



# INDO-PACIFIC FISHERIES COUNCIL

## PROCEEDINGS

7th SESSION

BANDUNG

INDONESIA

*13—27 May 1957*

## SECTION I

**IPFC Secretariat, FAO Regional Office  
for Asia and the Far East  
Bangkok  
1957**

**INDO-PACIFIC FISHERIES COUNCIL**  
**PROCEEDINGS**  
**SECTION I**

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OPENING ADDRESS OF HIS EXCELLENCY, MR. SADJARWO, MINISTER OF  
AGRICULTURE OF THE REPUBLIC OF INDONESIA, AT THE SEVENTH  
SESSION OF THE INDO-PACIFIC FISHERIES COUNCIL AT BANDUNG,  
MONDAY, 13 MAY 1957

**Mr. Chairman, Distinguished Delegates,  
Ladies and Gentlemen:**

It is a great honour for me to have the opportunity to be present at the opening of the Seventh Session of the Indo-Pacific Fisheries Council today. First of all I would like to welcome you in this beautiful city of Bandung, the city which has made its tradition by offering facilities to several international conferences, political conferences as well as international conferences on technical, economic, scientific and other fields. Still fresh in our memory are the famed Asia-African Conference, and Regional Conferences held by I.L.O., I.R.C., W.H.O. and F.A.O. recently. Bandung has even been chosen to accommodate international seminars, such as the Third Seminar on Co-operatives in 1955 organized by ILO/FAO, and others. During these last few years many nations have gathered together in this country to discuss matters of vital importance to the benefit of mankind in various fields. This time the I.P.F.C. will discuss another important field in an effort to bring a better nutritional standard to the people, especially in the Indo-Pacific region. About one week after the end of this conference, representatives of the Asian and Pacific countries will meet again in Bandung to discuss matters on forestry, which are also very important to human life.

**Mr. Chairman and Distinguished Audience:**

It is a great honour to Indonesia to be entrusted by the Nations and the People of the U.N.O. as host for all these conferences. We accept this honour with the greatest appreciation and wish to use this opportunity to contribute to the efforts of all nations in solving problems on various fields for the sake of mankind and humanity. It is not our intention to summarize all our services, but we want only to mention our modest contribution in organizing these conferences, although we have also to admit that there are still imperfections. To overcome these deficiencies we hope to have your understanding and co-operation in order to gain the best results in this conference. Mr. Chairman, allow me to express Indonesia's

gratitude for the honour which has been entrusted to this country.

Mr. Chairman, mentioning the working-scope of the I.P.F.C. in this region, namely solving fisheries problems for the improvement of food production, especially animal protein, which is essential for our health, we will be reminded of the F.A.O.'s statements in Rome, with figures from the Yearbook of Fishery Statistics for various continuous years, in which it is made evident that mankind is still in great need for food, especially for animal protein, for direct consumption as well as for industrial purposes. Besides that F.A.O. has indicated, in a compilation of figures from all over the world collected in Rome, that the world living aquatic resources either in the seas, oceans or in inland waters are not yet entirely exploited, even still under-utilized.

Thus Mr. Chairman, the function of the I.P.F.C. is quite clear, and it goes parallel with the function of other international organizations in the field of fisheries, such as the G.F.C.M. (General Fisheries Council for the Mediterranean), I.C.E.S. (International Council for the Exploration of the Sea), I.C.N.A.F. (International Commission for the North west Atlantic Fisheries) and others in other parts of the world. The Indo-Pacific region is a vast area in which are situated two oceans, the Indian and the Pacific Oceans with the surrounding seas and inland waters. Besides that, the greater part of the world population happens to live in this Indo-Pacific region. Any problem concerning this Indo-Pacific region is strongly influenced by these two factors. It is obvious from the above-mentioned facts how important regional organizations like this I.P.F.C. can be as a means of solving regional problems. Indonesia too is aware of this fact, and we don't want to stay behind in offering our contribution, such as organizing Training Centres and Seminars. There is an important fact in this Indo-Pacific region, that relations exist between countries with more advanced fisheries. Some countries are even very advanced in their fisheries and depend entirely on their aquatic resources for the supply of protein food, while

some other countries are more or less backward in that respect or still in a developing stage. It is because of those relations mentioned before, that many matters and knowledge can be exchanged, like results of investigations or other experiences, and errors which need not be repeated by other countries, such as have been made before by another country. The importance and benefit of the I.P.F.C. forum is therefore very great. With these relations the interests of each country could be arranged in such a way that they would not clash with those of other countries. The exhaustion of certain living aquatic resources in underdeveloped countries by more advanced ones could therewith be prevented.

It is in my opinion also one of the aims of the United Nations, to have mutual respect for each other's interests in the field of economic, and social and other matters. The continuance of the meetings of this Council since Singapore, Cronulla (Australia), Madras, Quezon City, Bangkok, Tokyo and now Bandung will certainly be extended until the aims of the Council are fully realized, especially concerning each other's interests as mentioned before. In the field of fisheries, Indonesia aims at an improved and more balanced income of the fishermen in proportion to their efforts, and to increase the living standard of these fishermen who seem to be kept behind nearly everywhere in the world.

In making up its national programme in the field of fisheries, besides attempting to achieve multiplied production, Indonesia will not leave its principle of improving the welfare of the fishermen on the one side, and on the other side keeping the products within the scope of the population's buying power. I hope the Council can find some formularization in solving this big problem, which in itself contains a certain degree of controversy.

Another big problem which the underdeveloped countries in general have to face at this moment is the factor of time for realizing those results which have been reached by more developed countries up to now. I am sure that there are already many adequate results to be applied, but still remain unpractised, due to various reasons and difficulties. I hope Mr. Chairman, that the Council will be in the position to seek the solution of these matters within the framework of I.P.F.C., which I personally highly appreciate.

The period of 2 weeks scheduled for this Conference is certainly not too long, yet I do hope that any contribution on the part of Indonesia could be of benefit to the advancement of the practical knowledge which is always very useful to all of us.

As a host we have done our best to make your short stay in Indonesia a pleasant one and give you a good impression of the fisheries as well as of the places you are going to visit in this country. May I ask you, Mr. Chairman, to convey our gratitude to Mr. B.R. Sen, Director-General of the F.A.O., who made it possible for this 7th Session to be held in Indonesia, and to Dr. D.B. Finn, Director of F.A.O. Fisheries Division in Rome and his Delegation to this conference. Also our thanks to the Executive Secretary and the Staff from I.P.F.C. Headquarters in Bangkok, who all have contributed their respective shares in order to make this conference successful. My gratitude is also directed to all the Delegates whose contribution is highly appreciated. Only with all this co-operation Mr. Chairman, could best results be gained. May I wish all participants of this conference a very successful discussion and may God be always with you.

I now have the pleasure in declaring open this Seventh Session of the Indo-Pacific Fisheries Council.

ADDRESS TO THE SEVENTH SESSION OF THE  
INDO-PACIFIC FISHERIES COUNCIL, BANDUNG, INDONESIA  
13-27 MAY 1957

Mr. B.R. SEN, DIRECTOR-GENERAL OF THE FOOD & AGRICULTURE  
ORGANIZATION OF THE UNITED NATIONS

**Mr. Chairman, Ladies and Gentlemen,**

I am particularly sorry that I cannot be with you at this Seventh Session of the Indo-Pacific Fisheries Council which-as you know-is the first that has taken place since I became Director-General of FAO. It is, in fact, the first FAO technical conference of any kind that has taken place in the region during that time. Naturally a meeting such as this, which cannot help but have a great and lasting effect upon the lives and happiness of the Asian peoples, is very close to my heart, and I shall follow your progress with the greatest of interest.

I remember that the last FAO Regional Conference for Asia and the Far East which, through the great kindness of the Indonesian Government, was also held in the delightful surroundings in which you are meeting today made particular reference to fisheries matters. And I am gratified to know for instance that you propose to consider very closely the effect of fish farming upon the resources and economies of your countries. Your enquiries into the expansion of fish culture in rice fields, for example, and your work in connection with co-operatives as a means of fostering fisheries

development, will undoubtedly improve the diets of the Asian peoples, which is after all one of FAO's basic aims.

At your last meeting, in 1955, delegates expressed some concern at the lack of badly needed FAO technical aid in fisheries. I am delighted to be able to report to you that since then there has been considerable assistance requested and given, and that there have been during the time no less than nineteen technicians at work on fisheries and associated projects in the region. We expect too, that during the next twelve months there will be additional training schools and fellowships in fisheries matters. I am happy too, to be able to report that progress has been made towards the strengthening of our regional structure, which in itself will result, we hope, in bringing you greater FAO technical help.

I feel that I cannot close without once again paying tribute to the great kindness of the Government of Indonesia in making your meeting possible, and for the unfailing and painstaking labours of the organising committees. Their work must have made yours infinitely easier, and I confidently wish you a happy and successful Session.

**PRESIDENTIAL ADDRESS TO THE SEVENTH SESSION OF THE INDO—PACIFIC  
FISHERIES COUNCIL, BANDUNG, INDONESIA**

13—27 MAY 1959

By

**N. KESAVA PANIKKAR, FISHERIES DEVELOPMENT ADVISER  
TO THE GOVERNMENT OF INDIA, MINISTRY OF FOOD AND  
AGRICULTURE (DEPARTMENT OF AGRICULTURE), NEW DELHI  
CHAIRMAN OF THE COUNCIL 1955-57**

My first duty is to thank the Government of Indonesia for their warm hospitality and the generous facilities extended to us to hold the Seventh Session of the Indo-Pacific Fisheries Council at Bandung. I would also request you to accept my grateful thanks for having elected me as your Chairman.

Since our last session at Tokyo, Council work has been pursued by the Executive Committee in accordance with the directions which were given at the Sixth Session. Action taken and the difficulties which we have had to encounter have been placed before you in the various documents prepared by the Secretariat. I would, however, like to mention a few aspects pertaining to Council work which should receive earnest consideration in our hands.

Realising the difficulties of continuing the work between the Sessions which now take place on an average only once in 18 months, certain recommendations were accepted at the last session suggesting measures for the more efficient prosecution of Council's activities. These have been duly transmitted to Member Governments and although we have had fairly good response, the position is not entirely satisfactory. While we meet during sessions, discuss problems and formulate programmes, it is becoming increasingly evident that unless there is an adequate follow-up during the interval, the practical achievements would continue to be small or negligible. The present system of panels and committees appear to be largely handicapped by difficulties during the intersessional period. Unless we find a solution to this problem of keeping up the enthusiasm for work during this period, much of our efforts would tend to become diluted or even ineffective. I would appeal to all participants of this Session again to examine how best we could solve this problem.

The second point I wish to deal with relates to Budget. The Indo-Pacific Fisheries Council is a growing organization. We have

been regularly utilizing the funds allotted to us from the F.A.O. Budget but the time is coming when we have to expand our activities and, in fact, unless these activities become more tangible to member countries, it is likely that the strength of the Council would diminish. The Council can legitimately take pride in the fact that it has effectively focussed attention on fisheries problems amongst the member countries, effecting internal administrative and scientific organizations directed to improve the fisheries in those areas where such developments have been called for. It has also provided a forum for discussion of common problems and exchange of information collectively useful to all member countries. A more logical extension of this very essential service can be had only with a larger budget and I would request all delegates to impress this fact on their Governments and through their representation in the F.A.O. to seek their governmental support for fisheries programmes in general and for special programmes of the Indo-Pacific area in particular.

The strength of the Council would largely depend on the extent of co-operation developing amongst the member countries and in this facet of Council's activities, our progress has not been appreciable. We have had two co-operative projects under active discussion—one relating to researches on *Hilsa* in which three member countries, viz. India, Pakistan and Burma are interested and another relating to *Rastrelliger* in which many countries (India, Ceylon, U.K. (Malaya), Indonesia, Thailand, Viet-Nam, Phillippines, Cambodia and possibly others) are interested. Proposals for co-operative research projects on both these subjects have been drawn up by technical bodies. The first one has already met with your approval and the project on *Rastrelliger* is coming before you for consideration. It is to be hoped that this would again receive warm support from member countries for the fullest scientific collaboration aimed at

the development and rational exploitation of this extremely valuable fishery resource of the Indo-Pacific region.

It is necessary that the Council should examine further co-operative programmes and especially those which will have a common interest to a majority of the members of the Council. It was hoped that the proposal on the "Indo-Pacific Fisheries Year" which was accepted during the last session would provide the basis for a co-operative programme in which all members could actively participate in work of direct value to each individual country. Unfortunately many difficulties have developed in the active prosecution of this project. Exploratory and methodological work for which we requested the assistance of the F.A.O. has not materialized. Substantial support has been received from some of the member countries whereas others have not expressed definite views owing to a certain amount of apprehension on the question of staff and commitments. It was hoped that a more active contact by the Secretary of the Council with the various countries of this area would have secured a larger amount of co-operation for implementing the general programme as drawn up at the last session of the Council, but this could not be given effect to owing to lack of adequate financial assistance to the Secretary to undertake such travel. The F.A.O. Fisheries Division has, however, agreed to place before us a draft Handbook which would enable collection of data at least on the essential items as recommended in our earlier resolution and with this material before us, it is to be hoped that we shall embark on this project in however small a way as practical conditions may determine.

During many past sessions of the Council several delegates have voiced the view that adequate expert assistance was not made available to them in fisheries. This question again is one of impressing on our own respective governments the need to give high priority to fisheries schemes and to see that requests for expert assistance in fisheries are placed in category I under the Technical Assistance Programme.

The Council was formed in 1949 based on the Baguio Agreement which was signed in February, 1948. It may not be out of place for us to re-examine the terms of the Agreement and for us to evaluate how much we have

accomplished or tried to accomplish within the nine years of our existence. Article III of the Agreement reads as follows:—

### ARTICLE III Functions

The Council shall have the following functions and duties:

- a) To formulate the oceanographical, biological and other technical aspects of the problems of development and proper utilization of living aquatic resources;
- b) To encourage and co-ordinate research and the application of improved methods in every day practice;
- c) To assemble, publish or otherwise disseminate oceanographical, biological and other technical information relating to living aquatic resources;
- d) To recommend to Member Governments such national or co-operative research and development projects as may appear necessary or desirable to fill gaps in such knowledge;
- e) To undertake, where appropriate, co-operative research and development projects directed to this end;
- f) To propose, and where necessary to adopt, measures to bring about the standardization of scientific equipment, techniques and nomenclature;
- g) To extend its good offices in assisting Member Governments to secure essential material and equipment;
- h) To report upon such questions relating to oceanographical, biological and other technical problems as may be recommended to it by Member Governments or by the Food & Agriculture Organization of the United Nations and other international, national or private organizations with related interests;
- i) To report annually to the Conference of the Food & Agriculture Organization of the United Nations upon its activities for the information of the Conference; and to make such other reports to the Food & Agriculture Organization of the United Nations on matters falling within the competence of the Council as may seem to it necessary and desirable.

Looking through the various functions defined in the above Article, we would find that our work has almost entirely consisted of assembling, publishing or otherwise disseminating oceanographical, biological and other technical information under sub-para 'c'. For this purpose, we have in our sessions technical papers, symposia and discussions on selected problems. The publication of these provide much valuable material for dissemination. We have obtained a considerable amount of preliminary information relating to fisheries of most countries, but if we would allow ourselves to be more objective, our efforts in formulating definite problems for the proper development and utilization of living aquatic resources have not been adequate. On the question of improved methods, we have made available to the member nations whatever information that has come to the Council. On the question of co-operative research and development projects, we have yet to cover much ground and as I have said before, our attempts to bring about such projects on *Rastrelliger* and *Hilsa* still remain to be vigorously pursued. We have much material at our disposal which would assist in the standardization of scientific equipment, techniques and nomenclature, but even here organized efforts still remain to be initiated.

It would be natural for Member Governments to evaluate the Council work in terms of specific achievements contributing to the development of the fishing industry and exploitation of fishery resources rather than by the large amount of information we gather, discuss and disseminate. If I may be permitted to say so, it would help the work of the Council if we could give a clearer picture of problems which fall within the work of the various committees and have it drawn up in terms of short range projects. In respect to fundamental or applied researches requiring continued efforts for a number of years, probably a certain amount of planning in terms of time would prove beneficial and the Council should decide strongly in favour of canalising its efforts in specific directions and on specific projects rather than spread thinly over a wide range of problems. It is possible that we have other means of solving our difficulties than by the procedure I have suggested, but I have thought it appropriate to place these views before you so that the influence

which the Council has on our respective governments would grow rather than diminish.

The varying status which Fisheries programmes enjoy in different governmental organizations and the difference in approach to fisheries problems amongst member countries as influenced by the national genius of each country are, no doubt, factors which impede the adoption of a more concentrated line of effort on our part. It is here that I should like specifically to emphasize the need for a closer interchange of technical experience in fisheries amongst the members of the Council. We have on the Council, nations occupying the highest place in the world in fisheries exploitation and management--others are in varying stages of technical development, while in some countries resources have hardly been brought to a stage of adequate exploitation. In the future work of the Council, I wish to submit for your consideration that we should examine efforts which would develop closer interchange of ideas, experiences and practical techniques than have hitherto been possible.

Fishery science is a young discipline amongst applied sciences. In most countries of the Indo-Pacific area, scientific study of fisheries and the application of scientific knowledge to fishery problems are both in their very early stages. The assessment of under-exploited resources and the basis for their rational utilization provide material for new lines of thinking in fishery research. Similarly, fish cultural practices occupy a unique position in the Indo-Pacific fisheries. These are aspects of work in which our countries will be in position to make new and distinct contributions. Added to this there is the slow transformation which is now taking place in many of the countries in the mechanization of the fishing industry superimposed over an ancient pattern of indigenous fish capture and utilization. This modernization is, however, bringing with it a number of other problems which have impacts on the existing industry and the fishing communities. The Council has the manifold task of keeping abreast of these developments to be in a position to give the right technical orientation to the member countries, to most of whom fisheries development is a matter of great urgency if proper nutritional standards of the people are to be maintained.



Before I conclude, I wish to make a reference to the importance of training of fisheries personnel. The Council has given repeated attention to the question during the previous years and as a result the F.A.O. has organized training courses and seminars on certain specified subjects like statistics, brackish-water fish culture, marketing and co-operation. F.A.O. sponsored courses on mechanised fishing have also been started in some centres. Valuable though these courses have been, one cannot help feeling that considering the needs of the area these courses have not been adequate in their frequency or in the range of subject dealt with. If all-round improvement in fisheries is to be achieved a sound full-fledged training programme for fishery administrators should have high priority and the Council should use its influence to see that such training programmes are started both at national and international levels, but within the area where the needs of trained personnel are paramount.

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INDO-PACIFIC FISHERIES COUNCIL  
SEVENTH SESSION, BANDUNG, INDONESIA

13-27 MAY 1957

**AGENDA**

1. Business of the Session
  - 1.1 Adoption of Agenda
  - 1.2 Report on Credentials
  - 1.3 Nominations
    - 1.31 Technical Committees
    - 1.32 Council Correspondents
2. Statements of Delegations
3. Report of Executive Committee
  - 3.1 Membership
  - 3.2 Relations with International and other Organizations
  - 3.3 Council's Report to FAO
  - 3.4 Publications and Editorial Policy
  - 3.5 Financial and Budget Report
  - 3.6 Implementation of Council Instructions and Recommendations
4. Amendments to the Agreement and Rules of Procedure
5. Reports of Technical and Sub-Committees
  - 5.1 Technical Committee I
  - 5.2 Technical Committee II
  - 5.3 Sub-Committee on Hilsa
  - 5.4 Sub-Committee on Rastrelliger
6. Proposals for the Indo-Pacific Fisheries Year
7. Time and place of 8th Session
8. Election of Chairman and Vice Chairman
9. Symposium for 8th Session
10. Other Business

**CHAPTER I. COUNCIL PROCEDURE**

1. The 7th Session of the Indo-Pacific Fisheries Council was opened by his Excellency The Minister of Agriculture, Mr. Sadjarwo, in the Conference Hall of the Department of Forestry Building, Bandung, at 1600 hrs. on Monday, 13 May 1957.
2. The Chairman, Dr. N.K. Panikkar, in asking His Excellency the Minister to declare the 7th Session officially open, thanked the Government of the Republic of Indonesia for the gracious invitation to hold this Session in Bandung and expressed the deep appreciation of the Council for the arrangements made for their reception and for the excellent facilities provided.

3. His Excellency the Minister of Agriculture, in an address recorded in the Introduction to these Proceedings, officially declared the 7th Session of the Indo-Pacific Fisheries Council to be open.
4. The Chairman then introduced Dr. H.C. Trumble, F.A.O. Country Representative in Indonesia, who conveyed a personal message to the Council from Mr. B.R. Sen, Director-General of the Food and Agriculture Organization. Mr. Sen's message is recorded in the Introduction to these Proceedings.
5. The Chairman of the Indo-Pacific Fisheries Council then presented a Presidential Address, which is also recorded in the Introduction to these Proceedings. The Chairman then adjourned the meeting.
6. Delegates and guests at the opening ceremony then attended the opening of the Fisheries Exhibition presented by the Government of the Republic of Indonesia at the Orient Hotel, Djalan Asia-Afrika, Bandung. The Exhibition was officially opened by Mrs. Sadjarwo, wife of His Excellency the Minister of Agriculture.
7. The first plenary meeting of the Council opened at 0930 hrs. on 14 May 1957, and the Chairman opened proceedings by reading a telegram received from His Excellency the Prime Minister of the Republic of Indonesia, Dr. R.H. Djuanda. The message ran as follows:

"I VERY MUCH REGRET NOT BEING ABLE TO ATTEND OPENING OF THE VIIITH SESSION OF THE COUNCIL DUE TO MANY OCCUPATIONS IN OFFICE STOP MAY I HEREWITH EXPRESS MY MOST HEARTY WELCOME IN INDONESIA TO THE DELEGATES FROM SO MANY COUNTRIES AND MY SINCERE HOPE THAT THIS SESSION WILL REACH A SUCCESSFUL END STOP"

The Council directed that a suitable letter of acknowledgement be transmitted to the Prime Minister.

8. The Council unanimously approved the adoption of the Agenda.
9. In accordance with a resolution of the 6th Session, official statements from Delegates of Member Governments were tabled, and not presented verbally.
10. The **Delegate for Australia** outlined the structure and organization of fisheries administration, research and development in Australia indicating that both Commonwealth and States authorities were directly concerned with these matters. In general, legislation relating to the fisheries was the responsibility of the Commonwealth for extraterritorial waters and of the States for territorial waters and inland fisheries.
11. The Commonwealth Government, recognizing the importance of fisheries, maintains a permanent institution for scientific research, C. S. I. R. O. Division of Fisheries and Oceanography. Some State and Commonwealth Departments and Universities also carry out research in fisheries.
12. Special Commonwealth funds were set aside in 1956 for a Fisheries Development Trust Account and in the same year a development plan for Papua-New Guinea fisheries was approved. Australian fishermen's co-operatives are an established feature, and because of this, the Food and Agriculture Organization of the United Nations has approved the holding of a Fisheries Training Centre in Australia at the end of 1957. Australia follows with interest the work of F.A.O. and I.P.F.C. and hopes that the endeavours of these Organizations will assist the development of fisheries in the Indo-Pacific area.
13. The **Delegate for Cambodia** emphasized the deep interest of his Government in the work of the I.P.F.C. Although a shortage of trained personnel made it extremely difficult for Cambodia to contribute as fully as it desired to the work of the Council, every effort was being made to implement the resolutions of the Council and to ensure that Cambodia would benefit to the greatest possible extent from the information made available through the Council's activities.
14. The **Delegate for Ceylon** stated that the main objective of the Ceylon Government fisheries policy was to encourage the development of a vigorous and progressive industry, which would breach the gap existing between the demand and the supply of fish and fish products in the Island. Particular attention was given to the mechanization of fishing craft to improve methods of fish capture through the utilization of modern materials.
15. Exploratory work to discover new fishing grounds was being carried out and facilities were provided for the training of fishermen in modern techniques. The programme for the development of fisheries and fish culture in fresh and brackish water was well established and was being extended to make full use of the 140,000 acres of inland water and the 900,000 acres of rice field for fish production. Problems of marketing, storing, handling and transport of fish and fish products were receiving serious attention and a detailed research programme was developing in relation to both deep-sea and inshore fisheries. Connected with this were studies in limnology, oceanography and food technology.
16. Extension work in the socio-economic fields was being actively developed and close attention was being paid to the formation and operation of fishermen's co-operative.
17. In the statement presented by the **Delegate for India**, after expressing thanks to the Government of Indonesia for inviting the Council to hold this 7th Session in Bandung, attention was drawn to the importance of Indonesia as a country where practical techniques for fish culture had been developed over many centuries.
18. In the Second Five Year National Plan considerable attention was given to the development of Indian fisheries, particularly those in inland waters, and the need for the modernization of sea fisheries was clearly recognized.
19. Facilities for the handling and storage of fish and for the encouragement of the co-operative movement are being actively developed, together with a programme for improvement of the systems and facilities for marketing and distribution of fish and fish products.
20. An inland fisheries statistical survey has been started and special courses of instruction in fisheries subjects continued to assist

in the development of a valuable pool of skilled personnel.

Co-ordination of activities in the field of fisheries is being given particular attention and the assistance of the personnel of the various foreign programmes has been sought in this regard.

21. The **Delegate for Indonesia** extended a cordial welcome to all participants at the Council's Session and expressed the appreciation of his delegation for the excellent direction and management of the Council's affairs during the inter-session period. He also expressed high appreciation of the achievement of FAO in carrying out its Technical Assistance Programme in the region and referred particularly to the forthcoming Training Centre on Fishery Co-operatives and Administration in Australia.
22. Referring to the structure and function of the Council the **Delegate** indicated that Indonesia would welcome the formation of a Sub-Committee on Fish Culture in Rice Fields, in order to facilitate the possibilities for further study and achievement in this respect. In addition, the importance of the proposed Sub-Committee on Marketing was emphasized. Reference was also made to the significance of the liaison and the co-operative efforts made between the Council and other international agencies. Attention was drawn to the mutual interest of Member Governments in the development of proper utilization of the living aquatic resources of the Indo-Pacific area, indicating that in Indonesia considerable progress in fisheries development and production had been achieved, although much still remained to be done. The opinion was also expressed that the Council was making a useful contribution to the national fisheries programme in Indonesia and the **Delegate** expressed the sincere hope that the coming session would achieve the success of previous sessions.
23. The **Delegate for Japan** conveyed an expression of appreciation on behalf of the Government of Japan for the excellent arrangements made by the Government of Indonesia and the Secretariat of the Council for the 7th Session, and also for the continued efforts by the Member Governments during the years since the inauguration of the Council.
24. Pointing out that there was the tendency for population to outgrow food supply from the land, the significance of increased production from the sea was emphasized. It was the wish of the Japanese Government to promote, through the Council, increased supplies of aquatic products in the Indo-Pacific region, and the Government had resolved to take all possible measures to conform with the decisions adopted by the Council on problems connected with the Indo-Pacific Fisheries Year, the basic productivity in the sea and fish culture in rice fields. The Japanese **Delegate** referred to the gratifying increase in the number of fisheries students visiting Japan from countries in southeast Asia and indicated the willingness of his Government to receive more students from these countries in the future.
25. Expressing his appreciation of the opportunity to be present at the 7th Session of the Council, the **Delegate for Korea** said he was gratified at the progress made by the Council since its beginning in 1948. He extended sincere thanks on behalf of his country for the efforts made by the Members and the Secretariat of the Council to attain the Council's objectives. Pointing out that the ultimate goal was still far ahead, he emphasized the need to avoid unrestricted exploitation so that the fisheries resources might be conserved and the livelihood of people depending upon them maintained.
26. Expressing the hope that such problems would receive close attention during the Session and that efforts would be made to find solutions for them, the Korean **Delegate** expressed his hearty thanks to those responsible for the arrangement for the current Session of the Council.
27. The **Delegate for the Philippines** extended the greetings of his Government to the Government and People of the Republic of Indonesia and wished the Indo-Pacific Fisheries Council Session every success. On behalf of his country he expressed sincere thanks to the Government of the Republic of Indonesia for the gracious invitation to attend the present Session.

28. A good measure of success had been attained in the development of Philippine fisheries. Production had increased by nearly 18 million kilograms, contributing to this being the expansion in area of the chanos fishponds and the increasing number of commercial fishing boats. Valuable assistance had been received from the International Co-operation Administration of the U.S.A. and development activities were aimed at high production from both marine and inland waters. Technical Assistance received through the agency of F.A.O. was contributing to the development of the fisheries with the introduction of the Japanese trapnet and liftnet and the deep-sea trawl. There was intensified activity in inland fisheries development, and fisheries research would be stimulated by an F.A.O./E.T.A.P. fisheries biology expert, who was working on a number of projects with full counterpart assistance. The Government of the Philippines was rendering financial assistance through fish marketing co-operatives under the Agricultural Credit and Co-operative Financing Administration. During the year the Philippine Bureau of Fisheries was reorganized and it was considered that the advanced level of academic instruction through the University of the Philippines would have an important bearing on the training of fisheries workers. The Philippine Government had taken great interest in the proposals for the Indo-Pacific Fisheries Year, and proposals for a Fisheries Statistics Project had been submitted to the Philippine National Economic Council. The Philippine Government was already organizing the collection of data relevant to the Indo-Pacific Fisheries Year but in some fields its activities were retarded through lack of manpower.
29. The **Delegate for Thailand** thanked the Government and the people of the Republic of Indonesia and the National Indo-Pacific Fisheries Council Committee for the warm welcome and untiring efforts to prepare for the Session and to make pleasant their visit to the country. He assured the Council that Thailand would do her best to co-operate with the Indo-Pacific Fisheries Council and its Members. Since its formation the Indo-Pacific Fisheries Council has encouraged its Members to increase fisheries production but he thought that emphasis should be placed now on problems of distribution and marketing with a view to ensuring that the fisherman would receive reasonable financial returns and that the consumer would be provided with better quality fishery products.
30. The **Delegate for the United Kingdom** informed the Council that Her Majesty's Government was fully aware of the important role played by fishing industries in south-east Asia and had therefore co-operated in the activities of the Council since its inaugural meeting. In the Federation of Malaya, mechanization of the fishing fleet is expanding the fishing grounds to the seaward and steps have been taken to assist the fishermen to work on a co-operative basis, not only in marine but also in fresh- and brackish-water fisheries. In Singapore, mechanization of fishing craft is well-developed and is expanding and prawn fisheries are being developed in swamp land which is being converted into prawn ponds.
31. In Sarawak, the industry is actively encouraged through a loan scheme and professional advice on gear and methods has been made available. Fresh-water fisheries are now being developed. Fish production in Brunei has increased through the adoption of more efficient gear and the mechanization of fishing boats facilitated by loans granted by the Government. The Fish Culture Station at Malacca is nearing completion. Staff is being recruited and the research programme is already being implemented.
32. Landings of fish in Hongkong showed an overall increase in value. The quantity, by weight, showed little change. Facilities for education, development and research have been organized by the Government and the University of Hongkong and include experiments in oyster culture, boat construction and fish culture and extension work with non-indigenous form of gear. The Hongkong Marketing Organization is developing the fish marketing facilities and satisfactory progress is reported. The organization also provides educational facilities for the children of fishermen.

33. The **Delegate for the United States of America** conveyed an expression of his Government's sincere and sympathetic interest in the problems of the region and assured the Council that great benefit had been obtained from the exchange of scientific information and through personal contacts during the Council's session.
34. The United States Delegate assured the Council that all the required data could be made available for the Territory of Hawaii in relation to the Indo-Pacific Fisheries Year. The Government for the United States of America extended sincere thanks to the Government of Indonesia for the invitation to attend the Council Session and for the opportunity of obtaining first-hand knowledge of local fisheries and their problems.
35. Expressing, on behalf of his Government, warm appreciation for the kind invitation extended by the Government of Indonesia, the **Delegate for Vietnam** said that his Government had been represented at the I.P.F.C. Sessions since 1951. Although the Vietnam contribution was of modest proportions, his country has profited greatly from the experience gained by other members of the Council. The introduction of Tilapia had stimulated interest in fish culture and this was flourishing now with the introduction also of carp. The Government of Vietnam had approved a plan for the development of the fisheries in hitherto unexploited areas with due regard to the need for adequate conservation measures. The 'Plaine des Jones' had been selected as the area for a pilot project derived from this plan. The Government was giving serious attention to the development of marine fisheries and was providing aid to refugee fishermen from North Vietnam to assist them in re-establishing themselves. Despite the conservative attitude of many fishermen, mechanization of fish craft was increasing as also was the use of synthetic fibres for nets and lines. The formation of fishermen's co-operatives was also encouraged and it was expected that the present reorganization of fisheries administrative services would result in a considerable improvement in that field allowing for more efficient work, co-ordination of activities and the maximum benefit from the deliberations of the I.P.F.C.
36. The **Delegate for the Netherlands** stated that his Government was re-organizing its fisheries programme and the two main regions from which this programme would be implemented were Hollandia and West New Guinea. The Sea Fisheries Division of the Department of Agriculture and Fisheries was examining the results of the trawl fishing experiments conducted in the waters south of Merauke and was initiating investigations on the pearl-shell fisheries in Goelvink Bay. An intensified programme for the development of native fisheries was in preparation and would include the improvement of the existing fishing gear, the survey of fishing grounds and improvement in methods of preserving the catch.
37. On behalf of the Government, the Observer for Portugal expressed his very sincere appreciation for the opportunity to represent his Government at the Council's 7th Session. He was extremely gratified by the courtesy and attention received during the Session, and greatly appreciated the efforts of the Council and the Organizing Committee to ensure the success of the Session and comfort and entertainment of the participants.

#### **Steering Committee**

38. The Executive Committee's function under Section X Part Ib of the Rules of Procedure having ceased upon the inauguration of the 7th Session, the Council constituted a Steering Committee for the conduct of the Session, consisting of the following:
- Chairman of the Council  
: Dr. N.K. Panikkar
  - Member of the Executive Committee  
: Mr. Boon Indrambarya
  - Chairman of Technical Committee I  
: Dr. K. Kurosuma
  - Chairman of Technical Committee II  
: Mr. G.M. Charidjie Kasuma
  - Leader of the Indonesian Delegation  
: Mr. R. Pranjoto
  - Chairman of Central Organizing Committee  
: Mr. H. Saanin
  - Chairman of Local Organizing Committee  
: Mr. M. Ahjar
  - Secretary of the Council  
: Mr. J.A. Tubb

### Membership

The Executive Committee's Report indicated that the membership of the Council consists of the 16 Governments as reported at the 6th Session.

### Report on Credentials

In accordance with Section III of the Rules of Procedure a Report on Credentials submitted by Delegates to the 7th Session of the Council was presented.

Officially accredited representatives of Member Governments participating in the Council's Session, were 14 Delegates, 5 alternates, 17 advisers and 10 experts. The following list shows the Member Governments on behalf of whom delegations were present:

Australia, Cambodia, Ceylon, France, India, Indonesia, Japan, Korea, Netherlands, Philippines, Thailand, United Kingdom, United States of America and Viet-nam.

Accredited representatives of the following non-member Governments and observer organizations were also present:

Portugal, Pan-Indian Ocean Science Association, World Meteorological Organization, Majelis Ilmu Pengetahuan Indonesia and Perkumpulan Penggemar Alam di Indonesia. Visitors from several local institutions were welcomed by the Chairman, on behalf of the Council.

### Nomination of Technical Committees

The Nominations received from Member Governments in respect of Technical Committees I and II and their respective panels and special Sub-Committees were accepted by the Council. (See Appendix II)

### Council Correspondents

Nomination for Administrative and Bibliographic correspondents were received from Member Governments at the commencement of the Session. These remain as for the preceding period, except as shown in Appendix II.

### Report of the Executive Committee

The Council considered the Report of the Executive Committee in the light of recommendations made in the report of the Special-Committee to study this document and accepted the Executive Committee's

report, drawing particular attention to the importance of the document (IPFC/C57/WP 27, "Proposals for Council's Budget", see para. 51).

### Relations with FAO

46. The Council expressed its appreciation of the action taken by FAO to provide English/French interpretation service for the Session, and particularly to the Fisheries Division for action taken on recommendations, arising from the 6th Session of the Council held in Tokyo bearing in mind the limitation imposed by the restricted budget. The Council accepted with pleasure the invitation from the Director-General of FAO to be represented at the International Fishing Gear Congress, and noted with appreciation the interest shown in fisheries matters during the Far East Regional Conference held in Bandung in October 1956. The development of a close liaison with the International Rice Commission was noted with approval.

### External Relations

47. The Council noted that the relations and liaison maintained with other international organizations was, in general, satisfactory and also approved the action of the Executive Committee in seeking to improve the liaison with UNESCO, particularly the Marine Sciences Advisory Committee of this organization. It was noted that direct liaison had been established with WMO and that through the Secretariat close co-operation was maintained with Pan-Indian Ocean Science Association (PIOSA) and with the Pacific Science Association (PSA). It was agreed that further action should be taken to determine to what extent UNESCO or other International Organizations might be able to assist in or to actually take over those aspects of the Council's work which come within the field of fundamental research.
48. Arising out of the Record of the First Session of the Rastrelliger Sub-Committee (p. 13), the Council decided to seek representation at the ICNAF/ICES/FAO Workshop on Population Dynamics and the Selectivity of Fishing Gear, Lisbon, June 1957. Dr. G.L. Kesteven, who was representing FAO Fisheries Division at the

- Workshop, kindly offered to watch the interests of the Council during the meeting.
49. The Council accepted the invitation from the Secretary-General of the Pacific Science Association to be represented at the Ninth Pacific Science Congress.

#### **Council's Report to FAO**

50. Subject to an alternative proposal being received from FAO, the Council decided that the Report should consist of the Summary Record of the proceedings which should be prefaced with a brief introductory statement emphasizing those recommendations of the Council which were of budgetary significance, those which required the attention of Fisheries Division, FAO, and those which were of immediate interest to the Organization.

#### **Financial and Budget Report**

51. The Statements of Expenditure for 1955 and 1956, as prepared by the Secretariat, were adopted and the proposed budget for the current year, 1957, was noted (Appendix IV).
52. The Council approved a proposal that the document IPFC/C57/WP 27 should be received on the basis that Delegates should draw the attention of their Government to the proposal contained therein. The Council suggested that Member Governments might wish to brief in detail their Delegations to the 8th Session of the Council on this proposal, alternatively Member Governments may consider it desirable to instruct their Delegation to the FAO Conference to be held in Rome, November 1957, to give specific attention to these proposals during consideration of the Programme and Budget Proposals prepared and submitted to the Conference by the Director-General of FAO (Appendix V).

#### **Implementation of 6th Session Recommendations**

53. The Council noted with approval the action taken by the Executive Committee to implement the recommendations of the Council's 6th Session and directed that an expression of appreciation to the Secretariat for the work carried out during the inter-session period, particularly with regard

to the excellent services over several years of Dr. C. Miles and Dr. T.J. Job who were separated from the Council between Sessions, and to Mr. J.A. Tubb and Dr. M.R. Khan who have joined the Secretariat and have carried on its functions with excellence despite the difficulties inherent in assuming this position, should be placed on record.

#### **Amendments to the Council Agreement and Rules of Procedure**

54. The Council adopted an official French version of the amendments to the Agreement and Rules of Procedure adopted in English at the 6th Session of the Council. The Government of the United Kingdom drew attention to the fact that the adoption of such a version in no way affected the status of the original document, comprising the Agreement for the Establishment of an Indo-Pacific Fisheries Council which had been formulated in Baguio in the English language, as the authentic text.

#### **Reports of Technical and Sub-Committees**

55. The Council adopted the Reports of Technical Committees I and II, working Papers 35 and 36, with the Addenda issued during the Session. In accordance with the recommendation of the 6th Session these documents were designated respectively as Part-A of the Final Reports of Technical Committees I and II.
56. Part-B of each Technical Committee Report, arising out of the work of the Technical Committee during the Session, was discussed in detail by the Council in full Committee and, having been finalized, was adopted by the Council in Plenary Session (see Chapters 2 and 3).

#### **Technical Committee I**

57. Chairman : Dr. K. Kuronuma  
 Rapporteur : Dr. Tham Ah Kow\*
- Panel A** Chairman  
 : Dr. K. Kuronuma  
 Rapporteur  
 : Dr. G.R. Fish
- Panel B** Chairman  
 : Mr. R. Soelaeman Natadisastra  
 Rapporteur  
 : Dr. Tham Ah Kow
- Hilsa Sub-Committee**  
 : Chairman : Dr. N.K. Panikkar



**Chanco Sub-Committee**

: Chairman : Dr. G.R. Fish

**Rastrelliger Sub-Committee**

: Chairman : Mr. V. Soesanto

**Fish Culture in Rice Fields Sub-Committee**

: Chairman : Mr. M. Ahjar

Rapporteur Dr. G.R. Fish

Elected *ad hoc* Rapporteur in the absence of Mr. E.R.A. de Zylva

**Technical Committee II**

58. Chairman : Mr. G.M. Charidjie Kasuma\*

Rapporteur : Mr. I. Petersen\*\*

**Panel A Chairman**

: Mr. W.D. Orchard

Rapporteur

: Mr. Foo Fah Lin

**Panel B Chairman**

: Mr. Harsono Hardjohutomo

Rapporteur

: Mr. E.H. Dahlgren

**Panel C Chairman**

: Mr. N. Oka

Rapporteur

: Mr. I. Petersen

**Sub-Committee on Marketing**

: Chairman Mr. I. Petersen

\*Elected *ad hoc* Chairman in the absence of Dr. M.R. Qureshi.

Dr. Tham Ah Kow having been required to undertake an assignment with Technical Committee I, Mr. I. Petersen was elected *ad hoc* Rapporteur.

59. For the inter-session period, and the 8th Session, the following were elected :

**Technical Committee I Chairman**

: Mr. H. Saanin

Rapporteur

: Dr. A.L. Tester

**Technical Committee II Chairman**

: Mr. G.M. Charidjie Kasuma

Rapporteur

: Mr. L.F. Tisseverasinghe

60. The Council expressed its very great appreciation of the excellent services rendered by the Technical Secretaries assigned by the Fisheries Division, FAO for the 7th Session, and expressed the view that the Council's work would be greatly stimulated by establishing direct and close

liaison between Members of the Council's Panels and Sub-Committees and the Technical Secretaries. The Council therefore requested FAO to develop and, as opportunity permits, to expand this service in the future.

61. The Council was fully aware of the need for and increase in dissemination of ideas and knowledge concerning fisheries matters throughout the region and reiterated its request to Member Governments to ensure that reports on the progress of fishery development activities in their countries should be sent regularly to the Council's Secretariat. The Council emphasized that in cases where Governments had little or no progress to report, an account of the factors limiting or preventing such progress would be helpful to the Council in planning its future programme of activities.

62. The Council recognized that direct and frequent contacts between panel and committee members with fishery workers within a particular member country, and of panel and committee members with their respective chairman would greatly facilitate the work of the Council. It therefore recommended that Member Governments might take steps to encourage their officially nominated members of committees and panels of the Council to develop such contacts.

63. The Council noted the existing practice for the formation and operation of panels and sub-committees under the two procedurally constituted Technical Committees and emphasized that although their assignments may continue during inter-session periods, these panels and sub-committees are essentially *ad hoc* in nature. It was decided that the assignment of work to be undertaken by these panels and sub-committees through an inter-session period should only be made with the approval of the Council in Plenary Session.

64. The Council expressed the view that any Member Government, if interested, had the right to be represented at any meeting of such an *ad hoc* Sub-Committee or Panel and that each Member Government should be invited to nominate a representative who may be assisted by experts to attend

any such meeting of an *ad hoc* group whose assignment may require a special meeting during the inter-session period.

#### **Proposals for the Indo-Pacific Fisheries Year**

65. These were considered on a basis of a recommendations submitted in Part-B of the Reports of Technical Committees I and II, and Working Paper No. 20, and specific recommendations are given in Chapter 4 of these Proceedings.

#### **Time and Place of 8th Session**

66. The discussion on Agenda Item 7 revealed a majority of opinion in favour of a two-year inter-session period, and there was general concurrence with the view that the 8th Session should be held during the last quarter of 1958, and that subsequent sessions be held at two year intervals. Such a programme would permit the preparation of the Council's Report and Budget Proposals in ample time for integration into the Report of the Director-General for presentation to the FAO Conference.
67. As no invitation was received from a Member Government which could act as host for the 8th Session, it was decided that the provisions of Sections II, para. 1 of the Rules of Procedure should be applied.

#### **Election of Chairman and Vice-Chairman of the Council**

68. It was moved by the Delegate for U.K., seconded by the Delegate for Viet Nam that Dr. K. Kurokuma be elected Chairman of the Council for the next inter-session period and the 8th Session.  
Carried, Korea abstaining.
69. The Delegate for U.S.A. moved, seconded by the Delegate for Indonesia, that Dr. Tham Ah Kow be elected Vice-Chairman of the Council for the next inter-session period and the 8th Session.  
Carried unanimously.

#### **Symposium for 8th Session**

70. The Council decided that the Symposium for the 8th Session should be on:  
"Fish Behaviour with Special Reference to Pelagic Shoaling Species", and instructed the Secretariat to circularize Member Governments with a view to obtaining Contributed Publications and Technical Papers bearing directly upon this subject.

#### **Other Business**

71. On the question of the use of the name West Irian instead of Netherlands New Guinea, the Chairman ruled that the Council was not competent to take a decision on this matter and that the statements submitted by the Delegate for Indonesia and the Delegate for the Netherlands should be recorded in the Minutes of the Plenary Meeting.

## CHAPTER 2 — RESOURCES

### INTRODUCTION

1. In dealing with matters relating to the investigation of resources (their detection, measurement and appraisal), the Council based its discussions on the Report by Technical Committee I of its work since the 6th Session of the Council. This document faithfully records the exchanges effected at the instance of the Council on the topics referred to by the Council in its 6th Session. Further information on national industries and resources programmes was furnished by Member Governments and was summarized in a status report compiled by the Secretariat. The Council made reference to this report in its discussions. In addition, the Council had before it a number of Working, Technical and Contributed papers relating to the selected and other topics.

2. In reviewing these topics, the Council sought to establish the principles that should guide it in its selection and treatment of topics. It recognized its general basic responsibility to be aware of the status of the fisheries of the region and currently of all development taking place in these industries, and it emphasized that the purpose of the planned Indo-Pacific Fisheries Year (IPFY) was to assist it in establishing a more comprehensive and systematic view of these industries. It felt obliged to emphasize that, while all aspects of resources work might legitimately be brought before the Council for discussion, there was a need to avoid the formulation of general resolutions advocating lines of work merely on the grounds that such work was valid and that its results would at some time be of value; instead the Council should try to identify the situations where inaccurate or incomplete resources information hampered the development or effective conduct of a fishery, and with respect to such situations the Council should formulate practical advice to Member Governments as to the action they should take, individually and in collaboration, to solve such problems.

### METHODOLOGY

#### General

3. The Council recognized the desirability for member countries to adopt standard methods and instruments for research work in the Indo-Pacific area. The difficulties which

might be encountered in attempts to effect standardization were appreciated but the Council, nevertheless, felt that the process of standardization should be initiated. The Council decided to request the FAO Fisheries Division to prepare a broad detailed categorisation of methods together with a description of methods considered suitable for adoption by member countries, for the consideration of Technical Committee I during the period between the 7th and 8th Sessions of the Council.

#### Age Determination of Fish

4. The Council recognised the need for techniques to analyse the response of population to exploitation in the development of a fishery. The Council noted that conventional techniques of age determination which were used to determine population structure and properties, presented difficulties and yielded ambiguous results when applied to tropical fish. The Council, nevertheless, recommended the use of age-determination techniques wherever possible, in population analysis research because these were relatively inexpensive. They should, however, be subjected to constant critical examination. At the same time the Council believed that the use of non-conventional techniques of age determination as the possibility of determining population properties without age determination should be explored.

#### Standardization of Plankton Nets

5. Having regard to the desirability for member countries to adopt standard methods and instruments for research work, the Council felt that standardization could be initiated by the tentative adoption of a standard zooplankton net of the "marutoku-B" type. The Council recommended that this net or a modified one should be used in productivity investigations, either of itself or in conjunction with another net already in use or preferred by individual agencies.

6. In order to facilitate the adoption of a standard zooplankton net, the Council instructed the Secretariat to explore ways and means of securing funds from UNESCO or some other agency to purchase sufficient nets (say 100) for distribution to member countries in

such numbers as may be necessary, on the understanding that member countries receiving them would report the results of their use to the next or subsequent session.

7. The Council decided to review the desirability of adopting a standard phytoplankton net, in the light of reports on the use of the tentative standard zooplankton net.

#### **Taxonomy**

8. The Council recognized that the interest of fisheries science in taxonomy was limited to correct identification of fish of economic importance. In studies on population dynamics it would be necessary to pursue at sub-specific level. In other studies less precise identification should be sufficient.

9. The Council considered that the services of professional taxonomists should be utilized for investigations requiring species or higher identification, whilst the identification of populations within the species, whether of racial or sub-specific status should be the work of the fisheries biologists.

10. The Council noted that the requirements in this field for commercial and economic purposes were always less than those for biological purposes and that in international trade it was almost a universal practice to refer to these catches by common name. Since commercial catches represented an operation of the stocks and the data represented some of the raw material of the biologist, the Council considered it essential that there should be correct identification of the stocks from which the catches were taken. The Council would, therefore, urge member countries to publish check lists of fishes giving the scientific names as well as the equivalent local and common names and to revise those already in existence, bearing in mind the needs of the fisheries biologist.

#### **Population Dynamics**

11. The Council recognized the important contributions which studies on "population dynamics" could make to the assessment of the relation between fish stocks, the yields obtained from them and the amount and kind of fishing. The important role which this branch of fisheries science plays in providing a focal point for biological, economic and technical studies of the primary industry and a meeting ground for specialists in these fields was noted.

12. The Council felt that, whilst studies on population dynamics had hitherto been carried out only in the fields of sea fisheries and lake fisheries, the time was ripe for the extension of such studies to fish populations under cultural conditions.

### **PLANNING AND PROSECUTION OF RESEARCH**

#### **Fish Culture in General**

13. The Council considered the possibility of fish, under cultural conditions, having their active feeding time limited to certain periods and noted that there were periods, particularly during midday and the hours of darkness during which they were disinclined to feed. Having regard for the importance of this subject, Member Governments were urged to apprise the Council of further studies carried out on this subject.

#### **Nutrition of Fish under Cultivation**

14. The Council noted the excellent work being carried out in this field in many countries of the region. It was considered that the results of studies on the nutrition of fish under cultivation, including physiological investigations on enzymes, could be usefully applied to fish cultural practices to obtain increased yields. The Council suggested that FAO could help stimulate work on this subject by preparing a comprehensive review. The Council urged Member Governments to report progress on this subject in the Current Affairs Bulletin.

#### **Soil Composition in Fish Ponds**

15. The Council noted the work which had been carried out on this subject. It was considered that the co-operation of soil chemists and bacteriologists with fish-pond culturists was likely to yield important data in this field. The Council recommended that more data should be assembled regarding the various techniques involved in sampling and examining bottom deposits, and that a clear and simple interpretation of the results of such surveys should be reported.

#### **The Control of the Introduction of Exotic Species**

16. The Council noted the difficulties in the control of the introduction of exotic species. It was considered that considerable research must be carried out before any legislation in respect of this problem should be contemplated.

