E.C. No. 531

ESTIMATES COMMITTEE
(1967-68)

THIRTY-EIGHTH REPORT

(FOURTH LOK SABHA)

Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture)—Central Institute of Fisheries Technology, Ernakulam

LOK SABHA SECRETARIAT
NEW DELHI
March, 1968
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C_O_R_R_I_G_E_N_D_A

TO

Thirty-Eighth Report (Fourth Lok Sabha) of Estimates Committee on the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture) - Central Institute of Fisheries Technology, Ernakulam.

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Page 10, para 1.13, line 2, for 'nets' read 'boats'

Page 11, para 1.15, line 4, for 'fabourable' read 'favourable'

Page 13, para 2.1, insert 'Members' against item (8).

Page 14, para 2.4, line 7, for 'monts' read 'months'

Page 18, para 2.15, line 20, for 'defectives' read 'defects'.

Page 21, para 2.25, insert 'Gear' immediately above para No. 2.25.

Page 21, para 2.26, delete 'Gear' immediately above para No. 2.26.

p.t.o.

Page 30, para 2.48(4), line 1, for 'Ghandhisagar' read 'Gandhisagar'.
Page 40, para 3.2, line 2, for 'Analysis' read 'Analysist'.
Page 40, para 3.3, line 2, add 'in' between 'stated' and 'a'.
Page 49, para 4.1, line 5, for 'Bhurla' read 'Burla'.
Page 51, para 4.10, line 2, for 'rgard' read 'regard'
Page 58, para 4.22, line 6, for 'Snb-stations' read 'Sub-stations'
Page 74, Serial No.6, line 7-8, for 'manunfactured' read 'manufactured'.
Page 77, Serial No.16, line 7, for 'form the results achieved by the Institute to in-' read 'from year to year due to lack of adequate staff.'
Page 79, Serial No.20, line 6, for 'Cotinuance' read 'Continuance'.
Page 82, Serial No.4, line 6, for 'therefrom' read 'thereon'.

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(1967-68)

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Shri K. D. Chatterjee—*Under Secretary.*

INTRODUCTION

I, the Chairman, Estimates Committee, having been authorised by the Committee to submit the Report on their behalf, present this Thirty-Eighth Report on the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture)—Central Institute of Fisheries Technology, Ernakulam.

2. The Committee took evidence of the representatives of the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture) and Central Institute of Fisheries Technology, Ernakulam on the 22nd November, 1967. The Committee wish to express their thanks to the Secretary, Joint Secretary and Joint Commissioner (Fishery), Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture), Director, Central Institute of Fisheries Technology, Ernakulam and other Officers of the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture) and Central Institute of Fisheries Technology, Ernakulam for placing before them the material and information they wanted in connection with the examination of the estimates.

3. They also wish to express their thanks to Shri Kurwath Damodaran, Vice-Chairman of the Marine Products Export Promotion Council, Ernakulam, Shri R. Madhavan Nayar, Ex-President, Seafood Canners and Freezers' Association of India, Cochin, and Dr. N. K. Panikkar, Director, National Institute of Oceanography, Council of Scientific and Industrial Research, New Delhi for giving evidence and making valuable suggestions to the Committee.

4. The Committee also wish to thank Shri Muthu-Kannappan, Member, Central Board of Fisheries, Dr. S. B. Setna, Managing Director, New India Fisheries Ltd., Bombay and Kerala Fisheries Corporation Ltd., Ernakulam for furnishing Memoranda to the Committee.

5. The Report was considered and adopted by the Committee on the 22nd February, 1968.

6. A statement showing the analysis of recommendations contained in the Report is also appended to the Report (Appendix III).

P. VENKATASUBBAIAH,
Chairman,
Estimates Committee.

NEW DELHI;
March 4, 1968.

Phalguna 14, 1889 (*Saka*).

CHAPTER I

GENESIS AND OBJECTIVES

A. Historical Background

1.1. The present annual production of fish in India reached about 1.34 million tonnes in 1965 of which about 62 per cent was obtained from the sea. The quantity is relatively small compared to the potentiality of seas and oceans around India and her vast inland water areas.

1.2. Until recently fishing in Indian seas was confined to a narrow coastal belt, 11—16 kms. in width and the rich offshore and deep waters remained completely unexplored and unexploited. This was largely due to the inadequacy and unsuitability of the fishing craft and gear in use. Further, over 49 per cent of the fish landings are sun-dried, salted or pickled for future consumption. But the curing processes are by and large unscientific and the product is generally poor in quality. A good part of the landings in different parts of the country gets spoiled owing to lack of adequate transport and preserving facilities and is used as manure or otherwise disposed of.

1.3. Hence, the scientific exploitation of the fishery resources is not only important for meeting the acute shortage of protein foods in India but is also necessary for raising the socio-economic status of the fishermen numbering about a million, who constitute one of the poorest and most backward communities. These objects can be achieved by increased catch of fish by application of techniques and equipment which are to be developed through research and development in crafts and gear suitable under local conditions. Storage, transport and preservation of the landed fish form an integral part of any scheme for exploitation of fisheries. The development of these facilities on scientific lines is to be based on studies on the causes of spoilage of fish, effect of different treatments on the nutritive value and consumer acceptance of the product, development of better processes and techniques for preservation, utilisation of by-products of processing industries, etc.

1.4 Fish and fish products have also proved to be a valuable foreign exchange earner. The earnings of foreign exchange through export of preserved and frozen fish and fish products have steadily increased in recent years. The table below gives the total export

earnings from fish and fishery products during the period 1960-61 to 1966-67:

Year	Quantity in Kg.	Value in Rs.
1960-61	199,12,523	461,86,646
1961-62	157,05,250	391,26,287
1962-63	108,61,634	408,12,467
1963-64	183,96,357	571,35,511
1964-65	196,56,512	681,77,446
1965-66	144,89,203	659,14,490
1966-67	201,50,897	1639,00,739

The export market in preserved fish is highly quality conscious and competitive. To retain and extend the volume of export of fishery products, pre-shipment inspection and quality control measures are deemed to be necessary.

1.5. In appreciation of the pressing need for co-ordinated research in various aspects of fishery technology, for the overall development of fishery industry in India, the Central Institute of Fisheries Technology was set up at Cochin (Ernakulam) in 1957 by Government.

1.6. As the type of fish and fishing conditions vary in different regions of India, it was also decided to set up Sub-stations and Units of the Institute at different representative localities to take care of specific fishing and processing problems of the region. Accordingly, Sub-stations have been set up at Veraval (Gujarat), Kakinada (Andhra Pradesh) and Burla (Orissa) and Units at Bombay, Calicut, Goa and Gobindsagar. One Mobile Unit has also been formed to attend to short-term exploratory and experimental gear work at various places in the country.

1.7. The Institute was directly under the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture) till September, 1967. It was transferred to Indian Council of Agriculture Research on the 1st October, 1967.

1.8. Asked whether any Project Report was prepared before the Institute was set up, the representative of the Ministry has stated during evidence that there was no Project Report as such for this Institute. It was actually established in two stages. In the first stage, Craft and Gear Wing was set up, based on the advice of an expert from F.A.O. who had come to India and looked into this problem. A couple of years later, the Processing Wing was started, based on the advice of a F.A.O. Expert.

1.9. Asked whether at the time of setting up the Institute, the technological research being done in various States was taken into account, the representative of the Ministry has stated as follows:—

> "There were some States, like Madras, which were carrying on the technological work piecemeal. There has been no coordinated effort. when the planning of the Institute was done, naturally there was an estimate of the work that was going on and the work that should be taken up in future. There has not been much duplication."

In reply to a question, the representative of the Ministry has stated:

> "This Institute has a very specific responsibility when fish is produced in large quantities. The purpose was two-fold; firstly to evolve better craft and better material for fishing; secondly to process the fish in a manner which will be economical and the production will be marketable."

He has assured the Committee that there had been specific planning although no Project Report as such was drawn up by a Study Team especially appointed for the purpose.

1.10. The Committee realise the importance of an institute devoted to fisheries technology for the proper exploitation of the fishery resources not only for providing protein food to the people but also for augmenting the exports of fisheries products so as to earn valuable foreign exchange. Viewed in this context, the establishment of the Central Institute of Fisheries Technology can be considered to be a landmark in the development of fisheries in the country. The Committee note that no Project Report was prepared and published prior to the establishment of the Institute. They need hardly emphasise the desirability of preparing comprehensive project reports before any Institute of this magnitude is set up. Unless this is done, there is every likelihood of uncoordinated growth and development of various Wings of the Institute resulting in lopsided development of the entire Institute.

B. Achievements

1.11. It has been stated that the research work at the Institute including its Sub-stations and Units is carried out in two Wings—Craft and Gear Wing and Processing Wing. The third Wing, the Extension, Information and Statistical Wing, renders a very useful service by functioning as a liaison between the Institute and the Industry.

1.12. The achievements made by the Institute through its various sections have been stated to be as follows:—

Craft and Gear Wing

Gear Branch

(1) *Gear Materials Section*:

(i) Quality standards have been prescribed for nylon twines manufactured in the country and the standards have been worked out for soft, medium, hard and extra hard cotton twines for different types of gear.

(ii) An empirical formula has been worked out for estimating the weight of webbing and thereby the weight of materials required for net. This will help the fishermen to plan for the requirement of materials for their nets.

(iii) A particular grade of Indian hemp has been found to be equally good as Italian hemp imported for 'Dara' gill nets.

(iv) Improved and more effective methods of preservation of cotton fishing nets have been evolved and recommended.

(2) *Fishing Methods Section*:

(i) Designs of different types of trawl nets for prawns and fish for operation from vessels ranging in horse power between 10 to 30 B.H.P. and several designs of gill nets, and different other types of gears have been prepared and these have been adopted by the fishing industry in the country. Suitable gears for inland fishery have also been developed.

(ii) Experimental shrimp trawling in the Bay of Bengal has revealed larger scope for the fishery in that area. In Veraval area two distinct prawn fishing grounds could be located for commercial exploitation. Experimental shrimp trawling off the Kathiawar coast has shown increase in the catches of prawns by selective methods of operation.

(iii) Fishing operations conducted in Gobindsagar reservoir have resulted in locating a number of highly productive fishing grounds in the upper as well as lower reaches of the reservoir. Similar investigations in the reservoir at Burla have shown a number of potential fishing grounds in the middle reaches of the reservoir.

(iv) Framed gill nets have been successfully introduced for the exploitation of the sparsely populated reservoir fishery.

(v) Trolling with lines, a cheap method of fishing has been popularised at a few centres. Artificial jigs of different designs and of indigenous origin have been introduced in the trolling operations.

Craft Branch

(1) *Boat Design Section*:

(i) Twelve standard designs of mechanised fishing boats between 7.67 M (25 ft.) and 16.35 M (50 ft.) length overall have been prepared and have been adopted by the State Fisheries Departments and private fishing industry. Besides, designs of fishing boats for operation in large reservoir and rivers as well as those for specific purposes have been prepared. More than 1,500 boats built according to the designs prepared by the Institute are in operation for commercial fishery in the different maritime States of India.

(ii) With the introduction of air-cooled engines, instead of water cooled ones, in fishing boats, the specific installation drawings prepared in case of different types of engines have helped in overcoming the difficulties experienced by boat builders during engine installation.

(iii) The more frequent wave parameters in the seas have been found out and are being applied in boat designing work.

(iv) An accurate basis for estimating the material and labour for building wooden fishing boats has been worked out.

(2) *Craft Materials Section*:

(i) Venteak, a cheaper wood, has been found to be a suitable timber for the construction of mechanised fishing boats in place of the more expensive timbers like Teak, Aini, etc.

(ii) Aluminium-magnesium alloy, available indigenously, was demonstrated to be suitable as a sheathing material for wooden hulls in place of the conventional and more expensive copper sheets that have to be imported.

(iii) From the construction of two prototype fishing boats (9.21 M and 15.35 M) at this Institute, it has been clearly demonstrated that a considerable reduction in the overall cost of fishing boats can be achieved by using Venteak. G.I. fastening aluminium alloy (for sheathing) and cast iron fittings.

(iv) A suitable painting schedule for the underwater aluminium-magnesium alloy sheathing of boats has been worked out.

(v) Galvanic protection measure has been worked out for use of aluminium alloy in sea water, apart from measures for preventing fouling.

(vi) Possible conditions of stray current corrosion in wooden fishing vessels were studied and remedial measures have been recommended.

(vii) It has been observed that indigenous natural resins can be used in the preparation of surface coatings of wooden structures in fishing boats in place of the imported resin Damaar battu. Five indigenous resins have been recommended so far. A suitable surface coating preparation incorporating Sal dammar (an indigenous natural resin) has been formulated.

(viii) Fibreglass chopped strand mat in conjunction with polyester resin has been found to be a good sheathing material for inside of fish hold.

(3) *Mechanical Engineering Section*:

(i) A method of proper selection of propellers in case of small trawlers for increasing the trawling performance and a method of predicting the towing pull have been developed.

(ii) The correct method of ventilation of engine rooms with air-cooled engines in fishing boats of the Institute's design has been prescribed.

(iii) A power-take-off clutch has been designed, fabricated and tested for the power transmission to winches in small boats.

(iv) An equipment has been designed and successfully tried for deweeding of smaller heels and tanks.

(v) An impulse generator has been designed and fabricated.

(vi) Some under-water lamps have been designed and fabricated. Navigation lights using anodised aluminium have also been developed.

(vii) A simple instrument was developed for measurement of the working depth of fishing gear.

(viii) An instrument has been developed for measurement of fuel consumption in marine engines.

(ix) By testing a number of Indian woods, it has been observed that "Andaman Bullet Wood" can be used as stern bearing.

(x) A number of designs of winches and other mechanical fishing accessories like gallows, gurdy etc. have been prepared and are regularly supplied to the fishing interests.

(xi) A simple bilge pump using rubber impellers was designed, fabricated and tried with satisfactory results.

Processing Wing

(1) *Chemistry Section:*

The studies carried out at the Institute on fresh and ice stored fish and shell fish have brought out (a) the optimum conditions of icing; (b) optimum period of ice storage in relation to suitability for processing; and (c) the nature and extent of losses by leaching during ice storages.

(2) *Bacteriology and Microbiology:*

(i) Methods of quick approximation as well as accurate determination of bacterial load in fresh fish products have been developed. Methods have also been developed for very quick and accurate estimation of E. Coli in fresh and processed fish products.

(ii) The optimum heat treatment conditions have been determined for destruction of salmonella organisms encountered in fish meal produced from sun dried fish.

(iii) A successful method has been developed for the preservation of fish wastes and trash fished in liquid form. Preservation is effected either by mineral acids or by lactic produced by lactobacillus organisms added to the fish under controlled conditions.

(3) *Processing and Engineering Section:*

(i) Cheap insulated containers were developed and tried successfully for transport of iced fish over long distances. These types of containers have been adopted by the industry and are in use particularly in Veraval area for transport of fish in internal markets like Delhi, Punjab, Assam, etc.

(ii) Frozen fish packed in insulated containers developed at the Institute could be successfully transported over long distances during a journey involving upto 4 days in ordinary railwagons. After reaching the destination the fish which would be in the thawed state can be distributed as fresh fish soon or can further be stored in ice for 2-3 days if needed prior to distribution.

(iii) Methods have been standardised for canning of prawns, other crustanceans like clams and mussels, lobster meat, marine fishes like sardine, tuna, mackerel, pomfret, seer fish, lactaris etc. and fresh water fishes like minor carp and catla.

(iv) Methods of freezing prawns, lobsters, froglegs and fishes like sardine, mackerel, pomfret, marlin and lactarius have been worked out.

(v) A process for extraction of fin rays from dried shark fins developed in the Institute makes it possible to prepare the product in the country.

(vi) A process was developed for production of laminated Bombay duck. The method recommended to the processors was well received for production of liminated Bombay duck for export.

(vii) Considerable improvement in the method of drying of Bombay duck was achieved as a result of demonstrations of the better technique worked out by the Institute.

(viii) Importable thermister thermometer was developed for studying the temperature fluctuations in consignments of frozen prawns transported from freezing plants to the port of shipment.

(ix) Different types of fish dryers—tunnel type and rotary drum type—have been designed for drying fish products.

