2\frac{3}{4}$	1

169. *Section D.*—This section of the Coast is 15 miles in extent. Survey of this section is incomplete. A regular fishery is said to have been carried on by divers on this Coast about a century ago, but the industry is now extinct and the local fishermen know nothing definite about the existence and extent of the chank-beds in this area. Further investigation is necessary before the beds in this section are definitely ascertained and charted. The sea-bottom is sandy up to three fathoms and is covered with sea-weed. The region between three to four and a half fathoms also sandy is clear of sea-weed, but seems devoid of any bottom fauna and is subject to strong current. The shells are of the same 'Patti' quality as the Adirampatnam ones but appear slightly heavier. A few 'Jadhi' shells are also found among rocks at the sea-ward end of the Manamelkudi shoal.

170. *Potential value of the beds discovered.*—Prior to the investigation the lessees of the Tanjore chank fishery confined their activities to a bed near Pudupatnam (in Section C) quite close to the shore within two and a half fathoms and fished 50,000 chanks from it annually in the years 1927 to 1929. The departmental investigations have brought to light the existence of six new chank-beds off the Coast of Adirampatnam to Manamelukudi. These new beds are all outside the area known to the lessees in depths from $2\frac{1}{2}$ to $3\frac{1}{4}$ fathoms—vide chart enclosed. (Appendix No. IV.)

171. The maximum and minimum catches made by divers on these beds during the investigation are given in Appendix V. On some days a diver was able to fish as many as 62

chanks. Had the diver been paid the usual wage of 1 anna 3 pies per shell, he would have earned Rs. 4-13-6 on such days. The Banderpatnam and Krishnapatnam beds are not so prolific and a diver was able to fish only five chanks on an average per day. This will give him an earning of 6 annas 3 pies per day. The divers were working on monthly wages and were not paid per chank. Had they been paid for chanks fished, their catches per day vary probably would have been higher.

172. Moreover, during the last two years, work was confined to survey and investigation only; no intensive fishing on commercial lines was attempted. Without actually fishing the new beds on the usual lines it is not possible to assess accurately their potentiality.

173. In the Palk Bay the chank diving season has been found to last only four months in the year from July to October. In very favourable years it may extend to five months from the middle of June to middle of November. Regular fishing is impossible at other seasons owing to adverse weather and water conditions. Even so, for 82 days during the survey from 10th August 1929 to 31st October 1929 when one boat with its full complement of six divers worked, the six divers have fished, 2,879 chanks or 1,053 chanks per mensem giving each diver six chanks or $7\frac{1}{2}$ annas per day including non-working days. If ten boats are engaged for a season and if fishing is done intensively it would be possible to fish at least 40,000 chanks at 1,053 chanks a month for the four fishing months (July to October). This is indeed a very low estimate as will be seen from the fact that the single inshore bank at Pudupatnam alone fished by the lessees, yielded 50,000 chanks a year. The economic possibilities therefore of the six new banks discovered by the survey are considerable.

174. The expenditure on the survey for the two years 1929-30 and 1930-31 was as follows:—

	RS.	A.	P.
Pay and travelling allowance for two years	3,799	15	0
Purchase of chanks	435	11	0
Hire on canoes	183	14	2
Batta to divers	1,420	4	0
Miscellaneous expenditure	85	13	8
Running expenses of motor launches.	2,088	10	0
Leave and pensionary contributions.	467	15	0
Total ...	8,482	2	10

The average annual expenditure of Rs. 4,000 is nothing considering the potential value of the banks discovered by the survey. After the banks are charted the question of testing their potentiality by intensive fishing on regular commercial lines should be examined. Necessary provision for continuing the survey was included in the budget estimates of 1931-32 and the continuance of the survey was recommended to Government. But Government in their order Ms. No. 1122, Development, dated 29th July 1931, have negatived the proposal on account of financial stringency.

B.—Administration.

175. (i) INSPECTION OF PEARL BANKS.—In pursuance of the programme adopted in 1928-29 for the regular annual inspection of the pearl banks in rotation, the pearl banks in the Palk Bay forming the third group of banks were inspected this year. The inspection showed that the Rameswaram, Tondi and Karangadu banks were all barren of oysters.

176. The Tholayiram par, the most productive of all the Tuticorin pearl banks inspected during 1929-30, was inspected again this year, as the divers who fished chanks near this bank noticed some pearl oysters. The bank on inspection was, however, found barren.

177. A list of the pars inspected this year is given below:—

III. DIVISION—PALK BAY BEDS.

A.—Rameswaram banks—

1. Off-sea beds—

- (a) Dhanushkodi bank.
- (b) Velangu par or Marikolundu par.
- (c) Nadu par.
- (d) Pasi par.
- (e) Tandi Kambi par.

2. Inshore beds—

- (a) Kannikai par.
- (b) Karai par.
- (c) Vangusoli par.
- Thagadu thatti par.
- Vettuva par.
- Mundal challi and Marikuli par.
- Kathamara par.
- (d) Vaipadu.
- (e) Sethu par.

B.—Tondi beds,

C. Karangadu Beds—

- (1) Karangadu Velangu par.
- (2) Karangadu Karai par.

178. Besides, the following two banks of the first group inspected during 1929-30 were inspected this year also:—

- (a) Tholayiram par.
- (b) Siluvai par.

179. The Assistant Biologist picked up in May last half a dozen pearl oyster shells on the south-eastern shore of Krusadai Island. A search for more specimens resulted in the collection of some more shells. It is believed that the shells have come from the seaward side of the island on the south. During the north-west monsoon a strong under-current runs on the southern side of the Krusadai Island. An examination of the sea-bed on the south side of Krusadai Island will be made in November or December 1931, wind and weather permitting.

180. (ii) TINNEVELLY CHANK FISHERIES.—The fishing was on the whole satisfactory, the catches amounted to 467,628 chanks against 612,362 chanks in the previous year. Owing to the sudden fall in prices of chanks and the financial stringency, Government ordered the closure of the fishery on 7th February 1931 when the funds allotted for the prosecution of the fishery in the financial year ending 31st March 1931 were exhausted. If fishing had been continued more than six lakhs could have been fished this year also. The sudden stoppage of the fishery entailed some loss of revenue to Government and to divers and boat-owners. As there was no forward contract for the sale of catches of this season's shells the stock on hand has been valued in the attached—statement No. 2 under Appendix No. II—at the production cost of Rs. 138 per 1,000 shells, which amounts to Rs. 61,795-5-8 against a revenue of Rs. 2,43,626-14-0 in the previous year. The fall in chank revenue is due to the depression in the chank market, and consequent low offers received for the chanks and the closing of the fishery for two months due to which a lesser number of chanks were fished. The rate obtained for the three years' lease ending 30th June 1930 was Rs. 400 per 1,000 full sized shells. By January 1931 the price had dropped to Rs. 280 and since the close of the fisheries year it has come down to Rs. 151.

181. In the report of the Assistant Director of Commercial Audit for the season 1929-30 the balance of four lakhs of shells to be delivered to the Dacca Co-operative Industrial

Union according to the agreement, viz., 212,363 full sized and 20,943 wormed and under-sized were valued at the production cost of Rs. 129-87 per 1,000 full sized shells, but these were actually sold this year for Rs. 58,417-1-2 at Rs. 280 per 1,000 full sized and Rs. 15 per 1,000 under-sized and wormed shells less a rebate of 2½ per cent.

182. *Advances to divers.*—At the beginning of the season a sum of Rs. 117-6-1 was outstanding with the Tinnevely and Ramnad divers. Of this, a sum of Rs. 38-9-0 became irrecoverable and was written off with the sanction of Government (G.O. Ms. No. 1639, dated 28th August 1930). This left a balance of Rs. 78-13-1 with both the Ramnad and Tinnevely divers. During the season a sum of Rs. 179 was advanced to the divers and Rs. 194-0-1 recovered from them leaving a balance of Rs. 63-13-0 at the close of the season (Ramnad district Rs. 40-12-0 and Tinnevely district Rs. 23-1-0).

183. *Boat loans to divers.*—No loans were granted this year.

184. *Increased rate for chanks.*—Government in their Order Ms. No. 2029, Development, dated 6th November 1930, sanctioned permanently the payment for Tuticorin shells at the rate of 1 anna 6 pies per shell.

185. *Recruitment of divers.*—The Assistant Director, Pearl and Chank Fisheries, was able to recruit a large number of divers locally as well as from Kilakarai, Periapatnam and elsewhere. In the beginning there was some difficulty, as the divers formed themselves into a society and refused to join the fishery except on their own terms. With much persuasion one by one, they joined the fishery. In all 357 divers, 22 canoes and 14 dhonis participated in the fishery. The diving labour consisted of:—

(1) Kilakarai and Periapatnam Muhammadan divers	...	...	...	...	...	270
(2) Arab divers	...	...	...	...	...	11
(3) Local Christians	...	...	...	...	...	51
(4) Local Palla Hindu	...	...	...	...	...	12
(5) Local Valaya Hindu	...	...	...	...	...	7
(6) Local Muhammadans	...	...	...	...	...	6
Total						357

186. *Quarters for divers.*—No sheds were erected this season for the foreign divers, as it was found possible to house them in the old police lines transferred to the Fisheries Department.

187. *Fishing operations.*—There were 106 fishing days. Two months and seventeen days were lost on account of bad weather and consequent cessation of fishing. As usual the Muhammadan divers who did not work on Fridays went out to sea on Sundays and the Christian divers took rest on Sundays. The maximum daily catch rose from 12,072 last season to 14,158. The maximum daily earning of a diver was Rs. 9 instead of Rs. 6-5-0 last season, the average however was Rs. 2-12-1 against Rs. 2-13-10 in the previous year. The par 'Mandadi' or rock-pilot accompanied as usual the chank canoes daily to the sea and located the fishing grounds. Gauging of shells fished was usually done in two sets and when the catches were heavy in four sets to complete the work early.

188. The following statement shows the statistics of catches for the three years ending 1930-31 :—

		1930-31.	1929-30.	1928-29.
Full-sized	...	467,628	612,362	431,127
Under-sized	...	18,813	16,025	15,090
Wormed	...	54,544	44,274	11,417

189. *Immature shells.*—Great vigilance was exercised in dissuading the divers from bringing ashore immature chanks. This year gauge board in zinc sheets were distributed to the canoes and dhonis, with instructions to divers to measure the chank at sea and bring ashore only full-sized shells. Of 36,382 under-sized shells brought, inadvertently ashore, 24,161 were returned alive to the beds and the rest could not be put back into the sea as divers had extracted the flesh from them.

190. *Valampuri shells.*—No 'Valampuri' shell was obtained during the year and the one got last season has not been sold yet, though enquiries from Madras, Bombay and Negapatam have been received.

191. *Idinthakarai chanks.*—Three hundred and seventy-three shells were collected in nets against 498 last season.

192. *Contract.*—There was no forward contract for the sale of this season's shells. As usual, tenders were called for, for the catches of the three seasons commencing from 1st July 1930. The only tender received was from the Dacca Co-operative Industrial Union, Limited, who offered Rs. 151 per 1,000 shells. This offer being very low fresh tenders for the catches of one season (1930-31) alone were invited. But owing to the acute trade depression there was no response. Negotiations with individual chank merchants are in progress.

193. *Accidents at sea.*—On 11th January 1931 a Kilakarai diver, by name Mohammad Ismail, was bitten by a shark on his right thigh but the injury was not serious and he recovered in a fortnight. On 12th January 1931 Mohideen Seenii, a diver of Periapattanam, disappeared after a dive; apparently he lost his breath, and did not come up to the surface. A search was made by the other divers, but their efforts proved fruitless. A further unsuccessful search was also made with the help of the launch 'Leverett.' The Muhammadan divers, as usual, performed a Kandiri before they went to sea again. On 24th January 1931 one canoe with six Periapattanam divers on board capsized while returning from chank fishing. A local canoe close by which went to its aid became dangerously overloaded with the crew of the capsized boat. Timely help rendered by one of the Kilakarai dhonis however saved the situation and both canoes and men were rescued.

194. *Weather.*—The weather was good for diving operations throughout the season except for a period of 17 days when it was stormy. Fishing was carried on from 6th November 1930 to 16th May 1931 with a long break in February and March 1931 when the fishery was suspended for financial reasons. The outbreak of the south-west monsoon commenced about 8th May 1931 and the chank fishery had to be closed by the 10th.

195. (iii) *TANJORE CHANK FISHERY.*—1930-31 was the second or final year of the lease granted to Janab K. E. Muhammad Sultan Marakkayar of Karaikal to collect shells caught in nets along the Tanjore Coast. Tenders for the lease of this fishery for a further period of three years were called for. Owing to the depression in the chank market, no tenders were received. The old lessee was interviewed by the Assistant Director. After much persuasion he offered Rs. 720 for one year. Another chank merchant by name Shumsudeen Marakkayar of Pondicherry also offered Rs. 701 per annum for a three years' lease. In view of the low offers, it has been decided since the close of the year not to lease the Tanjore fishery but collect the shells departmentally.

196. (iv) *SOUTH ARCOT CHANK FISHERY.*—Tenders for the lease of this fishery for a period of three years were called for and as offers received were very low, fresh tenders were invited and the offer of Janab K. E. Muhammad Sultan Marakkayar of Karaikal for Rs. 701 for one year being the only tender received was accepted. He now wants to take the

fishery from 1st September instead of the end of June. If he insists on this condition, departmental collection of shells is the only alternative possible.

197. (v) CHINGLEPUT AND NELLORE CHANK FISHERY.—The previous lease having expired by 30th June 1930, fresh tenders for three years were called for. Janab M. K. P. Muhammad Ibrahim Sahib of Madras offered Rs. 3,451-12-0 for the three years' lease and this offer was accepted. But he failed to pay both the rental and the additional deposit and the fishery had to be resold and was taken by Janab M. K. Shumsudeen Marakayar for Rs. 1,251 for a period of three years. According to the conditions in the tender notice, the defaulting lessee forfeited his earnest deposit of Rs. 100. Besides, a suit for the recovery of Rs. 2,100-12-0 towards the loss sustained by Government in the resale has been filed against him.

V. BIOLOGICAL SPECIMEN SUPPLY.

198. A list of institutions served by the station will be found in Appendix VI. During the year three more institutions have been supplied with the set of biological specimens specially designed for Natural History lessons in secondary schools last year:—

Board High School, Hosur.

Bishop Heber's High School, Trichinopoly.

Maharaja's College, Jaipur.

199. One large Dolphin (Elliot's dolphin) skinned and preserved was presented to the Government Museum, Madras.

200. Twenty-five green turtle eggs (eggs of 'Chelone Midas') were sent by request to the Colombo Museum and to Colonel Sewell, Director of the Zoological Survey of India, respectively.

201. Mr. Webber of Holyoke, Massachusetts, United States of America, has asked for a special collection of South Indian shells through the Secretary, Madras Young Men's Christian Association.

202. The usual annual supply of study and dissection materials to various Universities and educational institutions continued.

203. *Named collections.*—The accessions to the named reference collection at Ennur consisted of five molluscs, identified by Mr. Winckworth, four tunicates named by Miss Anna

B. Hastings and five medusoids determined by Mr. Govinda Kutty Menon of the Madras University, all new to the collection.

204. *Miscellaneous.*—On account of financial stringency the annual tour for the collection of specimens required for supply was not undertaken by the Research Assistant. The Research Stations at Krusadai Island and West Hill, the trawler, and the Pearl and Chank Fisheries Offices collected specimens for the Ennur station in the course of their duties.

205. Mr. Winckworth of the Royal Society, London, is a specialist who works on molluscs. At his request, assistance was given on several occasions to his brother, Colonel Winckworth of the India Army, stationed at Wellington, for dredging and otherwise collecting molluscs at the Madras Harbour, Ennur and Pulicat backwaters.