Member Governments in possession of information on possible control measures in respect of less desirable fish species were urged to apprise the Council of such information.

17. The Council decided to change the title of this subject to "Problems arising from the introduction of non-indigenous fishes".

#### River Basin Development

18. The Council noted the damage which could be caused to fish life and installations as a result of inadequate planning in river basin development. The Council recommended that early surveys should be carried out, on notice being given of impending construction of dams, and that dam sites should be cleared before water was allowed to accumulate in order to protect fish species already present, and to facilitate the early exploitation of the reservoir so created. The Council stressed the need for a "follow-up" survey some months after the completion of the project in order to check the adequacy of the work carried out as a result of the earlier survey.

#### Water Pollution

19. The Council noted that, whilst water pollution problems were unlikely to become acute in the immediate future in certain countries because of the abundant supply of surface water and the lack of industrial development, in many cases serious damage was caused by pollution to fisheries before adequate authority was obtained for necessary action to be taken. The Council therefore urged Member Governments to keep this problem constantly under review, and to ensure that action could be effectively taken before serious damage was caused.

#### Weed Control

20. The Council reviewed the position in respect of weed control by the use of Chinese Grass Carp and *Tilapia mossambica*. Certain limitations in this connection were noted. The Council recommended that further information on the general subject of weed clearing in ponds should be collected. Interested Member Governments were urged to carry out further experiments in order to assess the amount of plant material consumed by the Chinese Grass Carp and the relative suitability of the different common plants as sources of food for this fish.

#### General Inland Fisheries

21. The Council considered the report on the problems of fresh-water fisheries in areas of limited development. Although an acute shortage of protein food may be evident, the lack of knowledge amongst the indigenous population in these areas prevents the immediate adoption of large scale but relatively complex fish cultures. The Council recommends that in such areas, the stocking of natural swamps and waters with a handy species such as *Puntius javanicus* may be a preliminary step towards developing fresh-water fisheries.

#### Chanos

22. The Council considered that one of the major problems confronting the *Chanos* fisheries concerned the high mortality of the fry in nursery ponds. It recommended that the Sub-Committee, formed to investigate these fisheries, should collect the necessary information on any techniques used in member countries which reduce this mortality and make an appropriate report at the next session of Council.

#### Mugil

23. The Council noted that the comprehensive report requested at the last session was not yet available for study. It considered that the work of assembling these data should continue and form the basis of a report to be presented at the next session. In view of the lack of knowledge relating to the spawning and early stages of development in certain species of mullet, it recommends that particular attention be directed towards the prosecution of such research in member countries.

#### Hilsa

24. The Council noted the progress of work in this group and recommended the continuation of the work of the *Hilsa* Sub-Committee. The desirability for active workers in this field to be given the opportunity to meet to exchange news and discuss the standardization of experimental methods was stressed.

#### Trawling

25. The Council noted the status of the trawl industry in the various territories within the Indo-Pacific region. The Council considered that exploratory trawl fishing should be encouraged by Member Governments with a view to establishing such a fishery where no

such fishery existed and to expanding the fishery where it was already established. Member Governments were urged to utilize the Current Affairs Bulletin of the Council for the exchange of information on this subject.

#### **National Resources for the Study of Basic Productivity of the Sea**

26. The Council recognized the need for a study of basic production in the Indo-Pacific region in order to enable Member Governments to exploit their fishery resources in a rational manner. The Council, however, felt that before Member Governments could effectively undertake such work, the practical aspects including the standardization of methodology and instrumentation would first have to be studied. The Council noted that a symposium on the "Measurement of Primary Production in the Sea" would be held in Bergen, Norway, in September 1957 and decided to formulate recommendations on this subject only after full consideration had been given to the views expressed and conclusions arrived at during this symposium.

#### **Faunal changes**

27. With regard to faunal changes due to climatic modification, the Council noted that fluctuations were a permanent feature of our system. It was considered that, whilst meteorological data, being more readily available and cheaper to obtain than oceanographic data, would offer a starting point in the study of such fluctuations, the use of data on the immediate environmental factors should be considered in planning the methodology of studying fluctuations. It was also considered that accurate catch statistics should be available for such studies.

28. The Council would urge Member Governments to use the Current Affairs Bulletin of the Council to keep one another informed of such fluctuations.

#### **Oceanography**

29. The Council recognized that oceanographic data relating to the environment must be made available before fluctuations in fish catches could be interpreted in scientific terms. The possibility of using correlations based on extensive and continuous time-series of environmental factors was noted. The Council decided to request Member Governments to cdeisonr the

feasibility of sending their salinity and water temperature data to the Secretariat to be published and made available to all member countries.

#### **Tuna**

30. The Council noted the report of the Tuna Rapporteur. It was considered worthwhile to have this information assembled each year for dissemination to member countries in the region. It was felt, however, that it would not be necessary to review such work unless a specific problem requiring concerted action arose.

31. The Council considered the report of the Convener of the Special Committee on the Tuna Catch Statistics Chart. It was felt that there was no need at the present juncture to publish the proposed chart. Such catch statistics as are available could be submitted in tabular form and recorded on the master chart with 1° squares, after consolidation. The Council, however, recommended the adoption by Member Governments of the principle of the 1° square as a basis for organizing the collection of catch statistics. This principle could be extended to other pelagic fish as well as to fish of inshore areas by using smaller squares which could be fitted into the 1° square system.

#### **Rastrelliger**

32. Having regard to the present state of knowledge concerning the *Rastrelliger* fisheries and the problems confronting them, the Council recommended to Member Governments concerned the courses of action given in the Appendix to this chapter for the collection of information relating to both the Industry and the Resource.

33. Having regard to the need for vigorous steps to be taken to improve the standard of research work in respect of these fisheries and to secure standardization of the methods employed, the Council decided to request FAO to initiate arrangements to conduct a special short seminar to train technical officers in the standard techniques recommended in IPFC/C57/CP 1.

34. The Council considered that the courses of action recommended to Member Governments for adoption in respect of the *Rastrelliger* fisheries formed a suitable basis for the development under the ETAP of a group country project. The Council agreed to request FAO to assist in drafting a provisional pro-

gramme of work for the expert for circulation to interested Member Governments for approval. The Council noted that Member Governments would appreciate an indication of the financial commitment in respect of the local expenditure of the expert, which they may be called upon to face as a result of participation in this Group Country Project.

#### **Seaweeds**

35. The Council noted that only one paper was submitted during the current Session. Workers in this field were urged to submit their names and addresses as well as the titles of their papers for listing in the Current Affairs Bulletin.

#### **Programme**

36. The Council recommended that the following topics suggested by Technical Committee I be considered at the 8th Session:

- Panel A (1) Fish Culture in Rice Fields  
(2) Nutrition of Fish under Cultivation  
(3) *Chanos*

- Panel B (1) *Rastrelliger*  
(2) Standardization of Plankton Nets

and that member countries should be urged to submit technical papers on these topics.

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## APPENDIX TO CHAPTER 2

### ACTION TO BE TAKEN IN THE STUDY OF SELECTED PROBLEMS IN RELATION TO THE RASTRELLIGER FISHERIES

Each member country concerned should prepare maps with a half degree grid showing the location of fishing operations in waters adjacent to their territories, season by season, or month by month, as necessary. FAO offered to undertake the preparation of a master "*Rastrelliger*" blank map covering the entire area, from 30°E to 150°E and from 35°N to 30°S; it would also prepare such area maps for the convenience of the various countries, designing these, if possible, to constitute a mosaic of the entire area. The information on catch should also be recorded on these maps.

A classification and description of craft, gear and methods engaged in *Rastrelliger* fishery should be prepared. Each country should assemble description material for its territories and should forward this material to the Secretariat. It was suggested that the Technology Branch of the Fisheries Division might lend aid in the compilation of this material. The amount of fishing operations should include direct reference to the strategy and tactics of fishing, with special reference to any techniques for exploiting the schooling behaviour of the species.

An inventory of craft, gear and manpower engaged in *Rastrelliger* fishing should be prepared. All countries should forward to the Secretariat such data of this kind as might be available at present, and preparations should be begun for a special inventory to be made during the Indo-Pacific Fisheries Year. Whilst it was known that the IPFC Handbook for Fishery Field Observers would include directions for making observations on these matters and for recording these, it was requested that the Fisheries Division of FAO render whatever help it could in guiding the conduct of this inventory.

Every effort should be made to collect statistics on catch taken and effort expended. The broader use of sampling methods for this purpose was recommended. It was agreed that the IPFC interests should be represented at the Lisbon Workshop on Population Dynamics and Selectivity of Gear and it was hoped that the *Rastrelliger* problems could be examined by that Meeting.

First priority should be given to securing correct determination of the taxonomic identity of the group fished.

- (a) Each country should send to Mandapam and Singapore a description of the groups being fished, basing this description on Weber and de Beaufort, and should send a sample of each group, comprising 20 specimens, for examination. The two stations mentioned should exchange samples of the groups of their area.
- (b) A more extended programme of examination of these groups should be initiated in accordance with modern taxonomic practices. A plan for systematic sampling and measuring is to be drawn up and each country should undertake sampling and measuring work in accordance with this plan. It is noted that the plan calls for the use of punch card equipment for the computational work necessary in the analysis of the data that would be collected. It is believed that this operation could be undertaken at Rome.

The development of catch analysis work should form the basis of the extended biological programme. Sampling for this purpose should be extended or should be initiated if not already in progress. Sampling should be of 50 fish where the size was small (about 3 cm.) and of 100 where the range was greater. The minimum set of measurements should be: total length, standard length, weight, sex, gonad condition. Special biometric sheets should be used within columns for each of these items with a spare column for remarks. The sheets should also provide recording identity, locality, date and method of capture for the sample.

The use of tagging was desirable but the details of the programme should be left to each country, which should keep the Secretariat informed of its work in this field, giving information on type and number of tags used and places of release.



The compilation of information on schooling behaviour could prove extremely useful. It would be desirable for fishery officers to record the simple observations of fishermen in the course of their duties. These records should, if possible, include observations on size of school, density, behaviour and conditions prevailing in each instance. Copies of all records should be sent to the Secretariat for compilation.

The development of an accurate account of the environment inhabited by *Rastrelliger* should be undertaken as soon as possible.

Fish searching and exploratory work should be developed and prosecuted with the greatest possible vigour.

### Seminar

**Objectives:** to train technicians in the field and laboratory work to be performed by them as part of the study of populations of *Rastrelliger* and to formulate a standard pattern of research operations. (The urgency of research on *Rastrelliger* and the importance of population studies in the research programme are set out in the report of the *Rastrelliger* Sub-Committee).

**General Plan:** the seminar is an essential part of the general plan for an action programme to obtain data on the *Rastrelliger* stocks of the region. This general plan calls for immediate initiation of certain activities by interested Governments and FAO, some part of which will be preparatory for the seminar. The plan then calls for reinforcement of the national research programme along the lines agreed upon in the seminar, assisted by a Technical Assistance expert engaged on a Group Country Project.

### Curriculum:

1. Introduction-review of available knowledge on the biology and exploitation of *Rastrelliger*.

2. Planning of research-selection of observations to be made; design of pattern of observations; design of sampling programme, location, frequency and size of samples; relation of direct scientific sampling of stocks, with sampling from commercial catches.

3. Methodology-a) methods of linear and weight measurements, gonad studies, stomach contents, collection of material for age determination, observations on parasitism;  
b) field observations on behaviour;  
c) oceanographic and planktonic observations and collections to be made in conjunction with field observations and sampling of fish.

4. Analysis and interpretation of data, statistical procedures, compilation and elementary analysis.

**Programme:** Duration of course six weeks with time tentatively allocated as follows:

Lectures	44 hours
Practical work	142 hours
Field work	42 hours

**Location:** Bangkok (Thailand) or Mandapam (India).

**Time:** September-October 1958, or earlier if it could be arranged.

**Staff:** Co-director, Instructors (the *Rastrelliger* TA expert and two other TA experts in the region). Also a taxonomist and a statistician, if possible.

**Participation:** It is thought that two (2) trainees might be sent from each of the interested countries. It is likely that participants will be sent by India, Indonesia, Thailand, Philippines, Malaya and possibly other countries.

## REPORT OF TECHNICAL COMMITTEE I TO THE 7th SESSION

Chairman: Dr. K. KURONUMA

### INTRODUCTION

In accordance with the Resolution adopted at the 6th Session, the work of Technical Committee I has been organized during the year through two panels (A. Inland Fisheries, B. Sea Fisheries) and Consultative Body of Experts. The committee, panels and consultative body were constituted as below.

#### Technical Committee I

Chairman — K. Kuronuma (Japan)  
Rapporteur — E. R. A. de Zylva (Ceylon)  
Members — M. B. Blackburn (Australia)  
(No replacement after Dr. Blackburn's withdrawal in October 1956)  
U Ba Kyaw (Burma)  
Dom Saveun (Cambodia)  
J. Lemasson (France)  
B. S. Bhimachar (India)  
H. Saanin (Indonesia)  
Chee Choul Keun (Korea)  
N. Ahmad (Pakistan)  
H. R. Montalban (Philippines)  
P. Karnasut (Thailand)  
F. D. Ommanney (U.K.)  
L. A. Walford (U.S.A.)

#### Panel A Inland Fisheries

Chairman — H. Saanin (Indonesia)

#### Panel B Sea Fisheries

Chairman — F. D. Ommanney (U.K.)

#### Consultative Body of Experts (Since Oct. 1956)

H. U. Sverdrup (Norway)  
J. B. Tait (Scotland)  
F. S. Russell (England)  
A. Bruun (Denmark)  
C. H. Mortimer (England)  
W. Ohle (Germany)  
U. D'Ancona (Italy)  
K. F. Vaas (Indonesia)

#### Chanos Sub-committee

Chairman — H. R. Rabanal (Philippines)

#### Hilsa Sub-committee

Chairman — T. V. R. Pillay (India)

#### Rastrelliger Sub-committee

Chairman — N. K. Panikkar (India) (*ad-interim*) to 24 Sept. 1956  
D. W. Lemare (U.K.)

#### Tuna chart Sub-committee

Convener — A. L. Tester (U.S.A.)

#### Plankton net standardization Sub-committee

Rapporteur — Z. Nakai (Japan)

The interval between the Council's 6th and 7th Sessions was utilized by the committee to review progress made in the various fields of work recommended for detailed examination by the Council at its 6th Session held in Tokyo, 1955. Owing to various reasons the work of the committee did not progress as it should have been expected, but in some topics of study, as noted below, a note-worthy achievement has been obtained during the period. The pre-occupation of members of the committee with their own national duties, departure of members of committee and more or less frequent change of committee personnel were believed to have all contributed to the inadequate progress of the work of the committee. The consideration how the work of the committee could be made more effective was given by the Council at its 6th Session, and it is hoped that the same subject will be again examined very carefully at the 7th Session.

It is gratifying to find that the Consultative Body of Experts was established within the Council constituted by world famous specialists in October, 1956. The high activity shown by the Rastrelliger sub-committee in international co-operation is believed one of the great achievements of the Council's work since its foundation, and is set out in the "Record of the 1st Session of Rastrelliger Sub-Committee held in Penang, Sept., 24-30, 1956".

The present report will deal with the progress of work achieved by the committee for the period October 1955-May 1957 and submitted to the Council's 7th Session for examination. The committee chairman may add here to note

that the report is not complete since he has not received the report on Chanos up to the time of his preparation of the present report.

### CONSULTATIVE BODY

The Council at the 6th Session resolved that Technical Committee I shall consist of two Panels only dealing with i) Inland and ii) Sea Fisheries including marine and shell fisheries, respectively and that the former Panel C shall be considered as a consultative body, to which specialists may be co-opted by invitations extended to them by the Executive Committee regardless of their possible membership in delegations or official connection with the Organization. The work of this Panel shall be conducted by Consultants in the fields of Oceanography, Marine Biology, Limnology, and Freshwater Biology, who shall advise the Council of current developments in their respective fields.

It is highly gratifying to record that such a consultative body was established in the Council, which is constituted by 8 specialists undermentioned, each one of them of world wide repute as the highest authority in his field.

#### Oceanography:

Dr. H. U. Sverdrup  
Director, Polar Institute,  
Oslo, Norway

Dr. J. B. Tait  
Hydrographer, Scottish Fisheries  
Department,  
Aberdeen, Scotland

#### Marine Biology:

Dr. F. S. Russell  
Director, Marine Biological Laboratory,  
Plymouth, England

Dr. Anton Bruun  
Zoological Museum,  
Copenhagen, Denmark

#### Limnology:

Dr. C. H. Mortimer  
Director, Freshwater Fisheries  
Association Laboratory,  
Ambleside, Westmorland,  
England

Dr. W. Ohle  
Hydrobiologische Anstalt der Max  
Planck-Gesellschaft,  
246 Plön, c/o Holstein, Germany

#### Freshwater Biology:

Dr. K. F. Vaas  
Djajan Pangrango 8,  
Bogor, Indonesia

Prof. U. D'Ancona  
Department of Zoology,  
University of Padua,  
Padua, Italy

The establishment of the Consultative Body occurred in October, 1956, naturally the Council's programme for the period October 1955-May 1957 was not able to make full use of its services. However, it is very clear that the Council's activity will be highly accelerated from the 7th Session and thereafter as the Council's Committees, Sub-Committees, Panels and other Study Units may avail themselves of the service offered by these world authorities.

### INDO-PACIFIC FISHERIES YEAR (IPFY)

The execution of the Indo-Pacific Fisheries Year in the region is highly significant and was the subject of a resolution at the 6th Session of the Council in Tokyo, 1955, which is read as follows:

#### "INDO-PACIFIC FISHERIES YEAR"

A minimum programme for the Indo-Pacific Fisheries Year should include the following fishery data in respect of each country.

##### A. Fisheries Statistics

1. Total fish production of a country computed regionally by suitable sampling techniques or by total enumeration where possible.

2. Total fishing population (with separate figures for active adult fishermen).

3. Fishing craft and gear employed in fishing and their distribution.

4. Break up of fish landings—indicating the major commercial species and types of fishing techniques employed to enable computation of catch-per-unit of effort in respect of total production and in respect of the major commercial species.

5. Temperature and salinity cycles of inshore waters.

In the field of inland and other culture fisheries, the following may also be added:

1. Total inland fisheries production showing separate figures for yield of ponds, rivers and lakes and catch composition according to species. If possible, also separate figures as at 4 above.

2. Area of culturable inland waters.

3. Yield per acre under natural and artificial conditions.

In addition to the above, the following information should also be desirable.

#### B. Meteorological Information

Regionwise data on rainfall and major climatic factors.

#### C. Oceanographical Information

1. Data on temperature, salinity and nutrients.

2. Data on total plankton production to obtain an estimate of the productivity of the seas in the different regions of the Indo-Pacific.

3. Identification of water masses with a view to their association with particular types of fisheries.

4. Information on the principal constituents of marine fauna and flora collected with a view to comparing the results of surveys to be made in subsequent years.

Considering the importance of the proposition the Chairman of the present Committee requested by a circular the opinions of the Committee members of Member Governments. The answers received by the Chairman are as follows:

##### Japan (Dr. K. Kuronuma)

"Since the Statistics Section of Ministry of Agriculture and Forestry is collecting annually various kinds of statistics in fishery as its routine work, it is not needed to organize a special programme to submit the data required by IPFY, as far as *Fisheries Statistics* are concerned. The *Meteorological Information* will be also available, if the required scope of the data is not highly elaborate.

As to the *Oceanographical Information*, the data will be also available depending on the scope of required data perhaps without the function of special programme."

##### Philippines (Mr. Montalban)

"Reference is made to your letter of August 25, 1956. We are pleased to inform you, in this connection, that so far we have not

drawn up any programme for the Fishery Year 1957-1958 to correspond with the I.G.Y. 1957-1958. We find it rather difficult to do this under the stress of uncertainty in the face of an impending reorganization which will necessitate shifting of personnel and possible alteration of projects. It is hoped that before the end of the fiscal year 1956-1957, the reorganization of the Bureau of Fisheries will have been accomplished and implemented so that some definite programme along the matter treated in paragraphs 179-185 may be drawn by our office.

In this connection, we are looking forward to the pushing through of the proposed Regional Training Centre for Fisheries Administration (paragraphs 109-110 and paragraph 185) so that we may be able to send one or two of our men who might be depended upon to steer the collection of statistics during the Fishery Year." (Oct. 11, 1956)

##### U.K. (Dr. Ormanney)

"With reference to your letter of the 25th (Aug., 1956), fisheries statistics are collected in this Colony and in the Federation of Malaya by their respective Fisheries Department who would, no doubt, be able to supply statistics for these territories.

With regard to Borneo territories I do not know what arrangements are made for the collection of statistics and would suggest that you write to the Director of Fisheries, Malaya, on the subject." (Nov. 8, 1956)

##### U.S. (Dr. Walford)

"This is in reply to your letter of August 25 asking for suggestions for means of carrying out the Council's recommendations to conduct an Indo-Pacific Fisheries Year.

The information which is most desirable, of course, is a reasonably accurate estimate of the quantities of fish caught, by species, area, kinds of fishing apparatus and types of vessels; also a reasonably accurate estimate of the numbers of fishermen, vessels, and if possible the amount of time spent fishing during intervals such as weeks and months.

Obviously the collection of this information would require in some areas a very special effort, for which extra help must be engaged. Perhaps each country in the region could carry on a preliminary education campaign among fishermen, soliciting their interest and cooperation during the year. Would it be feasible to

appoint a key fisherman in each area, at a small stipend, to act on behalf of the government in collecting the desired data? In addition it would be necessary for the governments to engage extra help to go about among fishing centers to give talks, make necessary arrangements, and to follow up on the final assembly of data in some central place.

No doubt this would be an ambitious program, requiring the appropriation of considerable special funds by the member countries. However, it must be recognized that whatever program is carried out to fulfil the Council's recommendation will cost money; but the collection of catch and effort statistics seems to me to be the most useful thing that could be done, and probably the most economical." (Oct. 17, 1956)

"Thank you for your letter of November 2, requesting a statement on the significance of the project which I suggested for the Indo-Pacific Fisheries Year.

It seems to me that the collection of statistics on the quantities of fish caught and on fishing effort is the most useful data which can be obtained for a relatively small cost. Such information would give a rough but probably significant measure of abundance of the various species of fishery populations, which would have great use on future occasions when similar surveys would be made. Thus you could compare differences in abundance from one period to another. Ideally, of course, such information should be obtained continually, but since this is probably impossible an occasional special effort would be a reasonably satisfactory substitute." (Nov. 26, 1956)

In addition to these opinions sent to the Chairman as above he has also been privileged to have a chance to discuss this subject of IPFY directly with fisheries workers of three member countries who were visiting his country during varied times in 1956. The general impression brought out by the talks was: the significance of the IPFY is highly accepted by these workers, but the practice of the proposal is difficult to accomplish in their respective country due mainly to the lack of trained personnel to work on the project.

In the light of such information obtained as noted above the present Committee might well suggest that the Council formulate, during

the 7th Session, an adhoc committee to discuss the matter and arrive at an agreement among member countries, since the project of the IPFY contains the subjects shared by both Technical Committee I and II. In such an adhoc committee, at least one member of Executive Committee should participate, because, "this matter received considerable attention at the 23rd Meeting of the Executive Committee of the Council held in Penang in October, 1956" (communication from Secretary).

### TAXONOMY

Reviewing the discussions, considerations and means taken by the Council on this subject since 1950, it was felt that the Council's taxonomic work may be divided into three major topics, namely:

1. Standardization of names of fishes.
2. Establishment of field keys to the identification of common forms, accompanied by illustrations.
3. Publication of a special handbook on the 15 most important groups of fishes.

It seems clear that each topic has an intimate relation with the others. Among these topics, however, standardization of names of fishes in the region would require the priority of consideration over others in view of the past experience of the Council (IPFC, Proc. 1952, Sect. I, P. 28 (s).) which has started the preparation of check list of common fish, and the Council's resolution (IPFC, 6th Session Summary Report, para. 225). The priority of the topic will be further emphasized at this moment by the fact that the satisfactory execution of the INDO-PACIFIC FISHERIES YEAR which is anticipated in the years 1957-58 in this region may not be accomplished without use of standardized names of fish by member countries, because the *Fisheries Statistics* will occupy an important position in the work of IPFY.

It is needless to mention that the two other topics, i.e. "field keys" and "handbook", bear also high significance in the assignment and the projects as determined by the Council should be continued with further increased efforts.

Before formulation of the assignment on the standardization of names of fishes it is felt necessary to pay attention to the terminology

and definition of the names of fish. It is, again, felt appropriate to consider the subject as divided into two sub-topics.

#### **A. Naming of fish and other aquatic organisms in the sense of pure systematic zoology.**

This task requires competent taxonomists on each group of organisms (fish, molluscs, crustaceans, etc), otherwise, the answer will never be obtained, because the biological (especially zoological) nomenclature will not be so advanced as to satisfy many working systematists at least for some time to come. The specific names, it may be said, have nearly stabilized at least some fish which are commonly seen and fished on a commercial basis, but the generic names are generally very unstable and the one name used today may be changed into other tomorrow. The extent of this instability, however, will be gradually reduced in future and the changes expected may not be so marked as those which were seen from Bleeker, Day, Weber and Beaufort to the contemporary systematists. In this connection it is hoped that "a Handbook of the Fishes of Ceylon" by Dr. I.S.R. Munro of Australia (IPFC, 5th Meet. Proc. 1954, P 95), and "A Complete Check-list of the Fish Fauna of New Guinea....." by the same author (*ditto*, p. 96), if circulated by the aid of the council among member countries of the Council, can furnish valuable knowledge.

It may be stated that the pure academic aspects of systematic zoology as discussed now may not be necessarily required in the fisheries development of the region at least at present. Such a statement, however, does not mean that the accurate identification of species of fish and other organisms should be neglected in fisheries work. Rather, the urgent task in taxonomy should be the accurate naming of common fish, it is believed.

#### **B. Naming of common fishes.**

Firstly it may be necessary to consider what are the common fishes (common name should not be confused with common fish). The answer is quite difficult to give because of many reasons: a common fish in one country may not be common in other countries (international problem), and a common fish to fishermen may not be common to other people of different occupations (national problem). Such confusion,

expected to exist in the Indo-Pacific region, will be naturally much greater than the same experienced in the North Atlantic, North Pacific or Mediterranean Sea.

Since the Council's activity is interpreted to function on the international basis it may be said that the selection of common fishes in each country should be made by that country.

Following the adoption of a list of common fishes by each member country, it is required to give the proper names to such fish on the basis of international usage. To expect accuracy on the naming of fish it seems usual to adopt two kinds of names, i.e. scientific name and common name.

The scientific name, needless to say, starts from accurate identification of fish followed by adoption of proper generic as well as specific name. As pointed out above the adoption of specific name on the "common fish" will usually not invite much confusion at present, but for the adoption of generic name a considerable amount of disagreement will be involved. At the present moment such confusion, if it occurs, may be settled only by authorized competent systematic ichthyologists and biologists and the co-operative spirit of fisheries workers concerned.

The giving of common names of international sense will also involve a considerable amount of confusion due to the lack of any established principle for the naming except perhaps a custom or a tradition. The settlement of this problem will also rest in the hands of competent systematic biologists accompanied by the co-operation of fisheries workers concerned.

Keeping such considerations in mind the following topics for discussion may be suggested at the 7th session.

1. Standardization of names of fishes
  - a. Adoption of species
  - b. Scientific name
  - c. Common name (English and French)
2. Procedure of formulation of list
  - a. Time to be spent for the work
  - b. Necessity of formulation of special group of workers

## 3. Form of inquiry

Recommended reference at the discussion;

1. List of common fishes and aquatic organisms which appeared in the FAO Yearbook.
  2. List of fishes in Table submitted by Government of India (Committee on the Standardization of fish names and Fishing Subjects).
  3. Dr. Munro's works on fishes of Ceylon and New Guinea.
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## REPORT OF THE INLAND FISHERIES PANEL

## PANEL A

By HASANUDDIN, SAANIN, CHAIRMAN

As specified during the 5th I.P.F.C. Session held in Tokyo (1955) the Inland Fisheries Panel of Technical Committee I should give priority to the following items during the ensuing period; i.e.

- i. Fish culture in rice fields
- ii. Fish nutrition under cultivation
- iii. Soil composition in fish-ponds
- iv. Fisheries problems in river-basin development
- v. Control of introduction of exotic species
- vi. Pollution of streams
- vii. Weed control in natural waters
- viii. Cultivation of *Mugil*
- ix. International exchange of fish stocking material
- x. Cultivation of *Chanos*.

Progress reports have been received from Indonesia, Japan, Pakistan, Burma and the Philippines while Australia reported that no work as outlined is carried out during this period. A brief statement on Inland Fisheries in North Borneo was received.

Separate reports have been submitted by the rapporteurs on *Mugil*, Weed control and *Hilsa*.

No reports have been received from Cambodia, Ceylon, France, Korea, Netherlands, Thailand, United States of America and Viet Nam.

- i. Fish culture in Rice fields
- ii. Burma

Experimental culture of *Tilapia* in the rice fields has been initiated at the Hlawga Freshwater Station and the result is being awaited. (Note:- Culturing *Tilapia* in rice fields as a commercial enterprise was initiated in 1954 in the vicinity of Mandalay. Early results including the marketing of about 700 kg. of *Tilapia* are very encouraging.-Sec., IPFC)

## i. 2 India

For the item (i), Fish culture in rice fields in the Inland Fisheries, Government of India

submitted a consolidated report on the present position of fish culture in rice fields in India, which was read as below. A suggestion has also been received from the Government of India concerning the questionnaire on the subject which the Council be requested to circulate among member countries. The questionnaire in the hand of the Chairman Inland Fisheries Panel was presented at the 7th Session for the reference to the work of the Inland Fisheries Panel.

Culture of prawns and certain species of brackish water fishes in paddy fields after the paddy is harvested is a wide spread practice in Travancore-Cochin in South India. After paddy is harvested by September a natural crop of prawns and fish is raised in the same fields during November/March. Water from the back waters along with millions of young ones of prawns is let into the fields during the high tide and kept in with the help of secure sluice arrangements for a period of 2-3 months. When the prawns have grown sufficiently big the water from the fields is let out through the sluices during ebb tide and the prawns are caught in conical nets fixed at the sluice. This is repeated at every low tide until the entire stock is caught. Mulletts and *Etroplus* spp. form an appreciable part of the catch from these fields.

Paddy fields flooded with rain water to a depth of about 1½ feet are fairly extensive in certain parts of Travancore-Cochin, Malabar, Bihar and Assam and Madras. Adjoining and connected to the fields there are several ponds and besides these is a system of canals intended as drainage for surplus water from the fields. During rainy season (June-July) these canals serve as free passages for fish seed which take shelter in the deeper ponds when the water level recedes. The stock is prevented from escaping by erecting barriers and providing twigs in the ponds. The paddy is harvested in December and by January-February all the fields dry up and the stocks of fish are contained in the ponds and canals. Harvesting is done by means of cast nets, 'Ottal' traps and miniature



drag nets. The catch mainly consists of predatory species, dominated by the common murrel, *Ophicephalus striatus*.

In certain districts of the Andhra State millions of early fry of carps including the major carps *Catla catla*, *Cirrhina mrigala* and *Labeo fimbriatus* enter the irrigated paddy fields during June-July. They grow up to early fingerlings size 4 to 6 cm., by September-October when millions of them are caught in traps set at the inlet and outlets of terraced fields and across the connected ditches and drains. A large percentage of these fingerlings are collected by the local fisheries department and used for stocking ponds.

Very little work has yet been done by deliberately preparing the fields and stocking them with fish seed. Certain experiments undertaken at the Ippur fish farm, Andhra State, did not yield conclusive results. An experiment carried out in the 24 Parganas District of West Bengal in 1945 with fingerlings of major Indian Carps, in about 690 acres of fields, was under the following conditions.

Size of fry stocked	..... $\frac{1}{2}$ " to 2 $\frac{1}{2}$ "
No. per acre	..... 590
Artificial feeding	..... Nil
Length attained at the end of the experiment	..... 5" to 12"
Rearing period	..... 3-4 months
Production	..... about 100 lb./acre

In the Trichinopoly and Tanjore Districts of Madras where the paddy fields are irrigated, conditions appear favourable for regular fish culture. In a private farm in Trichinopoly district, the small fields were each provided with 3 pits, 10' x 5' x 3' at 3 corners and were interconnected by small channels along the sides. Inlets and outlets were protected. The pits and channels were found adequate to keep the stock of fish for a number of days when the water is drained off the fields. The rearing period could last 6 to 7 months. Further experiments on a larger scale have been undertaken by the Madras Fisheries Department in a plot of fields in the Tanjore District. The fields have been stocked with fingerlings of *Catla* and *Labeo* at about 150 per acre. The experiment is now in progress. A small scale experiment carried out in Mysore using *Ophicephalus striatus* for stocking was not very successful. Experiments have been taken up recently in West Bengal and Orissa also.

This aspect of fish culture is still in an empirical stage in India and there is vast scope for harnessing the millions of acres of irrigated and other rice fields for fish culture.

#### Advantages of fish culture in paddy fields

Several advantages are claimed for fish culture in paddy fields. These are briefly stated below.

1. The most economical utilization of land is achieved since the same land is used for the production of rice and fish.
2. The frequent visits which the farmer makes to the fields to detect and stop leakages or other flaws in the fields result in better care not only of the fish but also of the rice crop.
3. Deweeding expenses are minimised.
4. Some of the insect pests of paddy are controlled by the fish.
5. The constant movement of fish amongst the growing plants results in a sort of tillering action and the yield of rice is ordinarily 5 to 10% more than in ordinary fields.
6. Additional income is derived by the farmer.

Measures, which involve additional expenditure, if fish culture is undertaken in paddy fields.

1. In most of the fields the water level will be low and consequently the ridges or bunds separating the fields are also low. For culturing fish, deeper water is required. To provide this the bunds have to be raised and strengthened.
2. A certain percentage of the field area near the margins have to be used for constructing ditches.
3. Strains of paddy which tolerate deeper water than usual have to be selected.
4. As the fish, particularly the bottom feeding species, are likely to root out the tender growing paddy, strains with strong roots and stout stem are to be preferred.
5. Additional cost is involved in manuring the fields and artificially feeding the fish.

#### Problems of Fish Culture in Paddy Fields

From the limited data now available there can be no doubt that fish culture in rice fields is bound to appreciably augment fish production

from a source which now yields very little in the form of fish. However, the available data have to be critically examined and problems properly assessed so that there can be no scope for false hopes or disappointments. While it is generally seen that there is a slight improvement in the yield of paddy when fish are grown in them, the opposite has been the experience in certain countries, though the higher cost of fish would simply make up the loss in the yield of paddy. The cost of fish seed for stocking; expenses on enhanced manuring, modifying the field bunds, inlets and outlets, digging ditches and pits, cost of artificial food, etc. have all to be taken into consideration in assessing the economics of the venture. In irrigated fields, to get additional water specially for fish culture may not always be feasible. In tropical countries shallow water in the fields are likely to get heated up, leading to unfavourable conditions. Fluctuations in the water level have therefore, to be fully controlled.

The most opportune time for stocking fish in the fields has to be determined by repeated and careful experimentation. Plankton production in the field is likely to be the maximum soon after flooding. Once the transplanted seedlings take root they would be exactly like emergent vegetation so far as the water phase is concerned. With such abundant rooted vegetation plankton is bound to be poor in the water. In low lying fields depending on rain water accumulation, the water is usually very clear, perhaps with abundance of blanket algae also.

If fish cannot be introduced immediately after flooding and transplanting it becomes necessary to select such species of fish which could be advantageously introduced at a later stage. Used as nurseries, for hatching, these considerations do not come in, but other problems like control of predators in water may then have to be considered.

Extreme shallowness and the seasonal character of the water are peculiar feature of this type of fish culture. Conditions are, therefore, likely to vary widely with locality. In view of these, in the light of experience already gathered, it becomes essential to carry out a well-planned survey of the prevailing conditions in different parts in the various States with particular reference to the depth of water, season and duration, availability of fish seed, etc., and launch on a systematic scheme of field experiments to elucidate the various problems

requiring solution. Without this any large-scale utilization of rice fields for culture will carry with it the risk of expectations being not fulfilled.

### i. 3 Indonesia

Since 1955 experiments have been carried out in West and Central Java and in South Sumatra to determine the effect of fish culture on the growth and production of rice, and the proper stocking rate for the fish on different types of soil. As stocking material is used the common carp, the main species used in Indonesia for rice-field fish culture. These experiments are limited to the system of fish-cum-rice, and different strains of rice are cultivated in mentioned areas. In order to obtain an insight concerning the quality of the rice as an effect of the fish culture, data have been collected regarding number of rice stalks, number of grain per plume, weight of 1,000 grains, the huskability of the grain and the rice yield per unit of area. These experiments are still in progress but a paper for the 7th Session has been submitted. Effects of the use of fertilizers on rice field fish culture will be determined in the following year, when more funds can be expected for research.

Compared with 1954, the acreage of rice fields used for fish-culture in 1955 increased by nearly 39% (1954 = 65,167 hectares, 1955 = 90,493 hectares). The total yield, however, has remained on the same level due to several climatological circumstances. (1954 = 9,088 metric tons, 1955 = 9,160 metric tons).

Expansion of acreage and a better yield per unit of area can be expected in 1956.

### i. 4 Japan

Since the middle of June of 1956 two types of research are being conducted.

The first type is directed to the determination of the relationship between rice crop and fish harvest. As stocking material are used common carp and *Tilapia*, separated or combined and at several stocking rates. Artificial food is either given or not. This research aims also at the evaluation of *Tilapia* as weed controller of rice fields.

The second type of research is conducted for the determination of the effect of insecticides on both rice-crop and fish harvest. Rice field used for this purpose are either stocked with common carp and other species of fish or planted with rice only.

### i. 5 Pakistan

No work has yet been started. A scheme for "Paddy-Cum-Fish Culture" has been submitted to the Government for East Pakistan. The conditions in West Pakistan are not favourable for this purpose. Further information is contained in the publication "Paddy-Cum-Fish Culture".

### i. 6 Philippines

General lack of adequate water supply throughout the year and the comparatively large land holdings (more than one hectare) of the farmers are among others the reasons that intensive method of fish-culture is not practical.

Moreover, lack of highly suitable species for raising in rice-fields is another factor. However, the Philippine government is undertaking a demonstration project in the field of rice-field fish culture.

### i. 7 Thailand

In co-operation with the Department of Agriculture and the Department of Rice, the Department of Fisheries set up two experiments on Fish Culture in Rice Fields during 1955 and 1956. Suitable topographic conditions were found in the Chiangmai area.

Although an official report on these experiments has not been published the information obtained indicates that the yield of rice in the experimental plots which contained *Tilapia* as a culture fish was higher than the yield obtained from the control plots into which no fish had been introduced.

### i. 8 United Kingdom

Hong Kong reports it has been found that fish culture in rice fields is uneconomical and this type of fish culture therefore has been discontinued.

### ii. Fish nutrition under cultivation

#### ii. 1 Indonesia

As a common practice of the laboratory for inland fisheries, gut samples beside plankton and mud samples are collected and investigated at fixed intervals during the periods of conducting stocking rate and growth rate experiments. These investigations are directed to the finding of the fluctuation of the availability of fishfood and the food choice of the fish under cultivation (Carp, *Tilapia*). From several areas gut samples of carp have been received besides plankton and mud samples of the ponds in which the carp is cultivated and data concerning type of soil, altitude of the site, etc.

A survey of the food choice of one carpnet from the age of one day up to half a year has just been completed. Samples have been taken at the beginning of every other day, then successively at 3, 5 and 10 days intervals. A report on these investigations will be submitted to the next Council session.

### ii. 2 Japan

Researches on this line have been practised in the past, but not carried on at present in large scale.

The too wide scope of this subject, the too many factors involved in its study—chemical components of food, nutrition physiology, pond operation and pond management—make it desirable to reconsider the method and scope of research on this subject.

### ii. 3 Philippines

Some amount of controlled and field-experiments on food and feeding habits of cultivable species have been undertaken. Dietary requirements of fish-fry are being studied to determine the basic feed supplement needed during rearing of the fish. Experiments with artificial feeds prepared with the addition of antibiotics, vitamins and other trace elements have been started in *Chanos* ponds, and favourable results have been reported by private pond operators. Further investigations along this line will be carried out before forming definite conclusions.

### ii. 4 United Kingdom

The problem of fish nutrition under cultivation is regarded as a problem of great interest to Hong Kong. However, ponds which the Hong Kong Government planned to have built this year (1956) and which will allow the conduct of controlled experiments, have not yet materialised. Local practices of fish feeding are being investigated, but it is very difficult to obtain accurate figures from commercially managed ponds.

### iii. Soil composition in fishponds

#### iii. 1 Indonesia

No investigations have been carried out in this period. However, exact fish production data of fish-ponds and rice-fields are being collected throughout Java and in collaboration with the Institute for Soil Survey and by means of already available soil maps, attempts will be made to formulate the natural relationship

between yield of fish and type of soil. There is no doubt that pond management, species of fish and type and fertility of water have a great influence on the productivity of the pond, but there is still hope that a relationship between the two can be formulated.

### iii. 2 Japan

Though soil composition has been appraised as a very important factor in the production mechanism of fish in water, no research has been carried out in this line yet. A preliminary test, however, has been conducted to understand what is involved in this problem. For this purpose concrete tanks, one with a muddy bottom and the other without dirt at all, were stocked with wild goldfish. The growth of the fish, plankton and benthos are traced. Chemical analysis of bottom mud and deposit were carried out. An interim report on this experiment will be introduced in the near future.

### iii. 3 Pakistan

No programme on hand. However, under the scheme of "Control of Aquatic Vegetation" which is under operation in East Pakistan, some amount of work on soil composition of fish-ponds is expected to be done. This work has, however, not been started as yet for want of certain essential equipment, chemicals, etc.

### iii. 4 Philippines

With the widespread public inquiry on how to stimulate the growth of the food of fish in Chanos-ponds, studies of physical and chemical characteristics of the soil in commercial fishponds were studied in relation with the growth of the algal species. There were indications to show in these studies that fish-ponds with predominantly clayey soil and rich in nutrient and organic matter showed better results as compared to those lacking these characteristics. These studies, however, have not been followed up after this survey work, but are again attracting attention because of the shifting from the extensive to the intensive method of fish cultivation, wherein soil fertility plays an important role.

### iv. Fisheries problems in river basin development

#### iv. 1 Indonesia

As in Java at the moment river fisheries are of minor importance and no dams are under construction at the moment or will be construct-

ed in important rivers in the near future, no work has been carried out under this subject. The National IPFC Committee, Indonesia has requested involved ministries to pay attention to fisheries interest, whenever and wherever dams should be constructed. Existing impounded waters are regularly stocked with fish by the Inland Fisheries Extension Service.

#### iv. 2 Japan

A fisheries survey of Lake Hiraoka, an impounded lake of 260 hectares, was conducted from September 1954 and completed by the end of 1955. Data were obtained concerning physico-chemical characters of the water, fluctuation of the water level, growth of plankton and benthos. The magnitude of the fish production was studied by means of gill-netting, trapping etc. Growth rate, food and feeding habits and fecundity were also studied.

A brief result of this survey is as follows:-

- a. Common carp and wild goldfish are produced abundantly enough to permit a regulated gill-net fishing on commercial basis. Appreciation of wild goldfish as a foodfish must be encouraged among the local people.
- b. Common carp requires a repeated stocking of seed as recruitment of the stock is nearly negligible due to unfavourable environment of water for spawning.
- c. Length-weight ratio of both species indicates a normal growth and favourably comparable to that observed in natural waters.
- d. Checking of stomach contents and result of limnological surveys indicate the availability of abundant natural food.
- e. Production of plankton is rather poor, so stocking of pond-smelt is not highly recommendable.
- f. Measurement of temperature and oxygen content of the water, carried out both vertically and seasonally, indicate the possible production of trout.
- g. Fish resources in general can be further exploited by the people in the surrounding of the lake.

- h. Local people should be encouraged and guided to catch more fish by using such gear as gill-net, set-line and traps.
- i. The use of echo-sounding apparatus proved to be very efficient for the survey of bottom configuration and characters of bed soil.
- j. It is recommended to cut down and clear off all trees and bushes before impoundment of the area. The wood left in the water are hard and durable and forms a significant disadvantage for developing the fisheries.

A new reservoir, the Sakuma reservoir, has been created recently by blocking the river by a concrete dam of 150 m. high. This reservoir is the biggest artificial reservoir in Japan.

Prior to the start of the preliminary impoundment of the reservoir in December 1955 a careful topographical survey of the valley has been made. Serious considerations were made to the flow of water after filling, location of fish congregation, development of communities along the valley and transportation facilities leading to the reservoir. All these considerations and the surveys led to the selection of the site of clearing obstacles. Five locations on the valley with a total acreage of 22 hectares were selected, where the clearing is proposed and later carried out by cutting off all trees, bushes, grass etc. followed by burning. This is the first case in Japan, that, by means of clearing, attempts are made for developing the fisheries. The result of this method can only be considered after completion of the impoundment in the second half of 1956.

#### iv. 3 Pakistan

No work has been done in East Pakistan. A scheme is under implementation in West Pakistan.

#### iv. 4 Philippines

There are not many migratory species of fish of importance in the Philippine rivers and there are no major river basin development that may affect the indigenous species. It is possible that with industrialization and the development of hydro-electric and irrigation projects some such problems may arise in the future.

#### iv. 5 Thailand

Fisheries problems arising as a result of the construction of a dam across the Chao Phya River at Chainat in 1956 were drawn to attention of the Department of Fisheries by the authorities concerned with the construction and operation of the dam. In efforts to obtain solution of the problems, the Department of Fisheries is working in close liaison with the FAO Regional Fisheries Office. The Department of Irrigation has agreed to co-operate in the study of the fisheries problems connected with the dam with the aim of designing and implementing a conservation program to ensure that serious damage to the fish population of the river will not occur.

The Government of Thailand has under consideration the construction of a dam, 99 meters in height, to permit the generation of hydro-electric power, on the Meping river. In 1956 the Department of Fisheries carried out a preliminary survey of the fish and fisheries of that river and it is anticipated that an extension of this survey will be undertaken in the near future with the advice and assistance of the FAO Regional Fisheries Office.

#### v. Control of introduction of exotic species

##### v. 1 Indonesia

No introduction of exotic species has been done during the ensuing period. Earlier introduction has been done only after careful survey and consideration.

##### v. 2 Japan

Introduced American species of black-bass give at the moment no troubles. One species is already naturalized in Lake Ashi and well appreciated by sport anglers. Its dispersal to other bodies of water, however, is strictly prohibited.

The predacious habit of this species will not change the present policy, until some day, when it can be proved that the production of this bass is more profitable than the indigenous species. This, however, is very doubtful.

##### v. 3 Pakistan

Some species of exotic fish; viz., *Tilapia mossambica*, *Trichogaster pectoralis*, *Puntius javanicus* and *Cyprinus carpio* have been introduced in East Pakistan for culture. A scheme entitled

"Elimination of predacious animals from fish-ponds" has been sanctioned and will be implemented soon. *Tilapia*, *Trichogaster*, *Osphronemus gourami* and *Etroplus suratensis* have been introduced in West Pakistan recently. Necessary information on the introduction of exotic fish with special reference to predators is also expected to be obtained after the implementation of the said scheme. Some information on this will be found in the recent publication "Transplantation of Food Fish to East Pakistan".

## vi. Pollution of streams

### vi. 1 Indonesia

Much attention is being paid to the matter of water pollution in recent times, either to existing pollution or to possible pollution in the future. Accidental pollution has taken place in South Sumatra caused by leakage of oilpipes between the oil-fields and the refinery.

A case of pollution by the waste-product of a cardboard factory at Bogor has been investigated on request of the surrounding people and the City Council. Results of this investigation state that there is actually no pollution in the fishery sense of the word. Moreover the "polluted" stream is from the viewpoint of fisheries of no importance at all.

A large textile dying plant under construction in East Java has sent to Bogor information concerning the procedure to be applied at the plant for consideration in the line of pollution. Information and descriptions concerning the chemicals to be used are insufficient, more detailed specifications have been requested but not received yet. However, it is a very pleasant fact to state that industrialists realise the importance of the fisheries.

### vi. 2 Japan

Two important cases of pollution have been investigated in recent years.

- a. The first case was the pollution of the washing of the Joban coal mine. This pollution was studied by Mr. N. Taga of Tokyo University, and his report in Japanese titled "A study on water pollution of coal mine washing" was published. Mr. Taga showed in his report that the effluent of the Joban mine, carrying minute coal dust, deposited a thick layer of this material not only on the riverbed but also on

the bottom of estuary and shore nearby.

With data on the analysis of the deposit the author attempted the comparison of the total output of the coal mine and the amount of fisheries resources exploited in the region, represented by seaweed, abalone and edible oyster. Between 1945 and 1950 the output of coal increased 2½ times while the catch of marine products decreased to one quarter of the highest mark seen in 1947.

- b. The second case was the pollution by the Yatsugatake sulphur mine. This mine was surveyed in 1954 and 1955 and the results published in December 1955. The sulphur mine has been placed under the program of expansion by the owner and the Laboratory for Freshwater Fisheries Research was requested to measure the possible ill effect of the mining effluent. The expansion program naturally raised a social dispute between the mining company on one side and fishermen and farmers on the other side.

Water samples, insect fauna and algal flora were collected periodically and investigated.

The result of this investigation was a recommendation to the mining company as follows:-

- i. Effluent must be neutralised with high accuracy.
- ii. Sediments should never be discarded into the river.
- iii. Any kind of tailings from mining sites should never be allowed to enter into the river.

In early 1956 the Ministry of Industry made a decision that further expansion of this sulphur mining is not granted.

### vi. 3 Pakistan

In East Pakistan a scheme titled "Chandraghona paper mill pollution research scheme" is awaiting sanction. Work has already been started on this problem and preliminary investigations have been made. In West Pakistan also a scheme is under implementation.

#### vi. 4 Philippines

There were some complaints from public and private parties regarding pollution of some inland bodies of water due to distillery refuse, sawmill wastes and discharge from sugar refineries. The Bureau of Fisheries has taken a very active part in the survey of these conflicts in as much as it is specifically provided in the Philippine Fisheries Act that causing of pollution or water which may cause wholesale death of fish is punishable.

The Bureau of Fisheries has made a survey and formulated recommendations on ways and means to remedy such pollution and violators were punished or were made to compensate parties who suffered losses.

#### vii. Weed control in natural waters

##### vii. 1 India

In the note "On the control of weeds in fish ponds" presented by the Indian delegation to the sixth session of the Indo-Pacific Fisheries Council, some of the different lines of work suitable for India were discussed. During the same session the Council recommended to Member Governments that the work should be directed in the immediate future towards further field studies on the effect and economics of selected methods of weed control in individual water systems infested with weeds. In partial fulfilment of this recommendation, some work has been done at the Central Inland Fisheries Research Stations at Cuttack and Calcutta. The various States in India were also approached for information on work done on the subject recently. However, information has been received so far only from the Orissa and Madras Fishery Departments. So, it is presumed that no work has been done in departments of other States. The progress made so far is summarised below:—

##### I. Survey of aquatic weeds in Indian inland fishery waters:—

As part of an elaborate programme of survey of aquatic weeds in inland fishery waters of the different States of India, preliminary survey has been done in some areas of North East India, particularly Orissa. The following types of weeds have been found to occur fairly commonly in the area:—

(a) **Floating weeds:**— e.g. *Eichornia crassipes* (water hyacinth), *Pistia stratiotes* (water lettuce), *Lemna* spp. and *Wolffia* sp. (duck weeds),

*Salvinia cucullata* (water velvet) and *Azolla pinnata*. Of these water hyacinth and water lettuce are the most important.