(x) The technique of dehydration of prawns in rotary drum dryer whereby drying and deshelling of the prawns are carried out simultaneously was tried commercially and the product was well received in the market.

(xi) The half ton rotary fishmeal dryer got fabricated as per the design made by the Institute was successfully tried and was then handed over to a State Fisheries Directorate for further trials.

(xii) Methods have been worked out for the preparation of speciality products from fish and shell fish *viz.*, shrimp extract, crab concentrate, fish noodles, fish soup powder, fish flake, breaded fish etc.

(4) *Fish Curing*:

(i) A standard method has been specified for preparation of "Mass Seen", a traditional product prepared in Laccadives from tuna fish.

(ii) It has been shown that mixed preservatives containing sodium proportionate are very effective in preventing red halophillic and fungal attack on cured fishery products.

(iii) Suitable containers were developed for packaging cured fish products so as to increase shell life, after study of the different kinds of package materials commonly used.

(5) *By-products Sections*:

(i) A method has been worked out for preparation of fish protein concentrate.

(ii) Method was worked out for preparation of bacteriological peptone from trash fish. The method can be of importance in view of requirements of the product which is at present mainly imported.

(iii) A method has been worked out for preparation of commercial factice (mineral rubber) from sardine oil.

(iv) Printing ink prepared with heat-bodied and partially vulcanized sardine oilgrease was successfully tried for printing work and it compared well with commercial ink.

(v) A variety of products with water repellent as well as lubricating properties were prepared from heat-processed sardine oil.

(6) *Quality Control and Inspection*:

(i) Considerable improvement has been achieved from the point of view of quality of processed fishery products in the country. The extent of contamination of the products at different stages of processing was assessed and preventive measures suggested to the industry. The quality was judged at every stage and defects pointed out alongwith suggestions for overcoming them.

(ii) More efficient cleaning schedules suitable to the conditions existing in primary fish processing centres as well as factories have been worked out and demonstrated at different fish processing centres in the country. Schedule of cleaning of fishing boat decks, fish holds etc. has also been worked out.

(iii) A method of deodourisation of fish boxes, insulated and refrigerated fish carrier wagons etc. has been evolved.

(iv) A humane method has been developed for cutting legs for processing from live frogs. The technique recommend to the industry was well received and it should replace the cruel method of cutting the legs followed at present.

(v) Methods of quick approximation as well as accurate determination of bacterial load in fresh fish products have been developed. Methods have also been developed for very quick and accurate estimation of E. Coli in fresh and processed fish products.

(vi) Standards for quality of different processed fish products like frozen and canned prawns, frozen frog legs, frozen lopsters, canned sardine, mackerel, pomfret, tuna, dried Dara and Ghel, Laminated Bombay duck etc. were worked out.

1.13. Questioned as to the extent the technological research carried out by the Institute has been instrumental in the production or manufacture of indigenous materials or equipments and the estimate of foreign exchange saved as a result thereof, the Ministry in a written note submitted to the Committee have indicated the following research results achieved by the Institute which have got a direct bearing on the savings in foreign exchange:

(i) The mechanised fishing boats are constructed in the country mostly according to the designs prepared by the Institute. The standard design drawings of boats upto 15.35 length prepared, and the technical assistance and guidance given to the fishing boat building in the country made it possible to construct different sizes of boats within the country.

(ii) By the use of aluminium-magnesium alloy for sheething hulls of wooden fishing nets as recommended by the Institute instead of the imported copper sheets, the saving in foreign exchange that can be achieved during the Fourth Plan period is estimated to be Rs. 6 to 7 crores.

(iii) About 35 per cent saving in the overall cost of construction of mechanised fishing boats can be achieved by using the cheap substitutes recommended by the Institute instead of the conventionally used costlier materials.

(iv) The technical assistance and information on the exact requirements of engines for marine duties given to five Indian manufacturers of engines (to three of them for developing the engines and to others in respect of evaluation tests and suitable installation arrangements in fishing boats) helped the fishing industry in the country in adopting the available indigenous engines for fishing boats. The import of marine engines for fishing boats is being reduced considerably.

(v) The mechanical fishing accessories like trawl winches for different sizes of boats, gurdy etc. designed at the Institute made it possible to manufacture these accessories within the country. Import of trawl winches for fishing boats has been completely stopped during the past few years.

(vi) By the use of indigenous natural resins instead of imported resin "Dammer battu" for application on wooden fishing boats. It is estimated that a saving in the order of Rs. 3 lakhs as foreign exchange can be made per year on an average.

(vii) A particular grade of Indian hemp has been found to be equally good as Italian hemp imported for manufacture of gill nets

for "Dara" fish. By the use of the substitute recommended, it is possible to do away with the import in this respect.

(viii) Nylon twines for fishing nets in India is manufactured mostly according to the specifications worked out and recommended by the Institute. Requirement of nylon twines for fish nets is now mostly met by the indigenous production.

(ix) The process for extraction of fin rays from dried shark fins developed at the Institute makes it possible to prepare the product in the country.

1.14. Asked what has been the impact of the researches undertaken by the Institute on the exploitation of fishery resources and the socio-economic status of the fishermen, the representative of the Ministry has stated during evidence as follows:—

> "More than 1500 mechanised wooden fishing boats used in India at present are according to the designs supplied by the Institute. Use of the substitutes recommended by the Institute have helped to reduce the cost of construction and maintenance of fishing boats. Use of suitable fishing gear evolved by the Institute has helped to increase the efficiency of fishing operations. Then, it has helped in improving the quality of canned and frozen products which are exported."

1.15. The Committee have been further informed that Government has been trying to improve the lot of the fishermen by forming cooperatives and helping the cooperatives with boats and nets at fabourable terms. Shore facilities have also been provided to them. However, this Institute as such has not directly improved the "Socio-economic status" of the poor and backward communities of fishermen. It has to be done by further extension work. It will be too much to claim that this Institute has done this very substantially.

Asked whether any socio-economic survey of the fishermen's population is being done by the Institute, it has been stated during evidence that "No specific survey is made in regard to this by the Institute, but surveys have been made in regard to some other Institutes. It is not possible to make a survey in regard to the socio-economic impact of this particular Institute because the effect of scientific research is indirect. In the case of Indo-Norwegian Project in India, socio-economic survey has been made."

1.16. Asked to state the commercial value of the various investigations made by the Institute, the Committee have been informed during evidence as follows:—

> "We have got certain substitutes in respect of the boats and use of gum, resins, fishing gear, etc. They are far superior

to what was being used before in this type of fishing and the processing methods. We have improved them. Our exports now are able to compete under the standards which many of the foreign countries are now imposing. We have introduced bacteriological tests, because certain exports were refused by some countries because of suspicion of this thing.

1.17. It has been further stated that "The cooper which was imported has been replaced by certain local materials after some research and that has been adopted by and large in the field. That is saving us about Rs. 3,500 to Rs. 5,000 of foreign exchange in each case and that itself will amount in our Fourth Plan targets to a little over Rs. 3 crores."

It has been further stated that one of the main objectives of the Institute is to lower the capital cost of the boats, gear etc. used by the poor fishermen.

1.18. The Committee note the achievements of the Central Institute of Fisheries Technology. They, however, feel that the impact of such an Institute should be judged by taking into consideration the increase in catches of fish by application of better and cheaper techniques, craft and gear, reduction in wastage by better and developed methods of storage, transport and preservation of landed fish and by examining to what extent the research conducted by the Institute has resulted in the utilisation of cheaper and easily available indigenous materials which could be used even by the poor fishermen or their associations. From this point of view, the Committee feel that there is a real need for undertaking a survey to assess the impact of the researches undertaken by the Institute for the exploitation of fishery resources and for raising the socio-economic status of fishermen. The Committee suggest that the Ministry may devise a suitable methodology for conducting such a survey at an early date.

1.19. The Committee would also stress the need for export-oriented research in the various investigations, with regard to the production of quality items having consumer and market preferences. The Committee hope, the Institute would keep these objectives in view while drawing up research projects.

CHAPTER II

RESEARCH

A. Research Programmes

Research Committee

2.1. It has been stated that the Research Committee is entrusted with the task of drawing up programmes of fisheries research work throughout the country, advise on measures considered necessary for coordination of such work undertaken by Central and State organisations as well as by Universities, with a view to avoid duplication as far as possible. The functions of the Research Committee are advisory. The composition of the Research Committee is as follows:

(1) Joint Commissioner (Fisheries) to the Government of India	Chairman
(2) Director, Central Marine Fisheries Research Institute, Mandapam Camp	Member
(3) Director, Central Inland Fisheries Research Institute, Barrackpore	Member
(4) Director, Central Institute of Fisheries Technology, Ernakulam	Member
(5) Director, Central Institute of Fisheries Education, Bombay	Member
(6) Superintending Engineer, Deep Sea Fishing Station, Bombay	Member
(7) Three representatives of Maritime States (to be nominated by the Central Government in rotation)	Members
(8) Three representatives of Non-maritime States (to be nominated by the Central Government in rotation)	
(9) Two representatives of the Universities not below the rank of Professor (Zoologists) to be nominated by the Inter-University Board	Members
(10) One representative of the Council of Scientific and Industrial Research (Indian Ocean Expedition)	Member

(11) One representative of the Zoological Survey of India, Calcutta.	Member
(12) Deputy Commissioner (Fisheries Planning) to the Government of India.	Member Secretary

The Committee may co-opt not more than three eminent Research workers, if necessary.

2.2. The Committee find from the composition of the Research Committee that there are no representatives from fishery industry on it. Modern fisheries is as much an industry as a social welfare activity. The Committee, therefore, need hardly stress the desirability of having one or two representatives of fishery industry on the Research Committee so that they may make useful contribution to the deliberations of the Committee for the development of fishery industry in the country.

2.3. The Committee do not know whether the Indian Council of Agricultural Research to which the Institute has now been transferred, would like to be guided by the advice of the Standing Research Committee of the Ministry in matters relating to Fisheries technology. In any case, the Committee would like to be assured that technological research would continue to receive the closest attention it deserves and that efforts would be made to avoid duplication and overlapping in the field of technological research being done by various Central and State Institutes as well as by the industry.

Research Programmes

2.4. The number of research problems investigated by the Institute during the past three years which took different periods for solution is stated to be as follows:—

	Processing Wing	Craft and Gear Wing
Solved within 3 months . . .	10	10
Solved within 6 months . . .	45	3
Which took more than one year . .	27	30

2.5. Asked how many research projects were taken up by the Institute (i) *suo motu;* and (ii) on the request from the industry during the Third Plan period, it has been stated in a written note furnished to the Committee that all projects have been taken up *suo*

motu by the Institute but problems, as they come up in the industry, are referred to the Institute for carrying out short-term investigations.

2.6. It has been further stated that ten projects have been carried forward from the Third Plan period and seventeen projects have been added. A number of problems in each of the ten projects carried over were completed in the Third Plan period. Work on other problems is continuing. The details of those projects are as follows:—

S. No.	Title of major project	Reason for spill over
1.	Biochemical Investigations on Fresh Fish and Shell Fish.	All the projects were carried over to the IVth Plan period as the projects were started during the IIIrd plan period and the scheduled date of completion lies in the IV th Plan period. Hence the spill over.
2.	Bacteriological Investigations on Fish, Shell Fish and Processed, fishery products.	
3.	Preservation and Transportation of Fishery Projects.	
4.	Freezing characteristics of Tropical Fish and Shell Fish.	
5.	Factory Sanitation and Quality control.	
6.	Set net.	
7.	Improvements in the Design of Gill nets.	
8.	Lines.	
9.	Electrical Fishing.	
10.	Weed-control in inland waters by mechanical apparatus.	

2.7. Asked what is the average time taken in the solution of a problem referred to the Institute, it has been stated in a written note submitted to the Committee that the time taken for the solution of a research problem depended on the nature of the problem. Broadly the problems can be classified as short-term and long-term problems. As example of the former type may be mentioned the blackening in the particular consignment of a canned prawn and rapid spoilage of a particular lot of canned product. Examples of the latter type

include the high bacterial counts encountered in frozen prawn products, incidence of faceal indication organisms in frozen products, etc.

2.8. Asked how it is ensured that the research programmes are completed in the stipulated time, the representative of the Institute has stated during evidence that progress reports on each of the research programmes are submitted to the Director. In the progress reports, it is indicated what is the amount of work which is supposed to be done in a particular time and what has actually been done. If there is any shortfall, the reasons therefor are also given.

2.9. The Committee have also been informed that at the beginning of the year when the project is started, a list of accessories required such as equipment, facilities, personnel, etc. is drawn up. In the light of these requirements, the project is approved. The project report which is submitted every month, also gives an account of the difficulties which are likely to crop up. If there is any difficulty either with regard to the equipment or with regard to the research workers which has not been visualised earlier, then that may necessitate alterations in the project. The Project committee which consists of the senior most officers of the Institute goes into the details and the difficulties that have been mentioned and then makes recommendations and the Director takes administrative action on the basis of those recommendations.

2.10. Asked to mention one or two instances where the research programmes have been completed in the stipulated time, the representative of the Institute has stated as follows:—

> "In the case of production of bacteriological peptone, we have been able to do it in time. The production has come up to laboratory scale. Then regarding the designing of boats there is a schedule and we have completed all the designs in time, so far as boats upto 50 ft. are concerned. About the work on replacement of the costlier wood by cheaper wood, this was completed according to time."

2.11. The research programmes which could not be completed in time during each of the last three years have been stated to be as follows:—

Name of the Project	Year in which the project started	Reasons for not completing in time
1	2	3
1. Bacteriological Investigations of fresh fish-Bacteria generated in fish during ice storage	1964-65	The study is of seasonal character and to draw conclusive results the work had to be extended.

1	2	3
2. Trawl Fishing : Belly Depth Studies.	1964-65	The results were not conclusive.
3. Studies on set nets.	1964-65	Not completed as there was difficulty in operating the net in the place seleced (Malpe) due to the irregular appearance of shoals.
4. Canning of Fish Products Sloughening Phenomena in canned prawns	1965-66	For conclusive results the studies had to be extended.
5. Designing of a suitable single pack wash primer using easily available raw materials.	1966-67	For conclusive results it was found necessary to carry out investigations using the salt spray cabinet the fabrication of which could not be completed in time.
6. Testing of engines and accessories (i) Testing of Kerosene Engines	1966-67	The project leader was on long leave and there was no suitable associate who could continue the trials.
(ii) Experiments on stern bearings.	1966-67	The Motor used in the experiments required major repairs and hence the project had to be extended.

2.12. As regards steps proposed to be taken for improvement in the working of the Institute it has been stated in a written note that "More attention is being paid to organise the research project-wise with definite objective and time-limits for completion. Distribution of work in a project and fixation of responsibility for execution are being done. However, successful execution of project in time depends on timely supply of materials and equipment, adequate library and reference facilities and proper incentive to junior workers. Many of these requirements could not be adequately met in the past due to mainly lack of funds."

2.13. The Committee regret to note that some of the research programmes could not be completed within the stipulated time and successful execution of projects was hampered by delay in supply of materials, equipment, etc.

2.14. The Committee are of the view that the completion of research programmes within the stipulated time is a proof that the

research has been conducted smoothly and economically. They would, therefore, stress that as proposed by the Institute, the research should be organised project-wise with definite objectives and time-limits for completion laid down. For this purpose a comprehensive list of the pre-requisites necessary for a particular research programme should be drawn up and arranged in time so as to avoid any difficulties later on. It is also desirable that the economics of the projects are worked out as far as possible, both on a short term and long-term basis, before they are taken up.

The Committee trust that the Indian Council of Agricultural Research, to which the Institute has been transferred, would take suitable measures to remove the difficulties in the way of successful execution of projects.

B. Craft and Gear

Mechanised Boats

2.15. A reference has already been made earlier to the construction of mechanised fishing boats in the country mostly according to the designs prepared by the Central Institute of Fisheries Technology. Mention has also been made about the use of aluminium—magnesium alloy for sheathing hulls of wooden fishing boats, as recommended by the Institute, instead of the imported copper sheets, resulting in an estimated saving in foreign exchange during the Fourth Plan period to the tune of Rs. 6 to 7 crores.