206. Full instructions were given by the Research Assistant for the installation of sanitary tube wells in the compounds of fisheries schools and fish-curing yards on the West Coast and a sample set consisting of tubes, filter point, pump, etc., of a tube well which has worked at the Ennur station satisfactorily was sent to the Paravanna fish-curing yard on the West Coast where it was decided to give it a trial.

207. A zinc shed costing Rs. 484 was put up at the Ennur station during the year to house the growing collections made by the trawler.

208. Apart from the usual visits of college and school students and interested specialists the students of the Fisheries Training Institute visited the station at their own cost.

209. *Oyster shell grit.*—The demand for this as food for poultry continued. In the year under review more than 1½ tons (3,555 lb.) costing Rs. 187-12-0 was manufactured and sold to poultry-keepers throughout India and Burma.

VI. ANTI-MALARIAL WORK.

210. The annual anti-malarial stocking operations were carried out on the Nallamalais. Twenty-six water holes were stocked with 6,200 larvicides, at a cost of Rs. 153.

211. The Chingleput and the Vellore Fort moat which were flooded out by the heavy rains in November were re-stocked with larvicidal fish. There has been no complaint of recurrence of malaria at these two places.

212. Encouraged by the results of larvicidal stocking done for the American Mission at Vellore last year and the year before last, the American Mission at Chittoor wanted to have some of the wells in the Mission compound stocked with larvicides. This was done at their cost.

213. Some of the waters in Udayagiri town were examined by the Assistant Director of Fisheries (Inland) at the request of the District Health Officer, Nellore, and stocked with 2,000 larvicidal fish from the Mopad fish farm at the cost of the taluk board.

214. A well in the compound of the residence of Mr. Ottee, Kilpauk, Madras, was stocked with larvicidal fish at his expense.

215. The Manager of Siddhapuram Criminal Settlement (Kurnool district) wants the waters in the Settlement stocked with larvicides. This will be undertaken in the current year.

216. The Executive Engineer, Madanapalle, requested this Department to have some of the waters in Chandragiri stocked with larvicidal fish. The matter is engaging attention.

217. An enquiry was made by the Superintendent, Berhampur Jail, for a supply of larvicidal fish to wells in the jail compound as a precaution against malaria. On an examination of some tanks in Berhampur for local supplies of larvicidal fish *Macropodus capanus*, an efficient larvicide, was found to occur in the locality. Arrangements are in progress for stocking the jail wells with the fish.

218. In G.O. No. 2170, Development, dated 8th December 1930, Government wanted an approximate estimate of the cost of anti-malarial work done by this Department to be given in annual reports. Excepting in the Nallamalais where the work was carried out at Government cost, the parties concerned paid for all the other items of anti-malarial work done by the Department. The approximate cost of all the operations was Rs. 160.

219. *Gambusia*.—*Gambusia affinis*, the famous exotic larvicide, which had been nearly exterminated by a predaceous fish (*Megalops*) which invaded the pond unnoticed last year has now multiplied rapidly and several thousand young fish are now thriving in the pond at the Krusadai station. Extension of the pond has been undertaken at a cost of Rs. 50.

VII. SOCIO-ECONOMIC WORK.

A.—Education.

220. (i) FISHERIES TRAINING INSTITUTE, CALICUT.—The Institute re-opened after the midsummer vacation on 4th August 1930 and closed for the year on 19th June 1931.

221. Proposals for the reorganization of the Institute based on the recommendations of the Fisheries Committee were submitted to Government as a Part II Scheme for 1930-31. The Government have called for a fuller report. The question of effecting a reorganization without extra cost, which it is necessary to avoid in view of the present financial stringency, is engaging attention and a scheme will be submitted to Government shortly.

222. *Pupil teachers*.—The total number of pupil teachers under instruction in the year was 39 (inclusive of eight students deputed for special training by the Cochin State). One of the 39 students was a Muhammadan; all the others were Hindu fishermen. The Cochin students completed their special training at the end of the year. The Government were pleased to sanction the revival of the secondary classes abolished in the previous year so as to give the benefit of secondary training to the students already admitted—G.O. Ms. No. 2050, Development, dated 8th November 1930.

223. The Selection Committee did not hold any meeting at Mangalore as there were only two applicants, for the seats reserved for fisheries stipendiary students at the Government Higher Elementary Training School, Mangalore. These two were examined by the District Educational Officer, South Kanara, to test their educational attainments, and both were admitted. The Committee met at Calicut on 4th August 1930 and selected twelve candidates all belonging to the fishing community.

224. *Work at the Institute*.—The revival of the secondary classes was a great boon to the secondary grade students admitted in 1928 and 1929. The changes in the staff during the year affected adversely the efficiency of the work of the Institute. The training school was inspected by the District Educational Officer, North Malabar, on the 8th and 9th January 1931. He has remarked that "though there has been some dislocation in the regular work of the school, due to the changes in the staff, still the work done was on the whole fair." The Inspector of Industrial Schools inspected the carpentry work and examined the students in that subject

on 16th June 1931. Though the present carpentry instructor has not passed the examination necessary for a drawing teacher, his work in the carpentry class was found by the Inspector to be quite good. He is shortly appearing for the drawing examination with a view to qualify himself. The Government have been pleased to raise the pay of the post to Rs. 35—60. Though lower than the scale allowed elsewhere, this is a great improvement on the present scale of pay, viz., Rs. 25—1—60. The practical work in fishing was carried on as usual. The fish caught by the students realized Rs. 180-5-0 against Rs. 220-5-0 in the previous year. The navigation classes were resumed this year and special teaching was done in January and February and again in May—June by Tindal Gomez of the 'Lady Nicholson.' The 'Sutherland' which has been placed at the disposal of the Fisheries Training Institute was brought to Calicut in January 1931 and the pupil teachers were for the first time this year given practical training in the working of a large sized fishing vessel with sails. The final year students were examined in navigation by the Assistant Director of Fisheries (Marine), and their progress was found to be very fair. A Malayalam text-book based on the chank fisheries Inspector Somayaji's Tamil book on Navigation published in 1927 has been compiled for the use of the students by Mr. E. Raman Menon, the permanent headmaster. The Pupil Teachers' Literary Society and the Fisheries Training Institute Co-operative Society continued to function. The scout troop however did not show any activity. The students were taken on excursion to Tanur and Malpe to see the fishery work in these stations. The Cochin students visited the East Coast to study the inland piscicultural work of the Department. Eight students of the third year class appeared for the final examination, one passed in the first class and five in the second class; two failed. Six students who had failed in previous years completed their certificate by passing the examination.

225. *Equipment.*—Books valued about Rs. 30 were added to the library. With the revision of the curriculum of studies and the closure of the Cannery at Chaliyam, the lack of equipment for practical training in Fisheries technology was keenly felt. An important addition to the equipment of the Institute during the year is the provision of a canning shed and suitable plant. A good collection of appliances and fittings valued at Rs. 5,000 for practical instruction in canning was transferred from the Government Cannery, Chaliyam, to the Fisheries Training Institute under the sanction of Government conveyed

in G.O. No. 1004, Development, dated 14th May 1930. A two-roomed canning shed has been erected in the school compound for housing the plant. Regular instruction in canning technique will now be possible at the Institute.

226. (ii) *VILLAGE SCHOOLS.*—There were 41 fisheries elementary schools under the Department on the West Coast at the close of the year under report against 43 at the beginning of the year. The two schools that were closed were the ones at Udayavar and Hoode in the South Kanara district. The attendance in these schools was so poor that it was not considered worth while to continue them. Of the 41 schools 37 were day schools and 4 night schools. This number includes the model school attached to the Fisheries Training Institute at Vellayil.

227. The steady progress in the popularity of fisheries schools that has continued will be evident from the following statistics :—

Year.	Strength.	Boys.	Girls.
1924-25	2,450	1,759	691
1925-26	2,294	1,681	613
1926-27	2,440	1,737	703
1927-28	3,000	2,132	868
1928-29	3,442	2,368	1,075
1929-30	3,637	2,573	1,064
1930-31	4,136	2,794	1,342

228. The number of girls and boys has been more than doubled in the septennium ending 1930-31. In Muhammadan villages progress is, however, slow. Although compulsory elementary education has been introduced in the Parappanangadi, Kadalundi and Chaliyam villages, many boys of school-going age and most of the girls do not attend the local schools. A more rigorous enforcement of the provisions of the Compulsory Elementary Education Act in these areas is desirable.

229. The night schools run by the Department have not been as successful as may be desired. Those in the Muhammadan villages of Parappanangadi and Chaliyam are retrogressing in spite of strenuous efforts by the school teachers. The Pudiappa night school is of later establishment and is working more satisfactorily than other night schools. Owing to a misunderstanding between the villagers and the local teachers, which led to a criminal prosecution of some of the villagers for defamation by one of the teachers the night school was boycotted by the villagers and had to be suspended for six weeks. The dispute and ill-feeling has since been terminated and there is now fairly good attendance in the school.

230. The Kavvayi school was reduced to a single teacher school under the orders of Government (G.O. No. 533, Development, dated 9th April 1931), and the fourth class in the school had to be abolished. This has seriously affected the progress of education in the village. Children who complete the third standard course are not generally able to read and write or cipher properly and there is no school anywhere near the village where they could get any further education. Every child of school-going age in the village was attending the school, but now a large number of young children are idling after passing out of the school. The single teacher left has to teach three classes and cannot be expected to work efficiently in the circumstances.

231. The strength of the Kadavanad school in the Ponnani taluk, which caters to the needs of the backward community of Vettuvass, decreased to such an extent that the number of teachers employed in the school had to be reduced from 5 to 3. The unfavourable fishing season and the consequent poverty was the chief cause of the deterioration. The children could not even afford to purchase clothes to attend the school and those who could possibly take to any profession left the school much earlier than they would have done if their economic condition had not been bad.

232. In the South Kanara district, the progress of education is much less satisfactory than in Malabar. The fishermen in that district are very backward in point of education and they still consider that the education of girls is a luxury. The only school that has shown rapid and remarkable progress is the Kumbala school which caters to the needs of the Mappilla fishermen of Arikkadi village. The rate of progress made will be evident from the statistics furnished below :—

Year.	Strength.	Boys.	Girls.
1927-28	61	46	15
1928-29	66	48	18
1929-30	84	59	54
1930-31	154	97	57

The success of the Kumbala school is mainly due to the efforts of the headmaster who however has not attended the Fisheries Training Institute. Since the close of the year he has joined the Fisheries Training Institute for technical training.

233. *School buildings.*—Suitable buildings with masonry foundation and pillars, bamboo lattice work and thatched roof were constructed in March 1931 for the Kaup and Bendur schools at a cost of Rs. 450 each. The Sri Gnanodaya and

Malpe schools are housed in the temperance halls of fishermen. Sufficient accommodation for a play-ground is not available in the Sri Gnanodaya school compound. The Education Department has pointed out this defect but the defect has not yet been remedied as a suitable site is not available in the neighbourhood. The Kodi, Uppoor, Polippu, Kizhur, and Kirimanjeshwar schools are located in well-built rented buildings situated in suitable localities. The newly opened Navunda school is housed in a rented shed which, though only a thatched one, is suitable and conveniently situated. The rented building of the Bangremanjeshwar school is a permanent one but not convenient for conducting a school, being the upstairs of a shop. The Sandspit fisheries school at Mangalore is housed in a suitable Government building in Sandspit. The Kumbala fisheries school is still conducted in a temporary thatched shed. The construction of a permanent building has been sanctioned by Government. It is hoped to build it before the end of the current year. Kuriyadi and Chaliyam schools are housed in permanent Government buildings built by the Kavvayi Co-operative Society. Madapalli and Kadalundi schools are also permanent buildings and the Kavvayi school in a permanent building built for the accommodation of the schools by the local inhabitants. Kannankadavu school is housed in a semi-permanent building belonging to Government and Azhicode and Korapuzha schools are accommodated in similar buildings belonging to private people.

234. Owing to an unexpected increase in the strength of the schools many of the school buildings do not now possess accommodation commensurate with the strength. Quilandy and Pudiappa school sheds were enlarged this year but in the latter accommodation is still found insufficient. The Madapalli school has enough floor space for the strength of the school but as there are no partitions between classes, more space is found necessary to keep the classes sufficiently apart to prevent confusion and clash. The owner of the Kadalundi school had been promised an increase of rent. There is lack of accommodation also in Azhicode, Quilandy and Korapuzha schools. Want of accommodation is also felt at Blangad, Kottakadapuram, Talikulam, Nattika and Kaipamangalam. In Blangad the owner has agreed to extend the building on payment of increased rent. Kundazhiyur is housed in an ill-ventilated rickety shed; Government have sanctioned the construction of a permanent building for housing this school. The construction of the new building will commence as soon as the land required for the purpose is acquired

by the Revenue Department. At Kottakadapuram the owner pleads inability to extend the building and has promised to surrender the building to Government along with the site on which it stands. The matter is under correspondence. At Tallikulam there are two factions. The school building is jointly owned by the factions and they are finding it difficult to keep the school building in proper repairs for want of money. A temporary settlement has, however, been arrived at, but the only satisfactory remedy seems to be to acquire the building and the site. At Nattika the owner has promised to extend the building. The construction of an extension to the Kaipamangalam school had to be postponed owing to financial stringency.

235. At the request of the Education Department a census record of the children of school-going age in fishing villages is being maintained in all the schools.

236. (iii) OTHER EDUCATIONAL WORK—*Marine Aquarium*.—The Madras Marine Aquarium which continues to be one of the most popular resorts of the City suffered from floods caused by the cyclone and heavy rains in November 1930. About 3 feet of water collected inside the Aquarium through percolation and could not be drained for four days on two occasions. For the first time after the Aquarium was transferred to the Fisheries Department it had to be closed to the public on these four days. Further, owing to the political unrest throughout India and the world-wide financial depression mufassal visitors to the City have been few. Foreign tourists were conspicuous by their absence. The above causes account for the fall in the number of visitors and in the gate collection.

237. The number of visitors was 88,810 against 99,970 in the previous year. The record attendance as usual was on the Kannupongal day when however the visitors numbered 3,619, i.e., 124 more than the previous year.

238. The daily average attendance for the year was 245 against 274 in 1929-30. Fifteen batches of school children of different schools and colleges visited the Aquarium with their class teachers for demonstration purposes and were admitted at half-rates. Two hundred and fifty-nine Corporation school children were admitted free. The Aquarium was reserved on six occasions for zenana parties of Zamindars and Royal families. Prominent among the several distinguished visitors were Her Highness the Junior Maharani of Travancore; Sir M. Visweswarayya; Maharani of Gadwal; Lord Hardinge;

Professor Henry Moore of Philadelphia; Maharaj Kumar of Idar; His Highness the Maharaja of Mysore; the Hon'ble Mr. M. W. Sampson, Minister for Public Works of the South African Government; General Sir John Monash and a number of parties from the Government House.

239. The gate collections for the year amounted to Rupees 6,984-14-0 against Rs. 7,726-3-0 in the previous year. Rupees 154-1-0 was realized by the sale-proceeds of 495 English guides, 152 Tamil guides, 237 packets of picture post-cards and a few loose cards. The rental from the Aquarium Restaurant was Rs. 600. Thus the aggregate revenue for the year was Rs. 7,738-15-6. The expenditure for the year was Rs. 6,789-14-9.

240. (iv) MISCELLANEOUS.—His Highness the Maharaja of Travancore and his tutor P. C. Dutt, Esq., I.C.S., on a tour in the Northern Circars for administrative training visited the Vizagapatam Fisheries Office on 13th March 1931.

B—Co-operative Societies.