(b) **Emergent weeds:**— e.g. *Nelumbium speciosum* (lotus), *Nymphaea* spp. (water lily), *Euryale ferox* (prickly water lily), *Aeschynomene aspera* (water mimosa), *Limnathemum* spp., *Ipomoea aquatica*, *Jussiaea repens* (water primrose), *Trapa bispinosa* (water chestnut), *Limnophila heterophylla*, *Myriophyllum* sp. (water milfoil), *Monochoria hastata*, *Sagittaria sagitifolia* (arrow-head), *Potamogeton* sp. (pond weed) and *Marsilea quadrifoliata*. Most of these are fairly common. The water lilies and *Limnathemum* very often become abundant.

(c) **Marginal weeds:**— The most common marginal weeds are various sedges, rushes and grasses (including *Phragmites karka* (Reed grass), *Anellema* sp., *Colocasia* sp., and *Typha elephantina* (cattail).

(d) **Submerged weeds:**— e.g. *Utricularia stellaris* (bladder-wort), *Ceratophyllum demersum* (Coontail), *Vallisneria spiralis* (tape grass), *Lagerosiphon Roxburghii*, *Hydrilla verticillata*, *Ottelia alismoides*, *Najas foveolata*, *N. marina* and *Chara* sp. These weeds very often choke shallow small-sized waters.

(e) **Filamentous algae** like *Spirogyra* and water bloom algae like *Microcystis* and *Anabaena*.

Though the exact area covered by these water weeds remains to be ascertained it is very often variable according to whether a piece of water is completely abandoned or made use of during certain seasons. However, it is possible to say that considerable nuisance is caused by most of them in the successful rearing of fish.

#### II. Ecology of common aquatic weeds:—

a) **Autecological and socio-ecological studies** of the common water weeds are in progress both at Calcutta and at Cuttack. Some aspects of the autecology of *Limnathemum cristatum* and *Hydrilla verticillata* have already been completed (cf. Mitra, 1956; Mitra-under publication). Further studies of common aquatic weeds with special reference to the water and soil condition are in progress. It is too early to draw any definite conclusions from these observations. However, it appears that the pH, total alkalinity, concentration of phosphates, nitrates, chlorides etc. are probably important factors in determining the type of flora. Some

plants are also tolerant of a wide range of chemical conditions. Competition between different weeds is another important factor.

**b) Seasons of abundance and profuse vegetative growth:—**

The weeds predominate during certain seasons, there being variations with individual species. Most weeds start germinating at the commencement of the monsoon, viz., in June, from seeds or winter buds, or reproduce by runners, offsets etc., from floating or underground condensed stems. However, it is usually the floating weeds and some emergent and marginal weeds which attain dominance during the monsoon months of June-October. The water hyacinth, *Pistia*, *Lemna*, *Nymphaea*, *Limnanthemum*, *Ipomoea*, *Jussiaea* etc., are good examples.

During the monsoon months the submerged weeds are kept somewhat under check probably due to the turbidity of the water and high water level following heavy rains. These coupled with the cloudy atmosphere prevailing during the monsoon season shut off sunlight from the submerged vegetation in many waters. Thereafter, the submerged vegetation becomes luxuriant and by November-December practically chokes the waters, if left uncared for.

The filamentous algae, particularly *Spirogyra*, become abundant during summer forming mats in shallow fish ponds. The blue green alga *Oscillatoria* is very often associated with it. The water bloom alga *Microcystis* spp. develops almost throughout the year depending on the species, some species becoming predominant during the monsoon and early summer while others predominate during winter. The yellow green alga *Botryococcus* sometimes becomes associated with it during October-December. *Anabaena* sp. becomes dominant during the August-September or October and during March-April.

**c) Seasons of flowering and of formation of seeds and turions:—**

The time of flowering varies from plant to plant and very often the same plant flowers during more than one season. However, in general, most of the weeds start flowering with the onset of winter when there is bright sunlight and produces fruits and seeds by the end of winter. Some like water hyacinth and *Monochoria*

may, however, be seen flowering more profusely during August-September and March-April, when the temperature is higher, than during the cooler months. *Hydrilla* also flowers during July-September.

Plants like *Hydrilla* and *Potamogeton* also produce winter buds with the onset of the cold season and these are shed in the bottom soil by the end of winter for them to germinate at the commencement of the monsoon season.

**III Control Measures:—**

**1) Manual labour:—**

Control by this method has been found suitable and economical in fish ponds and other small waters in the case of floating weeds like *Pistia*. A fair measure of success has also been obtained in the case of emergent weeds like *Nymphaea* and *Limnanthemum* by underwater cutting with scythe. Only, this operation needs repetition till the underground stems cease to renew shoots. The free-floating weeds as well as the cut shoots of emergent weeds have been dragged to the shore with the help of rope nets, manual labour being exclusively used throughout the operation.

In preliminary observations carried out in a moat at Cuttack the cost of thorough manual clearance of rank growths of some common aquatic weeds worked out as follows:—

**(a) Water hyacinth**

Rs. 60/— per acre

**(b) *Ipomoea aquatica***

Rs. 60/— per acre

**(c) *Pistia stratiotes***

Rs. 20/— per acre

**(d) *Hydrilla verticillata***

Rs. 114/— per acre

The cost of labour was calculated @ Rs. 1/8/— per 4 man hours and supervision charge of Rs. 3/— per every 10-12 men was included for every 4 hours of supervision. *Pistia* was removed with the aid of drag rope-net, whereas the rest were removed with hand. The cost of removal of *Pistia* is fairly cheap, and that of water hyacinth and *Ipomoea* moderate and that of *Hydrilla* fairly high. Since *Hydrilla* regenerates fairly rapidly from the underground runners, the annual cost of keeping the water clear of this weed is bound to be much more. Further observations under different conditions obtaining in India are being undertaken to strike an average cost in terms of annual expenditure.



In the case of submerged weeds, manual clearance has been found more time-consuming and laborious. In preliminary observations conducted in a moat it has been concluded that three such clearances per annum at a total cost of Rs. 150/— per acre may be necessary to keep the water clear of persistent and luxurious growth of submerged weeds.

## 2) By manual-cum-mechanical, and mechanical methods :—

In the Orissa Fishery Department nine types of hand weeders and two types of power weeders have been designed and constructed and their effectiveness against *Hydrilla*, one of the noxious submerged weeds in Orissa, is under study.

## 3) By shading :—

Shading of the submerged plant *Ottelia* with *Pistia* in experimental cement cisterns had previously (cf. Annual Report of the C.I.F.R.S., 1954, p. 410) given very good results. Corroboration for this has also been found in the field, when a thick growth of submerged vegetation was completely destroyed in a moat at Cuttack when it became naturally infested with *Pistia*.

Preliminary experiments in which the water in cement cisterns containing a luxuriant growth of *Hydrilla* was made turbid with the aniline dye, nigrosine, have not proved conclusive since the dye cleared fairly quickly due to coagulation, probably caused by the prevailing high temperature and high alkalinity of the water.

Water bloom algae like *Microcystis* have also been temporarily checked by spraying a thick emulsion of raw cowdung in the surface layer of water in fish ponds (cf. Alikunhi, 1956).

## 4) Biological control :—

Observations on *Tilapia mossambica*, which has been recently introduced in India on an experimental scale, and *Cyprinus carpio*, recently introduced at Cuttack, are in progress, with regard to their capacity to control submerged weeds. Judging from the fact that some water sections in which *Tilapia mossambica* were in plenty, still became infested with a very thick growth of submerged weeds, its usefulness appears to be somewhat limited. However, it is too early to draw any definite conclusion.

## 5) Chemical control :—

Some chemicals were tried on submerged weeds during 1955-56.

a) **Soil sterilants** :— Preliminary experiments carried out in dried-up ponds, which before drying up supported a thick growth of submerged vegetation indicate that (1) submerged weeds are suppressed temporarily by ploughing in a high dose of a mixture of copper-sulphate and ammonium-sulphate (2) even a very high dose of super-phosphate, on the other hand, only encourages profuse growth of such weeds.

b) **Hormone weedicide** :— Srinivasan and Chacko (under publication), working at Madras, have concluded that Fernoxone (sodium 2, 4-D) at a concentration of 2 p.p.m. is able to kill submerged plants like *Hydrilla*, *Najas* and *Potamogeton* without any adverse effect on fish and other fresh water biota. Work done at the Central Inland Fisheries Research Sub-Station, Cuttack, with the same chemical at 4, 6 and 8 pounds per acre foot did not, however, give any conclusive result against a thick growth of submerged weeds, particularly *Hydrilla*. This probably indicates that further experiments are necessary to arrive at definite conclusions.

c) **Sodium arsenite** :— From controlled experimental observations conducted in cement cisterns and in the field, it has been concluded (Philipose, Banerjee and Ramachandran-under preparation) that :—

(1) Sodium arsenite in concentrations of 4-6 p.p.m. is very effective in completely destroying several submerged weeds like *Hydrilla verticillata*, *Ottelia alismoides*, *Lagerosiphon Roxburghii*, *Ceratophyllum demersum* and the filamentous alga *Spirogyra* in about two weeks' time without any adverse effect on the major Indian carps, *Tilapia*, cat fishes and murels.

(2) Though emergent parts of weeds like *Limnanthemum cristatum*, *Marsilea quadrifoliata* and *Jussiaea repens* are affected, the underground parts are not affected and they regenerate new shoots two or three weeks after treatment. This is also a probable indication that the soil is not in any way affected.

(3) The cost of treatment of the chemical at 5 p.p.m. works out to approximately Rs. 18/— per acre foot, which may be considered fairly cheap. The experiment also brought out that an area cleared of submerged weeds has to be

utilised immediately. Otherwise there is a chance of the water being over-run by floating and emergent weeds.

Thus, this chemical, though considered unsuitable for waters used by the public, seems to be suitable for small-sized enclosed fishery waters with persistent submerged weeds, on account of its effectiveness, cheapness and harmlessness to fish life, if it can be applied under strict supervision.

d) **Fertilisers as weedicides** :— Though, as soil sterilent, superphosphate at high concentrations did not appear to be useful, it was found effective (Mitra, unpublished observation) against *Hydrilla* when applied in the water at a high concentration of 500 p.p.m., the fertiliser being probably injurious to the normal physiology of the plant at this high concentration under certain environmental conditions.

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#### vii. 2 Indonesia

Eradication of *Eichornea crassipes* in Kalimantan by means of spraying with 2% Sidico, a 2-4 D preparation as a byproduct of the quinine factory, is still progressing. Depending

on the density of the vegetation, the rate of spraying is one liter of solution to 3-5m<sup>2</sup>

#### vii. 3 Japan

Owing to the temperate nature of climate, Japan faced no significant troubles with excess growth of aquatic plants in natural bodies of water.

The excess growth of aquatic plants in farm-ponds seems to have a significant bearing on the fish-production. Weed control in ricefields is also a problem to be considered.

The main species for cultural purposes in farm-ponds are the common carp and wild goldfish. Normally, fertiliser either of chemical or of organic source is applied before the stocking of fishseed. Experience shows that excess growth of aquatic plants absorbs nutrient elements which otherwise will nourish phytoplankton and this fact is well realized especially when fertilization of water is practised. Normally and naturally, fish culturists do not desire to spend much labour and money for eradication of weeds, so the Fisheries Agency has directed its attention to biological control of the plants rather than to mechanical or chemical procedure. Experiments have shown that grass-carp, if properly handled, is a very efficient weed-controller in ponds, without any ill effect on the yield of the carp and goldfish. The details were reported at the 7th Session.

#### vii. 4 Pakistan

Preliminary work has been done on weed control under the scheme of "Control of Aquatic Vegetation in Fisheries". The information so far collected is very meagre due to lack of facilities for field work and absence of necessary equipment. Two small papers have already been published "On water-hyacinth and its control in fish ponds" and "Control of submerged vegetation in fish-ponds".

#### vii. 5 Philippines

The presence of weed problem in natural water bodies is widespread, but the problem is not very well felt, as most of the areas where it occurs are still not well settled.

In settled areas the choking of waters by extensive growth of *Eichornia* occurs from year to year, and is attracting attention for solution. One of the remedies presented is the utilization of this weed as animal feed.

vii. 6 **Report of the Rapporteur on Weed control**  
(IPFC/C 57/WP 25)

Dr. M.T. Philipose of India, assigned by the Council as Rapporteur on Weed control commenced contacting members of the Inland Fisheries Panel and other persons interested in aquatic weed control in the region as early as January 1956. Considerable information has been received from U.S.A. and Australia. Some information has also been collected from U.K., France, Indonesia, Cambodia, Korea, Thailand, Netherlands, Burma, Vietnam, Pakistan, India the Philippines and Japan. It is hoped that information will be received in the near future from Hong Kong and Ceylon.

viii. **Cultivation of *Mugil***

viii. 1. **Indonesia**

No intentional cultivation of *Mugil* occurs in Indonesia. Brackishwater ponds yield as a byproduct the *Mugil*, the fry and fingerlings which enter the ponds with the tidal water during the filling.

viii. 2. **Japan**

In some regions of Japan, pond culture of gray mullet can be found in combination with eel or common carp.

No research with significant meaning has been carried out on this subject.

Mullet are fished in coastal water. The biology of the several mullet species found in Japan is, however, not well known.

viii. 3. **Pakistan**

No programme of investigations on "Mullets" is envisaged in East Pakistan. The mullet fingerling will be collected from creeks of Sind and cultured in the ponds in the interior.

viii. 4. **Philippines**

*Mugil* is not cultivated as a distinct species, but often mixed with the stock of *Chanos* in brackish and saltwater ponds. Actual stocking of *Mugil* in addition to other species is being tried in some projects.

viii. 5. **World survey on *Mugil cephalus***

Mr. J. D. Bromhall, Acting Director of the Fisheries Research Unit, University of Hong Kong, is conducting a world survey on *Mugil cephalus*, both as wild and a cultivable fish. The FAO has offered assistance in the design and execution of this survey.

ix. **International exchange of fish-fry**

ix. 1. **Indonesia**

On request, Indonesia has sent fingerlings of Puntius carp to Iraq early this year. Through I.C.A. requests have been received from the Philippines for stocking material of three varieties of *Cyprinus carpio* and *Osteochilus hasselti* and from Pakistan for *Puntius javanicus* and *Osphronemus goramy*. Plastic bags for the shipment have been ordered by ICA from Japan or Hong Kong. These requests have been met.

ix. 2. **Japan**

In connection with this subject it is reported that in the same region of the Tone River as described in the paper IPFC/C55/CP 27 by Dr. K. Kuronuma, in July of this year again the spawning of grass-carp has been observed. Early in June the spawning of large shoals of silver-carp has been observed in nearly the same region.

A preliminary account on this subject will be reported by Inaba and Nakamura in a contributed paper at the 7th Session. Fragmentary information at hand are as follows:-

- a) In early June fisheries workers of Saitama Fisheries Station succeeded to catch mature females and males of silver carp from the river. Artificial fertilization of stripped eggs was made with no difficulty. The development of the eggs was traced to the stage of hatching, and the fry grew to the size of 1 cm. in 14 days. Due perhaps to improper handling about one million fertilized eggs were found dead either during the development or after hatching.
- b) Grass carp were seen spawning actively in early July. However, only a single female fish with fully mature eggs could be caught, so artificial fertilization could not be accomplished. The failure of catching grass carp is believed to be attributed to the lack of experience in handling such big fish in fresh-water bodies.
- c) An amateur angler collected a bucketful of eggs floating in the water far below the spot of spawning in the river. The time of collection nearly coincided with the spawning. These eggs

cultured in containers as well as in ponds under careful attendance, proved to be the grass carp and silver carp.

#### x. Cultivating of *Chanos*

##### x. 1. Indonesia

Several parts of the coast of Bali and Lombok prove to be rich in *Chanos* fry during certain months and these parts have since been exploited by fry collectors from the neighbourhood and from the island of Madura.

In West and East Java the Philippine method of fry nursing has been followed with satisfactory result. Mortality of fry during the nursing can be lowered to half of that achieved with the common method. IPFC/C57/TECH 17, a paper on their experiments, is submitted to the Council at its 7th Session.

##### x. 2. Pakistan

Milk fish has not been recorded from Pakistan so far and no work is envisaged.

##### x. 3. Philippines

Progress in the expansion of areas devoted for *Chanos* culture has continued during the present period and is expected to continue because of the presence of available areas for expansion.

In already established areas, innovations are being made by the application of intensive methods of cultivation, the use of fertilizers, artificial feeding and by better pond management.

##### x. 4. North Borneo

The total production of fresh fish from fish ponds in North Borneo is estimated to be in the neighbourhood of 10 tons for the year 1956. Some 90% of this yield will comprise *Tilapia*, and the remaining 10% Chinese Carp (*Cyprinus carpio*, *Ctenopharynx godon idellus* and *Hypophthalmichthys molitrix*) with a very small proportion of Gorami (*Osphronemus goramy*). No data is available for production in rivers and lakes.

The total area of fish ponds in August 1956 was approximately 30 acres. The majority of these ponds are concentrated in inland districts. The area of culturable inland waters in North Borneo as yet remains to be investigated.

*Tilapia*, under artificial conditions (in combination with pig raising and occasional feeding with rice bran) yield  $\pm$  2,000 lb. per acre per year. Recent experiments on "monosex" culture indicate that production may be increased and also that more and larger fish can be obtained by this method. There are no records in connection with yields in natural waters. However, the stocking of *Tilapia* in the Benoni Swamp in Papar District, which was carried out in 1953, has to date given very promising results. The *Tilapia* have taken the place of the local fish (*Puntius*, *Osteochilus*, *Trichogaster trichopterus* and *Anabas testudineus*) which were the major species in the catches before and were of little commercial value, whereas the *Tilapia* has been accepted as first class fish in the local market.

##### x. 5. Thailand

The early development of *Chanos* cultivation in Thailand was retarded by the lack of adequate capital available among the farmers and which could be used to finance the construction of suitable ponds. In 1956 in the Chantaburi Province, on the East Coast of Thailand, a suitable site was selected and local farmers were invited to join in a pilot project. One of the most important factors governing the selection of the site was that it was known that *Chanos* fingerlings could be collected in the sea water in the immediate vicinity. Also the topography of the site was such that large capital expenditure on pond construction would not be required. The Department of Fisheries provided funds to the amount of Bt. 30,000 (U.S. \$ 1,500) and 20 ponds totaling 9 hectares have been constructed.

# REPORT ON THE IMPLEMENTATION OF INDO-PACIFIC FISHERIES COUNCIL RECOMMENDATIONS REGARDING HILSA FISHERIES

BY T.V.R. PILLAY, CHAIRMAN.

Hilsa Sub-Committee

The Council at its 6th Session in Japan accepted the report of the Hilsa Sub-Committee which met at Calcutta in June/July, 1955 and recommended that the interested Governments, namely Burma, India and Pakistan should collaborate in implementing research on the lines laid down in that report as a co-operative project.

Investigations on *Hilsa* fisheries formed an integral part of the programme of work of the Central Inland Fisheries Research Station in India. A scheme for the investigation of *Hilsa* fisheries in West Pakistan has been functioning since 1954.

For the implementation of the Co-operative Research Programme on Hilsa fisheries, the Hilsa Sub-Committee had recommended that India and Pakistan may establish national Hilsa Research Units in charge of competent fishery biologists who will have the assistance of statisticians and an adequate number of field and laboratory workers. The Government of India have already established a small Hilsa Research Unit in the Central Inland Fisheries Research Station at Calcutta to initiate investigations on the *Hilsa* fisheries of India. This Unit is expected to be expanded shortly to function effectively as the national Hilsa research unit. The Pakistan Government have sanctioned an additional scheme for the investigation of the *Hilsa* fisheries of East Pakistan, which started functioning in March, 1956.

With regard to investigations on *Hilsa* in Burma, the Hilsa Sub-Committee had recommended that in view of the reported lack of trained personnel to undertake this work in Burma, investigations in that country have to be restricted to racial studies and collection of market statistics until such time as adequate trained personnel become available in that country. As a preliminary to such studies, it was considered desirable to make a preliminary brief survey of the *Hilsa* fisheries in that country. But till such a survey can be undertaken, it was

suggested that samples of *Hilsa* obtained from the catches from specified localities may be sent to the Chief Research Officer, Central Inland Fisheries Research Station for examination. The Burmese member of the Sub-Committee has informed that he hopes to start sending samples from October, 1956.

The *Hilsa* Sub-Committee of the Indo-Pacific Fisheries Council continued to be active during the period after the 6th session of the Council in Japan and contact was maintained between the members of the Sub-Committee through correspondence. A suggestion was made by Dr. M.R. Qureshi, member for Pakistan, that a meeting of *Hilsa* research workers may be organised at Calcutta to enable the Pakistan workers to familiarize themselves with the methodology followed in the investigations on *Hilsa* in India. The Government of India has proposed that the Hilsa Sub-Committee should meet to finalise the practical application of the co-ordinated programme of research on *Hilsa* fisheries approved by the Council and decide upon the details of the uniform procedure to be adopted for the implementation of the recommendation of the Council, and expressed the opinion that the visit of the Pakistan research workers would be more fruitful if arranged after that. The matter is now under correspondence with the member for Pakistan.

Investigations on *Hilsa* fisheries formed an integral part of the programme of work of the Central Inland Fisheries Research Station in India. A National Unit, to conduct investigations on *Hilsa* fisheries of India following the programme approved by the I.P.F.C., was established in the Station in 1956 and the Unit has since been expanded. The progress of *Hilsa* investigations in India was reviewed by the Fisheries Research Committee of the Government of India which met at Calcutta in January 1957. The proposal to set up a Sub-Committee of the Fisheries Research Committee of the Government of India to co-ordinate the *Hilsa* fisheries research programme in India is now under consideration.

The research unit established in 1954 to study the *Hilsa* fisheries of West Pakistan continued to function during the period. Another research unit was established in East Pakistan to undertake similar work in February 1956. Additional equipment such as a research vessel and a number of small boats are being obtained for the units.

With regard to investigations on *Hilsa* in Burma no progress could be made on account of the lack of trained personnel. A preliminary brief survey of the fisheries in that country, suggested by the Sub-Committee, also could not be undertaken. In continuation of the offer made by the Government of India to have the material relating to racial studies of *Hilsa* stocks in Burma examined at the Central Inland Fisheries Research Station at Calcutta, the authorities in Burma were requested to send samples of *Hilsa* to the Central Inland Fisheries Research Station for examination. Due to lack of staff and other difficulties it has not yet been possible for the Government of Burma to make available the material for study.

Considerable progress has been made in India on the studies relating to racial composition of *Hilsa* stocks. Morphometric data of samples from the Rivers Hooghly, Padma, Ganga, Brahmaputra, Barak, Godavary and the Gulf of Cambay have been collected and are now under analysis. Further data are being collected from these areas as well as from the Chilka lake and the rivers Narmada, Tapi, Krishna and Cauvery. The analyses of data so far conducted indicate that the *Hilsa* fisheries of India bear on a number of independent or semi-independent populations.

The possible reason for the abundance of *Hilsa* in the monsoon season of 1955 in West Bengal (India) was examined in the light of available data relating to age composition of catches and the morphometric features of the fishes caught. The studies showed the predominance of 1 to 1½ year old fish in the winter catches of 1952. This age class was traceable as the dominant group in the monsoon catches in subsequent years till 1955 when the most predominant group was constituted by 4 to 4½ years old fish. It would, therefore, appear that the abundance of *Hilsa* in 1955 was due to the abnormally successful spawning of this fish in West Bengal waters during 1951. An intensive

programme of market measurements has been initiated to study the age-class composition of catches, with a view to determining the correlation between the abundance of *Hilsa* catches and the dominance of year classes. Preliminary experiments have also been conducted to evolve a suitable technique for quantitative surveys of larvae and young fish to assess the success of spawning during different years. Statistics of *Hilsa* catches in the Hooghly and Matlah estuaries of West Bengal are now being collected, employing a suitable sampling technique, as a part of a general investigation on the fisheries of these waters. Similar sampling programmes are being organised in the riverine areas of Bihar and Uttar Pradesh and in the estuarine areas of Orissa and Andhra. Statistics of *Hilsa* catches in the in-shore areas of India are being collected by the survey section of the Central Marine Fisheries Research Station. Action has also been taken to collect catch statistics of *Hilsa* from areas where the National Unit has no survey staff, through the co-operation of the respective State Fisheries Departments.

The *Hilsa* fisheries in the Sunderbans during the winter season of 1956-1957 was a complete failure. Hardly any shoals of *Hilsa* was found in the area and the fishermen who were camping in the Sunderbans for fishing, therefore, migrated to the coastal areas of Orissa. With a view to ascertaining the reasons for the failure of *Hilsa* fisheries in the Sunderbans intensive environmental studies were undertaken. Even though data from previous years are not available for purposes of comparison, it appears from these studies that the very poor production of plankton in the area and the high turbidity of the waters may be related to the unavailability of *Hilsa* in the Sunderbans during 1956-1957.

The total catch of *Hilsa* in West Pakistan has been estimated to be 3,651,480 pounds. Information relating to the identification and delimitation of *Hilsa* stocks migrating into the rivers of Pakistan, their age composition, maturity, migration, feeding habits and spawning grounds, are being collected and environmental studies have also been initiated. It was observed that during the Indo-Pacific Fisheries year (1956-57) *Hilsa* did not ascend beyond the Golam Mohammad Barrage, a distance of 150 miles from the mouth of River Indus. Observations made on fish passes provided in the Barrage

indicated that the fish do not negotiate them. A general survey of *Hilsa* fisheries in East Pakistan has been initiated and preliminary information on the number of fishing craft and tackle and fishermen have been collected. The total *Hilsa* production of East Pakistan has been estimated to be about 6,900,000 pounds per annum.

The investigations conducted in India during the period under report related mainly to the racial composition of stocks and the magnitude of catches. Morphometric data of *Hilsa* samples from the River Hooghly, River Padma, River Ganga, River Brahmaputra and River Barak have been collected and are now under analysis. It is proposed to extend this investigation shortly to other water areas also.

Analysis of morphometric data has shown that *Hilsa* with significantly greater relative height of body ascends the river Hooghly during a part of the monsoon in 1955. Representatives of this stock were not found in the catches during the subsequent winter.

Statistics of *Hilsa* catches in the Hooghly and Matish estuaries of West Bengal (India) are now being collected, employing a suitable sampling technique, as a part of a general investigation on the fisheries of these waters. Information on the landings of *Hilsa* is also being collected from certain centres in U.P. and Bihar in India.

A preliminary survey of the *Hilsa* fisheries of Assam (India) about which very little information was available so far, was completed recently and the data collected are now being analysed and compiled.

With a view to implementing the recommendations of Indo-Pacific Fisheries Council, the Government of Pakistan have, under the aegis of the Food and Agriculture Council, initiated a scheme for investigating the *Hilsa* fisheries in both the wings of Pakistan. An appropriate organization has been set up in the form of two research units, one for each wing. The replies to the queries relevant to *Hilsa* fisheries in Pakistan are as under:

#### WEST PAKISTAN

##### A. Fisheries Statistics

1. Total catch of *Hilsa* computed by enumeration 1,460,592 fish which on the basis of average calculated weight of 2.5 lb. per fish comes to 3,655,480 lb.

2. Total fishing population engaged in *Hilsa* fishing during the year 1956-57 is 10,506. Out of 12,505 fishermen population only 5,000 are active adult fishermen.

##### 3. Fishing craft and gear :

(a) Craft:	Name of craft	No.
	Donda Beri (Round bottomed, large sized boat)	238
	Batela (Flat-bottomed small-sized boat)	195 433

##### (b) Gear :

Local Vernacular name	Type	No.
Bhan . . . .	Gill net (operated as beach seine)	52
Ghava . . . .	Gill net (operated as beach seine)	94
Ojhani . . . .	Gill net (shallow water net)	96
Sandh . . . .	Hand net (Deepwater hand net)	2663
Kalera . . . .	Hand net (Surface hand net)	658 3665

##### 4. Break-up of fish landing :

Detailed studies on the identification and delimitation of *Hilsa* stock are being conducted. Break up of fish landing will be possible only when investigation would prove that more than one stock of *Hilsa* frequent this region. Further work is in progress.

In addition to the above, information is being collected on the following aspects of *Hilsa* fisheries in Pakistan.

1. Identification and delimitation of *Hilsa* stock migrating into the rivers of Pakistan.
2. Collection of catch statistics.
3. Age composition, maturity, migration and feeding habit.
4. Spawning grounds, eggs, larvae and juveniles.
5. Environmental studies with special reference to floods, tidal condition, turbidity, temperature, salinity, abundance of plankton, prevalence of competing and predatory animals and obstructions natural as well as artificial.

##### Effect of artificial obstruction on *Hilsa* ascent :

In West Pakistan, there is only one river, the Indus which has *Hilsa* fisheries. Before the

construction of Ghulam Mohammed Barrage, *Hilsa* provided valuable fisheries for about 300 miles from the mouth of Indus up to Sukkur Barrage. With the construction of this Barrage we have lost about half of *Hilsa* fishery. During the Indo-Pacific Fisheries Year (1956-7) the fish has not ascended beyond Ghulam Mohammed Barrage, a distance of 150 miles from the mouth of the river. The observations made on fish passes provided in Ghulam Mohammed Barrage indicate that fish do not negotiate these passes.

### EAST PAKISTAN

*Hilsa* Investigation Scheme in East Pakistan commenced from February 1956. As the full staff could not be appointed before the close of the Indo-Pacific year, the detailed investigations on the lines suggested by I.P.F.C. could not be undertaken. General survey of *Hilsa* Fisheries in East Pakistan is in progress.

#### A. Fisheries Statistics :

1. The total *Hilsa* production of East Pakistan is estimated at 6,900,000 lb. per annum.

#### (b) Gear : Local vernacular name

- i) ( 1. Khakrija  
( 2. Shangla Jal  
( 3. Bheshal Jal  
( 4. Chhakni Jal

- ii) ( 1. Chandi Jal  
(  
( 2. Chapila Jal  
( 3. Dora Jal  
( 4. Har Jal

- iii) Jagat Ber

Type	No.
Set bag net	1,107
— do —	
— do —	
— do —	

Gill net	379
Drift net	

Beach and encircling seine	280
	1,766

2. Total population of the fisherman is 650,000. The break up of total population is given below :

Total fishermen population	650,000
Engaged in marine waters	138,000
Engaged in inland waters ( <i>Hilsa</i> fisheries)	512,000

#### 3. Fishing crafts and Gear :

##### (a) Craft :

Names of the craft :	No.
Bara Balam	129
Madhyam Balam	185
Chota Balam	76
Chandi	152
Dinghi	458
Total	1,000

One vessel for the collection of data is under construction and a number of small boats fitted with outboard motors will also be available soon to negotiate short distances.

#### Break up of fish landings :

Studies on identification of *Hilsa* stock in the rivers of East Pakistan are being conducted. The observations and the results obtained so far, are not conclusive. Breakup of fish landing will be possible only when investigations would prove that more than one stock frequents the rivers of East Pakistan.

The condition of *Hilsa* fisheries in East Pakistan is very much different from that of West Pakistan. In East Pakistan there is a

network of rivers and waterways with hundreds of *Hilsa* landing and catching centers, out of which so far 250 have been marked by the staff working under *Hilsa* Investigation Scheme, East Pakistan. The *Hilsa* Investigation Organization in East Pakistan has quite recently started the work and they are in the initial phase of the collection of statistical data. The aforesaid figures are provisional for the year under reference.



## REPORT OF THE SEA FISHERIES PANEL PANEL B

BY F.D. OMMANNEY, CHAIRMAN

A request for information concerning the work of their respective departments since the 6th Session of the Council was circulated on November 21st, 1956 to the 14 Governments having representatives on Panel B, Sea Fisheries.

The information was requested under 8 headings. These were laid down in "A Resume of the Various Programmes Undertaken by the Council's Committees during the Forthcoming Period" (Biology, B-Sea Fisheries) (Ref. I.P.F.C. Circ. 56/1 dated December 26th, 1955 and Ex. Co. 56/1 dated January 9th, 1956).

The following Governments replied to these enquiries:—

United States of America	Philippines
Australia	Burma
France (New Caledonia)	India
Hong Kong	Indonesia
Japan	Japan
Pakistan	

The report which follows is therefore compiled from data supplied by these Governments, with the exception of Hong Kong, and by the British Territories of South East Asia as represented by the Singapore Regional Fisheries Research Station.

The 8 headings under which information was requested are as follows:—

- i. Tuna investigations.
- ii. Age determination in tropical fishes.
- iii. Investigations on *Rastrelliger* mackerel.
- iv. Trawling.
- v. Statement at the 7th Session as to what extent national resources would permit a study of the basic productivity of the sea.
- vi. Investigations on possible faunal changes due to modifications of world climate.
- vii. Desirability of equipping fishing fleets with facilities for the receipt and transmission of weather data.
- viii. Investigations on seaweed resources.

### 1. Tuna Investigations

The information under this head is compiled mainly from the Report of the Rapporteur on Tuna, Dr. Joseph E. King, and statements from the Member for Australia (Mr. J.W. Thomson) and the Chef de L'Institut Francais d'Océanie (Mons. M. Legend).

The report of the Rapporteur on Tuna contains information from the United States (Pacific Ocean Fisheries Investigation), Japan, Australia and the Philippines. Statements were received from India, Ceylon, the Netherlands (New Guinea) and Singapore to the effect that there were either no tuna fisheries or investigations in their areas or that the sparse data available were not adequate for presentation.

The information called for by the Rapporteur is listed in the Proceedings of the 5th Session, p. 11, as follows:—

- a. Compilation and Analysis of Morphometric Data.
- b. Information on Ecology.
- c. Numbers tagged and recovered.
- d. Exploratory Fishing Operations.

#### a. Compilation and Analysis of Morphometric Data

The Pacific Oceanic Fishery Investigations of the U.S. Fish and Wildlife Service has continued research on 3 tuna species in 3 major areas, the yellowfin (*Neothunnus macropterus*) in the central equatorial Pacific, the skipjack (*Katsuwonus pelamis*) in the waters adjoining the Hawaiian Archipelago, and the albacore (*Germo alalunga*) in the temperate north central Pacific.

No details of morphometric investigations made during these researches are given in the Rapporteur's report except the statement that attempts were made to age albacore by means of growth rings in the vertebrae and scales, but agreement between the readings and the length frequencies were poor and the work has been temporarily set aside.

In Japan fork-length measurements were taken by the Nankai Fisheries Research Laboratory on 985,166 tunas and marlins in seas adjacent to Japan, in the north and south Pacific and in the Indian Ocean. Detailed morphometric studies on 50 albacore, 200 big-eye tuna, 200 yellowfin and 550 striped marlin were also made. In addition, the Kanagawa Prefectural Fisheries Experimental Station made fork-length measurements on about 45,000 yellowfin, 20,000 big-eye tuna and 15,000 marlins.

In Australia compilation of morphometric data from the southern bluefin (*Thunnus maccoyii*) is being continued. Sufficient data have

not yet been collected for analysis. The length/weight relationship of this species compares closely with that of the yellowfin.

In the Philippines data on two species (*Euthynnus yatei* and *Katsuwonus pelamis*), collected prior to 1950 by the Philippines Fishery Investigations sponsored by the United States, are being analysed.

Biometric observations have been undertaken by the ORSOM III, the vessel of the Institut Français d'Océanie, Noumea, New Caledonia. Two species, yellowfin (138 fishes) and the skipjack (82 fishes), were taken by trolling lines. Figures obtained from the west coast of New Caledonia have been treated separately in both species from those from the New Hebrides and the Loyalty Islands. The figures confirm the greatly accelerated growth of the 2nd dorsal fin and the rather slower growth of the pectoral fin found by other authors. *N. macropterus* seemed to belong mainly to Age Group II and III. The figures for the skipjack are not considered to be sufficient to allow more than provisional conclusions to be drawn with regard to growth. The work is being continued.

Length measurements and weights of tuna, mainly yellowfin but also some skipjack and "big-eye", landed from the Indonesian research vessel "Bima" were recorded when that vessel made her third experimental cruise in June-August 1956 south of the islands of Bali and Lombok.

#### b. Information on Ecology.

The Pacific Oceanic Fishery Investigations found longline or deep swimming yellowfin to be scarce during the year ending February 1956, and there was little indication of the seasonal variation evident in earlier years. There was a parallel scarcity of troll-caught surface tuna. The highest catch rates of troll fish were made during March and April and these rates were highest in the northern Line Islands which lie, in or near the Equatorial Counter-current, an area already shown to support larger numbers of these fish than the waters to the north and south.

It is significant that sea surface temperatures at Christmas Island were lower than those in the good yellowfin years 1950-53.

A preliminary hypothesis has been developed by P.O.F.I. workers for the skipjack, based on the relationship between the windflow over the area of Hawaii and the skipjack catch. There seems to be positive correlation between the catch during the "season" or summer months and the direction and strength of the wind in the late spring. This may be due to the effect of the wind on oceanic circulation. This appears to form a starting point for the study of annual fluctuations.

A study of 703 stomachs of skipjack has shown that the major food components were fish (73%), molluscs—mainly squid (22%) and crustacea (4%). Juvenile skipjack composed 8% by volume of the food of the adult. With increasing distance from the shore food changes from coastal or littoral to pelagic or oceanic fauna. Fish decreased from 9% to 59%. The food of the skipjack is generally similar to that of the yellowfin and big-eye tuna.

Examinations of the stomachs of skipjack and yellowfin tuna have been made by the French vessel ORSOM III. The work is confined at present to determining the recognizable species present and is continuing.

A morphological study of the eyes of small and large surface skipjack and large deep swimming yellowfin tuna is being undertaken by P.O.F.I. to determine if there are any differences which might be associated with differences of habit and habitat. None has yet been found.

The P.O.F.I. albacore programme is designed to explore the area of the north Pacific between the Japanese fishery in the west and the American fishery in the east. It is hoped to determine the biological and oceanographical factors associated with the violent fluctuations in catches. Exploratory fishing cruises in the summer months have suggested that there is a break in the distribution of the surface albacore of the central and eastern north Pacific. One of the P.O.F.I. vessels found albacore in abundance about 300 miles south of the Aleutian Islands, the catches by trolling and gill netting diminishing towards the American coast. This break is less marked in the autumn and in the spring all the areas sampled yielded poor catches.

With regard to the southern bluefin tuna (*Thunnus macoyii*) Australian workers have

developed a hypothesis that this species, and perhaps others also, frequent an identifiable water mass which can be followed. A detailed examination of encouraging positive evidence is being made to find the factors influencing congregation, dispersion and migration.

Dr. D.L. Serventy has published a paper on this species in which, basing his opinions on extensive biometric and anatomical considerations, he expresses the view that the southern bluefin is a subspecies of a wide-flung species (*Thunnus thynnus*) with an apparently discontinuous range. The only known spawning ground of the southern bluefin in Australian waters is off the south-west corner of the continent, but it is probable that the stocks of south-eastern Australia spawn elsewhere (Aust. Journ. Mar. Freshw. Research (1956) 7: pp. 1-43).

In the same number of this journal Dr. Serventy has a paper on the biology of the northern bluefin tuna (*Kishinoella tonggol*). This is an account of the long-line tests, using steel wire long-line, which were carried out by the C.S.I.R.O. (Division of Fisheries and Oceanography). This is the most abundant species in the Indo-Malayan and Northern Australian region and the catch rate compared favourably with that of Japanese vessels.

The Philippines Government hope to begin long-line tuna investigations with the research vessel M/V DAVID STARR JORDAN in February 1957.

In Japan, studies on the biology of tunas were conducted mostly by the scientists of the Nankai Regional Fisheries Research Laboratory at Kochi City, where investigations were derived from the data accumulated by the Fishery Agency research boats "Tenyo-maru" and others as well as from the data collected by commercial tuna boats. Some of these data were included in the Report of Sea Fisheries Panel, and a number of new findings and information were reported in several technical papers submitted to the Council's 7th Session.

#### c. Numbers Tagged and Recovered.

P.O.F.I. tagged 1,000 yellowfin tuna during the year ending February 1956. Up to December 1956 there had been 3 recoveries. The first two were from the same general localities as the releases, the third was from 700 miles east, 13 months after tagging. The fish had grown in this time from 55 to 95 lb.

Japanese workers tagged a total of 146 yellowfin over a wide area of the Pacific and Indian Oceans during the period January 1955 to September 1956.

A total of 945 skipjack were tagged by P.O.F.I. in Hawaiian waters. During the year ending June 1956 there were 12 recoveries. They indicate a limited movement with a maximum of about 40 miles. All but one fish were at liberty for less than three months. The one exception was at liberty for just over 8 months and during that period grew about 7 lb. A new type of plastic dart tag has been developed.

A Pacific-wide co-operative tagging programme has been launched in which P.O.F.I. took part, tagging 287 albacore during the year ending November 1956 in North Pacific waters. There have been 4 recoveries, 8- $\frac{1}{2}$  to 16 months after tagging. Three show a westerly movement towards the coast of Japan, while the fourth shows an easterly movement towards the coast of California. In May 1956, a team of 2 P.O.F.I. biologists was sent to Japan to instruct Japanese scientists in P.O.F.I. tagging methods. 270 albacore were tagged off the coast of Japan.

#### d. Exploratory Fishing Operations

As noted above, P.O.F.I. has carried out exploratory fishing operations in the north central, Hawaiian and equatorial regions of the Pacific. Australian exploratory fishing operations were confined to a limited region along the south-east coast. The catch rate exceeded that of the Japanese and American fisheries. A modified steel wire long-line was used.

The French vessel ORSOM III has carried out exploratory cruises trolling 15 lines by the French method along the fringing reefs and passes of the west coast of New Caledonia and along the coasts of the New Hebrides and Loyalty Islands. Cruises in participation in the Equapac project have also been made between the New Hebrides, Gilbert and Fiji Islands. No fish other than some skipjack were seen far from the coasts of these islands. The summer months seem to be the most favourable for the two tuna species, skipjack and yellowfin.

In Indonesia experimental longlining trips have been made with the Research Vessel "Bima", a 60 ton wooden vessel powered by a

120 H.P. diesel engine and equipped with a Japanese-made line-hauler. The longlining method was introduced into Indonesia at the end of 1954 by an American expert sponsored by the International Cooperation Administration and a fisheries official was sent to Japan to obtain practical training in the method.

Floatlines 30 m. in length were used, each having 5 branchlines 15-20 m. in length.

The first experimental trips were made from October 1954 to March 1955 at the southern end of the Sunda Strait, the second in September to October 1955 in the Macassar Strait and the third (June to August 1956) in the Indian Ocean South of the islands of Bali and Lombok.

## 2. Age Determination in Tropical Fishes

Australian workers have made age studies on the giant perch (*Siakap of Malaya-Lates calcarifer*). Scales can be used for age determination for the first 3 years. After that growth checks appear more frequently than yearly. The first three checks appear to be produced at the onset of the rainy season. Some of the later checks may be produced during movements to and from the sea. The check is the percomorph type of break in circular continuity and not the winter-summer zones of the Gadoids and Salmonids.

Large numbers of standard (fork) and total length measurements of a number of species of ground fishes have been taken in Malayan and Borneo waters during the trawling cruises of the research vessel MANIHINE. Among these species are:-

<i>Lutianus sp. (roseus?)</i>	<i>Caranx malabaricus</i>
<i>Plectorhynchus pictus</i>	<i>Gymnocranius griseus</i>
<i>Aprion typus</i>	<i>Rastrelliger kanagurta</i>
<i>Priacanthus tayenus</i>	<i>Decapterus russelli</i>

These figures have not yet been analysed. They may lead to length-frequency age grouping.

Since Japanese sea waters do not produce the fishes included in the category of so-called tropical fishes, no researches were carried out which fall on the present subject. However, the studies on this line were made on tuna fish which show a large-scale migration in the vast area of the Pacific and Indian Ocean, and the problem of age determination was touched upon

in some of the technical papers mentioned above. Also a paper has been presented to the 7th Session by Mr. Hayashi titled "A review on age determination of the Pacific Tuna", which, reviewing some 50 published works, discusses the method of age determination and the growth curves secured on 5 species of tuna in Pacific waters.

Studies have been begun in the Philippines under the guidance of FAO technical expert Dr. K. Tiews, on several common commercial species caught by the trawl in Manila Bay. Collections are being made of otoliths.

## 3. Investigations on *Rastrelliger Mackerel*

The "ad hoc" Committee on *Rastrelliger* met on Saturday, September 24th, 1956 in Penang, and its report has been circulated under cover of Secretariat letter ExCo 57/5 dated January 23rd, 1957.

During the trawling survey of the research vessel MANIHINE in Malayan and Borneo waters *Rastrelliger* was occasionally taken in the otter trawl. The largest catch, 384 fish, was taken near Pulau Tioman, off the east coast of Malaya in September 1956. All other catches were much smaller. Attempts to catch this fish by means of drift nets failed. It seems probable that 2 populations of *Rastrelliger* exist since specimens taken from the western side of the Malay Peninsula were smaller, though more mature, than those taken on the eastern side. Three species seem to be involved, *R. kanagurta*, *R. brachysoma* and *R. neglectus*.

In the Philippines studies on maturity, size and sex composition are being continued and otolith studies have been started this month under Dr. K. Tiews. Racial studies on *Rastrelliger brachysoma* are also being continued.

No studies were made on this mackerel which does not dwell in Japanese waters.

## 4. Trawling

A preliminary trawling survey was carried out in Malayan and Borneo waters by the research vessel MANIHINE of the Singapore Regional Fisheries Research Station. Between September 1955 and August 1956 this vessel steamed 15,182 miles and hauled a 70 ft. (headrope) otter trawl 207 times, 175 times in

the South China Sea and 32 times on the western side of the Malay Peninsula. Although large areas of the South China Sea gave comparatively poor catches, it was possible to locate five areas of moderate potential commercial value with standardized catches of 125-150 cwt. per 100 hr. fishing and catches containing 30%-45% "prime" best quality fish. The ground over the continental shelf of the South China Sea is uniformly "heavy", composed of soft grey mud with large cup sponges, and dendriform *Gorgonacea*, *Pennatulacea*, etc. The depth is between 20 and 55 fathoms.

In Burma, a programme of combined operations of set long-line boats and small trawling is being undertaken. The small trawlers, in addition to their normal trawling work, will tow the long-line boats to and from the fishing grounds and also supply bait for long-lining. A trawling expert from Canada (under the Colombo Plan) is arriving here soon to train the local fishermen, and also to advise the Division of Fisheries of the Agricultural and Rural Development Corporation.

In Pakistan an exploratory trawling programme is being carried out by means of two vessels, the ALA and the MACHHERA. The ALA is a North Sea trawler which was received as part of the assets of the Government of Pakistan in 1947. She has a steel hull and is powered by a 150 B.H.P. Ruston Diesel engine. She has an insulated fish hold with a capacity of 30 tons.

The MACHHERA, received in November 1954 under technical aid from the United States of America, is a typical Gulf of Mexico shrimp boat. She has a wooden hull and is powered by a 120 B.H.P. Caterpillar diesel engine. She has a refrigerated fish hold with a capacity of 27 tons.

Another vessel, NEW HOPE, has been purchased from F.A.O. and will be put into operation after reconditioning. An exploratory fishing vessel for East Pakistan has been designed and orders for its construction will be placed soon.

Three areas off the Pakistan coast were surveyed. One is situated off the Karachi coast between the 10 and 22 fathom contours, bounded by Lat.  $24^{\circ} 39'$  and  $24^{\circ} 47'N$ . and Long.  $66^{\circ} 04'$  and  $66^{\circ} 41' E$ . The second is situated

off the Sind coast between the 3 and 30 fathom contours, bounded by Lat.  $23^{\circ} 45'$  and  $24^{\circ} 44' 30'' N$ . and Long.  $66^{\circ} 40'$  and  $67^{\circ} 18' E$ . The third lies off the Mekran coast between the 5 and 20 fathom contours, bounded by Lat.  $24^{\circ} 55'$  and  $25^{\circ} 15' N$ . and  $62^{\circ} 00'$  and  $66^{\circ} 40' E$ .

The M.F.T. ALA, for a total period of absence from port of 38½ days, landed 33½ tons. The total number of hauls was 240 with an average duration of 1 hr. 57 min. The average catch works out at 478 cwt./100 hr.

The M.F.V. MACHHERA for a total period of absence from port of 50.4 days, landed 57½ tons. The total number of hauls was 240 with an average duration of 1 hr. 57 min. The average catch works out at 478 cwt./100 hr. Unfortunately the bulk of the fish caught are not regarded as "prime" food fish by the local population.

Three prospective fishing grounds, one for shrimp and the other two for flatfish (sole) and catfish were located about 4, 6 and 60 miles off Manora.

The fishery by trawling, having about 20% of catch in total marine fish production of Japan, is seen all around Japanese islands, though the gear and boats adopted vary from place to place and by depths of water where they are operated. However the more or less centralized fishing grounds of trawling are now found in East China Sea and surrounding waters of Hokkaido.

There was published a number of papers on the fishery biology of bottom fish which constitute the catch of trawling; food habit, spawning potential, movement, age composition and other items were studied on some major species in the catch, the studies undertaken mostly by the workers belonging to the Regional Fisheries Research Laboratories of Hokkaido, Tohoku and Seikai. These studies are a part of routine work carried out by these Laboratories and they are by no means new projects.

The Japanese fishery workers engaged in the trawling meet once or twice in a year to discuss the results of their researches and the design of their attacking of problems. Some highlights on their discussions made recently may be mentioned as follows.

In Hokkaido waters, where the principal species of trawl catch are Atka mackerel, flat

fish and Alaskan pollack, the trawling vessels find recently a considerable amount of herring in their catch. The biological explanation of this phenomenon has not been given adequately so far, but it has brought up some troubles imposed upon the administration of sea fisheries there. Because, the fishermen engaged in herring set-net have protested against the trawlers claiming that their interference is a danger to the still declining herring resources in Hokkaido waters.

In a highly generalized term it was agreed that the overall catch of trawl fishery of Japan has shown a rather stable trend in amount, but the average size of fish in the catch has grown smaller in recent years. Since the species composition of fish in the catch varies by fishing ground and season, the general tendency as noted above is witnessed in varied extents from species to species. Thus, the fishery scientists are placed in a state of confusion as to the finding of evidence of actual declining or increasing of bottom fish population.

Investigations in the Philippines have also been started on the intensity of trawling activities in Manila Bay. Every month a three-man team goes out on privately operated otter trawlers to collect statistical data on the different fishes caught. Forms have been issued to operators to fill out to determine where they trawl and the catch composition. The Manila Bay area has been subdivided into equal divisions and each trawler captain will be requested to fill in his books as to the position in the Bay according to the Square No. on the map supplied therein. The times set and hauled will be noted also. These forms, after being duly completed, will be submitted later to the Bureau of Fisheries.