The Ministry have stated that this amount of Rs. 6 to 7 crores represents the total saving and not for aluminium sheathing only. The calculations are based on a saving of Rs. 4,000 worth of copper sheets for 8,000 boats (Rs. 3.2 crores) and Rs. 4,000 worth of winches for 6,000 boats (2.40 crores). There will be other savings on account of hemp, dammar battu etc. The Institute has got its wooden boat hulls sheathed with magnesium aluminium alloy in place of copper. On the recommendations of the Institute, some of the State Fishery Departments have also started using this method. Some complaints were received from the State Fishery Departments that such sheaths were getting detached from the wooden hulls. The Institute has investigated this problem and defectives in fixing this aluminium sheathing have been pointed out. It has now been agreed that the Institute will, under its own supervision, have the sheathing done in Madras and Kerala States for the departmental boats of those States and the performance will be again examined.

2.16. The Committee desired to have a note on the cost structure of a mechanised fishing boat and the resultant savings due to the

researches made as well as the system of supplying the boats to the fishermen in various States. The position, as explained by the Ministry, has been stated in the succeeding paragraphs.

2.17. The cost of a 32 ft. fishing boat, for example, (excluding engine but including winch, fishing gear, navigational and life saving equipments) when constructed out of the conventionally used timber "Aini" (*Artocarpus hirsula*) and with copper sheathing and copper/brass fastenings and fittings is estimated to be Rs. 34,000; whereas when constructed out of Venteak and using aluminium-magnesium alloy (for sheathing) and galvanised iron fastenings and cast iron and mild steel fittings as recommended by the Institute, the cost of the boat is estimated at Rs. 24,000, thus resulting in a saving of Rs. 10,000 in the construction of the 32 ft. boat.

218. The cost structure of a 32 ft. fishing boat for example can be seen from the following statement:

Items	32 ft. boat constructed using the cheap substitutes recommended by the Institute	32 ft. boat constructed out of the conventionally used materials
Numbar . .	Venteak 560 cu. ft. @ Rs. 7/- per cu. ft. =Rs. 3,920	Aini 520 cu. ft. @ Rs. 13/- per cu. ft. Rs. 6,760/-
Labour	1200 M.D. @ Rs. 5·50 per M.D. =Rs. 6,600/-	1100 M.D. @ Rs. 5·50 per M.D. =Rs. 6,050/-
Fastenings & fittings . .	G.I. Fastenings Cast iron and M. G. fittings=Rs. 2,000/-	Copper fasteings, copper/ brass fittings=Rs, 6,000/-
Sheathing .	Aluminium Magnesium Alloy =Rs. 1,700/-	Copper =Rs. 5,300/-
Paints . .	Rs. 1,200/-	=Rs. 1,200/-
Winch, fishing gear . .	Rs. 5,000/-	=Rs. 5,000/-
Navigation & Fire fighting equipment .	Rs. 2,000/-	=Rs. 2,000/-
Miscellaneous .	Rs. 1,600/-	=Rs. 1,600/-
TOTAL	Rs. 24,020/- say Rs. 24,000/-	Rs. 33,910 Say Rs. 34,000/-

2.19. Supply of boats to the fishermen is arranged by the different State Fisheries Departments. However, the design drawings of different sizes of boats are supplied by the Institute. For supply of the drawings the costs as below are realized.

Drawings of 25 ft. boat		Rs. 5 per set.
Drawings of 30 ft. boat		Rs. 10 per set.
Drawings of 32 ft. boat		Rs. 20 per set.
Drawings of 36 ft. boat	..	Rs. 50 per set.
Above 36 upto 50 ft. boat		Rs. 100 per set.

2.20. Asked whether sufficient 'Venteak' was available in the country to meet the requirements fully, the representative of the Ministry has stated that it is available in larger quantities than teak. The physical and mechanical properties of timbers are obtained from the Forest Research Institute. Their resistence to marine organisms before and after treatment is tested at the Central Institute of Fisheries Technology.

2.21. Asked whether it would be better to introduce some sort of inspection system by which officers of the Institute could be sent to examine the boats supplied, especially by the indigenous suppliers on the designs furnished by the Institute, the representative of the Ministry has stated that, "It will be desirable and the matter is being examined."

2.22. The Committee note that at the meeting of the Fisheries Research Committee held at Madras in October-November, 1966, members referred to the increasing cost of mechanised fishing boats and impressed on the imperative need for effecting reduction on construction costs. The use of cheaper boat building timber, marine plywood, galvanised iron fastenings, etc. were suggested. It was recommended that information available with the States might be passed on to the Director of the Institute, who would undertake basic studies in the matter.

2.23. The Committee need hardly point out that one of the aims of the researches being made in the Institute should be to reduce the cost of the mechanised fishing boats so that the poor fishermen could afford to purchase them and take advantage therefrom. The Committee do not think that there has been any appreciable decrease in the overall cost of production of a mechanised fishing boat because, whereas the cost of production of the hull has gone down, the cost of the engine has gone up. They expect that all out efforts will be made on the basis of further investigations, to reduce the overall

cost of production of a mechanised fishing boat to the extent possible.

2.24. The Committee note that there have been complaints about the wooden boats whose hulls were being sheathed with magnesium-aluminium alloy in place of copper, as suggested by the Institute. They would, therefore, like the Institute to examine carefully the performance of the boats in Madras and Kerala after the sheathing is done under the supervision of the Institute, before a final conclusion is drawn about the new sheathing.

2.25. It has been stated that the Institute has prescribed the quality standards for the nylon twines manufactured in the country and the standards have been worked out for soft, medium, hard and extra hard cotton twines for different types of gear. Further, a particular grade of Indian hemp has been found to be equally good as Italian hemp imported for 'Dara' gill nets. Improved and more effective methods of preservation of cotton fishing nets have been evolved and recommended.

Gear

2.26. In a written note submitted to the Committee it has been stated that the demonstration in application of indigenous resins in place of 'Dammar battu' has already been given and the 'Dammar battu' has been taken out of the list of items which can be imported by the fish processors against their entitlement under actual users' licence. The import of 'Dammar battu' has been stopped but the quantity of indigenous material used is not known.

2.27. It has also been stated that the gill nets made with the Indian hemp twine are under trial at Veraval and recommendations will be made after the trials are successfully completed. The annual saving as a result of substitution of Italian hemp will be about Rs. 10 lakhs.

2.28. It has been stated by a Fisheries expert that the introduction of synthetic fibres (nylon) in place of the cotton and hemp nets has resulted in increased catches. This change should be accelerated and indigenous supplies of synthetic fibres should be provided. It has also been stated that the textile industry taking on to nylon find it more profitable to manufacture high grade nylon apparel for wear rather than manufacturing fishing twine for nets. It may be considered whether new units manufacturing synthetic fibres should not be persuaded to accept a certain amount of fishing twine production as a fixed responsibility.

2.29. The Committee desired to have a note on the steps taken during each of the last three years for the supply of gear *e.g.* twines nets, etc. to the fishermen at reasonable prices. In reply, the Government have stated as follows:—

"The Institute does not supply gear, twine to fishermen directly but only designs and technical advice when they require, are supplied to them. State Governments supply gear under their schemes for subsidized supply of fishing requisites.

For the supply of nylon yarn/twine to the fishing industry at a reasonable price, arrangements were made for the import of about 450 tonnes of Caprolactum against Dutch General Purpose Credit and this was handed over to M/s. Garware Nylons for manufacture and sale of finished products at prefixed prices. Supply against this Caprolactum commenced from March, 1967 and is likely to last 14 months more on the basis of the present offtake. Import of nylon is prohibited from 1962 except under schemes for providing incentives to exporters of fish and fish products.

As regards hemp twine, import ceilings of Rs. 6·0 lakhs during each of the years 1963-64 and 1964-65 and of Rs. 1 lakh for 1965-66 were fixed and there had been no complaints of insufficiency. During 1966-67 this was provided under the scheme for priority industry and no specific foreign exchange ceiling was allocated. By March, 1967 Fishermen Cooperative Societies of Maharashtra and Gujarat had forwarded import licence applications of the value of Rs. 6·70 lakhs to the licensing authorities.

The arrangements require review from time to time. Since these fishing twines are treated under the scheme for priority industries, no difficulty in the supply of Caprolactum (raw material for nylon manufactured in the country) and hemp twine is visualised."

2.30. It has been further stated that on the basis of the present offtake of nylon manufactured from Dutch Caprolactum, it cannot be stated that there is shortage of nylon in the country. The present quantum of fishing twine manufactured in the country is adequate.

2.31. The Committee are glad to note the researches made for evolving suitable and cheap gear by the Central Institute of Fisheries Technology. They suggest that concerted steps may be taken to acquaint the users and the industry with the processes developed by

the Institute so that there may be a growing demand for indigenously manufactured gear materials and dependence on imports may be avoided. As regards nylon twines, the Committee suggest that the Ministry may consider whether it could not be made incumbent on the new units manufacturing synthetic fibres to produce a certain amount of fishing twine as well, as and when there is a demand for the same.

Need for a 60 ft. trawler for the Institute.

2.32. It has been stated that the Institute has the following fishing vessels for experimental fishing:—

Fish Tech. No. I (30 ft.) at Kakinada
„ No. II (32 ft.) at Cochin
„ No. III (32 ft.) at Burla
„ No. IV (36 ft.) at present at Veraval but will be transferred to Goa.
„ No. V (30 ft.) at Cochin
„ No. VI (40 ft.) at Cochin
„ No. VII (40 ft.) at Kakinada
„ No. VIII (50 ft.) at present at Cochin, but will be transferred to Veraval.

In addition to the above, the Institute has three small boats (two supplied by F.A.O.) of length 18 ft. (2 Nos.) and 14 ft. One 50 ft. vessel is now under construction departmentally and one 32 ft. vessel is being procured through Director General Supply and Disposal. Another 18 ft. boat (outboard Motor) is also under construction at Nangal.

2.33. It has been further stated that as in the future the main development will be in deep-sea fishing for which suitable gear, fishing methods and equipment are to be developed, the Institute requires larger vessel of 60 ft. and above in length for trawling and purse-seining. In this connection a proposal has already been submitted to the Ministry for approving the procurement of a 60 ft. steel trawler costing about Rs. 9 lakhs.

The Committee have been informed during evidence that the proposal was received on the 1st September, 1967 from the Institute. The proposal was examined by the Ministry and it was found that the Institute could use the fishing vessels belonging to the Deep Sea Fishing Station. Meanwhile, the transfer of the Institute to the Indian Council of Agricultural Research has taken place and the comments of the Government have been passed on to them. The Council has accepted the advice of the Government and had requested the

Institute to re-examine the proposal and make fresh proposal if they found it absolutely necessary.

2.34. The Committee are not sure whether the Institute which has already eight vessels of sizes varying from 30 ft. to 50 ft. should require a bigger vessel. They feel that it should be possible for the Institute to make use of the vessels available with the Deep Sea Fishing Station, Bombay. They hope that the Indian Council of Agricultural Research will examine the Institute's request in the context of their needs and the resources position of the Government at present.

C. Fish Production and Processing

Aspects of Training

2.35. It has been stated that the Institute does not run any regular training courses in fishery technology. However, training on specific subjects is given to a limited number of persons if sponsored by the Department of Fisheries of any of the States or from the fishery industry for very specific training. The number of persons trained in such manner during the past three years is given below:

	Aspects relating to Fish Processing Technology	Aspects relating to Craft and Gear Technology
1964-65 . . .	9	40
1965-66 . . .	3	34
1966-67 . . .	2	74

2.36. No Diploma or other similar certificates can be issued in such cases. The mode of training is to attach the trainee to the particular Section or Sections which deal with the field in which the training is required.

2.37. The Committee have been informed during evidence that due to the setting up of Marine Products Processing Training Centre at Mangalore, the number of trainees in the aspects relating to fish processing and technology has decreased.

2.38. The Committee would like to emphasise that more and more persons from the fishery industry, which is mostly concentrated at Ernakulam/Cochin, should be encouraged to come to the Institute

to participate in the special training courses. They need hardly point out that this will have two-fold advantages. First, a close liaison will be maintained with the fishery industry inasmuch as candidates sponsored by them will be receiving training in the Institute and secondly, the Institute will be able to gear up its research programmes according to the needs of the fishery industry.

Pilot Plant for the dehydration of fish.

2.39. The Committee have been informed that the Central Institute of Fisheries Technology has sent specifications to Maritime States for the establishment of pilot plants for the dehydration of fish. The Central Board of Fisheries recommended at its meeting held in October, 1966 that—

> "The Maritime States should establish pilot plants for dehydration, the specifications of which have already been sent to Maritime States by Central Institute of Fisheries Technology."

It has been stated that the State Governments made a note of this recommendation for action by them.

2.40. The Committee desired to have a note on the progress made by various States in this behalf. In reply, it has been stated that further clarifications and queries on the dehydration of fish on the basis of the specifications supplied were sent to the Departments of Fisheries, Orissa, Mysore, Kerala and Maharashtra. It is understood that they are considering the proposal for putting up such a plant.

2.41. The Committee feel that the progress made by various States in implementing the recommendation of the Central Board of Fisheries (made in October, 1966) for setting up pilot plants for dehydration of fish on the specifications supplied by the Central Institute of Fisheries Technology is not satisfactory. The Committee would like the Institute to pursue the matter vigorously.

D. By-Products Section

2.42. The achievements of the By-products Section of the Institute have been stated to be as follows:—

(i) A method has been worked cut for preparation of fish protein concentrate.

(ii) A method has been worked out for preparation of bacteriological peptone from trash fish. The method can be of importance in view of requirements of the product which is at present mainly imported.

(iii) A method has been worked out for preparation of commercial factice (mineral rubber) from sardine oil.

(iv) Printing ink prepared with heat-bodied and partially vulcanised sardine oil base has been successfully tried for printing work and it has compared well with commercial ink.

(v) A variety of products with water repellent as well as lubricating properties have been prepared from heat-processed sardine oil.

2.43. Asked to what extent the by-products developed by the Institute have been commercially exploited by the industry, the representative of the Institute has stated during evidence as follows:—

"In some of the processes we have gone over the laboratory stage and the next step will be pilot plants. In some cases, pilot plants have been ordered and after trials with that only we can work out the economics completely and then hand over to the industry. In the case of sardine oil in the form of paint-base, a process has been developed and the Institute is already in correspondence with the paint manufacturers. The main difficulty is that oil is available in small irregular quantity whereas the paint manufacturers want in sufficient quantity and assured supply. In the case of printing ink, etc. the enquiries are there and the industries are agreeable to take it up but they want the assurance that sardine oil will be available throughout."

2.44. Asked whether any royalty will be charged, if something is adopted by the industry, the representative of the Institute stated, "Some of the things are being adopted by them. But we have not asked for any royalty. This is a new industry."

2.45. The attention of the Committee has been drawn to the researches on fish protein concentrate (FPC) in the United States. It is stated that the U.S. Government treats the FPC project as a scientific programme ranking in importance with the desalting of water. A plant is expected to be in operation by mid-1968 which will make 3,000 tons of FPC a year, using 50 tons of raw hak fish a day. The FPC was approved recently by the U.S. Food and Drug Administration as safe, nutritious, wholesome and fit for human consumption. This important evaluation came after more than five years of research and controversy. Tests have shown that FPC has a protein quality equivalent to the protein quality in milk. It is also claimed that the protein in one pound of FPC is comparable to the protein in a five-pound quality meat. It has been stated that much

more research and experimentation are needed to be done before the ideal FPC process is determined.

2.46. The Committee are glad to note that some by-products have been evolved by the Institute. They have no doubt that further research in the matter will yield encouraging results and cover more items. The Committee consider that fish protein concentrate has immense possibilities for supplementing the dietary needs of the underfed and the undernourished sections of population in the country. There is, therefore, a need for intensification of researches on FPC so that a product of the right quality acceptable to nutrition experts could be evolved. The Committee hope that the Institute will take advantage of the researches already undertaken in the United States in the preparation of an edible fish protein concentrate. They suggest that the progress made on this project may be included in the Annual Reports of the Institute.