241. (i) WEST COAST.—The number of fishermen co-operative societies at the beginning of the year was 60, of which 21 were in the South Kanara district. Six societies were closed in South Kanara and one was opened in Malabar. As almost all the societies were in a dormant condition on account of inadequate inspection, arrangements were made to obtain from the Co-operative department the services of a special Inspector as recommended by the Committee on Fisheries, to pay constant visits, rectify defects and put the societies in working order wherever possible. Before he set to work, however, the registration of the Uppoor Mogeyars' and Gangoli Kharvis' Societies had been cancelled. The Kadikke, Sri Gnanodaya, Kasaragod Mogers' and Coondapoor Kharvis' Societies could not be revived in spite of strenuous efforts and had also to be liquidated during the year. The Chantrappini Society in the Ponnani taluk, which had been registered a long time previously, started work during the year under report.

242. Fishing during the year has been far below normal. The economic condition of the fisherfolk has been steadily going from bad to worse during the last six years. Conditions are therefore hardly ideal for any attempt at reformation of these societies. Overdues are the bane of all societies and the recovery of loan is the first step in any effort at rectification. But recovery of loans without resort to coercive measures has been found impossible in the majority of fishermen societies

owing to the poverty of fishermen brought about by the scarcity of fish continuously for half a dozen years. The undesirability of legal compulsion in the case of the poor members of the societies led the panchayatdars to choose the lesser evil of giving frequent extensions of time or getting the bonds renewed. Even the office-bearers of most of the societies are found to be defaulting debtors to the societies. Voluntary repayments are very scarce as the little income that the fishermen get is used for daily necessities of life or to repay other and more merciless creditors. Unless the fishing season returns to normal and a few normal years succeed one another the fishermen societies cannot be expected to work satisfactorily. In spite of the adverse conditions, the societies are kept functioning owing to the persistent efforts of the departmental Officers and but for such efforts more than 50 per cent of the societies would have been defunct by now. As it is, it is hoped that 90 per cent of these will clear off their encumbrances and flourish with the return of normal conditions of fishing.

243. The Inspector of Fishermen Co-operative Societies paid ten visits to the Cheerambakkavu Co-operative Society during the year and made a strenuous attempt to revive the society. But due to the indifference of the President towards the improvement of the Society the Inspector's efforts did not meet with success. It was also not found possible to obtain another President for the Society. The Udayavar, Moolki and Coondapoor Societies which were reported to be in a very bad condition in last year's report have been revived and put in working order. The transactions of the following societies are satisfactory in South Kanara :—

Idya Mogers',
Hejmady Mogers',
Kalpanjal, and
Utchil Bovis.

In the Aila Bovis' Co-operative Society, all time-barred loans have been collected except Re. 1 which will be collected during 1931-32. The overdue loans however had to be given an extension of time owing to the bad fishing season of the year. Efforts will be made to collect the overdues during 1931-32. The Kasaragod, Kizhur, Kittikulam, Bekal, Kanhangad Fishermen Societies are financed by the South Kanara Central Bank. No fresh loans were given during the year. These societies attended only to collection and the amounts collected have been remitted to the Bank. On account of the bad fishing season the fishermen were not able to meet the

demand of the Bank. Every effort will be made to collect the further dues this year.

244. The Modeenpalli Co-operative Society, consisting of members from the Mappilla fisher community, is the only society financed by the Madras Christian Central Bank. A loan of Rs. 1,381 was overdue to the Bank from the society on 30th June 1931. The members who are the debtors in the society are those who suffered heavy loss in their fish business in previous years and the year's fishing season being worse than the previous year were really unable to pay up their dues to the society. In spite of these adverse circumstances, owing to constant persuasions Rs. 136 was collected from them during the year. As the Bank could not any longer extend the period of the loan, suits have been filed against the society for the recovery of the loans.

245. In Malabar, the Kuriyadi, Muzhappilangad and Thalayi societies are working satisfactorily notwithstanding the prevailing depression and the condition of the following societies may be considered fairly satisfactory, viz., Chaliyam, Beypore, Korapoya, Kannankadavu, Velloor, Kollam, Meladi General, Thiruvani and Arayajana of Tellicherry, Madapalli Curers' and General, Cannanore Women Curers', Azhicode and Kavvayi societies. The following societies are in a much less satisfactory condition, but return of normal fishing conditions will restore them, viz., Kadalundi, Elathur, Puthiappa and Quilandy societies.

246. The Vellayil Kadappuram, Puthiyangadi, Meladi Curers' and Thayyil Arayajana Societies are in a moribund condition. Prolonged and concentrated efforts may possibly revive the first two of them. Meladi Curers' Society has lost most of its share capital by defalcation and unless this amount is recovered the society may have to be liquidated. Efforts are being made by the present Secretary and the Inspector of Fishermen Co-operative Societies to recover the sum from the father of the deceased Secretary who was responsible for the defalcation. Thayyil Arayajana Society declines to submit its books for inspection by Fisheries officers and it is reported that there has been no transactions in the society for the past three years. The society has been recommended to be liquidated.

247. In the Puthenkadapuram Society (Ponnani taluk), which has recently been revived completely, some share capital has been adjusted towards loans due from members and these members have been allowed to withdraw from membership. The same procedure has been adopted in the case of

certain members of the Kundazhiyur and Kaipamangalam Societies who could not in any circumstance repay their loans. They voluntarily withdrew from membership after getting their paid-up share capital adjusted towards their long overdue loans when they realized that they could not repay the loans otherwise. In the Areekara Bhagavathi Society renewal of time-barred loans has been effected. These societies are now in working order.

248. One drawback that was experienced in reviving the dormant societies was the disinclination of the Deputy Registrars to permit amendments of by-laws proposed by the general bodies of societies and recommended by the Fisheries Department. There are societies not affiliated to any Union and yet supervision fees are charged and paid to the District Federations. This is a burden which such societies are bearing unnecessarily at a time of great financial distress.

249. *Industrial societies.*—Operations in the two boat and net societies at Blangad and Palapatti were very unsatisfactory during the year. The Blangad Society was able to repay Rs. 200 towards the Government loan whereas the Palapatti Society could not pay anything this year. While the Blangad Society had to pay only Rs. 50 more to Government at the end of 1930-31, the Palapatti Society had yet to pay back Rs. 550 to Government and Rs. 300 to the District Bank. The Government were pleased to grant to the latter society extension for the repayment of the balance of the Government loan up to March 1932. Out of Rs. 300 outstanding to the Bank, Rs. 200 was overdue by the end of the year. A statement giving comparative figures for 1929-30 and 1930-31 regarding the fishing operations of these two societies is given below :—

Particulars	Blangad.		Palapatti.	
	1929-30.	1930-31.	1929-30.	1930-31.
	MDS. SRS.	MDS. SRS.	MDS. SRS.	MDS. SRS.
1. Quantity of fish captured ..	525 20	542 30	339 21	877 0
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
2. Sale-proceeds of fish ..	1,396 0 0	1,002 2 0	801 6 0	830 3 0
3. Living wages paid to crew ..	827 0 0	543 6 0	476 6 0	631 7 0
4. Societies' share of the sale-proceeds ..	284 8 0	229 6 0	162 8 0	99 6 0
5. Distribution of the balance to members ..	280 8 0	205 10 0	115 12 6	96 11 0
6. Wages paid to non-members ..	4 0 0	10 12 0	46 11 6	2 11 0
7. Wages paid to other workers, if any ..	Nil.	Nil.	Nil.	Nil.
8. President's and Secretary's share ..	Nil.	13 0 0	Nil.	Nil.

250. (ii) *EAST COAST—Inland Fishermen Co-operative Societies.*—As regards the progress of the fishermen societies the remarks in my last year's report still hold good. For want of proper supervision and check, sympathy from other departments notably the local officers of the Public Works Department, and through internal dissensions and factions among the members, the societies in general are not able to save anything. The Co-operative Department officers cannot be expected to devote special attention to these societies. Until a special officer is detailed to look after these societies as on the West Coast they cannot be expected to improve. With the exception of the Parvatharajakula Fishermen Society of Karunthattangudi, Tanjore district, all are functioning. This society, which was started three years ago under very good auspices with the help of Mr. Gray, when he was Collector of Tanjore, came to grief through several causes, some of which were beyond the members' control, and it was ordered to be liquidated by the Deputy Registrar, Tanjore. The present Registrar and the Joint Registrar have, however, taken a sympathetic attitude and are trying to revive the society. The only new society started during the year is the Sriperumbudur Fishermen Co-operative Society. The fishery sales of the Sriperumbudur tank was given to the society for two years ending 31st December 1932 on an annual rental of Rs. 125 (G.O. Mis. No. 518, Development, dated 7th April 1931).

251. The societies to which fisheries were leased out during the year were—

Name of society.	Year of formation.	Fishery leased out.	Period.	Annual rental.
(1)	(2)	(3)	(4)	(5)
1. Hampapuram Fishermen Co-operative Society, Coimbatore district.	1921	Three items relating to the Cauvery river in Kollegal taluk.	One year ..	RS. 70
2. Sunkesula Fishermen Society, Kurnool district.	1924	Sunkesula anicut and Edurur swamp fisheries.	One year ending 31st March 1932.	750
3. Nandyal Fishermen Society, Kurnool district.	1926	Nandyal tank fishery..	Three years from 1st July 1930.	520
4. Chidambaram Society, South Arcot district.	1926	Nine items relating to the Lower Anicut system, South Arcot district	Three years from 1st January 1931.	386
5. & 6. Udayargudi and Lalpet Societies, South Arcot district.	1926	Two items relating to the Lower Anicut system, South Arcot district.	Two years from 1st July 1929.	1,800

Name of society.	Year of formation.	Fishery leased out.	Period.	Annual rental.
(1)	(2)	(3)	(4)	(5)
7. Lower Anicut Society, Tanjore district.	1927	Coleroon river in Kum-bakonam taluk.	Three years from 1st July 1930.	Rs. 4,100
8. Tirumalavasal Society, Tanjore district.	1928	Four items in Shiyali taluk.	Three years from 1st July 1929.	1,387
9. Papakoil Society, Tanjore district.	1926	Perar Fishery, Nega-patam taluk.	Three years from 1st July 1930.	1,650
10. Vallampadugai Fishermen Society, South Arcot district.	1929	Coleroon Fishery, South Arcot district.	Three years from 1st July 1930.	4,000
11. Murungapettai Hindu Fishermen Society, Trichinopoly district.	1930	Cauvery river in Trichinopoly taluk and one item in Kulittalai taluk.	One year from 1931.	6,300
12. Sriperumbudur Fishermen Society.	1931	Sriperumbudur tank fishery.	Two years from 1st January 1931.	125
13. Kandukur Fishermen Society.	1930	Mopad and Machavaram tanks.	One year from 1st January 1931.	700

252. The curers of the Lawson's Bay fish-curing yard were keen on forming a co-operative society with a view to obtain a loan for boats and gear. Their desire to get an advance from Government for the purchase of boats and fishing gear originated with the visit of the Fisheries Committee to Vizagapatam. The by-laws of the two industrial societies run by the Fisheries Department on the West Coast were furnished to them for their information.

C.—Other Socio-economic Work.

253. (i) WEST COAST.—The economic condition of the fishing population is entirely dependent on the yield of the sea and when fishing fails for a series of years, nothing that Fisheries officers can do will afford much relief to the poverty and distress among fisherfolk. The year under review has been no better for the fishermen than the previous ones and the catches have been just enough to stave off actual famine and acute distress. The financial position of the fishermen households is therefore worse than it has ever been during the last two decades. The oil and guano industry brought much wealth to many fishermen families, but the continued absence of the oil sardine has demoralized the industry and ruined many people who owed their all to this industry. In Cannanore and Tellicherry many Araya families, once rich and influential, are now immersed in debts or actually bankrupt.

To add to these misfortunes, the demand for and price of salted fish, has declined both in the interior markets and in Ceylon owing to the prevailing economic depression.

254. Fisheries officers have done all that was possible to help the community. The yard officer, Cannanore, had induced the local curers to prepare semi-dried prawns, for which there is an inexhaustible market. Much persuasion and pressure was required before the curers would take to this new and very profitable way of curing fish. In the Thalayi yard some of the more enterprising of the curers made substantial profits by curing seer fish in slices according to the method taught to them by the yard officer. Thalayi fishermen constituting about thirty families earned Rs. 315 by making a net for the Assistant Director, Rural Pisciculture. An order from the Assistant Director of Fisheries (Marine), for Ratnagiri nets costing Rs. 800 provided work for the Dalji fishermen families during the rainy months of 1930, which is their slack season.

255. There has been a great decrease in the drink habit among fishermen. In Thalayi, Madapalli and Quilandy, toddy shops were situated in the vicinity of the fishermen houses and even women were contracting the taste for toddy. At the instance of the Fisheries Department, the shops were removed to other places and this had the desired effect. Latterly owing to the fear of being identified with the anti-drink activities of the Indian National Congress, which was accentuated by the receipt of a complaint from the Assistant Commissioner of Excise, Fisheries officers have been hesitating to do propaganda work in the cause of temperance.

256. Several fishermen families received free medical help at the instance of the yard officer, Thalayi, who induced his medical friends to pay visits to sick people at a time when typhoid prevailed in the village.

257. Night schools were opened at Kollam and Ezukkudikal near Quilandy at the instance of, and with some financial help from, the Sub-Inspector, Quilandy yard. The Nicholson Reading Room at Quilandy and the Swabhimani Reading Room at Calicut continued to afford intellectual recreation to the fisherfolk of these localities. The small reading room at Azhicode received active assistance from the Headmaster of the local Fisheries School. Well-known social workers were induced to give lectures and advice to the villagers on social and moral advancement. Recreation clubs and sports teams

organized by Fisheries officers last year are still flourishing. The Child Welfare Centres at Vellayil and South Beach in Calicut continue to serve the fisher-families living around them. Officers of the Fisheries Department continued to render official and private help to the fisher people within the sphere of their influence, towards their social, material and moral advancement, and their relations with the fishing community have remained, in consequence, entirely cordial.

258. (ii) EAST COAST.—In 1924 the Forest Department at the instance of the Labour Department leased out to the fishermen of Pandipallam for a period of five years at a nominal rent of Rs. 400 per annum, 1,390 acres of forest adjoining the village for utilizing the fuel for smoking fish and the mangrove bark for tanning their nets. The first lease expired in 1929, and as the fishermen had exhausted all the fuel in the area leased, they applied for permission to make use of two more coupes of forest adjoining the village. The Forest Department declined to grant their request but permitted them to purchase casuarina prunings at a fixed rate of Rs. 3 per acre. The fishermen of Pandipallam complained that casuarina prunings were unsuitable for smoking fish and memorialized Government through the President of the Agnikula Kshatriya Mahasangam for the lease of a further portion of reserve forest for their use. The Government having invited the opinion of the department, the allegations of the fishermen that casuarina is unsuitable for smoking fish was experimentally examined and found correct, and the lease of coupe 'B' of 'Mayaputippa reserve' to which the fishermen also agreed was recommended to Government. The Chief Conservator of Forests was opposed to handing over further area of reserve forest to the fishermen but agreed to grant every year one coupe for felling trees for a rental of Rs. 23 per acre provided the Labour Department was made responsible for the collection of the lease amount. The Conservator also agreed to lease the required area for collecting bark for tanning at a rent of Rs. 500 per annum for a period of three years (G.O. Ms. No. 1120, Development, dated 29th July 1931).

259. The Pallikaras of Gudivada petitioned to me for the grant of house-sites in Slaterpettah at cheap prices repayable in instalments. As Collectors have been authorized by Government to grant house-sites, etc., to the East Coast fishermen [G.O. No. 1135 L. (Public Works and Labour Department), dated 5th April 1930], the petition was forwarded to the Collector of Kistna for disposal.