From Australia it is reported that the number of steam trawlers based on Sydney has fallen from 10 in 1953-4 to 5 in 1955-6. Flathead (*Platycephalidae*), which are believed to have been depleted by overfishing, have continued to be poorly represented in the catches. The Danish seine fleet, which formerly fished only off the coast of New South Wales, has extended its operations during the last two years to Lake Entrance in Victoria. The principal fish taken there is the "tiger" flathead (*Neoplatycephalus macrodon*), the species which has been

depleted in New South Wales waters. The C.S.I.R.O., Division of Fisheries and Oceanography, is conducting an investigation to determine whether the flathead stocks in Victoria are independent of those in New South Wales or part of the same stock. A total of 3,500 flathead has been tagged. All 37 tagged fish recaptured so far have come from Victorian waters.

In India exploration of offshore fishing grounds for the location of shrimp grounds is being carried out in Kerala State by the fishing schooners of the Norwegian Project and the F.A.O. Fishery Engineer. New shrimp grounds have been discovered along the Malabar coast while trawling with a 22-ft. F.A.O. "dan" boat. The shrimp run in a 4-mile wide strip about 140 miles long from Baypore to Mangalore. They average 4"-5" in length and are being caught at the rate of 100 lbs. per hour's trawling with a 10 ft. open skiff. It is thought that fishermen could vastly increase their catches if they had mechanized boats and could fish for shrimp in mid-winter and spring as well as in the summer season when the shrimp are caught in the traditional bag nets when schooling at the surface. The above information is contained in a letter from Shri R.D. Mohindra, Under-Secretary to the Government of India, Ministry of Food and Agriculture, New Delhi to the Secretary, I.P.F.C., dated January 25th, 1957. A programme of prawn trawling will also soon be under way in Burma.

##### 5. National Resources for the Study of Basic Productivity of the Sea

The following statement has been received from the United States of America (Dr. A.L. Tester, U.S. Administrative correspondent to I.P.F.C.).

##### UNITED STATES OF AMERICA

For several years various Pacific agencies of the United States of America have undertaken studies of potential biological production (inorganic nutrients) and standing crop (plankton, forage organisms and fish) in the central and eastern Pacific Ocean. Since 1954, some agencies have augmented these studies to include determinations of primary (basic) productivity (rate of production) employing the carbon-14 technique first introduced by Steemann Nielsen in 1952. Briefly, this consists

of measuring the rate of fixation of radioactive carbon by the photosynthesis of phytoplankton in sea water samples.

The Steemann Nielsen technique has been modified and improved by Dr. Maxwell Doty of the University of Hawaii. With the assistance of the U.S. Fish and Wildlife Service (Pacific Oceanic Fishery Investigations), he has used it to study the zonal variation in primary productivity in the central Pacific from 30°N. to 20°S. latitude. In 1955 the technique was used on the EASTROPIC expedition, a multiple-ship survey of the central and eastern equatorial Pacific, by the Pacific Oceanic Fishery Investigations (in co-operation with the University of Hawaii) and the Scripps Institution of Oceanography (in co-operation with the Inter-American Tropical Tuna Commission). The results have shown a higher rate of fixation in the new water at the surface in the region of upwelling along the Equator than in the older surface waters of the Equatorial Counter-current. A similar relationship exists in the size of the standing crops of zooplankton and forage fish. One of the most interesting discoveries resulting from the carbon-14 work was finding a marked "inherent" diurnal variation in the carbon fixing rates, as measured in day and night samples. In 1956, the carbon-14 technique was again used by the same two agencies, together with l'Institut Français d'Océanie, during EQUAPAC, a multiple-ship survey of the western and central equatorial Pacific. The results are as yet unavailable.

American investigation of primary productivity in the central and eastern Pacific Ocean will continue. The United States of America will be pleased to provide detailed information on the results of these studies, as they become available, to member nations of the Indo-Pacific Fisheries Council. We approve and encourage cooperative studies of primary productivity in the Indo-Pacific area as a possible means of assessing the potential food resources.

#### JAPAN

Dr. Z. Nakai, Member of Sea Fisheries Panel sent a statement as follows:

It is most desirable for welfare and prosperity of humankind to utilize living resources in the sea to as great an extent as

possible, under appropriate management of existing species. From this point of view, unexploited resources in the sea have to be immediately developed, if they are known to exist in certain regions of the ocean. Knowledge that one would need for undertaking such development program may include, above all, the present amount of the resource and its future magnitude which may be estimated.

Nevertheless, to obtain a reliable estimate of the abundance is not always easy in many cases and still more difficult when the fishery dependant on that resource has not been developed to a certain level. There is prevailing notion, however, that the basic productivity of the ocean makes little or no difference between the seas of the tropic and frigid zones so that fisheries resources in an undeveloped region in the tropic zone can be reproduced as efficiently as they are in a well-developed region in the other zone. In some cases of the tropical zone, fishery development programs often seem to be contemplated on the basis of such expectation as this.

Of two problems involved here, the first is that basic productivity of the sea may not necessarily be interpreted as productivity of fishery resources to be directly utilized by man. Generally speaking, the basic productivity is, of course, high in a region where fishery resources have high productivity. Evaluation of marine resources useful for fisheries would vary from time to time depending on species of living organisms. However, an area with low basic productivity, on the one hand, may be capable of offering a large quantity of catch on account of physiological and ecological peculiarities, such as factors pertaining to migration and spawning, of species occurring in the area. On the other hand, the sea with rich basic productivity may sometimes be found to be markedly barren in fisheries resources. The second problem is related with a theory that there is little or no difference in basic productivity between the seas of the tropic zone and the frigid zone. However, the theory which was first introduced by Dr. Gordon A. Riley may not be regarded as an established law, for it seems to be wide open to question as will be referred in a paper entitled "A Note on the Difference of the Basic Organic Production between Low and High Latitudes of the Sea", and submitted by Dr. Rinnosuke Fukai to the 7th Session

of IPFC. For this reason, the above problems should fully be taken into consideration when fishery development programs for unexploited regions are to be carried out. It was requested in the decisions of the 6th Session of IPFC (para. 207 of the Summary) to the effect that the Member Governments be prepared to state to what extent their resources would permit a study of basic productivity of the sea, preparatory to a discussion or symposium at the 8th Session.

From the standpoints stated above, we, Japanese delegates and members of Sea Fishery Panel, recognizing necessities of thorough investigation and scrutiny to be conducted by the Member Governments in regard to various aspects relevant to these problems inclusive of the first one in particular, solicit that the subject under consideration would be adopted as one of important items to be discussed at the 8th Session of IPFC.

However, it is thought that if a symposium can be held on this subject at the next Session, it will be more or less of interim nature, because it is doubtful whether or not the duration between the 7th and 8th Sessions would enable the Member Governments to reach any conclusive phase in the investigations. Furthermore, it is suggested that if the Member Governments are likely to be requested to take active investigations on the subject during the period prior to the 8th Session, attention would be invited at the present occasion to make effective arrangement for some of the practical aspects that might be needed for carrying out the investigations, for example, reorientation or standardization of methodology and instruments within a feasible extent, such as those employed in quantitative analyses of chemical elements of the sea as well as for plankton sampling with determinations thereof, and any other item that has to be provided for advancement of the investigation.

### PAKISTAN

Dr. M.R. Qureshi forwarded the following statement:

The marine fisheries of Pakistan are tapped in a belt about 10-12 miles from the coast line and hence the exploitation is very limited. This is due to the indigenous methods of fishing and that the fishing is done by sail

boats. Although the number of mechanized boats at Karachi is 48 these also fish with gill nets and do not go beyond 15 miles from the shore. The total number of mechanized and sail boats is only 1,500 including a large number of small boats which operate very near the coast. The fishermen cannot go far away as they have no navigation instruments on board and have to keep the coast in sight. This is the condition on the West Coast (Arabian Sea). Only two trawlers of the department have surveyed waters up to 30 fathoms, from 30-40 miles away from the shore.

On the east coast, the sea fisheries are very small being confined mostly to stake nets and beach seines, only a few gill nets are used. The inshore waters are very shallow where big boats cannot fish owing to the presence of silt brought every year by the rivers and hence only stake nets are in operation. The basic productivity of the sea can be studied when more mechanized vessels are available.

Thus it will appear from the above that offshore commercial fisheries do not exist in Pakistan. The intensity of fishing is low and hence there is no immediate need of conservation of any fisheries. The basic productivity of the sea can only be studied when some more mechanized vessels are available for the procurement of which arrangements are underway.

### KOREA

The Delegate for Korea submitted the following statement:

In seas adjacent to Korea, there are a number of species of important fish that migrate in the upper, middle and bottom layers of the cold or warm currents. All of these fish spawn in the shallow areas along the coast, and later migrate to the neighbouring waters.

Mackerel, for instance, which inhabit in the upper layer, pass the severe winter in the bottom layer on the continental shelf in the warm sea adjacent to Cheju Island located south of Korea. In March or April when the warm currents begin moving north, they form into the schools and migrate to the north along the east, south and west coast of Korea to feed and spawn. After spawning in the shallow areas of the east and south coasts in May, they



again move along the coast of Korea to feed. In winter when the water temperature falls, the schools return to the south sea area.

Another example is the croaker, which pass the winter in the south Yellow Sea area, west of Cheju Island. During the end of March and the beginning of April, they school and migrate to the north to spawn early in May in the shallow (less than ten meters depth) seas near the islands off the west coast of Korea where the salinity of the water is comparatively low.

Other species of fish such as Spanish mackerel, horse mackerel and yellow tail which are upper layer fish, Alaska pollack, hair tail and cuttle-fish which are middle layer fish and minnow, haddock, seabream, herring, flounder etc. which are bottom fish, have almost the same habits as the two species as mentioned above. These facts are the result of the research activities which are being undertaken by the joint efforts of the Bureau of Fisheries of the Office of Marine Affairs, the Central Fishery Experiment Station and its 6 branches. This research work financed through the national budget, is one of long range programs of this country to obtain basic data on the ocean and fisheries resources, including the fluctuation of the fisheries production, accurate studies of the dynamics of the fish population, effect of fishing intensity, and the development of the fishing grounds. For this purpose many of the private fishing boats and vessels belonging to the experiment stations are mobilized to investigate the following items:

1. Correlation between fishing intensity and body length and age composition.
2. Ecological study regarding life forms, migration and life history.
3. Marine ecological research with respect to oceanographic conditions and plankton.

Technicians and investigators are dispatched to more than sixty (60) fishing ports of South Korea to gather data on marine landings, important fishing activities and the relations between fisheries resources and productivity. Work is also being carried on regarding productivity by species and on oceanic conditions (geographical position, depth, flora and fauna of the sea bed, deposits,

current, temperature, salinity, dissolved oxygen, nutrient salts, water colour, transparency, plankton, waves, ocean atmosphere and other factors in nine areas which cover all waters under jurisdiction and control of the Republic of Korea. The results of these observations are published in Korean language annual reports.

The Australian C.S.I.R.O., Division of Fisheries and Oceanography is in process of forming a section to study basic productivity under the leadership of the recently appointed Chief of the Division, Dr. G.F. Humphrey.

There is no information under this head from other territories. The Singapore Regional Fisheries Research Station will undergo reorganisation in 1957 and its future scientific programme is not yet decided.

#### 6. Faunal Changes due to Climatic Modification

Mr. A.M. Olsen of the C.S.I.R.O., Division of Fisheries and Oceanography, is making a study of this possibility in the Tasmanian Region. A *prima facie* case has been made out for the recent extension into Tasmanian waters of northern forms.

No particular findings were secured on this subject. The stocks of sardine and herring still show the sign of declining in Japanese waters. On the other hand, the stocks of three forms of marine fish, anchovy, Pacific saury and horse-mackerels as well as common cuttle-fish are either stable or increasing. These facts are indicated by the studies on their population dynamics or made apparent by the amount of catch, but fisheries workers here are not always unanimous as to the interpretation of the facts whether they are ascribed to the change of climate or to any other factors which escape from the attention of scientists.

There is no information from other territories.

#### 7. The Desirability of Equipping Fishing Fleets with Facilities for the Receipt and Transmission of Weather Data

In Australia, the majority of sea-going fishing craft are equipped with two-way radio and receive regular weather reports and can pass on information about the weather.

In Malayan waters the research vessel MANIHINE was equipped with a radio

transmitter/receiver. During the trawling survey from September 1955 to August 1956 weather reports in code were transmitted twice daily at 0000 and 1200 GMT to the Singapore Meteorological Office whenever the ship was in range, that is, within about 400 miles. The Meteorological Office cooperated by lending instruments, code books and charts and, it is believed, found the messages to be of value.

From Pakistan it was heard, "The equipping of fishing boats will start only when these are mechanized. As such the boats are small and the crew not trained. A proposal is under consideration to provide some mechanized boats by the Government for the safety of fishermen at sea. The main receiving and transmitting station will be installed on the fish harbour which is under construction. It may not be possible to equip all the fishing boats with RT/WT sets for a long time."

Japan reports that no significant change or modification has been made recently on this subject.

#### 8. Seaweed Resources

Dr. S. Sudo, Rapporteur on Seaweeds reported that no detailed contribution on this subject was received from Member Governments.

Information recently available on this subject is as follows:

In Japan studies on techniques for "sowing" spores of the purple laver and of "Wakame", an edible kelp-like brown alga are now proceeding to improve the culture methods for these species. Chemical studies to extend the utilization of seaweeds in medicine have been started and reports on the results are expected in the near future.

Some taxonomic work is proceeding at the University of South Australia, and investigations on *Gracillaria* spp. and *Sargassum* spp. are being carried out at the technological laboratory of the Government of the Philippines on the possible utilization of these seaweeds for use as fish, poultry and livestock feed.

Pakistan Government reports that seaweeds from different localities were collected and then

sent to some institutes in U.S.A. and Germany for identification; the results are awaited. Work on the taxonomy of sea-weeds has started in the University of Karachi.

#### 9. Prawn Investigations

In accordance with 6th Session resolution (Summary Report para 224, c) Prof. Kubo of Tokyo University of Fisheries requested member countries to supply him specimens of prawn and shrimp for his study. He has received samples from India and Indonesia, which, according to him, are not adequate enough to prepare a consolidated field key of these organisms in the region, and Prof. Kubo is still expecting to receive more specimens from other parts in the region. He informed that since the United States territories in the region produce no shrimps of commercial importance, no specimens will be expected from Hawaii.

The artificial raising of prawns under controlled conditions has been continued during the period of 1955-1957, but the results of the experiments are still too immature to be disseminated at this moment.

#### RASTRELLIGER INVESTIGATION

Having an important bearing on the sea fisheries in the region, the Sub-committee on the Rastrelliger research was established on an international basis at the 6th Session of the Council under Technical Committee I with the participation of India, Indonesia, Thailand and U.K. At the kind invitation of the Government of Malaya, the Sub-committee held its first session in Penang from 24 to 30, September, 1956, which was joined by the members of Executive Committee and the Secretariat of the Council, as well as an officer each of FAO and UNESCO.

The Record of the 1st Session of Rastrelliger Sub-Committee was submitted at the 7th Council Session for examination. The result of the examination made on the fish specimens sent to Mandapam and Singapore from various localities in the region was not available to the 7th Session for study.

It was also noted (Agenda 5 of the Record) that the Sub-Committee agreed to recommend that consideration should be given by the Council to establishment of this Sub-Committee as a Standing Committee under Technical Committee I of the Council.

## REPORT OF SPECIAL SUB-COMMITTEE ON "TUNA CATCH STATISTICS CHART"

BY A.L. TESTER, CONVENER

Report has been issued separately as working paper IPEC/C57/WP 6.

## REPORT OF STANDARDIZATION OF PLANKTON COLLECTING GEAR

BY Z. NAKAI, RAPPORTEUR

This has been issued separately as working paper IPFC/C57/WP 33.

### CHAPTER 3—TECHNOLOGY AND ECONOMICS

#### Craft and Gear

1. At its 6th Session the Council had pointed out that although the largest investment in the fishing industry is in craft, this subject had previously been much neglected. The Council accordingly then recommended that, as a first step, professional drawings of selected existing indigenous craft in each country should be made available, and studied by a qualified naval architect, before any contemplated modifications are attempted. It was then also felt that there was a need for specialized fishing boat architects, who should be trained to assist governments in improving their local craft. To meet these two needs the Council had expressed the hope that FAO might study the possibility of producing a suitable handbook on fishing boat design from which a person with a good basic training in mechanical engineering could learn the technique of drawing small boats, and that Governments should consider the possibility of requesting FAO to organize a special training centre for fishing boat architects.

2. On the question of a special training centre for fishing boat architects, the Council decided that for most countries in the region it was at this stage perhaps too ambitious to consider specialized training of already qualified naval architects in design problems peculiar to the requirements of fishing craft. Whilst the original proposal was considered admirable, and some countries would be glad to participate in the training scheme should it materialize, the

Council felt on reconsidering the problem that vocational training of local boat-builders (to enable them to read working drawings and produce boats from those plans) was the first requirement. Special attention was directed to IPFC/C57/CP 17, IPFC/C57/CP 39, and IPFC/C57/CP 42.

3. The Council requested FAO to study the possibility of producing a handbook on the techniques of construction of small fishing boats. Such a publication would satisfy a widespread need.

The Council noted that nearly every country in the region had continued to expand its already existing services and, what is even more gratifying, that several Governments had initiated new measures (such as training schemes, the appointment of specialized staff and/or the construction of improved type fishing craft) all directed towards these ends.

5. Arising from IPFC/C57/Tech. 51, IPFC/C57/Tech. 52 and IPFC/C57/Tech. 56, it was found that future development in both India and Ceylon is being delayed by the difficulties inherent in devising a suitable proto-type mechanized beach landing craft. The Council therefore requested FAO to make a thorough appraisal of progress to-date in this field and to disseminate an account of their work to Member Governments. It was also suggested that FAO might consider the advantages of arranging a meeting of FAO experts working in this field and naval architects on its own staff, together

with the technical and administrative staff of interested Member Governments, to discuss not only the naval architectural aspects of this problem, but also the related technical and economic aspects.

6. The Council expressed its satisfaction in the efforts underway in the region for mechanization of fishing craft and expressed the hope that Member Governments will intensify their efforts in this field.

7. The Council commended the action already taken by certain Governments for organizing training programmes for fishermen in navigation and in safety at sea as well as in marine engineering. The Council recognized that, in view of the progressive improvement in design and propulsion of fishing craft, and the consequent extension of fishing grounds, the need for training of fishermen in navigation and engineering is being increasingly felt. The Council therefore recommended that Member Governments should take appropriate measures to meet these requirements.

8. Announcements by FAO to the effect that "*An Annotated Bibliography on fishing Gear and Methods*", together with a new Handbook on these subjects, will both be available in the near future, were welcomed by the Council.

9. An invitation from FAO for the IPFC to be represented at the forthcoming "International Fishing Gear Congress", to be held in Hamburg between the 7th and 12th October, 1957, was warmly received by the Council. It was decided that this invitation should be accepted as the deliberations of this Congress are expected to prove to be of great value to fishery workers throughout the Indo-Pacific region. The Council expressed the hope that gear relatively important to this region e.g. fish-traps, would receive adequate attention at the Congress.

10. Only one paper had been received on the subject of echo-sounders. This concerned the new ultra-sonic directional fish finder known as the "Sea Scanar", and it was realized that this particular equipment could only be used in countries with advanced fishing industries.

11. At the sixth session it had been decided that the use of echo-sounders not only to study depth and occasional schools of fish but, also in order to study the reaction of fish towards fishing gear, should be studied. The response to this assignment was poor as many

of the Governments were not in a position to carry out this work. The Council therefore decided to delete this assignment from the general programme for the next inter-session period and, instead, to treat this as a specific subject on which Technical Papers, from only those experienced workers concerned, would be welcome.

12. Papers concerning a floating trawl developed in the Philippines for the capture of *Chanos chanos* fry, and from Honolulu describing a new method of handling Tuna longline gear, the introduction of which has resulted in considerable savings in manpower, were both studied with interest.

13. Information received from Indonesia and India (IPEC/C57/Tech. 19 and 52 respectively) on the preliminary results obtained from investigations on the comparative fishing efficiency of several different types of gear were studied. The Council expressed the hope that this work, which is of a continuing nature, would be pursued further.

14. Only one paper, from Indonesia, was received on the subject of indigenous materials used for the manufacture of fishing gear. This concerned the use of "Gebang" (*Corypha utan*), an indigenous product from which some 60% of the local gear is constructed. The Council noted with approval that further studies involving the comparative efficiency of "Gebang" and cotton were contemplated. Although general mention of the rapid introduction of nylon into many countries within the region is contained in various status reports, no technical papers were received regarding "natural versus synthetic fibres" for fishing gear. In the light of this failure to produce data on these two subjects, which it was found had been brought about by the inability of Member Governments to deal satisfactorily with the wide range of subjects previously assigned, the Council decided to reduce the work of the next inter-session programme to the one general brief "Improvement and Preservation of Craft and Gear".

15. The Council had no information on the activities in Gear Preservation. It was hoped that information on this subject will be available at the next Session.

16. At the 6th Session, the Council had recommended Member Governments to ensure that use is made of all available information

from local meteorological agencies for the benefit of fishermen. Measures taken in several countries to publicize weather forecasts were discussed. It was found that, whereas in some cases the need was being satisfactorily met, the position elsewhere was still far from satisfactory. The Council therefore decided to recommend to Member Governments that they should give due consideration to the installation of radio receiving sets in fishing boats to enable them to receive up-to-date weather information from shore station. The Council considered that the existing network of meteorological stations in certain parts of the region could be improved by equipping some of the larger fishing boats with transmitters as well as receivers, so as to enable them to transmit weather information to shore stations and other fishing boats operating in the area.

17. It was decided that the work of Technical Committee II on Craft and Gear during the next inter-session period should concentrate on the following phases:

1. Improvement of craft
  - a) Design and construction with due consideration to economics.
  - b) Mechanization of fishing craft.
  - c) Vocational training for boat-builders.
2. Improvement and preservation of gear.
3. Mechanized handling of fishing gear.
4. Training of fishermen in navigation, seamanship and engineering.
5. Availability and exchange of weather information between fishermen and meteorological agencies.

#### Food Technology

18. The Council noted the progress made in the region in the processing and preservation of fish as reflected in Part A of the Report of Technical Committee II and in IPFC/C57/Tech. 9, 32, 36, 37, 38, 54 and 60 which contain valuable information relating to processing of fish in the region.

19. The Council made special note of the preliminary work in progress in the region on the processing of fish and expressed the hope that the work will be pursued more vigorously and that the results thereof will be reported at the next Session of the Council. In this con-

nection the Council suggested that the investigations might include work on the suitability for use in fish canning of the several vegetable oils or mixtures of these which are generally available in the region.

20. The Council carefully examined the proposals made by the Technology Branch, FAO Fisheries Division, Rome, in IPFC/C57/WP28 in connection with the preparation of a Fishery Products Manual. The Council endorsed these proposals and requested Member Governments to encourage a systematic study of the fishery products in the region, information being collected in the same general pattern as suggested in IPFC/C57/WP28 for "Nauru-Pla". The Council further requested Member Governments that the information resulting from the above recommended study should be made available to the Council for compilation, editing, and distribution in the region with assistance from FAO.

21. The Council took note of the projects for the introduction of Fish Flour for human consumption and suggested that Member Governments may like to give this project serious consideration.

22. The Council emphasized the need for training facilities for fishery technologists in the region and requested FAO to consider the possibilities of organizing a Regional Training Centre in Fish Preservation and Processing with particular reference to Curing of Fish in Humid Tropical Climate.

23. The Council also suggested that Member Governments might consider the possibility of a "T.A. Group Country Project" as an immediate follow-up of such a Training Centre for a comprehensive study of the Fish Curing Industry in the region with special emphasis on the improvement of quality.

24. From a review of preceding Panel activities and of papers, the Council considered that the following are self-evident:

- a. Lack of adequate methods of preservation is a limiting factor in the distribution of fish in many parts of the region.
- b. The means of preservation for the majority of the people is limited to some form of drying or salting; refrigeration and canning are imprac-

tical for lack of facilities and for unrealistic costs.

- c. The Committee has not been as successful as had been hoped in stimulating research on improved techniques. Further, the proposals to develop publications on the subject have yet to materialize.
- d. In certain areas, at least, improvement in consumption will not be possible until more effective methods of preservation and distribution are known and utilized.

The Council therefore requested FAO assistance in providing a consultant to be assigned to the Far East Regional Office for one year to assist in:

- i) co-ordinating activities in fish processing and preservation, with special reference to fish curing in a humid tropical climate, currently underway in several countries of the region.
- ii) assisting Member Governments to organize activities in this particular field, and
- iii) providing in-service training of fishery technologists in the region.

25. The Council expressed the view that the progress made so far in the study of improved methods of processing and storing fish, particularly with regard to humid tropical conditions, was small when considering the importance of fish curing to the economy of this region, and considering that a study of the problem has been a project of the Council for over four years.

26. The Council agreed that the above study should be continued during the next inter-session period and recommended that Member Governments should encourage a vigorous pursuit of the study along the specific lines recommended at 6th Session (para 158 of the Summary Report of the 6th Session).

#### Statistics

27. The Council recognized that although considerable effort was at present directed to the collection of statistics there was scope for improvement to fulfil more effectively the requirements of the development programmes currently in progress or anticipated in the near future in the member countries.

28. The Council stressed the urgent need for more reliable statistical information as to the levels of production, composition of catches, and utilization of fish in the region together with the trade in fishery products, and in this connection recognized the effective application of sampling techniques.

29. The Council noted that the FAO Handbook for Preliminary Fishery Surveys (First Draft) will prove of use to Member Governments in the planning and execution of surveys in fishery economics in their countries.

30. The Council noted that sampling techniques have been devised and are in operation in India and under FAO/ETAP in Uganda and Egypt, and expressed its keen interest in these activities and the results thereof.

31. The Council recommended to Member Governments that they should:

- i) consider the desirability of requesting FAO to provide, under its Expanded Technical Assistance Programme, expert assistance, to advise and assist Governments in organizing and operating systems for the collection of fishery statistics;
- ii) consider the possibilities of a Group Country Project in this respect.

32. To stimulate the interest in the use of sampling techniques for the collection of statistics, to accentuate the importance of such techniques and generally to assist Member Governments in this connection the Council decided to enlist the aid of FAO in the drafting of an appropriate Programme for an expert in this field on a Group Country Project basis and to circularize the suggested programme together with an estimate of expenditure likely to be incurred by participating member countries.

33. The Council recognized the limitations imposed by the shortage of adequately trained personnel, equipment and other facilities for the collection of statistics in the region, and adopted the following as the minimum programme in respect of statistics:

- i) Census of the number of fishing vessels operating in member countries, the number of fishermen engaged in the industry and fishing methods used, together with cold storage and processing facilities.

- ii) Collection of statistics on overall fish production, together with statistics on utilization and trade in respect of species of major economic importance.

### Marketing

34. The Council recognized that although the progress made in the region in the field of fish marketing was appreciable there was enough scope for intensification of activities in this field.

35. The Council referred the study of fish marketing to a Sub-Committee with the following directives:

- i) The Sub-Committee should for the time being consist of a Chairman and two members elected during the Session and Member Governments not represented on the Sub-Committee should be invited to nominate representatives if they so desired.
- ii) For the purpose of the Sub-Committee, the term "marketing" should be taken to comprise the economic aspects of fish sales; distribution, transportation and storage.
- iii) The activities of the Sub-Committee during the next intersession period should be confined to "the preparation of an up-to-date factual account of fish marketing conditions in member countries, together with a review of measures, so far introduced by Member Governments, related directly or indirectly to the improvement of fish marketing".

36. The Council agreed that in the preparation of a Bibliography of publications concerning marketing of fish, with special reference to this region, which is essential to the Sub-Committee on Marketing in order for it to be able to discharge its functions properly, the assistance of FAO will be extremely useful. The Council, therefore, requested FAO to provide the necessary assistance in this respect.

### Socio-economics

37. The Council expressed satisfaction on the general progress made in the field of Socio-economics, it being emphasized, however, that an intensification of efforts for improving the socio-economic conditions of fishermen was extremely important.

38. The Council noted the interest of Member Governments in the organization and administration of effective credit facilities and the need for the training of personnel in this field. The Council reiterated its request to Member Governments to give adequate consideration to this aspect of the fisheries industry, and to encourage the assembling of up-to-date information on credit schemes introduced so far in member countries and a review of the results achieved and problems encountered.

39. The Council took special note of the Projected FAO IPFC Training Centre in Fisheries Co-operatives and Administration as also of the current investigations, promoted by FAO in co-operation with certain Economic Research Institutions in the region, of the Functions of Middlemen and Co-operatives in regional fisheries.

40. The Council urged Member Governments to participate in this Training Centre and to nominate well-qualified candidates, actively engaged in the organization and management of fishery co-operatives.

41. The Council also requested Member Governments to help in the assembling of all available background information, publications, etc. on fishery co-operatives in the region, for use in connection with the above Centre and to inform FAO of any particular problems encountered in the organization and arrangement of fishery co-operatives, so that these may be taken into account in planning the training programme of the Centre.

42. Member Governments were further requested to investigate the possibilities of extending the survey of the Functions of Middlemen and Co-operatives, through the agency of Universities or other Research Institutions, acting in close collaboration with Fishery Departments.

43. The Council recognized the limitations of personnel and other facilities for conducting socio-economic research in the region, but in view of the relative urgency of certain problems in the field of socio-economics recommended the following programme in the field of socio-economics for the next inter-session period:

- i) A factual survey of fishermen's co-operatives in the Indo-Pacific region with special reference to their or-

ganization, operation and effectiveness.

- ii) A factual survey of credit facilities available to fishermen with special reference to the present forms of

credit, the rates of interest or return, the forms and extent of securities required as well as the effectiveness of the existing credit facilities.

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## REPORT OF THE TECHNICAL COMMITTEE II (PANELS A, B AND C)

Having considered the progress in the activities of the Technical Committee II during the period between the 5th and 6th Sessions, the Council at its 6th Session issued fresh directives for the activities of this Committee and approved the following assignments for the period between the 6th and the 7th Sessions.

### PANEL A: CRAFT AND GEAR

- 1) Improvement of craft
  - a) Design and construction with due consideration of economics
  - b) Propulsion and mechanized handling of fishing gear
  - c) Safety at sea and seamanship
  - d) Education of craft designers and boat-builders
- 2) Fish finding (echo sounder, loran or asdic)
- 3) Improvement of gear
  - a) Material (nets, preservation, etc.)
  - b) Relative fishing efficiency of the various types of gear
- 4) Relation between fishing methods and craft designs
- 5) Meteorology

### PANEL B: FOOD TECHNOLOGY

Study of improved methods of processing and storing dried fish, particularly with regard to humid condition.

### PANEL C: STATISTICS, MARKETING AND SOCIO-ECONOMICS

- i) Advances in the collection of adequate fisheries statistics, including sampling survey methods in the production phase.
- ii) Socio-economic problems affecting the production, processing and distribution of fisheries products; their solution.
- iii) Advances in the development of fish marketing and distribution; development of consumption of fisheries products to improve nutrition; the effect of consumer tastes for non-customary products and means of influencing them.
- iv) Development of fishery extension services (i.e., the extension of scientific knowledge to the level of the fisherman and fish-farmer).
- v) Significance of fish-culture as an integral part of rural economy.

## REPORT OF CRAFT AND GEAR PANEL PANEL A

BY S. TAKAYAMA, CHAIRMAN\*

It has to be admitted that activities of the Craft and Gear Panel during the intervening period following the 6th Session have not been satisfactory in providing a true record of the achievements in the region, despite the criticism given at the last Session (para. 139 of the Summary Report, 1955). Reports have been submitted only from the Governments of Japan and Pakistan.

It is suggested that practical consideration should be given at the 7th Session in regard to operative procedures of the Panel as well as budgetary aspects to be borne in connection with activities of the Panel.

In regard to the introduction of advanced technology from outside a country concerned (para. 140, of the Summary Report), there remains a number of problems to be solved for the host country. It is one thing to understand the merits of mechanization of fishery technology, but to assure the possibility of mechanization is another. Failure to attain some technological advantage in a limited period may be overcome by continuing the training period within the host country for a further length of time. However, one should be careful in introducing exceedingly advanced techniques into a country where technological levels in industrial fields in general have not been advanced in accordance with the foreign technique desired. Such a technique would fail, on the basis of a mere demonstration, yielding no fruitful results to the host country unless attention had been paid to the feasibility of introducing the technique in that country.

Take mechanization of fishing boats for instance. The efficiency of boats equipped with modern facilities is highly appreciated. Nevertheless, there is not always a guaranteed market for the greater amount of catch that would result from the mechanization. Imbalance between the supply and the demand of fishery products may render the production cost too high to justify the mechanization of commercial fishing operations. The same can be said about use of synthetic fibres for fishing nets and

ropes. Generally speaking there is no doubt about the advantage of synthetic fibres for fishing materials. However, use of indigenous materials might as well be considered from the viewpoint of economical management of the industry.

As an instance where a project introducing non-indigenous methods has failed (para. 141 of the Summary), one may recall an attempt in West Bengal, India. There bull trawlers purchased from Japan with the aid of the U.S. Point-4 Program through the International Cooperation Administration (ICA) are said to have been left idle for months mostly because the vessels were not properly fitted for fishing. According to information received by the writer, one of the reasons why the boats were inefficient, was reported to be that a ship building company with little experience in fishing boats had been selected, before the Fishery Agency of the Japanese Government could be consulted, apparently owing to the price offered. In addition, incomplete specifications for equipment are said to have been furnished to the ship builders.

It is hoped that efforts will be made to avoid other such failures through consultation with the staff members of IPFC/FAO and the governmental agency of the country when a responsible shipyard or any other commercial firm has to be chosen in connection with a program introducing non-indigenous techniques.

Reports received from the member countries are recorded below:—

**JAPAN** Recent progress in fishing gear technology in Japan covers:—

**Renovation of Fishing Boats:** According to the statistics available from the Fisheries Agency, the total number of fishing boats in Japan in 1955 was 676,500, of which 42 per cent were nonpowered. Among powered boats, those in the 0- to 5-ton-class constituted 26 per cent, and therein the 5- to 10-ton-class, 2 per cent of the total. In other words, 70% of the fishing boats in the country, consist of small

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wooden boats of less than 10 tons. This may be partly attributed to the fact that a substantial portion of the Japanese fishing industry depends on coastal fisheries which are great in number but minor in scale. As most of those small boats were built immediately after World War II when no administrative control over the construction of fishing boats was in force, they are now either too old to be in active service, or at best, are in need of improvement.

Until recent years, however, the Government have not paid as much attention to technical guidance for improving the hull and structure of small boats as they have done for steel vessels of the larger types; nor have legal requirements necessitated inspections of small fishing boats for safety precautions at the time of construction or later when they are in use.

Since particular requirements have to be considered when deciding on the construction and operational requirements of small wooden boats to be built at small shipyards with materials mostly supplied from local sources, the government is extending technical assistance to these shipyards by organizing, from time to time, short training courses on naval architecture. With this extension program of the Government, technical experts stationed at various fishing centers are available for consultation on problems pertaining to engines and other mechanical equipment for fishing boats. Although most of the engines commonly installed on fishing boats have been of the kerosene-oil type working on electric ignition, boats furnished with small diesel engines have increased in number since 1956.

Under the five year fishing boat adjustment program that commenced in 1956, the government has rendered financial assistance in the form of low-interest loans for building fishing boats. Concerning the larger types of boats, more than 15 meters in length and more than 20 tons of gross tonnage, attention has been paid to ensure sea-worthiness in compliance with laws relating to the construction of fishing and merchant vessels, which require that fishing boats belonging to this category will be subject to inspection several times at different stages of construction from drafting till completion.

**Fish-Finder:** According to the statistics compiled by the Fisheries Agency, the number of fish-finders in service was about 7,000 units by the end of 1956. Although all of these operate on the vertical system, various designs are available depending on specific types of fisheries. For example, the one specially designed to obtain clear reflections from the sea bottom is used for trawlers, and another with high precision is used for investigations in relatively shallow waters. Another device operating in a horizontal direction, like the "Sea Scanner", is on the market. Nevertheless, the high cost of this new equipment seems to prevent it from being widely accepted among fishermen here.

It is interesting to note a recent trend in which inexpensive types of fish-finders, which, even though of more or less low precision, have a practical value, have been produced and are gaining popularity among small fishing boats owners.

**Improvement in Materials for Fishing Gear:** With technical advances in production, the amount of synthetic fibres introduced in place of natural fibres for the fishing industry has been growing year after year. For instance, of a total consumption of fishing net materials of approximately 50 million pounds a year, 22 per cent consisted of synthetic fibres in the calendar year of 1955 and 30 per cent in 1956. It is expected that the consumption of synthetic fibres for replacing fishing gear materials will, within the next five years, amount to 30 million pounds a year.

As synthetic fibres used so far for fishing include four kinds, each having different characters, polyamide, polyvinyl, polyvinyl chloride and polyvinylidene chloride, they are applied to different types of fisheries depending on their own physicochemical properties. All of them have been remarkably improved in twist, processing techniques including mixing with other synthetic fibres, plastic treatment, and heat setting. Although some synthetic fibre yarns are now comparable in price with cotton thread, difficulties in adopting high speed twisting for synthetic fibre yarn and in the net-weaving thereof still remain to be solved.

When compared with the remarkable advance that synthetic fibres have made in fishing net materials, the replacement from natural to

synthetic fibres for fishing ropes might appear to lag in respect of market price as well as processing techniques such as twistability, elongation, and heat setting. However, large-scale experiments were initiated in 1956 in an effort to secure the adoption of synthetic fibres for rope materials. A proportion of the tuna long-lines and the harpoon lines for whaling formerly of natural fibre has already been superseded with these chemical fibres.

## PAKISTAN

### **The need for the Training of Specialized Fishing Boat Architects :**

The present stage of development does not justify the need for naval architects specially for the fishing boats. As such there is a great shortage of naval architects in the country and their services are being utilised for the fishing boat also.

The Pakistan Industrial Development Corporation have a shipyard at Karachi (West Pakistan) and two boatyards at Narayanganj and Khulna in East Pakistan. In view of the above there is no immediate programme for training of specialized fishing boat architects.

### **Making Meteorological data available to Fishing Boats :**

Nothing has so far been done in this regard. However, some receiving sets are being obtained through I.C.A. to be installed in fishing villages for this purpose. The information on weather conditions is received from the Meteorological Department and passed on to the fishermen of Karachi alone.

### **Improvement of Craft :**

Thirty outboard motors (15 of 5½ H.P. and the rest of 10 H.P.) have been distributed to the fishermen to mechanize the smaller boats (tony, bheri, hora, ekdar and smaller hora). The results are not encouraging. Firstly the outboard motors do not stand the rough handling and secondly, these are very heavy on petrol and are not economical.

Six inboard marine diesel engines, 3 of 112 and 3 of 75 B.H.P. were obtained through I.C.A. and have now been fitted on fishing boats. These are giving good service. The F.A.O. report on mechanization of West Pakistan fishing boats has been received and according to the recommendations contained therein a boat will

be constructed soon at Karachi and one at Chittagong for demonstration to the fishermen. Later this type design will be followed by the fishermen for which engines worth \$500,000 are under procurement through the U.S. Commodity Aid.

### **Fish Finding Equipment :**

Excepting one fishing launch, none of the fishing boats are equipped with any such equipment. Only the two trawlers are fitted with echo-sounders and also have radio-telephone to communicate with each other.

### **Improvement of Gear :**

Gill net is the principal gear used in our sea fisheries. Trawl net which has been introduced by the Department is being gradually adopted by the fishermen for shrimp fishing.

Lampara net and purse seine are also being introduced by the department for catching pelagic fish. A powered skiff is under construction and experiments with these nets will start as soon as the skiff is ready.

Long line gear, imported from Holland has also been introduced for mackerel and tuna fishing.

Lobster pots have also been experimented upon for catching lobsters; these pots were made locally of iron frames and were covered with galvanized chicken wire.

### **Correlation of fishing methods and craft design :**

Not tried yet.

### **Exploration for shrimp grounds in the off-shore areas :**

M.F.T. MACHHERA was partly used for locating shrimp grounds in the off-shore areas. The study is continuing. The results so far achieved have been summarised under trawling.

### **Continued study on natural versus synthetic fibres for fishing gear :**

No studies have been made, but some fibres besides cotton twine have been introduced. The fishermen were provided with hemp twine for the gill nets, these were tried but later rejected.

For gill-netting the fishermen are now using more and more nylon twine in place of cotton twine. In 1955, nylon twine worth \$98,000 was obtained under U.S. Commodity aid for the fishermen. This has been distributed to them on easy terms of payment. This year nylon twine worth \$500,000 is under order. The fishermen use light wood for floats which will soon be replaced by synthetic floats. Nylon ropes are also under order in small quantities so that fishermen may try this product also.

#### THAILAND

**Project:** Aid to Fishermen to Mechanize their fishing Boats.

#### Justification:

It has been generally accepted that mechanized fishing boats facilitate the development and progress of fishing activities, because fishermen will have conveniences and speediness to arrive at fishing grounds, to extend the area of fishing operation and to have more fishing hours. The facilities will enable the fishermen to catch more fish.

Now, there is increased need among the fishermen to have their boats installed with marine engines. There is a class of coastal fishermen who have no contact with the fish agents in Bangkok, and naturally have no credit to obtain loan to buy marine engines. This class of fishermen consists of owner-operators of gillnet, shrimp trawl, trolling line, shark long line, and underwater trap (bubu). These fishermen own the boats which are not above 6 ton gross. The marine engines of 4-10 H.P. are suited for their crafts.

It has been estimated there are about 2,500 of such boats and with 1,500 "poh" boats, will make a total of 4,000 non-mechanized fishing boats in the Gulf of Thailand. 4-10 H.P. marine engines will meet the need, and each costs about 15,000 bahts.

The Department of Fisheries considers that it is appropriate to extend aid to this class of fishermen in order that they will have their

boats installed with engines. The Department later on has had the joint approval of the Thai Technical and Economics Committee (TTEC) and ICA to make use of the Fisheries Revolving Fund of 300,000—700,000 bahts to work out this project since July 20, 1956.

#### Means of Approach:

1. The Department will be authorized to send open invitation to importing firms to co-operate in selling their engines to fishermen of the above class by installed payments.

2. Installed payment will be of 2 categories. The first will consist of 25% of the cost of the engines. The second will consist of monthly payments by the fisherman to cover the cost of engine according to the agreement between him and the firm.

3. The Department is authorized to advance the sum equal to the amount of the first category payment to any contracting firm which must in turn sign an agreement with the Department to reimburse the advance fund within 6-9 months.

4. The contracting firm itself will be responsible in the collection of installed payments from individual fishermen and will provide services in advising the handling and maintenance of the engines, and will have necessary stock of spare-parts of sale.

5. The fishermen, who will receive the aid, must be qualified fishermen of good conduct in accordance with the requirements set up by the committee of the Department.

6. The Department is authorized to appoint a committee to draft contracts, to make rules for negotiation with the importing firm and for selecting fishermen who should receive this aid.

7. For the practical flexibility, the condition specified in clauses 2 and 3 may be amended by the Department on the approval of the Minister of Agriculture.

**Expected Result:**

The Department hopes that with this Fisheries Revolving Fund, it can help in the mechanization of 100 fishing boats a year. The catch will be increased by 500 metric tons worth 2,500,000 bahts a year,

The above aid has been started since July 20, 1956. In the first 30 days, 14 applications from fishermen in various coastal

provinces for hire-purchase of the above mentioned engines have been forwarded to the Fisheries Department for approval. It is anticipated that additional applications will be steadily presented to the Department. This aid will apparently help the fishermen in the increase of their catch.

Since the introduction of the Scheme in August 1956, fishermen have already received 26 marine engines for mechanizing their craft.

**Report on the use of Nylon Gillnet off the Coast of Ban Pae,  
Rayong Province**

It has been the desire of the Government to make known to the fishermen the use of fishing gear that costs reasonably and that gives appropriate returns. Of the fishing gear experimented under the co-operation of the Department of Fisheries and USOM-ICA, nylon gillnet is one. The reason for its introduction and experimentation is the result well known in U.S.A. and Japan.

USOM-ICA supplied the Department of Fisheries with small horse-power marine engines, known as Yanmar Engine, and the nylon gillnet (the type used in salmon fishing in U.S.A.).

The experiment started in January 1955.

**Native Gillnet:**

Before 1954, at Ban Pae, there were two persons who operated native gillnets, locally called *Uan Loi Pan Tow*. The expert gillnet fishermen were outsiders who came from Ta Mai District in Chantaburi Province to fish off the coasts of Ban Pae every year. About 12 boats came to Ban Pae and fished during November and January.

The material of the native gillnets is a kind of herb-fibre, which was not strong. The net was 150 fathoms long and 4 fathoms deep and cost 2,500 bahts. It could be used only for one year, and had to be treated with preservative every week. The cost of every treatment was about 100 bahts. The sailing boat used was 7 meters in length and cost 4,000 bahts. The number of crew was 4.

**Result of the Experiment:**

The Ban Pae Marine Station made the nylon gillnet, 150 fathoms long and 4 fathoms

deep, of the same length and depth of those of the native gillnet which were used by Ta Mai fishermen. Two experiments were conducted. The first experiment was conducted between 15-29 January 1955. Two sets of nylon gillnets were operated by the Station and 2 sets of native gillnets operated by Ta Mai fishermen in the same locality off Ban Pae. Ta Mai fishermen stopped the operation on January 28, 1955 and returned to Ta Mai in February.

The second experiment was conducted solely by the Station in February 1955. 3 sets were used.

The catches of the first and second experiments were tabulated as Table I and Table II. It was found that the average catch per haul of nylon gillnets was between 67.8 kg. and 86.6 kg. and that of the native gillnets between 34.0 kg. and 39.2 kg. It was apparent that the nylon gillnet gave twice the catch of the native gillnet.

**Estimation of the investment, expenditure, and the income:**

a. Investment	Bahts
1 set of nylon gillnet, 150 fathoms long 4 fathoms deep	12,000.—
Yanmar marine engine, 4 H.P.	10,500.—
Hull	4,500.—
Total	<u>27,000.—</u>

<b>b. Expenditure :</b>	<b>Bahts</b>
Cost of Diesel Oil (4 litres per day, for 150 days, 600 litres)	540.—
Cost of lubricating oil ( $\frac{1}{2}$ litres per day, for 150 days, 50 litres)	350.—
Cost of food (150 baht a month, 5 months)	750.—
Cost of nylon thread (10 kg.) for repairing net	2,000.—
Cost of boat maintenance and repair	400.—
Depreciation of nylon gillnet (age 2 years) 1 year	6,000.—
Depreciation of boat and engine (age 5 years) 1 year	3,000.—
Total for 1 year	<u>13,040.—</u>

**c. Income :**

As a set of nylon gillnet would get 60 kg. of fish per haul, and 2 hauls could be made in one night for the period of 5 months of actual 100 days' operation, and as the catch would consist of Spanish mackerel, bonitos, black pomfrets, catfishes and sharks which would give 360 baht per night, the income would then be

36,000.—

**Ban Pae Fishermen and their Interest:**

The Ban Pae fishermen may be divided into two groups. Those of first group are bamboo-stake trap and Bubu fishermen. They are of well-to-do class and can find loans for their fishing activities. The second group are peasant fishermen. There are about 100 families, 30 of which have their homes near the Station. The fishing season off Ban Pae will last 5 months in a year, from September to January. The income of one family of the peasant fishermen was estimated 20 baht per day during the fishing season.

As the results of the two experiments were illuminating, the peasant fishermen of Ban Pae showed keen interest, despite that the Station was not ready to give them full

confidence due to short time experimentation. They came to the Station for consultation about the cost of a set of nylon gillnet and the Yanmar marine engine. The Station then communicated with the importing agents in Bangkok about the American nylon gillnet and the Japanese nylon gillnet. Samples of the U.S. nylon gillnet were sent to Japan and the costs were inquired from U.S.A. and Japan. It was then decided to advise them to use Japanese nylon gillnet on account of the cheaper price.

In August 1955, the Ban Pae fishermen received 7 sets of Japanese nylon gillnets and had 2 fishing boats of the same design as those of the Station and one sailing boat mechanized, all with Yanmar engines of 4 H.P.

In November 1955, 9 sets more of Japanese nylon gillnets and 4 mechanized boats were added to them.

Now there are 16 sets of Japanese nylon gillnets and 7 mechanized boats.

**Aids extended by the Station :**

As the peasant fishermen did not have sufficient capital, the Station advised the importing agent of Japanese goods in Bangkok to sell the Japanese gillnets and Yanmar engines by installments and received cooperation from the agent (Thai Trading Co).

Besides, the Station helped the fishermen by sending its carpenter and mechanic to assist in building the boats and in installing the engines.

In November 1955, the Station helped towing fishing crafts of the newly formed Ban Pae gillnet fishermen to the fishing ground and sent its own fishermen to advise them to operate the gillnets properly on spot.

Now it can be said that Ban Pae fishermen are entirely for the nylon gillnet. The Ta Mai gillnet fishermen came in November 1955 as usual, but they went back as soon as they felt that their fishing gear was not as efficient as the nylon gillnets.

**Production in November 1955 :**

In November 1955, the Ban Pae gillnet fishermen caught 180 kg. of fish a day which gave the income ranging from 450 to 800 baht, depending on the daily price of fish. Further follow-up on the study of fishing effort is now being planned.

### Navigation of fishing Boats:

(a) A Training Course for fishermen in navigation, operation and maintenance of marine diesel engines as well as in general safety at sea and seamanship, was organized in 1956 by the Fish Marketing Organization, Bangkok and the Department of Fisheries.

Instructors were drawn for the Navy, the Customs, and the Harbour Departments.

Thirty trainees participated and on successful completion of the course were given certificates of competence.

The course which lasted six weeks was imparted free but a trainee was charged 600 Bahts (US \$ 30.00) for board during the six weeks of the course.

A similar course was also organized in 1957. Another batch of 30 participants successfully completed this second course.

(b) A project to train young boys from the fishing community has been approved by the Government. According to this project boys whose parents are fishermen will receive training for a year in navigation, operation and maintenance of marine diesel engines, making and repair of nets, and handling of fish. This training will be given at the Marine Fisheries Station at Ban Pae, Rayong Province.

A dormitory, a small boatyard and a shed for making ropes and nets have already been constructed. It is expected that the training courses will commence from 1958.

### Introduction of Non-Indigenous Gear:

Attempts were made to operate in the Gulf of Thailand a Japanese purse seine from local boats. The boats tried are mechanized and are employed to tow skiffs from which Chinese purse seines are operated.

It was found that the Japanese purse seine could not be operated from only one of such local boats nor did economic considerations justify employing two such boats for operating the gear.

Necessary modifications to the gear so that it can be operated from only one boat of the type tried, are being worked out.

### Improvement in the Design and Construction of Craft:

Local carpenters who build fishing boats will be trained in the use of blue prints for boat building as well as in the economical use of material for boat construction, as in their present practices the carpenters waste a great deal of timber.

Three Japanese experts are being provided under Colombo Plan for conducting the training.

The training is scheduled to commence about the middle of June 1957. A batch of five carpenters will receive training at a time for a period of one month. During 1957 two such batches will be trained.

