REPORT ON
THE SIXTH REGIONAL WORKSHOP
ON FISHERY STATISTICS IN SOUTHEAST ASIA
BANGKOK, THAILAND
1-4 July 1986

THE TRAINING DEPARTMENT
SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER

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CONTENTS

ANNEXES

REPORT ON THE SIXTH REGIONAL WORKSHOP ON FISHERY STATISTICS IN SOUTHEAST ASIA

I. INTRODUCTION

1. In order to improve data collection and the fisheries statistical system in the Southeast Asian region, the SEAFDEC Training Department organized five regional workshops on fisheries statistics between 1976 and 1980. The positive outcome of these workshops was the "Fisheries Statistical Bulletin for the South China Sea Area", which has been compiled, in cooperation with the governments in the region, by the Training Department and published annually by the Secretariat since 1978. This Bulletin is recognized as a valuable source of reference on fisheries statistics in the region and is well-accepted by all organizations/agencies and personnel concerned with the management and development of fisheries in Southeast Asia. Nevertheless, there is a growing demand to improve the content of the Bulletin in order to meet the requirements of fishery administrators and researchers in the region.

2. The SEAFDEC Training Department therefore organized the Sixth Regional Workshop on Fishery Statistics in Bangkok from 1 to 4 July 1986.

3. The objectives of the Workshop were as follows:

   (a) to discuss the requirements for fishery statistics of fishery administrators and researchers in each participating country;

   (b) to review current practices for the collection and compilation of fisheries statistics in each participating country and to exchange experiences in improving fisheries statistics;

(c) to review the contents of the Fisheries Statistical Bulletin for the South China Sea Area and suggest improvements for the convenience of various users; and

(d) to discuss constraints in improving fisheries statistics in the region.

4. The Workshop was attended by 24 participants from Hong Kong, Indonesia, Malaysia, the Philippines, Taiwan, Thailand and the Indo-Pacific Tuna Development and Management Programme of FAO (FAO/IPTP). Observers from the Thai Department of Fisheries, the National Statistical Office and the Fish Marketing Organization (FMO) of Thailand also attended the Workshop. The list of participants and observers is shown as Annex 1.

5. The opening address was given by Dr. Veravat Hongskul, Secretary-General of SEAFDEC. He welcomed all the participants to the Workshop, he stressed the need for accurate fisheries statistics in order to assist in planning and evaluating the fishery development and management programs in the region. The text of his address appears as Annex 2.

II. ELECTION OF THE CHAIRMAN

6. The Workshop elected Mr. Kazuo Inoue, Deputy Secretary-General of SEAFDEC, as Chairman. The Workshop also appointed a Vice-Chairman and Rapporteurs for each major agenda item.

III. ADOPTION OF THE AGENDA

7. The agenda was adopted and appears as Annex 3.

IV. PRESENT STATUS OF FISHERY STATISTICAL SYSTEMS IN THE REGION

8. The representatives of the countries participating in the Workshop presented their country reports outlining the present

status of fishery statistical systems employed in collecting and compiling statistics as well as problems and constraints faced in each country. The reports appear as Annexes 4 to 9.

9. The Workshop discussed the important fisheries statistics required for the planning, management and development of fisheries in the region and compared the statistics available in each participating country based on the published statistical reports for 1983.

10. It was noted that the following statistics are not available in many countries in the region:

a) Number of fisheries establishments by size;

b) Number of fishing units in operation by type of fishing gear;

c) Catch and effort statistics for major fisheries by fishing ground;

d) Aquaculture statistics;

e) Inland catch statistics; and

f) Economic statistics for both enterprise and small-scale fisheries.

11. In some countries, the fishing gear classification should be amended to meet recent developments in fishing gear technology. Purse seine, for example, which is one of the most efficient fishing gears for catching pelagic resources, is included under beach seine in some countries. It was agreed to amend the standard classification for fishing gear in the region to meet recent technological developments.

12. The Workshop agreed to review the standard classifications of fish species in order to meet the requirements of the various users. The representative of FAO/IPTP requested that SEAFDEC revise the species classifications for small tuna in the Bulletin.

13. The participants presented the constraints in improving fisheries statistics in their country. In all participating countries the lack of budget allocations for carrying out the collection of statistical data in the field is the most serious problem faced. An insufficient number of trained enumerators was mentioned by Thailand. The participant from Malaysia reported that the lack of a computer system for data processing and analyses was a major constraint to the prompt publication of their report.

14. The participants felt that the Workshop was a very useful forum for the exchange of ideas among statisticians in the region with a view to improving the standard of fisheries statistics, collection methods, etc.

V. DATA COLLECTION METHODOLOGY

15. Although the statistical methods applied in each country may vary according to local conditions and thus cannot be unified throughout the region, it is still useful to have an exchange of experiences between countries and discuss improvements in data collection.

16. The Workshop identified important data which could be improved in each country and encouraged an exchange of experiences among the participants on the following subjects:

a) Catch-effort data;
b) Economic data;
c) Price data;
d) Aquaculture data; and
e) Inland fisheries data.

a) Catch-effort data

17. Catch and effort statistics are indispensable for the clarification of the state of fishery resources exploitation in certain fishing areas, and can be used as an index reflecting the abundance of fishery resources. Among SEAFDEC Member Countries, excluding Japan, only Thailand and Malaysia have this data at present. The Department of Fisheries, Thailand, collects catch and effort statistics for eleven major fishing gears, using a log book system, namely: 1) Otter board trawl; 2) Pair trawl; 3) Beam trawl; 4) Thai purse seine; 5) Chinese purse seine; 6) Anchovy purse seine; 7) Luring purse seine; 8) Mackerel encircling gill net; 9) King mackerel gill net; 10) Push net; and 11) Bamboo stake traps.

18. The participant from Thailand explained the format and application of the log book survey currently being conducted in Thailand. Fishermen selected for the samples were asked to complete the forms after each trip. Malaysia is also carrying out similar surveys on trawlers and purse seiners. Indonesia has a log book survey on a shrimp trawl joint venture, but so far no results have been published. The participant from Indonesia pointed out that marine fisheries in this region are quite different from those in temperate countries. The use of multiple small fishing gears and the variety of species caught present a difficulty in applying a log book system in tropical waters and the obvious lack of trained manpower in data collection and analyses hamper the surveys. Problems also occur in respect of biological studies and selecting the species to be covered. Another problem which arises is lack of communication between the data collectors and the people using the statistics.

19. With respect to the accuracy of the catch data derived from the log book surveys, the following two important issues were discussed at the Workshop; i) the accuracy of the population (frame) for sampling surveys; and ii) the accuracy of catch data obtained by interview.