VIII. PROPAGANDA.

A—Rural Pisciculture.

260. The second noteworthy development of the year in Departmental activities is the initiation of a scheme for propaganda in favour of rural pisciculture, which constitutes an entirely new departure. In the development of inland fisheries as source of food supply the aim of the Fisheries Department was long ago recognized as the conservation of existing resources and their improvement by scientific pisciculture. In the quarter of a century during which the Department has worked, much has been done in this direction. Five Government fish-farms for the culture and distribution of important indigenous and non-indigenous food fish have been established, large irrigation tanks in twelve districts, the Cuddapah-Kurnool Canal and the Cauvery river and its connected channels and tanks are now scientifically controlled and annually stocked with new varieties of food fish. While the fisheries of these major waters of the Presidency had received consideration, the minor irrigation sources and the vast multitude of village ponds and wells received no attention. This apparent neglect was not due to any lack of appreciation of the magnitude and value of the latter source of fish supply. The staff and equipment of the Department was altogether inadequate for the task and moreover the ponds and wells were too small and too scattered to repay direct Government effort. The village ponds and wells, though individually small and scattered, in the aggregate form a vast potential area for the culture of food fish. If the fisheries of the 106,050 village ponds and 650,000 wells in the Presidency were to be adequately developed as sources of additional income and food supply, it was clear that the villagers themselves should be educated in piscicultural methods by demonstration and propaganda and persuaded to apply the methods to their ponds and wells. The Royal Commission on Agriculture in India also strongly advocated the addition of fish to the diet of the cultivator and recommended that all measures practicable to this end should be taken. A definite scheme with the minimum of staff for propaganda in rural areas was formulated and received the sanction of Government towards the close of 1929-30. The Assistant Director and staff sanctioned, though new to the work, carried on propaganda work throughout the year with a gratifying measure of success.

261. *Work done.*—As outlined in the scheme submitted to Government—vide my letter No. 2385-I/29, dated 19th May 1930, the Assistant Director after studying the village and

taluk maps of the Chingleput district undertook a preliminary survey of villages in the Chingleput, Conjeeveram and Saidapet taluks. The villages visited and tanks and wells inspected, selected and stocked up to 31st May 1931 are shown in the accompanying map—vide Appendix VII. It will be seen that in the three taluks a total of 98 villages were visited. Two thousand one hundred and seventy-two wells and 264 ponds in these villages were examined and out of this number 175 wells and 35 ponds were selected as suitable for piscicultural operations and 45 wells and one pond were stocked.

262. *Survey.*—The Assistant Director, Rural Pisciculture and the Inspector of Fisheries undertook the survey of the wells and ponds with the assistance of the local Revenue officers. By previous appointment village officers of each village met the Assistant Director in their respective villages and assisted him in his enquiries. The Assistant Director explained the objects of the scheme to the villagers and obtained from the village records the survey and patta numbers of the wells and ponds, the extent of the latter with the names of their owners. The ponds and wells were then examined in detail with special reference to the nature and duration of water-supply and the presence or absence of natural food for fish.

263. The results of the survey as it progressed were recorded in a special register designed for the purpose—vide Appendix VIII. Information under columns 4 to 7, 9, 10 and 14 in this register was obtained from the village officers while that under columns 8, 11, 12 and 13 was gathered by actual inspection on the spot supplemented when necessary by answers elicited from the owners. After ascertaining the ownership of the wells and ponds and their suitability for pisciculture the owners were interviewed. From those who were willing to adopt cultural methods an agreement was obtained.

264. Of the wells and ponds inspected only those wells of 20 feet diameter and above and ponds holding perennial water or at least an eight months' supply were chosen as suitable for culture with due regard to the depth, nature of water-supply and the amount of fish food, etc. Out of 2,172 wells only 175 were found to answer these requirements and were selected as suitable for piscicultural operations. Of the 264 ponds 35 were found fit for fish culture. All wells and ponds found suitable could not however be stocked. It is here that the most difficult phase of the work was encountered. As the intention of Government is to induce well and pond owners to cultivate fish in their waters the owners had first of all to be

convinced of the utility of these operations. Even when convinced of the value of cultural operations, the villagers often urged other objections for not adopting pisciculture. The most important of these objections were briefly as follows:—

(1) In the majority of cases they expressed difficulty in safeguarding the fish in their wells—not only were they afraid of fish being stolen by clandestine fishing, they alleged that designing people are in the habit of poisoning the fish and looting them when stupefied.

(2) Vegetarian owners (fortunately only a few) had sentimental objections to killing fish but agreed in some cases to adopt the scheme with a view to benefit their servants or to clarify and improve the quality of the water.

(3) Most of the ryots objected to paying charges for the initial stocking but agreed to defray all expenses for the subsequent stocking experiments if successful and remunerative.

(4) Not a few hesitated for fear of future taxation. It required much discussion and persuasion to dispel their suspicions.

(5) Some of the well-to-do ryots own several wells. As the scheme is new, they were agreeable to have only one of their wells stocked by way of experiment.

265. So the stocking had necessarily to proceed considerably slower than the survey of the wells and ponds. Consequently only 45 wells and one pond could be stocked.

266. The very first gentleman to accept the department's advice and help and make a beginning in pond culture was the Reverend Peter, a Catholic Priest of Chingleput, who owns a few large wells. The largest of his wells was stocked with catla in September last. The enthusiasm and initiative of Father Peter was responsible in convincing the municipality of Chingleput of the wisdom of starting pisciculture in the municipal pond, Dimmarajakulam, mentioned in the paragraph below.

267. The great disparity in the proportion of wells and ponds stocked, out of the number selected, was due to the fact that there are very few ponds owned by single individuals. In fact in the three taluks surveyed only ten private ponds have been found while the total number inspected was 259. The ownership of the vast majority of small village ponds rests in the Revenue Department or local bodies (district and taluk boards, municipalities and village panchayats). Unlike wells which belong to individual ryots the task of initiating

pisciculture in public ponds is beset with many difficulties. Some of the taluk boards, municipalities, and panchayats in the area surveyed were addressed on the subject. While they agreed to give a trial to the scheme in one of their ponds they expressed financial and other difficulties in experimenting in all ponds in their area at once. For instance the only pond so far stocked is Dimmarajakulam of the Chingleput municipality. At my instance the municipality resolved to experiment with the scheme in the above pond and sanctioned on 13th August 1930 an expenditure of Rs. 77 for cleaning, stocking and guarding the pond. On 26th September 1930 the pond was cleaned and inlets were trapped with wire net and the pond was stocked with 600 catla measuring $1\frac{1}{2}$ to 9 inches. The pond is watched by a municipal watchman. When last inspected on 12th May 1931 the fish measured 9 inches to 16 inches.

268. The pond is expected to be fished this year and the result of this operation is keenly awaited both by the municipality as well as the public of Chingleput. The Taluk Board of Saidapet have agreed to start pisciculture at Veerathamankulam—a perennial pond of about three acres—in Pallikaranai firka and have sanctioned an expenditure of Rs. 250 towards it. The President of Chembakkam Panchayat has consented likewise to cultivate fish in the forest panchayat pond adopting the department's advice. The Reverend Mr. Sutherland of the Leper Settlement, Chingleput, has arranged to demonstrate piscicultural methods and results to students of the Mission Agricultural School and Settlement, Melrosapuram, near Singaperumalkoyil. A cistern measuring about 40 feet square and 4 to 5 feet deep was stocked on 8th January 1931 with 30 gourami ranging in size from one to four inches. A second was stocked on 19th February 1931 with about 75 *Etrophus* ranging in size from $1\frac{1}{2}$ to 5 inches. Under the personal care of the Superintendent of the Settlement the fish are reported to be growing well. Similarly in the Madambakkam village near Pallavaram, the President of the panchayat and the trustees of the Tenupureeswarar temple have offered to start fish culture in two ponds, one under the control of the village panchayat and the other under that of the temple. At Irumbuliyur, the village panchayat are desirous to develop the fisheries of a way-side drinking-water pond in their village but have expressed their inability to meet the entire cost of stocking. As an inducement they were offered free the fish for stocking for the first operation provided they will clean the pond and arrange for guarding the same. At

other places (Aminjikarai, Vadagaram, Settiagaram and Ayappakam) the owners, though some of them are Brahmans, have already agreed and are anxious to try the experiment as soon as catla fry are available for stocking.

269. No fishery revenue accrues to public bodies from the majority of small village ponds. The villagers are not interested in improving the fisheries of these ponds as the ownership does not vest in them and they are not sure of deriving any benefits from their endeavours. In consequence the villagers have remained apathetic and the fisheries of the village ponds have been grossly neglected. Once the public realize the quick returns and the handsome profits accruing from pisciculture as a by-industry, through propaganda and demonstration, it should be possible to induce them to start the cultivation of fish in public ponds with the consent of the local bodies concerned.

270. *Fry for stocking.*—The scarcity of fry of suitable fish hampered the progress of stocking of village ponds and wells to an appreciable extent during the year. In the programme of work for the Assistant Director outlined by me, the third item of work prescribed was the inspection of neighbouring rivers or large tanks with a view to discover and utilize the available supply of fry of food fish in the vicinity of the village for stocking its ponds. The inexperience of the Assistant Director and staff was nowhere more evident than in the execution of this part of their work. The actual survey of tanks began about the middle of July 1930 when at the close of the south-west monsoon and floods in the major rivers, large numbers of fry are generally available and are used by the Assistant Director of Fisheries (Inland) for stocking irrigation tanks controlled by the Department. The quickest growing fish which yields handsome and striking results in ponds and wells is the catla, the fry of which are available generally in the Godavari and Kistna rivers from the middle of August to the middle of October. It was possible for the Assistant Director, Rural Pisciculture, to stock the Dimmarajakulam pond and a few wells first examined with catla which were then available. With a view to reserve a stock of this fish for the continuance of the stocking operations in villages, the Assistant Director, Rural Pisciculture, in collaboration with the Assistant Director of Fisheries (Inland) stored in a small pond in the Chingleput Fort moat 3,000 catla fry in September. In the unexpected cyclone on 29th November 1930 the pond burst its bunds and overflowed causing the

escape of the fry into the Kolavai lake and Palar river and the stock was thus irrecoverably lost. Thereafter the Assistant Director, Rural Pisciculture, in consultation with the Assistant Director (Inland) searched for possible sources for the supply of fry, but failed to locate any; as a constant supply of fry is essential for the progress of the stocking scheme I had to undertake this part of the work for him in December; though it was so late in the year, a stock of about 500 catla fry, was traced to a pond close to Bezvada, but due to the late receipt of conditioning boxes and carriers, died before transit to Madras. Other catla discovered in ponds close to Nidadavole in January proved too large for economic and successful transport. Urgent efforts were therefore made to locate places close to Madras where young labeo (another suitable quick-growing carp) could be obtained. My survey of the rivers in the Chingleput district in January and early in February resulted in the re-discovery of the fish in sections of the Palar and Korattaliyar rivers close to Attur in the Chingleput taluk and the Vallur anicut near Minjur in the Ponneri taluk respectively. These were fixed in 1916 as stocking centres for the Chingleput, Nellore tank stocking scheme [vide paragraph 7 (3) and (4) of Mr. Hornell's letter No. 415-P.R./19-3, dated 26th June 1919]. Of these the latter proved the most useful and an almost inexhaustible source of supply, incidentally showing the mistake of abolishing this centre by the Inland section during my absence in England. Minjur has, since January, been exploited by the Assistant Director, Rural Pisciculture, for the supply of labeo for his stocking operations. It will be necessary to rebuild the store shed at Minjur in the interests of village work. Some of the brackish water wells examined have been stocked with *etroplus* from the Adyar river.

271. A further contingency which has arisen in connexion with an expeditious and cheap supply of fry for stocking village ponds and wells, is the need for storage ponds in convenient centres for fry before their final distribution to the villages. It was found that the success of the propaganda depended to a very large extent on cheapening the supply of fish to wells and ponds. To transport catla from the Godavari or even the local labeo from Korattaliyar in small consignments for each well entailed unnecessary and avoidable expenditure which unduly enhanced the cost of stocking. The only way to minimize this expenditure was to transport in bulk when fry were available and store them in perennial ponds in central villages and thence distribute them to wells and ponds

within an easy radius of the store pond. The establishment of such storage ponds departmentally will involve expenditure in the preparation of the ponds such as the removal of murrel and other predaceous fish, the trapping of inlets and outlets, etc., annual outlay on maintenance, as well as the appointment of a watchman, besides payment of rent if any for each pond. Even so temporary menials of the watchman class are untrustworthy and there will be no guarantee against the theft of fish. The progress of the propaganda revealed the existence of perennial ponds under the close supervision of their owners who are respectable and trustworthy ryots and who were persuaded to adopt pisciculture as a by-industry. If such landlords could be induced to temporarily accommodate large stocks of fry in their ponds which are ideal for the purpose it should be possible for the department to avoid expenditure on the establishment of storage ponds in convenient centres. Such temporary accommodation will entail no additional labour or expenditure on the owner of the pond. Being a prospective pisciculturist himself the pond is prepared for stocking for his own purpose. A pond can accommodate a much larger number of small fry than it can of adult fish. As the additional fry stored in the pond will be distributed to the neighbouring wells and ponds in the course of a month, the prospects of pisciculture in the pond by the owner are not thereby prejudiced. The following pond owners were approached with the proposal and have gladly agreed:—

- (1) Venkatarama Ayyar.
- (2) Madambakkam Village Panchayat President.
- (3) Sembakkam Village Forest Panchayat President.
- (4) Irumbuliur Village Panchayat.

The need therefore for departmental expenditure on an ever-increasing number of store ponds and watchman has been thus effectively obviated.

272. *Finance*.—In formulating this scheme I pointed out to Government that a comprehensive scheme of this nature can only be carried out at some cost. The Government's share of the cost in initiating the scheme will be limited to the pay and allowances of the special officer and his staff and the initial demonstration in fish-rearing in each village, which, if successful, the villagers are likely to follow up in subsequent years with expert advice and suggestions from the officer. In several cases the experiment, I presumed, could be tried at no cost except the cost of cleaning the tank and obtaining

fry. Even this I thought could be reduced to a minimum if the officer could interest the villagers at the start and tactfully enlist their co-operative energy.

273. The heaviest item of expenditure in pond culture is the initial thorough cleaning of a pond and the trapping of inlets and outlets. These operations are however luckily unnecessary in the case of wells. The majority of ponds for which alone these operations are essential are the property of rich mirasidars or public bodies who are in a position to meet the expenditure. The Assistant Director, Rural Pisciculture, estimated the expenditure involved in the case of each pond for the information of the owner. Until the owner or the public body concerned provided funds for the work the preparation of the pond was not undertaken. Though the money paid by the owner was strictly limited to the expenditure involved in preparing the pond, its temporary custody in the hands of departmental subordinates was considered inadvisable. Such receipts and expenditure therefore have been dealt with as regular revenue and disbursements in a Government office. The receipts were credited into the treasury by chalans and the expenditure was defrayed from the contingent advance. As however the expenditure is in conformity with the estimates framed and approved by the owners the receipts and expenditure were exactly balanced, any excess of expenditure over the estimates was recovered from the owner and any deficit was refunded to him. Thus the Department has not been put to any expenditure on cleaning and preparing ponds. This is more than was anticipated at the beginning.