**TABLE I. Catch made by Nylon gillnet and native gillnet off the coast of Ban Pae, Rayong Province, Thailand, 1955.**

Date	Set 1				Set 2			
	Nylon gillnet		Native gillnet		Nylon gillnet		Native gillnet	
	No. of hauls	Total kg.	No. of hauls	Total kg.	No. of hauls	Total kg.	No. of hauls	Total kg.
Jan. 15	2	47	2	21	2	64	—	—
16	2	180	3	117	2	152	3	93
17	2	51	2	41	2	83	—	—
18	2	77	2	34	2	53	3	127
19	2	132	2	76	2	154	2	96
20	2	96	2	38	2	80	2	31
21	2	28	2	28	2	23	2	55
22	—	—	—	—	—	—	3	398
23	2	411	3	226	2	446	3	138
24	2	124	2	101	2	678	2	71
25	2	570	3	175	2	228	3	118
26	2	89	3	64	2	145	3	46
27	2	265	3	100	2	40	3	23
28	2	216	—	—	2	138	—	—
29	2	174	—	—	1	55	—	—
<b>Total</b>	<b>28</b>	<b>2,260</b>	<b>30</b>	<b>1,021</b>	<b>27</b>	<b>2,339</b>	<b>29</b>	<b>1,186</b>
<b>Average</b>	<b>1</b>	<b>80.7</b>	<b>1</b>	<b>34</b>	<b>1</b>	<b>86.6</b>	<b>1</b>	<b>89.2</b>



**TABLE II. Catch made by Nylon gillnet  
off the Coast of Ban Pae, Rayong Province, Thailand, 1955.**

Date	Boat 1		Boat 2		Boat 3	
	No. of Hauls	Total kg.	No. of Hauls	Total kg.	No. of Hauls	Total kg.
Feb. 10	2	113	2	79	1	23
11	1	87	1	71	1	37
12	—	—	—	—	—	—
13	—	—	—	—	—	—
14	2	160	2	152	2	208
15	2	160	2	215	2	293
16	2	244	2	226	2	296
17	2	142	2	115	—	—
18	—	—	—	—	—	—
19	1	45	1	31	—	—
20	2	139	2	169	2	41
21	—	—	—	—	—	—
22	1	74	1	58	2	113
23	1	65	1	58	2	98
24	2	198	2	177	2	186
25	2	189	2	173	2	182
26	1	62	2	57	2	147
27	2	71	2	46	2	85
Total	23	1,749	24	1,627	21	1,709
Average	1	76	1	67.8	1	81.4

Note: — means no fishing on that night.

#### UNITED KINGDOM (HONG KONG)

##### The need for the training of specialized fishing boat architects:

Immediately after the 6th Session of the Indo-Pacific Fisheries Council, Mr. Jan-Olof Traung, Chief of the Fishing Boat Section of FAO, paid a visit to Hong Kong. Mr. Traung kindly produced lines plans for a new Government inshore boat (now constructed) and for a proposed proto-type distant water wooden vessel. Many helpful suggestions were received from Mr. Traung. It was on his advice that a consultant naval architect (Mr. Li Yiu Sing) was engaged to complete the design, and supervise construction, of the new inshore boat. This one small boat, and a pair of 80 ft. wooden hulled ships (built under Government Marine Department supervision for the leading junk trawler fisherman with a loan from the Fish Marketing Organization), were the very first fishing vessels to ever be built in primitive local yards strictly according to plans.

On the recommendation of Mr. Traung, a new post of "Craft Technician" was created in the Department of Agriculture, Fisheries and Forestry. This led to the appointment of a qualified naval architect (Mr. Cheung Wing

Hon), with practical experience in shipbuilding and engineering. This officer has been studying construction methods in a local junk building yard. He has also made a trip in one of a pair of Japanese-type commercial trawlers to study the actual fishing operations, together with the ship's behaviour at sea. South-east of Hainan Island these trawlers were caught in a typhoon and received a severe buffeting which resulted in the Craft Technician being privileged to observe his particular ship under the worst possible conditions.

An interesting paper on "Fishing Junks" was presented to the Engineering Society of Hong Kong by Mr. Stanley S.S. Yuan, a naval architect employed with Messrs. The Hong Kong & Whampoa Dock Co., Ltd. Permission has generously been received for this paper, together with the printed discussion, to be made available to the Indo-Pacific Fisheries Council. Particulars concerning many of the problems to be overcome in Hong Kong and guidance as to their solution, are contained in this literature.

Professional officers of the Marine Department in Hong Kong have given invaluable advice in the design and construction of the three recently completed wooden fishing boats mentioned above. Although hard pressed with

their other normal work, certain of these Marine Department officers have taken a personal interest not only with these particular vessels but in the gradual improvement of the local fishing junks generally.

The larger and more modern Hong Kong shipyards have in recent years received an increasing number of orders for the building of fishing boats, mostly for delivery abroad. Even if no "specialized training" in fishing boat naval architecture has taken place, at least a general interest, and awareness of, the problems peculiar to the requirements of fishing craft, has come into existence.

**Information available from national Meteorological Agencies to be made available to fishermen:**

With effect from the 1st January, 1956, Royal Observatory kindly agreed for the daily weather forecast for the "South China Coastal Waters" to be broadcast in plain voice, immediately after the local forecasts, over the Chinese programme of Radio Hong Kong. The area "South China Coastal Waters" fortunately covers nearly all of the grounds fished by even the largest of the junk-type vessels. This new service was inaugurated especially for the fishing community and is much appreciated.

Other additional weather services provided by the Royal Observatory as from 1st April, 1956, were the introduction of several new visual code signals. These were the "Local Strong Monsoon" signal and an abbreviated form of the "Local Storm Signal Code" (three signals), used on police cruising launches and at supplementary signal stations located at fishing harbours. To provide advance notice of the new services to as many fishermen as possible, the Fisheries Division, in co-operation with the Royal Observatory, had special explanatory posters printed. These were posted up at the Aberdeen Fish Wholesale Market during the time of the Fisheries Exhibition held at Chinese New Year when the fisherfolk congregated together there to celebrate and throughout the three days of the Exhibition a voice recording, explaining the details contained in the posters, was played over the market public address system every two hours.

**Improvement of craft:**

Details of the new inshore fishing boat built for the Department of Agriculture, Fisheries and Forestry are recorded in a separate paper.

The most important development to date has been the completion of two 80 feet wooden hulled trawlers, with a capacity of 177 tons each, built by the leading junk trawler fishermen with a loan from the Fish Marketing Organization. In the distant-water range, these vessels represent the first radical departure from the local type fishing junk. The trawlers were launched in January, 1957 and their operations are being keenly watched by every fisherman in Hong Kong.

Several interesting new trends in fishing junk development have been brought about by the fishermen themselves. Briefly these are as follows:

- (a) An increase in the number of *house boats* on which the non-working members of the fishermen's families are left, so that the operative fishermen may work at sea unrestrictedly in a boat intended solely for fishing.
- (b) A marked tendency for new purse-seine net boats, small long-liners and shrimp trawlers to be built to *larger dimensions* and to be installed with *more powerful engines* than was the case previously. These boats have been going further afield and exploiting fisheries that are new to them. Furthermore, whereas in the earlier sailing days each class of boat pursued only one method of fishing, they are now each employing a variety of different forms of gear.
- (c) A new "*multi-purpose*" class of junk, each about 50 ft. in length overall, has been developed. Built primarily for shrimp beam-trawling, they may also be used for pair-trawling in partnership with another vessel. The most important change in ideas behind these boats is, however, that they may during the short mackerel scad season be used for purse seining operations. A raised bow,

comparatively clear foredecks, and the introduction of a steel rudder in place of the large wooden sailing rudder, are the main new innovations.

- (d) The new Fisheries Division boat was the first small craft, built in a native yard, to have a *wheelhouse*. No less than four local fishermen have already copied the idea and incorporate wheelhouses in their newly built craft.
- (e) The large native-type wooden sailing rudder with its tiller is gradually being replaced by the introduction of small *steel rudders*. Owners of eight mechanized inshore boats have recently fitted *steering wheels* and have adopted the more modern *chain or cable steering* arrangements.

**Fish Finding Equipment:** Experiments have been conducted with a simple under water sound detecting machine, made by one of the leading marine radio engineers. Experienced Yellow Croaker fishermen were favourably impressed and it is considered that the equipment will have a practical application.

**Improvement of Gear:** Since May 1955 the programme of the research vessel ALISTER HARDY has included experiments on the design and construction of an otter trawl suitable for the fishing grounds off Hong Kong, under the supervision of the Government Fishing Master. Much of the time has been spent in training the crew in the use of unfamiliar gear, but several designs of net have been used experimentally, including one which has been worked over grounds too difficult for fishing by the parri-trawl.

The Fishing Master made and perfected a small nylon shrimp otter-trawl for use from the inshore boat "OLENKA", operated by the

Department of Agriculture, Fisheries & Forestry. The same net was then used together with some beam-trawls for comparative trial hauls from the F.R.V. ALISTER HARDY, both forms of gear being towed simultaneously.

No real interest in otter trawling has yet been shown by the local fishermen. As the change-over will have to be encouraged gradually, the Fishing Master designed a "compromise" inshore otter trawl embodying many features of the local native net. This was then made by the Fisheries Division crew, who have taken a close interest in the subsequent fishing operations.

**Correlation of fishing methods and craft design:** Brief mention of the changes now being incorporated in the design of purse seiners, small long-liners and shrimp trawlers, to enable a greater diversity of fishing methods, has been made under the section above dealing with "improvement of craft".

**Exploration for shrimp grounds in off-shore areas:** Although, unfortunately, there have not been indications of any lucrative new "off-shore" shrimp grounds, mention should be made of the increased distances both to the East and West of the Colony now being travelled by Hong Kong-based shrimp trawlers in their fishing operations. This has been rendered necessary by a large increase in the number of shrimp trawling vessels, which, in turn, has resulted in a reduced catch-per-boat from the former nearby grounds.

## UNITED KINGDOM (FEDERATION OF MALAYA)

### Mechanization:

Whilst the structure of the industry has not changed, to any marked extent, as stated above, in so far as the financing of the industry and ownership of craft and gear are concerned the increase in the number of powered boats has continued as is shown in the following table:

	Landings Tons	Number of Fishermen	Number of Gears	Powered Boats	Non-Powered Boats
1949	104,880	71,403	21,139	327	21,793
1954	109,934	49,532	18,654	4,052	17,789
1955	109,422	61,212	17,606	4,550	18,879
1956	111,083	50,690	19,427	5,641	17,730

It will be noticed that while there has been a reduction in the number of non-powered boats and a reduction in the number of fishermen, there has been an increase in the number of gears. This is an indication of the efforts of the Department to diversify the fishing effort of the fishermen in the industry. In the past there has been too much reliance upon a single gear to provide fishermen with their livelihood, but during the past year an attempt has been made, with some success, to persuade the fishermen to own a series of gears, so that they may adapt their efforts to the changing seasons. The number of powered boats is about one-third of the number of non-powered boats, but it must be noted that quite a number of registered boats consist of very small craft operating in estuarine waters in very shallow inshore waters, or are engaged only in part-time fishing and these do not offer a potential for development and mechanization.

Trials started in 1955 with small inboard diesel engines to replace the outboard engine where it is physically possible were brought to a satisfactory conclusion. For the Chinese drift net sampan and kota, the Japanese single cylinder Yanmar engines of 4-6 and 9 H.P. and the English Petter engine, both single cylinder 5 H.P. and twin cylinder 10 H.P. have proved eminently popular, and have been adopted in many parts of the country. For the smaller boat used by the Malays for hand lining, small long-lines or small portable traps, the  $3\frac{1}{2}$  H.P. air-cooled Lister engine has become most

acceptable. Following on the experiments of 1955, the Department continued into 1956, and eventually produced a most satisfactory small craft modelled on the Trengganu sekochi which was cheap to construct and cost approximately \$1 per day to run. This is a tremendous improvement over the outboard engine, and has been taken up in a number of most unexpected places. The most notable of these is Telok Sari on the East Coast of Johore where the Malay people have found this engine highly satisfactory for their purpose, and there is a small fleet of craft at this village all of which are engined by this type. The manufacturers have performed an invaluable service in taking a number of these fishermen in their workshop in Kuala Lumpur, with assistance from R.I.D.A. and this Department, to give them instruction in the care, maintenance and repair of these engines. This is most important since fishermen in remote and out of the way places do not find mechanical workshops to hand in order to service and repair their craft and should prove invaluable. It is anticipated that within the next few years the above types of engines will completely replace the outboard engine, except under special conditions where the outboard engine is particularly useful. Among the bigger boats engines of up to 200 H.P., of the fast revolving type have been installed in some of the purse seine boats, and it is a tribute to the industry that these engines which are beautifully cared for and maintained, in consequence give no trouble.

# REPORT OF THE FOOD TECHNOLOGY PANEL

## PANEL B

BY S. WATARI, CHAIRMAN

### INDIA

Report on the investigations on "Effective Studies on Improvements in Methods of Processing and Storing Dried Fish with Special Reference to Humid Tropical Conditions".

Systematic investigations on this subject had been primarily carried out in Madras, West Bengal, the Central Marine Fisheries Research Station, Mandapam, and the Government of India Deep Sea Fishing Station, Bombay.

#### Madras:

The present status of cured fish as produced under Government supervision in the curing yards as well as under private management, were evaluated. It was found that the fish cured by indigenous curers had a higher moisture content which leads to earlier spoilage. Hence, suggestions were offered for allowable maximum limit of moisture and minimum limit of sodium chloride concentration in the cured products.

Studies were also made on the microbial degradation of salted fish, especially with reference to the 'Pink Eye'. The infection was found to be due to red halophilic bacteria. Presence of magnesium salts, above certain concentrations, encourage the growth of such bacteria. It was also observed that higher relative humidity in the West Coast favoured reddening of salted fish. Many of these red bacteria are obligatory halophiles in character and as such fail to grow in less than 10% salt concentration and require temperatures between 37° to 40°C. Storage at low temperature, use of salt containing 96-98% NaCl and having less than 1% combined calcium and magnesium salts were recommended for curing purposes (1 to 3).

It was found difficult to control the growth of these reddening organisms even by using 10 p.p.m. aureomycin; 0.2% sodium nitrite, however, could arrest the growth of red forms but had no action on the cocci, while 0.2% sodium ricinoleate suppressed the cocci but not the reds (4).

Studies on the proper quality of salts for curing fish are in progress. Crushed salt has been found to be better than large grained or

powdery Tuticorin salts. Experiments are also in progress with respect to Wadala salt having 98% NaCl for curing purposes. Effect of calcium, magnesium and trace metals like copper, iron etc. is also being studied.

#### Bombay:

Various efforts for the improvement of the fish curing industry in the Kanara and Ratnagiri District have been made. Experimental curing is being carried out at Fisheries Department model fish curing sheds, and precise quantities of salt required for curing different varieties of fish in different weathers by different processes to suit requirements of prospective markets, were worked out. A new method of drying fish on raised bamboo platforms has shown that since both the sides of the fish are exposed to hot air, the flesh dried up evenly resulting in a good quality product.

#### West Bengal:

In West Bengal, investigations were carried out on the dehydration of fish by preheated air. The method adopted was to cook the filleted fish, drying the same by preheated air between 60° to 80°C for a period of 4 hours after mincing, the humidity being maintained between 10 to 12%. The product obtained had moisture between 10-12% and could be reconstituted easily. Only lean fish were used for the purpose of drying. Fatty fish could not be successfully dried by the above method. From about 100 lb. of fish, about 9.3 to 14 lb. of dehydrated fish could be obtained. The product was found to contain about 90-93% protein on moisture-free basis.

Effect of storage of this dried product under different temperature conditions and under different atmospheres was also studied. Storage in a carbon dioxide atmosphere at a temperature of 20°C or storage at 0°C, even in the presence of air, was found to give the best results (5).

Fish like skate, shark, Ribbon Fish and Bombay Duck contain relatively large amounts of non-protein nitrogenous compounds including urea and these non-protein compounds appeared to be responsible for the observed undesirable taste in the processed material.

Investigations were carried out to evolve suitable methods for removal of these undesirable compounds from the fish-tissue. Methods tried for removing urea content were (i) by steaming, (ii) by treatment with chemicals, e.g. sodium chloride, sodium bicarbonate or sodium nitrite followed by steaming and (iii) by dehydration with or without pre-steaming. It was noticed that treatment with sodium bicarbonate gave best results as regards removal of urea. About 50% of urea could be removed when shark flesh was treated with 2.0% sodium bicarbonate for about 45 minutes followed by steaming at 2 lb. per sq. inch guage pressure for 45 minutes. Colour of the tissue, however, was found to be changed appreciably and the tissue became soft. Original colour and texture of the tissue could be maintained by treatment with sodium nitrite solution. In this case, reduction of urea content was not great. Steaming alone did not have much influence in reducing the urea.

Dehydration experiments were also carried out with shark flesh. From the results obtained, it appeared that the rate of dehydration maintained a steady state only for a short time and after that it started falling. The time of dehydration could be minimized by about 50% by steaming the tissue prior to drying. The critical moisture content for dehydration appeared to be between 39 and 42% on wet basis. The product became brown when dried at a temperature of 70°C. The urea content of the tissue was not much influenced by the process of dehydration (6).

Regarding storage of dried fish, it was observed that the primary reason for spoilage during storage was the absorption of atmospheric moisture, particularly during the rainy season. The rate of absorption of moisture by the product increased considerably when salt containing calcium and magnesium salts was used for pretreatment. Spoilage through attack of insects also played a prominent part under certain conditions. It appeared that when the product with 8-10% water was stored under a relative humidity of 30%, absorption of moisture could be checked. Alternately, when the product was packed in moisture-proof packing, absorption of moisture could be checked and the product kept better. For controlling the

growth of insects, periodical treatment of storage bins, barrels and godowns with 'Killopter' (a product containing insecticidal, non-harmful solvents) was found to be effective.

#### Central Fisheries Research Station:

At the Central Marine Fisheries Research Station, Mandapam, investigations on the chemical quality of cured fish products from the West Coast of India was carried out. Chief methods of curing in vogue along the South and West Coasts are (1) sun-drying, (2) dry-salting, (3) wet-curing, (4) pit curing and (5) Colombo-type curing. Sun-dried products were found to be highly variable in quality-moisture content varying from 13.8-42.3%; sodium chloride from 0.75 to 10% (occasionally it was as high as 13%). In some of the samples total volatile nitrogen (T.V.N.) was found to be high, indicating a high degree of spoilage. T.V.N. was found to vary from 50 to 300 mg. per 100 gm. of cured fish. In dry cured samples, moisture content varied between 30 to 50% (A single instance of 20% was also recorded). In most of the samples, the moisture level was high and far above the maximum allowable limit. T.V.N. showed a wide range of variation between 25 to 300 mg. per gm. and in exceptional cases going up to 467.5 mg. Sodium chloride concentration varied between 7 to 21%. In wet cured samples, moisture content in some cases was found to be above 50%. Samples were characterized by high salt content (up to 35% on dry basis).

In spite of high salt content, samples collected from the fish curing yards of Bombay showed very high T.V.N. indicating spoilage to certain extent. In pit-cured fish, moisture content was generally above 40%, salt content was also very high and the T.V.N. values were low in most cases. No sample of Colombo-type cured fish could be collected for study.

#### Deep Sea Fishing Station, Rombay:

Investigations on problems relating to the storage of pomfrets and other commercial fishes at different temperatures, and experiments to evolve suitable storage methods to increase the storage life of fish without discolouration up to a storage period of even one year were carried out at the Quick Freezing & Cold Storage Plant, Bombay. Experiments on preserving white pomfrets in ice blocks showed

favourable tests for quality, colour, condition of viscera etc. up to a storage period of 12 weeks.

The use of anti-oxidants indicated that tri-sodium phosphate, ascorbic acid, and ascorbic acid with citric acid were better than other anti-oxidants. Ascorbic acid, although the best, cannot be used due to its high cost. The treatment by tri-sodium phosphate was found to be suitable and cheaper to fish traders.

Even though glazing and reglazing help to retain the moisture content in the fish they do not entirely prevent yellowing. For this purpose some kind of moisture-proof wrapping or container has to be used to prevent excessive dehydration. Experiments on storage under moisture-proof wrapping or container indicated

that after a period of 12 months the fish were in excellent condition with no sign of discolouration and rancidity. In the pomfrets stored in a specially prepared double sack lined internally with a moisture-proof lining (Alkathene-lined Hessian sack), the overall quality was far superior to that of frozen fish stored in a gunny sack which was dipped in water several times during the storage period and those that were quick frozen at -25°F and placed in a gunny sack which was dipped in ice cold water before storage.

The problems relating to blackening of prawns and drying of fish air-bladders are being investigated.

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#### JAPAN

##### Change of the muscle temperature of fish during the course of drying\* :

In the course of outdoor drying, the quality of dried fish products chiefly depends upon environmental conditions, particularly air temperature and solar irradiation has a remarkable effect on the change of muscle temperature of products in drying process.

Because of the paucity of literature in this respect, relation between muscle temperature of fish and meteorological conditions has been examined for the samples of sardine which were prepared by splitting along belly side as done in commercial production. The muscle temperature was found always higher than that of atmospheric temperature, possibly owing to the heat of solar radiation. Therefore, caution must be taken to prevent the rise of temperature of fish for obtaining better quality of dried fish, especially in summer time. (*Bulletin of the Japanese Society of Scientific Fisheries*, Vol. 21, No. 6, 1955).

##### On the denaturation of fish muscle proteins by dehydration\*\* :

Denaturation of muscle proteins during dehydration process of flatfish and squid was studied by following the change of solubility.

In the course of dehydration, pieces of muscles were taken at intervals, extracted, and the salt-extractable proteins (L), the myosins (M), the nonmyosins (N = L-M), and the water-extractable proteins (S) were determined.

Both in muscles of flatfish and of squid, the salt-extractable proteins and the myosins decreased in parallel to the dehydration, but the non-myosins kept a constant level throughout the procedure.

The amount of the water-extractable proteins of flatfish showed no change on dehydration, being almost equal to the non-myosins. In the case of squid, however, the water-extractable proteins which originally amounted to 50% of total proteins, suddenly dropped down to 6-9%, when some 40% of moisture was removed from the muscle.

\* T. Maruichi, Y. Shimazu, and Y. Hino, Shimane Prefectural Fisheries Experimental Station, Japan.

\*\* M. Migita, J. Matsumoto, T. Saishu, Shimane Prefectural Fisheries Experimental Station, Japan.

The streaming bi-refringence which was found in the salt-extracts of flatfish and squid, and in the aqueous extracts of squid, failed to be detected in those of dried muscle, by the apparatus used here, while it was observed in the control groups.

It seems most probable that, on dehydration of muscle of flatfish or squid, the myosins are readily denatured, while albumins remain inactive. (*Bulletin of the Japanese Society of Scientific Fisheries*, Vol. 22, No. 7, 1956).

## THAILAND

### The inspection and the certification on standard and quality of salted fish to be exported from Thailand\*:

1. During March 1955, the Government of Thailand has adopted the resolution that only salted fish on standard and of good quality be exported from Thailand, and has authorized the Fisheries Department to conduct the inspection and the certification.

2. To cope with this policy, the Ministry of Agriculture has issued, on June 29, 1955, orders and regulations regarding this inspection and certification.

3. In this preliminary stage, the inspection and the certification is required only on exported pedah (salted *Rastrelliger*) by sea going vessels. Salted fish shipped by other means of transportation is exempted from inspection.

4. Exporters of pedah must declare whether the product is *On Standard* or *Under Standard*, and whether *Red* (oily) *Pedah* or *White* (Slightly oily) *Pedah*.

5. *Pedah On Standard* requires the following qualifications:

- i) Belonging to either of the following grades:

<i>Grade Special</i>	1,000 fish weigh	40 kg. & upwards
<i>Grade I</i>	1,000 " "	36-39 kg.
<i>Grade II</i>	1,000 " "	31-35 kg.
<i>Grade III</i>	1,000 " "	25-30 kg.
<i>Grade IV</i>	1,000 " "	21-24 kg.
<i>Grade V</i>	1,000 " "	15-20 kg.

- ii) All fish in each lot and each grade are alike in kind, and have fine external condition. It must not

be broken, badly bent, torn and badly ragged. Such fish are allowed not more than 5%.

- iii) Very minimum or no entrails left.
- iv) Dryness is accepted on the condition that no liquid appears when pressing stomach and eyes.
- v) Characteristic odor of pedah. No extraneous odor.

Any *Pedah*, failing to conform to the above requirements, is certified as *Under Standard*.

- vi) *Pedah*, except that of Grade V, must be packed, in layers, in wooden cases. (An empty case with lid, nails and wire must weigh 30-34 kg).

Weight of wooden case, weight of fish, total weight, name of consigner with address and trade mark must be written on each wooden case.

6. The request for inspection before packing the product can be given.

The requirement for the inspection of already packed product is as following:

The minimum is 2 per cent of the total cases, and the maximum is 5 per cent. This percentage of unpacking for inspection stands despite the number of cases is under one hundred. The inspector has authority to unpack for inspection more than 5% of the cases if it seems to him necessary.

7. In recognition of standard and quality of the exported pedah, the Fisheries Department will issue the Certificate of Origin and Quality together With Report on Salted Fish Inspection.

### Remarks:

The inspection and the certification of origin and standard quality of the exported salted *Rastrelliger* have been conducted since 1955. It has proved out to gain the confidence of the importing countries of the satisfactory quality and origin of the exported products, and is evidently instrumental for Thailand to steadily export her salted fish.

\* Boon Indrambarya, Director-General, and Padh Tavaranusorn, Head, Socioeconomics Section, Department of Fisheries, Thailand.



Statistics on the Inspection and the Certification of Origin and Standard Quality of Salted Pedah (*Rastrelliger*) and of under-Standard Pedah (*Rastrelliger*) exported from Thailand in January 1957, conducted by the Department of Fisheries.

Nos. of application for inspection	Amount of exported salted pedah and of under-standard pedah (ton)	Nos. of certificates issued	Destination	Prices (Pound sterling)	Remarks
<i>The inspection and certification in 1955</i>					
310	Salted pedah 4,096.29	305	Indonesia and Indochina	279,620.54	1. The average price of salted pedah is £62-85 per ton.
	Under - standard pedah 321.31	44	Singapore	5,665.51	2. The average price of under - standard pedah is £16-20 per ton.
Total 310	4,417.60	349		285,286.05	
<i>January - December 1956</i>					
680	Salted pedah 16,488.55	772	Indonesia and Singapore	1,098,024.55	1. The average price of salted pedah is £65-85 per ton.
80	Under - standard pedah 529.38	80	Singapore	10,587.60	2. The average price of under - standard pedah is £20 per ton.
Total 760	17,017.93	852		1,108,612.15	
<i>January 1957</i>					
136	Salted pedah 3,223.69	136	Indonesia and Singapore	209,539.85	1. The average price of salted pedah is £65 per ton.
16	Under - standard pedah 42.81	16	Singapore	856.20	2. The average price of under - standard pedah is £20 per ton.
Total 152	3,266.50	152		210,396.05	
<b>Remarks:</b> There are 22 salted fish exporters altogether.					

#### UNITED KINGDOM (FEDERATION OF MALAYA)

##### Fish processing experiments:

Experiments were continued in the production of fishmeal, and a useful small fishmeal plant has been developed which can cope with a maximum of 8 piculs or half a ton of wet fish per day. A number of samples have been analysed and a statement has been produced

of the relative protein contents of fishmeal manufactured from different species of fish. The ultimate adoption by the fishing industry of any fishmeal plant must depend upon the ready availability of the raw material at a cheap price, since the recovery is about 20 per cent. In view of the very high demand for fish of all grades and types in Malaya, it is rarely that glut conditions are such as to permit this to occur.

In addition to ordinary fishmeal an inexpensive method for the production of fish flour was developed. The object of these experiments was to provide a high protein containing flour which would have a long shelf-life when adequately kept, and so be available to peasant people in inland areas where protein is lacking in the diet. From feeding trials on rats carried out at the Institute for Medical Research in Kuala Lumpur, a satisfactory meal was produced. However, it was considered that the microscopic spicules of bone which

were contained in the flour, might have an erosive irritant action on the intestines of small children and babies. While it would be possible by refined techniques to eliminate such potential irritants from the flour, it was decided as a matter of policy not to continue with these experiments, but to concentrate on the production and distribution of fresh fish throughout the country. Not only has the approach to be made through the more effective distribution of sea fish, but also through the promotion of freshwater fisheries.

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## REPORT OF SOCIO-ECONOMICS AND STATISTICS PANEL PANEL C

BY N. OKA, CHAIRMAN

This report has been prepared on the basis of the contributed papers submitted by the Governments of the following nine countries: Burma, Ceylon, India, Indonesia, Japan, Pakistan, Philippines, Thailand and U.K. (A note on "Fish Marketing System in U.S.A." is appended). Relevant information from U.K. (Hong Kong) is contained in WP 4, pages 34-36.

No contribution was available from other Governments.

The Council resolved at the 6th Session that the work specified at the 5th Session should be a continuous assignment of the Panel during the ensuing period as follows:

- i. Advances in the collection of adequate fisheries statistics, including sampling survey methods in the production phase.
- ii. Socio-economic problems affecting the production, processing and distribution of fisheries products; their solution.
- iii. Advances in the development of fish marketing and distribution; development of consumption of fisheries products to improve nutrition; the effect of consumer tastes for non-customary products and means of influencing them.
- iv. Development of fishery extension services (i.e. the extension of scientific knowledge to the level of the fishermen and fish-farmer).
- v. Significance of fish-culture as an integral part of rural economy.

And it was also decided that the following aspects of the above assignments should receive special attention during the period between the 6th and 7th Sessions:

- (a) Economic aspects of fish processing.
- (b) Retail trade in fish products.
- (c) Trade in fish and fish products between the countries of the Region.
- (d) Income-generating effects of fishing industry.
- (e) Industrial relations in fishing industry.

(f) Economic aspects of air transportation of fish.

(g) Economic aspects of refrigeration.

It was again pointed out that the study of distribution should also cover economic aspects of storage and transportation.

This means that the special attention of our Panel after the 6th Session has been called to the economic aspects of processing, retail trade, international trade, fishing family's income, industrial relations, air transportation and refrigeration, etc. which were formerly let go unchallenged.

According to the information received from the nine countries, except for the economic aspects of refrigeration, processing and marketing, the attention of the Governments has not been sufficiently called yet to these aspects and no remarkable results of improvement are reported.

Continuous efforts have been made by the Governments during the ensuing period for the improvement of statistics and survey, the enforcement of fisheries development programme, the betterment of fishing boats and gear (especially the powering of small boats), the improvement of facilities and system in distribution aspects, the active guidance and assistance for co-operative activities, etc. To this end, the Governments have encouraged the education of fishermen and granted subsidies.

Fisheries in the Indo-Pacific region are generally of small-sized enterprise and are not sufficiently industrialized. The same can be said on the fish culture industry in inland waters. Accordingly, the volume of international trade of fish and fish products is very small and it is very difficult to make available quantitative industrial relations in fishing industry as well as quantitative changes in fisheries income, which can be made available only after untiring training in book-keeping and entry. But there is no doubt that a gradual decrease is seen in the quantity of home production of aquatic products and a gradual increase in the quantity bought through wages by labour (including lay system).

The outline of the development of economic aspects of fisheries made by the nine Governments between the 6th and the 7th Sessions of the Council is described below. The degree of these developments in these countries may not be treated equally and its direction may differ to some extent, because of the difference in their socio-economic background and natural environment, which are most important factors.

1. **Advances in the collection of adequate fisheries statistics, including sampling survey methods in the production phase.**

## **BURMA**

According to the report submitted at the 6th Session, the collection of statistics was made dividing into open fisheries and leased fisheries, and the annual production and its disposition were roughly estimated by district revenue officers. But afterward a new fisheries programme has been established and special statistics have come to be collected from the districts where the new system is enforced.

## **CEYLON**

A pilot sampling scheme has been evolved on the method of random sampling. It is proposed to implement the scheme practically at the earliest possible date. If the scheme proposed proves to be a success, it will enable them to collect comprehensive information on all aspects of fisheries statistics in Ceylon.

- i. Essential data on fish production is collected regionally for the whole island. These figures are being collected on the basis of total enumeration by Inspectors posted in different regions.
- ii. Figures of total active adult fishermen are also being compiled by the Fisheries Department.
- iii. The present statistical system provides no adequate basis for one to arrive at an estimate of catch per unit of effort in respect of total production. However, the pilot sampling scheme that has been evolved will certainly enable computation of catch per unit of effort in respect of total production.

## **INDIA**

Statistical services relating to fisheries have been substantially strengthened in recent years. Many of the states of India collect regular statistics of fish production and trade but these principally relate to marketable surplus and not to catches actually obtained or landed. A notable exception is the State of Madras where marine fishery statistics have been regularly collected through the agency of fish curing yards. Based on the data from curing yards figures of fish landings in the Madras State since 1935 to 1950 have been recently published.

To estimate the production of sea fish in the country as a whole a sampling system was developed by the Central Marine Fisheries Station at Mandapam on the basis of which the catches in each sector of the Indian coast are reported regularly. Fairly detailed figures of sea fish production showing break up of species and time of the year are now available from 1950 onwards. In this statistical survey a boat-net combination is taken as a sampling unit. Recently, the statistical staff for sampling and estimating production has been greatly expanded, thereby reducing the errors in estimates. Test surveys in a very detailed manner have been conducted in certain sectors of the coast to compare the production figures arrived at by complete enumeration and by sampling.

As regards inland fisheries the position is particularly difficult owing to the highly diffuse nature of the production centres. A fishery statistical survey on the pattern of the marine survey is now being organised and it is proposed to put this into regular operation for the major river systems of India from July 1957. Surveys of cultured and culturable waters have been completed for most of the States. Similarly, fishing units in inland areas are being accurately ascertained. By combining these with a sampling system for inland fisheries it is hoped that statistics of fresh water and estuarine fisheries will be gathered in a continuing basis.

A pilot scheme for detailed statistics of production of fish in the Chilka lake has recently been started but the work is in combination with an intensive biological study relating to the conservation of fish stocks.

The National Sample Survey of India propose to undertake pilot investigations on the socio-economic conditions of the fishing industry. The Bombay state is proposing to initiate a statistical study of fishing operations based on indigenous gear as compared with mechanized operations.

As fishery development is taking place on many aspects it is necessary to evolve suitable yardsticks to measure the application and results of development programmes. This is a particularly difficult task but efforts are being made to resolve developmental projects and their results in terms of comparable units.

## INDONESIA

There is only poor progress in the collection of adequate fisheries statistics, due to lack of fisheries statisticians and difficulties in the collection of data caused by too few workers and a very long coast line with widespread landing places.

The Inland Fishery Service has held two courses in 1955-1956 specially for statistical purposes for the inland fishery while the Sea Fishery Service has made some amendments in statistical forms.

In order to obtain and to plan a better and suitable system in the collection of adequate fisheries statistics the National IPFC Committee has proposed to the Minister of Agriculture to nominate at least one qualified fishery statistician to the Central Office of Statistics.

## JAPAN

Basic statistics of Japanese fisheries have been compiled since 1947 chiefly by the Statistics and Investigation Division of the Ministry of Agriculture and Forestry (S.I.D.) and its subordinate offices, and the figures thus obtained have been revised or supplemented by the statistics compiled by the Fisheries Agency and other agencies. Such practice has been established under the necessity of separating the statistics compilation from the fisheries administration, and to economize the administrative expenditures through the common utilization of labour and facilities with the agency of agricultural statistics.

The items of fisheries statistics which are compiled monthly, yearly or periodically are as follows:

- (A) **Production or catches of all countries** (by S.I.D. offices):
  - (a) Sea fisheries: monthly, by types of fisheries (38 types), by tonnage of boats (12 grades) and by species of fish (94 species), the number of trips and catches are enumerated.
  - (b) Shallow-sea fish culture industry: monthly, by kinds of industry (species), the number of facilities and catches are enumerated.
  - (c) Aquatic products processing: yearly,
  - (d) Inland fisheries: yearly,
  - (e) Freshwater fish culture: yearly,
  - (f) Paddy-field fish culture: yearly, by species or by products, the quantities of production and the number of operators are enumerated.
- (B) **Market prices:**
  - (a) Six major cities: monthly (by regional public bodies),
  - (b) Markets of producing centers: monthly (by S.I.D. offices), the quantities of products and catches and their prices by species are enumerated.
- (C) **Fisheries trade returns:** monthly,
  - (a) Exports (by Ministry of Finance),
  - (b) Imports (by Ministry of Finance), the quantities and value by species are enumerated.
- (D) **Managements of fisheries (736)** (by S.I.D. offices):
 

yearly and quarterly, the cash, incomings and outgoings in kind, household expenses, prices, assets and liabilities of fisheries managements are enumerated.
- (E) **Consumption of fuel oils** (by S.I.D. offices):
 

by types of fisheries, monthly, the consumed quantities of heavy oil, gasoline, and kerosene are enumerated.
- (F) **Fishing boats** (by Fisheries Agency): yearly,
 

by types of vessel (wooden and iron), by types of engine and by grades of tonnage, the number of vessels and their tonnage are enumerated.

- (G) **Fishing ports** (by Fisheries Agency):  
by types of port, yearly, the number of fishing boats coming in and out and their landings of catch are enumerated.
- (H) **Ice making and refrigerating plants** (by Fisheries Agency):  
the locality, capacity, ownership and stocking of plants are enumerated yearly.
- (I) **Fishing boats insurance** (by Fisheries Agency):  
yearly, the effects of insurance, payment of insurance money, etc. are enumerated.
- (J) **Fisheries Cooperatives** (by Fisheries Agency):  
yearly, the number of members, capitalization, results of business, etc. are enumerated.
- (K) **Fisheries Census** (by S.I.D. offices):  
every 5 years, the scale of fisheries management, organization, number of fisheries managements, fishing labour, number of fishing boats used, fishing days, outfits of fishing boats, side-works, fishing households, employment, production, value, etc. are enumerated.
- (L) **Dynamic statistics on fisheries** (by S.I.D. offices):  
yearly, as a supplementary survey of the Census, the organization of fisheries managements, tonnage of fishing boats, types of fisheries, number of managements, etc. are enumerated.

From among the items of fisheries statistics mentioned above, the following *five new items*, which have been inaugurated recently, are taken out, and their purport is briefly described below:

(a) **Statistics on fish market price at producing centres:**

The statistical research of ordinary fish price in producing centers which was formerly carried on by the Fisheries Agency has recently been switched over to the Statistics and Investigation Office. The statistics are taken, in the survey of landings, by the tabulation of the total amount of selling prices and sales at the producing centers.

(b) **Statistics on fisheries managements of medium scale:**

This statistical research has also been taken over by the Statistics and Investigation Office recently from the Fisheries Agency.

Fisheries managements of medium scale have less common statistical factors among themselves than fishing families of small scale. Therefore the ordinary way of compilation of statistics may not be adequate to show a general aspect of the status of the management of this type. But this statistical research furnishes us with necessary data to know the actual conditions of the activities.

(c) **Statistics on ice-making and refrigerating plants:**

In addition to the yearly preparation of lists of refrigerators and the monthly survey of total stock of fish held in the refrigerators, statistics were taken in 1956 on the facilities of refrigerating plants, their capitalization, organization, status of management, operation of fisheries, competition among refrigerators, etc.

(d) **Statistics on fisheries cooperatives:**

Taking out 4,000 fisheries cooperatives, detailed surveys were made on the amount of their capitalization, membership, amount of catch handled, etc. On the basis of such statistics, the following matters have been clarified:

- i. How the postwar fisheries management has been tied up through the organization of cooperatives.
- ii. How the financial aid of the Government has been utilized by managements of various types through cooperatives.
- iii. What important roles cooperatives have been playing in the fisheries of Japan.

(e) **Dynamic statistics on fisheries:**

As the Fisheries Census is conducted once in 5 years, the changes in the interim years are clarified by this yearly dynamic statistical research. After the Fisheries Census in 1949, vicissitudes have been observed in the yearly status of many managements.

## PAKISTAN

The Central Fisheries Department with Headquarters at Karachi is confining its activities to the marine fisheries only. With the creation of East Pakistan Wing of Central Fisheries Department at Chittagong and the opening of Mekran Coast Fish Development Scheme with Headquarters at Pasni the long-felt difficulty of collecting statistics from those areas will be solved. The Survey and Statistics Branch of the Central Fisheries Department is, therefore, collecting marine fisheries statistics of Karachi area only for the present.

With a view to having accurate and adequate fisheries statistics, FAO nomenclature was adopted. The record of the fishing, processing and marketing units have been defined and marked. After preparing inventory of such units, statistical survey to record the detailed study of the units has been taken up in the fishing settlement of Karachi Administration Area. The inter-relation of these units has been studied with special attention to the factors of production e.g. craft, gear and manpower and finance. Data on the production of fish by species have also been collected from the fishing centers of the area and the seasonal variation of catch has been recorded. With respect to manpower the data on adult fishermen engaged in various phases of the industry have been collected while the data on craft has been split up into operative and non-operative boats. While in the utilization phase, various channels of distribution e.g. fresh consumption, curing, by-products and finally exports are being studied.

## PHILIPPINES

The National Economic Council (NEC) of the Philippines, which is charged with the over-all planning and programming of the various economic development projects, has requested the Bureau of Fisheries to submit a plan for an expanded section on statistics.

The NEC will finance such expansion along with other statistics collecting agencies of the Government.

In compliance with this request the Bureau of Fisheries is submitting a program which would initially require an appropriation of sixty thousand pesos (P 60,000.00). Under this plan no increase of the present staff on

statistics is contemplated. Instead, the Bureau of Fisheries will enlist the services of school teachers in at least six hundred and fifty (650) municipalities where fishery activities are fairly important. These teachers will be employed on part-time basis in gathering the necessary information on fishery and related industries in their respective areas. A set of instructions and forms are now being prepared which will simplify and standardize the gathering of information and data.

Part of the money being requested from NEC will be used for the purchase of some office equipment like calculators to speed up the analysis of the data as they come from the different provinces.

It is expected that with this plan enough reliable data would be gathered to give the Bureau of Fisheries and the NEC a real working basis for fisheries development programming for the Philippines.

## THAILAND

With a well-organized marketing system and the enforcement of inspection of exported fisheries products, systematic collection of statistics has been attained.

Statistics are collected on wholesale and retail prices of fish, fresh and processed, and tabulated into bi-weekly tables. Information on daily prices of fish have been disseminated through the Thai Radio Broadcasting Service by the good offices of the Bangkok Wholesale Fish Market Organization. In addition, tables on retail prices of fresh fish at retail markets in Bangkok (capital of Thailand) have been continuously published in the bi-weekly Fishery Leaflets.

## U.K. (Hong Kong)

Since all species of fish are handled by the fish market under the control of the Government, detailed figures of landings, value, etc. are made available through the market. Through the net work of various societies which are under active guidance and assistance of the Government, the collection of statistics on the number of fishermen, fisheries operators, fishing craft, etc. has come to be conducted successfully.

## 2. Intensification of investigation in the economic and social aspects of fisheries.

### BURMA and CEYLON

In Burma and Ceylon there are under way general fisheries investigations necessary for formulating a fisheries improvement plan.

### INDIA

Patiala and East Punjab have taken up estimation of the fishing population, total catches, types of fishing gear, wholesale and retail price of fish. Saurashtra has taken up similar studies. Uttar Pradesh has intensified collection of statistics regarding fry and fingerlings and yield from Government water areas. In Hyderabad, the Indian Council of Agriculture Research has sanctioned a pilot survey scheme for inland fisheries. In Madras, fisheries statistics continue to be collected through the fish curing yard staff and publications are available up to 1949-50. In addition, provision has been made for developing the technique of collecting marine statistics with the assistance of the Indian Council of Agriculture Research. In Orissa, detailed survey has been conducted on the fisheries and fishing population of the Chilka Lake and the Mahanadi estuary. A pilot scheme for improving the technique of collection of both marine and inland statistics is under consideration. Madhya Bharat has taken up survey of culturable waters as to their suitability, ownership, etc. Generally, although the activity in these directions is by no means adequate, there has been much intensification of investigations into the economic and social aspects of fisheries.

### INDONESIA

The Indonesian Government has given very great and serious attention to socio-economic problems affecting the production, processing and distribution of fisheries products.

The Sea Fisheries Service has set up a marketing investigation division while the Inland Fisheries Service have a socio-economic division especially to observe and to study all these problems.

### JAPAN

New researches of fisheries economy have been conducted by various exports entrusted by the Government. Their subjects are exclusively concerned with the fisheries of Japan. The important subjects are as follows :

#### (a) Study on changes in the structure of postwar fisheries production :

This study has been entrusted by the Fisheries Agency to the Society of Fisheries Research. The Society, under the guidance of Dr. Kondo, Professor of Tokyo University, has worked in co-operation with officials of the Fisheries Agency and professors of several Universities.

The contents of the work consists of fishermen, movement of fishery workers, changes in production power, changes in working class relations, changes in distribution structure, etc.

#### (b) Quantitative study on fisheries Production structure :

This study has also been entrusted by the Fisheries Agency to the Society of Fisheries Research. It includes the structure of production (organization, character and productivity of fishing fleet and labour power). The results of this study will endorse the study of the preceding paragraph.

#### (c) Statistical research on the structure of fisheries products trade :

This is a positive research of the theory of trade and doctrines of business conditions of fisheries products. Being entrusted to the Society of Fisheries Research, the research work is under way through the co-operation of its researchers and officials of the Fisheries Agency.

#### (d) Study on the character of smaller capital in fishing industry :

The development of fisheries of medium and small capital in Misaki fishing port and the foundation of problems with which the smaller fishermen there have been confronted after the war are now under study by the Society of Fisheries Research entrusted by the Fisheries Agency and under the guidance of Dr. T. Yamanaka.

#### (e) Study on the economical functions of fishing ports :

This study has been conducted by Prof. D. Ito of the Society of Fisheries Research as leader. The subjects include general characters of fishing ports, differentiations of their function, development of financial policy for construction and equipment, and conditions.



**(f) Study on fisheries co-operatives :**

In this study system of fisheries co-operatives, changes in fisheries structure of various fishing places types of co-operatives and their characters, future courses, etc. are included. Being entrusted by the Fisheries Agency, the Society of Fisheries Research has carried out the research with Prof. K. Isobe as leader.

**(g) Economic-geographical study on coastal fisheries :**

In a study conducted by Prof. K. Iisuka as leader the economical structure of coastal fishing villages has been clarified, and criticism has been offered on the present fisheries administration as well as on the general public views of fisheries.

**(h) Study on fishermen's movement :**

This is an objective and positive study of the movement of fishing people in the development of fisheries economics since the beginning of the 20th century. Prof. K. Oshima is the leader of this economical research.

**(i) Study relating to changes in fisheries labour market :**

The changes in fisheries labour market has been studied by Prof. K. Asada clarifying various types of labour formation and rules of their interchange and turnover.

**(j) Basic study on the distribution of fisheries products :**

This basic study conducted by the Data and Statistics Section, Fisheries Agency, includes subjects relating to the market organization in producing centers, the functions and actual conditions of storing, transport and processing facilities and the changes in prices.

**(k) Basic study on fishing labour :**

The actual conditions of labour formation and employment, employment terms, wages and livelihood have been studied by the Data and Statistics Section, Fisheries Agency.

**PAKISTAN**

The West Pakistan Government has undertaken investigations relating to general conditions of fisheries, and specific investigations have been made in Karachi district, which are of use for the improved distribution of fisheries products.

The data of import and export of fish and fish products to and from Pakistan is being collected, compiled and analysed. The data for quantity and value is maintained in commodity-cum-country-cum-monthly basis from both the wings of Pakistan separately. The export items of international trade being analysed regularly to record increase or decrease with respect to the last year. The data on external trade is being maintained and studied for promotion of trade and market studies have been made from time to time.

**PHILIPPINES**

Effective investigations have been made for the purpose of establishing a fish marketing system and adjusting fisheries conflicts between trawl operators and local subsistence fishermen.

**THAILAND**

The survey of pla-tu salting industry and study and survey for expansion of internal markets for fresh sea fish have been commenced by the Government as follows:

**a. Survey of Pla-tu Salting Industry :**

Department of Fisheries is now implementing the survey on pla-tu salting industry in the provinces of Smutsarkorn, Chumporn and Choburi where this phase of processing is predominant. The objectives of the survey are five-fold.

- (i) To know the investment of the business.
- (ii) To know the potential output of the respective plants.
- (iii) To be more aware of how to make salted pla-tu of good quality.
- (iv) To know the minimum price of salted pla-tu which meets its cost.
- (v) Using the information in item to estimate the minimum price of the exported salted pla-tu.

Through the cooperation of personnel from ICA, FAO, National Economics Council, Kasetsart University, Fisheries Director and Chief of Socio-economics Sections as secretary, a questionnaire on pla-tu salting industry in both English and Thai was drawn up after 7 heavy discussions and one pre-test at Smutsakorn.

Enumerations were made in each of the 3 provinces since late October, 1956. Salted fish plants (samples) in Chumporn visited by enumerators were 79 out of the existing 128, equivalent to 58.1%; in Smutsarkorn 117 out of 185 = 63.3%; and in Choburi 53 out of 95 = 56.8%. Since the middle of December 1956, the collected data have been compiled and tabulated for the benefit of analysing purpose. (See Questionnaire III).

**b. Study and survey for expansion of internal markets for fresh sea fish:**

The idea of the study and the survey is to find ways and means to ship more fresh sea fish at inexpensive cost of transportation to the North and North-East of Thailand where fish food is scarce, and also try to keep the retail prices reasonable for consumers.

Since early 1955, the Socio-economics Section has, with the support of ICA, carried out investigations with the purpose of expanding the internal markets for fresh sea fish. From a few trips to the North and North-East of Thailand, the Section has compiled a substantial amount of information regarding volume of fish transported to the different places of interest, prices as compared with those in Bangkok, price spread and just prices (retail) at the points of survey, availability of ice, prices of ice, transportation facilities, type of containers, etc. Some work was done on the construction of insulating containers with the objective of curtailing the amount of ice needed for the transportation of fresh sea fish. Some tests were carried out to ascertain the amount of ice used for the different keeping times. Some actual shipments of fresh fish in insulating containers will be tried in the first quarter of 1957.

**U.K.**

**A. Hong Kong:**

A field survey designed to obtain data concerning the economic and social background of the fishing industry, was carried out by forty undergraduates of the Hong Kong University in December, 1956. Some four hundred fisherfolk were interviewed. Analysis of the information collected will take time and, although a full report will not be available until the summer of 1957, a preliminary report is expected early in the year. The survey was

organized by, and under the control of, Mr. E.F. Szczepanik who has been in close contact with FAO and the Indo-Pacific Fisheries Council. Funds were provided by Government and every possible assistance was rendered by the Co-operative and Marketing Department and by the Department of Agriculture, Fisheries and Forestry.

**B. Penang:**

An excellent diagnostic survey of wholesale and retail fish marketing was made in Georgetown, Penang.

**Remarks:** It is noted that the following publications are most valuable contributions to be distributed at the Panel Meetings.

- (i) Questionnaire on pla-tu salting, by Department of Fisheries, Thailand.
- (ii) Annual Departmental Report, by Registrator of Co-operative Society and Director of Marketing, Hong Kong.
- (iii) Report on diagnostic survey of wholesale and retail fishing marketing in Georgetown, Penang.

**3. Advances in development of marketing and distribution with special reference to increased consumption; the effect of consumer tastes and the means of influencing them.**

**BURMA**

The Government of Burma has taken an action of marketing the products through the agents selected by the fishermen themselves and under the supervision of the Division of Fisheries, Agricultural and Rural Department Corporation to protect the fishermen's interest.