20. Since the number of fishing boats registered at harbour departments generally differs significantly from the actual number of fishing boats in operation owing to the existence of many illegal fishing boats and the nature of seasonal operation depending on the monsoons, it is difficult to establish the actual number of fishing boats as a population. In order to obtain an accurate population, a population survey or inter-fishery census survey should be done at least twice a year.

21. Since "objective measurement" for catch surveys as suggested by FAO is not practical, many countries in the region collect catch data either by interviewing the skipper or from the transaction records kept by the fish dealers.

22. In general, most fishermen are reluctant to disclose their catch to the enumerators. After lengthy discussion by the participants based on their experiences, the participant from Hong Kong suggested that enumerators should be very familiar with local fishermen and gain their trust, i.e. not to disclose their catch to the Tax Office. Daily cooperation with fishermen is necessary to gain this confidence.

23. It was suggested, on the other hand, that catch data should not be obtained directly from the fishermen, but from the transaction records kept by the fish dealers. This issue, therefore, is the most crucial to fisheries statisticians in the region.

b) Economic data

24. Fisheries economic statistics are divided into two categories: i) Costs and earnings to determine the productivity and profitability of the enterprise fisheries; ii) Income and expenditure to determine the living conditions of small-scale fishermen.

25. For planning the management and development of fisheries in each country, both stock assessment and socio-economic

conditions are important. Therefore socio-economic surveys should be encouraged in the region. An example of such a survey in Thailand was presented to the Workshop. The questionnaire employed included the following survey items: household members in respect of number, sex, age, religion, status within the family, marital status, educational level and occupation, labour utilization and income from fishing and non-fishing. The Workshop agreed that studies on costs and earnings of important fisheries, generally conducted on an ad hoc basis, are desirable and should be carried out more regularly in the future.

26. Suggestions were made by the Workshop to include the following in a survey on costs and earnings:

a) Information on number of trips per year;

b) Annual docking and maintenance costs per boat;

c) Cost of insurance (if any);

d) Comparison of opportunity costs with interest rates; and

e) Tax costs.

c) Price data

27. The Chairman emphasized that the prices of major fish species should be obtained with the quantities landed at major landing centers so that the demand and supply of major fish species can be analysed and forecasting of price trends made possible in the future.

28. The Workshop was informed that, in the case of Hong Kong, three types of price data are collected, i.e. ex-vessel, wholesale and retail price data. The fishing vessels are required by law to land their catch at the fish marketing centers. Therefore at one particular landing center, it is possible to collect, at

the same time, ex-vessel and wholesale prices. The prices are determined by auction and six per cent is deducted as commission. Ex-vessel price represents auction price less six per cent commission. The landings are transported to the retail markets where the price collection is done by the Census and Statistics Department of Hong Kong. This data is collected for the consumer price index.

29. In Malaysia, there are four kinds of prices collected, i.e. wholesale and retail value of landing, average wholesale, and retail prices of a few selected fish species.

30. The role and function of the Fish Marketing Organization of Thailand was outlined particularly with regard to price data. The reasons for the fluctuation of prices at the Bangkok Fish Market were explained as follows: Consumer price and producer price do not normally have the same trends. Consumer prices tend to be constant whereas producer prices vary seasonally. The retail price is determined largely by the freshness of the fish landed. It was suggested that, since the Bangkok Fish Market is the central wholesale market in Thailand and the fish landed at local ports are conveyed to Bangkok by road, the price survey should be expanded to cover local landing places in order to obtain the actual producer price.

d) Aquaculture data

31. Aquaculture statistics are sub-divided into mariculture, brackishwater culture and freshwater culture in the region. Aquaculture has developed remarkably in recent years in accordance with the short supply of captured fish and the improved standard of living of people in the region. Shrimp, sea bass, milkfish, tilapia, carp and catfish culture are popular for both export and local supply.

32. It was remarked that, when comparing aquaculture statistics to review the development and productivity of the major species cultured, there are often discrepancies caused by over-

estimates or the grouping together of captured products and cultured products, especially in the cases of molluscs and seaweed culture.

33. The Workshop acknowledged the importance of examining the definition of aquaculture and fish propagation. It was suggested that aquaculture be defined as "a production system to breed and grow owned aquatic animals or plants in certain occupied areas with active management of the environment, facilities and production techniques". On the other hand, fish propagation is defined as "a human action to increase natural resources and catch by introducing certain techniques at different stages in the life cycle of objective aquatic animals or plants".

34. The representative from Malaysia explained that, for the purposes of statistical reporting and compilation, data on cockles and inland fishery have been included, in line with Malaysia's national planning programs, in the aquaculture statistics since 1984.

35. It was also suggested that the production of mussels in Thailand should be included in capture fisheries. As for oysters and cockles, elements of investment, care, etc. are involved; they should therefore be considered under aquaculture.

36. The Workshop agreed that the elements of active management, exclusively occupied areas and ownership of fry should be taken into consideration in separating aquaculture from capture fisheries.

e) Inland Fisheries data

37. The Workshop agreed that the collection of statistics for inland fisheries is very difficult. Accurate data on this aspect is very much affected by the distance and vastness of this fishery in certain countries.

38. Thailand is one of the countries that has elaborate methods for collecting inland fishery statistics. There are a total of 47,482 establishments and a sample size of 10 per cent is taken. The survey is done once a year. In the Philippines, statistics on inland fisheries are collected for major water bodies only, i.e., lakes, rivers and dams. In Malaysia catch statistics for inland fisheries are not collected at present but will be collected in the near future.

VI. REVIEW OF THE FISHERY STATISTICAL BULLETIN FOR THE SOUTH CHINA SEA AREA

39. The Workshop agreed that the objective of the Statistical Bulletin is to facilitate international comparison of fisheries between countries bordering the South China Sea Area and that one of the objectives of this Workshop was to review the present contents of the Bulletin for further improvements.

40. The Workshop reviewed the present format of the Bulletin. It was suggested that, firstly, the Explanatory Notes be transferred to form one of the appendices.

41. It was considered that, if the Annual Series of Fishery Productions could be expanded to cover a longer time span than the present five-year period, it would be more useful to the users. The SEAFDEC Secretariat, therefore, asked the participating countries to provide any available time series data as far back as possible, so that they can be included in the Country Statistical Profiles, planned to be compiled and published by the Secretariat in the near future.

42. The standard classification of fish species was reviewed by the Workshop, particularly with regard to mackerel, tuna and shrimp. It was proposed that the name frigate mackerel be changed to frigate tuna, but no decision was taken and the participants agreed to leave this matter to the Training Department for further study. Furthermore, when a code number does not exist for a specific species and it is included under another code number, a footnote to this effect should be added.

43. The guidelines on distinction of small-scale and large-scale fisheries were reviewed. It was noted that there is no commonly used statistical criteria for small-scale fisheries in the region at present, although the economic concept of a small-scale fishery is "a fishing household engaged in fishery mainly employing household members".