The Committee would also like to stress that unless the by-products evolved by the Institute are commercially exploited, research alone in the matter will not serve any useful purpose. They hope that concerted steps would be taken to attract the industry to commercially exploit the by-products evolved by the Institute. They also suggest that the feasibility of taking out patents on the by-products evolved by the Institute before releasing the same to the industry and charging royalty thereon from the industry may be considered.

E. Mobile Unit

2.47. It has been stated that the Mobile Unit was formed in 1964. It attends to the short term exploratory and experimental work at various places of the country. Normally it works on local inland gear problems but also helps in marine fishing when required. Besides attending to the requests received from various States, the Unit takes work on its own accord for specific items. The staff of the Unit consists of an Assistant Research Officer and two Research Assistants.

2.48. The following exploratory and experimental works have been stated to be attended to by the Mobile Unit during the years 1964-65, 1965-66 and 1966-67:

1964-65

(1) *Fishing gear investigations in Assam*

Government of India directed the Institute to depute a gear technician to Assam to study the problems related to fishing in the Brah-

maputra river system. The Director of Fisheries, Assam intimated that they would require assistance on the following:

(i) Improvement of existing gear.

(ii) Nature and extent of present exploitation.

(iii) Scope for introduction of Power fishing.

(iv) Design of boats for fishing, fish carrying and inspection.

It was felt necessary that before any advice on the improvement of the existing gear could be given it was necessary to have knowledge of the technical details of their construction and operation. Consequently a team of two Research workers was deputed for a period of six weeks during January-February, 1964, for the work. An analytical study of the data collected during the course of the survey indicated the following short-comings:—

(i) Low technical standard of the gear materials.

(ii) Wrong selection of the materials for the gear.

(iii) Incorrect relationship between twine size and mesh size.

(iv) Inappropriate relationship between mesh size and the size of the fishable stock.

(v) Imperfect method of net hanging.

(vi) Incomplete framing of gill nets.

(vii) Insufficient rugging with floats and sinkers.

(viii) Irregular preservative treatment.

(ix) Insufficient width of "Lungi" and "Phasi jabs".

(x) Irrational design.

Even though the main objective of the investigations was to gather fundamental data on the indigenous fishing gear and fishing methods, trial fishing with gill nets and long lines, was also conducted to study the availability and concentration of fish in the main Brahmaputra.

Basing on the above studies the following suggestions for the improvement of the indigenous fishing gear and fishing methods were made:—

(i) The immediate attention of the Government is required to improve the low quality of the gear materials used at present.

(ii) All types of gill nets *viz.* "Lungi and Phasi jabs" will have to be reconstructed, by framing the nets with head and foot ropes and breast lines. There should be more uniform distribution of floats and sinkers.

(iii) The height of all types of surface gill nets will have to be increased to a minimum of 3 m, and a maximum of 6 m. The height of the encircling and bottom set gill nets, has to be increased from 3 to 4 m.

(iv) For gill nets, mesh sizes of 20 to 30 cm. are suggested.

(v) Immediate steps are necessary to discourage the use of seine nets and gill nets of mesh size 5 cm, and below and also of dewatering of water bodies as a method of fish capture.

(vi) Necessary training facilities are to be provided to the State Fishery officials, in fishing gear and fishing methods.

(vii) An adequate machinery has to be set up to collect gear wise catch data which is essential for formulating developmental programmes.

(2) *Fishing experiments in the Sunderbans*

A year round commerical exploitation of the Sunderbans estuary was suggested as a possible means of regular fish supply to Calcutta Market and thus lessening the dependence of import from Pakistan. Accordingly a preliminary exploratory survey was conducted, by the Mobile Unit, attached to the Institute, during January-February, 1964. The results of this survey and the peculiar ecological conditions prevailing in this estuary made clear the necessity of a detailed exploratory surveys work to study the craft and gear requirements to assess the fishery potentialities and to suggest suitable fishing gear and methods. Accordingly three departments, namely, Central Inland Fisheries Research Institute, Department of Fisheries, West Bengal and Central Institute of Fisheries Technology were asked to undertake a joint exploratory work in Sunderbans.

Actual fishing operations were started by the middle of August, 1964. Altogether about 100 days were spent in fishing. Main types of fishing attended to were surface drift gill netting, bottom set gill netting, trawling and long lining. A total time of 1745 hrs. 45 mnts. were spent in surface drifting, 157 hrs. 35 mnts. in bottom setting, 123 hrs. 05 mnts. in trawling and 89 hrs. 30 mnts. in long lining.

As a general conclusion, it can be said that, the existence of a lucrative fishery in the Sunderbans during the monsoon period appears to be doubtful. Drift gill netting. with nets mounted, with more looseness appears to be the only gear suitable for the Sunderbans. It is however, felt that the investigations should be conducted, for one more season with the selected gear like simple gill nets with more looseness, nets with vertical lines and trammel nets.

1965-66

(3) *Bheel Fishing*

At the request of the State Department of Fisheries, a preliminary survey of the fisheries of Mathura, Kalyani and Kulia Bheels was undertaken to assess the fishing problems and to suggest suitable fishing gear and methods. The total catchment area of these three bheels comes to about 875 sq. kms. The peculiar characteristics of these bheels are that there is thick floating and underwater vegetation. The depth varies from 1 to 6 metres. Except the Mathura bheel, which has got a narrow connection with the River Hooghly and the others are permanently cut off from the main river. The bheels are stocked with major carps and minor carp (Cyprinus carpio).

At present fishing is conducted in restricted areas. The major types of gear operated are seines like Berjal and Kochal Jal, lift nets such as Tolijal and Moijal, a type of drag net. All these types of fishing gear mentioned require considerable man power and are tedious processes. The operation of any active type of gear appears difficult at this stage, since it requires the removal of weeds and underwater vegetation. Hence it was suggested that passive gear with high entangling capacity could be tried after clearing the weeds from the narrow stretches of water. Simultaneously long lines could also be tried for the bottom dwellers.

1966-67

(4) *Ghandhisagar Dam*

As per the request from Director of Fisheries, Madhya Pradesh the unit carried out fishing gear investigations in Gandhisagar Dam during the year 1966-67.

The fish fauna of the reservoir is composed of nearly 39 species of fishes. The commercial fishery of the reservoir is constituted by five species of major carps and four species of cat fish. In 1965-66 season the total catch consisted of 73.05 per cent of major carps and the rest cat fishes. Excepting for a closed season from 15th June to 31st August, fishing is conducted throughout the year. As in other reservoirs, the indigenous gear employed are gill nets of the Bangoon net type. The peculiar topographical conditions of the reservoir, hampers very much the scope of fishing with active gear. At present there is no standard size for the gill nets in use.

Fishing experiments, by the Mobile Unit of the Institute were conducted for 28 days with simple gill nets of uniform area. The

mesh sizes selected for the experimental gear were 50 mm. bar, 60 mm. bar and 70 mm. bar. For fabrication nylon twine of specification 210/2/3 and 210/3/3 was used. The nets were operated in the different localities, in the lower reaches of the reservoir. At depths of 4 metres, the nets were operated as surface drifts.

Among the catches landed by the experimental gear major carps *Labeo calbasu, Barbus tor* and *Cirrhina mrigala* constituted 56.4 per cent. The cat fishes comprising of *Siloniacsilondia* and *Mystis sp.* contributed to 30.9 per cent while the rest was composed of miscellaneous fishes.

The Madhya Pradesh Fisheries Department has conducted some investigations, which indicated that the following species are breeding in the reservoir *Cirrhina mrigala, Barbus tor, Labeo calbasu, Mystis sengala, Mystis aor, and Silonia Silondia.*

The two important major carps *viz.* Catla and Rohu are not indigeneous to the river system and stocking of these was regularly started from 1959 onwards as a measure of enriching the fish stock of the reservoir. *Labeo calbasu* is indigenous to the river system. An analysis of the catch composition of the landings in the reservoir has indicated that the share of this fish in the total landings is steadily increasing both by weight and in numbers. During 1964-65 it contributed 14.55 per cent by weight and 18.57 per cent by number of the total catches. In 1966-67 the share of this fish was 27.2 per cent by weight and 47.22 per cent by number. This indicates that the fish has established in the reservoir and in all probability there is very rich population of the same in the reservoir.

From the morphometric data of *Labeo calbasu* landed with the experimental gear, it was found that the predominent size group of the season comprises of the 38-44 cms. group. This comprises more than 60 per cent of the total catch.

The mesh size suitable for exploitation of the population, was found as 53 mm. bar. The data collected on the catches of the nets with 50 mm bar and 60 mm bar of twine size 210/2/3 and 210/3/3 were analysed. The nets of 50 mm mesh bar caught significantly higher catches than that of 60 mm mesh bar. Further nets of nylon 210/2/3 caught more than that of 210/3/3.

In order to fix up the fishing height of the net it is necessary to find out the place of capture of the fish, in the net. For this purpose each of the experimental gear was divided into three portions *viz.* the upper, middle, and lower parts and the number of fishes caught in each portion was noted. An examination of the data revealed that

the upper and the middle region of the net caught more than the third region. It has been stated that the experiments were conducted during the summer months and hence it will be quite interesting to investigate whether any changes take place in the swimming height of the fish during winter period. However, as an interim finding the fishing height of the nets is to be fixed as 3 metres.

The main conclusions, which were drawn, by the above investigations are consolidated below:—

1. The introduction of nets having higher entangling capacity like the frame nets and trammel nets is necessary. Accordingly the designs of nets were suggested.

2. A design of a simple gill net for selective fishing of *Labeo calbasu*, the main carp populations of the reservoir was also suggested.

2.49. The Committee note the exploratory and experimental work undertaken by the Mobile Unit of the Institute during each of the last three years. They, however, feel that the Institute should maintain a close liaison with the State Departments of Fisheries with a view to find out to what extent follow-up action has been initiated on the suggestions made by the Unit. The details of experiments conducted by the Unit and the results achieved should be published and made available to State Departments of Fisheries, Fisheries Research Institutes and the industry.

F. Pilot Plant Laboratory

2.50. It has been stated during evidence that the pilot plant laboratory of the Institute is not very well-equipped. The idea is to set up this pilot plant laboratory as soon as the building, which is intended to be constructed at Ernakulam, is available. A proper pilot plant laboratory cannot be had unless the building is ready.

Asked whether the scientists working in the laboratory have complained about the deficiencies in the laboratory, the representative of the Institute has stated during evidence, "The general complaint is not that this laboratory is not equipped. A special equipment may not be available for the time being. For that we have to wait for foreign exchange".

2.51. While agreeing that unless the building is ready there cannot be a proper pilot plant laboratory, the Committee would like to stress that, if steps are not taken to equip the laboratory with essential and important equipments, to the extent possible, under the existing conditions, the work of the scientists will suffer, thus

retarding the progress of the pilot plant laboratory. They hope that early action with regard to this matter as also the building will be taken.

G. Liaison

2.52. It has been stated in a written note furnished to the Committee that research investigations being carried out, the progress being made and results obtained are made known to the State Fisheries Departments and Fisheries Technological Stations through the quarterly and annual reports and other publications of the Institute. When specific problems are encountered or information needed, the State Fisheries Departments, Technological Stations, etc. refer them to the Institute and get the required information and guidance. The Institute also provides short term training to nominees from State Fisheries Departments and related organisations in different subjects in fishery technology whenever such training is requested for. The drawings of boats, nets, mechanical fishing accessories, fish processing equipments, etc. designed by the Institute are supplied free of cost to the State Fisheries Departments and related organisations. When special designs of fishing boats for specific purposes, designs of other equipments, etc. are required by the State Fisheries Departments, etc., the Institute prepares and furnishes them as per the requirements. Assistance is also rendered to the departments by sending research workers from the Institute for looking into the specific problems referred to it which are required to be solved by personal observations, discussion and guidance.

2.53. The Committee have noted that at the meeting of the Fisheries Research Committee held at Madras in October-November, 1966. the Director of the Central Institute of Fisheries Technology observed that some of his problems were being handled in the State laboratories as well. He suggested that unnecessary duplication might be avoided and wherever replications were intentially made on the fisheries technology side, he might be informed of the matter. With a view to avoiding inadvertent duplication, the committee recommended that progress reports could be exchanged between Central and State research institutes on a quarterly basis.

2.54. Asked how over-lapping is avoided between the Institute and Technological stations run by various State Governments, the representative of the Ministry has stated during evidence, "We take stock of what is being done and try to coordinate the work. But my own feeling is that there is room for better coordination with State sub-stations so far as research work is concerned. By and large there is no duplication".

2.55. The Committee have further been informed during evidence that "Now coordinated research has become more important and we should see that they (State Sub-stations) work on one aspect and we work on another aspect. The Research Committee is trying their best to effect this coordination." It has also been stated in a written note that the Fisheries Research Committee is now co-ordinating fisheries research conducted under the Central Research Institutions, Research Institutions under the State Governments and the Universities.

2.56. The Committee desired to know the liaison maintained by the Institute with the Central Food Technological Research Institute (CSIR) and Defence Food Research Laboratory (Mysore). It has been stated in a note that "Director, Central Institute of Fisheries Technology is a Member of Scientific Advisory Committee of Central Food Technological Research Institute and maintains liaison through that Committee. Defence Food Research Laboratory does not at present work directly on the aspects of Fish processing etc. on which Central Institute of Fisheries Technology is working. This matter will be looked into further as we do not have full information".

2.57. Asked whether the Institute refers any problems to the Council of Scientific and Industrial Research Institute or Defence Food Research Laboratory, it has been stated that the Central Institute of Fisheries Technology has not referred any problem to them.

2.58. The Committee note that by and large close liaison and coordination is being maintained by the Institute with State Fisheries Departments, Technological Stations, etc. There is, however, imperative need to intensify the efforts in this direction so that any inadvertent duplication of research work may be avoided from the very outset of the operation of any scheme. The Committee have no doubt that the Indian Council of Agricultural Research will examine this problem in all its aspects and decide whether the coordination of fisheries research by the Fishery Research Committee is adequate or whether some other suitable machinery should be devised through which closer coordination and liaison could be maintained. The Committee would like the Council also to examine the possibility of forging intimate links between Central Institute of Fisheries Technology on the one hand and the Central Food Technological Research Institute and the Defence Food Research Laboratory on the other. The Committee, in this connection, would also like to draw the attention of the Government to the recommendation contained in their Thirty-Sixth Report (Fourth Lok Sabha) on

the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture)—Central Marine Fisheries Research Institute, Mandapam Camp.

H. Informal Consultative Committee

2.59. The Study Group of the Estimates Committee which visited the Institute in September, 1967 have been informed that the Institute has proposed to the industry the formation of an informal consultative committee with representatives of the industry and the Institute to examine and advise on the research activities of the Institute, but the proposal has not received much favourable response.

2.60. During evidence, the representative of the Institute has stated that there are two ways of bringing close liaison between the Institute and the industry so as to make the research industry-oriented. One way is to have a well-equipped van so that the Institute could go to the factories and workshops to know their problems. The Institute is now in the process of getting such vans. Secondly, the results of the researches are brought to the notice of the industry, Marine Products Export Promotion Council, etc. Demonstrations are also arranged where industry is invited. So far as the proposal to constitute an informal consultative Committee is concerned, two organisations of the industry in Kerala have been contacted and they have promised to look into the matter.

2.61. The Committee would like the idea of constituting an informal consultative committee with representatives of the industry and the Institute to advise on the research activities of the Institute to be pursued vigorously by the Indian Council of Agricultural Research. They have no doubt that the informal consultative committee, if set up, can help a great deal in making the research industry-oriented and thus bringing in quicker results.

I. Extension, Information and Statistical Wing

Mode of Working

2.62. It has been stated that the Extension and Information Branch of the Extension, Information and Statistical Wing functions as a liaison between the Institute and the industry and its activities cover both fish processing and craft and gear technology. The results achieved by the Institute are passed on to the industry in the following ways:—

(1) By publishing a quarterly by name Fish Technology Newsletter. It is distributed free of cost to the industry, State Fisheries and related Departments. The results

achieved by the Institute are published in the Newsletter in non-technical language. At present there are 310 addresses in the mailing list for supply of the publications.

(2) By publishing leaflets and information sheets on the important results obtained by the Institute, on schemes for fish processing units, etc. and supply them among the industry on request.

(3) By conducting field demonstrations, 'Open house', by sending exhibits for displays in Exhibitions and by participating directly in exhibitions.