**CEYLON**

**Cooperative fish sales Union:**

The proper development of cooperative societies has to ensure proper marketing facilities for the members. During the war period the Department of Fisheries purchased fish and retailed fish as an emergency measure. On cessation of emergency conditions purchase of fish was abandoned, though sales necessarily had to continue in order to dispose of the fish caught in Government trawlers. In 1951 an

organization called the Ceylon Cooperative Fish Sales Union was set up. All registered co-operative Fisheries Societies were eligible for membership. The constitution of the Union called for the appointment of a Managing Board consisting of 9, 5 of whom were elected by the members at their annual Sessions. In order to strengthen the working of the Union the Registrar of Cooperative Societies nominates the remaining 4 members.

The 4 nominated members were generally members of the Cooperative and Fisheries Departments; for day-to-day work the Board of Directors appointed from amongst the Board a Working Committee of 5, 3 of whom form a quorum.

Government assistance was given to the Board by

- (i) a cash loan of Rs. 400,000/- to the Union (this was repaid within 2 years).
- (ii) Facilities for storage of fish at a nominal rate of Rs. 1/- per lb. the Department had leased a part of a cold storage plant owned and operated by the Admiralty. About 80% of this space was given over to the Union.
- (iii) Technical assistance by members of the Fisheries & Cooperative Departments.

The Union was extremely successful in the first three years of its operation.

The total profit in this period was over Rs. 200,000/-. Subsequent to this the Union entered into a contract to purchase fish from a joint Ceylon Japan Fishing Company operating from Ceylon with disastrous results. The entire profit was wiped out and the working of the last year might result in a loss.

The Union gives guaranteed prices to the member societies. The procedure was for societies to purchase fish from its members, clean and pack the fish and consign the fish to the Union. The Union revised its prices monthly depending on the particular fishing season, but the prices were always notified about one week in advance of the days it was to come into operation. Retail sales were conducted by the Union through fish stalls and agents. The system of purchasing fish at fixed prices had followed from the practice followed

by the Union in purchasing fish from Government at fixed prices. There is now a suggestion that the Union act only as a commission agent, selling the fish of member societies at the best available price, retaining a percentage for working expense and remitting the balance to the society. This would be possible since the Union would no longer attempt to subsidise the customers as happened in the past. Up to now the stalls operated by the Union were really "fair priced stalls" where during the off season when fish was scarce, fish at the depots maintained by the Union was sold at prices lower than the current market prices. However, during the fishing season the Union found it difficult to sell at market prices and at the same time give a guaranteed price to the fishermen. The Union lost on both transactions. During the off season the Union often sold fish below prevailing market rates and during the fishing season fish had often to be sold at prices lower than that paid to the members. Sales on the basis of a commission would shortly be introduced.

#### Cold storage

One reason for the violent fluctuation in the price of fish was the absence of adequate storage facilities. A good proportion of the fish caught in Ceylon is sent to Colombo. Some of it is repacked and sent to the consuming centres. Some fish is also sent direct to consuming centres from fishing villages. However, the price at Colombo is the factor affecting the industry.

Due to inadequate storage the fish sent to the markets have to be sold the same day or the next day. It might so happen that the price of a particular variety of fish might be Rs. 1/50 per lb. on one day and be Rs. 3/10 the very next day. In order to attempt to smoothen out this fluctuation it was decided to build a cold storage plant. The machinery for the cold storage plant and by products factory valued at about Rs. 1,250,000/- was gifted by Canada under the Technical Assistance Scheme. It is, however, not proposed to freeze the fish brought in by indigenous craft. A greater percentage of this fish is not fit for freezing since it is often iced 8-10 hours after capture. As an ancillary to the cold storage section tanks have been erected, through which chilled brine (at about 30 to 32° F.) would be circulated.

Experiments conducted in Ceylon have revealed that fish can be maintained in reasonably good condition for about 6 days—at least in a better condition than the fish one finds exposed for sale in the market. (Experiments are also being conducted with the use of acronize in the chilled brine). The fish caught in Government owned and privately owned trawlers would be frozen at the plant and stored. The present storage rooms in use were unsatisfactory which meant that fish brought in by trawlers had to be disposed of within 3 weeks. This fish is landed in excellent condition and is suitable for freezing but proper facilities were not available. The plant which is due to commence operations in May 1957 is capable of quick freezing 15 tons of fish per day at a temperature of about  $-5^{\circ}\text{F.}$  to  $5^{\circ}\text{F.}$

Further advances in the development of marketing are:

- (i) The establishment of 3 ice making plants each with a capacity of 5 tons per day.
- (ii) The acquisition of land for beaching boats close to the auction sites.
- (iii) The construction of auction sheds where fishermen could sell their fish.
- (iv) The provision of roads where no roads existed and the improvement of roads which could take only bullock cart traffic to a stage where small lorries could use them. This is a continuous programme and Government has spent about Rs. 300,000 annually from 1957 the allocation for this service is being increased to 500,000/-.

## INDIA

The purchasing power for fish and fish products continued to be good and, in general, the demand for fish far exceeded the supply in almost every State. The road building programme has in many cases coincided with creating approach roads to fishing areas as a result of which fresh fish is coming to the market in increasing quantities. The biggest drawback has continued to be one of refrigeration, salting being found unsuitable for many of the large sized estuarine fish. Consumers' tastes have preferred fresh fish and bulk of the fish is therefore marketed in the fresh condi-

tion, iced fish coming next in order. The progress in developing marketing and distribution has been scattered and slow, most of the State Fisheries Departments having no equipment for the purpose. Saurashtra has created a central cooperative fish and fishery products marketing association with a capital of Rs. 5 lakhs. Travancore-Cochin intends to construct a number of cold storages and ice plants and work has commenced. Madras runs a number of specially constructed vans to transport fish to markets. It also continues to run the 73 fish curing yards, providing salt of good quality. In Orissa, apart from increasing the production of ice for the Chilka Lake, a two-ton ice plant received from TCA is operating in the Mahanadi estuary and a large number of vans are now marketing fish from the area, including insulated vans of the Department. Operations have been extended to the Dhamra estuary, another large fish producing centre, with insulated vans and carrier launches. This area suffers from want of ice on the spot which is a big factor of loss. A cold store is under erection in the Chilka Lake. There is a great need to have insulated railway vans and a few more ice factories all over India to improve marketing.

### (1) Economic aspects of fish processing:

The recent trend has been for marketing of fresh fish in ice and a number of ice factories have been newly established. The bulk of the marine catch however continues to be processed in the fish curing yards where cheap salt is made available. The fish curing yards have been taken over by the Fishermen's Cooperatives. Experiments are being conducted in the Technological Laboratory, Orissa, on freezing of fish but the cost of electricity being high it is not likely that this will be economical. Frozen prawns are being exported from the West Coast to about 200,000 pounds annually. Economics of salting have been studied in Madras where 200,000 tons of fish valued at about Rs. 3 crores (1 crore is equal to 10 million) out of which 40% are salted in 73 fish curing yards. Ice sells at Rs. 80/- to Rs. 100/- per ton and the quantity being very insufficient, salt is used extensively instead.

### (2) Retail trade of fish products:

The fish products continue to be dealt with through a large number of middlemen, none of whom are too prosperous. The forma-

tion of fishermen's cooperatives has eliminated middlemen to some extent but most of the cooperatives suffer from middlemen being in the management. This aspect is being studied in detail by all the State Governments, and attempts are being made to have consumers' cooperatives for retail sale.

**(3) International trade in fish products:**

It has not been possible to collect exact statistics. The prawn sales in Burma have revived and the exports of dry fish are continuing.

**(4) Economic aspects of air transport of fish:**

Experiments were conducted in Orissa to transport fish by air from the Chandbali area to Calcutta but the cost was prohibitive and this has been discontinued. Large quantities of spawn is however being transported by air from Calcutta to various States sponsored by the Central Fisheries.

**(5) Economic aspects of refrigeration:**

Packing in ice has been found to be the main means when fish is not stored in cold storages for any appreciable length of time. Cost of ice is however more than in other countries and efforts have to be made to make ice more cheaply available on fishing grounds.

## INDONESIA

No desirable and important changes and improvements in marketing system can be ascertained in these two years. Ambon is planning to establish an auction place but owing to financial problems there are some difficulties in the execution of this plan.

The fishermen's community development plan at Kotabaru (Kalimantan) inaugurated in 1956 includes provision of processing and ice-making facilities.

**(1) Economic aspect of fish processing:**

Fish processing plays a very important role in Indonesia from the point of view of increasing fish production and distribution.

The processing of fish is still done in primitive ways so that measures should be taken for improvement in processing and keeping quality.

Lack of several important factors, such as transportation facilities, adequate salt stock, capital, etc., form a great handicap for the improvement of processing and distribution.

**(2) Retail trade in fish products:**

The retail prices of salted fish are considered very high in the consuming areas in comparison with fresh fish prices in the production areas.

The high prices are caused by too many links in the business sector and a rather low quality of the fish product while the fish business is entirely within the influence and under control of big fish traders.

**(3) International trade in fish products:**

Indonesia is one of the big fish importing countries in the region, especially in salted fish originating from Thailand, Hong Kong and other adjacent countries.

There is a very brisk trade between these countries and Indonesia, which imports more than 50,000 tons of fish annually in her effort to minimize the big shortage of fish.

Canned fish is also popular in Indonesia and a great deal is imported from Japan, Hong Kong and Singapore.

On the contrary, Indonesia also exports sea products to various countries and fresh fish to Malaya and Singapore.

However, the volume of export is smaller than the import.

It is the policy of the Government to import fish directly from the producing country, while before the war nearly all the fish was imported from the transit port, Singapore.

**(4) Economic aspects of air transport of fish:**

Due to the high air transport tariffs and expenses from the commercial point of view, air transport for the time being is in Indonesia not economical.

The expenses of air transportation are usually higher than the price of fresh fish giving a rather bad effect to this system of transportation. Air transportation of fish fry for experimental purposes has been done in the country.

**(5) Economic aspects of refrigeration:**

Refrigeration of fresh fish and fish products is still unfamiliar in Indonesia. To keep

the quality of fish for two or three days, fresh fish are iced in baskets or other containers.

The high costs of refrigeration (factory, equipment, other expenditures) and small scale of catch for the time being are the main reasons which makes the setting up of refrigeration plants not justified economically.

## JAPAN

(1) The recent evolution in the living mode of Japanese people has brought on a change in their choice or preference of sea food. With the recent tendency of concentrating fish landings in large landing places, changes can be seen in the size and operation of such facilities as equipped for refrigeration, processing, marketing and distribution of catches.

Meanwhile there are some fishing villages where the old distribution system still survives. In farming villages at large the consumption of processed fisheries products is on the increase, while there is insufficient supply of fresh fish and shellfish. In short, there are great regional differences in the modes and quantities of consumption of fisheries products throughout the country.

(2) The amount for trade in the total fisheries production is very small, but it is growing larger in some degree these days. Former statistics show that foreign trade in fisheries products is subject to sharp fluctuations with changes of the world economy and the trade policy of countries as well as competitive situations of the world market.

### Fish marketing expansion programmes:

#### 1. Revision to the Central Wholesale Market Law.

As stated in the Report made by Professor Szczepanik, the markets in Japan are classified into two categories: market at producing centers and markets at consuming centers. An overwhelming majority of the total fish production is marketed through the markets in six big cities (Tokyo, Yokohama, Nagoya, Kyoto, Osaka, and Kobe). Markets in 13 consuming centers including the above six cities were all established in accordance with the Central Wholesale Market Law enacted in 1923. This Law remained unrevised for more than 30 years. During this period fresh foods handled at these central wholesale markets have been doubled. The main function of

such markets has been shifted from that as markets at the consuming centers to that as markets at collecting and distributing centers. In recent years, competition among wholesalers at the central wholesale market in handling and selling the goods is becoming increasingly intensified. As a result, the normal adjustment of supply and demand or price formation at the central wholesale markets has become liable to be checked. In view of this, a partial adjustment was made in June 1956. Among the leading amendments are: designation of districts of central wholesale markets, licence of wholesale business, amalgamation of wholesalers, transfer of business, exemption of application of provisions of the Private Monopoly and Fair Trade Law to the agreements to the terms of transactions, supervision over wholesalers. Supervision over the above matters was vested in the Minister of Agriculture and Forestry. Thus the function of the central wholesale market is intended to be rectified. In order to carry out further improvement of market transactions in aquatic products, those problems such as wholesalers, brokers, transaction method, payment method, commissions, etc., remain unsolved.

The Central Wholesale Market Law is applicable to the cities containing a population of 150,000 or more. In the case of markets in small and medium cities containing a population of less than 150,000 and the markets in producing centers, market regulations are now enforced in 26 prefectures of a total of 46 prefectures. Markets are all kept under the management of the respective prefectural governors.

#### 2. Cooperative Marketing by Fisheries Cooperatives.

In Japan, there are 4,000 or more markets in fish producing centers. Most of them are under the management of fisheries cooperatives. Fisheries cooperatives engaging in marketing business constitute 70 per cent of the unit fisheries cooperatives. Only 16 per cent of them are cooperatives engaging in selling the fishes purchased and as high as 95 per cent are those selling the fishes on consignment.

Fisheries cooperatives composed of small or medium fishermen ought to purchase the fish and shellfish from member fishermen and ship them to consuming centers on behalf of the latter, but most of the cooperatives are carrying on consignment sales of fish and shellfish of members to brokers (fresh fish shippers, proces-

sors or retailers) in the producing centers in order to obtain commission. In addition, with the extension of off-shore fisheries and the greater number of fishing ports, fish catch by the fishing boats belonging to the districts other than the producing centers will increase and member fishermen's benefit will be neglected by marketing cooperatives. In this respect, the functions of the district fisheries cooperatives in producing centers have to be reviewed.

### 3. Transportation

In order to expand the consumption of aquatic products, the means of transportation and storage must be improved. In Japan, railway and trucks are the chief means of transporting aquatic products. Connected with the railways transportation of aquatic products, it is of prime importance to lower the freight rate for goods and to make good arrangements for car distribution at the rush time when a great quantity of fish is caught at a certain place. For this purpose, refrigerator cars and containers come into use increasingly. Long-distance hauling by trucks has increased rapidly since the end of the war. In order to promote long distance hauling, road construction programs are now designed under the long range economic plan. Great expectations are entertained for the hauling by trucks.

In addition, lift conveyers came into use to improve the landing services and the use of metal fish boxes has been encouraged in order to save wood resources and to improve sanitary conditions.

### PAKISTAN

The report from Pakistan gives the following information:

(1) After a thorough survey of West Pakistan in general and the Karachi Administration Area in particular, schemes were prepared to establish a chain of cold stores and ice plants in almost all important cities of the region with a view to enable fishermen to use adequate quantities of ice at cheaper rates. The scheme has already been enforced in Karachi as an "Emergency Fish Distribution Scheme". To start with, two cold stores of 10 tons and 5 tons capacity are nearing completion. One insulated fish van has started functioning in Karachi to transport the catch. A number of such vans will gradually be made available to fishermen to ply between Karachi and different fishing villages.

(2) The Railway Department is equipping refrigerated bogies for transport of fish to distant places in fresh condition. It is hoped that there will be an adequate number of such bogies on different lines very soon which will help a lot in transport and distribution of fresh fish.

(3) Schemes were prepared and submitted to the Government to construct good motorable roads which may connect different catching centers to Karachi, the main assembly centre. The schemes are being scrutinized by the Government.

(4) Government-supervised fish stalls, 22 in number, are being established in different localities of Karachi. These are equipped with refrigerated fish display cabinets. Fresh fish is sold at these depots from 7.00 a.m. to 7.00 p.m. at moderate prices which is not an usual practice with other fish dealers. This sort of hygienic handling, attractive display and above all availability of fish at moderate prices throughout the day will certainly help to popularize fish. Out of twenty-two proposed fish depots, eight have already started functioning and the rest will be ready soon. It is intended to operate a small fish restaurant attached to each of these depots. This is the first step towards a study of consumer's taste. The Government plans to expand the scheme of fish depots through the country gradually.

(5) Regarding international trade in fish products, fish was till now exported only in cured condition, fresh fish being exported packed in ice only to India. During the last two years frozen and canned shrimps have assumed a good proportion of the exports to U.S.A. and Europe.

Very recently fresh fish, frozen in cold storage prior to its export, has been exempted from all export duties and taxes. This has given impetus to the export of fish and shrimps to foreign countries.

(6) Regarding the economic aspects of fish processing, it may be said that the fish industry of Pakistan is still in an under-developed state and whatever is done, is on an unorganized and non-scientific basis.

(7) The transport of fresh fish to up-country is still not satisfactory as there is a not sufficient number of refrigerated vans or

railway bogies. The Railway Authorities in consultation with the Fisheries Department have taken up this issue and trial shipments are being sent from Karachi to other big cities in the interior. More refrigerated bogies are being procured by the Railway Authorities.

(8) Regarding the economic aspects of refrigeration, it may be stated that except in Karachi or some big cities of Pakistan, there are no proper arrangements for refrigeration of fish. Even at Karachi the refrigeration system is not satisfactory. Until now there has not been a single refrigeration plant exclusively meant for fish and fish products. There is much room for this development in the country. Private enterprise is now taking greater interest in fish industries and it is hoped that within a few years the industries will get fully established. The Government is taking an active interest and has been providing all facilities to the industrialists and has earmarked land near the fish harbour which is under construction. For processing plants a site has been selected outside the Municipal Area. This will be developed and given to the industrialists.

## PHILIPPINES

The contributed paper from the Philippines informs of the present situation of fish marketing as follows:

The Philippines, up to the present time, does not have an organized marketing system for fish. The fish trade business is controlled by private interests without government participation or intervention. Old primitive practices of fish marketing still prevail and the wholesale fish trade is handled mostly by fish brokers who charge 5% of the gross sales value for their services rendered in every transaction. Due to this situation, fishery products, oftentimes, have to pass through several middlemen before finally reaching the consumers. Only a few fishermen handle the sales of their catches themselves. Marketing facilities are inadequate, area of distribution is limited to coastal centers of population, and marketing processes involving middlemen are complicated and expensive. These unfavourable factors resulted in the small returns realized by the fishermen, thus aggravating their already low-level socio-economic status and thereby destroying their initiative for more productive efforts.

An organized fish marketing system is deemed necessary and indispensable in this country. The Agricultural Credit and Co-operative Financing Administration (ACCFA), a semi-government organization entrusted to ameliorate the standard of living of people in the rural areas, is on the threshold of setting up an efficient fish marketing system in the Philippines. This system involves the organization of the following:

- (a) Fishermen's Cooperative Marketing Association (FICOMA)
- (b) Federation of FICOMAS, and
- (c) Central Cooperative Exchange (CCE)

**Fishermen's Co-operative Marketing Association (FICOMA):** These groups are organized in the different fishing centers in the Philippines similar to the Farmer's Cooperative Marketing Associations (FACOMAS) which are now operating in full blast. There are ten FICOMAS scheduled to be organized which are presently distributed to the different regions of the Philippines. Organization papers for the FICOMAS located at Coron, Palawan; Balatan, Cammarines Sur; and Navotas, Rizal; are already approved by the proper authorities while the rest of the organization papers for other FICOMAS to be set up at the other regions are still being processed.

Members of the FICOMA can avail themselves of the different loans, namely; production loan, gear improvement loan, and facility loan; while the FICOMA itself can make use of the facility and merchandizing loans. The FICOMA takes care of the marketing of the fishery products of the members. The lack of facilities at the present time has restricted its business operations on processed fishery products only. The FICOMA is directly responsible to the member-fishermen on their produce being delivered for sale. Unsold commodities in the FICOMA are delivered to the Federation of FICOMAS for disposal.

**Federation of FICOMAS:** All the FICOMAS in a region form the Federation of FICOMAS. This Federation handles the sales of fishery products that can not be sold by member FICOMAS. In turn, fishery products which can not be sold by such federations are forwarded to the Central Cooperative Exchange for final disposal.



**Central Cooperative Exchange** — All the Federation of FICOMAS will be under the direct supervision of the Central Cooperative Exchange. With offices in Manila, the Exchange takes over the final distribution of fishery products obtained from the different FICOMAS and Federation of FICOMAS. Proceeds of the sales are given back to the fishermen, less operating expense of the three entities but not more than 5% of the gross sales value.

The FICOMAS, Federation of FICOMAS, and the Central Cooperative Exchange are managed and supervised by their respective Boards of Directors. Such Directors are elected from among members during annual meetings. These different organizations are financed by ACCFA funds. The Central Cooperative Exchange is directly responsible to the Agricultural Credit and Cooperative Financing Administration for the loans being granted for marketing the fishery products.

Conscious of the difficulties of the fishing industry, especially in the fish marketing practices, the Third Congress of the Republic of the Philippines in its third session passed the following bills:

**House Bill No. 778** — “An Act authorizing the Appropriation of Five Hundred Thousand Pesos to be loaned to Cooperative Fishing Associations, and for other purposes”;

**House Bill No. 1620** — “An Act providing for effectual Government Financial Assistance to Filipino fishermen and to authorize the appropriation of funds therefor”; and

**House Bill No. 3292** — “An Act appropriating the sum of One Million Pesos or so much thereof as may be necessary for the construction of a wharf to be used as fish landing in the Municipality of Navotas, Province of Rizal.

## THAILAND

The Bangkok Wholesale Fish Market Organization was established on the Chao Phya River side at Yarnava District, Bangkok, in 1953. Through the joint arrangement with the Department of Fisheries and the Bangkok Wholesale Fish Market Organization, sea fish agents were removed to the premises in the compound of the Organization in 1953, fresh water fish agents in 1954 and salted fish agents in 1956. The work will secure the mutual interests of the fishermen and the fish agents.

(1) In 1956, a 1,000 ton cold storage warehouse for holding fresh fish was established in the compound of the Bangkok Wholesale Fish Market. During the surplus of catch, the cold storage warehouse will help by buying fish from the fishermen at the price which meets its cost. When fish is rare in the markets, it will supply the preserved fish to meet the requirement of the consumer at a reasonable price. In addition, the Fisheries Department intends to organize cold storage warehouses of different sizes for holding fresh fish at various areas where there is good fishing and where food fish is scarce.

(2) In August 1955, the committee on the inspection and the certification of salted fish to be exported from Thailand was established. Rules and regulations for the inspection and the certification of salted *Rastrelliger* (the species being required in the initial stage to be inspected and certified) have been issued by the Minister of Agriculture through the joint arrangement of the Fisheries Department, with exporters and salted fish agents.

The inspection and certification have been conducted by the Fisheries Department since 1955. Up to December 31, 1956, 1,070 certificates had been issued to salted fish exporters. The volume of exported salted pla-tu was 21,435.53 tons, valued at Baht 1,393,898.20. The inspection and certification have contributed to gain the confidence of the importing countries as to the satisfactory quality and origin of the exported products, and are clearly instrumental in aiding Thailand to export her salted fish.

(3) In September, 1956, the Salted Fish Trade Promotion Committee was organized. The objectives of the Committee are seven-fold;

- i. To reorganize the system of salted fish trade both internal and external for the interests of the nation as a whole.
- ii. To arbitrate on any conflict arising between or among salted fish dealers (agents and exporters).
- iii. To exchange with foreign buyers knowledge regarding rules, regulations, prices, quality, etc.
- iv. To set out qualifications to be imposed, some time in the near future, on personnel who will become salted fish agents for export.

- v. To carry out the salted fish trade according to existing objectives and understandings.
- iv. To arrange meetings of salted fish dealers whenever it is necessary or advantageous.
- vii. Other duties as deemed essential by the assembly.

The Fisheries Director is chairman of this Committee. The Fisheries Department has made use of this Committee as a means to improve the salted fish trade of Thailand.

#### U.K. (Hong Kong)

(1) As in previous years, the past 12 months have seen further progress in the development of this fishing industry. Approximately 200 more boats were mechanized during this period, bringing the total number of mechanized vessels to over 960. This position is in striking contrast with that obtained in 1946, when the fleet relied exclusively on sail.

(2) The total quantity of fish handled by the Organization amounted to 662,162 piculs, a figure which represented a decline from the previous year's record total of 686,690 piculs. This decline affected both fresh and salt/dried fish, the last-named being reduced from its 1954/55 quantity of 98,631 piculs to a new low figure of 89,868 piculs. The future of the salt/dried fish industry, indeed, must be regarded as speculative. The progress of mechanization, which has reduced the necessity for salting fish at sea in order to prevent its deterioration en route to market, is no doubt a contributing factor in the present decline. Perhaps more important, however, is the effect of the embargo imposed by the Chinese authorities, through which the once-important mainland market has been closed to the local industry.

(3) Towards the end of the year, however, the trend in landings—at least so far as fresh fish was concerned—showed a definite increase. If this trend is maintained, the industry seems likely in the foreseeable future to enter the less favourable stages of the normal economic cycle of expansion—increased production and good prices—over-production—decreasing prices—falling production—recession. With this eventuality in mind, if not yet in view, the interest which has been shown by one or two

leading commercial houses in the possible exportation of local fish, is very much to be welcomed.

(4) The ratio between the quantities of fresh and salt/dried fish handled by the Organization has followed the pattern of previous years, i.e. there has been a further reduction in the proportion of the salt/dried variety.

(5) One or two local commercial houses have become interested in the export of fresh marine fish. In the face of continuing demands from the local market, however, this trade is of potential rather than of actual importance: its value during the year amounted to some HK\$ 370,000.

(6) The average wholesale price of both fresh and salt/dried fish showed a further decline from the low figures of the previous year. The price of fresh fish, indeed, at 58c a catty, represents the lowest average price for any year since the Organization was established. This continuing downward trend, although to some extent influenced by the general level of food prices, may in part be attributed to the successful operations of the Organization.

(7) The replacement of the Organization's land transport services by commercially hired vehicles, introduced in the previous year, was successfully extended to the Kowloon Fish Market.

(8) The Organization operates eight fish collecting depots and posts, which are located at Cheung Chau, Tai O, Shanley, Kolauwan, Kat O, Shataukok, Sai Kung and Castle Peak.

(9) The staff of these depots not only handled fish on behalf of the fishermen but also provided assistance in many other ways, for example, in obtaining licences, in registering personnel, in settling disputes and obtaining medical treatment.

(10) Fishermen's Credit and Marketing Society has been formed by the owners of a group of wind-driven fishing junks. The Society obtained a loan of \$29,000 from the Fish Marketing Organization with which it purchased a mechanized fish collecting vessel. This vessel is used to collect the catches of the sailing trawlers at their fishing ground, and so enables the wind-driven vessels to remain at sea for longer periods. It is also used for provisioning the wind-driven group and, when not otherwise

engaged, in fishing on its own account. Financially, this experiment has proved most successful: 75% of the loan was repaid between the formation of the Society, in August, 1955 and the end of the financial year.

#### **U.K. (Penang)**

Fish catches are disposed of to consumers through a complicated machinery of many buyers. The method of trading is not yet much modernized. Among agents, though small in scale, there are some who accommodate fishermen with working funds, and some operate fisheries as producers. Retail merchants also vary in types, but the development of fisheries production and the introduction of modern refrigeration and new processing would invite a greater evolution in this field.

#### **4. Significance of fish-culture as an integral part of rural economy,**

#### **CEYLON**

A survey as to how effective fish farming is, both in ponds and paddy fields among the peasantry, has not been carried out as more time is now being devoted to establish and obtain positive results of experiments in fish farming before it is passed on to the peasantry. Officers who underwent a course of training under Dr. S.W. Ling, F.A.O. Fish Culturist, have been sent out into the field to carry out fish farming on more scientific lines. If fish farming is successful in rural areas, there is no doubt that Ceylon will be able to cut down a great percentage of the importation of processed and canned fish which now costs the government as much as Rs. 55 million a year.

#### **INDIA**

All over India a new pattern of village organization through Grampanchayats is under evolution and the village tanks have now a place in the organization for development. The role of pisciculture in rural economy has been accepted as important but the main difficulties in developing the village tanks have been (i) lack of organization, (ii) lack of capital, (iii) lack of improved fish seed and (iv) lack of organized marketing facilities.

Almost all the State Governments are now adopting the principle of leaving the village tanks to the care of Grampanchayats who in

their turn will entrust it to local fishermen. State Governments are also providing capital on a subsidized basis to Grampanchayats to reclaim the tanks but the main difficulty continues to be one of inadequate quantities of fish seed and facilities for distribution. Excepting Bengal, Bihar and Orissa where appreciable quantities of spawn are collected from the rivers the other States have very inadequate quantities of fish seed and the resources of fish seed have to be developed on a top priority basis.

#### **INDONESIA**

As reported at the 6th Session, fish culture industry in Indonesia is not only a very important income source of farmers, but it also supplies a great source of nutrition to the people around. Accordingly, the ownership and administration of the waters and the rationalization of the marketing organization of products constitute important problems in this country.

#### **JAPAN**

Fish culture in Japan is an intensive fishery operated with a supply of feed in large quantities. Therefore, the farming of fish for popular use, or cheap fish, is greatly influenced by the price of feed. The increased price of feed in postwar days has made it difficult to culture the cheap species of fish, and fish culture has come to be concentrated on species of higher or luxury grade. At the same time fish farming is showing an evolution from a simple side-job of farmers to a little enterprise in farming villages. Most of the products are shipped to towns and cities where they are used chiefly at restaurants and hotels while some of them are exported to America.

#### **PAKISTAN**

Fish culture of this country flourishes specially in East Pakistan. Its edible products are not only the source of nutrition of the people, but also they are shipped to towns, cities and abroad and make a great source of income for farmers. The culturing of fish is not operated with feed supplied by men but by use of natural waters enriched with natural feed. Therefore, though it may be influenced by seasonal rainfall, it has the advantage of not

being affected by the price of feed. In the Philippines, too, fish culture is an integral part of rural economy and a supplier of nutritious food to the people.

#### **U.K. (Hong Kong)**

Fish farming has, for centuries past, been an important rural industry in Hong Kong. It is doubtful if any other community in the world is more aware of the benefits, both direct and indirect, to be derived than are the villagers of the Yuen Yong area in particular. This interest is spreading, with encouragement from the Fisheries Division and Government District Administration officers, throughout the New Territories wherever fish culture is possible. Financial difficulties in connection with the building of new fish ponds and the renovation of old or disused ponds, whether as village community ventures or by private individuals, are overcome by generous help from the Kadoorie Agricultural Aid Association. Loans and cash grants for building bunds and sluice gates, or for the purchase of fertilizers, fish fry, foodstuffs and so on, together with gifts of cement, are made by this Association.

When considering these facts, it must be clearly understood that in Hong Kong fish culture is a purely rural industry and that the fish produced is, almost entirely, consumed in the rural areas. The Colony covers a total land area of 391 square miles, out of which some 30,020 acres only are utilized for agricultural purposes, and yet it has a population of some 2½ million people, most of whom live in the urban areas. Supplies of pond fish for the larger urban populations are mostly received from the China mainland.

Some 2,000 acres of former tidal mud flats and marsh land are being very gradually, and almost naturally, reclaimed for agricultural use. This is accomplished by the construction of bunds, with sluice gates, along the seaward edge. Filter nets are fitted in the open sluice gates at high water and, at the moment, the impounded waters are thus only used as tidal traps for the capture of shrimps and small fish. Extension work aiming at the better utilization of this area is contemplated. Having at last acquired its own experimental fish ponds,

Government and the Fisheries Research Unit now expect to be able to tackle the problems involved in the introduction of improved methods of grey mullet cultivation which, when adopted by the fish farmers after successful demonstration, should produce better financial returns. Furthermore, a recently appointed Government Soil Survey Officer has suggested possible ways of expediting the silting-up process and of treating the subsequently reclaimed land to sweeten it for agricultural use. If a proposed pilot scheme should prove successful, then a large scale project could be safely put in hand. Altogether some 5 square miles could, by first being converted into fish ponds, be reclaimed. The area potentially available for fish cultivation would therefore, even at a conservative estimate, be more than 3 or 4 times that of the total area at present devoted to fish culture.

#### **5. Development of Fisheries Extension Services**

##### **BURMA**

Technical advice on all phases of fishing industry is given through a modest scale programme.

##### **CEYLON**

(1) With the help of the Canadian Government, it has been possible to establish extension services in Ceylon. About 2 years ago, an extension department was established at the School of Cooperation, Polgolla. In this center Inspectors from the Cooperative Department are trained in education work in fishing villages and village leaders also attend training classes periodically. Recently, money has been provided for the establishment of 4 training schools at important fish producing centers.

(2) The indigenous craft that is used at present limits production to a great extent. Since the craft has to be paddled, the major part of the fisherman's energy is spent in getting his frail craft across the choppy seas to the fishing grounds. The wind, no doubt, plays an important part, but very often the fisherman is not fortunate enough to have favourable winds. Though the present type of craft may be manoeuvrable in inland waters and easily beached along the sea-coast, a system has got to be

evolved whereby the energy of the fisherman could be conserved solely for the catching of fish. The answer is the introduction of mechanization. The Government is carrying out a programme whereby the fishermen are given free demonstrations to indicate the capabilities of mechanized boats. However, the difficulty the fisherman is faced with is that the installation of an engine in his boat will cost him far more than his meagre income and unless the Government is prepared to subsidize the scheme of mechanization, the actual introduction of mechanization to the fishing industry will have to be a very long-term programme.

## INDIA

The re-organization of the States has delayed the final shape of the State Directorates. The All-India Fisheries Conference has recommended that separate Directorates should be established in each State, major work of the Directorates being extension activities specially in the field of inland fisheries. Uttar Pradesh through its extension workers supplies fingerlings of carps. Similar activities are carried on in almost all the States. The Central Fisheries are now increasing the extension activities and have established six extension units in different centers to augment the efforts of the State Government.

## INDONESIA

(1) Both Fishery Services (Inland and Sea) have increased the number of workers in order to intensify extension work and in all important fishery-areas trained personnel are placed. Continuous contact with the fishermen has proved to be the best system, in introducing more efficient systems of several catching methods, using of better and new kinds of equipment. Demonstrations, films, information and meetings give a considerable contribution for a better idea and understanding of the aims and activities of the government in order to increase the fish production and to create a better living for the fishermen.

(2) In the field of fisheries education two low-grade fisheries schools are opened, one at Ambon (Moluccas) and another at Belawan (Sumatra) while the other provinces are busy establishing fisheries schools and training centers. A Training Center for fishing opera-

tion with engined vessels where fishermen and fishermen's children in groups are trained is opened in Tegal (Middle Java). When these fishermen's groups finished the training with success they obtain a fishing-boat on hire-purchase system from the Sea Fishery Service.

Village-courses on inland fisheries are opened in many places such as in the provinces West Java, Sulawesi (Minahasa, Gorontalo), Middle and South Sumatra, usually with good results.

Courses for staff personnel and field workers for extension purposes for the Inland Fisheries Service of the Ministry of Agriculture are centered at Sukabumi (West Java) with a branch at Muntiran (Middle Java).

A College of Inland Fishery, with a four year Course will be opened this year at Bogor (West Java).

The Central Government is planning to open a Sea Fishery Academy.

One-month cooperative courses sponsored by the Federation of the Indonesian Fishermen Cooperative Societies are held every year in several places in Java: in 1956 twice, one at Semarang and one at Pekalongan.

## JAPAN

### (1) Extension of fisheries techniques.

Techniques developed at the fisheries research institutes and universities are tested at the local fisheries experiment stations. Thus the technological knowledge is disseminated among general fishermen. For this purpose, the subsidy required for the employment of specialists (about 100 persons) is provided from the Central Government to local Governments. Among the leading activities assigned to those specialists are propagation of fish in inland waters; propagation of oyster and seaweeds in coastal waters; and the fisheries by the use of fish finders.

### (2) Crew training program.

With the expansion of size of fishing-boats, and with the increase in use of modernized machinery, it has become necessary to give technical training to the higher class crew. Under this training program, young people who are destined for crew are trained. Training centers have been sponsored by local govern-

ments or by non-governmental organizations with the Government subsidy of 50% of the actual costs for each training center. Persons who have received training are qualified as navigating officers, engineers or wireless operators.

(3) Ship-carpenters' training centers.

Small-sized wooden fishing-boats in Japan are built by ship-carpenters scattered throughout the country. They are not favoured with the opportunities for learning scientific techniques. Fishing-boats are built based upon their experience in non-powered boat building. With the recent increase of small-sized powered-boats, the Government has decided to hold training centers to give them theoretical and technical knowledge about powered-boat building, aiming at improving the capacity of fishing-boats and preserving them from the disasters at sea. This program was launched in fiscal year 1954. Under this program approximately 1,000 carpenters are expected to be trained in five years, at the rate of 200 trainees a year. Training centers are held at three different places in a year. Each center lasts for two or three weeks. The annual appropriation of Y228,000 is made by the Government.

(4) Popularization of wireless equipment for fishing-boats.

With the progress in fisheries, communication between the crew on board and fisheries operators, markets, or fisheries cooperatives on land is becoming increasingly busy. Wireless equipment for fishing-boats has come into wide use. Of 7,000 fishing-boats of more than 20 gross ton average capacity, 6,000 fishing-boats are fitted with wireless equipment. Wireless equipment is becoming increasingly popular also in the case of craft less than 20 gross tons. The Government provides grants to encourage the installation of land wireless stations for the purpose of communication with fishing-boats. Such stations number 85 and are rendering services to fishing-boats without charge.

These land wireless stations are attached to the fisheries cooperatives. The number of stations of more than 250 W output (large-scale) reaches 25. Small-scale stations are used for coastal fisheries. VHF is most excellent for short-distance.

(5) Examination of fishing-boats by application.

Fishermen in general have not sufficient knowledge about fishing-boat building. The Government must, in compliance with the request from fishermen, give technical advice on design and manufacturing of hulls, engines, refrigerators, electric apparatus, fish-finders, fathometers. The examination of such equipment is also carried on by application to the Government.

## PAKISTAN

(1) Primary schools were opened at various fishing villages.

(2) Mobile dispensaries were arranged for those villages which are very far off from the city.

(3) Cooperative spirit was infused and cooperative activities were intensified.

(4) Medical and sanitary help accorded from time to time.

(5) Recreation Clubs organized in various fishing settlements.

(6) The Government procured 47,242 lb. worth US\$98,000 of Nylon twine and distributed this to the fishermen. Another consignment worth \$500,000 is being procured during this year.

(7) The Government procured 30 (Johnson) outboard motors and distribution was made to the fishermen.

(8) Six inboard engines were procured to mechanize the boats and another 60 are being procured during the current year.

(9) More nylon twine, Spongex floats, fishing hooks, nylon ropes, coir ropes etc. are being procured under import licences issued to the Fishermen's Cooperative Purchase and Sale Society Ltd.

(10) Fishing articles such as coir ropes, mast wood, and Spongex floats worth Rs. 302,000 are under procurement for which funds have been provided by the Agriculture Development Committee.

## U.K. (Hong Kong)

(1) Training facilities continued to be provided for fishermen by the Department of Agriculture, Fisheries and Forestry. In each case the training is in line with the requirement. During 1956 a total of 10 Skippers, 117 Coxswains and 14 Engineers, passed the prescribed examinations.

(2) Widespread interest is still being shown in the European type shrimp beam trawl successfully introduced earlier by the Fisheries Division. Outfits of the improved gear continued to be lent to fishermen and members of the Government crew were sent out to sea in the fishermen's own boats to demonstrate its operation.

(3) Under agreements supervised by the Fisheries Division, arrangements were made for several fishermen to borrow new nylon purse seine and trammel nets, free of charge for three months and without any financial obligation, from the local agents of the manufacturers. Whilst appreciating the advantages of the new stranded synthetic fibers, local fishermen have not yet started buying the ready made-up nets on account of the high initial cost. (Monofilament nylon has, however, almost completely replaced ramie for the construction of gillnets during the past year).

(4) The fourth in the current series of Fisheries Exhibitions, arranged by the Fish Marketing Organization in conjunction with the Agriculture, Fisheries and Forestry Department, was held in Aberdeen wholesale market during the Chinese New Year holidays. As in previous years, the exhibition was intended to serve two purposes: first, it provided fishermen with an opportunity of inspecting the wide variety of products, of direct interest to the industry, which are obtainable through local commercial firms. It also enabled members of the general public to see something of the working and the development of the local fishing fleet. During the three days on which it was open to the public it attracted considerable interest both amongst fishermen and among members of the community at large.

#### 6. Other Socio-economic problems affecting the production, processing and distribution of fisheries products.

#### BURMA

A modest-scale programme with an aim to solve the problems affecting production, processing and distribution of fishery products has been underway since last June. Functions of the programme are:

i. Issue of loans directly to the fishermen at 6½% p.a. interest and recoverable in three years by instalment.

ii. Supply of fishing materials and equipment at reduced rates.

iii. Marketing the products through the agents selected by the fishermen themselves and under the supervision of the Division of Fisheries, Agricultural and Rural Development Corporation to protect the fishermen's interest.

iv. Technical advice on all the three phases of the industry.

#### CEYLON

The fishermen in Ceylon live under slum and very unhygienic conditions. Hand in hand with educational schemes, instructions to a better and cleaner living have been given and, to ameliorate the conditions of living, the Government is constructing houses for fishermen. About 200 houses are nearing completion and another 100 houses should be completed by the end of this year.

#### INDIA

(1) In general, the need is for social education, organization of proper type of co-operatives and issue of capital on easy terms. Punjab has made a start in organizing 2 co-operatives with interest-free loans from Government. Saurashtra has been able to increase the per-caput income of fishermen from Rs. 665/- to Rs. 775/- per annum and half the fishing villages have been brought under the influence of the cooperative movement and given loans of Rs. 765,000. Uttar Pradesh has started organization of fishermen's cooperatives. Travancore-Cochin gave the fishing rights of inland fisheries to cooperatives and 3 societies have been organized out of which one is running very satisfactorily. It is proposed to organize 20 more model cooperatives. In Hyderabad fishing rights are exclusively given to the fishermen. Madras has special staff for socio-economic work with 250 societies of various types. Bengal has put a scheme to form co-operatives with loan into operation.

(2) Madras reports that the per caput income of the fishermen of the West Coast is Rs. 1/- to Rs. 5/- per day and in the East Coast half to Rs. 1/-.

#### INDONESIA

(1) The Government of the Republic of Indonesia drafted a five-years-plan, including plans for developing and improving nearly all

aspects and fields of the inland-and-sea fisheries.

The major part of the fisheries budget of this plan is estimated and reserved for mechanizing fisheries industries and related ancillary industries, fisheries stations and workshops for fishing centres and dredges, etc. and for educational purposes.

(2) The fishing fleet consisting of several small-type fishing boats for coastal fishing increased to 1,500 in 1956. As there are plenty of suitable domestic woods for fisheries purposes grown in Indonesia. All the hulls of these boats are built in the country, and only the engines and spare parts are imported from various countries.

The use of fishing boats becomes more and more popular among the Indonesian fishermen. The demand for suitable boats for fishing and carrying is now bigger than the supply.

By fishing with engined vessels, new fishing grounds are now opened which formerly could not be reached by the primitive sailing-vessels, which at the moment still take a prominent place in the Indonesian fishery industries.

(3) New efficient methods, such as the longline, the Japanese muro-ami (reef fisheries), pool-fishing are now introduced in several areas which can only be done by using engined vessels and in most cases with good results.

It is desirable to note that a greater interest from national and foreign private enterprises can be observed for the sea fishery industries.

Fisheries stations and workshops at Ambon and Ternate (Moluccas Islands) and at Belawan (East Sumatra) are completed and enlarged and another station is now in preparation at Tandjung Pinang (Riau Archipelago) near Singapore.

A fishermen's community development plant at Kotabaru (Borneo) was set up in 1956 and expected to be ready for operation this year.

This plant consists of:

- i. A cannery with a capacity of 10 tons fresh fish daily, especially "kem-bong" (*Mackerel*, *Scomber karagurta*, *Scomber neglectus*).

- ii. A fish flour plant with a capacity of 10 tons fresh fish, for human consumption.
- iii. Fish salting/drying shed.
- iv. Ice flake plant, with a capacity of 15 tons daily.
- v. Net loft, with five hand machines.
- vi. Shipyard and workshop, for vessels smaller than 40 tons.
- vii. Four carriers of several tonnage.
- viii. Shrimp trawl, in experimental stage with the vessel MUNA.
- ix. Otschi-ami, is also in experimental stage with two Japanese experts as instructors.
- x. Fourteen vessels with 10 H.P. each are meant to motorize the djalalampo and sesse.

This plant covers an amount of Rp. 30,000,000.00.

In Ambon, a cannery for tuna, with a capacity of 10 tons daily will be set this year and the engines and other equipment have arrived.

(4) From the point of view of fishermen's income that from the inland fishery (Middle Java) can be considered as very low. It is the main policy of the Government to increase the fishermen's income gradually by giving support, facilities and credits to fisheries industries.

(5) As Indonesia is still in the beginning stage of the building up of her fishery industries in all aspects, it is understandable that relations to other industries are very few.

It is worthwhile to note the increasing and developing of small shipyards for hull-building of wooden vessels.

The establishment of ice factories for supply to fishery boats in several places in Java (Tegal, Djakarta) can be noted.

No doubt there are other and more activities of the Government and private enterprises, which affect above-mentioned problems. The National IPFC Committee as an advisory board to the Ministry of Agriculture which has its meeting at least twice a year is one of a permanent government agencies in the field of fisheries which continuously observed these problems and discussed the possibilities of improvement and development.



## JAPAN

(1) Fisheries production maintains a high level even now as before. With modernized fishing craft and gear the fishery productivity is still increasing. The powering of non-powered craft of small type constitutes a current characteristic feature.

(2) Fisheries being operated by various gears cannot be discussed sweepingly, but, generally speaking, among fisheries of small types, the production by powered boats is on the increase. Most of fishing families with non-powered boats depend upon wage labour or side-jobs besides their original job. The commercial profits of smaller fisheries management are not stabilized under a sharp control of general business and natural conditions of fishing grounds. Large scale managements, which have expanded their marketing or processing functions and are carrying on diversified business, are making a steady progress in their enterprise.

(3) Among all fisheries operators, the percentage of wage labourers is showing a gradual increase. Most of fisheries operators are engaged in small fisheries.

(4) The supply of working funds for enterprises has been recently relieved, but the funds for improvement of the facilities of smaller fisheries is not yet adequate. Government subsidy for small fishermen is not properly organized.

Even though a steady increase is seen in the number of fisheries cooperatives, their membership and capitalization, there are still a number of small cooperatives which cannot carry on economical functions. Cases of co-operative of small fishermen which operate fisheries on their own account are on the increase. Steady development is seen in the common sales of catches, common purchase of fuel oils and transplantation of fish seeds in inland waters which are carried on through cooperatives.

(5) Government Budget and Financial Aid

### a. General aspect

The annual estimated expenditures of the Fisheries Agency of the Government excluding those in special account, occupy 0.6% of the total general account of the Government, while the percentage of those of agricultural administration accounts for 9%. This shows the difference in economical scale between fishing industry and agriculture in Japan.

The rate of the financial expenditures to the annual income from agriculture and forestry is 13%, but that of the financial expenditures to the income from fisheries is only 4%. The loaning of national funds to fishing industry is larger than that to agriculture.

### b. Major items of expenditures for fisheries administration

- (1) Fishing boat crew training centers (subsidy)
- (2) Fisheries techniques improvement and extension programme (subsidy)
- (3) Guidance and supervision for fisheries cooperatives
- (4) Registration and inspection of fishing craft
- (5) Mediation and adjustment for fisheries disputes in coastal, off-shore and inland waters
- (6) Inspection of fisheries contraventions in coastal and off-shore waters
- (7) Transplantation of freshwater fish seeds (subsidy)
- (8) Propagation of shellfish and seaweeds in shallow seas (subsidy)
- (9) Disaster relief work (subsidy)
- (10) Construction and repairing of fishing ports (subsidy)
- (11) Fishing boat insurance against loss
- (12) Fisheries mutual aid service
- (13) Fisheries economics research work
- (14) Development research of unexploited fishing grounds
- (15) Studies on fishing craft
- (16) Research laboratories and hatcheries of several types
- (17) College of Fisheries.

### c. Loaning of funds

Funds are loaned for the following services:

- (1) Construction and repairing of fishing ports
- (2) Building of fishing craft authorized for operation
- (3) Purchase of synthetic fibre fishing nets
- (4) Construction of fishing villages in Hokkaido and others
- (5) Propagation of fish, shellfish and seaweeds
- (6) Construction of refrigerating plants

(6) Fishing port construction, repairing and planning.

With the increase in the number of large-sized boats and in operating rates since the end of war, there is pressing need to rebuild the fishing ports as bases of fishing boats or as fish landing places. The Government designed a fishing port repairing plan in 1951 in order to repair 375 fishing ports. This program was expanded in 1955 in order to push forward the repairs to the fishing ports damaged during the war. The target set up was to complete the repairs to 604 ports by 1962. In the event of completion, the mooring area per ton would increase to 40.4 m<sup>2</sup> from 18 m<sup>2</sup> in 1953 and the quay length per ton would extend to 0.44 m. from 0.28 m. in 1953. For this purpose, approximately ¥3,000 million has been spent every year up to now, of which nearly two-thirds of the total expenditures have been subsidized by the Government.

(7) Development of unexploited offshore fishing grounds.

The fisheries survey indicated that there exist many unexploited fishing grounds on the nearby sea. It is estimated that there exist a great many new fishing grounds fitted for drag net fisheries and surrounding net fisheries. In order to avoid the danger with which the exploitation may be attended, the respective local governments are making a survey of the new fishing grounds by the use of pilot survey boats with the cooperation of survey institutes or laboratories and the interested fishermen. The Government subsidy was granted for such exploration (¥10,210,000 in fiscal 1955, and ¥5,379,000 in fiscal 1956, respectively).

(8) Fish propagation.

Owing to the water pollution, sea-bottom reclamation and power source development, some coastal sea and inland waters are becoming unsuitable for living fish and shellfish. In order to conserve the fisheries resources and fish propagation, the natural environmental conditions are required to be improved. Such improvement projects should be carried out by fishermen themselves, but due to their limited capital, they are not able to do so. Therefore, the improvement program has been pushed forward by the Government subsidy (¥145,460,000 in fiscal 1955 and ¥190,819,000 in fiscal 1956).

The leading projects are as follows:

- a. Conservation of fisheries resources.
  - i. Conservation of anadromous fish by means of dam construction
  - ii. Pollution preventive measures
  - iii. Conservation of shallow-sea shellfish.
- b. Inland water fish propagation.
  - i. Seed production of trouts, *Ayu*, eel, common carp, and wild goldfish; and installation of equipment therefor
  - ii. Salmon and trout hatching; and *Ayu* hatching
  - iii. Production of superior seeds of trouts.
- c. Shallow-sea fish propagation.
  - i. Plowing and harrowing for the purpose of exploitation of fishing grounds in shallow-sea or in bay
  - ii. Soil-dressing for improvement of fishing grounds in shallow-sea or in bay
  - iii. Establishment of artificial seaweed nurseries
  - iv. Seaweed propagation in ocean and shallow-sea; immersing of stones and blasting of reefs for fish and shellfish propagation
  - v. Scratching of rock surface for seaweed propagation
  - vi. Building of fish shelters or nests.

(9) Investigation of fisheries resources.