44. Therefore, since it is not possible to finalize the general criteria regarding the size and gross tonnage of fishing vessels used in small-scale fisheries in the region, it is better to leave the definition of small-scale fisheries to the discretion of the countries concerned.

45. The participant from Thailand informed the Workshop that the data collected during the 1985 Fisheries Census will enable Thailand to provide information on fishing vessel size by gross tonnage, and this was welcomed by the Workshop.

46. The statistics on the values of marine catches were discussed at length because of their significance to the user, particularly for economic studies on costs and earnings. The Workshop agreed to keep these statistics unchanged. One of the problems discussed was that the basis for valuation varies from country to country. In Malaysia, Hong Kong and Taiwan, the value used is obtained from the wholesale price, whereas, in the Philippines the producer price is used. Malaysia, Hong Kong and Taiwan could supply the producer price by deducting commission.

47. It was suggested to abridge Table 4.8 on Catch of Marine Fishery by type of Fishing Gear and Species because of its considerable length. However in view of its importance for stock assessment and the fact that some countries do not give this data in their national statistical publications, it was considered expedient to maintain this table in the Bulletin.

48. Catch by Type of Fishing Gears in Table 4.9.1 was discussed and it was proposed to sub-classify surrounding nets into two groups. Because of the importance of purse seine in the

region, data on this gear should be indicated separately from those of other traditional surrounding nets. It was further suggested that the table on Catch by Type of Fishing Gear should be improved by referring to the catch structure.

49. A more precise classification of other gears in the publication was also suggested, particularly as regards trawls, seine nets and gill nets. Malaysia's catch data on seine nets should be credited to purse seine. The data from the Philippines for large-scale fishery or trawl refers to otter trawl and that for small-scale fishery refers to baby trawl. Data on shrimp net and Dutch seine in Indonesia should be classified under trawl. Other suggestions on gear classification were for trawl to be subdivided into double rigger trawl, otter trawl and pair trawl; for gill net, to be divided into Spanish mackerel drift gill net and other gill nets; for surrounding nets, to be divided into purse seine and other surrounding nets. In addition, purse seine should be sub-divided into one-boat purse seine and two-boat purse seine.

50. The participant from Malaysia pointed out that the data for the inland production of Malaysia reflected in the table was very much understated.

51. The distinctions between mariculture, brackishwater culture and freshwater culture were discussed and the conclusion of the Workshop was to retain the present classifications used in this region.

52. The Chairman proposed that Table 6.4.2 on brackishwater culture reflect the species being cultured, with details of the number of establishments, number of workers, etc., but no decision was made because of the recognized difficulties in supplying such data. The participants agreed to reconsider this proposal at a future date.

53. With regard to Price Statistics, the Training Department requested the participating countries to add a footnote to their producer price and consumer price statistics, to include name of market or source and methodology, since this would facilitate its estimations.

54. The Workshop agreed that Catch and Effort Statistics should be published separately from the General Fishery Statistics, and that they should give data for each specific fishing ground.

VII. RECOMMENDATIONS

55. The participants made the following recommendations for consideration and action by the agencies concerned:

1. High priority should be given to improving fisheries statistics by the participating countries in order to meet urgent needs, in particular in the fields of assessment of aquatic stocks and socio-economic conditions.

2. SEAFDEC should find ways and means to assist the participating countries in the training of their fishery statisticians and enumerators, including the development of computerized data processing and analysis.

3. SEAFDEC should review and revise the standard classifications for fishing gear and species included in the Fishery Statistical Bulletin in order to meet the current situation of fisheries in the region.

4. SEAFDEC should establish an appropriate classification for aquaculture and develop statistical tables suitable for comparative analysis of productivity among the participating countries.

5. SEAFDEC should organize a seminar/workshop on the socio-economic aspects of fishing communities in the region in order to improve the collection and analysis of socio-economic statistics.

VIII. ADOPTION OF THE RECOMMENDATIONS

56. The Workshop adopted the Recommendations in this Report on 4 July 1986 and requested that the Secretary-General of SEAFDEC submit the Recommendations to the SEAFDEC Council of Directors for consideration and approval.

PHILIPPINES

Mr. Candido M. Ramos	Supervising Statistician Bureau of Fisheries and Aquatic Resources Philippines
Ms. Lourdes R. Bautista	Senior Statistician Bureau of Fisheries and Aquatic Resources Philippines

TAIWAN

Dr. Sing Hwa Hu	Deputy Director Taiwan Fisheries Bureau Taipei, Taiwan Republic of China

THAILAND

Mr. Thongchai Ngasong	Chief, Fisheries Statistics Section Department of Fisheries Ministry of Agriculture and Cooperatives Bangkok, Thailand
Ms. Orasri Lipikorn	Statistician Fisheries Statistics Section Department of Fisheries Ministry of Agriculture and Cooperatives Bangkok, Thailand

Ms. Amara Cheunpan	Marine Fishery Biologist Marine Fisheries Division Department of Fisheries Ministry of Agriculture and Cooperatives Bangkok, Thailand
Ms. Panipa Hanvivatanakit	Fishery Economist Fishery Economic Section Department of Fisheries Ministry of Agriculture and Cooperatives Bangkok, Thailand
Mr. Prapon Siripanich	Chief, Planning and Evaluation Section Fish Marketing Organization Bangkok, Thailand
Mr. Chanchai Skawattanont	Statistician Fish Marketing Organization Bangkok, Thailand
Dr. Apichart Pongsrihadulchai	Chief of Statistical Technique and Survey Planning Branch Center for Agricultural Statistics Office of Agricultural Economics Ministry of Agriculture and Cooperatives Bangkok, Thailand

FAO/IPTP

Mr. Toshifumi Sakurai	Programme Director Indo-Pacific Tuna Development and Management Programme Sri Lanka

SEAFDEC

Mr. Kazuo Inoue	Deputy Secretary-General and Deputy Chief of the Training Department SEAFDEC Training Department
Prof. Dr. Tadashi Yamamoto	Professor of Fishery Economics College of Economics Nihon University Tokyo, Japan
Mr. Kungwan Juntarashote	Head, Statistics and Socio-economics Section SEAFDEC Training Department
Mr. Somsak Chullasorn	Chief, Stock Assessment Unit Marine Fisheries Division Department of Fisheries Bangkok, Thailand
Mr. Chumpol Nagalaksana	Chief, Computer Section Fishery Policy and Planning Division Bangkok, Thailand
Ms. Amanda Owden Challali	Technical Editorial Officer SEAFDEC Liaison Office Bangkok, Thailand
Ms. Pouchamarn Sorayutasanee	Statistics and Socio-economic Assistant SEAFDEC Training Department