(4) The Wing attends to the large number of technical queries received and furnishes specific detailed informations on them. The design drawings and related details of fishing boats, nets, trawl winches, fish dehydration plants etc. prepared at the Institute are supplied by the Wing on the requests received. Besides, arrangements for analysis of samples of processed products, fish by-products, gear materials etc. at the Institute are made by the Wing and reports of analysis with suitable suggestions wherever necessary are furnished to the concerned parties.

(5) The Wing also gives technical assistance to the processing factories and primary processing centres mainly in Cochin area after on-the-spot study of the conditions.

2.63. The Statistical Section of the Wing apart from giving assistance to the different sections in the Institute in their researches and investigations also undertakes study of problems in the industry that need survey, collection of data and statistical evaluation to establish norms and standards.

2.64. It has been stated in a written note that the Information and Extension Section "continued to give technical assistance to and dissemination of results of researches among the Fish Processing factories outside the State, viz., in the States of Mysore, Maharashtra and Orissa upto the year 1966. Since then due to inadequate staff, the work could not be continued in outside States. At present such assistance is given to those who require them, by the different Substations and Units of the Institute in different localities in the concerned subjects".

2.65. It has been represented to the Study Group of the Estimates Committee which visited the Institute in September, 1967 that the Extension Wing should be strengthened and the Institute should be allowed to bring out the extension publications quickly by arranging for their printing locally instead of through Government Press.

2.66. It has been admitted in a written note furnished to the Committee that, "There has been an inordinate delay in getting the papers published through the Government Press". However, for strengthening the Wing, a selection for the post of Extension Officer has been made through Union Public Service Commission. Research staff at Sub-stations and Units of the Institute are often called up to help in demonstration work".

2.67. The Committee need hardly point out that mere collection of useful information without disseminating it to the users quickly serves no purpose. They regret to note that there has been delay in getting the newsletters, booklets, leaflets and other reports published. They suggest that the question of expeditious publication of the extension publications may be considered.

2.68. The Committee apprehend that deputing the research staff of the Sub-stations and Units of the Institute for doing demonstration work may interfere with the research work being done by them. They suggest that suitable ways may be devised in order to enable the Extension, Information and Statistical Wing to perform its functions smoothly and efficiently, especially in view of the fact that this is the only extension wing attached to a Central Fisheries Institute.

Demonstrations

2.69. It has been stated that the number of demonstrations, exhibitions and "Open house" arranged by the Institute during each of the last three years has been as follows:—

Year	No. of demonstrations conducted.	No. of exhibitions conducted	No. of "Open house" conducted
1964-65 . .	34	2	1
1965-66 . .	31	2	1
1966-67 . .	15	2	Nil

2.70. The Committee desired to know the reasons for the downward trend in the number of demonstrations arranged from year to year. In a written note furnished to the Committee, it has been stated that the post of the Extension Officer has been lying vacant for nearly two years. The small staff of the Extension Unit is also engaged in replying to the questions received from the industry and also arranging for the publication of the quarterly newsletters and different publications. So the number of demonstrations had to be reduced. After the Extension Officer is appointed, more demonstrations at the factories and in fishing centres both in Kerala State and outside will be undertaken.

2.71. The Committee feel that the demonstrations can go a long way in bringing home in a visual form the results achieved by the Institute to industry as well as fishermen. They regret to note that there has been a decrease in the number of demonstrations being arranged by the Institute from year to year due to lack of adequate staff. The Committee desire that the requirements for adequate demonstration work may be kept in view.

J. Evaluation

2.72. It has been stated that in the rapid progress of mechanised fishing and fish production in the country, the Central Institute of Fisheries Technology, apart from its various other achievements, contributed its part by designing and popularising the suitable types of boats of different sizes and suitable types of gears for different regions and different types of fishery. Trawling, a new method of fishing in this country has been introduced for commercial fishing and has been established especially on the West Coast. More fishing grounds are now under systematic exploitation consequent to the increased catches of different varieties of fish and shell fish; the processing industry which is mainly export-oriented, also made rapid progress. With only prawns as its raw material for the canning and freezing industry in its initial stage, now the products exported at present include frozen prawns, frozen froglegs, frozen lobsters, frozen fish and canned prawn and fish.

2.73. Asked whether any evaluation has been made of the research and other work done in the Institute, the representative of the Ministry has stated during evidence that there has been no regular evaluation done so far. Only a review Committee is appointed from time to time to see whether proper work has been done on a particular scheme and to suggest modifications, if necessary. But it is not a comprehensive evaluation.

2.74. The Committee stress the need for periodical evaluation of work of the Institute by an Achievement Audit Committee consisting of specialists. In this connection the Committee would like to invite the attention of the Ministry to the recommendation made by them in para 9 of their 76th Report (Third Lok Sabha) on the Ministry of Food and Agriculture (Department of Agriculture)—Indian Agricultural Research Institute

CHAPTER III

QUALITY CONTROL

A. Pre-shipment Inspection Scheme

3.1. It has been stated that under the Pre-shipment Inspection Scheme for fishery products, the intending exporters are required to put in an application to the Inspection Authority at least 3 days in advance in order to facilitate full examination of the products. On receipt of the application, the Inspection Authority deputes an Inspection Officer to visit the concerned factory and draw samples from the completed master cases after making a physical verification for the total number, grades etc. of the product offered for inspection. In the case of frozen fishery products, the samples are to be examined in the factory premises itself for organoleptic and physical characteristics and the materials returned to the processors after examination, in order to reduce loss due to sampling. In drawing the samples, a direct schedule as given in Indian Standards Institution specification No. 2237/1962 is followed, taking care to examine at least one sample from each code offered. When too many codes are presented in a small consignment the codes are conveniently grouped so that each group will not exceed 7 consequtive days production and samples are then drawn. The different types of pack like Headless, Peeled and Deveined and Cooked frozen are treated separately. In case of any sample not meeting the required specifications, the particular code is subject to a re-examination on the same day, if possible or the following day. If the defect is confirmed. certificate is not issued to that portion and the processor is required to throw out that portion in the presence of the Inspection Officer. However, if the party is not in agreement with the Inspection Authority, the disputed portion is sealed in the presence of the processor and kept aside so that the processor could prefer an appeal to the stipulated panel under the Fish Product (Inspection) Rules.

3.2. In the case of canned products also, sampling is done strictly according to the Indian Standards Institution Schedule (I.S.I. Specification No. 2236/1962) after ensuring that at least one sample is collected from each code and size grade. The samples are brought

to the Central laboratory of the Authorised Officer and examined by qualified Analysis. The same procedures of re-examination and detentions are followed in this case also.

3.3. Asked to what extent this scheme has been able to step up and stabilize the export of fishery products, it has been stated a written note submitted to the Committee as follows:—

"The present Pre-shipment Inspection Scheme provides only for an examination of the final products on a random sample basis. The tests carried out are also limited to organoleptic and physical characteristics only and as such it has a certain amount of limitation in the sense that a uniform quality of the materials presented in the consignment on bacterial soundness of the entire product cannot be guaranteed fully. However, the introduction of this inspection system has brought out a fair amount of uniformity in the field weight, drained weight, size grades and product quality, with the result that the inspected products are better received in the buying countries.

Recently, the Australian Government have started accepting cooked frozen prawns shipped out of India if the consignments are accompanied by a bacteriological certificate from the Central Institute of Fisheries Technology. Assistance is being rendered to the trade by this Institute in preparing bacteriologically sound cooked frozen prawns for the Australian market. A bacteriological test certificate is issued to those parties who specially ask for it, after a thorough examination, for a nominal fee of Rs. 5 per sample.

Similarly, a special service is being rendered to the trade for carrying out bacteriological tests on canned prawns intended for Canadian market as required by the Canadian specification, prior to shipment.

Buyers in the importing countries like U.K., France, the U.S.A. and Japan, have now started insisting on the exporters the filing of the Central Institute of Fisheries Technology Certificate along with the shipping documents before the consignments are cleared in the importing countries. Insurance companies both in India and abroad have now reduced the insurance fee chargeable for risks against rejections on the strength of the Central Institute of Fisheries Technology Certificate.

As mentioned, above, bacteriological examination is not now carried out on the export consignments except in the case of cooked frozen prawns to Australia. The question of introducing bacteriological standards both for frozen and canned fishery products is under the active consideration of the Export Inspection Council and the Government of India.

A system of continuous in-plant inspection is also being considered for implementation first on a voluntary basis. If continuous in-plant inspection is introduced, it is expected to guarantees better sanitary condition from the factories and more uniform quality of the products processed in their establishments from raw material to the finished stage, which are not covered in the present Pre-shipment Inspection Scheme."

3.4. It has further been stated that inspection and certification are now being done from 5 different Centres, *viz.* Cochin, Neendakara, Calicut, Mangalore and Bombay. Exports from Madras are brought under the jurisdiction of the Authorised Officer at Cochin, those from Goa under the Authorised Officer at Bombay. The entire operation of the scheme is controlled by the Director, Central Institute of Fisheries Technology, who has been authorised as the Inspection Authority for this purpose by a notification of the Ministry of Commerce. The Director has appointed Authorised Officers at various centres mentioned above to arrange for inspections and issue of certificates on his behalf. At Cochin, Calicut and Neendakara, Officers of the Central Institute of Fisheries Technology are functioning as Authorised Officers while at Mangalore and Bombay the Officer-in-Charge of the Fishery Technological Laboratories of the State Fisheries Organisations fulfil this function on behalf of the Director, Central Institute of Fisheries Technology. However, the inspections are carried out by the Inspection Officers, appointed by the Central Institute of Fisheries Technology in all these centres. Thirteen Inspection Officers operate in Cochin area where more than 80 per cent of the Commodities are processed, two Inspection Officers at Neendakara where about 10 per cent of the total export commodities are processed and one each at Calicut, Mangalore, Goa and Bombay. The Inspection Officers working at outstations are under the technical control of the respective Authorised Officers of the area.

3.5. Asked as to why the Central Institute of Fisheries Technology has been entrusted with the operation of this scheme, it has been stated that inspection of all export commodities comes under the jurisdiction of the Export Inspection Council set up by the Ministry

of Commerce, Government of India under the Export (Quality Control and Inspection) Act, 1963. However, in view of the highly complicated nature of fish inspection, the work has been entrusted to the Central Institute of Fisheries Technology which is carrying out specialised investigation work on such topics. This view has been endorsed by the industry as well as the Marine Products Export Promotion Council off and on during discussions relating to implementation of the scheme, with the trade, representatives of Commerce Ministry, Marine Products Export Promotion Council and Central Institute of Fisheries Technology. The question of other Agencies like Agricultural Marketing Directorate, Marine Products Export Promotion Council etc. has been considered at various stages but it has been decided that it should be only by a Government Agency such as Central Institute of Fisheries Technology, since such certificates issued by Government Agencies are valued more in importing countries.

3.6. Asked about the fee charged for doing the inspection and issue of certificates, it has been stated that a fee of 1 paisa per kg. of canned prawn and one kg. of frozen froglegs and 1·5 paise per kg. of frozen prawns is levied. In case of processors who have made standing security deposits, the certificates are issued without insisting on pre-payment. In case of others, certificates are issued only on production of a treasury chalan covering the inspection fees. The income earned so far as fee on this account has been as follows:

	Quantity in Kgs.	Fees collected
1964-65		
(from 15-3-65 to 31-3-65)		
		Rs.
Frozen	1,30,677·70	1,960·16
Canned	1,675·70	196·75
Froglegs	Nil	Nil
TOTAL		2,156·91
1965-66		
Frozen	69,77,282·00	1,04,659·23
Canned	9,23,626·00	9,236·26
(From 15-3-66 to 31-3-66)		
Froglegs	23,361·00	233·61
TOTAL		1,14,129·10

	Quantity in Kgs.	Fees collected
1966-67		
Frozen	90,29,927·00	1,48,949·00
Canned	17,16,202·00	17,162·00
Froglegs	7,36,165·00	7,361·65
TOTAL .		1,73,472·65
1967-68		
(from 1-4-67 to 30-10-67)		
Frozen	62,53,372·20	93,800·58
Canned	10,16,291·85	10,162·92
Froglegs	1,05,631·37	4,056·31
TOTAL .		1,08,019·81
Fees collected for Bacteriological analysis C & P Shrimps (from May, 1967 to October, 1967)		Rs. 1,920·00

3.7. It has been stated that no separate account is being maintained in respect of the Pre-shipment Inspection Scheme.

The expenditure in respect of the Pre-shipment Inspection Scheme (both stag and other expenditure) is met out of the sanctioned budget grant of the Institute. The receipts on account of pre-shipment inspection fees are taken as revenue receipts of the Institute. Before the transfer of this Institute with effect from 1st October, 1967 to Indian Council of Agricultural Research, the inspection scheme receipts were remitted into the Treasury under the Head "XXV-Agriculture-Central-Miscellaneous Receipts-Adjustable by Accountant General, Kerala". Similarly the security deposits by the processing firms were being remitted into the Treasury as Revenue Deposits. No new procedure is contemplated in the actual working of the Scheme with the going of the Institute to the Indian Council of Agricultural Research. The security deposits and fees realised are being remitted to the Bank account of the Institute and accounts of receipts maintained. From 1st October, 1967, the fees are being paid in cash or demand drafts by the firms as no more transactions are allowed with the Government Treasuries.

3.8. Asked whether any complaints have been received from importing countries about the quality of frozen and canned shrimps and frozen froglegs exported after inspection, the Ministry have furnished the following details of detention of frozen and canned prawns by the importing countries:

Port of Detention	Date of Detention	No. of Cases	Name of the Exporter	Grounds for Detention	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
New York	25-6-1965	137 cartons frozen shrimp	Marine Fisheries Cochin	Decomposition	..
Do.	3-5-1965	39 cases frozen shrimp	Inland Seafoods, Cochin'	Do.	Decomposed deteriorated pieces not sufficient to justify detention at our end.
Do.	21-7-1965	82 cartons frozen shrimp	Bharat Trading Co. Cochin.	Do.	Do.
Sydney	April, 1965	50 cartons frozen shrimp	K. Damodran Cochin	For reasons of quality	Processed before the introduction of the Scheme.
New York	6-9-1966	10 cartons frozen shrimp	Indo-Marine Agencies, Cochin.	Short weight	Misunderstanding on the part of US subsequently passed by the Food and Drugs Administration.

Do.	15-6-1966	5 cartons frozen shrimp	United Industries Cochin	Decomposition.	Subsequently passed after re-examination
New York	15-6-1966	210 cases frozen shrimp	Pisces Corpn., Cochin		Score deductions did not justify our detention.
Do.	18-8-1966	157 Cartons Headless	International Fisheries, Cochin		Do.
Do.	17-10-66	4400 lbs. Frozen shrimp	Kasamali, Bombay.	Decomposed	Due to delay in loading after passed for export.
Do.	31-1-67	12,550 lbs. Frozen shrimp	United Industries Cochin	E. Coli	Bacteriological examination not covered now.
Do.	9-2-67	1,600 lbs. Frozen shrimp	Kasamali, Bombay.	Bacteriological Contamination.	Bacteriological examination not covered now.
Do.	28-3-67	65 lbs. Frozen shrimp	United Industries	Decomposed	Bacteriological examination not done.
Do.	13-3-67	107 cartons frozen	Indian Acquatic Products Quilon.	Decomposition, short weight	Score deduction satisfactory.
Do.	10-3-67	4470 lbs. Frozen shrimp	Travancore Cochin Prawn Curers' Corporation Sec., Cochin.	Unfit for food	Bacteriological defect.

3.9. The Committee note that the Pre-Shipment Inspection Scheme is being operated by the Central Institute of Fisheries Technology in view of the highly complicated nature of fish inspection and in view of the fact that this has been endorsed by the Industry as well as by the Marine Products Export Promotion Council. The Committee feel that this is the legitimate function of the Ministry of Commerce. Now that the Institute has gone under the control of the Indian Council of Agricultural Research, the Committee suggest that the question whether the operation of this Scheme should remain with the Institute or go to the Ministry of Commerce or any other Agency of the Ministry of Commerce may be examined in all its ramifications and early decision taken in the matter.