274. In the case of wells, the only item of expenditure is the cost of fry for stocking. As explained in paragraph 271 above with the establishment of store ponds in the immediate neighbourhood of villages the cost of fry will be reduced to a minimum. In the first year of work such economies were naturally not feasible and the cost of fry has been excessively high. As the ryots who have yet to realize the benefits of the scheme are likely to be discouraged from experimenting with their ponds and wells, which is the chief aim of the department, a price much below the actual cost of the fry had to be charged to them. In the case of wells a nominal fee of four annas to two rupees was collected from the owners for 20 to 25 fish fry supplied. In the case of Dimmarajakulam, the only pond so far stocked, the municipality paid the full cost of the fry and their transport charges. From experience so far gained the collection of a nominal fee, however small,

is found essential for the success of the scheme. If stocking is done free of cost even for the purpose of initial demonstration the villager who is naturally of an indifferent disposition, having no stake in the concern, will not care to look after the fish. If the fish are stolen by the owner himself or others or destroyed in any other way, the operation will only demonstrate a failure of the scheme and not its success and the expense and trouble on the part of the department will not only end in vain, but will prejudice future propaganda in the locality. With a view to create a personal interest in the experiment a nominal fee however small is now insisted upon from the owner before operating on wells. The total expenditure on the collection and transport of fry to ponds and wells amounted to Rs. 112-14-0. The receipts by the sale of fish was Rs. 5-4-0 for the period ending 30th June 1931.

275. From the foregoing it will be seen that the results achieved so far in spite of the many initial difficulties connected with a novel scheme have amply justified the continuance of this work. In the area to which the scheme was extended, the public concerned have been awakened to the possibilities of pisciculture as a food producing and remunerative by-industry. The results of the waters stocked are awaited with keen interest not only by the owners but by the whole village or town and where the phenomenal growth of fish as in the case of Father Peter's well has already been demonstrated new applications for initiating the industry are on the increase. The scheme has worked with considerable success, and more than fulfilled anticipations. I therefore recommended to Government the continuance of the scheme. Under the present financial condition however Government decided to suspend the scheme and the highly promising experiment had to be abandoned.

B—Exhibitions.

276. The Inland section, the Tanur Research station and the Ennur Biological Specimen Supply section participated in several exhibitions during the year:—

(1) *Park Fair Exhibition held last Christmas.*—The exhibits from the Marine Biological section at the Madras Park Fair Exhibition consisted of rare and beautiful specimens of marine animals, chanks and chank ornaments, natural pearls and pearls *in situ*, a shell case and a collection of the larger South Indian Crustacea and 100 lb. of oyster shell grit packed in 1 lb. packets for sale to the public.

The Inland section exhibited live specimens in aquaria of etroplus, gourami, and the many species of larvicidal fish. The Tanur Experimental station contributed hygienically cured fish, and other fishery products, such as oil, guano and fish meal.

(2) To the Baby Week Exhibition held in January 1931 at Madras, two dozen specimens mounted in museum jars and an invertebrate case, exhibits relating to button and bangle manufacture, charts of anti-malarial operations and food value of fish, larvicidal fish in aquaria and samples of all the goods manufactured at the Tanur station were sent.

(3) At the Tiruppur Industrial and Agricultural Exhibition and Cattle Show last May held under the auspices of the Coimbatore District Agricultural Association, a dozen mounted specimens in museum jars, samples of oyster grit from Ennur, important economic food fish of value to the ryot from the Inland section and products of the Tanur Fisheries station (fish-oil, guano, fish meal and cured fish) formed an attractive show.

277. The Ennur station took part in the following other exhibitions also:—

(i) In February 1931 a collection of 20 specimens mounted in museum jars was displayed in the exhibition held in connexion with the Teachers' College Day celebration at Saidapet.

(2) At the exhibition held by the Madras twenty-third Provincial Educational Conference opened by the Hon'ble Diwan Bahadur M.R.Ry. S. Kumaraswami Reddiyar, Minister for Education, in May 1931 at Palghat, sets of zoological specimens suitable for Natural History courses in secondary schools were exhibited. A certificate of merit was awarded for the set.

(3) In September 1930 at Palghat in connexion with the Malabar District Educational Conference (Dasara Session) a secondary school set together with a case of dry invertebrate specimens were exhibited. This was used in connexion with the lectures delivered as refresher courses to the secondary school teachers who assembled at the conference.

(4) To the International Fair held at Leipzig, twenty-six kinds of interesting marine animals such as St. Xavier's crab and other rare crabs, star fishes, holothurians, sea urchins, pinna, pearl oyster, chank and other molluscs turtle eggs, sea snakes, etc., were sent.

C.—Miscellaneous.

278. The President of the Village Panchayat, Madhavaram, Tadepalligudem taluk, West Godavari, was given advice about stocking some permanent water ponds of the panchayat with edible fish.

279. Mr. A. M. Whittle, Survey Estate, Gudalur, the Nilgiris, was furnished with information about the cultivation of food fish in his estate situated at an elevation ranging from 1,000 to 4,000 feet.

280. Mr. C. H. John Ines of Mailur Estate, the Nilgiris, was furnished with particulars of fish suitable for stocking a tank in his estate situated at an elevation of 5,500 feet.

281. Mr. H. M. Hight, Mogannad Peak, Nagalur P.O., Salem district, was furnished with information about Etroplus which he wanted to introduce into his waters.

282. Mr. M. D. Ghasvala, share stock broker, Bombay, was given information about breeding fish in wells.

283. Mr. Anjaneeya Chowdri Garu, Honorary Assistant Registrar and President, Ellore Local Co-operative Union, who is keenly interested in pisciculture, has sought the assistance and advice of the Department in developing the fisheries of a number of ponds in and around Ellore. The Inspector of Fisheries, Vizagapatam, was deputed for the inspection of the ponds. The matter is still under correspondence.

284. In some of the coastal villages of the Chidambaram aluk, which adjoin the Uppanar, a salt water tidal creek, a snake-like creature was reported to be causing damage to paddy cultivation by boring holes through the bund which separates the paddy fields from the salt creek, thus causing the entry of salt water into the fields during high tide. At the instance of the Agricultural Department the matter was investigated and the creature was found to be the common backwater eel—*Pisoodonophis boro* (H.B.), and suitable remedies have been suggested for the mitigation of the nuisance.

285. With a view to facilitate stocking work, and give an incentive to the public to take to pisciculture as a cottage industry, the question of reducing the railway freight for transport of live fish was examined but the railway declined to agree to any reduction. The question of railway freight is an important one and has considerable bearing on the improvement of fresh water fisheries by Government or private agencies.

286. The Panchayat of Madhavaram is one of those in which the Inspector of Co-operative Societies, Tadepalligudem, tried to create a genuine interest in fish culture. Haphazard stocking with catla is what the panchayat have been doing hitherto and they are now anxious to adopt scientific pisciculture. At their request their seven tanks were inspected by the Inspector of Fisheries, Vizagapatam.

287. M.R.Ry. Rao Sahib G. A. Chowdhry of Chatrapur, Ellore, is keen on pisciculture and is acquainted with the methods of fish culture in Bengal. He wishes to take on lease some Government tanks and even panchayat tanks and start piscicultural operations in them. At his request some of the tanks he proposes to stock were examined and advice regarding their suitability was given. A poramboke Government tank in Ellore the lease of which he had applied for was inspected and on a reference from the Revenue Department its lease for five years was recommended.

288. M.R.Ry. S. Veerabhadrayya of Potonuru was advised as to the suitability of his newly dug tank for fish culture.

289. At Doctor Sitaramayya's request his pond at Cocanada was examined and advice was offered by the Inspector of Fisheries, Vizagapatam, to make it suitable for fish culture. A stock of catla will be supplied to him in the coming season.

IX. FISHERY LEGISLATION.

290. Two cases of illicit fishing were detected in the Bhavani Conservancy during the year and the accused were prosecuted. The magistrate found the accused guilty and sentenced them to a fine of Rs. 10 each.

291. Under the amended Fisheries Act two prosecutions, one at Madurantakam and another at Madras (Powder Factory Fish farm), were successfully conducted and ended in convictions.

292. The suit instituted against the tenderer of the Kanigiri-Duvvur tanks fishery referred to in the last year's report (paragraph 171) has been decreed in favour of Government. Further action to collect the amount is being taken by the Collector of Nellore.

293. Ever since the introduction about 25 years ago, first in Pulicat and subsequently in the Adyar river, of the "Agni valai" or "Badi-valai," a large sized but small meshed drag net, there has been an outcry from poor fishermen, who

could not afford to purchase this costly net, about the destructive character of the net. This was felt all the more keenly in a small water area like the Adyar estuary and the Adyar freshwater fishermen who ply small cast nets could not obtain their livelihood. Besides, the use of the agni-valai leads to a wholesale destruction of immature fish, which tends to deplete the river. The Government therefore have prohibited the use of the net in selected portions of the Adyar river (G.O. Ms. No. 615, Development, dated 30th April 1931).

294. The Adi-Dravida fishermen of Pulicat also complained about the use of "badi-valai" in the Pulicat lake and petitioned to Government that the net should be prohibited in the lake. On investigation it was found that this net had been in use for about 30 years and that it had not adversely affected the fishery of the lake, which is several square miles in area. The Government did not therefore consider it necessary to prohibit the use of the net in the Pulicat lake (G.O. Ms. No. 343, Development, dated 9th March 1931).

295. *Rules for the regulation of pearl and chank fisheries.*—The Advocate-General who was consulted with regard to the control of the window pane oyster fishery advised Government that it is safer to publish a notification under subsection (4) of section 6 of the Indian Fisheries Act as amended, prohibiting the fishing of these oysters.

296. The Government however desired that rules for the administration and control of pearl and chank monopolies of Government may be framed under sections 6 (4) of the Fisheries Act. Accordingly rules were published in the *Port St. George Gazette*, dated 22nd May 1931.

X. PUBLICATIONS.

297. *Fish statistics.*—The statistical report for 1926-27 was published as a supplement to the Annual Report for 1927-28. The report for 1927-28 is in the press.

298. *Administration Report for 1917-18.*—The publication of the Administration Report for 1917-18 in bulletin form was inadvertently omitted. This report has now been issued as Report No. 7 of Bulletin XI.

299. *Trawler's First Report.*—The first report on the systematic survey of deep sea fishing grounds by S. T. 'Lady Goschen' was published during the year as Report III of Bulletin XXIII and covers the period 1927-28.

300. *Bulletin on marketable fish.*—During the year the collection and identification of specimens for the bulletin was continued. More than two dozen pen and ink sketches and a dozen coloured plates for illustrating the bulletin were completed.

301. *Bulletin on pearl fisheries.*—As a large number of books and publications of learned societies had to be consulted and several of them had to be obtained from libraries outside Madras, the preparation of the bulletin has been slow.

302. *Paper read at the Indian Science Congress.*—A paper on the early development of the Madras edible oysters *ostrea arakanensis* Sowerby and practical suggestions for its culture by myself and Dr. D. W. Devanesan, was read by me at the Science Congress held at Nagpur in January last.

303. *Other publications relating to Madras fisheries.*—A supplementary paper in the Pycnogonida of the Krusadai Island by me was published in September 1930 as Part I No. 2 of Volume I of the Bulletin of the Madras Government Museum, New Series.

304. Mr. R. Winckworth of the Royal Society has published two papers entitled, respectively, "Molluscs from Pulicat Lake" and "On the growth of *Paphina undulata*" (*Veneridæ*) in the Proceedings of the Malacological Society, London, 1930–31. The material for the preparation of these papers were collected with the help of this department.

PART II.

FINANCE.

305. *Summary of financial results.*—The total expenditure of the Department for the year was Rs. 7,56,820 as against Rs. 9,36,378 in the previous year. The decrease was chiefly due to the following reasons:—(1) The closure of the Tinnevely chank fishery during February and March 1931, two of the best fishing months in the year; (2) the laying up of the trawler at Cochin for five months; and (3) a new system of accounting suggested by the Assistant Director of Commercial Audit whereby only the prime cost of salt issued during the year is debited to the accounts as expenditure instead of the value of the opening stock of salt and the cost of salt purchased as in previous years. The total receipts for the year amounted to Rs. 4,40,418 as against Rs. 7,57,795 in the previous year. The fall is accounted for by (1) the fewer chanks fished as fishing was stopped for two months; (2) the chanks fished

remaining unsold due to a slump in the chank market and the consequent adoption of the prime cost instead of sale value in the accounts of the year; (3) the omission of the value of the closing stock of salt in the yards according to the new system of accounting adopted this year by the Assistant Director of Commercial Audit.

306. The operations of the Inland section resulted in a net revenue of Rs. 19,001 against a debit balance of rupees 7,617 in the previous year. The Chank fisheries, Marine Aquarium and Oyster Farm have, as, in the previous year, resulted in a net revenue to Government. Due to financial stringency the Tanur station, Fisheries Training Institute, schools for fishermen and the Zoological Specimen Supply section were run at the minimum possible cost. The schools for fishermen cost Government only Rs. 57,748 against rupees 60,940 in the previous year although there was an increase of 499 in the number of pupils attending the schools. The Specimen Supply section cost Government Rs. 1,732 against Rs. 2,743 in the previous year.

307. The usual financial statements are appended. The figures furnished by the Assistant Director of Commercial Audit have been adopted as directed by Government in the statements relating to pearl and chank fisheries and the fish-curing yards.

PART III.

STAFF AND EQUIPMENT.

308. A list of the Gazetted staff of the Department is given in Appendix I.

I. BIOLOGICAL.

A.—Assistant Biologist.

309. The sanction for the post of the Assistant Biologist expired on 31st May 1931, and Government were addressed for its permanent retention. The retention of the post for three months only has been sanctioned by Government, since the close of the year, pending a decision regarding a new boiler for the trawler, apparently because they are of opinion that the Assistant Biologist will not be required when the trawler's survey is concluded. From the programme for ten years' research approved in G.O. No. 1621, Development, dated 21st November 1926 and the recommendation of the Committee on Fisheries, according to which this post was sanctioned, it will be clear that there is urgent need and considerable scope for biological research in every branch of the

department, without which no appreciable progress can be made. It was in view of the volume of work awaiting to be done that a Fisheries Biologist and eight Assistant Biologists were recommended by the Committee on Fisheries but only a single Assistant Biologist was sanctioned. There can be no question about the need for his services, even after his immediate work in connexion with the survey which has been given precedence over all other items, ceases. Not only the Biological station where work has been revised and enlarged by the Assistant Biologist, but the volume of urgent biological research in the Inland section for which the new freshwater experimental farm at Chetput has been sanctioned, the contemplated research on hilsa at the Bezwada hatchery, the hilsa marking experiments started in the Palk Bay, the conduct of the chank and pearl fishery research of which the chank marking experiments initiated last year is only a beginning, as well as the progress of the investigation in the valuable prawn fisheries of the Collair lake and oyster culture near Madras, all of which are items of work on which the Department is now engaged or has been engaged for some years, need a well qualified Biological staff.

310. In the year under report the appointment of an Assistant Biologist made it possible to consolidate the work at the two Fisheries Research stations which were drifting for lack of sufficient attention and control and to start some new and badly needed lines of investigation. The post of the Assistant Biologist is but one of several required for the efficient organization of the Research section of the Department. Even so the creation of a single post has supplied a long needed addition to the staff without which it would have been impossible for me single-handed to organize and conduct the researches mentioned above. A beginning has been made with many urgently needed lines of investigation and the appointment of the Assistant Biologist has been amply justified by what has been already accomplished in addition to his immediate duties on board the trawler.

311. It is hoped that Government will see their way to continue at least the single post of the Assistant Biologist even if they are not in a position financially to augment the staff. No real or lasting progress in the technical fields of the department's activities can be achieved without biological research which needs a whole time staff to itself. Every one of the items enumerated above, Inland pisciculture, hilsa, pearl, chank, oyster and prawn fisheries are capable of great economic development to the benefit both of the Government and

the people but are awaiting systematic research for which the department deplorably lacks the staff.