Observers

Mrs. Marena Waiyasilp	Statistician Fisheries Statistic Section Department of Fisheries Ministry of Agriculture and Cooperatives Bangkok, Thailand
Ms. Patchareenart Semanit	Statistician Fisheries Statistic Section Department of Fisheries Ministry of Agriculture and Cooperatives Bangkok, Thailand
Mrs. Boonrat Laeaddee	Statistician Economic Survey Division National Statistical Office Bangkok, Thailand
Ms. Ruamporn Sirirattrakul	Technical Statistician Economic Survey Division National Statistical Office Bangkok, Thailand
Mrs. Mala Supongpan	Senior Fisheries Biologist Marine Fisheries Division Department of Fisheries Bangkok, Thailand
Mr. Masahiro Yamao	Fishery Economist Research Division SEAFDEC Training Department
Mr. Dhammasak Poreeyanond	Chief, Exploratory Fishing Sub-Division Exploratory Fishing Division Department of Fisheries Samut Prakarn, Thailand

Annex 2

OPENING REMARKS
of
Dr. Veravat Hongskul
Secretary-General
and
Chief of the Training Department
Southeast Asian Fisheries Development Center

Distinguished Participants, Ladies and Gentlemen:

On behalf of the Training Department of the Southeast Asian Fisheries Development Center, I wish, first of all, to extend our warmest welcome to all participants and observers to the Sixth Regional Workshop on Fishery Statistics in Southeast Asia, in particular, to our former colleagues in this series of Workshops, namely, Mr. Candido Ramos from the Philippines, Mr. John Cheng from Hong Kong, Prof. Yamamoto and Mr. Sakurai who have done significant work for our statistical system; and Dr. Purwito and Mr. Somsak who were invited to attend this workshop in order to share their unique experience as users of statistics for the purpose of resources assessment.

This is the sixth workshop organized by the Training Department on fishery statistics and the last meeting was held in 1980. The previous workshops resulted in the production of the Fishery Statistical Bulletin for the South China Sea Area published since 1978. Gradual improvements to the Bulletin have been observed but they are not enough. We want to make sure that our Bulletin continues to develop with time to meet the needs of all users. We therefore welcome any comments or suggestions you may wish to make in order to improve our Bulletin.

The objectives of this Workshop are, first, to discuss the requirements for fishery statistics by the fishery administrators and researchers in each participating country; second, to review the current practices regarding the collection and compilation of fisheries statistics in the region; and, finally, to review the contents of the SEAFDEC Fishery Statistical Bulletin and to suggest any improvements.

May I take this opportunity to express my thoughts as a user of the fishery statistics of the region. The first priority in collecting and compiling any type of statistics is accuracy. For fishery planning, management and development, the statistics employed in the decision-making process must be accurate to ensure the right decision and strategy. I also believe that no statistics are better than incorrect statistics. Without statistics, we can proceed to collect them as required to make a decision; but incorrect statistics could lead us into a number of problems including mismanagement. The statisticians must therefore be honest in reporting the changes, either positive or negative, they must also be brave enough to say when some of the statistics required by decision makers are not yet available or not accurate enough.

The fishery statisticians must be prepared to first check what changes have occurred in the figures. They must also be able to identify the causes for such changes. For example, what were the species for which catch records rose so sharply? For which species were catch records much below those of the previous year? Why? In what areas and when? He must race against time to collect more information that could indicate the current situation in the fishing industry and report to the administrators on a timely basis before the printing of the annual statistical records, usually two years later, and before the press reports it. In this context, the statisticians must work in close coordination with other units to assist them in interpreting the mass figures compiled and to present them more meaningfully. Of

course, once all the figures are checked, compiled as tables and printed as annual records, the statistics will become history. Your excellent work has been done for one more year. The rest is up to the users to digest and make use of these statistics as appropriate.

This Workshop is therefore not an easy one. May I request your active participation in discussing needs and advising us on ways and means of improving not only the contents of our Bulletin, but also the standard of fishery statistics in the region. I am confident that, with the collective wisdom of all participants, this difficult task can be overcome and that we can look forward to seeing the system and the Bulletin strengthened in the years to come for the mutual benefit of all concerned. I therefore wish the Workshop every success.

With this final remark, I now declare open the Sixth SEAFDEC Regional Workshop on Fishery Statistics in Southeast Asia.

Annex 3

AGENDA

1. Opening Ceremony

2. Election of the Chairman, Vice-Chairman and Rapporteurs

3. Adoption of the Agenda

4. Presentation of country reports and discussion:

   a) Fishery statistical system, organization, data collection, compilation and reporting at national level

   b) Statistical data on fish production (catch and effort)

   c) Statistical data on inland fisheries and aquaculture

   d) Statistical data on the socio-economic aspect of fisheries, and

   e) Problems and constraints in improving fisheries statistics at national level

5. Data collection methodology:

   a) Catch-effort data

   b) Economic data

   c) Price data

   d) Aquaculture data, and

   e) Inland fisheries data

6. Review of the SEAFDEC Fishery Statistical Bulletin:

   a) Classification and definition

   b) Species coverage

   c) Catch-effort statistics

   d) Small-scale fisheries statistics, and

   e) Aquaculture statistics

   f) Differences between the statistical figures in the Bulletin and in other statistical yearbooks

   g) Classification and definition of fishery products

7. Training requirements in fishery statistics at national and regional levels.

Annex 4

FISHERIES STATISTICS IN HONG KONG

1. Institutional Framework for Fishery Statistics

In Hong Kong the institutional framework for fishery statistics comprises several government departments, notably the Agriculture and Fisheries Department and the Fish Marketing Organization (FMO). Their respective roles are briefly described as follows:

1.1 The Agriculture and Fisheries Department with responsibility for fisheries development planning requires detailed information on the fishing fleet and overall fisheries production as well as specific information on, e.g., assessment of fishery resources, cost and earnings of the fishing enterprises, structure and characteristics of the fishing fleet and aquaculture establishments, and consumption, supply and prices of fishery products. The Department, therefore, conducts appropriate surveys for the acquisition of establishment, production, resource, economic and marketing statistics. It collates landings records from FMO and liaises with other government departments or international agencies for additional information of use to the local fishing industry.

1.2 The Fish Marketing Organization was established as a statutory corporation in 1945 by authority of the Marine Fish (Marketing) Ordinance, Chapter 291 of the Laws of Hong Kong, which provides for the control of the landings and wholesale marketing of fresh marine fish. The Organization presently operates seven wholesale fish markets throughout the territory, and its sales records provide accurate landings information on the quantity, value and average price of fresh marine fish for the main taxa and major gears.