3.10. The Committee need hardly point out that the Pre-Shipment Inspection Scheme can serve a very useful purpose in bringing about quality consciousness among the exporters of sea food products. They, however, note that there have been quite a few cases since the introduction of the Scheme wherein the goods were detained by the importing countries even after they had been inspected and certificates issued. In one case the products decomposed owing to delay in loading after having been passed for export. In the circumstances, the Committee cannot but conclude that there is much scope for improvement in the working of the Scheme especially in regard to those aspects which have come to notice in the past.

3.11. The Committee would also urge that demonstrations on improved methods of cleaning of fishing boat decks, fish holds etc., and of processing, chlorination of water and cleaning of the premises should be regularly arranged in factories in increasing number to stress upon the industry the importance of hygienic conditions for bringing about improvement in the quality of products handled at various stages of production.

B. **Staff Position**

3.12. The present staff sanctioned for the Pre-shipment Inspection Scheme has been stated to be as follows:—

(1) Senior Inspection Officer	1
(2) Inspection Officers	19
(3) Analysts	3
(4) Accountant-*cum*-Head Clerk	1
(5) Junior Clerk	1
(6) Media Assistant	1
(7) Laboratory Attendants	2
(8) Laboratory boy	1
	29

3.13. The distribution of the Inspection Officers is as follows:—

Cochin (80 per cent of total production)	..	13
Neendakara (10 per cent of total production)	..	2
Mangalore	..	1
Bombay	..	1
Goa	..	1
Calicut	..	1
		19

3.14. It has been stated that the above staff strength was based on the number of exporters (about 70) that existed at the time of the introduction of the scheme in March, 1965. Now the number of exporters has increased to about 131. The supervisory work at present is being carried out by the staff of the Central Institute of Fisheries Technology as well as officers from States Fisheries Organisations at outstations. There is need for full time supervisory officers at the various centres as the work increases.

3.15. If bacteriological standards are to be introduced, the following additional staff will be necessary:

(1) Analysts	..	2
(1 for Hqrs. and 1 for Neendakara)		
(2) Laboratory Attendant	..	1
(3) Laboratory Boy	..	1

3.16. For continuous inspection, the introduction of which is yet to be decided by the Government, it is estimated that at least three Inspection staff will be required for each factory opting for this type of inspection. The actual quantum of additional staff required cannot be worked out at present as the number of units opting for voluntary continuous inspection is not yet known. However, initially the minimum additional staff required will be as follows:—

(1) Inspection Officers	..	4
(2) Analysts		2
(3) Laboratory Attendant	..	1
(4) Junior Clerk	..	1
(5) Laboratory Boy	..	1

3.17. Asked whether any steps have been taken to augment the existing staff, the Ministry have stated that the following additional posts have been created recently:

(1)	Inspection Officers	2
(2)	Media Assistant ..	1
(3)	Analyst	1
(4)	Laboratory Attendant	1
(5)	Laboratory Boy	1

3.18. The Committee have been further informed that all the posts under the Scheme are temporary.

3.19. In the opinion of the Committee in order to ensure a steady and expanding foreign market for fish and fishery products from India, it is essential to maintain high standard of the product especially from the hygienic point of view. The endeavour of the Government should therefore be to encourage the various units of exporters to opt for voluntary continuous inspection of their products.

CHAPTER IV

ADMINISTRATION

A. Organisational set-up

4.1. The organisational set-up of the Institute may be seen at Appendix I. The Headquarters of the Institute is at Ernakulam/Cochin with (i) Processing Wing; (ii) Craft and Gear Wing; and (iii) Extension, Information and Statistical Wing. The Institute has three Sub-stations at Veraval, Kakinada and Bhurla and four Units at Bombay, Calicut, Nangal and Goa.

4.2. It has been stated that the present organisational set-up of the Institute is felt to be adequate for its smooth and efficient functioning.

4.3. The total sanctioned staff strength both at the Headquarters and various Sub-stations and Units is 346. In a statement furnished to the Committee, the number of posts lying vacant as on 1st April in each year from 1962 to 1965 and on 30th November, 1967 has been stated to be as follows:—

1-4-1962	..	11
1-4-1963	..	22
1-4-1964	..	15
1-4-1965	..	52
30-11-1967	..	50

4.4. The details of the permanent and temporary posts available at the Institute have been stated to be as follows:—

	Permanent	Temporary	Total
Class I (Gazetted) . . .	16	4	20
Class II (Gazetted) . . .	22	11	33
Class II (Non-Gazetted) . .	—	20	20
Class III . . .	77	96	173
Class IV . . .	35	65	100
	150	196	346

4.5. The Committee have been informed during evidence that about 12 posts out of the 56 posts which were vacant as on 31st November, 1967, have to be kept vacant in view of the 3 per cent ban introduced by the Government of India. It has been admitted that, "To the extent posts have been vacant, the work of the Institute has been affected." It has also been stated that bulk of the vacancies remaining unfilled are those of Research Assistants. There is shortage of suitable candidates holding Master Degrees in Chemistry, Physics, etc. Pay-scales have been the difficulty in respect of some posts. It has been stated during evidence that, "We feel strongly that the pay-scales of research people are not consonant with their responsibility and market value. In the Indian Council of Agricultural Research we have more or less come to an agreement regarding pay-scales. Even the Scientific Sub-Committee of the Cabinet has recommended that the Council of Scientific and Industrial Research scales should be given at the comparative levels. When we were just going to get it through, this ban came. We are trying to get the ban relaxed for this particular purpose." It has been further stated that, "In the case of one post of processing engineer, a higher scale has been recommended. In another case of chemical engineer, we have not filled the post from 1962 although we tried through the Union Public Service Commission. After that we have not tried to fill up the post. A proposal was made for upgradation of the pay-scale of the post. We have not been able to upgrade that. With the present grades, we do not expect we can get proper officers."

4.6. It has been further stated that as many as 16 research assistants have left the Institute due to unfavourable pay-scales. Their work had to be left in between and it took quite some time for the new workers to adjust themselves to the new circumstances.

4.7. The Committee are unhappy to note the large number of posts lying vacant in the Central Institute of Fisheries Technology. They are also unhappy to note that as many as 196 posts out of 346 posts are temporary. They need hardly emphasise that the continuance of a large number of vacant and temporary posts and unattractive pay scales for scientific posts is likely to have a deleterious effect on the smooth functioning of a research institute. The Committee would like the Indian Council of Agricultural Research to examine the position and take appropriate steps in the matter.

4.8. As regards pay-scales of the researchers and scientists, the Committee would like to draw the attention of the Government to the recommendation contained in para 2.13 of their Thirty-Sixth Report (Fourth Lok Sabha) on the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture)—Central Marine Fisheries Research Institute, Mandapam Camp.

Encouragement to Scientists

4.9. The Study Group of the Estimates Committee which visited the Institute in September, 1967 have been informed that, "No special scheme for encouragement of scientists at this Institute exists at present. However, meritorious work is recognised and recorded in the Annual Confidential Reports. The Institute can also sponsor applications from the scientists for rewards given by the National Invention Board, etc."

4.10. The Committee, however, have been informed during evidence that, "There are certain regulations in rgard to the encouragement which can be given to scientists who do good work. There is a scheme of merit promotions and advance increments which permits a Director of the Institute to give promotions in cases of proved ability. There is also the normal procedure according to which a scientist who has invented something like a commercial process can take out a patent. The scientist who contributes mainly to an invention is permitted to take a share of the royalties."

4.11. In reply to a question, the Committee have been further informed that cash awards have been given in some cases. Also papers are published in the name of the person who has done the research. However, no special mention is made about him in various publications.

4.12. The Committee are not sure whether the scheme for merit promotions and advance increments is being taken advantage of by the Institute. They need hardly stress that scientific and technical personnel should be given suitable incentives for doing meritorious work. The Committee hope that Indian Council of Agricultural Research will take appropriate steps in this behalf.

B. Building

4.13. It has been stated that the buildings in which the Central Institute of Fisheries Technology Office and laboratories are housed are residential houses only under private ownership. These houses contain only small rooms, and that too, not properly ventilated. The layout of the rooms and the locations of the buildings are not ideal for housing an up-to-date technological laboratory. Difficulties are being faced regarding installation and operation of heavy machines and equipments in these residential buildings. The laboratory working space in all the buildings occupied by the Institute at Ernakulam/Cochin is insufficient. Supervision and coordination of various Sections will be easy if all the Sections are housed in a single and suitable building. Such a building is not available for rent at Ernakulam/Cochin.

4.14. It has been further stated that the approval to construct a permanent building for the Central Institute of Fisheries Technology has been under consideration since 1958. In 1960 an area measuring about 4.3 acres in the Willingdon Island (Cochin) was taken on lease from the Cochin Port Authorities. On the basis of the estimate and the drawings prepared by the Central Public Works Department the Ministry sanctioned an amount of Rs. 28,62,100 in December, 1963 for the construction of the building. The first phase of the construction was the pile driving and this work involving Rs. 6.70 lakhs was awarded to a Contractor by the Central Public Works Department in July, 1965. The work was, however, cancelled in October, 1965 on the basis of the decision of the Ministry owing to Emergency and financial stringency.

4.15. The Committee feel that proper supervision over the work being done at the Institute is difficult unless all the Sections of the Institute are housed in a single and suitable building. They note that difficulties are being faced for installation and operation of heavy machines and equipments in the present buildings and that laboratory working space in all the buildings occupied by the Institute is insufficient. The Committee, however, appreciate that in view of the present financial stringency, there may be difficulties in restarting the construction works suspended in October, 1965. They suggest that Indian Council of Agricultural Research may go into this question in all its aspects and find how best an improvement can be brought in the present situation.

C. Finance

4.16. The Budget allotments for the Central Institute of Fisheries Technology and its various Sub-stations/Units during each of the last three years have been stated to be as follows:—

	1964-65		1965-66		1966-67	
	Plan Rs.	Non-Plan Rs.	Plan Rs.	Non-Plan Rs.	Plan Rs.	Non-Plan Rs.
Pay of Officers	1,60,000	1,36,000	1,80,000	1,43,500	22,600	2,75,000
Pay of Establishment	2,25,000	1,33,000	3,00,000	1,38,500	44,400	4,10,000
Travelling Allowance	10,000	20,000	12,000	29,000	9,000	22,500
Dearness Allowance	20,000	20,000	60,000	35,900	20,000	1,80,000
Other Allowances	15,000	14,000	20,000	19,000	8,000	45,000
Other charges	1,50,000	2,90,000	2,50,000	2,15,000	46,000	4,70,000
TOTAL	5,80,000	5,23,000	8,22,000	5,80,900	1,50,000	14,02,500

CAPITAL OUTLAY

	1964-65	1965-66	1966-67
	Rs.	Rs.	Rs.
Building	5,00,000	8,00,000	..
Other Capital Expenditure	1,00,000	1,00,000	3,65,000
TOTAL . .	6,00,000	9,00,000	3,65,000

4.17. The Committee have been informed that the original provision of Rs. 3,65,000 under "Other Capital Expenditure" during 1966-67 was revised to Rs. 4,29,900. Against this an expenditure of Rs. 1,46,660 has actually been incurred. It has also been stated that this shortfall in expenditure is due to non-finalisation of land acquisition proceedings by the State/District authorities and non-receipt of engines ordered through the Director-General of Supplies and Disposals.

4.18. The Committee desired to have a detailed note on the acquisition of land and also the indent placed on the Director General of Supplies and Disposals for the supply of the engines, showing the difficulties and the reasons for delay. In reply, the Ministry have furnished details as follows:—

(i) *Acquisition of land at Therva, Ernakulam for the construction of staff quarters*:

On the basis of the request of this Institute the Government of India, had requested in October, 1964 the Government of Kerala to take steps to acquire an area of about 6.5 acres of land at Thevra, Ernakulam, for the construction of Staff quarters for this Institute. As instructed by the Kerala Government (Department of Agriculture & Rural Development) the District Authorities at Ernakulam took action under Section 5 of the Kerala Land Acquisition Act and the enquiry was held at the Collectorate, Ernakulam on 14th June, 1966 to hear the objections filed by some of the persons residing in the area proposed for acquisition and subsequently the Declaration regarding the acquisition of the land was published in the Gazette, dated 6-9-1966. In connection with finally settling the matter the District Collector had stated that the valuation was pending. In this connection the District authorities had also addressed the Executive Engineer, Buildings and Roads, Ernakulam, for expediting the valuation report in respect of the buildings on the land proposed. Though the Executive Engineer was contacted and reminded on several times the final valuation report was not received before the end of the financial year 1966-67. The provision included in the Revised Estimate for acquisition of land could not therefore be utilised. The valuation report was finally received from the District Collector, Ernakulam on 3-8-1967 and the Ministry has been requested to approve the expenditure.

(ii) *This Institute had placed indents on the Director General of Supplies and Disposals for the supply of 4 Engines during* 1966 *to* 1967. *The delay about their supply position is as below:—*

(1) *One* 10 *H. P. Kirloskar Engine for installation in a Boat*

Indent for the supply of this Engine was placed with the Director of Supplies and Disposals, Madras on 19-2-1966. A/T for the supply of the engine was placed on 7-6-66 with M/s. Parry & Co., Madras. In January, 1967, the firm had written to Director of Supplies & Disposals, Madras that Inspection authorities are insisting for the production of M.M.D. approval Certificate for this Engine. On 28-1-1967 this Institute had written to Director of Supplies and Disposals stating that the Engine is required for reservoir fishing and hence M.M.D. Certificate may not be insisted upon. Director of Supplies and Disposals, Madras have issued the instruction to the firm accordingly on 4-3-1967. The manufacturers have not put up the Engine for inspection so far though we have reminded about it a number of times.

(2) *One* 40 *H.P. Kirloskar Engine for replacement of old lister Engine at Cochin*:

Indent was placed with Director of Supplies and Disposals, Madras on 19-7-1966. A/T was placed by Director of Supplies and Disposals, Madras on 19-7-1966. A/T was placed by Director of Supplies and Disposals, Madras on 6-10-1966. In this case also, the inspecting authority wanted M.M.D. Certificate for the Engine in December, 1966. Inspecting Authorities have however agreed to inspect the engine without M.M.D. Certificate in April, 1967. The engine has not been put up for inspection by manufacturers till date.

(3) *One* 40 *H.P. Kirloskar Engine for replacement of old Lister Engines at Kakinada*:

Indent for this engine was placed with Director of Supplies and Disposals, Madras *vide* this office Indent No. 19-13/65-St., dated 13-3-1967. A/T has not been placed yet.

(4) *One 150 H.P. Marine Engine for installation in second 50' Boat:*

An indent for the supply of above engine was placed with Director General of Supplies and Disposals *vide* this office Indent No. 19-15/66-St., dated 28-11-1966. Tender was invited by Director of Supplies and Disposals, Madras and the last date for receipt of tender was 28-8-1967.

4.19. The Committee are distressed to note that there has been heavy shortfall in the expenditure inasmuch as only Rs. 1,46,660 could be utilised out of Rs. 4,29,900 provided in the Revised Estimates for 1966-67 for the acquisition of land for the construction of staff quarters and purchase of engines. They need hardly stress that the programmes of work, for which budget provisions have been made, should be executed with a sense of urgency.

D. Sub-stations/Units

4.20. It has been stated that the Institute has three Sub-stations and four Units as detailed below:—

Sub-stations	Veraval, Kakinada and Burla.
Units	Bombay, Calicut, Nangal and Goa.