312. *Inspector*.—The temporary Inspector Mr. V. John continued as Inspector on board the trawler.

313. (i) CALICUT BIOLOGICAL STATION.—The temporary Research Assistant Mr. S. Varadarajan was in charge of the Research station during the year under review.

314. Though the Government sanctioned the further retention of the statistical clerk on 29th May 1930, the clerk was on leave from 27th May to 26th July and was able to restart work only on the 26th July 1930. The work of compilation of statistics is progressing satisfactorily.

315. An overhead tank for the supply of freshwater and seawater to the laboratory was constructed.

316. Additional accommodation for the Assistant Biologist and his office was found by hiring a building close to the Calicut Biological station.

317. (ii) KRUSADAI BIOLOGICAL STATION.—The temporary Research Assistant Mr. E. K. Madhavan, continued in charge of the station during the year under review. Difficulty was experienced in securing a suitable laboratory attendant for the station. An S.S.L.C. holder who underwent a month's training as apprentice was appointed as Laboratory Attendant on 21st April 1931.

318. The station received several additions by way of scientific equipment. The construction of the cement overhead tank for sea water was completed and the aquarium attached to the laboratory was brought into working order in April 1931. Sea water is now regularly pumped by a hand pump installed on the northern shore of the island into the overhead tank from whence it flows into glass table aquaria on the front veranda of the station. The overflow in the aquaria is carried away by a concealed drain in the floor.

319. (iii) MARINE AQUARIUM.—During the year there was no change in the staff.

II. TECHNOLOGICAL.

A.—Tanur Experimental Station.

320. Mr. T. P. Baratan, who was acting Research Assistant in the previous year, continued till 31st October 1930. On his transfer as Inspector of Fisheries (Inland), Mr. K. Ambady, was posted to the station. Mr. Ambady

went on medical leave for a month to begin with and the station was temporarily put in charge of the clerk, pending the selection of a qualified Research Assistant by the Madras Services Commission. Mr. E. J. Verghese, a chemistry graduate, was finally selected and he acted as Research Assistant from 16th March to 15th June 1931, when he was relieved by Mr. Ambady. Mr. Ambady though not a graduate is well trained in the work and has held charge of the Tanur station and the Chaliyam Cannery before. He is the most experienced among the present staff of the department for the work.

B. Chaliyam Cannery.

321. In response to the sale notices issued no satisfactory offer for the purchase of the cannery was received. Mr. M. Viswanath's application for the lease of the cannery for a period of five years on a monthly rental of Rs. 100 was accepted by Government in G.O. Ms. No. 2099, Development, dated 21st November 1930. Mr. Viswanath, however, was unable to take over the cannery as the sardine fishery on the West Coast had failed during the year, and has since petitioned to Government for a reduction of the rent to Rs. 50 per mensem.

III. EDUCATIONAL.

322. (i) FISHERIES TRAINING INSTITUTE.—There were unavoidable, though temporary, changes in the staff of the Institute in the course of the year. The Headmaster was on sick leave from 7th October 1930 to 6th June 1931; Mr. K. S. Sankara Ayyar, M.A., L.T., of the Education Department, acted as Headmaster from 1st December 1930 to 6th June 1931. The First Assistant who left the Institute on study leave towards the end of the previous year, returned only in March 1931. The Madras Services Commission could not secure a suitable substitute and the Educational Department were also unable to depute a candidate on account of the low pay. Advertisements and all other efforts made by the Madras Services Commission and the Department did not materialize in the appointment of an acting First Assistant in place of Mr. Sukumaran. His post consequently remained vacant throughout the period of his leave and the work had to be divided among the rest of the staff as far as possible. The Drill Instructor and Clerk, who was also doing the work of the Drawingmaster, was on sick leave from 6th January 1931 to 27th March 1931. The post remained vacant during his absence as no one qualified could be found to act. A qualified Carpentry and Drawing Instructor could not be had

for the low pay sanctioned for the post and therefore an unqualified man had to be appointed as a temporary expedient in August 1930. Government have since revised the scale of pay for the post.

323. (ii) VILLAGE SCHOOLS.—One hundred and forty-one teachers were employed in all the schools taken together of whom one was employed solely in a night school. The corresponding figure for the previous year was 139. The number of pupils attending the schools however increased from 3,637 to 4,136. There has thus been an increase of only two teachers for an increase in strength of 499 pupils in the schools run by the Department. Consequently many of the schools are under-staffed. Additional staff is required at Kumbala, Kavvayi, Madapalli, Kuriyadi, Kannankadavu Korapoya, Pudiappa, Naduvattam, Chaliyam, Nattika and Kaipamangalam. Of the teachers 106 have been trained at the Fisheries Training Institute, 30 in ordinary training schools and 5 are untrained teachers.

IV. NAUTICAL.

324. (i) "*Lady Goschen*".—Captain T. G. Cribb continued to command the vessel as Assistant Director of Fisheries (Marine). The tail-end-shaft was condemned by the Harbour Engineer, Cochin, and a new one was fitted on 1st November by Messrs. C. A. Hutson & Co., Ltd., Colombo. The new shaft ordered in January 1930 through the Director-General of Stores, London, was received too late and is kept as a spare shaft.

325. The trawler was lent to the Revenue Department for the inspection of the Laccadive Islands. On 3rd February last she left with the first inspection party to Androth Island. On the 5th while returning to Calicut her boiler developed serious leakage and became irreparable. The vessel was towed to Cochin Harbour for safe anchorage. The question of fitting a new boiler to the trawler is under the consideration of Government. Her crew has been reduced temporarily to a skeleton consisting of one mate, one sukkani, two lascars, one cook, one bandhari and an assistant driver.

326. Mr. W. Bay, a domiciled European recruited in Ceylon, was the chief driver from 26th August 1930 to 31st October 1930. In G.O. Ms. No. 105, dated 23rd January 1931, the pay of the post was raised from Rs. 130 to Rs. 350 temporarily for the recruitment of a qualified driver. Another

European driver, Mr. Warwick, recruited from Ceylon held the post from 18th January to 19th February. His services were dispensed with when the vessel became disabled.

327. (ii) "*Lady Nicholson*".—This vessel was employed in the inspection of pearl banks during the year and the full complement of the crew was engaged for the inspection. During the rest of the year the crew were reduced to the minimum prescribed in G.O. No. 498, Development, dated the 10th March 1930. The charges for her maintenance amounted to Rs. 8,112-8-4 this year against Rs. 5,699-7-9 in the previous year, the increase in the expenditure was due to the slipping of "*Lady Nicholson*" at Colombo. The Government have since agreed to my proposal not to dock the vessel annually (G.O. No. 1297, Development, dated 1st September 1931).

328. Mr. A. Gomez, tindal of "*Lady Nicholson*" was deputed this year also to teach navigation in the Fisheries Training Institute at Calicut.

329. (iii) "*Sea Scout*".—This vessel was exclusively engaged in the chank fishery of the Tinnevely district with her full complement of crew from 1st October 1930 to 31st May 1931 and with a reduced crew for the remaining months. Her maintenance charges were Rs. 3,301-11-9 against Rs. 4,373-15-3 in 1929-30.

330. (iv) "*Leverett*".—This vessel was engaged partly in the Tinnevely district for conducting the chank fishery and partly in the Tanjore district in connexion with the survey of the chank beds. The cost of her maintenance amounted to Rs. 3,553-5-6 against Rs. 4,178-8-10 in 1929-30.

331. (v) "*Sutherland*"—was transferred to the Fisheries Training Institute, Calicut, as a training boat for the students as per orders in G.O. Ms. No. 791, Development, dated 8th April 1930.

332. (vi) "*Pearl*".—The Government in their order Ms. No. 490, Development, dated 30th March 1931, were pleased to accept the recommendations of the Committee on Fisheries that this motor boat should be fitted with a modern engine of the Ailsa Craig Kid type at a cost not exceeding Rs. 1,600 and stationed at the Krusadai Island station. They also sanctioned the employment for a period of three years with effect from 1st October 1931 of a driver on Rs. 40 per

ensem and a lascar on Rs. 18 per mensem for the vessel. The upkeep of the vessel costed the Department Rs. 581-8-11 against Rs. 649-13-0 in 1929-30.

V. PROPAGANDIST.

333. *Assistant Director (Rural Pisciculture and staff).*—Mr. S. T. Moses, temporary Assistant Director, Rural Pisciculture, was relieved on 10th September 1930 by Mr. M. Jayaram Nayudu, Inspector of Fisheries, Vizagapatam, the candidate selected by the Madras Services Commission for the post. The sanction for the post expired on 10th June 1931 and Government have since abolished the Rural Piscicultural section in view of financial stringency.

334. Mr. C. R. Natesa Pillai, continued as Inspector till 23rd June 1931. As Mr. C. R. Natesa Pillai was not qualified under the Madras Fisheries Subordinate Service Rules, to hold the post of Inspector of Fisheries, Government ordered that his services as Inspector of Fisheries should be terminated and the post filled up by a duly qualified candidate. Mr. Suryanarayana Rao, B.A., was appointed as Inspector of Fisheries, Rural Pisciculture, on 23rd June.

VI. ADMINISTRATIVE.

A.—Director's Office.

335. *Director.*—There was no change during the year. The Government were unable to sanction the extra clerks proposed for the Director's office to clear off arrears accumulated and the congestion of work experienced since 1926.

336. *Personal Assistant.*—Dr. C. J. George continued as Personal Assistant throughout the year.

B.—East Coast (North).

337. Mr. M. Jayaram Nayudu continued as Inspector at Vizagapatam till his appointment as Assistant Director, Rural Pisciculture, on 10th September 1930 when he was relieved by Mr. S. T. Moses.

C.—East Coast (Central).

338. *Assistant Director.*—Mr. C. G. Chakrapani Ayyangar, was in charge of the section throughout the year.

339. *Staff.*—Mr. K. U. Nayar, Inspector, was transferred to the West Coast and Mr. Baratan, Research Assistant, Tanur, was appointed in his place.

D.—East Coast (South).

340. *Assistant Director*.—Rao Bahadur J. A. Fernandez was in charge of the section throughout the year; he was on privilege leave from 14th to 30th May 1931.

341. *Staff*.—Government in their order No. 172, Development, dated 7th February 1931, were pleased to sanction the retention of the Inspector of Pearl and Chank Fisheries for a further period of one year from 1st April 1931. Mr. D. D. Peter Devadas continued in the post and Mr. A. Somayaji continued to be Inspector of Fisheries in charge of the Tanjore Chank Fisheries investigations.

342. Consequent on the premature demise of Mr. K. R. Samuel, the permanent Survey Assistant, who was on long leave, M.R.Ry. T. S. Velu Mudaliyar, Head Clerk, office of the Director of Fisheries, who was acting as Survey Assistant was confirmed on 20th October 1930.

E.— West Coast.

343. *Assistant Director*.—Mr. U. Karunakara Menon was Assistant Director throughout the year.

344. *Staff*.—Mr. U. Nagappa and Mr. A. K. Krishnan, continued as Inspectors at Mangalore and Calicut but Mr. K. Ambady, Inspector of Fisheries, Chowghat, was transferred as Research Assistant, Tanur. In October 1930 Mr. K. U. Nayar, who was Inspector of Fisheries under the Assistant Director of Fisheries (Inland), was transferred to Chowghat in place of Mr. Ambady.

345. The Assistant Director (Coast)'s office continued to be understaffed. The three Section Inspectors likewise require clerical assistance. Proposals for the additional clerical staff has been withheld in view of the financial stringency of Government.

346. All the fish-curing yards and fisheries schools and the Tanur Experimental Station were inspected by the Assistant Director of Fisheries (Coast) during the year. The Fisheries Training Institute, Calicut, was inspected by the District Educational Officer, South Malabar.

347. *Office*.—The Assistant Director of Fisheries (Coast)'s office continued to be located at West Hill. The office of the Inspector of Fisheries, Calicut, and the Laboratory of the Research Assistant, West Hill, also continued to be located there. As stated last year, want of accommodation is very

keenly felt. Records are accumulating in the fish-curing yards where there is no room to store them. But they cannot be transferred to the Assistant Director (Coast)'s office as there is no record room. The office accommodation for the Inspector of Fisheries, Mangalore and Chowghat, is satisfactory.

348. His Excellency the Governor visited Calicut in October last. The Zamorin Raja of Calicut entertained him with a display of fireworks at West Hill, opposite to the Fisheries office. At the request of the Municipal Chairman, His Excellency was accommodated in a specially erected pandal in the office compound.

349. *Tanur station bungalow*.—The District Board bungalow at Tanur was transferred to the control of the Fisheries Department on 1st August 1930. Repairs to the bungalow were carried out at a cost of Rs. 1,150. The provision of a fence and gate and minor repairs to the out-house cost Rs. 363.

I have the honour to be,

Sir,

Your most obedient servant,

B. SUNDARARAJ,

Director of Fisheries.

APPENDIX I.

Staff of the Fisheries Department.

Post.	Inoumbent.	Period.
Director	Dr. B. Sundara Raj ..	1st July 1930 to 30th June 1931.
Assistant Director (Marine).	Captain T. G. Cribb ..	1st July 1930 to 30th June 1931.
Assistant Director (Coast ..	M.R.Ry. U. Karunakara Menon Avargal.	1st July 1930 to 30th June 1931.
Assistant Director (Inland).	M.R.Ry. C. G. Chakrapani Ayyangar Avargal.	1st July 1930 to 30th June 1931.
Assistant Director, Pearl and Chank Fisheries.	M.R.Ry. Rao Bahadur J. A. Fernandes Avargal.	1st July 1930 to 13th May and 1st June to 30th June 1931.
Assistant Director (Rural Pisciculture).	M.R.Ry. S. T. Moses Avargal. M.R.Ry. M. Jayaram Nayudu Avargal.	1st July 1930 to 10th September 1930. 11th September to 9th October 1930 and 20th October 1930 to 30th June 1931.
Assistant Biologist	Dr. D. W. Devanesan ..	Was on leave from 14th to 31st May 1931. 1st July 1930 to 13th December 1930 and 11th January 1931 to 30th June 1931. Was on leave from 14th December 1930 to 10th January 1931.

APPENDIX II.

STATEMENT No. 1.—Expenditure and Revenue of the Fisheries Department for 1930-31.

Particulars.	Expenditure.	Revenue.	Difference.
	RS. A. P.	RS. A. P.	RS. A. P.
A. Direction	33,234 4 8	..	— 33,234 4 8
B. Assistant Director, Pearl and Chank Fisheries ..	82,833 4 7	* 1,00,693 13 3	17,860 8 8
C. Assistant Director (Marine)	85,717 12 11	564 9 0	— 85,153 3 11
D. Assistant Director (Coast)	12,102 4 11	120 0 0	— 11,982 4 11
E. 1. Tanur Station	6,912 8 5	2,723 9 2	— 4,188 15 3
E. 2. Church Island Fish-curing Station	180 0 0	..	— 180 0 0
F. Fisheries Training Institute	17,220 14 8	383 6 6	— 16,837 8 2
G. Schools for fishermen	57,854 6 4	106 2 3	— 57,748 4 1
H. Assistant Director (Inland)	1,04,675 8 11	1,23,776 1 2	19,100 8 3
Assistant Director, Rural Pisciculture ..	12,126 14 11	5 4 0	— 12,121 10 11
Nilgiri Fisheries	6,190 12 0	0 10 0	— 6,190 2 0
J. Oyster Farm, Pulicat	2,084 5 5	2,365 6 0	281 0 7
K. 1. Marine Biological Section—			
(a) Zoological Supply Section, Ennur	5,436 6 3	3,704 10 0	— 1,731 12 3
(b) Research Station, West Hill	23,492 3 11	49 10 0	— 23,442 9 11
(c) Research Station, Krusadai Island	12,097 12 3	..	— 12,097 12 3
K. 2. Aquarium	6,789 14 9	7,738 15 6	949 0 9
L. Fish-curing yards—			
(a) Voted	2,85,913 12 4	1,97,777 0 4	— 88,136 12 0
(b) Non-voted—Agathi Island	892 13 0	295 1 0	— 597 12 0
Fisheries Cannery (1st April 1930 to 31st March 1931).	1,064 0 1	114 4 11	— 949 11 2
Total	7,56,820 0 4	4,40,418 7 1	— 3,16,401 9 3

* Includes Rs. 2,110 receipts from Salt Factory channels.