1.3 The Census and Statistics Department is the government Department with statutory responsibilities for the organization and conduct of major surveys and censuses for collecting social, economic, trade as well as industrial statistics. The decennial (every ten years) or quinquennial (every five years) census carried out by the Department includes a marine section which covers information related to the demographic, social and economic aspects of the fishermen's households and the structure of the fishing fleet. In the consumer price index survey, the Department collects information on retail prices including certain selected food fish. Figures on imports and exports of fishery products are included in the Hong Kong Trade Statistics which are published monthly by the Department.

1.4 The Marine Department is responsible for the licensing of fishing vessels. Information on the length, width, tonnage capacity and other details of the vessels are recorded at the time of licensing.

2. Current Statistical Programmes Related to Fisheries

2.1 The current statistical programmes related to fisheries in Hong Kong are summarized in Appendix I. The major surveys related to the collection of fishery statistics in Hong Kong are described below:

2.2 Fisheries Census

There is no general fisheries census in Hong Kong. However, certain areas related to the fishing industry are included by the Census and Statistics Department in its territory-wide population census carried out decennially and quinquennially. A marine by-census has just been completed in February 1986 together with a population by-census. The former was designed to collect information on the demographic, social and economic aspects of the boat-dwelling population the majority of whom are fishermen.

2.3 In the 1986 marine by-census, the information obtained in respect of the fishermen's population includes the number of fishermen by age, sex, educational attainment and whether land or marine-based. As for the fishing vessels, the information obtained includes the number of fishing vesels by major type of fishing and income from the main operation. Results of the 1986 population by-census will be compiled and published by the Census and Statistics Department.

2.4 Fishing Vessel Statistics

The size and major characteristics of the fishing fleet in Hong Kong are obtained from a census conducted by the Agriculture and Fisheries Department once every three years during the lunar new year period when almost all the Hong Kong-based fishing vessels stay in port. The last fishing fleet census carried out by the Department was in February 1985. The main objectives of the census are to ascertain the number and type of active Hong Kong licensed fishing vessels and to collect on a sample basis information relates to the major characteristics of the local fishing fleet, such as engine power, size of vessel and number of crew.

All fishing vessels in Hong Kong were physically counted during the census period which lasted four days between 14th and 17th February 1985. A total of 54 places were covered including all fishing ports, typhoon shelters and anchorages where fishing vessels stayed for celebration of the lunar new year. A list of available information and data parameters in respect of the 1985 fishing vessel count in Hong Kong is shown in Appendix II.

2.5 Catch Statistics

Two types of catch statistics are being collected in Hong Kong, viz. (i) fisheries production statistics and (ii) catch and effort statistics. These statistics, however, are not categorized into industrial and small-scale fisheries. All capture fishing units in Hong Kong are owner-operated.

2.6 Fisheries production statistics

The major Hong Kong fisheries comprise marine capture, coastal marine culture and inland culture. The fishing grounds exploited by the Hong Kong fishing vessels stretch along the Chinese coast from the Gulf of Tonkin to the East China Sea and out to a depth of less than 200 metres (see Figure 1). Within the territorial waters of Hong Kong marine fish culture is conducted in 27 designated fish culture zones in sheltered bays and inlets totalling about 130 ha of sea surface area. Fish ponds used for inland fish culture occupy about 2080 ha of which about 630 ha are either temporary fallow or pending for land development. The following paragraphs deal with the production statistics in respect of marine capture. Aquaculture statistics are described under paragraph 2.12 below.

2.7 Marine capture statistics are collected from two major sources, viz. landings sold through the Fish Marketing Organization and those sold elsewhere. By virtue of the Marine Fish (Marketing) Ordinance, fresh, chilled marine fish may only be bought and sold wholesale at a market operated by FMO. The Organization is required to document every transaction between the seller (fisherman) and the buyer (wholesaler) at the market as this forms the basis on which the fisherman's sales proceeds are calculated. Although the market transaction records are intended basically for accounting purpose, FMO produces the following statistics on landings sold through the Organization's markets:

1) landings by markets in quantity, value and average price (monthly and yearly);

2) landings by taxa in quantity, value and average price (monthly and yearly);

3) landings by type of fishing in quantity, value and average price (monthly).

2.8 Information on landings of live marine fish, shrimps and other invertebrates which do not pass through FMO and landings made by local fishing vessels outside Hong Kong is collected by means of sample surveys. The sample design aims at interviewing skippers from about 10 per cent of the fishing vessels by major types of fishing. The sampling frame is derived from the results of the fishing vessel count (see paragraph 2.4 above) which show the distribution of the fishing vessels by type and major fishing ports. The FMO's Liaison Officers stationed in the major fishing ports, who perform an important role as the first line of personal contact with fisherman, interview the skippers for information on landings outside FMO. This information includes landings in quantity and value by vessel type, major products, disposal forms and distribution channels.

Data on catches and local landings are processed on a quarterly and annual basis by pooling together the information from the two sources.

2.9 Fishing effort statistics

The trawler catch and effort sampling programme was designed and initiated in 1973 by the Agriculture and Fisheries Department to collect fishing effort information from the trawler fleet. It should be noted that between 60 and 70 per cent of the total marine catch by the Hong Kong fishing fleet is obtained by trawling with the remainder by various selective gears such as lines, gill nets and purse seines.

The primary objective of the programme is to measure the time-trend in the relative abundance of the exploited demersal resources. It also provides fishermen with information on the distribution of good fishing grounds based on the quarterly results of the previous three years. The sample design aims at obtaining 10 per cent coverage of the fishing activities conducted by pair and stern trawlers landing at two out of seven wholesale fish markets operated by FMO. These two markets are responsible for about 70 per cent of the total FMO trawler landings.

Effort information is collected by interviews with skippers at the landing places on randomly selected dates. Composition of the landed catch by major taxa is subsequently compiled from FMO sales records. The interviews cover the location and depth of fishing grounds, fishing duration, power of vessel and size of gear. The location is then translated into a ½° longitude by ½° latitude statistical grid of the South China Sea (see Figure 1) using number of fishing days per statistical rectangle as the basic effort data. In addition to the basic information on days fishing and quantities of fish landed, the skippers have since 1975 been requested to furnish details of vessel power, gear dimensions and other supplementary data such as landings made outside Hong Kong.

Processing of the catch and effort data is performed with the computer on a quarterly basis. The output includes landed catch per unit effort for each taxon and statistical rectangle, distribution of effort, estimates of total effort for each fishing area and estimates of total landings per taxon for each fishing area and type of trawler. In addition, results for all types of trawlers are pooled using "HP.HL (m). day" as a common unit of effort to give a more useful index of abundance. The latter results are also plotted in a graphical format using numerical codes by the computer. Automatic plotting of estimated total effort by each type of trawler is also made. The sample data are stored on magnetic tapes and may be retrieved for future analysis.