4.21. Asked when were these Sub-stations and Units set up and what was the justification for setting them up, the Ministry have furnished the following information:—

Name of Sub-station/ Unit	Year in which set up	Justifications for setting up the Sub-stations/Units
1	2	3
Sub-Stations:		
Veraval . .	1962	The Central Institute of Fisheries Technology with its Headquarters at Ernakulam/Cochin can handle most of the major technological problems facing fisheries development in the country. However, certain regional problems require continued on the spot study and trials. Veraval in Gujarat State is one of the major fishing centres and

1	2	3
		the State Government is constructing one of the biggest fishing harbours. Rapid mechanisation of the fishing crafts is also taking place in Gujarat and Maharashtra. To cater to the needs of the fishing and fish processing industry of Gujarat and Maharashtra a sub-station at Veraval was felt necessary.
Kakinada .	1962	The nature and type of fishing along the East Coast vary in certain respects from those along the West Coast. The sub-station at Kakinada conducts studies on trawl nets, gill nets, trammel nets etc. to evaluate suitability of various types of nets for fishing along Eastern Coast.
Burla . .	1963	Coastal Stations can undertake studies pertaining to marine fisheries only. India has vast inland resources also with numerous lakes, reservoirs etc. A sub-station at Burla on the brink of the Hirakud reservoir was felt necessary to effectively undertake investigations on problems connected with riverine, lacustrine and reservoir fishing.
Units :		
Bombay . .	1958	This Unit was functioning at Bombay under the Deep Sea Fishing Station even before the inception of this Institute. When the Central Institute of Fisheries Technology was set up the Unit was transferred to this Institute. Bombay is one of the biggest markets for fresh and iced fish and the Unit is to undertake investigations on the quality of marketed fish, problems on transportation of fresh and iced fish etc. On the spot investigations are necessary for successful handling of these problems.
Calicut . .	1962	Calicut and the near about places are important landing centres for Sardines, Mackerels etc. To study the changes taking place during different stages of curing of fish; for studies on various curing techniques practised for evolving improved methods etc. a small Unit at Calicut was felt necessary.

1	2	3
Nangal . .	1964	The Bhakra Nangal Dam is the deepest reservoir in the country and it merits special study in respect of its fishery and the fishing techniques to be employed. The Unit there is engaged in trying out many gear which might prove effective in such a deep reservoir. Training of local people in modern fishing methods is also undertaken.
Goa	1965	From the fishing point of view, Goa is strategically placed near the Northern boundary of shrimps trawling and purse seining grounds and the Southern boundary of the fish trawling grounds. The Portugese Authorities had done practically nothing to develop fishing in Goa although it has great potentialities as a major fishing centre. To Test various types of fishing gear for use there a Unit was felt necessary at Goa.

Asked how liaison and coordination is maintained with these Sub-stations and Units, it has been stated that the projects and the problems to be handled by the various Sub-stations/Units are approved at the Headquarters only after carefully studying the various aspects connected with the suggested programmes. The Headquarters also exercises full administrative control over these Sub-stations/Units and hence coordination becomes possible.

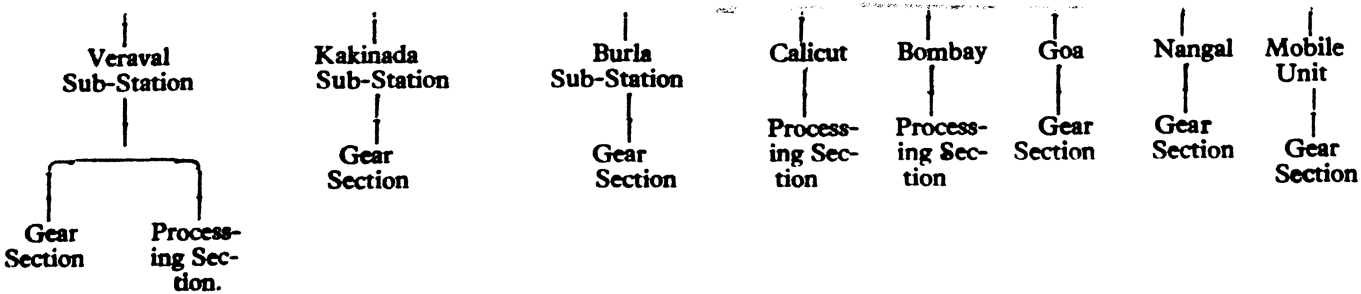
4.22. The Committee have been further informed that the Sub-stations and Units have been located at the places referred to above mainly in consideration of the variation in the type of fishery and fishing conditions. Asked whether it is proposed to continue them on a permanent basis, it has been stated that it will depend on periodical review of the work of the Snb-stations and Units.

4.23. The Committee would stress the desirability of reviewing the work of each Sub-station and Unit at regular intervals to watch the progress of work entrusted to them and to ensure that continuance of each of them in justifiable. The Committee would also stress that there should be close liaison and coordination between

the Institute and various Sub-stations and Units on the one hand and between various Sub-stations and Units *inter se* on the other so as to avoid duplication and overlapping in the work being done by them.

NEW DELHI;
March 4, 1968.
Phalguna 14, 1889 (*Saka*).

P. VENKATASUBBAIAH,
Chairman,
Estimates Committee.



Details of the staff may be seen in the attached sheets.

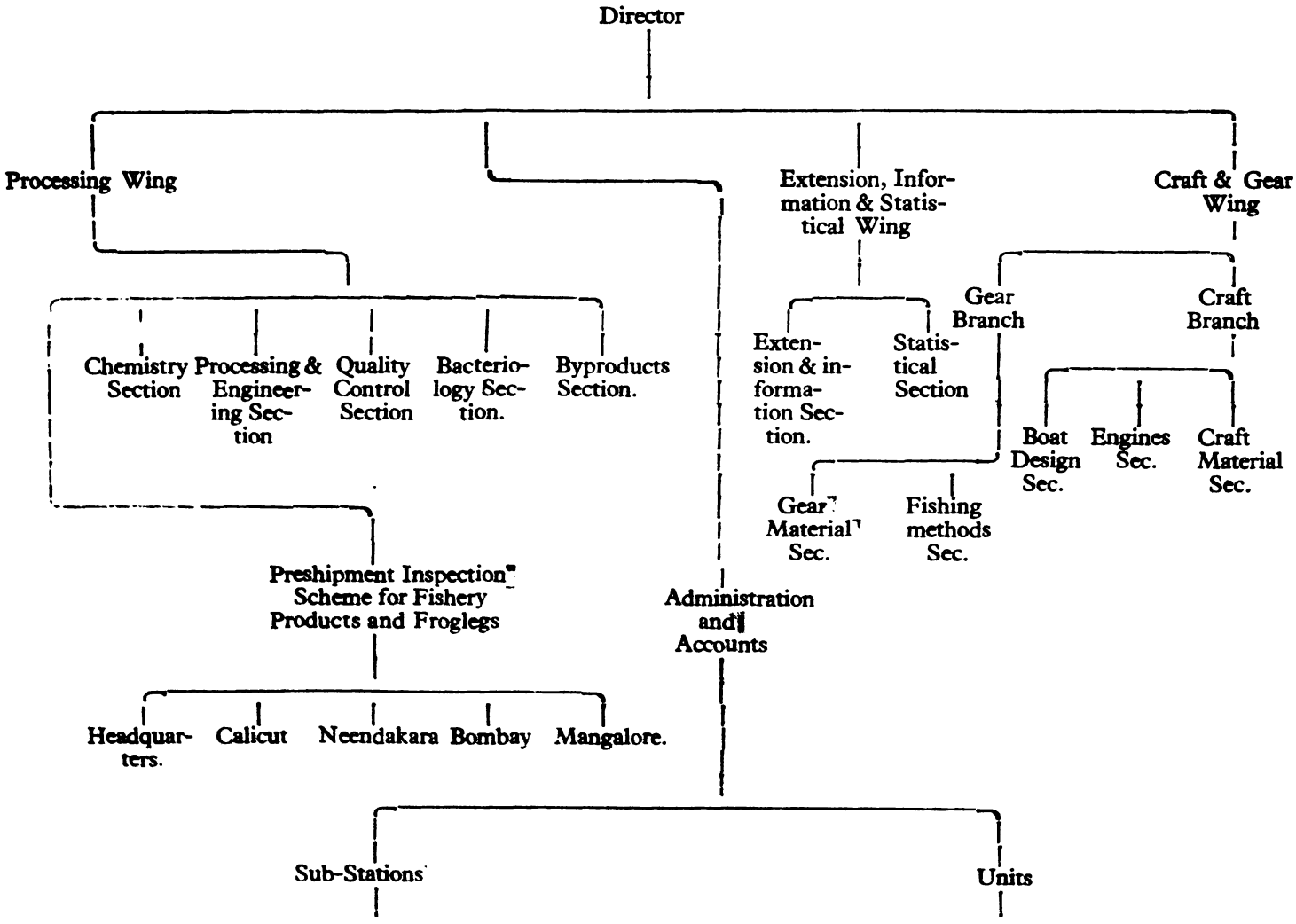
APPENDIX I

(*vide* Para 4·1 of the Report)

ORGANISATIONAL CHART

CENTRAL INSTITUTE OF FISHERIES TECHNOLOGY, ERNAKULAM

HEADQURTERS OFFICE : CHITTOOR ROAD, ERNAKULAM



CENTRAL INSTITUTE OF FISHERIES TECHNOLOGY, ERNAKULAM

Distribution of scientific and technical posts in the various Sections

Headquarters

Director	1

Processing Wing :

Senior Researeh Officer (Processing)	1

(*i*) *Chemistry Section.*

1. Research Officer (Processing)	1
2. Asstt. Research Officers (Processing)	2
3. Research Assistants	4
4. Laboratory Attendants'	2
5. Laboratory Boys	1

(*ii*) *Processing and Processing Engineering Section*

1. Research Officers (Processing)	2
2. Asstt. Research Officers (Processing)	6
3. Research Assistans (Processing)	4
4. Glass Blower	1
5. Instrument Technician	1
6. Senior Mechanic	1
7. Metal Worker	1
8. Boilerman	1
9. Laboratory Attendant	1
10. Laboratory Boys	2

(*iii*) *Quality Control Section*

1. Quality Control Officer	1
2. Asstt. Research Officers (Processing).	2
3. Research Assistants	3
4. Senior Laboratory Assistant	1
5. Laboratory Attendant	1
6. Laboratory Boys	2

(*iv*) *Bacteriology Section*

1. Research Officer (Processing)	1
2. Asstt. Research Officer (Processing)	1
3. Research Assistants	3
4. Senior Laboratory Assistants	2
5. Laboratory Attendant	1
6. Laboratory Boy	1

(*v*) *By-products Section*

1. Asstt. Research Officer (Processing)	1
2. Research Assistants	3
3. Laboratory Attendant	1
4. Laboratory Boy	1
5. Senior Laboratory Assistant	1

(*vi*) *Inspection Scheme*

(a) *Headquarters*

1. Senior Inspction Officer	1
2. Inspecion Officers	18*
3. Analysts	3
4. Media Assistant	1
5. Laboratory Attendants	3
6. Laboratory Boy	1

Extension, Information and Statistical Wing :

Extension Officer	1

(a) *Extension and Information Section*

1. Asstt. Research Officer (Extension)	1
2. Research Assistants (Extension)	2
3. Photographer-cum-Artist	1
4. Field Assistant	1
5. Laboratory Boy	1

(*b*) *Statistical Section*

1. Asstt. Research Officers (Statistics)	2
2. Research Assistants (Statistics)	2
3. Computor	1

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*(including one each at Neendakara, Calicut, Mangalore and Bombay)

Craft and Gear Wing, Cochangadi, Cochin-5

Senior Research Officer (Craft & Gear)	1
(a) *Gear Branch* :	
Research Officer	1
(*i*) *Gear Material Section*	
1. Asstt. Research Officer (Craft & Gear)	1
2. Research Assistants (Craft & Gear)	4
3. Laboratory Attendant	1
4. Laboratory Boys	2
(*ii*) *Fishing Methods Section*	
1. Asstt. Research Officers	3
2. Research Assistants	9
3. Draughtsman	1
4. Carpenter	1
5. Tindals	3
6. Drivers (Launch)	3
7. Deck hand	1
8. Laboratory Boys	5
9. Lascars	5
10. Net makers	2
(b) *Craft Branch* :	
(*i*) *Boat Design Section* :	
1. Senior Research Officer	1
2. Research Officer	1
3. Asstt. Research Officer	1
4. Research Assistants (Craft & Gear)	2
5. Senior Draughtsman	1
6. Draughtsman	1
7. Boat Building Mistry	1
8. Laboratory Boy	1
9. Carpenters	2
(*ii*) *Engine Section*	
1. Research Officer (Craft & Gear)	1
2. Asstt. Research Officer (Craft & Gear)	1
3. Research Assistants (Craft & Gear)	2
4. Laboratory Boy	1

(iii) Craft Material Section

1. Research Officer (Craft & Gear)	1
2. Asstt. Research Officer (Craft & Gear)	1
3. Research Assistants (Craft & Gear)	2
4. Laboratory Attendants	2
5. Laboratory Boys	2

Work Shop

1. Superintendent (Electrical & Mech.)	1
2. Senior Mechanic	1
3. Welder-cum-Blacksmith	1
4. Fitter	1
5. Draughtsman	1
6. Machinist	1

Sub-Stations

Central Institute of Fisheries Technology Sub-Station, Veraval

Senior Research Officer (Processing)	1

(a) Processing Section

1. Asstt. Research Officer (Processing)	1
2. Research Assistants (Processing).	3
3. Senior Machanic	1
4. Laboratory Attendants	2
5. Laboratory Boys	3

(b) Craft and Gear Section

1. Research Officer (Craft & Gear)	1
2. Asstt. Research Officer (Craft & Gear)	1
3. Skipper	1
4. Research Assistants (Craft & Gear)	4
5. Bosun	1
6. Engine Drivers	2
7. Deck hands	3
8. Cook	1
9. Laboratory Boy	1
10. Net Makers	2
11. Lascars	2

Administrative and General

1. Senior Clerk	1
2. Junior Clerk	1
3. Peon	1
4. Watchmen	2

Central Institute of Fisheries Technology Sub-Station, Kakinada

1. Research Officer (Craft & Gear)	1
2. Assistant Research Officer (Craft & Gear)	1
3. Research Assistants (Craft & Gear)	4
4. Bosum	1
5. Engine Driver	1
6. Tindal	1
7. Driver (Launch)	1
8. Deck hands	2
9. Cook	1
10. Laboratory Boys	3
11. Net Makers	2
12. Lascars	3

Administrative and General

1. Junior Clerk	1
2. Peon	1
3. Watchmen	2

Central Institute of Fisheries Technology Sub-Station, Birla

1. Assistant Research Officers (Craft & Gear)	2
2. Research Assistants (Craft & Gear)	2
3. Laboratory Attendant	1
4. Tindal	1
5. Driver (Launch)	1
6. Laboratory Boys	2
7. Lascars	3
8. Net Makers	2
9. Jeep Driver	1

Administrative and General

1. Junior Clerk	1
2. Peon	1
3. Watchmen	2

Central Institute of Fisheries Technology Unit, Calicut

1. Assistant Research Officer (Processing)	1
2. Research Assistants (Processing)	3
3. Laboratory Attendant	1
4. Laboratory Boy	1

Administrative and General

1. Junior Clerk	1
2. Watchman	1

Central Institute of Fisheries Technology Unit, Bombay

1. Research Officer (Processing)	1
2. Assistant Research Officer (Processing)	1
3. Research Assistants (Processing)	3
4. Laboratory Boy	1

Administrative and General

1. Peon	1
2. Watchman	1

Central Institute of Fisheries Technology Unit, Goa

1. Research Officer (Craft & Gear)	1
2. Research Assistants (Craft & Gear)	2
3. Laboratory Boy	1
4. Net Maker	1

Administrative and General

1. Peon	1
2. Watchman	1

Central Institute of Fisheries Technology Unit, Gobindsagar (Nangal)

1. Assistant Research Officer (Craft & Gear)	1
2. Research Assistants (Craft & Gear)	2
3. Laboratory Attendant	1
4. Jeep Driver	1
5. Tindal	1
6. Driver (Launch)	1
7. Laboratory Boy	1
8. Lascars	2
9. Net Maker	1

Administrative and General

1. Peon	1
2. Watchmen	2

Central Institute of Fisheries Technology, Mobile Unit

1. Assistant Research Officer (Craft & Gear)	1
2. Research Assistants (Craft & Gear)	2
3. Net Makers	2

Administrative Section at Headquarters (Ernakulam and Cochin)

1. Administrative Officer	1
2. Accounts Officer	1
3. Superintendents	2
4. Senior Store Keeper	1
5. Accountant-cum-Head Clerks	2**
6. Senior Clerks	7
7. Librarian	1
8. Stenographers	2
9. Junior Clerks	9