APPENDIX II—cont.

STATEMENT No. 2.—Trading Account of the Tinnevely Chank Fisheries for the year ended 30th June 1931.

	RS. A. P.	RS. A. P.	RS. A. P.
Opening stock—			
Indinthakarai chanks ..	15 9 0		
Valampuri shell ..	143 12 0		
Tinnevely chanks ..	27,590 8 0		
Purchase of chanks ..			
Fishing charges ..			
Bonus and donations to divers ..			
Storing, sorting and miscellaneous charges ..			
Running expenses of motor launches ..			
Share of office establishment of pearl and chank fisheries ..			
Share of office contingencies ..			
Share of pay, etc., of Assistant Director, Pearl and Chank Fisheries ..			
Property tax on chank godown buildings ..			
Depreciation on sundry assets ..			
Share of leave and pension contribution ..			
Share of direction charges ..			
Balance being profit on Tinnevely chanks transferred to General Trading and Profit and Loss Account ..			
Total ..	1,20,386 13 3		
By Sale of chanks—			
Full sized 212,860 at Rs. 280 per 1,000 ..		59,600 12 10	
Sale of wormed and under sized 20,943 at Rs. 15 per 1,000 ..		314 2 4	
Less rebate at 2½ per cent ..		59,914 15 2	
Miscellaneous receipts ..		1,497 14 0	
Value of stock at cost—			
Stock of chanks at Indinthakarai ..		15 7 5	
Value of Valampuri shell (29—30) ..		143 12 0	
Value of Tinnevely chanks ..		61,795 5 8	
Total ..		68,417 1 2	
		15 3 0	
		61,954 9 1	
Total ..		1,20,386 13 3	

APPENDIX II—cont.

STATEMENT No. 3.—General Trading and Profit and Loss Account of the Chank Fisheries for the year ended 30th June 1931.

	RS. A. P.	RS. A. P.
To Opening stock ..	269 7 0	
Expenses during the year on the investigation of the chank beds off the Tanjore coast ..	4,289 8 1	
Expenses in connection with diving mask experiment ..	144 2 9	
Legal charges paid ..	203 7 0	
Bad debts written off ..	40 12 0	
Audit fee ..	250 0 0	
Miscellaneous ..	11 4 0	
Balance: being net profit ..	31,713 13 4	
Total ..	36,922 6 2	
By Profit transferred from the Trading account of the Tinnevely chank fishery ..		30,886 3 2
Tanjore chank fishery rental ..		3,755 8 0
South Arcot chank fishery rental ..		701 0 0
Chingleput and Nellore fisheries rental ..		417 0 0
Earnest money deposit forfeited ..		100 0 0
Lease amount and sale proceeds of Ramnad chank fishery land and buildings ..		677 0 0
Closing stock of chanks obtained during the Tanjore chank fishery investigation ..		435 11 0
Total ..		36,922 6 2

STATEMENT No. 4.—Revenue account—Pearl fisheries operations for the year ended 30th June 1931.

EXPENDITURE.		REVENUE.	
	RS. A. P.		RS. A. P.
To Expenditure on Pamban Pearl Farm ..	120 0 0	By Revenue of coconut trees in the Krusadal Island ..	112 8 0
Inspection of pearl banks ..	871 11 4	Miscellaneous receipts ..	7 9 0
Share of establishment charges ..	2,218 8 4	Balance—Net expenditure carried to the balance sheet ..	15,963 4 8
Share of pay and allowances of the Assistant Director ..	1,301 8 3		
Leave and Pension contribution ..	490 4 0		
Share of contingencies ..	871 0 7		
Running expenses of "Lady Nicholson" ..	7,420 12 4		
Running expenses of chank fishery motor launches ..	293 5 4		
Debitable to pearl fisheries ..	2,746 3 6		
Depreciation and loss on revaluation of tools and crockery ..	250 0 0		
Audit fee ..			
Total ..	16,083 5 8	Total ..	16,083 5 8

APPENDIX II—cont.

STATEMENT No. 5.—Tanur (Fisheries) experimental station—Trading and Profit and Loss account for the year ending 30th June 1931.

	RS. A. P.	RS. A. P.	By Sales—	RS. A. P.	RS. A. P.
Opening stock of finished products ..	..	64 1 6	Cured fish ..	..	575 6 11
Fish purchased (fresh) ..	313 14 0	..	Fish meal ..	..	546 15 0
Value of oil, fuel and stores consumed ..	537 8 10	..	Fish oil ..	..	200 5 0
Wages ..	180 1 1	..	Miscellaneous ..	..	310 15 0
Salaries and allowances ..	..	1,011 7 11	Miscellaneous receipts—	..	1,633 9 11
Rates and taxes ..	..	2,124 1 4	Packing and railway freight charges recovered ..	..	428 4 5
Travelling allowances ..	..	40 0 0	Rents recovered ..	..	54 2 7
Railway freight charges ..	..	141 13 0	Bungalow fees ..	..	16 8 0
Petty coolie and carriage ..	..	268 2 0	Stock in hand ..	..	498 15 0
Repairs to buildings ..	..	14 4 6	Loss transferred to balance sheet ..	..	655 1 9
Petty repairs ..	..	2,067 0 6	..	..	4,188 15 3
Plantation and maintenance expenses ..	..	49 3 6			
Postage and telegrams ..	..	173 8 1			
Packing charges ..	..	143 14 6			
Miscellaneous expenses ..	..	68 11 7			
Direction charges ..	..	7 2 6			
Audit fee ..	602 3 6	..			
Depreciation on wells ..	200 0 0	..			
	20 0 0	..			
Total ..	..	822 3 6			
			Total ..	6,976 9 11	

Profit and Loss Account—Part II showing the expenditure relating to education and research activities.

To Share of salaries and allowances 1,132 4 0 By Deficiency carried to balance sheet 1,132 4 0

NOTE.—Interest on capital has not been charged in the accounts. The same at 5.44 per cent works out to Rs. 1,778.

APPENDIX II—cont.

STATEMENT No. 6.—Income and Expenditure Account of the fish-curing yards for the fisheries year ending 30th June 1931.

	Quantity MDS.	RS. A. P.	RS. A. P.	INCOME.
To Opening balance of salt on 1st July 1930 ..	174,455—8	1,37,300 6 9	By Sale of salt to fish-curers ..	..
Add purchase during the year ..	156,650—11	36,155 7 0	Do. Others (Jails) ..	..
Add transport and other incidental charges ..	..	83,813 12 11	Miscellaneous receipts ..	..
Less closing balance on 30th June 1931 (a) 177,093—35	..	2,57,269 10 8	" Deficiency for the year ..	..
Prime cost of salt issued during the year ..	152,973—36	1,17,350 7 6		1,33,147 15 9
Establishment charges of yards (Pay, travelling allowance and overtime fees) ..	..	..		671 11 6
Supervision charges (Direction and Divisional) ..	..	..		4,067 6 1
Repairs to buildings ..	..	..		88,136 12 0
Contingencies ..	..	..		
Clothing and equipment ..	..	..		
Apparatus and materials ..	..	..		
Depreciation on storage sheds and machines ..	..	..		

APPENDIX II—cont.

STATEMENT No. 6.—Income and Expenditure Account of the fish-curing yards for the fisheries year ending 30th June 1931—cont.

EXPENDITURE.		INCOME.	
	Quantity. ms.	RS. A. P.	RS. A. P.
Leave and pension contribution less leave salary paid ..	..	5,653 0 0	
Miscellaneous—			
Refunds ..	..	1,268 14 2	
Total ..		2,85,913 12 4	2,85,918 12 4

NOTE.—Interest on capital at 5-44 per cent for the year on the capital expenditure incurred by Government in the construction of sheds, etc., and the purchase of machinery works out to Rs. 2,496.

The loss of revenue involved in the issue of salt free of duty amounts to about Rs. 1,91,217 at Rs. 1-4-0 per maund.

(a) Excludes 50 per cent of the pay of the Inspector of Fisheries, Vizagapatnam, debited to Research but included 25 per cent of the pay and travelling allowance of the Assistant Director, Pearl and Chank Fisheries.

(b) Excludes Rs. 2,237-11-6 expenditure incurred on common buildings during the year.

(c) Excludes Rs. 1,073-10-0 expenditure on the purchase of weighing machines.

(d) Differs from the book balance by 607 maunds. Difference under reconciliation.

APPENDIX II—cont.

STATEMENT No. 7.—Government Fisheries Cannery, Chaliyam—Statement of affairs as on 31st March 1931.

Capital and liabilities.		Property and Assets.	
	RS. A. P.		RS. A. P.
Madras Government Capital Account—		Fired assets—	
Balance as per last balance sheet ..	40,199 1 4	Buildings at cost as per last balance sheet ..	18,597 0 0
Less loss for 1929-30 adjusted by the Accountant-General ..	4,751 7 9	Less depreciation as per last balance sheet ..	4,878 12 0
	35,447 9 7	Plant and machinery as per last balance sheet ..	22,656 9 0
Add reserve for expenses due to Government in 1929-30 adjusted against capital by the Accountant-General ..	2,154 0 0	Less value of plant and machinery transferred to Tanur Research Station and Fisheries Training Institute ..	2,875 5 6
	16 0 0		19,781 3 6
Reserve for expenses due to Government—			
Balance of interest for 1929-30 ..	246 1 0	Less depreciation as per last balance sheet ..	5,751 10 3
Travelling allowances ..	50 0 0	Depreciation on Plant and machinery transferred ..	808 0 5
Liabilities—			
For security deposit ..	50 0 0	Furniture as per last balance sheet ..	1,456 2 8
For wages ..	50 0 0	Less value of furniture transferred ..	3 8 6
		Depreciation as per last balance sheet..	1,452 10 2
			533 5 2
		Loose tools ..	919 5 0
		Raw materials ..	408 0 0
		Less reserve ..	12,449 6 11
			9,903 5 0
		Packing materials ..	2,546 1 11
			44 14 6
			2,591 0 5

APPENDIX II—cont.

STATEMENT No. 7.—Government Fisheries Cannery, Obaliyam—Statement of Affairs as on 31st March 1931—cont.

	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.
Empty cans	..	..	..	..	..	..	200	0	0
Suspense—Accountant-General's current account (Fisheries Training Institute and Tanur Research Section) ..	..	..	..	..	..	..	3,893	1	0
Cash and other balances—									
Personal Ledger Account No. I	..	..	..	6	9	7			
Do. II	..	..	..	437	5	9			
Cash in hand	..	..	..	1	9	0			
Service stamps	..	..	..	0	3	0			
Profit and loss account—Loss for the year	..	..	..	..	..	..	445	11	4
Grand Total ..	37,962	10	7	Grand Total ..	37,962	10	7		

APPENDIX III.

Comparative statement of salt transported to West Coast fish-curing yards from the year 1924 to 1931.

Year.	Total quantity of salt transported.	Quantity by contractor.	Cost.	Rate per maund.	Quantity by rail.	Cost.	Rate per maund.	Quantity by trawler.	Cost.	Rate per maund.
1924-25	MDS. 168,952	MDS. 158,952	RS. A. P. 63,911 15 0	RS. A. P. 0 6 5-2	MDS. 10,000	RS. A. P. 6,510 6 8	RS. A. P. 0 10 5	MDS. ..	RS. A. P. ..	RS. A. P. ..
1925-26	.. 203,366	.. 180,150	.. 72,435 5 0	.. 0 6 5-2	.. 23,216	.. 15,114 9 4	.. 0 10 5	.. ..	.. ..	.. ..
1926-27	.. 100,322	.. 40,910	.. 16,449 2 0	.. 0 6 5-2	.. 46,414	.. 25,640 15 4	.. 0 8 10	.. 12,998	.. 4,627 12 0	.. 0 5 8-2
1927-28	.. 231,080	.. 21,386	.. 8,804 0 3	.. 0 6 5-2	.. 147,430	.. 77,554 5 2	.. 0 8 5	.. 62,254	.. 22,113 2 2	.. 0 5 8-2
1928-29	.. 220,038	.. 143,498	.. 58,880 1 0	.. 0 6 3	.. 76,540	.. 36,630 2 0	.. 0 7 8	.. ..	.. ..	.. ..
1929-30	.. 181,712	.. 162,296	.. 59,112 9 2	.. 0 5 9-9	.. 19,416	.. 14,665 12 0	.. 0 12 1	.. ..	.. ..	.. ..
1930-31	.. 119,518	.. 100,318	.. 39,915 12 10	.. 0 6 4-4	.. 19,200	.. 10,724 13 0	.. 0 8 11	.. ..	.. ..	.. ..

APPENDIX IV.

[Chart showing chank-beds of Tanjore district.]

APPENDIX V.

The maximum and the minimum catches made by the divers during the Tanjore Chank Fishery investigation.

	Minimum number of chanks.	Maximum number of chanks.		Minimum number of chanks.	Maximum number of chanks.
August 1929—			October 1929— <i>cont.</i>		
2nd ..	13	13	6th ..	Unfavourable weather.	
3rd ..	13	13	9th ..	3	18
4th ..	Sunday.		10th ..	11	21
5th ..	7	7	11th ..	11	37
6th ..	Unfavourable weather.		12th ..	10	55
to ..			14th ..	9	37
13th ..			15th ..	21	62
14th ..	4	23	17th ..	10	29
15th ..	11	21	18th ..	2	11
16th ..	5	22	19th ..	Unfavourable weather.	
17th ..	13	44	and ..		
19th ..	11	33	20th ..		
20th ..	9	28	21st ..	4	18
21st ..	5	18	22nd ..	3	12
22nd ..	Unfavourable weather.		23rd ..	2	14
to ..			24th ..	5	20
31st ..			25th ..	8	22
Total ..	91	222	26th ..	2	14
September 1929—			27th ..	Rain.	
2nd ..	3	9	to ..		
3rd ..	3	18	31st ..		
4th ..	9	22	Total ..	118	417
5th ..	7	26	July 1930—		
6th ..	2	12	4th ..	3	3
7th ..	Unfavourable weather.		5th ..	3	3
to ..			6th ..	3	3
10th ..			7th ..	3	3
11th ..	2	7	8th ..	3	3
12th ..	Unfavourable weather.		9th ..	5	5
13th ..	2	9	10th ..	3	3
14th ..	3	20	11th ..	3	3
16th ..	15	62	12th ..	3	3
17th ..	6	19	14th ..	6	6
18th ..	Rainy weather.		15th ..	3	3
19th ..	4	22	16th ..	3	3
20th ..	5	18	17th ..	3	3
21st ..	10	20	18th ..	3	3
23rd ..	4	58	19th ..	3	3
24th ..	9	31	21st ..	12	12
25th ..	1	7	22nd ..	13	13
26th ..	Unfavourable weather.		23rd ..	14	14
to ..			24th ..	2	2
30th ..			25th ..	Unfavourable weather.	
Total ..	85	360	26th ..	3	3
October 1929—			28th ..	11	11
2nd ..	2	11	29th ..	14	14
3rd ..	8	8	30th ..	2	2
4th ..	4	14	31st ..	Divers absent.	
5th ..	3	14	Total ..	121	121

APPENDIX VI.