2.10 Economic Survey

Annual cost and earnings surveys of the different capture fisheries and aquaculture sub-sectors are conducted to provide information on their economic profile.

1) Marine capture

The cost and earnings survey aims at interviewing 10 per cent of the fishing vessels by major type of fishing methods.

The sampling frame is derived from the results of the fishing vessel count (see paragraph 2.4 above). Interviews with skippers are carried out by field staff of the Agriculture and Fisheries Department at the major landing places and cover the following information:

- boat characteristics : licence number, length, age, engine power, current capital value of boat, deck machinery and equipment;

- cost : labour, fuel oil, ice, baits, provisions, marketing, repairs, gear replacement, depreciation and interest payment; and

- earnings : days at sea per year, catch, disposal of catch, average price and catch revenue.

The above information is taken down by the enumerators on a standard questionnaire form during the interviews. Results of the survey are analyzed to produce information on the average economic profile showing the average catch revenue, total cost (breakdown by items) and profits of the major types of fishing. Depreciation is taken on a simple straight-line method; at 7.5 per cent on the current capital value of the vessels.

2) Aquaculture

Economic surveys of fish pond culture and mariculture are conducted annually, sampling about 10 per cent of the fish farms in each of the two sub-sectors. Information on the sampling frame of pond fish farms is obtained from the Fish Culture Development Section of the Agriculture and Fisheries Department and of marine fish farms from the mariculture licence records. Interviews with fish farmers are carried out by field staff of the Department at the farm sites and cover the following information:

- operator, farm size, pond formation and farm structure (e.g. fish ponds, drainage facilities, mariculture rafts, cages and other equipment);

- inputs including fry, rent, feedstuffs, labour, maintenance, marketing and depreciation; and

- output including yield, average price and gross income.

Pre-designed questionnaires are used for each of the different aquaculture sub-sectors for recording the above information obtained from the interviews. Results of the surveys are analyzed to produce information on the economic profile of the aquaculture sub-sectors showing the average yield, income, total cost (breakdown by item) and profits of the different culturing practices. Depreciation is taken on the basis of the different expected economic life of the capital equipment.

2.11 Fish Marketing Survey

Information on the demand, supply and prices of the major fishery products can be obtained from the available data, such as:

1) local supplies : based on the landings data compiled by the Agriculture and Fisheries Department;

2) imports and exports : based on the trade statistics compiled by the Census and Statistics Department;

3) wholesale prices : based on the data compiled by the Fish Marketing Organization on fresh marine fish and by the Agriculture and Fisheries Department on other fishery products; and

4) retail prices of marine and freshwater fish : based on the household surveys carried out by the Census and Statistics Department.

2.12 Aquaculture

1) Aquaculture in Hong Kong comprises mainly the inland pond fish culture and marine fish culture. Oyster is also cultured but the production in relation to the total fisheries output is insignificant. Statistics on aquaculture are collected in respect of: establishment, yield and economics.

2) Establishment

Information on inland fish pond area is obtained from the land use survey carried out by the Agriculture Economics Section of the Agriculture and Fisheries Department. The survey is designed to collect information related to the utilization of agricultural land in Hong Kong under different categories such as paddy, crops, orchard, fish ponds and fallow lands. The survey is stratified into 30 geographical locations covering the entire land area in Hong KOng. Aerial photographs are used to supplement the survey and provide annual estimates on the agricultural land use patterns including fish ponds.

By virtue of the Marine Fish Culture Ordinance, Chapter 353 of the Laws of Hong Kong, all marine fish culture operators are required to practise fish culture under licence in sites specified within fish culture zones. The licensing of mariculturists provides records of the operators and their operations including name, location, and approximate size of rafts. The licences are renewed annually and the records are updated accordingly.

3) Yields

The bulk of the local pond fish are marketed through a wholesale market situated within the major fish pond area and operated by fish dealers. Information on the yields from local fish ponds is collected by means of the market throughput survey. Visits to the wholesale market are made on randomly selected days about three times a month to obtain the market information based on estimates of the total local pond fish yields which are made on a monthly basis.

2.13 Inland Fisheries

There are no inland capture fisheries in Hong Kong.

3. Publication of Statistics

3.1 Statistics related to fishermen, fishing vessels and fisheries production are published by the Agriculture and Fisheries Department in its Annual Departmental Report.

3.2 The Fish Marketing Organization also publishes statistics on the sales of marine products by type of fish, vessel and market in terms of quantity, value and price in its Annual Report.

3.3 The Census and Statistics Department publishes monthly the Hong Kong Trade Statistics which includes information on the imports, exports and re-exports of major fishery products. The Department also publishes monthly the Hong Kong Monthly Digest of Statistics which includes information on the retail prices of selected marine and freshwater fish. In addition, results of the 1981 population census are published in the Hong Kong 1981 Census Main Report which contains information on fishermen and fishing vessels collected during the 1981 census.

4. Problems and Constraints

4.1 The fishery statistics programmes in Hong Kong cover different aspects of the fishing industry and the information being collected is generally adequate. Although there are several government departments involved in data collection related to fisheries, the bulk of the fishery statistics are obtained by the Agriculture and Fisheries Department and Fish Marketing Organization. As close liaison is maintained among the departments, there are few problems regarding the institutional framework for fishery statistics.

4.2 On the other hand, the major shortcomings of the fishery statistics programmes in Hong Kong and considerations for improvements are described as follows:

4.3 Data Collection

At present, there are a number of separate surveys designed to interview skippers for information on catch and effort, cost and earnings, landings sold outside FMO and fishing vessel and gear characteristics. Some of the information covered by these surveys may overlap and it is possible for a fisherman to be interviewed more than once on the same day by different enumerators for different surveys. An integrated sampling programme is being considered by the Agriculture and Fisheries Department with a view to rationalizing and stream-lining the data collection system so that one survey can serve different requirements.

4.4 Data Processing

The catch and effort statistics have been processed by computer since 1975. The fishing vessel count data collected in 1985 were also processed by computer. As a result of the computerization a wider scope of information can be compiled and made available serving different requirements while requests can also be handled more efficiently and with accuracy. A proposal has been made to acquire a micro-computer for processing of the catch statistics, data from the economic surveys and mariculture licences. This should further improve the quality and efficiency of the fishery statistics.