** One post kept in abeyance.

10.	Store Keepers	2
11.	Jeep Drivers	3
12.	Gestetner Operator	1
13.	Daftry	1
14.	Peons	10
15.	Watchmen	8
16.	Sweepers	3

APPENDIX II

Summary of Recommendations/Conclusions contained in the Report

Sl. No.	Reference to para No. of the Report	Summary of Recommendations/ Conclusions
(1)	(2)	(3)
1.	1.10	The committee realise the importance of an institute devoted to fisheries technology for the proper exploitation of the fishery resources not only for providing protein food to the people but also for augmenting the exports of fisheries products so as to earn valuable foreign exchange. Viewed in this context, the establishment of the Central Institute of Fisheries Technology can be considered to be a landmark in the development of fisheries in the country. The Committee note that no Project Report was prepared and published prior to the establishment of the Institute. They need hardly emphasise the desirability of preparing comprehensive project reports before any Institute of this magnitude is set up. Unless this is done, there is every likelihood of uncoordinated growth and development of various Wings of the Institute resulting in lop-sided development of the entire Institute.
2.	1.18	The Committee note the achievements of the Central Institute of Fisheries Technology. They, however, feel that the impact of such an Institute should be judged by taking into consideration the increase in catches of fish by application of better and cheaper techniques craft and gear, reduction in wastage by better and developed methods of storage, transport and preservation of landed fish and by examining to what extent the research conducted by the Institute has resulted in the utilisation of cheaper and easily available indigenous materials which could be used even by the poor fishermen or their associations. From this point of view, the Committee feel that there is a real need for undertaking a survey to assess the impact of the researches undertaken by the Institute

(1)	(2)	(3)
		for the exploitation of fishery resources and for raising the socio-economic status of fishermen. The Committee suggest that the Ministry may devise a suitable methodology for conducting such a survey at an early date.
	1.19	The Committee would also stress the need for export-oriented research in the various investigations, with regard to the production of quality items having consumer and market preferences. The Committee hope, the Institute would keep these objectives in view while drawing up research projects.
3.	2.2	The Committee find from the composition of the Research Committee that there are no representatives from fishery industry on it. Modern fisheries is as much an industry as a social welfare activity. The Committee, therefore, need hardly stress the desirability of having one or two representatives of fishery industry on the Research Committee so that they may make useful contribution to the deliberations of the Committee for the development of fishery industry in the country.
	2.3	The Committee do not know whether the Indian Council of Agricultural Research to which the Institute has now been transferred, would like to be guided by the advice of the Standing Research Committee of the Ministry in matters relating to Fisheries technology. In any case, the Committee would like to be assured that technological research would continue to receive the closet attention it deserves and that efforts would be made to avoid duplication and overlapping in the field of technological research being done by various Central and State Institutes as well as by the industry.
4.	2.13	The Committee regret to note that some of the research programmes could not be completed within the stipulated time and successful execution of projects was hampered by delay in supply of materials, equipment, etc.
	2.14	The Committee are of the view that the completion of research programmes within the stipulated time is a proof that the research has been

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		coducted smoothly and economically. They would, therefore, stress that as proposed by the Institute, the research should be organised project-wise with definite objectives and time-limits for completion laid down. For this purpose a comprehensive list of the pre-requisites necessary for a particular research programme should be drawn up and arranged in time so as to avoid any difficulties later on. It is also desirable that the economics of the projects are worked out as far as possible, both on a short-term and long-term basis, before they are taken up.
		The Committee trust that the Indian Council of Agricultural Research, to which the Institute has been transferred, would take suitable measures to remove the difficulties in the way of successful execution of projects.
5.	2.22	The Committee note that at the meeting of the Fisheries Research Committee held at Madras in October-November, 1966, members referred to the increasing cost of mechanised fishing boats and impressed on the imperative need for effecting reduction on construction costs. The use of cheaper boat building timber, marine plywood, galvanised iron fastening, etc. were suggested. It was recommended that information available with the States might be passed on to the Director of the Institute, who would undertake basic studies in the matter.
	2.23	The Committee need hardly point out that one of the aims of the researches being made in the Institute should be to reduce the cost of the mechanised fishing boats so that the poor fishermen could afford to purchase them and take advantage therefrom. The Committee do not think that there has been any appreciable decrease in the overall cost of production of a mechanised fishing boat because, whereas the cost of production of the hull has gone down, the cost of the engine has gone up. They expect that all out efforts will be made on the basis of further investigations, to reduce the overall cost of production of a mechanised fishing boat to the extent possible.
	2.24	The Committee note that there have been complaints about the wooden boats whose hulls were being sheathed with magnesium aluminium alloy

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		in place of copper, as suggested by the Institute. They would therefore like the Institute to examine carefully the performance of the boats in Madras and Kerala after the sheathing is done under the supervision of the Institute, before a final conclusion is drawn about the new sheathing.
6.	2.31	The Committee are glad to note the researches made for evolving suitable and cheap gear by the Central Institute of Fisheries Technology. They suggest that concerted steps may be taken to acquaint the users and the industry with the processes developed by the Institute so that there may be a growing demand for indigenously manunfactured gear materials and dependence on imports may be avoided. As regards nylon twines, the Committee suggest that the Ministry may consider whether it could not be made incumbent on the new units manufacturing synthetic fibres to produce a certain amount of fishing twine as well, as and when there is a demand for the same.
7.	2.34	The Committee are not sure whether the Institute which has already eight vessels of sizes varying from 30 ft. to 50 ft. should require a bigger vessel. They feel that it should be possible for the Institute to make use of the vessels available with the Deep Sea Fishing Station, Bombay. They hope that the Indian Council of Agricultural Research will examine the Institute's request in the context of their needs and the resources position of the Government at present.
8.	2.38	The Committee would like to emphasise that more and more persons from the fishery industry, which is mostly concentrated at Ernakulam/ Cochin, should be encouraged to come to the Institute to participate in the special training courses. They need hardly point out that this will have two-fold advantages. First, a close liaison will be maintained with the fishery industry inasmuch as candidates sponsored by them will be receiving training in the Institute and secondly, the Institute will be able to gear up its research programmes according to the needs of the fishery industry.

(1)	(2)	(3)
9.	2.41	The Committee feel that the progress made by various States in implementing the recommendation of the Central Board of Fisheries (made in October, 1966) for setting up pilot plants for dehydration of fish on the specifications supplied by the Central Institute of Fisheries Technology is not satisfactory. The Committee would like the Institute to pursue the matter vigorously.
10.	2.46	The Committee are glad to note that some by-products have been evolved by the Institute. They have no doubt that further research in the matter will yield encouraging results and cover more items. The Committee consider that fish protein concentrate has immense possibilities for supplementing the dietary needs of the underfed and the undernourished sections of population in the country. There is, therefore, a need for intensification of researches on FPC so that a product of the right quality acceptable to nutrition experts could be evolved. The Committee hope that the Institute will take advantage of the researches already undertaken in the United States in the preparation of an edible fish protein concentrate. They suggest that the progress made on this project may be included in the Annual Reports of the Institute. The Committee would also like to stress that unless the by-products evolved by the Institute are commercially exploited, research alone in the matter will not serve any useful purpose. They hope that concerted steps would be taken to attract the industry to commercially exploit the by-products evolved by the Institute. They also suggest that the feasibility of taking out patents on the by-products evolved by the Institute before releasing the same to the industry and charging royalty thereon from the industry may be considered.
11.	2.49	The Committee note the exploratory and experimental work undertaken by the Mobile Unit of the Institute during each of the last three years. They, however, feel that the Institute should maintain close liaison with the State Departments of Fisheries with a view to find out to what extent follow-up action has been initiated on the suggestions made by the Unit. The details

(1)	(2)	(3)
		of experiments conducted by the Unit and the results achieved should be published and made available to State Departments of Fisheries, Fisheries Research Institutes and the industry.
12.	2.51	While agreeing that unless the building is ready there cannot be a proper pilot plant laboratory, the Committee would like to stress that, if steps are not taken to equip the laboratory with essential and important equipments, to the extent possible, under the existing conditions, the work of the scientists will suffer thus retarding the progress of the pilot plant laboratory. They hope that early action with regard to this matter as also the building will be taken.
13.	2.58	The Committee note that by and large close liaison and coordination is being maintained by the Institute with State Fisheries Departments, Technological Stations, etc. There is, however, imperative need to intensify the efforts in this direction so that any inadvertent duplication of research work may be avoided from the very outset of the operation of any scheme. The Committee have no doubt that the Indian Council of Agricultural Research will examine this problem in all its aspects and decide whether the coordination of fisheries by the Fishery Research Committee is adequate or whether some other suitable machinery should be devised through which closer coordination and liaison could be maintained. The Committee would like the Council also to examine the possibility of forging intimate links between Central Institute of Fisheries Technology on the one hand and the Central Food Technological Research Institute and the Defence Food Research Laboratory on the other. The Committee, in this connection, would also like to draw the attention of the Government to the recommendation contained in their Thirty-Sixth Report (Fourth Lok Sabha) on the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture)—Central Marine Fisheries Research Institute, Mandapam Camp.

(1)	(2)	(3)
14.	2.61	The Committee would like the idea of constituting an informal consultative committee with representatives of the industry and the Institute to advise on the research activities of the Institute to be pursued vigorously by the Indian Council of Agricultural Research. They have no doubt that the informal consultative committee, if set up, can help a great deal in making the research industry-oriented and thus bringing in quicker results.
15.	2.67	The Committee need hardly point out that collection of useful information without disseminating it to the users quickly serves no purpose. They regret to note that there has been delay in getting the newsletters, booklets, leaflet; and other reports published. They suggest that the question of expeditious publication of the extension publications may be considered.
	2.68	The Committee apprehend that deputing the research staff of the Sub-stations and Units of the Institute for doing demonstration work may interfere with the research work being done by them. They suggest that suitable ways may be devised in order to enable the Extension, Information and Statistical Wing to perform its functions smoothly and efficiently, especially in view of the fact that this is the only extension wing attached to a Central Fisheries Institute.
16.	2.71	The Committee feel that the demonstrations can go a long way in bringing home in a visual from the results achieved by the Institute to industry as well as fishermen. They regret to note that there has been a decrease in the number of demonstrations being arranged by the Institute form the results achieved by the Institute to in- The Committee desire that the requirements for adequate demonstration work may be kept in view.
17.	2.74	The Committee stress the need for periodical evaluation of the work of the Institute by an Achievement Audit Committee consisting of specialists. In this connection, the Committee

(1)	(2)	(3)
		would like to invite the attention of the Ministry to the recommendation made by them in para 9 of their 76th Report (Third Lok Sabha) on the Ministry of Food and Agriculture (Department of Agriculture)—Indian Agricultural Research Institute.
18.	3.9	The Committee note that the Pre-Shipment Inspection Scheme is being operated by the Central Institute of Fisheries Technology in view of the highly complicated nature of fish inspection and in view of the fact that this has been endorsed by the Industry as well as by the Marine Products Export Promotion Council. The Committee feel that this is the legitimate function of the Ministry of Commerce. Now that the Institute has gone under the control of the Indian Council of Agricultural Research, the Committee suggest that the question whether the operation of this scheme should remain with the Institute or go to the Ministry of Commerce or any other Agency of the Ministry of Commerce may be examined in all its ramifications and early decision taken in the matter.
	3.10	The Committee need hardly point out that the Pre-Shipment Inspection Scheme can serve a very useful purpose in bringing about quality consciousness among the exporters of sea food products. They, however, note that there have been quite a few cases since the introduction of the Scheme wherein the goods were detained by the importing countries even after they had been inspected and certificates issued. In one case the products decomposed owing to delay in loading after having been passed for export. In the circumstances, the Committee cannot but conclude that there is much scope for improvement in the working of the Scheme especially in regard to those aspects which have come to notice in the past.
	3.11	The Committee would also urge that demonstrations on improved methods of cleaning of fishing boat decks, fish holds etc., and of processing, chlorination of water and cleaning of the pre-

(1)	(2)	(3)
		mises should be regularly arranged in factories in increasing number to stress upon the industry the importance of hygienic conditions for bringing about improvement in the quality of products handled at various stages of production.
19.	3.19	In the opinion of the Committee in order to ensure a steady and expanding foreign market for fish and fishery products from India, it is essential to maintain high standard of the product especially from the hygienic point of view. The endeavour of the Government should therefore be to encourage the various units of exporters to opt for voluntary continuous inspection of their products.
20.	4.7	The Committee are unhappy to note the large number of posts lying vacant in the Central Institute of Fisheries Technology. They are also unhappy to note that as many as 196 posts out of 346 posts are temporary. They need hardly emphasise that the cotinuance of a larger number of vacant and temporary posts and unattractive pay scales for scientific posts is likely to have a deleterious effect on the smooth functioning of a research Institute. The Committee would like the Indian Council of Agricultural Research to examine the position and take necessary steps in the matter.
	4.8	As regards pay-scales of the researchers and scientists, the Committee would like to draw the attention of the Government to the recommendation contained in para 2:13 of their *Thirty-sixth* Report (Fourth Lok Sabha) on the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture)—Central Marine Fisheries Research Institute, Mandapam Camp.
21.	4.12	The Committee are not sure whether the scheme for merit promotions and advance increments is being taken advantage of by the Institute. They need hardly stress that scientific and technical personnel should be given suitable incentives for doing meritorious work. The Committee hope that Indian Council of Agricultural Research will take appropriate steps in this behalf.

(1)	(2)	(3)
22.	4.15	The Committee feel that proper supervision over the work being done at the Institute is difficult unless all the Sections of the Institute are housed in a single and suitable building. They note that difficulties are being faced for installation and operation of heavy machines and equipments in the present buildings and that laboratory working space in all the buildings occupied by the Institute is insufficient. The Committee, however, appreciate that in view of the present financial stringency, there may be difficulties in restarting the construction work suspended in October, 1965. They suggest that Indian Council of Agricultural Research may go into this question in all its aspects and find how best an improvement can be brought in the present situation.
23.	4.19	The Committee are distressed to note that there has been heavy shortfall in the expenditure in as much as only Rs. 1,46,660 could be utilised out of Rs. 4,29,900 provided in the Revised Estimates for 1966-67 for the acquisition of land for the construction of staff quarters and purchase of engines. They need hardly stress that the programmes of work, for which budget provisions have been made, should be executed with a sense of urgency.
24.	4.23	The Committee would stress the desirability of reviewing the work of each Sub-station and Unit at regular intervals to watch the progress of work entrusted to them and to ensure that continuance of each of them is justifiable. The Committee would also stress that there should be close liaison and coordination between the Institute and various Sub-stations and Units on the one hand and between various Sub-stations and Units *inter se* on the other so as to avoid duplication and overlapping in the work being done by them.

APPENDIX III

(*Vide* Introduction)

Analysis of Recommendations/Conclusions contained in the Report

I. CLASSIFICATION OF RECOMMENDATIONS

A. Recommendations for improving the Organisation and Working:

Serial Nos. 1, 2, 3, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23.

B. Recommendations for effecting economy:
Serial Nos. 3, 4, 5, 10 and 24.

II. ANALYSIS OF THE RECOMMENDATIONS DIRECTED TOWARDS ECONOMY

Sl. No.	Serial No. as per Summary of (recommendations Appendix II)	Particulars
(1)	(2)	(3)
1.	3	Efforts should be made to avoid duplication and overlapping in the field of technological research being done by various Central and State Institutes as well as by the industry.
2.	4	Completion of research programmes within the stipulated time is a proof that the research has been conducted smoothly and economically. It is also desirable that the economics of the projects are worked out as far as possible, both on a short-term and long-term basis, before they are taken up.
3.	5	One of the aims of the researches being made in the Institute should be to reduce the cost of the mechanised fishing boats so that the poor fishermen could afford to purchase them and take advantage therefrom.

(1)	(2)	(3)
4.	10	Concerted steps should be taken to attract the industry to commercially exploit the by-products evolved by the Institute. The feasibility of taking out patents on the by-products evolved by the Institute before releasing the same to the industry and charging royalty therefrom from the industry may be considered.
5.	24	There should be close liaison and coordination between the Institute and various Sub-stations and Units on the one hand and between various Sub-stations and Units *inter se* on the other so as to avoid duplication and overlapping in the work being done by them.

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