List of Institutions supplied with zoological specimens
during 1930-31.

			Value.		
			RS.	A.	P.
Agra ..	.. St. John's College ..	..	65	4	0
	Scientific Apparatus and Chemical Works, Limited.		222	0	0
Ahmedabad ..	Gujarat College ..	..	45	4	0
Ajmer ..	Government College ..	..	13	8	0
Aligarh ..	Muslim University ..	..	71	8	0
Allahabad ..	The University ..	..	366	11	0
Benares ..	Hindu University ..	..	58	0	0
Bombay ..	St. Xavier's College ..	..	28	4	0
Bangalore ..	Central College ..	..	118	12	0
	Government High School, Fort.		1	12	0
	Messrs. T. Ramachandra ..	..	91	0	0
Calcutta ..	The University ..	..	152	8	0
Fyzabad ..	Government Intermediate College.		7	8	0
Hyderabad ..	Oosmania University ..	..	79	8	0
Jaipur ..	Maharaja's College ..	..	252	4	0
Jodhpur ..	Jaswent College ..	..	23	8	0
Lahore ..	Government College ..	..	270	0	0
	The Punjab Veterinary College.		41	0	0
Lucknow ..	The University ..	..	253	4	0
Mysore ..	Intermediate College and Medical College.		89	0	0
Nagpur ..	College of Science ..	..	215	0	0
Patna ..	Patna College ..	..	25	12	0
	Bihar and Orissa Veterinary College.		15	8	0
	The Prince of Wales' Medical College.		88	8	0
Trivandrum ..	Maharaja's College of Science ..	..	45	0	0
	His Highness the Maharaja's College for Women.		154	0	0
Tumkur ..	Government High School ..	..	58	15	0
<i>Madras Presidency.</i>					
Anantapur ..	Ceded Districts College ..	..	152	8	0
Changanacherry ..	St. Berchman's College ..	..	58	12	0
Coconada ..	Pithapuram Raja's College ..	..	5	12	0

List of Institutions supplied with zoological specimens
during 1930-31—*cont.*

				Value.		
				RS.	A.	P.
Coimbatore	..	Government College	..	4	0	0
Dharapuram	..	Board High School	..	35	4	0
Hosur	..	Do.	..	133	0	0
Madras	..	Presidency College	..	5	8	0
		Madras Christian College	..	64	8	0
		Women's Christian College	..	49	0	0
Madura	..	American College	..	14	0	0
Mangalore	..	The Premier Scientific Com- pany.		51	8	0
Saidapet	..	Teacher's College	..	81	4	0
Salem	..	London Mission High School	..	126	0	0
Vizagapatam	..	Maharaja's College	..	8	8	0
		Miscellaneous	..	2	0	0
Total				3,644	10	0

APPENDIX VII.

[Map of Chingleput, Conjeeveram and Saidapet taluks (showing village wells and ponds inspected, selected and stocked) in 1930-31.]

Survey Register.

(1)	Burvey number.	
(2)	Name of village.	
(3)	Date of preliminary survey.	
(4)	Pond.	Name of
(5)	Well.	
(6)	Burvey number.	
(7)	Size of pond or well	
(8)	Description of pond or well (presence or absence of embank-ments, springs, inlets, etc.).	
(9)	Use to which tank is put.	
(10)	Supply perennial or temporary.	
(11)	Nature of bottom.	
(12)	Source of supply.	
(13)	Whether suitable for pisciculture.	
(14)	Ownership whether (Government, Local Funds, or private.	
(15)	Whether owner is agreeable to take to pisciculture.	
(16)	Date and number of agreement with owners.	
(17)	Remarks.	

Statement showing the names of schools (district, taluk and village in which they are situated), strength, number of teachers, cost of upkeep, etc., West Coast.

APPEN

Statement showing the names of schools (district, taluk and cost of upkeep, etc.,

Serial number.	Name of school.	Taluk.	Village.	Strength.			
				I	II	III	IV
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
South Kanara district—Northern section.				B. G.	B. G.	B. G.	B. G.
1	Byndoor ..	Coondapoor.	Tarapati ..	26 7	12 3	9 3	6 3
2	Kirimanjeshwar ..	Do.	Kodiyeri ..	28 9	9 2	9 3	11 2
3	Navunda ..	Do.	Navunda ..	52 11	14 0	9 0	7 0
4	Malpe ..	Udipi ..	Malpe ..	31 4	17 2	13 1	3 4
5	Uppur ..	Do.	Kullianpur ..	26 9	4 3	9 1	3 2
6	Polippu ..	Do.	Polippu ..	37 12	9 1	6 1	5 0
7	Udayavar ..	Do.	Kanakode ..	Closed in May 1931.			
8	Kaup ..	Do.	Kaup ..	16 5	11 0	8 1	8 0
9	Hooode ..	Do.	Hooode ..	Closed in April 1931.			
10	Kodi ..	Do.	Kodi ..	34 12	10 2	8 0	9 0
11	Malpe Night ..	Do.	Malpe ..	Closed tentatively.			
12	Sri Gnanodaya ..	Mangalore ..	Hoige Bazavar ..	30 22	9 8	11 7	8 5
13	Sandspit ..	Do.	Sandspit ..	23 6	6 2	4 1	2 1
14	Bangramanjeshwar ..	Kasargod ..	Bangramanjeshwar ..	16 12	10 0	3 0	4 0
15	Kumbbla ..	Do.	Arekadi ..	52 48	18 4	9 3	12 1
16	Kizhur ..	Do.	Kalanad ..	13 7	16 11	8 6	1 4
Total ..				384 164	145 38	106 27	79 22

Total—Boys ..
Girls ..

Malabar district—Central section.				B. G.	B. G.	B. G.	B. G.
1	Kavayi ..	Chirakkal ..	Kavayi ..	10 8	4 5	2 3	.. ..
2	Azhicoode ..	Do.	Azhicoode ..	9 12	5 9	7 5	4 5
3	Madapalli (Higher Elementary) ..	Kurumbra-nad.	Madapalli ..	30 31	6 7	14 3	26 3
4	Kuriyadi ..	Do.	Kuriyadi ..	37 28	8 12	9 4	10 7
5	Quilandy ..	Do.	Kovilkandy ..	38 33	26 9	17 14	11 5
6	Kannankaduvu ..	Do.	Kannankaduvu ..	23 11	9 2	4 5	2 3
7	Korapuzha ..	Do.	Korapuzha ..	16 14	9 5	9 4	9 5
8	Pudiappa Day ..	Calicut ..	Pudiappa ..	42 38	18 25	17 17	10 9
9	Pudiappa Night ..	Do.	Do.	17 0	16 0	.. ..	.. ..
10	Calicut Model school ..	Do.	Velayil ..	46 22	13 4	17 0	9 0
11	Calicut Night ..	Do.	Do.	30 0	10 0	7 0	.. ..
12	Naduvattam ..	Ponnani ..	Naduvattam ..	25 12	24 21	14 7	3 1
13	Chaliyam Day ..	Ernad ..	Chaliyam ..	47 22	16 3	14 4	10 1
14	Chaliyam Night ..	Do.	Do.	8 0	2 0	7 0	6 0

DIX IX.

illage in which they are situated), strength, number of teachers, West Coast.

V	VI	VII	VIII	Total number of teachers.	Fisheries training.			Ordinary training.				Number passed out of each school.	Cost of up-keep.
					Secondary	Higher Elementary.	Lower Elementary.	Secondary.	Higher Elementary.	Lower Elementary.	Untrained.		
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
B. G.	B. G.	B. G.	B. G.									B. G.	Rs. A. P.
6 0				2	..	1	..	..	1	..	..	3 3	1,243 0 9
4 1				2	..	2	..	..	..	..	..	3 1	832 13 0
.. ..				3	..	2	..	..	1	..	..	..	848 8 0
4 1				3	..	3	..	..	..	..	..	..	1,456 2 0
2 1				2	..	1	..	1	..	..	..	1 0	844 15 0
7 2				3	..	1	1	..	1	..	..	0 2	1,114 0 7
.. ..				..	..	..	..	..	..	..	..	..	386 0 6
6 1				2	..	1	..	..	1	..	..	3 0	1,299 11 0
7 0				3	..	3	..	..	..	..	..	2 2	628 2 0
.. ..				..	..	..	..	..	..	..	..	..	1,016 15 0
3 5				4	..	4	..	..	..	..	..	5 3	1,378 15 0
3 3				2	..	2	..	..	..	..	..	6 1	796 13 10
.. ..				2	..	..	..	2	..	..	..	..	690 12 0
6 1				3	..	..	2	..	1	..	..	4 0	1,060 0 3
5 5				3	..	..	3	..	..	..	..	..	1,101 7 0
33 20				34	..	19	7	..	8	..	..	27 12	14,697 3 11

77 } = 1,048.
71 }

.. ..	.. ..	.. ..	.. ..	1	..	1	..	..	..	..	..	6 5	501 9 0
5 5	.. ..	.. ..	.. ..	3	..	1	1	..	1	..	..	17 18	1,077 12 0
13 6	15 1	15 0	7 1	8	1	2	2	1	1	1	..	53 13	3,473 15 7
2 2	.. ..	.. ..	.. ..	4	..	2	2	..	..	..	..	23 20	1,591 7 3
9 0	.. ..	.. ..	.. ..	6	..	4	1	..	1	..	..	40 20	2,366 1 2
4 0	.. ..	.. ..	.. ..	2	..	2	..	..	..	..	..	18 4	751 7 0
6 2	.. ..	.. ..	.. ..	2	..	..	..	..	1	..	1	35 15	723 0 0
10 1	.. ..	.. ..	.. ..	5	..	3	..	..	2	..	..	44 45	2,427 6 0
.. ..	.. ..	.. ..	.. ..	..	..	Honorarium.		..	..	..	..	..	181 8 0
.. ..	.. ..	.. ..	.. ..	6	1	3	..	..	2	..	..	..	2,325 6 0
.. ..	.. ..	.. ..	.. ..	1	..	1	..	..	..	..	..	..	467 5 6
.. ..	.. ..	.. ..	.. ..	3	..	1	2	..	..	..	..	61 33	1,191 10 6
6 2	.. ..	.. ..	.. ..	4	..	2	1	..	..	..	1	34 31	1,448 7 9
.. ..	.. ..	.. ..	.. ..	..	..	Honorarium.		..	..	..	..	1 0	163 12 10

Order—No. 1675, Development, dated 20th November 1931.

Recorded.

2. The trawler was in commission for a period of less than six months during the year but the survey conducted yielded very useful results. New trawling grounds have been located on the East Coast and species of fish unknown to the local markets were obtained. The survey has also led to the discovery of new fisheries on both the coasts. The Assistant Biologist appointed towards the close of the previous year worked on board the trawler and controlled the work at the two biological stations on the West Hill and Krusadai the equipment at which was improved during the year.

3. The Government sanctioned the lease of the cannery at Chaliyam for a period of five years but owing to the failure of the sardine season the lessee applied for a reduction in the lease amount fixed by the Government and this has since been agreed to tentatively for a year.

4. The working of the Tanur Experimental Station again resulted in a loss due to the poor fishing season. Experiments were, however, conducted with the remodelled artificial drier which revealed the possibilities of improving its efficiency. The unfavourable season affected also the working of the oil and guano factories on the West Coast. Out of 64 factories in the South Kanara district and 172 factories in the Malabar district which took out licences only 22 factories in Malabar worked during this year.

5. The poor season also adversely affected the working of the public fish-curing yards. The concession given to the coastal villagers to prepare salt for local requirements has, it is reported, not affected the working of these yards but the transactions in these yards, on the whole, have decreased as compared with those of the previous year. This unsatisfactory working is reflected in the cost of maintenance of these yards. In spite of the continuance of the high issue price, it has not been found possible to work these yards without loss, the net expenditure to Government in the working of the yards being Rs. 88,137 against Rs. 76,414 in the previous year. In paragraph 97 of his report, the Director has referred to the unsatisfactory working of some of the curing yards on the West Coast. Subsequent to the close of the year, a few of the unsatisfactory yards were ordered to be closed by the Director owing to the continued loss in their working. The curers of those yards have, however, represented to Government the inconvenience caused by the closure. In two cases, orders have issued to reopen them provided the loss in their working could be recouped to Government by the curers and the

question of issuing similar orders in the case of the rest is under consideration.

6. There was no pearl fishery during the year. The annual inspection of the pearl banks showed that the banks were barren. The special investigation of the chank beds off the Tanjore Coast has led to the discovery of six new chank beds of considerable economic value. There was a reduction of nearly 145,000 in the chanks fished off the coast of Tinnevely due to the cessation of fishing in the last two months of the financial year 1930-31. The catches of the season have not yet been sold owing to depression of the chank market.

The Government are glad to note the successful results of the continued experiments with the Japanese diving apparatus.

7. The departmental fish-farms continued to do useful work. Experiments in establishing catia have yielded very encouraging results and the stocking of gourami has also proceeded satisfactorily. The administration of the inland fisheries has yielded during the year a profit of Rs. 19,100 against the loss of Rs. 7,600 in the previous year. In connexion with the development of inland pisciculture, the year witnessed the working of the scheme inaugurated towards the close of last year for undertaking propaganda for stocking rural ponds and wells. The Assistant Director and staff sanctioned for the purpose carried on propaganda work throughout the year, and the description of the work given in section VIII-A of the Director's report shows that it is possible to awaken an interest not only among individuals but also among public bodies owning private waters in the possibilities of developing pisciculture as an important remunerative industry. Though for financial reasons it has been found necessary to disband the special staff, it is hoped that the department would through the existing organization of the inland section be able to render whatever help may be needed for the continuance and development of this work in suitable areas.

8. The education of fisher children made steady progress in the year. In spite of a decrease of two in the number of schools, the strength of boys and girls increased by nearly five hundred. Several schools require additional staff; and want of accommodation handicaps expansion in some others. But greater progress cannot be hoped for under the present financial conditions.

The working of the co-operative societies has not improved. On the other hand, there seems to be a deterioration owing to the economic condition of the fishermen having been worsened by a series of poor fishing seasons.

* 9. The Aquarium at Madras attracted as usual a large number of visitors their number however being smaller than in the last year. The net revenue during the year was Rs. 949 against Rs. 970 in the previous year.

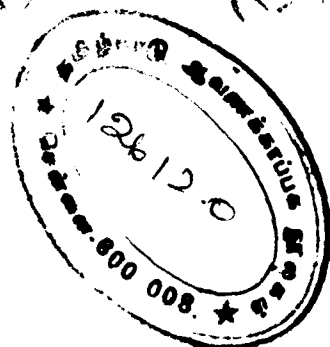
The Oyster-farm at Pulicat also earned a revenue of Rs. 281 as against Rs. 229 of last year.

10. The working of the department in the year ended in an increased net expenditure of Rs. 3,16,400 against Rupees 1,78,600 in 1929-30. The expenditure of most of the sections has been kept low but there has been a noticeable fall in the revenue in the pearl and chank fisheries section which has been accounted for in paragraphs 180 and 305 of the Director's report.

(By order of the Government, Ministry of Education and
Excise)

S. V. RAMAMURTI,
Secretary to Government.

To the Director of Fisheries.
„ the Local Self-Government Department.
„ all Collectors.
„ the Board of Revenue (Land Revenue and Settlement).
„ the Collector of Salt Revenue.
„ the Law (Education) Department.
„ the Public Works and Labour Department.
„ the Public Department.
„ the Finance Department.
„ the Registrar of Co-operative Societies.
„ the Director of Agriculture.
„ the Accountant-General.
„ the Director of Commercial Intelligence (with C.L.).
„ the Government of India, Commerce Department (with C.L.).
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