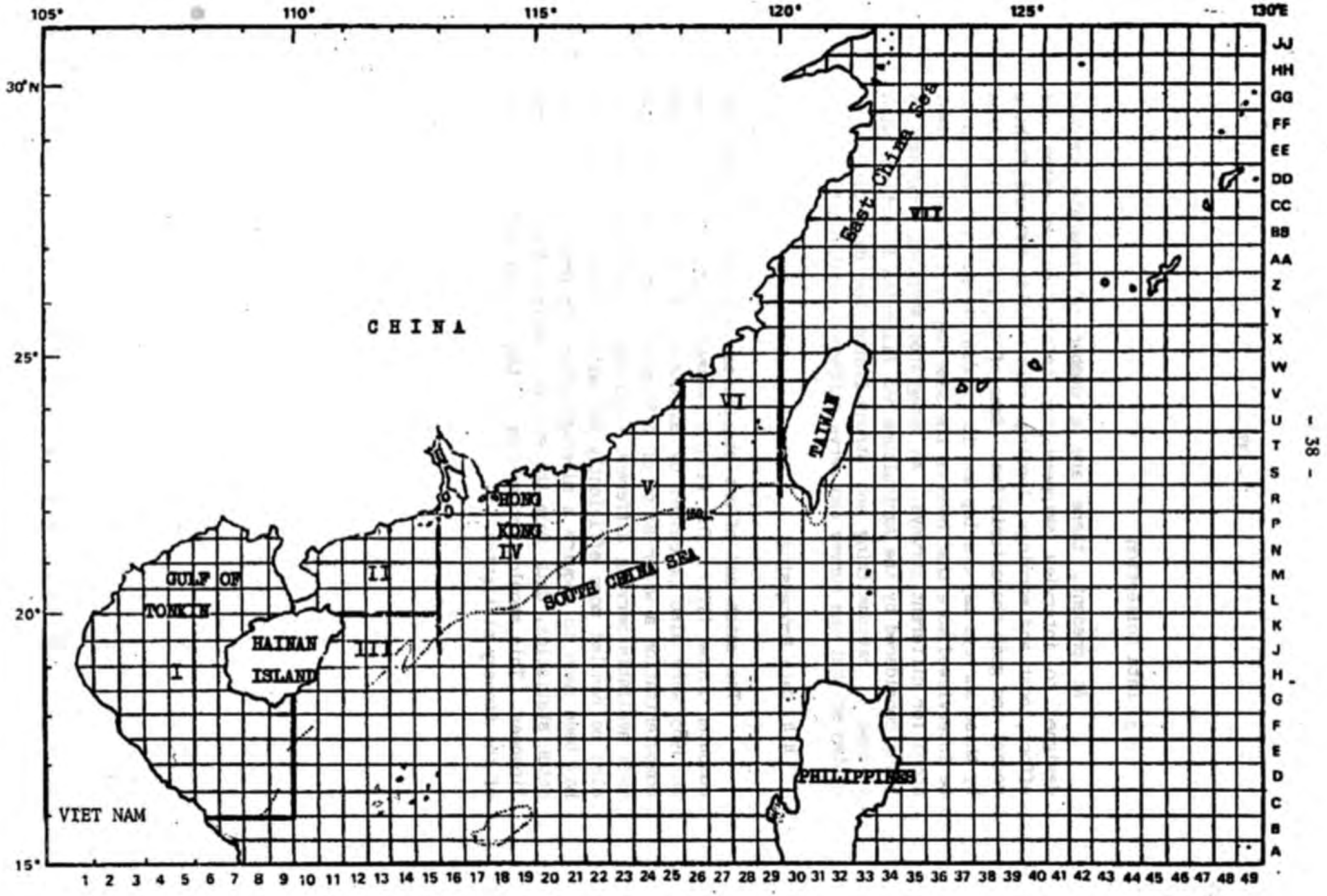

Fig. 1 Chart showing statistical rectangles and shelf area divisions.

Appendix I

Current Statistical Programmes Relating to Fisheries in Hong Kong

Subject	Frequency	Collection Methods
Fishing Fleet and Fishermen		
AFD fishing vessel count: size of fleet by gear, length, horsepower, hull design and crew	3-year intervals	census covering all fishing ports and anchorages
CSD census: number of fishermen by age, sex, education attainment and income	5-year and 10-year intervals	territory-wide population census
CSD census: number of boats by gear, horse-power, length and income	5-year and 10-year intervals	territory-wide population census
MD licensing: number of fishing vessels, length, capacity and horsepower	annually	licensing records
Catch Statistics		
FMO : landings by market, quantity, value and price	monthly and annually	market transaction records
FMO : landings by taxa, quantity, value and price	monthly and annually	market transaction records
FMO : landings by gear, quantity, value and price	annually	market transaction records
AFD : estimates of total catch by gear, quantity and value	quarterly and annually	FMO data and sample survey by interviewing skippers at major fishing ports

Subject	Frequency	Collection Methods
Catch Statistics (continued)		
AFD : Catch-effort of trawlers by type, area and taxa	quarterly	sample survey by interviewing trawler-skippers at two of the FMO markets
Economic Statistics		
AFD : cost and earnings of fishing vessels by gear	annually	sample survey by interviewing skippers at major fishing ports
AFD : cost and earnings of aquaculture by culturing practices	annually	sample survey by interviewing fish farmers at farm sites
Fish Marketing Statistics		
AFD : consumption demand, supply of fishery products	annually	compilation of data from available sources
AFD : wholesale prices of live marine fish by species	monthly, annually	sample survey by interviewing fish dealers at wholesale centres
FMO : wholesale price of fresh marine fish by species	monthly, annually	market transaction records
CSD : retail prices of fresh marine and freshwater fish of selected species	monthly, annually	general household survey for the Consumer Price Index
CSD : imports, exports and re-exports by product, country, quantity and value	monthly, annually	compilation of data from customs documents

Subject	Frequency	Collection Methods
Aquaculture Statistics		
AFD : inland fish pond area by geographical location	annually	agricultural land use survey and aerial photographs
AFD : mariculture establishment by fish culture zone, size of raft and cages	annually	mariculture licensing records
AFD : estimates of inland fish pond yields by quantity, value and species	annually	survey of market throughput
AFD : estimates of mariculture yields by quantity, value and species	annually	sample survey by interviewing fish farmers/ dealers at major fishing ports

Abbreviations

AFD Agriculture and Fisheries Department, Hong Kong Government

CSD Census and Statistics Department, Hong Kong Government

FMO Fish Marketing Organization, Public Corporation

MD Marine Department, Hong Kong Government

Appendix II

Fishing Vessel Count 1985

(A) List of available information

All fishing vessels anchored in the areas covered (1) by the count are enumerated.

(a) The following information is obtained on a complete enumeration basis:

i) Hong Kong vessel licence number;
ii) with or without PRC licence;
iii) type of vessel (2);
iv) modern or traditional hull; and
v) powered or non-powered.

(b) The following information is obtained on a sample basis from at least one vessel out of five vessels enumerated for each type of vessel:

i) primary operation;
ii) secondary operation;
iii) number and configuration of engines;
iv) engine power (3);
v) length of vessel (4);
vi) number of sampans attached to the mother boat;
vii) number of outboard engines;
viii) number of inboard engines;
vix) number of crew onboard;
x) number of family crew;
xi) number of locally-hired crew; and
xii) number of PRC crew.