The investigation of fisheries resources is made for the purpose of conservation of fisheries resources as well as for the purpose of exploitation of unutilized resources. In Japan, the investigation of fisheries resources is made (1) by research boats and experiment boats of the central and local governments and (2) based upon reports made by boats engaging in fishing operations. The main object of the former is to make oceanographical and fish ecological surveys and the latter is made to estimate the fisheries resources through the statistics on fish catch. A part of the statistics is collected and analyzed at the Society of Fisheries Research and reported to the Fisheries

Agency. Another part of the statistics is forwarded through the local office of the Statistics and Investigation Division, Ministry of Agriculture and Forestry, to the Division and then to the Fisheries Agency. The results obtained by the survey boats are analysed by biologists and the analytical results are submitted to the Fisheries Agency.

Fisheries resources in the nearby sea of Japan are judged based upon the data obtained by the steps as stated above and the maintenance of fisheries resources is made based upon the findings. At the same time, unutilized fisheries resources and fishing grounds are reported. Regarding the more important fishing grounds requiring to be exploited, a further comprehensive study is now in progress by mobilizing the various research institutes and laboratories.

#### (10) Fostering of fisheries cooperative development.

The Central Government provides subsidy to the respective local governments in the hope that the latter may encourage fisheries cooperatives to healthy development, particularly inspect the cooperatives' financial management.

The guiding principle of the Government is to promote the improvement of management of unsuccessful fisheries cooperatives and federations so that they may display fully their own functions to secure the stability of fishermen's living. For this purpose, the Agriculture, Forestry, and Fisheries Cooperatives Reconstruction and Rehabilitation Law was enforced in 1951. In addition, in order to lighten the pressure of interest on frozen debits on the part of federations provided from the cooperative banking institution, the Government has granted the interest subsidy to the banking institutions, in accordance with the Agriculture, Forestry, and Fisheries Federation Promotion Law.

#### (11) New rural community development plan.

The development of an area involving small farmers, forestry men, or fishermen cannot be achieved by the individuals. Therefore, the Government encourages the rural people so that they may design the optimum development plan on their own initiative for each area which may be regarded as one community from the

geographical, social, and economic viewpoints (1,500 households in size), and grants subsidy equivalent to 30 to 50% of the required funds for implementing the established plan.

The program was started in 1956 and lasts for 5 years. Under this program, a total of 5,000 areas is expected to be established. In the first year, 900 areas are determined to be set up and the Government subsidy is estimated at Y2,400 million and the financial credits to be provided are estimated at Y1,500 million. The communal facilities associated with fisheries include fishing boat hoists, fishing boat repairing, operation, fishing boat supplement, water supply, battery charging, simplified processing, simplified refrigeration, water reservoir, fish sorting, fish propagation, and ultra-short wave wireless sets, fish warehouses and fishing boats owned by fisheries cooperatives.

#### (12) Improvement of marketing of fisheries production.

In order to expand the production and consumption of fish and fisheries products, marketing improvement is of primary necessity and at the same time storing facilities have to be provided. With this end in view, the Government has taken the following measures: (i) fishermen are also allowed to participate in operation of markets in the fish producing centers and the markets are operated by fisheries cooperatives, if possible; (ii) the markets located in big consuming centers have come under Government control according to the law.

#### (13) Fishing boat insurance system.

Fishing boat insurance system in Japan was inaugurated in 1937. As it was a self-supporting accounting system, it was hard for small fishermen possessing small-sized boats to participate therein. Almost all the insured boats were large-sized ones. Therefore, the government-operated reinsurance system was inaugurated in 1952. Ordinary fishing boat insurance, insurance to cover depreciation of fishing boats, and fishing gear insurance are included in the fishing boat insurance.

### PAKISTAN

It needs no emphasis, that the fishermen community of Pakistan is most down-trodden, poverty-stricken, illiterate and devoid of all the facilities which a normal man enjoys in other civilized countries or even in Pakistan.

## PHILIPPINES

The conflict between trawl operators and local subsistence fishermen in San Miguel Bay, Bicol Peninsula, on Luzon which had been raging since pre-war days, is now being studied for a permanent solution with the dispatch to this area of a technical man of the Bureau of Fisheries and an adviser to the President of the Philippines on fisheries.

The conflict involves a small group of fishermen from Manila using a superior gear, the otter trawl, and the local fishermen using fish corrals, scissors nets and other hand-operated gear. The local fishermen complain of getting less and less fish, while the trawlers catch was either steady or increasing. The local fishermen blame the trawlers for depleting the fishery resources of the bay. To settle this conflict and to conserve the fisheries of the Bay, Administrative Order No. 20, which prohibits the operation of trawlers inside the Bay from May to October each year, was promulgated by the Department of Agriculture and Natural Resources before the war. This is the period when the Bay is fairly calm and allows the installation of fish corrals. The order, however, was not fully enforced, and the depletion of the fisheries and the complaints of local fishermen continued.

The conflict became more serious after the war and Executive Order Nos. 22, 66 and 80 were promulgated in 1954 and 1955 completely banning trawlers from the bay. The conflict had taken on a political color with the depletion of the Bay being used by local politicians as a convenient excuse to drive the trawlers from the Bay. The trawl owners fought the executive orders in the courts and won an injunction order from the Court of First Instance in Manila which declared the executive orders null and void on the ground that they prohibit a legal gear permanently in a specific body of water. Under present laws such prohibitions can be enforced only for a period not longer than five (5) years.

With the outlawing of the Executive Orders no regulation could be enforced which would protect the fisheries as well as the local fishermen of San Miguel Bay.

The Bureau of Fisheries seriously believes that while the case is subjudice there should be at least a temporary restraint to the activities of

the trawlers which undoubtedly are also contributing to the rapid depletion of the Bay. In line with the wide clamor to prohibit or limit the operation of trawlers in many parts of the Philippines, the Bureau of Fisheries is now preparing a more rigid control of trawl operation in San Miguel than was enforced under Administrative Order No. 20.

Several bills were filed in Congress during the last session which reflected the growing hostility of a large section of the fishing population and municipal authorities against the trawlers. Many of the complaints of municipal authorities especially, are directed against trawlers of more than three tons which are licensed by the National Government and which could operate in all waters whether municipal or national. Because municipalities have had conferred by law the right to administer municipal fisheries under their jurisdictions, the entry of nationally-licensed trawlers in their waters is frequently being objected to on the ground that these big trawlers not only deprive local fishermen of their legitimate catch but they also do so without paying any taxes to the local government.

The temper of Congress in the last session indicate that the trawlers are getting less sympathizers and a compromise bill between the Bureau of Fisheries and congressmen was evolved which would prohibit trawls in all coastal waters of 10 fathoms deep or less. This bill, if passed, would remove more than forty per cent (40%) of the present limited trawling grounds from the present fleet of trawlers. In the particular case of San Miguel Bay, this will mean that only about twenty per cent (20%) of its area would be trawlable.

The proposed ban of trawlers from coastal waters of 10 fathoms or less at present does not appear to be the best solution to the present conflict between trawlers and coastal fishermen according to the views of the Bureau of Fisheries, since there are many coastal areas of this depth which are as yet not widely exploited by other types of gear. It is feared that with the sudden withdrawal of trawls from a large section of trawlable coastal waters, there would be a scarcity of fish in the markets. The trawlers account for more than forty per cent (40%) of the total fish production of commercial fishing boats. A compromise stand is being adum

which would provide for greater prohibition of trawlers in areas that are now heavily fished by both trawlers and other gear, while providing for less control of trawlers in areas that are as yet not intensively fished by other types of gear. It is believed that the coastal waters of the Philippines are not yet so generally depleted as to require sweeping regulations that would ban trawlers from all coastal water of 10 fathoms deep or less regardless of their state of exploitation.

#### **THAILAND**

Aid to fishermen to instal 4-10 horsepower engines in their fishing boats was started during July, 1956. Up to early February 1957, 35 applications from fishermen for hire-purchase of the said engines were passed to the Fisheries

Department for approval. It is anticipated that additional applications will be steadily forwarded to the Department. Finance used in this aid is called "Fisheries Revolving Fund" of about 700,000 bahts derived through the good offices of ICA.

#### **U.K. (Hong Kong)**

Fish Pond Societies, Fishermen's Thrift Societies, Fishermen's Thrift and Loan Societies, Fishermen's Thrift, Loan and Housing Societies, Fishermen's Credit and Marketing Societies have been organized for the benefit and welfare of fishermen, and to this end governmental guidance and financial aid are given. The financial aid is partly refunded through the proceeds of sales at fish markets.

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## FISH MARKETING SYSTEM IN U.S.A.\*

The system for the marketing of fish in the United States is highly developed and varied in application according to areas. The U.S. Fish and Wildlife Service takes an inactive part in the operation of this system which is directly related to the high level of organization and competition obtaining in America.

Under present conditions there is no Federal or State regulation of the margin of profit between the producers and consumers since this is governed by the law of supply and demand.

The regulation of the fisheries, as to personnel who may fish, number of boats, sizes and seasons when fish may be taken and in what waters, is under the jurisdiction of the individual States and not the Federal Government except for the Alaska fisheries and certain pelagic mammals. However, the Federal Government conducts a wide range of research activities. Included to effect the maximum consumer utilization of the fishery resources is an educational and market development program to assist the industry in solving its marketing problems and improving its competitive status with other protein food industries. Designed to minimize periodic production and marketing imbalances, the program includes: a nationwide series of fish cookery demonstrations for school lunch and other institutional supervisory personnel; cooperation with industry in national sales promotion program; the production and distribution of Government and industry-financed market-development motion pictures in the encouragement of fishery educational programs at the academic and vocational levels; market outlook reports; the development of new markets for under-utilized fish for use as fur-animal and pet food; and the development of export markets. This program is conducted on a national basis, in cooperation with the various states and the domestic fishing and allied industries.

During the fiscal year of 1956 a total of 250 fish cookery demonstrations, including the distribution of fish recipe booklets, were con-

ducted by U. S. Fish and Wildlife Service home economists for school lunch supervisory personnel in 18 states, with an additional 30 for other institutional food supervisory personnel. Over a million school children are served each day by these supervisors, cooks and managers of school lunch room. This represents sales of approximately 200,000 pounds of fish (edible weight) per week, if fish is served one day a week to these school children. The school lunch rooms thus represent one of the largest potential outlets for fishery products.

Special market promotion campaigns were conducted on a national basis during 1955 and 1956 to assist the tuna and haddock industries in developing increased markets for their products. Another campaign was recently coordinated with the all-industry sales promotion to stimulate consumer interest in fishery products. In addition to these campaigns, efforts were also made to encourage the fishing industry to sponsor educational and promotional exhibits at the prominent food trade conventions. Consulting services and distribution of publications were included in these campaigns and exhibitions.

Several industry-Government cooperative sales promotion campaigns have been conducted with additional programs scheduled for the summer and fall of 1956. In each instance, the full staff and services of the Educational and Market Development Section have been assigned to stimulate sales through the school lunch program, public and private institutions, including national, regional, state and local restaurant associations, chain stores, food trade associations, the radio, press and television food editors, fishery trade associations, and the promotional outlets of the United States Department of Agriculture. TV and radio demonstrations by Service home economists and the fishery marketing specialists also play an important role in these programs. The broadcasting time is donated by the individual station.

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Prepared from information received from U.S. Fish and Wildlife Service, Commercial Fisheries Branch and U. S. Department of the Interior, Ann. Rept. of the Secretary, "Research and Activities under the Saltonstall-Kennedy Act, Fiscal Year 1956".

In connection with the special marketing programs, special recipes, fact sheets and photographs are prepared and distributed to the food editors. Participation on public service radio and television programs to encourage the increased use of fishery products is an expected function of the home economists and the field representatives as a supplement phase of their field activities. This phase of the program is particularly stressed during the special marketing programs.

Three market development motion pictures were produced during the year, and also others were in the process of preparation. Of these, three were financed by private industry. Two additional films are currently underway one of which is financed by private industry.

The fishery educational motion pictures are being distributed nation-wide on a free-of-charge basis through 140 cooperating film libraries. In addition, public service TV showings provide for extensive distribution. Each of the Section's fishery marketing specialists have been supplied with projectors and prints of all films for training and public relations showing. Approximately 2,500 prints of fishery educational motion pictures are now in distribution and it is estimated that these films were viewed by nearly one million persons last year, exclusive of the TV showing.

Considerable success has been obtained in developing markets for the plentiful and under-utilized fish of the Great Lakes. Although these fish, such as sheepshead, burbot, carp and goldfish, have long been available in

plentiful supply, there has been no market to encourage the fishery. The large and growing fur farming and canned cat and dog food businesses have been brought into the field and considerable optimism exists for the future of these fisheries.

Periodic publications such as, *Commercial Fisheries Review*, *Commercial Fisheries Outlook* are designed to meet the growing interest in the marketing of fishery products and contains analyses of expected future markets and the supply and demand situation. The *Outlook* report reflects a combination of opinions of representative industry members and interpretations of past experiences as related to Government and other economic data. During 1956 these publications continued with improved coverage and revisions.

Monthly forecasts of the availability of fishery products are also supplied to the Department of Agriculture for use in the preparation of its monthly list of foods in plentiful supply, to the National Restaurant Association, and to a number of other national food trade groups.

In order to apprise the domestic industry of the trends and new developments in the foreign markets, arrangements are made for qualified experts to survey these markets. The survey during April-July 1956 included Norway, Sweden, Denmark, Western Germany, the Netherlands, Belgium, France and the United Kingdom. During the summer of 1955 a similar survey was made of the countries bordering the Caribbean to study their fisheries, fishery resources and prospects as markets for US-produced fishery products.

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## CHAPTER 4 — INDO-PACIFIC FISHERIES

### YEAR

1. In view of the fact that the limitations imposed by the inadequacy of trained personnel, equipment and other facilities of research still continue, and that no appreciable progress was made so far in the preliminary arrangements for the first Indo-Pacific Fisheries Year (IPFY), the Council considered that it might not be possible for all Member Governments to adjust fisheries survey programmes to coincide with the International Geo-Physical Year (IGY), commencing in July 1957.

2. The Council, however, stressed that the commencement of the first IPFY should, where possible, be 1 July 1957, but in any case the initiation of the programme should not be delayed beyond January 1958.

3. The Council recommended to Member Governments that a minimum programme for the collection of data during the IPFY should include statistics relating to:

- (a) Total fish production of a country, computed regionally by suitable sampling techniques or by total enumeration, where possible, together with break-up of fish landings indicating the major commercial species and types of fishing techniques employed.

- (b) Total fishing population, with separate figures for active adult fishermen.

- (c) Fishing craft and gear employed in fishing with their distribution.

4. The Council considered that the proposals in the above minimum programme should not be construed to imply a recommendation that Member Governments should limit their activities in this respect; and the Council would welcome the presentation of data related to other proposals contained in IPFC/1957/WP. 22.

5. The Council expressed the opinion that in certain cases the adoption of the minimum programme may give a stimulus to the development of national programmes in statistics.

6. The Council accepted with pleasure a suggestion from the Observer for WMO that data on meteorology required by fisheries authorities or organizations in member countries might be obtained by direct approach to the country's IGY Committee, from whom information on the scope of the country's meteorological programme could also be obtained.

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## CHAPTER 5—TECHNICAL ASSISTANCE

1. The Council noted that the activities proposed by FAO in the field of fishery development are consistent with the requirement of national fishery programmes in the region, and that these activities fall within the terms of reference of the Council. The Council recognized in this connection the scope for closer cooperation on the part of the Member Governments, the Council and FAO in order to secure greater coordination of the fishery development programmes in the region.

2. The Council commended FAO for the extensive Technical Assistance provided to the region. The view was, however, expressed that there was still ample scope for intensification of these activities.

3. The Committee further commended the decision of FAO to conduct a Training Centre in Fishery Cooperatives and Administration, in response to the recommendations made by the Council at its 6th Session and expressed its appreciation of the generous offer of the Australian Government to act as host in this connection.

4. The Council urged Member Governments to participate in this Training Centre and to nominate well-qualified candidates actively engaged in the organization and management of fisheries cooperatives.

5. The Council also noted that Member Governments in some cases have not given sufficiently high priority to fisheries when framing their overall requests for Technical Assistance and repeated its recommendation to Member Governments as contained in para 95-101 of the Summary Report of the 6th Session.

6. The Council recognized the desirability, in certain cases, of assigning experts for two or more years, it being understood that Member Governments should embody such requirements in the terms of their original requests to FAO for Technical Assistance.

7. In consideration of the limited number of personnel who can be accommodated under international training programmes, and the limitations imposed by language on these training programmes, the Council recognized

the desirability, in so far as this region is concerned, of FAO providing French interpretation services at future fishery training centres held in the region. The Council also stressed the desirability of FAO assisting Member Governments in the organization of National Training Centres.

8. The Council urged Member Governments to consider the advantages of Group Country Projects in which the services of one or more experts may be shared by a number of Governments requiring similar services, and thus a maximum utilization of the funds available to FAO for rendering Technical Assistance, may be ensured.

9. The Council drew to the attention of FAO the desirability of providing Member Governments, during preliminary negotiations in respect of Group Country Projects, with an estimate of the expenditure involved.

10. The Council recommended that Member Governments might give consideration to the desirability of requesting FAO to provide, under the ETAP, expert assistance to advise and assist Governments in organizing and operating systems for the collection of fisheries statistics.

11. Having reviewed the earlier Council proposal for a Training Center for fishing boat architects, the Council considered that for most countries in the region such a project was too ambitious and felt that vocational training of local boat builders was the first requirement.

12. The Council requested FAO to consider the possibilities of organizing a Regional Training Centre in Fish Preservation and Processing with particular reference to the Curing of Fish in Humid Tropical Climate.

13. The Council also suggested that Member Governments might consider the possibility of a Group Country Project under the ETAP as an immediate follow-up of such a Training Center.

14. The Council noted that clearly defined procedure requires that reports on Technical Assistance Projects are normally cleared with the Government of the country

receiving the assistance before they are released. The Council considered, however, that in some cases considerable advantage might be gained, if meetings of experts in the same field but assigned to different countries could be arranged, and that at such meetings delegations from the countries concerned should participate.

15. Having noted that Technical Assistance had been provided to other organizations, e.g. the South Pacific Commission, the Council decided that immediate steps should be taken to explore the possibility of the Council itself requesting and receiving Technical Assistance in relation to one or more special projects directly connected with the Council's work.

16. The Secretary was instructed to explore the possibility of developing such a proposal and to seek the advice of FAO Fisheries Division on the subject.

17. The Council decided that a specific subject upon which it might seek the provision

of Technical Assistance Funds was that relating to *Rastrelliger*.

18. The following Resolution was adopted:

**Having regard** to the present state of knowledge concerning *Rastrelliger* Fisheries and the problems confronting them,

**Having regard** to the need for vigorous steps to be taken to improve the standard of research in respect of these fisheries, and

**Having regard** to the desirability for securing standardization of the methods on the employment in such research work,

**The Council decided** to submit a request for consideration by the United Nations Technical Assistance Board to provide funds to permit the holding of a special short Seminar to train technical officers in the standard techniques recommended in the Record of the First Session of the *Rastrelliger* Sub-Committee of the IPFC held in Penang on the 24th–30th September 1956.

## CHAPTER 6—PUBLICATION AND DOCUMENTATION

1. The Council noted with pleasure the progress made by Fisheries Division, Rome, in the preparation of handbooks and noted that the production of these volumes owing to the requirements for simultaneous publication in 3 languages was very expensive, and the necessity for translating and editing into 2 additional languages from the original text entailed delays. The Council submitted that FAO may give consideration to the proposition that there is no necessity for handbooks, for use in the Indo-Pacific region, to be issued in Spanish, and urged that all possible steps be taken to ensure the distribution, at least in mimeograph, of texts as they became available. It was noted that the information contained in such handbooks was of the utmost importance to the countries in the region, and that extended delays in publication might result in much of the text becoming obsolete. Reviewing earlier discussion of the subject, the Council noted that the documents referred to at previous Sessions fell naturally into 2 groups; books of "Know How" which could be conveniently termed Handbooks and which were concerned largely with the methodology of the subject under consideration; the other group which might be termed Manuals were concerned with the documentation of information relating to the given subject.

1. The Council was informed that the Fisheries Division, FAO, was prepared to accept full responsibility for the preparation and publication of books in the handbook series, in so far as these works would be of world-wide interest and demand, and would deal with given subjects in a more or less generalized manner.

3. The Council agreed that volumes falling within the manual series could conveniently be a subject for action by the Council itself and in which the Council would take the initiative in designating subjects and stimulating the collection of material for inclusion.

4. The Council received with pleasure the assurance that the Fisheries Division of FAO would be ready to assist the Council in

the preparation of the manuals, and that it would give advice and guidance to the Council, and where necessary practical assistance in the preparation of handbooks.

5. The Council noted with satisfaction the accomplishments listed on pages 4 and 5 of the Report of the Executive Committee. It was further noted that the Current Affairs Bulletin, in its new form, shows an improvement in coverage and quality. The Council directed the Secretariat to take all possible steps to ensure that the Current Affairs Bulletin should be issued regularly each quarter.

6. The Council strongly recommended to Member Governments that they should make available, through the Administrative Correspondents, periodical progress reports on fisheries activities in their countries, so that the information contained in the Current Affairs Bulletin would be kept fully up-to-date.

7. The Council directed the Secretariat to take appropriate action to publish in printed form the Proceedings of the 7th Session, in accordance with the usual procedure and in view of the recommendations of the Editorial Committee.

8. The Council decided that the attention of Member Governments should be drawn to the need for documentation, as complete as possible, on the specific subjects within the Council's programme for the inter-session period, and it was urged that Technical Papers and other contributions submitted by Governments for consideration at Council's session should, as far as possible, relate specifically to the subjects within this programme.

9. In view of the fact that work is being conducted at national level on subjects other than those listed in the Council's programme, the Council expressed its willingness to receive information papers on such extra-curricular subjects and expressed the view that as far as possible these papers would receive the attention of the Council, provided Council consideration of its programme, as set out, would receive first priority. The Council recommended to Member Governments that papers on extra-curricular subjects should, where possible, rela

to new topics proposed by Member Governments for inclusion in the Agenda of the Council.

10. The Council directed the Secretariat to ensure that future reports of the Executive Committee and of the Council for presentation

to the FAO Conference should be prepared and transmitted, if necessary, as a first draft in sufficient time prior to the Council's Session to permit Member Governments to ensure adequate briefing of delegates.

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## CHAPTER 7—SYMPOSIUM FISH CULTURE IN RICE FIELDS

1. The value of fish culture in combination with rice cultivation was indicated by the comprehensive nature of many of the written contributions and the interest shown by participants in the discussions that followed. The main features of this culture that are followed in the member countries varied widely from the capture of local fish, casually introduced as a result of flooding the rice field, to systems where the culture of selected fish species forms an integral part of the rice field cultivation. Both brackish-water and fresh-water cultures were discussed.

2. The Symposium indicated where more work was urgently required as follows:

- a) The factors controlling the incidence of breeding of mosquitoes in rice fields should be clarified.
- b) A clear and simple directive should be compiled, based on scientific experiment, to indicate the effect on fish of commonly used insecticides.
- c) The fundamental principles underlying the present methods of such fish culture should be investigated.

3. Based on the Symposium and supported by the very keen interest of the Indonesian Delegation, Technical Committee I appointed the following Working Group to examine the problem of Fish Culture in Rice Fields:

Dr. K. Kuronuma (Japan)  
Mr. R. Gelar Wiraatmadja (Indonesia)  
Dr. G.R. Fish (U.K.)  
M. Cao Thien Buu (Viet Nam)  
Nai Boon Indrambarya (Thailand)

Mr. M. Ahjar, Convener of the Symposium, was appointed Chairman of the Working Group.

4. Following discussions the Working Group drew up a questionnaire to examine the actual development of this industry and its potential expansion in member countries. The questions to which answers are to be sought are as follows:

- i. What is the approximate acreage devoted to rice growing?
- ii. Approximately what proportion of this is also combined with fish culture?
- iii. To what depth of water (approximate maximum and minimum) are the rice fields flooded?
- iv. What is the approximate height of the bunds normally prepared in rice fields?
- v. Is there any possibility of expanding the scope of fish culture in combination with rice growing?

5. The examination of specific problems was referred to members of the Working Group as follows:

Dr. K. Kuronuma (Japan)  
— Insecticide research  
Mr. R. Gelar Wiraatmadja (Indonesia)  
— Anti-malarial measures  
Dr. G.R. Fish (U.K.)  
— Physiology of the pond complex  
M. Cao Thien Buu (Viet Nam)  
— Commercial exploitation  
Nai Boon Indrambarya (Thailand)  
— Promotion of fish culture in rice fields.

6. The Council confirmed the recommendations of the Working Group and decided that this Group should be established as a Sub-Committee on Fish Culture in Rice Fields to undertake the programme set out and to report to the Council at the next Session.

7. It was agreed that Member Governments should be requested to support the investigations of the Sub-Committee where practicable, to make available to it all information at present in hand and where possible to develop the investigations in accordance with the programme as set out.

## CHAPTER 8—RESOLUTIONS &amp; RECOMMENDATIONS

1. The resolutions, recommendations and requests which originated during the 7th Session of the Council fall into four main categories:

- A. Those requiring the attention of Member Governments.
- B. Those requiring the attention of FAO.
- C. Those relating to the activities of the Council.
- D. Resolutions of appreciation.

2. The following is a brief outline of the subjects upon which the Council has expressed its opinion, with cross reference to the full text of such opinions in the preceding chapters of the Proceedings.

A. To Member Governments	Chapter	Para
i. Council Budget Proposals	1	52 and Appendix V
ii. Indo-Pacific Fisheries year	4	
iii. 8th Session Symposium	1	70
iv. Representation on Committees and Panels	1	62-64
v. Technical Activities		
a. Standardization of Methods and Equipment	2	3-5
b. Check Lists of Fish	2	10
c. Fish Culture	2	13-15
d. Fish Culture in Rice Fields	7	2-7
e. Introduction of Exotic Species	2	16
f. River Basin Development	2	18
g. Water Pollution Control	2	19
h. Control of Aquatic Plants	2	20
i. Development of Inland Fisheries	2	21
j. <i>Mugil</i> Study	2	23
k. <i>Hilsa</i> Sub-Committee	2	24
l. Exploratory Trawl Fishing Results	2	25
m. Study of Faunal Changes	2	27-28
n. Compilation of Oceanographic Data	2	29
o. Tuna Catch Statistics Collection	2	31
p. <i>Rastrelliger</i> Studies, Seminar and Group Country Project	2	32-34 and Appendix to Chapter 2
q. Training of Fishermen	3	7
r. Shore-to-Ship Weather Information	3	16
s. Local Vegetable Oils in Fish Canning	3	19
t. Collection of Data on Processed Fishery Products	3	20
u. Fish Flour for Human Consumption	3	21
v. Group Country Project in Fish Curing	3 5	23 13
w. Processing and Storing Fish in Humid Tropics	3	25-26
x. Group Country Project in Fisheries Statistics	3	31-34
y. Review of Fishermen's Credit Facilities	3	38
z. FAO Training Centre in Fisheries Co-operatives and Administration	3	39-41
aa. Survey of Functions of Middlemen and Co-operatives	3	42-43

	Chapter	Para
vi. Technical Assistance		
a. FAO Training Centre in Fisheries Cooperatives and Administration	5	3-4
b. Requests for Technical Assistance	5	5-6
c. Group Country Project	5	8, 13
d. Expert Assistance on Statistics Collection	5	10
e. Regional Meetings of TA Experts	5	14
vii. Publications and Documentation		
a. Country Progress Reports	1	61
	6	6
b. Submission of Papers	6	8-9
<b>B. TO FAO</b>		
i. Council's Report to FAO Conference	1	50
ii. International Fishing Gear Congress	3	9
iii. Technical Assistance	5	14-18
a. <i>Rastrelliger</i> Seminar	2	33
	5	18
b. <i>Rastrelliger</i> Group Country Project	2	34
c. Meeting of Experts on Design of Beach Landing Craft	3	5
d. Regional Training Centres-French Interpretation	5	7
e. Regional Training Centre in Fish Preservation	3	22
	5	12
f. National Training Centres	5	7
g. Special Consultant in Fish Preservation to be assigned to FERRO	3	24
h. Statistics Programme and Expert Assistance	3	31-32
i. Estimates of Cost of Group Country Projects	5	9
j. Regional Meeting of Experts	5	14
iv. Documentation and Publications		
a. Handbook on Fishing Boat Design and Construction	3	1-3
b. Bibliography of Fish Marketing	3	36
c. Mimeographing of Handbooks	6	1
v. Technical Secretaries	1	60
vi. Technical Activities		
a. Standardization of Methods	2	3
b. Review of Nutrition in Fish Culture	2	14
<b>C. Council Activities</b>		
i. Liaison with International Organizations	1	47-49
ii. Time and Place of 8th Session	1	66-67
iii. Draft Reports for Governments	6	10
iv. Technical Committee I Programme	2	1,6,7,15,23,26,30,36
v. Technical Committee II Programme	3	13,15,17,33,34
vi. Chanos Sub-Committee	2	22
vii. <i>Rastrelliger</i> Sub-Committee	2	32-34 and Appendix to Chapter 2

	<i>Chapter</i>	<i>Para</i>
viii. Hilsa Sub-Committee	2	24
ix. Fish Culture in Rice Fields Sub-Committee	7	2-7
x. Fish Marketing Sub-Committee	3	35
xi. Technical Assistance to IPFC	5	15-16
xii. Subjects and Data for Manuals	6	3
xiii. Quarterly Current Affairs Bulletin	6	5

#### D. Resolutions of Appreciation

1. On a motion by the **Delegate for India** the Council adopted a resolution as follows :

That the Council records its grateful appreciation of the spontaneous hospitality and numerous facilities which have been so graciously extended by the Government and people of the Republic of Indonesia to the Council, to the Delegations of Member Governments and other participants attending the 7th Session, and directs that this expression of appreciation be formally communicated to the President of the Republic of Indonesia.

2. The **Delegate for Japan** Proposed and the Council adopted a resolution at follows :

That the Council expresses its sincere thanks to His Excellency the Minister of Agriculture of the Republic of Indonesia, Mr. R. Sadjarwo, for the cordial welcome extended by him to the delegates of the Member Governments, Observers and all others attending the 7th Session of the Council and also commends in the highest terms the assistance and co-operation received from the staff of the Ministry of Agriculture during the 7th Session of the Council.

3. The **Delegate for the United Kingdom**, proposed and the Council adopted a resolution as follows :

The Council desires to record an expression of its very sincere appreciation of the excellent arrangements made and the facilities provided by the Central and Local Organizing Committees, and also to record most grateful thanks for the personal assistance, hospitality and close attention to the well-being of the participants to the 7th Session by the individual members of the Organizing Committees.

4. The **Delegate for Ceylon** then proposed and the Council adopted a hearty vote of thanks to Dr. N.K. Panikkar for his excellent services to the Council as Chairman and for the skill and acumen with which he had directed the affairs of the Council since the 6th Session.

5. The **Delegate for Indonesia** proposed and the Council adopted a vote of gratitude to the Director-General of the Food and Agriculture Organization for his deep interest in the affairs of the Council and for the valuable assistance rendered during the 7th Session by the senior officers of F.A.O. Fisheries Division, who had served in the capacity of Technical Secretaries during this Session.

6. The **Delegate for Korea** proposed and the Council adopted a vote of appreciation of the services of the Council's Secretariat for the manner in which it had carried out the instructions of the Council since the 6th Session and also for the manner in which the 7th Session had been serviced. Attention was drawn particularly to the very valuable part played in servicing the 7th Session by local secretariat personnel, assigned to assist the Council's Secretariat by the Indonesian Government.

7. The **Delegate for Thailand** proposed and the Council adopted a vote of appreciation to the Director of the Forestry Department for his courtesy and assistance in making available for the Council's Session the Department of Forestry Building, and noted with gratitude the assistance and co-operation received from members of the staff of the Forestry Department.



APPENDIX 1.  
PARTICIPANTS AT THE SEVENTH SESSION

<i>Member Government Country</i>	<i>Name</i>	<i>Designation</i>	<i>Address</i>
Australia	Dr. A.M. Rapson (Delegate)	Chief	Division of Fisheries Dept. Agriculture, Stock and Fisheries, Port Moresby, Territory of Papua and New Guinea.
Cambodia	Mons. Sao-Leang (Delegate)	Chef	Division des Peches de la Province de Kandal, Direction des Eaux et Forets, Phnom Penh, Cambodia.
Ceylon	Mr. L.F. Tisseverasinghe (Delegate)	Assistant Director	Department of Fisheries, P.O. Box 531, Colombo, Ceylon.
France	Mons. M.P. Legand (Delegate)	Chef	Laboratoire d'Océanogra- phie de l'Institut Français d'Océanie (l'Office Fran- çais de la Recherche Scientifique d'Outre Mer) Bp. 4, Noumea, New Caledonia.
India	Dr. N.K. Panikkar (Delegate)	Fisheries Development Adviser	Ministry of Food and Agri- culture, New Delhi, India.
Indonesia	Mr. R. Pranjoto (Delegate)	Head	Central Office, Sea Fish- eries Service, 12 Djalan Kerapu, Djakarta-kota, Indonesia.
	Mr. R. Atmohardjono (Alternate)	Head	Central Office, Inland Fish- eries Service, 2 Djalan Nusantara, Djakarta, Indonesia.
	Mr. G.M. Charidjie Kasuma (Expert)	Chief	General Division, Sea Fish- eries Service, 12 Djakarta- kota, Indonesia.
	Mr. H. Saanin (Expert)	Chief	Laboratory for Inland Fisheries, 1 Djalan Sempur, Bogor, Indonesia.
	Mr. R. Gelar Wiraatmadja (Expert)	Chief	Education Division, Inland Fisheries Service, Suka- bumi, Indonesia.
	Mr. Eddiwan (Expert)	Chairman	Federation of Indonesian Fisheries Co-operatives, 12 Djalan Kerapu, Djakarta-kota, Indonesia.

<i>Member Government Country</i>	<i>Name</i>	<i>Designation</i>	<i>Address</i>
Indonesia (Continued)	Mr. R. Soelaeman Natadisastra (Expert)	Chief	Sea Fisheries Service, Central Sumatra Region, Tandjung, Indonesia.
	Mr. R.A. Kartono (Expert)	Chief	Research Division, Sea Fisheries Service, 12 Djalan Kerapu, Djakarta-kota, Indonesia.
	Mr. V. Soesanto (Expert)	Acting Chief	Biological Section, Sea Fisheries Service, 12 Djalan Kerapu, Djakarta-kota, Indonesia.
	Mr. Abdussamad Djaingsastro (Expert)	Chief	Inland Fisheries Service, East Java Province, Surabaya, Indonesia.
	Mr. Harsono Hardjohutomo (Expert)	Head	Food Technology Section, Bureau of Horticulture, Pasar Minggu, Djakarta, Indonesia.
	Mr. R.O. Ardiwinata (Adviser)	Head	Inland Fisheries Research Institute, Pasar Minggu, Djakarta, Indonesia.
	Mr. Moh. Ahjar (Adviser)	Chief	Inland Fisheries Service, West Java Province, 17 Djalan Wastu Kentjana, Bandung, Indonesia.
	Mr. Moh. Unar (Adviser)	Sea Fisheries Officer	Biological Section, Central Office, Sea Fisheries Service, Djakarta, Indonesia.
	Mr. Samiru Wirjodinolo (Adviser)	Deputy Chief	Inland Fisheries Service, Central Java Province, Semarang, Indonesia.
	Mr. R. Soekarno (Adviser)	Chief	Socio-economics Division, Inland Fisheries Service, 2 Djalan Nusantara, Djakarta, Indonesia.
	Mr. Kamaralsjah (Adviser)	Chief	Educational Section, Co-operative Service, 1 Djalan Gadjah Mada, Djakarta, Indonesia.
	Dr. Poerwosoedarmo (Adviser)	Head	Nutrition Board, Djalan Diponegoro, Djakarta, Indonesia.
	Mr. R. Soerjaatmadja (Adviser)	Deputy Chief	Institute for the Investigation of the Sea, Pasar Ikan, Djakarta, Indonesia.

<i>Member Government Country</i>	<i>Name</i>	<i>Designation</i>	<i>Address</i>
Indonesia (Continued)	Mr. R.A. Soemarjo (Adviser)	Chief	Educational Division, Djawatan Meteorologi dan Geofisik, Gedung Anggeris 3, Djakarta, Indonesia.
Japan	Dr. K. Kuronuma (Delegate)	Chief	Freshwater Fisheries Research Laboratory, Hinomachi, Tokyo, Japan.
	Mr. N. Oka (Alternate)	Chief	Data and Statistics Section, Fisheries Agency, Kasumigasaki, Chiyoda-ku, Tokyo, Japan.
	Mr. W. Miyake (Adviser)	Vice-Consul	Japanese Consulate-General, Djakarta, Indonesia.
Korea	Mr. Chee Choul Keun (Delegate)	Director	Bureau of Fisheries, Office of Marine Affairs, Republic of Korea, Seoul, Korea.
Netherlands	Mr. M.H. Brodhaag (Delegate)	Agricultural Attache	Netherlands Diplomatic Mission, Medan Merdeka Timur 3, Djakarta, Indonesia.
Philippines	Mr. C. Martin (Delegate)	Chief	Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.
Thailand	Mr. Boon Indrambarya (Delegate)	Director-General	Department of Fisheries, Rajadamnern Avenue, Bangkok, Thailand.
	Mr. Charoon Phasukavanich (Alternate)	Director	Fish Marketing Organization, New Road, Bangkok, Thailand.
	Mr. Padh Tavaranusorn (Adviser)	Head	Socio-economics Section, Department of Fisheries, Rajadamnorn Avenue, Bangkok, Thailand.
	Mr. G. Sand (Adviser)	FAO/ETAP Fisheries Technologist	c/o FAO Regional Office, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.
U.K. (Malaya and Hong Kong)	Dr. Tham Ah Kow (Delegate)	Chief Fisheries Officer	Fisheries Division, Ministry of Commerce and Industry, P.O. Box 749, Singapore.

<i>Member Government Country</i>	<i>Name</i>	<i>Designation</i>	<i>Address</i>
U.K. (Malaya and Hong Kong) (Continued)	Mr. W.D. Orchard (Alternate)	Fisheries Officer	Department of Agriculture, Fisheries and Forestry, Kom Tsun Street, Laichikok, Kowloon, Hong Kong.
	Dr. G.R. Fish (Adviser)	Scientific Officer-in-Charge	Fish Culture Research Institute, Batu Berendam, Malacca, Federation of Malaya.
	Mr. Foo Fah Lin (Adviser)	Senior Fisheries Assistant	H.Q. Fisheries Department, Penang, Federation of Malaya.
	Mr. Yu Yat Sum (Adviser)	Assistant Fisheries Officer	Department of Agriculture, Fisheries and Forestry, Kom Tsun Street, Laichikok, Hong Kong.
	Mr. J.D. Bromhall (Adviser)	Chief Scientific Officer	Fisheries Research Unit, University of Hong Kong, Hong Kong.
	Mr. I. Petersen (Adviser)	Marketing Officer	Cooperative and Marketing Department, Tung Kung Street, Yaumati, Kowloon, Hong Kong.
U.S.A.	Dr A.L. Tester (Delegate)	Director	Pacific Oceanic Fishery Investigations, P.O. Box 3830, Honolulu, Territory of Hawaii.
	Mr. E.H. Dahlgren (Alternate)	Technical Adviser	I.C.A., c/o American Embassy, Djakarta, Indonesia.
	Mr. G.M. Taggart (Adviser)	Chief	Fisheries Division, Economics-Finance Department, U.S. Civil Administration of the Ryukyu Islands, APO 331, Naha, Okinawa.
Vietnam	Mons. Cao Thien Buu (Delegate)	Chef	Service National des Peches Continentales, Direction des Eaux et Forets des Viet Nam, Saigon, Vietnam.

## OBSERVER ORGANIZATIONS AND NON-MEMBER GOVERNMENTS

<i>Observer Organizations and Non-Member Governments</i>	<i>Name</i>	<i>Designation</i>	<i>Address</i>
Natural History Society of Indonesia (Perkumpulan Penggemar Alam di Indonesia)	Mr. Garnadi Prawirosudirdjo (Observer)	Chief	Biological Section, Teacher, University, c/o P.T.P.G. Bumi Siliwangi, Bandung, Indonesia.
PIOSA	Dr. A.M. Rapson (observer)	Chief	Division of Fisheries, (Papua and New Guinea) Port Moresby, Territory of Papua and New Guinea.
Science Council of Indonesia (Majelis Ilmu Pengetahuan Indonesia)	Prof. Kusnoto Setyodiwiryo (Observer)	Director	Botanical Gardens (Kebun Raya), Bogor, Indonesia.
WMO	Mr. W.W. Simon (Observer)	Chief	Meteorological Division, Djawatan Meteorologi dan Geofisik, Geredja Inggris 3, Djakarta, Indonesia.
Portugal	Dr. J. Vidigal (Observer)	Medico Veterinario	Municipal Avenida Republica No. 88, Macao.
VISITORS	Dr. K.F. Vaas Mrs. A. Vaas-van Oven		Laboratory for Inland Fisheries, Bogor, Indonesia.
	Mr. T.H. Butler Mr. T. Tonomura Mr. Salam		Sea Fisheries Service, Djakarta, Indonesia.
	Mr. M. Abdullah Mr. E.D. Damanik		Co-operative Service, Ministry of Trade, Djakarta, Indonesia.
	Ir. Gunawan Satari Ir. Backtiar Rifai		Faculty of Agriculture, University of Indonesia Bogor, Indonesia.
	Prof. Dr. P. Heegard Dr. D. Tisnamidjaja		Faculty of Mathematical & Natural Historical Sciences, University of Indonesia, Bandung, Indonesia.
	Mr. A. Jazir		Ministry of Agriculture, Djakarta, Indonesia.
	Mr. J.A. Tubb	Secretary of the IPFC	Regional Fisheries Officer, FAO Regional Office for Asia and the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.
IPFC SECRETARIAT			

<i>Observer Organizations and Non-Member Governments</i>	<i>Name</i>	<i>Designation</i>	<i>Address</i>
IPFC SECRETARIAT (Continued)	Dr. G.L. Kesteven	Technical Secretary	Chief, Biology Branch, Fisheries Division, FAO, Viale delle Terme di Caracalla, Rome, Italy.
	Mr. C. Beever	Technical Secretary	Fisheries Economist, Fisheries Division, FAO, Viale delle Terme di Caracalla, Rome, Italy.
	Dr. M.R. Khan	Technical Secretary	Assistant Regional Fisheries Officer, FAO Regional Office for Asia and the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.
	Miss A. Jiannee	Conference Officer	Technical Assistant, Fisheries Division, FAO Regional Office for Asia and the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.
	Mr. E. Hidiger	French/English Interpreter	Case Servette 51, Geneva, Switzerland.
	Mr. P. Tolstoy	French/English Interpreter	2 Chemin de Roches, Geneva, Switzerland.
F.A.O.	Mr. W.H. Cummings	Regional Representative of the Director-General of FAO	FAO Regional Office for Asia and the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.
	Dr. H.C. Trumble	FAO Country Representative in Indonesia	FAO Technical Assistance Mission to Indonesia, Djalan Salemba Raya 16, Djakarta, Indonesia.
	Mr. G. Mulgrue	Regional Information Adviser	FAO Regional Office for Asia and the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.
	Dr. K.F. Tiews	FAO/ETAP Fisheries Biologist	c/o TAB Resident Representative, United Nations Building, Padre Faura, Manila, Philippines.
	Mr. S. Bunnag	Assistant Regional Information Officer	FAO Regional Office for Asia and the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.

## INDONESIAN GOVERNMENT CENTRAL ORGANIZING COMMITTEE

Mr. Hasanuddin Saanin	Chairman
Mr. R. Soekarno	Vice-Chairman I
Mr. R.M. Iskandar	Vice-Chairman II
Mr. R. Pramudjo	Secretary
Mr. R. Soedjono	Treasurer
Mr. Soekardi	Member
Mr. Gelar Wiraatmadja	Excursion Officer
Mr. Roestami Djajadiredja	Reception and Return Travel
Mr. F. Chalik	
Mr. R. Koestedjo	Information Officer
Miss S. Boediningsih	Assistant Conference Officer

## BANDUNG LOCAL ORGANIZING COMMITTEE

Mr. M. Ahjar	Chairman
Mr. Soekardi	Vice-Chairman
Mr. Salkorn Wigena	Secretary
Mr. I. Tanumanggala	Treasurer
Mr. Hambali Winatapradja	Accommodation Officer-Bandung
Mr. M.T. Wiraatmadja	Information Officer
Mr. R. Kartasa Wargadiradja	Protocol Officer
Mr. R. Hendra Djajusman	Security Officer
Mr. M.K.M. Mangundiprodjo	Sound equipment & accommodation Officer
Mr. R.M. Martakusumah	Entertainment Officer
Mr. V. Gent	Electricity Officer
Mr. Achmad Kartadibrata	Documentation Officer
Mr. R. Atmawiria	Transport Officer
Mr. Usman Nandika	Conference Building Officer

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## APPENDIX II

### I P F C NOMINATIONS

The following nominations took place at the 7th Session of the IPFC for Council Administrative and Bibliographic Correspondents, Members of Technical Committees I and II and their respective Panels.

<i>Member Governments</i>	<i>Administrative Correspondent</i>	<i>Bibliographic Correspondent</i>
AUSTRALIA	The Secretary, Australian National FAO Committee, c/o Department of External Affairs, Canberra, Australia.	Mrs. L.M. Willings, Division of Fisheries and Oceanography, CSIRO, Cronulla, N.S.W., Australia.
BURMA	The Secretary, Ministry of Agriculture and Forests, Union of Burma, Rangoon, Burma.	U Ba Kyaw, Executive Officer, Division of Fisheries, Agriculture and Rural Development Corporation, Corner of Dalhousie Street and Thompson Street, Rangoon, Burma.
CAMBODIA	Monsieur Sao Leang, Chef de Division des Pêches de Kandal, Direction des Eaux et Forêts, Phnom Penh, Cambodia.	Monsieur R. Lafont, Charge, l'Institut de Recherches Piscicoles, Phnom Penh, Cambodia.
CEYLON	Director of Fisheries, Department of Fisheries, P.O. Box 531, Colombo, Ceylon.	Director of Fisheries, Department of Fisheries, P.O. Box 531, Colombo, Ceylon.
FRANCE	Le Directeur de l'Office de la Recherche scientifique et technique d'Outre-Mer, 47 Boulevard des Invalides, VII Paris, France.	Le Directeur de l'Office de la Recherche scientifique et technique d'Outre-Mer, 47 Boulevard des Invalides, VII Paris, France.
INDIA	Dr. N.K. Panikkar, Fisheries Development Adviser, Department of Agriculture, Ministry of Food and Agriculture, New Delhi, India.	Dr. D.V. Bal, Director, Institute of Science, Mahatma Gandhi Road, Fort Bombay, India.
INDONESIA	Mr. R.M. Soepanto Koesoemowinoto, Sea Fisheries Officer, Sea Fisheries Service, Foreign Relations Section, 12 Djalan Kerapu, Djakarta, Indonesia.	Miss Rr. S. Boediningsih, Secretary, National IPFC Committee of Indonesia, 12 Djalan Kerapu, Djakarta, Indonesia.
JAPAN	Mr. M. Takashima, Chief of the Second Section, International Co-operation Bureau, Ministry of Foreign Affairs, Chiyoda-ku, Tokyo, Japan.	Dr. N. Sasaki, Data and Statistics Section, Fisheries Agency, 2-2 Kasumigaseki, Chiyoda-ku, Tokyo, Japan.
KOREA	Mr. Chee Choul Keun, Director, Fisheries Bureau, Office of Marine Affairs, Seoul, Korea.	Mr. Nam Sang Kyu, Chief, Fishing Section, Bureau of Fisheries, Office of Marine Affairs, Seoul, Korea.
NETHERLANDS	Mr. W.A. Mackenzie, Inspector of Sea Fisheries, Department of Agriculture and Fisheries, Hollandia, Netherlands New Guinea.	



<i>Member Government</i>	<i>Administrative Correspondent</i>	<i>Bibliographic Correspondents</i>
PAKISTAN	Dr. M.R. Qureshi, Director, Central Fisheries Department, Karachi-3, Pakistan.	Dr. A.H. Qadri, Department of Zoology, University of Karachi, Karachi, Pakistan.
PHILIPPINES	Mr. C. Martin, Chief, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.	Mr. I.A. Ronquillo, Fishery Biologist, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.
THAILAND	Mr. Boon Indrambarya, Director-General, Department of Fisheries, Bangkok, Thailand.	Mr. Jinda Thiemmedh, Inland Fisheries Biologist, Department of Fisheries, Bangkok, Thailand.
U.K. (for Federation of Malaya, Singapore, Borneo & Sarawak)	U.K. Liaison Officer with U.N.O., British Embassy, Bangkok, Thailand.	Mr. D.W. Le Mare, Director of Fisheries for Federation of Malaya and Singapore, H.Q. Fisheries Department, P.O. Box 459, Penang, Malaya.
U.K. (for Hong Kong)	Director, Department of Agriculture, Fisheries and Forestry, Hong Kong.	Director, Department of Agriculture, Fisheries and Forestry, Hong Kong.
U.S.A.	Dr. A.L. Tester, Director, Pacific Oceanic Fishery Investigations, P.O. Box 3830, Honolulu, Hawaii.	Mr. J.E. King, Fishery Research Biologist, POFI, P.O. Box 3830, Honolulu, Hawaii.
VIETNAM	Monsieur Tran Van Tri, Inspecteur des Pêches, Direction de la Navigation, Ministère de Travaux Publics, Saigon, Vietnam.	Monsieur Cao Thien Buu, Chef, Service National des Pêches Continentales, Direction des Eaux et Forêts, Saigon, Vietnam.

## I.P.F.C. TECHNICAL COMMITTEE I AND PANELS A AND B

<i>Member Governments</i>	<i>Technical Committee I</i>	<i>Panel A (Inland Fisheries)</i>	<i>Panel B (Sea Fisheries)</i>
AUSTRALIA	Dr. G.E. Humphrey, Chief, Division of Fisheries and Oceanography, CSIRO, Cronulla, N.S.W., Australia.	Dr. A.G. Nicholls, Senior Research Officer, Division of Fisheries and Oceanography, CSIRO, Cronulla, N.S.W., Australia.	Mr. J.M. Thomson, Senior Research Officer, Division of Fisheries and Oceanography, CSIRO, Cronulla, N.S.W., Australia.
BURMA	U Ba Kyaw, Executive Officer, Division of Fisheries, Agricultural and Rural Development Corporation, Rangoon-Insein Road, Kamayut, Burma.	(No nomination)	U Tint Hlaing, Division of Fisheries, Agricultural and Rural Development Corporation, Rangoon-Insein Road, Kamayut, Burma.
CAMBODIA	(No nomination)	Mons. Sao-Leang, Chef de Division des Peches de Kandal, Direction des Eaux et Forets, Phnom Penh, Cambodia.	(No nomination)
CEYLON	Mr. E.R.A. de Zylva, Deputy Director of Fisheries, Department of Fisheries, P.O. Box 531, Colombo, Ceylon.	Mr. A.S. Mendis, Research Officer, Department of Fisheries, P.O. Box 531, Colombo, Ceylon.	Mr. S. Sivalingam, Research Officer, Department of Fisheries, P.O. Box 531, Colombo, Ceylon.
FRANCE	Mons. J. Lemasson, Conservateur des Eaux et Forets, Ministere de la France d'Outre Mer, 27 rue Oudinot, Paris 7e, France.	Mons. J. Lemasson, Conservateur des Eaux et Forets, Ministere de la France d'Outre Mer, 27 rue Oudinot, Paris 7e, France.	Mons. M.P. Legand, Chef, Laboratoire d'Océanographie de l'Institut Français d'Océanie, I.F.O. Bp 4, Noumea, New Caledonia.
INDIA	Dr. B.S. Bhimachar, Chief Research Officer, Central Inland Fisheries Station, 47/1 Strand Road, Calcutta-7, India.	Mr. K.H. Alikunhi, Research Officer, Central Inland Fisheries Station, Cuttack, Orissa, India.	Dr. S. Jones, Chief Research Officer, Central Marine Fisheries Station, Mandapam Camp P.O., S. India.
INDONESIA	*Mr. Hasanuddin Saanin, Chief, Laboratory for Inland Fisheries, 99 Tjikeumeuh, Bogor, Indonesia.	Mr. R. Gelar Wiraatmadja, Chief, Education Division, Inland Fisheries, 15 Djalan Selabintana, Sukabumi, Indonesia.	*Mr. R. Soelaeman Natadisastra, Chief, Sea Fisheries Service, Tandjung Pinang, Central Sumatra Region, Indonesia.
JAPAN	Dr. K. Kuronuma, Chief, Freshwater Fisheries Research Laboratory, Hinomachi, Minamitamagun, Tokyo, Japan.	Dr. K. Kuronuma, Chief, Freshwater Fisheries Research Laboratory, Hinomachi, Minamitamagun, Tokyo, Japan.	Mr. T. Nakai, Chief, Marine Resources Section, Tokai Regional Fisheries Research Laboratory, Tsukishima, Chuo-ku, Tokyo, Japan.

Member Governments	Technical Committee I	Panel A (Inland Fisheries)	Panel B (Sea Fisheries)
KOREA	Mr. Chee Choul Keun, Director, Bureau of Fisheries, Office of Marine Affairs, Seoul, Korea. (No nomination)	Mr. Chung Moon Ki, Chief, Fisheries Inspection Station, Office of Marine Affairs, Seoul, Korea. (No nomination)	Mr. Chee Choul Keun, Director, Bureau of Fisheries, Office of Marine Affairs, Seoul, Korea. (No nomination)
NETHERLANDS			
PAKISTAN	Dr. N. Ahmad, Director of Fisheries, Eden Building, Dacca, East Pakistan.	Mr. K.A. Husain, Warden of Fisheries, 2 Sanda Road, Lahore, West Pakistan.	Mr. A.G. Hussain, Deputy Director, Central Fisheries Department, Karachi-3, Pakistan.
PHILIPPINES	Mr. I.A. Ronquillo, Fishery Biologist, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.	Mr. P. Acosta, Fish Culturist, Inland Fisheries Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.	Mr. I.A. Ronquillo, Fishery Biologist, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.
THAILAND	Mr. Prida Karnasut, Chief, Inland Fisheries Division, Department of Fisheries, Bangkok, Thailand.	Mr. Prida Karnasut, Chief, Inland Fisheries Division, Department of Fisheries, Bangkok, Thailand.	Mr. Sant Bandhukul, Head, Control Section, Division of Fisheries Administration, Department of Fisheries, Bangkok, Thailand.
U.K.	Dr. Tham Ah Kow, Chief, Fisheries Officer, Fisheries Division, Ministry of Commerce & Industry, P.O. Box 749, Singapore. (No nomination)	(1) Dr. G.R. Fish, Scientific Officer-in-Charge Fish Culture Research Institute, Batu Berendam, Malacca, Federation of Malaya. (2) Assistant Fisheries Officer, Department of Agriculture, Fisheries and Forestry, Kom Tsun Street, Laichikok, Hong Kong. (No nomination)	(1) Mr. J.D. Bromhall, Chief Scientific Officer, Fisheries Research Unit, University of Hong Kong, Hong Kong. (2) Dr. Tham Ah Kow, Chief Fisheries Officer, Fisheries Division, Ministry of Commerce & Industry, P.O. Box 749, Singapore.
U.S.A.	Dr. A.L. Tester, Director, Pacific Oceanic Fishery Investigations, P.O. Box 3830, Honolulu, Hawaii.	(No nomination)	Dr. A.L. Tester, Director, Pacific Oceanic Fishery Investigations, P.O. Box 3830, Honolulu, Hawaii.
VIETNAM	Mons. Cao Thien Buu, Chef, Service National des Peches Continentales, Direction des Eaux et Forets Saigon, Vietnam.	*Mons. Cao Thien Buu, Chef, Service National des Peches Continentales, Direction des Eaux et Forets, Saigon, Vietnam.	Dr. Ngo Ba Thanh, Chef, Service National des Peches Maritimes, Ministere de Travaux Publics, Saigon, Vietnam.

\* denotes Chairman

## I.P.F.C. TECHNICAL COMMITTEE II AND PANELS, A, B AND C

Member Governments	Technical Committee II	Panel A (Craft and Gear)	Panel B (Food Technology)	Panel C (Socio-Economics and Statistics)
AUSTRALIA	Mr. F.F. Anderson, Director, Commonwealth Fisheries Office, Department of Primary Industry, Barton, Canberra, ACT., Australia.	Mr. F.F. Anderson, Director, Commonwealth Fisheries Office, Department of Primary Industry, Barton, Canberra, ACT., Australia.	Dr. J.R. Vickery, Division of Food Preservation & Transport, CSIRO, Homebush, N.S.W., Australia.	Mr. A.C. Bogg, Senior Research Officer, Division of Food Preservation and Transport, CSIRO, Homebush, N.S.W., Australia.
BURMA	U Ba Kyaw, Executive Officer, Division of Fisheries, Agricultural & Rural Development Corporation, Rangoon-Insein Road, Kamayut, Burma.	U Ba Kyaw, Executive Officer, Division of Fisheries, Agricultural & Rural Development Corporation, Rangoon-Insein Road, Kamayut, Burma.	(No nomination)	(No nomination)
CAMBODIA	(No nomination)	(No nomination)	Mons. M.R. Lafont, Charge, l'Institut de Recherches Piscicoles, Phnom Penh, Cambodia.	Mons. Sao-Leang, Chef, de Division des Peches de Kandal, Direction des Eaux et Forêts, Phnom Penh, Cambodia.
CEYLON	Mr. L. Tisseverasinghe, Assistant Director of Fisheries, Fisheries Department, P.O. Box 531, Colombo, Ceylon.	Mr. E.R.A. de Zylva, Deputy Director of Fisheries, Fisheries Department, P.O. Box 531, Colombo, Ceylon.	Mr. E. St. C. Gunasekera, Research Chemist, Fisheries Department, P.O. Box 531, Colombo, Ceylon.	Mr. V.L.C. Pietersz, Assistant Director of Fisheries, Fisheries Department, P.O. Box 531, Colombo, Ceylon.
FRANCE	Mons. R. Serene, Adviser, Institut Oceanographique de Nha Trang, Station Maritime de Cauda, Nha Trang, Vietnam.	(No nomination)	(No nomination)	(No nomination)
INDIA	Dr. D. Bhatia, Deputy Fisheries Development Adviser, Department of Agriculture, Ministry of Food and Agriculture, New Delhi, India.	Dr. C.V. Kulkarni, Director of Fisheries, Taraporewala Aquarium, Marine Drive, Bombay, India.	Mr. R. Venkataraman, Assistant Director of Fisheries, Fisheries Technological Station, Tuticorin, Madras State, India.	Mr. G.N. Mitra, Director of Fisheries, Department of Fisheries, Cuttack, Orissa, India.

<i>Member Governments</i>	<i>Technical Committee II</i>	<i>Panel A (Craft and Gear)</i>	<i>Panel B (Food Technology)</i>	<i>Panel C (Socio-Economics and Statistics)</i>
INDONESIA	*Mr. G.M. Charidjje Kasuma, Chief, General Division, Sea Fisheries Service, 12 Djalan Kerapu, Djakarta-Kota, Indonesia.	Mr. R.A. Kartono, Chief, Research Division, Sea Fisheries Service, 12 Djalan Kerapu, Djakarta-Kota, Indonesia.	*Mr. M. Harsono Hardjohutomo, Chief, Food Technology Section, Bureau Horticulture, Pasar Minggu, Djakarta, Indonesia.	Mr. Eddiwan, Chairman, Federation of Indonesian Fisheries Cooperatives, 12 Djalan Kerapu, Djakarta-Kota, Indonesia.
JAPAN	Mr. N. Oka, Chief Data and Statistics Section, Fisheries Agency, Kasumigaseki, Chiyoda-ku, Tokyo, Japan.	Mr. S. Takayama, Chief, Fishing Gear and Method Section, Tokai Regional Fisheries Research Laboratory, Tsukishima, Chuo-ku, Tokyo, Japan.	Mr. M. Higashi, Chief, Marine Product Utilization, Section, Tokai Regional Fisheries Research Laboratory, Chuo-ku, Tokyo, Japan.	*Mr. N. Oka, Chief, Data and Statistics Sections, Fisheries Agency, Kasumigaseki, Chiyoda-ku, Tokyo, Japan.
KOREA	Mr. Rhee Im Do, Chief, Fishing Section, Central Fisheries Research Station, Pusan, Korea.	Mr. Rhee Im Do, Chief, Fishing Section, Central Fisheries Research Station Pusan, Korea.	Mr. Rhee Bong Nae, Chief, Processing Section, Central Fisheries Research Station, Pusan, Korea.	Mr. Chee Choul Keun, Director, Bureau of Fisheries, Office of Marine Affairs, Seoul, Korea.
NETHERLANDS	(No nomination)	(No nomination)	No nomination	(No nomination)
PAKISTAN	Dr. M.R. Qureshi, Director, Central Fisheries Department, Karachi-3, Pakistan.	Mr. M.A. Burney, Fisheries and Gear Technologist, Central Fisheries Department, Karachi-3, Pakistan.	Mr. S.A. Ali, Deputy Director, Directorate of Fisheries, Comilla, East Pakistan.	Mr. S.A. Jaleel, Assistant Director, Central Fisheries Department, Karachi-3, Pakistan.
PHILIPPINES	Mr. C. Martin, Chief, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila Philippines.	Mr. S.B. Rasalan, Fishery Technologist, Marine Fisheries Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.	Mr. J.I. Sulit, Chemist, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.	Mr. J. Montemayor, Fishery Statistician, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.
THAILAND	Mr. Tuanthai Bumradharinpai, Chief, Fisheries, Investigation Division, Department of Fisheries, Bangkok, Thailand.	Mr. Sanan Ruamraksas, Gear Specialist, Department of Fisheries, Bangkok, Thailand.	M.C. Kosol Suriyong, Head, Technological Section, Department of Fisheries, Bangkok, Thailand.	Mr. Swasdi Thiemmedh, Chief, Fisheries Administrative Division, Department of Fisheries, Bangkok, Thailand.

Member Governments	Technical Committee II	Panel A (Craft and Gear)	Panel B (Food Technology)	Panel C (Socio-economics and Statistics)
U.K.	Fisheries Officer, Department of Fisheries, Department of Agriculture, Fisheries and Forestry, Kom Tsun Street, Laichikok, Hong Kong.	<p>* (1) Fisheries Officer Department of Fisheries, Department of Agriculture, Fisheries and Forestry, Kom Tsun Street, Laichikok, Hong Kong.</p> <p>(2) Mr. Foo Fah Lin, Senior Fisheries Assistant, H.Q. Fish Department, Penang, Federation of Malaya.</p>	Marketing Officer, Co-operative and Marketing Department, Tung Kung Street, Yaumati, Kowloon, Hong Kong.	<p>(1) Marketing Officer, Co-operative and Marketing Department, Tung Kung Street, Yaumati, Kowloon, Hong Kong.</p> <p>(2) Mr. Foo Fah Lin, Senior Fisheries Assistant, H.Q. Fish Department, Penang, Federation of Malaya.</p>
U.S.A.	Mr. G.M. Taggart, Chief, Fisheries Division, Economics-Finance Department, US Civil Administration of the Ryukyu Islands, APO 331, Naha, Okinawa.	Mr. G.M. Taggart, Chief, Fisheries Division, Economics-Finance Department, US Civil Administration of the Ryukyu Islands, APO 331, Naha, Okinawa.	Mr. E.H. Dahlgren, Fishery Technical Adviser, c/o American Embassy, Djakarta, Indonesia.	Mr. L.S. Christey, Fishery Technical Adviser, c/o American Embassy, Karachi, Pakistan.
VIETNAM	Dr. Ngo Ba Thanh, Chief, Service National des Peches Maritimes, Ministere des Travaux Publics, Saigon, Vietnam.	Mons. Tran Van Tri, Inspecteur des Peches, Direction de la Navigation, Ministere des Travaux Publics, Saigon, Vietnam.	Dr. Ngo Ba Thanh, Chief, Service National des Peches Maritimes, Ministere des Travaux Publics, Saigon, Vietnam.	Mons. Nguyen Van Tich, Chef, Bureau Social Economique Service des Peches Maritimes, Ministere des Travaux Publics, Saigon, Vietnam.

\* Indicates Chairman of Committee or Panel

APPENDIX III  
RASTRELLIGER SUB—COMMITTEE

CEYLON	Dr. T.P. Goonewardena	Research Officer, Department of Fisheries, P.O. Box 531, Colombo, Ceylon.
INDIA	Dr. S. Jones	Chief Research Officer, Central Marine Fisheries Station, Mandapam Camp P.O., S. India.
INDONESIA	* Mr. V. Scesanto	Acting Chief, Biological Section, Sea Fisheries Service, 12 Djalan Kerapu, Djakarta, Indonesia.
PHILIPPINES	Mr. I.A. Ronquillo	Fishery Biologist, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.
THAILAND	Mr. Sant Bandhukul	Head, Control Section, Fisheries Administration Division, Department of Fisheries. Bangkok, Thailand.
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	(2) Dr. M.R. Qureshi	Director, Central Fisheries Department, Dundas Street, Karachi-3, Pakistan.

## FISH CULTURE IN RICE FIELDS SUB-COMMITTEE

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\* denotes Chairman

# APPENDIX IV LIST OF DOCUMENTS

## INCIDENTAL PAPERS:

IPFC/C57/INC	1	Provisional List of Delegates and observers.
	2	List of documents.
	3	Provisional Programme.
	4	Post Sessional Fisheries Tour (Central and East Japan).
	5	Excursion — Environs of Bandung & Tangkuban Prahur, 19 May. — Djakarta, Bogor and Puntjak, 25 May.
	6	General Information.
	7	IPFC Nominations.
	8	Opening Statements of Member Governments.
	9	Notes on the 1st Meeting of Tech. Comm. I.
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	14	Recommendations by the <i>ad hoc</i> Sub-Committee on Marketing to Tech. Comm. II.
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	16	Notes on the 4th Meeting of Tech. Comm. I.
	17	Notes on the 5th and 6th Meeting of Tech. Comm. II.
	18	Notes on the 7th Meeting of Tech. Comm. II.
	19	Notes on the 5th Meeting of Tech. Comm. I.
	20	Notes on the 8th and 9th Meeting of Tech. Comm. II.
	21	Notes on Meeting of Panel B, Tech. Comm. I.
	22	Notes from Working Group on Fish Culture in Rice Fields, Tech. Comm. I.
	23	Notes on the 6th Meeting of Tech. Comm. I.
	24	Notes on the 10th and 11th Meeting of Tech. Comm. II.
	25	Notes on the 7th Meeting of Tech. Comm. I.
	26	Notes on the 12th Meeting of Tech. Comm. II.

## WORKING PAPERS:

IPFC/C57/WP	1	Provisional Agenda (Annotated).
	1	Rev. 1 Ditto.
	2	Report of the Executive Committee.
	3	Technical Briefing of the Council's Delegations.
	4	Report to the 7th Session on the Status of the Fishing Industry (with bibliography of current literature).
	5	A Summary of the 1955 Research Programme of the Pacific Oceanic Fishery Investigations, Honolulu, T.H.
	6	Report of the Special Sub-Committee on "Tuna Catch Statistics Chart".

- IPFC/C57/WP 7 Documents Published by or otherwise Contributed or Presented to the IPFC through 1948—1956, with Attachment. (IPFC Occasional Paper 57/1).
- 8 Report on International Rice Commission 5th Session, Calcutta, India, 12—19 Nov. 1956.
- 9 Synopsis of Data on "Hilsa" *Hilsa ilisha* (Hamilton-Buchanan) 1822.
- 10 A Study of the Fishery Resources of the Indo-Pacific Region.
- 11 FAO Indo-Pacific Training Centre in Fishery Co-operative and Administration.
- 12 FAO Activities in Fishery Economics and Statistics of Interest to Indo-Pacific countries.
- 13 A Note on the FAO Programme in Connection with Living Aquatic Resources, with Special Reference to the Compilation of Data on Species of Economic Importance.
- 14 Study of Basic Production in Fishery Service.
- 15 A Note on Recent Developments in the Study of the Dynamics of Exploited Fish Populations.
- 16 The Role of Middlemen and Co-operatives in Indo-Pacific Fisheries.
- 17 FAO Liaison Committee on Fishery Products Technology-Purpose, History and Procedures.
- 18 Fishing Gear Research.
- 19 Methods and Equipment for Research in Fisheries Biology: Measures toward Improvement and Standardisation.
- 20 Handbooks and Manuals.
- 21 Technical Assistance in the Indo-Pacific Region.
- 22 Indo-Pacific Year.
- 23 Rastrelliger Investigations.
- 24 Reference List for Committee Work.
- 25 A Report on the Present Status of Aquatic Weed Control in the Indo-Pacific Countries.
- 26 Note on Soil Composition in Relation to Productivity of Fish Ponds.
- 27 Proposals for Council's Budget.
- 28 Fishery Products Manual.
- 29 Version Française Officielle des Amendements adoptés par le Conseil lors de Sixième Session.
- 30 Commercial Production of Fish on Rice Lands.
- 31 Statement relevant to the Problem of Basic Productivity of the Ocean.
- 32 Control of Aquatic Vegetation.
- 33 Report on the Standardisation of Plankton Collecting Gear.
- 34 3rd FAO Regional Conference for Asia and the Far East-Recommendations relating to Fisheries.
- 35 Report of Technical Committee I (Panels A and B).
- 36 Report of Technical Committee II (Panels A, B & C).
- 37 Report of the Special Committee to consider the Executive Committee's Report.
- 38\* Handbook for Preliminary Fishery Surveys-First Draft.  
(subject to revision).

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\* This was in limited issue.

TECHNICAL PAPERS: Note:— Where Abstracts and/or Summaries have been provided they have been embodied in the paper.

		Subject	
IPFC/C57/TECH	1	A preliminary report on the sea scanar, an ultra-sonic fish finder..... Henny, S.H. Yuen	Craft & Gear. Abs.
	2	Age termination of Albacore by the vertebral method..... Tamio Otsu & Richard N. Uchida	Sea Fisheries. Abs.
	3	A new method of handling long-line gear. A description of POFI "Tub" gear ..... Herbert J. Mann	Craft & Gear. Abs.
	4	How should the time of food-supply be controlled in fish culture?..... Shinjiro Kobayashi & Hachiro Hirata (Figs. 1-4 retained)	Inland Fisheries. Sum.
	5	A Note on the difference of the basic organic production between the seas of low and high altitudes..... Rinnosuke Fukai	Sea Fisheries. Sum.
	6	A review on age determination of the Pacific Tunas ..... Shigeichi Hayashi	Sea Fisheries. Sum.
	7	Bangos fry trawl..... D.M. Bunag	Inland Fisheries. Abs. Craft & Gear.
	8	Notes on growing of Lab-lab in Bangos nursery ponds ..... I.A. Ronquillo and A. de Jesus	Inland Fisheries. Abs.
	9	Processing and storage of salted herring ( <i>Sardinella perforata</i> Cantor) ..... J.I. Sulit, R.S. Napugan, E.A. Caldito, P. Santos & F.R. Gonzales	Food Technology. Abs.
	10	Observations on artificial feeding of Bangos fry <i>Chanos chanos</i> (Forsk.)..... I.A. Ronquillo & E. Villamater	Inland Fisheries. Abs.
	11	Observations on the use of Terramycin and Vigofac-enriched diet on Bangos fry, <i>Chanos chanos</i> (Forsk.) ..... I.A. Ronquillo, E. Villamater & H. Angeles	Inland Fisheries. Abs.
	12	Fertilization of Bangos nursery ponds with commercial chemical fertilizer..... J.I. Sulit, R.S. Esguerra & H.R. Rabanal	Inland Fisheries. Abs.

		Subject	
IPFC/C57/TECH 13	Studies on food and feeding habits of the Common Carp in Indonesian ponds I — Changes in the diet during growth II — The food of the Common Carp in ponds in various circumstances..... K.F. Vaas	Inland Fisheries.	Abs. Abs.
14	On the use of Marygold ( <i>Tithonia diversifolia</i> Gray) as green manure in Indonesian Carp ponds..... A. Vaas-van Oven	Inland Fisheries.	Abs.
15	Experiments on different stocking rates of the Common Carp ( <i>Cyprinus carpio</i> L.) in nursing ponds..... A. Vaas-van Oven	Inland Fisheries.	Abs.
16	Some notes on a Tendipedide larva of the <i>plumosus</i> -type from Java..... Slamet Soeseno	Inland Fisheries.	Abs.
17	A preliminary report of the introduction of the Philippine-type nursery pond in Indonesia.. R. Roestami Djajadiredja	Inland Fisheries.	Abs.
18	Gebang, <i>Corypha utan</i> , an indigenous material for fishing in Indonesia..... R. Agus Kartono	Craft & Gear.	Abs.
19	Comparison of fishing efficiency between a) Longline and "Rawai" (Prawe); b) Trawl and "Dogol;" c) Various types of "Pajang"..... R. Agus Kartono	Craft & Gear.	Abs.
20	Control of less desirable exotic species of fish competing with or harmful to desirable indigenous species in inland waters in the Phillippines..... H.R. Rabanal & L.V. Hosillos	Inland Fisheries.	Abs. & Sum.
21	Studies on the Albacore: V. The fishing condition & size of Albacore in the South Pacific Ocean..... Misao Homma & Tadao Kamimura	Sea Fisheries.	Abs.
22	On the currents in the Solomon Seas from the drift of Tuna longline between June and August in the years 1952 and 1953..... Hazime Yamanaka	Sea Fisheries.	Abs.
23	Fishing conditions in the Indian Ocean, especially the size composition of Albacore in the Eastern Indian Ocean... Koya Mimura	Sea Fisheries.	Abs.

		Subject	
IPFC/C57/TECH 24	On the young of the Black Marlin, <i>Eumakaira nigra</i> Nakamura..... Shoji Ueyanagi	Sea Fisheries.	Abs. only
25	Length frequencies of Big-eye Tuna caught from the Indo-Australian Archipelago Area..... Koya Mimura	Sea Fisheries.	Abs. only
26	The concentrated spawning areas of the Big-eye Tuna in the Western Pacific..... Shoji Kikawa	Sea Fisheries.	Abs. only
27	Studies on variability of hooked-rates of Yellowfin Tuna by long line fishing. 1-A trial to estimate confidence limits of mean hooked-rates using data of the catches of commercial vessels..... Tadao Kamimura	Sea Fisheries.	Abs. only
28	The growth and age of the Yellowfin Tuna..... Yoichi Yabuta & Mori Yukinawa	Sea Fisheries.	Abs. only
29	A consideration on the productivity in the intensive carp culture..... N.Y. Kawamoto	Inland Fisheries.	Sum.
30	Retail marketing of "tsukudani" a preserved edible Fishery product in Japan..... Noriaki Oka	Food Technology.	Sum.
31	On the latest tendency of some pelagic fish migrations in the western waters of Japan..... Kisaku Yamada	Sea Fisheries.	Abs.
32	Studies on the preservation of marine products by combined use of salt and preservatives..... Sogo Tetsumoto	Food Technology.	Sum.
33	Experiments on the quantitative assessment of zooplankton by net haul.. Sigeru Motoda	Sea Fisheries.	Sum.
34	Preliminary report of studies on transportation of live rainbow trout..... N.Y. Kawamoto, S. Fujimura and M. Tanizaki	Sea Fisheries.	Sum.
35	Necessity of fishery products processing & its effect..... Yoji Asada.	Food Technology.	Sum.
36	Fish flour..... Nutrition Board	Food Technology.	Abs.

		Subject	
IPFC/C57/TECH	37	Some notes on indigenous methods of manufacturing fish products in Indonesia..... Soejarwidodo	Food Technology. —
	38	Improvement of keeping quality of "pindang"..... R. Harsono Hardjohutomo	Food Technology. Abs.
	39	Economic aspect of fish processing..... Eddiwan	Socio-Economics. Abs.
	39	Rev. 1 Ditto (revised)	
	40	Retail trade in fish products..... Eddiwan	Socio-Economics. Abs. & Sum.
	40	Rev. 1 Ditto (revised)	
	41	International trade in fish products..... Eddiwan	Socio-Economics. —
	41	Rev. 1 Ditto (revised)	
	42	Income generating effects of fishing industry with special reference to the inland fish in the Province of Central Java..... Eddiwan	Socio-Economics. Abs.
	43	Industrial relations in the fishing industry..... Eddiwan	Socio-Economics. —
	43	Rev. 1 Ditto (revised)	
	44	Economic aspects of air transport of fish..... Eddiwan	Socio-Economics. Abs.
	45	Economic aspects of refrigeration..... Eddiwan	Socio-Economics. Abs.
	45	Rev. 1 Ditto (revised)	
	46	Indigenous types of fishing craft in Indonesia..... Salam	Craft & Gear. Abs.
	47	Role of Pisciculture in rural economy in Orissa, India..... G.N. Mitra	Inland Fisheries. Sum.
	48	An experiment in organization of producers' co-operatives in inland pisciculture in Orissa..... G.N. Mitra	Socio-Economics and Statistics. Abs.
	49	An experiment in the organization of marketing co-operatives in the Chilka Lake..... G.N. Mitra	Socio-Economics and Statistics. Abs.
	50	Weed control in farm ponds and experiment by stocking Grass Carp..... Katsuzo Kuronuma & Kazuo Nakamura	Inland Fisheries. Sum.

		Subject	
IPFC/C57/TECH	51	Mechanization of fishing craft and the use of improved fishing gear in Ceylon... E.R.A. de Zylva	Craft and Gear. Abs.
	52	A preliminary account of the recent experiments in mechanised fishing in Bombay waters using small vessels..... R. Jayaraman & P.D. Nayak	Craft and Gear. Abs.
	53	Observations on the occurrence, collection, acclimatisation, transport and survival of mullet seed in West Bengal (India)..... K.K. Sarojini	Inland Fisheries. Sum.
	54	An experimental investigation of dry fish manufacture..... G.E. St. C. Gunasekera & Nihal N. de Silva	Food Technology. Sum.
	55	General features and productivity of the Wadge trawl fishery. Contribution 2—The effect of fishing on the stock of Carangids..... S. Sivalingam	Sea Fisheries. Sum.
	56	A note on the mechanisation of Indian fishing craft..... K. Gopinath	Craft and Gear. Sum.
	57	The Gouramy in Ceylon..... E.R. de Zylva	Inland Fisheries. Abs.
	58	Seaweeds of economic importance in Hong Kong..... B.T. Chiu	Sea Fisheries. Sum.
	59	Growth characteristics of four species of pond fish in Hong Kong..... Ti Chow	Inland Fisheries. Sum.
	60	Recent work on fisheries food technology in Thailand..... S. Kosol, N. Praphat. K. Bungon and P. Somsri	Food Technology. Sum.
	61	Report of the Fisheries Department's economic survey of the purse seine industry at Kuala Kedah..... The Dept. of Fisheries, Federation of Malaya & Singapore	Socio-Economics. —
	62	Marine fish marketing in rural districts—Successful experiments in Hong Kong..... I. Peterson	Socio-Economics. —
	63	The Fish Culture Research Station, Batu Berendam, Malacca, Federation of Malaya..... G.R. Fish	—



		Subject	
IPFC/C57/TECH 64	Coastal and highland fresh water fishery problems of Papua and New Guinea..... A.M. Rapson	General.	Sum.

#### SYMPOSIUM PAPERS:

IPFC/C57/SYM 1	Fish culture in rice fields in Indonesia. R. Odjoh Ardiwinata		
2	Food fish farming in the United States of America..... Malcolm C. Johnson and Verre E. Davison		Sum.
3	A Preliminary experiment on agricultural insecticides and rice field fish culture..... Yoshihiro Matida, Sekio Kimura and Michinori Tamakawa		Sum.
4	Pisciculture in reclaimed swamps and its role in rural economy in Orissa..... G.N. Mitra		Abs.
5	Observations on the culture of brackish water fishes in paddy fields in West Bengal (India)..... T.V.R. Pillay and B. Bose		Sum.
6	Fish culture in rice fields — A preliminary review and annotated bibliography		
7	Quelques essais de rizipisciculture au Sud-Viêt-nam.....		Abs.
8	Report on the Symposium on Fish Culture in Rice Fields. 8. Rev. 1 Ditto (Revised)		

**CONTRIBUTED PUBLICATIONS:** The following publications were made available to the Council in limited numbers. These have been distributed as widely as possible. When numbers of copies were small, distribution was limited to heads of Delegations only.

IPFC/C57/CP 1	Record of the First Session of the IPFC <i>Rastrelliger</i> Sub-committee, Penang, Federation of Malaya, 24-30 September 1956 (mimeo).		
2	The Marine and Freshwater Fishes of Ceylon, I.S.R. Munro. Aust. Dept Ext. Affs. Canberra, 1955.		
3	World Fisheries: General Trends and Outlook, with Examples from Selected Countries. State of Food and Agriculture, 1956, Chapter IV, FAO, Rome.		
4	Fishermen's Organization and Regulation of Fish Prices in Sweden, C. Hessel and S. Verstanding. FAO, Fish. Bull. 9 (3): July-Sept. 1956.		
5	Fisheries Problems, C. Miles and T.J. Job. Multi-purpose River Basin Development, Part I. Manual of River Basin Planning (Flood Control Series, No. 7) 69-75, ECAFE, Bangkok, 1955.		
6	General Fisheries Council for the Mediterranean, 4th Meeting, Istanbul, Turkey, 17-22, Sept. 1956 (mimeo report).		
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- 10 Public Law 1024-Fish and Wildlife Act of 1956—84th Congress Chapter 1036, 2nd Session. S. 3275-An Act- (pamphlet).
- 11 Progress of Fisheries Development in India: Published on the Occasion of the First All-India Fisheries Exhibition at Cuttack, 1956. Central Inland Fisheries Research Station and Dept. of Fisheries, Orissa, India.
- 12 A Preliminary Study of the Physical, Chemical and Biological Characteristics of Singapore Straits, Tham Ah Kow. Colonial Office Fisheries Publications: 1 (4): 66 pages, London, 1953.
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- 18 The Larsen Mid-water Trawl, Alan Glanville. FAO Fish. Bull. 9 (3), 1956.
- 19 Current Technological Problems in Fish Canning, Ernest Hess. FAO Fish. Bull. 9 (4), 1956.
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- 21 Philippine Fishes. Pop. Bull. 49. Dept. of Agriculture and Natural Resources. Manila 1956.
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- 25 Progress Reports (Biological and Technological) No. 2, 1956. Fish. Res. Str., Dept. of Fish, Ceylon.
- 26 Ceylon's Beach Seine Fishery, P. Caragaratnam and J.C. Medcof. Bull. No. 4, 1956. Fish. Res. Str., Dept. of Fisheries, Ceylon.
- 27 General Feature & Productivity of the Wadge Bank Trawl Fishery, S. Sivalingam and J.C. Medcof. Bull. No. 6, 1957. Fish. Res. Str., Dept. of Fish, Ceylon.
- 28 Preliminary Contribution of the UN Scientific Committee on the Effects of Atomic Radiation on the Specific Questions concerned with the Oceanography and Marine Biology in Respect of Disposal of Radio-active Wastes. (mimeo) — FAO Fish. Div., Biology Branch, (Rome) 1957.

- IPFC/C57/CP 29 Fisheries. Chambers Encyclopedia 106-110 Year Book 1956.
- 30 Studies and Reviews — GFCM: No. 1 — Standardization of Biometric and Observation Methods for Clupeidae (especially *Sardina pilchardus*) used in Fisheries Biology, 1957.
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- 32 Zooplankton-Considered in Respect of its Relation with Phytoplankton and thus as a Factor affecting Basic Production, T. Laevastu—(mimeo). FAO Fish. Div., Rome, 1957.
- 33 The Rainfall over the Indonesian waters, K. Wyrski, 1956 - Kementerian Perhubungan Lembaga Meteorologi dan Geofisik, Djakarta. Verhandelingen 49.
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- 35 On Chemical Components of *Tilapia*, K. Kuronuma. (mimeo). Freshwater Fisheries Research Laboratory, Tokyo, Japan.
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- 37 Conditions of the Life of the Benthos in the Sea and its quantitative Evaluation in respect of Fisheries, T. Laevastu, FAO Fisheries Division, Rome. (mimeo) 1957.
- 38 Paddy-cum-Milkfish Culture, a Creation from the Lowlands of the Solo River, A. Djaingsastro. (Extract) "Berita Perikanan" No. 1-2 (March/April 1957).
- 39 Fishing Boats, K. Brown — ICA., Djakarta, 1957.
- 40 Preliminary Report on the Spawning of Grass Carp and Silver Carp in the Tone River, Japan, and the Development of their Eggs, D. Inaba, M. Nomura & M. Nakamura. Journal of the Tokyo Univ. of Fisheries, 43 (1): 81 — 96.
- 41 Pedoman Perikanan Air Tawar (Indonesian). Djawatan Perikanan Darat, Djakarta, 1956.
- 42 A Fishing Junks, S.S. Yuan. Engineering Society of Hong Kong 9 (2): 41-78, 1956.
- 42 B Discussion on the above paper, P.V. Reveley, *ibid*, 9 (2): 78a-78y.
- 43 First, Second and Third Reports on the Working of the Central Fisheries Dept. for the period Jan. 1, 1951 — 30 March, 1956, M.R. Qureshi. Fish. Dept. Karachi.

# Note

In addition, the following belong to the Contributed Publications category. Unfortunately, in many instances only one copy was received by the Secretariat. These papers were accepted for tabling and are now held for reference in the Secretariat. However, those wishing to obtain copies are advised to write directly to the authors, Departments or Institutions issuing the publications.

## (UNNUMBERED)

- Modified Whirling Apparatus for the Sub-Sampling of Plankton, Patricia Kott (1955). Aust. J. Mar. Freshw. Res. 4 (2): 387-393.
- The Zooplankton of Lake Macquarie, 1953-4, Patricia Kott (1955). Aust. J. Mar. Freshw. Res. 6 (3): 429-442.
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- Fluctuations in Catch of the Yellow-eye Mullet *Aldrichetta forsteri* (Cuvier and Valenciennes) (Mugilidae), J.M. Thomson (1956). CSIRO Aust. Div. Fish. Oceanogr. Rep. No. 1.

(Note: Individuals or institutions interested in obtaining copies of above 10 publications, please contact Div. of Fisheries and Oceanography, Marine Biological Laboratory, Cronulla, N.S.W., Australia.)

Report on Diagnostic Survey of Wholesale and Retail Fish Marketing in George Town, Penang-Headquarters Fisheries Department, Federation of Malaya, Penang Publication, 1956.

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Japanese Fish Cultivation in Paddy Fields, P.K. Eapen, Fish Dept., Tokyo Univ. 1956.

## MINUTES :—

IPFC/C57/M	1	Minutes of first Plenary Session	(09.30 - 12.10, May 14)
	2	Minutes of second Plenary Session	(09.45 - 10.15, May 15)
	3	Minutes of third Plenary Session	(09.30 - 10.45, May 16)
	4	Minutes of fourth Plenary Session	(09.30 - 11.00, May 17)
	5	Minutes of fifth Plenary Session	(09.30 - 10.50, May 18)
	6	Minutes of sixth Plenary Session	(09.45 - 11.15, May 21)
	7	Minutes of seventh Plenary Session	(09.30 - 11.30, May 22)
	8	Minutes of eighth Plenary Session	(09.30 - 10.15, May 23)
	9	Minutes of ninth Plenary Session	(09.45 - 10.20, May 24)
	10	Minutes of tenth Plenary Session	(09.30 - 10.30, May 27)

**SPEECHES :**

1. Presidential Address to the 7th Session of the IPFC, Bandung, Indonesia, May 13-27, 1957 by N.K. Panikkar, Fisheries Development Adviser to the Government of India & Chairman of the Council 1955-57.
2. Address to the 7th Session of the IPFC, Bandung, Indonesia, May 13-27, 1957 by Mr. B.R. Sen, Director-General of the Food and Agriculture Organization of the United Nations.
3. Opening Address of his Excellency, Mr. Sadjarwo, Ministry of Agriculture of the Republic of Indonesia.

**IPFC PUBLICATIONS****(UNNUMBERED)**

IPFC Special Publication No. 3, Economic Marine Algae of tropical South and East Asia and their Utilization. J.S. Zaneveld, 1955.

IPFC Occasional Paper 55/2, Sampling Methods used in Japanese Fisheries Catch Statistics, T. Yamamoto, 1955.

IPFC Directory of Institutions, 1956.

**FAO PUBLICATIONS****(UNNUMBERED)**

What it is, What it does, How it works. (Pamphlet)

FAO Activities in Asia. (Pamphlet)

**INDONESIAN GOVT. PUBLICATIONS****(UNNUMBERED)**

Guide Book for Delegates to IPFC 7th Session, Bandung, Indonesia, 1957.

Short Guide—(Djakarta, Bogor, Bandung). Ministry of Information. Republic of Indonesia.

Petundjuk nama djalan kota Bandung berikut Peta.

Indonesia in Brief.

Indonesia (Magazine) Vol. 11 (5) 1957.

Arts and Crafts in Indonesia.

**FILMS**

1. GRANDE PECHE
2. VIEREN MAAR
3. OUTBOARD FISHERMEN U.S.A.
4. PURSE-SEINE, A NEW AUSTRALIAN FISHERY
5. THE FISH & THE SEINE NET
6. GILL-NETTERS OF THE BEHRING
7. PURSE-SEINING-A NEW AUSTRALIAN FISHERY
8. FISHING PARTNERS
9. THE RISING TIDE

## APPENDIX V

### FINANCIAL REPORT AND BUDGET PROPOSALS

All expenses incurred on behalf of the Council for the years 1955 and 1956, except salaries and wages are as follows:

## IPFC STATEMENT OF EXPENDITURE 1955

	Expenditure US\$	Budget Allocation US\$
A. EXECUTIVE COMMITTEE TRAVEL:.....	1,704.48	2,000.00
IPFC 20th Executive Committee Meeting, Kandy, (Ceylon) and Mandapam (India), 24-28 March 1955		
Mr. Boon Indrambarya (Chairman).....	468.76	
Mr. J.A. Tubb (Vice-Chairman).....	1,113.22	
IPFC 21st Executive Committee Meeting Tokyo, (Japan), 29-30 September 1955		
Mr. Boon Indrambarya (Chairman).....	35.00	
Mr. R. Serene (Member).....	35.00	
IPFC 22nd Executive Committee Meeting, Tokyo, (Japan), 18 October 1955		
Dr. N.K. Panikkar (Chairman).....	17.50	
Mr. D.J. Rochford (Vice-Chairman).....	17.50	
Mr. Boon Indrambarya (Member).....	17.50	
B. PRINTING.....	1,293.56	2,500.00
1,000 copies IPFC Procs. 5th Meeting, Sections II and III including cost of packing, despatching and postage charges for distribution.....Ind. Rs. 2,620-0-0		
Reprints of the above	540-0-0	
2,000 copies Symposium		
Paper - total cost.....Ind. Rs.	3,280-0-0	
UNESCO share	2,351-4-0	
IPFC share	928-12-0	
Reprints of the above	331-0-0	
	<u>*Rs. 4,419-12-0</u>	
*Of this figure there was charged to the 1954 budget Rs. 4,215-3-0		
1955 budget Rs. 204-9-0.....	40.62	
Cost of 12 copies Journal A. Soc.....	17.57	
Current Affairs Bulletin No. 15.....	35.24	
Air freight charges on publications.....	9.62	
Printing IPFC folders.....	75.00	
400 copies Agreement.....	200.00	
50 copies of reprints of Technical Papers from Zoological Survey of India (Ind. Rs. 34-14-0).....	7.34	
Printing and binding charges on "Fisheries Problem".....	8.18	
	<u>393.57</u>	

	Expenditure US\$	Budget Allocation US\$
B. PRINTING: (contd.).....	1,293.56	2,500.00
<i>Outstanding commitments paid in 1956 but from 1955 budget</i>		
2/ 400 copies IPFC Occasional Paper 55/2 "Sampling Methods used in Japanese Fisheries Catch Statistics", by T. Yamamoto.....Ind. Rs. 793		
1,500 copies IPFC Special Publication No. 3 "Economic Marine Algae of Tropical South and East Asia and their Utilization" by J.S. Zaneveld.....Ind. Rs. 1,050		
Rs. 1,843 or US\$ 385.81		
3/ Proportionate cost of 1,500 copies of IPFC Directory of Institutions.....514.18		
C. MEETING:.....	672.70	750.0
Expenditure for the IPFC 6th Session, Tokyo, Japan, 30 Sept.-14 Oct. 1955 in connection with interpretation services, despatch of documents and other incidental Secretariat expenses.		
D. MISCELLANEOUS EXPENSES:.....	891.47	1,000.00
Postage and telegrams.....388.18		
Stationery supplies.....495.67		
Airfreight charges.....6.62		
Mailing expenses incurred by FAO Information Officer, New Delhi Rs. 4.14.0 for 1955.....1.00		
	4,562.21	6,250.00

2/ Sufficient balance funds were ear-marked at the end of 1955 of that year's budget to meet this.

3/ Total cost of 1,500 copies was Ind. Rs. 3,550. It was requested this be paid in the following breakdown:

Ind. Rs. 3,357-8-0 (US\$ 694.28) chargeable 1955

Ind. Rs. 192-8-0 (US\$ 39.80) chargeable 1956

The final audit however revealed the following adjustment:

US\$ 514.18 - 1955

US\$ 219.90 - 1956

## IPFC STATEMENT OF EXPENDITURE 1956

	Expenditure US\$	Budget Allocation US\$
<b>A. EXECUTIVE COMMITTEE TRAVEL:.....</b>	<b>1,563.00</b>	<b>1500.00</b>
23rd Executive Committee Meeting, Penang, Federation of Malaya, 22-27 Sept. 1956		
Chairman (Dr. N.K. Panikkar) Fare 426		
Subsistence 138		
Terminals 20		
<u>584</u>		
Vice-Chairman (Mr. D.J. Rochford)		
Fare 680		
Subsistence 120		
Terminals 20		
<u>820</u>		
Member (Nai Boon Indrambarya) Fare 71		
Subsistence 80		
Terminals 8		
<u>159</u>		
<b>B. PRINTING.....</b>	<b>1,011.87</b>	<b>2,000.00</b>
Packing, freight etc. on shipping balance copies IPFC 5th Procs. Sections II & III, and Plankton Symposium Ind. Rs. 170.....33.61		
Balance proportionate cost of 1,500 copies IPFC Directory of Institutions.....219.90		
Cost of printing in Rome 1,000 folders for IPFC Directory of Institutions.....519.68		
Mailing charges for sending 900 folders to Madras.....62.21		
Cost of extra screws ordered from Rome (and mailing Charges to Madras) sent by pouch to New Delhi, Regional Office.....12.80		
<i>Outstanding commitments to be paid in 1957 from the 1956 budget:</i>		
1,500 copies of IPFC 6th Procs. Section I (rate: 1,300 copies at Ind. Rs. 3,500) estimates in US\$.....810.00		
1,300 copies IPFC 6th Procs., Sections II and III, Ind. Rs. 5,040 — estimate in US\$.....1,100.00		
Mailing charges for IPFC 6th Procs. Section I.....est. (250)		
Sections II & III.....est. (200)		
IPFC Directory of Institutions.....est. (350)		
<u>Total 2,710.00</u>		
Less Balance transferred to 1957 <u>980.00</u>		
1957 Commitment <u>1,730.00</u>		



	<i>Expenditure US\$</i>	<i>Budget Allocation US\$</i>
C. MEETING:.....	Nil	Nil
D. MISCELLANEOUS: .....	1,061.24	1,000.00
Postage.....	350.21	
Office supplies, stationery etc.....	559.89	
Postage and packing literature.....	119.28	
Telegrams.....	31.86	

### IPFC BUDGET PROPOSALS

The Budget for the current year is:

A. Executive Committee Travel.....	US\$1,500
B. Printing.....	2,000
C. Meeting Costs.....	1,350
D. Miscellaneous.....	1,000
Total.....	<u>US\$5,850</u>

It will be noted that Item C—Meeting Costs, has been increased by US\$600 over the amount usually allocated. This is to serve in part for defraying expenditure in relation to the English/French interpretation service.

Proposals for the Budgets for 1958 and 1959, presented in Working Paper IPFC/C57/WP27 are as follows:

The Rules of Procedure of the Indo-Pacific Fisheries Council do not provide for the submission of budget proposals to the Director-General of FAO for more than "the next succeeding financial year" (Section XI, para 2).

The present procedure, in which an inter-session period of 18-20 months elapses between sessions of the Council, tends to create a situation under which the Council may find itself without a budget specifically approved by the Council. Moreover, it is highly probable that budget proposals for 1958 (and 1959), which may be approved by the Council during its 7th (and 8th) Sessions, will be received by the Director-General of FAO too late for inclusion in his general budget proposals which are to be submitted to the FAO Conference in November 1957.

Through the good offices of the Director, Fisheries Division, FAO, financial provision has been made for the continuation of the Council's work on those occasions when the Council itself has had no approved budget.

However, it is understood that the Conference of FAO this year will be invited to consider whether it should budget on an annual or on a biennial basis. Although it is competent for the Council to consider amendment of the Rules of Procedure to overcome the existing difficulties, the Executive Committee suggests that such amendment might be deferred pending the decisions of the FAO Conference.

With reference to the particular problem relating to budget proposals for 1958 and 1959, the Executive Committee suggests, subject to approval by the Council, that Member Governments may wish to consider the possibility of instructing their delegations to the FAO Conference to be held in Rome, November 1957 to give specific consideration to the matter of the IPFC Budget Proposals and if and when necessary to request the Conference to amend such proposals as may be included in the Director-General's Budget in accordance with proposals drafted by IPFC at its 7th Session.

## Budget Proposals

### A. Travel

At the 6th Session, the Council recommended that "Member Governments should be encouraged to hold sub-regional meetings of workers on particular projects in neighbouring areas, between sessions, on subjects indicated by the Council. Executive Committee Meetings could coincide with these meetings." (Para 123, Summary Report, 6th Session).

This recommendation carries the implication that the Executive Committee should continue its usual practice of visiting member countries during the inter-session period. Excluding Executive Committee Meetings held directly in connection with Council session and which involve only small *per diem* payments, the average cost of travel and *per diem* for an Executive Committee Meeting to be held in a country other than that of the session host country may be expected to involve expenditure of approximately US\$2,000.

### B. Printing

The increasing demand for the Council's publications indicates that the numbers printed may have to be increased. Moreover, the increasing number of technical papers (approx. 65 at this Session) will involve appreciably higher printing costs. The gratifying reception of the *Current Affairs Bulletin* in its new form, and increasing demand for it, also implies additional expenditure.

Charges for printing and distribution may therefore be expected to show an appreciable increase which will be enhanced if the Council decides to issue further Special Publications or Occasional Papers in printed form. The Statement of Expenditure submitted in respect of 1956 shows outstanding commitments (under Printing) of \$1,730 which will have to be met

out of the 1957 allocation of \$2,000 leaving a net balance of \$270 for the remainder of this year, excluding the cost of *Current Affairs Bulletin* No. 18 recently issued.

Cost of printing and distributing the Proceedings of the Council's 7th Session will have to be met from the 1958 budget and may be expected to be not less than \$2,500.

Three (possibly four) issues of the *Current Affairs Bulletin* in 1958 will involve, including distribution costs, approximately \$270 (360) and provision should be made to allow for at least one Special Publication (say \$1,140).

### C. Meetings

It will be recalled that the 6th Session of the Council in Tokyo considered "that an expert English/French interpreter should be provided at Council sessions, since such a person was not usually available in the host country. The Council therefore recommended that provision be made to this end in the 1957 budget." (para 88, Summary Report, 6th Session).

"It was also evident that the task of interpreting at Council sessions was sufficiently heavy to demand two persons, one of whom might be recruited locally. It was therefore recommended that the Council's budget for session expenses should be increased to \$1,500 to provide travel expenses for a non-local interpreter, plus wages for one additional interpreter on a local basis." (para 89, Summary Report, 6th Session).

The Executive Committee suggests that, as in the case of the current Session, attempts to recruit a competent English/French interpreter locally may fail, provision should be made to permit the appointment of two such interpreters from the Geneva Pool.

It is estimated that the expenses involved would be:

Two 1st class return fares (say, Geneva - Singapore) approx.....	\$3,000
Salary and <i>per diem</i> 2 x 20 days @ US\$35.....	<u>1,400</u>
Total	<u>\$4,400</u>

**General**

Proposed allocations of funds, subject to the approval of FAO Conference, for the years 1958 and 1959 are submitted in the following schedule, compared with estimates drafted in accordance with the above remarks.

	1 9 5 7		1 9 5 8		1 9 5 9
	Allocation	FAO <sup>+</sup>	Council	FAO <sup>+</sup>	Council
A. Travel (Executive Committee)	1,500	1,500	2,000 <sup>1</sup>	1,500	2,000 <sup>1</sup>
B. Printing	2,000	2,000	4,000 <sup>2</sup>	2,000	4,000 <sup>2</sup>
C. Meetings	1,350	—	4,650 <sup>3</sup>	1,350	— <sup>4</sup>
D. Miscellaneous Expenses	1,000	1,000	1,000	1,000	1,000
	<u>5,850</u>	<u>4,500</u>	<u>11,650</u>	<u>5,850</u>	<u>7,000</u>

1. Allows 2 x 4-6 day meetings of Executive Committee, inclusive of fares and *per diem* in countries other than Thailand or the site of the 8th Session.
2. (a) Proceedings, 7th and 8th Sessions, including mailing and distribution charges.....US\$2,500  
 (b) *Current Affairs Bulletin* - 4 issues @ \$90..... 360  
 (c) Special Publications and Occasional Papers..... 1,140  
 US\$4,000
3. (a) Meeting Expenses.....US\$ 250  
 (b) Interpretation Service 2 x 1st class return fares  
 Geneva-Singapore.....\$3,000  
 Salary and per diem 2 x 20 days @ \$35 1,400  
4,400  
 US\$4,650
4. No provision is made in FAO proposed budget for a Council Session in 1958, but the Executive Committee suggests "not prior to September 1958" leaving the last quarter available for a Session if decided desirable. In this case there would presumably be no Session in 1959.

<sup>+</sup> Proposed budget drafted by Fisheries Division, Rome.