(B) List of data parameters

(1) Areas covered

i) Sha Tau Kok
ii) Tai Po
iii) Sai Kung
iv) Shau Kei Wan
v) Stanley
vi) Aberdeen
vii) Cheung Chau
viii) Harbour
ix) Tsuen Wan
x) Tai O
xi) Tuen Mun

(2) Type of vessel

i) Pair Trawler
ii) Stern Trawler
iii) Shrimp Trawler
iv) Hang Trawler
v) Longliner - multi-species
vi) Longliner - golden thread
vii) Longliner - shark/conger-pike eel
viii) Longliner - grouper
ix) Hand Liner
x) Gill Netter
xi) Purse Seiner
xii) Miscellaneous

(3) Engine power (kw)

i) under 11
ii) 11 - 37
iii) 38 - 74
iv) 75 - 111
v) 112 - 186
vi) 187 - 260
vii) 261 - 335
viii) 336 - 410
ix) 411 - 484
x) over 484

(4) Length of vessel (metres)

i) under 6
ii) 6 - 10
iii) 11 - 15
iv) 16 - 20
v) 21 - 25
vi) 26 - 30
vii) over 30

Annex 5

FISHERIES STATISTICS IN INDONESIA

1. Introduction

Indonesia the world's largest archipelago, lies along the equator, Indonesia is comprised of about 13,000 islands of which about 3,000 are inhabited and covers an area of 2 million square Km.

Indonesia is divided into 27 Provinces. Each Province into several Regencies and Municipalities, each Regency/Municipality into several subdistricts and each subdistrict is divided into several villages. There are 350 Regencies/Municipalities, 3,500 subdistricts, and 60,000 villages. Total population in 1985 was 165 million.

2. Organization of Statistical Services

According to the Indonesian Statistical Law No.7, 1960, the Central Bureau of Statistics (CBS) is responsible for the collection of basic statistical data, including fishery data. On behalf of the Government, CBS also acts as a coordinating body for all statistical activities including those of other Government Agencies.

CBS has a branch office in each Province and each Regency/Municipality. In each subdistrict (Kecamatan) there is one field officer as an enumerator. Within the CBS there is a Fishery Statistics Subdivision, operating under the Non-food Crops Agricultural Statistics Division.

The Directorate General of Fisheries (DGF), which is a Directorate of the Agriculture Department, is the central body for fishery administration. At the provincial level there is a Fishery Service Office which has a branch office in each district.

The staff, including officials in charge of fishery statistics, are assigned to these offices. At each subdistrict at least one fishery extention officer is stationed. He serves both the Chief of the Fishery Service at the district level, and the Chief of the Subdistrict Office. One of his responsibilities is the collection of fishery statistics. Because of a limited budget, the development of fishery statistics is the responsibility of both the CBS and the DGF. Currently, the CBS is responsible for fishery censuses and the like, and the DGF is responsible for current fishery statistics.

3. Fishery Census in Indonesia

3.1 The 1973 Fishery Census

1) According to the Indonesian Census Law No.6, 1960, a Census is to be conducted every ten years. The Fishery Census in Indonesia is undertaken as part of the Agricultural Census. The 1973 Fishery Census was part of the Agriculture Census undertaken by CBS in close collaboration with the Department of Agriculture, Directorate General of Fisheries.

This census was limited to marine fishery and brackishwater culture in Sumatra, Java and Bali, since marine fishery and brackishwater culture in these three islands were considered to be priority fishery development activities.

Although the Fishery Census was conducted as a part of the 1973 Agriculture Census and owing to the nature of fishery, which is quite different from that of agriculture, the design of the Fishery Census was quite independent of the 1973 Agriculture Census with the exception of the complete count (enumeration) of agriculture and fisheries households.

2) Objectives

The 1973 Fishery Census was conducted primarily with the following objectives:

- To clarify the economic structure of marine fishery and brackishwater culture in Sumatra, Java and Bali;

- To establish a sampling frame for any other survey to be conducted in the future.

The 1973 Fishery Census constituded the following three surveys.

a. Complete Enumeration

A complete count was conducted with the following objective:

- To obtain the total number of fishing and agricultural households, which was ultimately used as a raising factor to estimate various Provincial figures based on the results of the sample census;

- To establish a sampling frame for future fishery surveys.

b. Sample Census

The major objective of the sample census was to clarify the economic structure of fishing activities in the country.

Census blocks which were established for the 1971 Population Census were used as sampling units.

c. This survey was conducted to clarify various characteristics of marine villages and covered all marine villages involved in any scale of marine fishery and brackishwater culture.

3) Sampling Design For Sample Census

a. Sampling Frame

The sampling frame for marine fishery was obtained from the complete count of the 1971 Population Census which tried, as part of its function, to identify all census blocks having marine fishing households. However, as there was some incompleteness in the identification the sampling frame obtained was verified and corrected by the CBS field officer.

The sampling frame for brackishwater culture was obtained from census maps prepared for the 1971 Population Census, which indicated the location of brackishwater fish ponds. However, as the sampling frame obtained seemed to be incomplete data available at the DGF was used for verification and correction.

b. Sample Selection

Since the size, i.e. the total number of sample census blocks throughout the three islands had been fixed when the budget was appropriated for the fishing census, such a sample size was allocated to each Province taking into account the population size of the Province.

From the total number of census blocks involving marine fishery and brackishwater culture in each Province sample census blocks were selected by means of systematic sampling. However, the population size of brackishwater culture in north Sumatra, Jakarta and Bali was very small, so in those Provinces all census blocks were selected as sample blocks.

3.2 The 1983 Fishery Census

1) Objectives

The main objective of the 1983 Agricultural Census was to get basic data which could be used in the formation of an

Agriculture Development Plan and also for basic estimation purposes. The 1983 Fishery Census was undertaken as part of the 1983 Agricultural Census.

2) Scope and Coverage

The geographical coverage of the Agricultural Census encompassed the whole country. In the 1983 Agricultural Census, all agricultural subsectors were included except forestry and hunting.

The households engaged in fisheries covered under the census were located in the rural as well as the urban areas of the country.

3) Methodology

The sampling method for basic data collection in general census samples is one stage sampling by selecting 20% of the ordinary census blocks, special census blocks are not included.Before conducting census blocks selection, the villages are divided into urban and rural areas. The villages in each Regency/Municipality are arranged by their locations running order and then the census blocks were selected systematically.

The basic data of each selected census block was collected through the household listing.

The information in the household listing covers house hold activities, number of smallholder plantations, number of livestock and poultry, area of fishery cultivation, land control and number of farm households by holding size.

Particularly in the case of the rural areas, besides collecting the basic data, a 20% sample of the households were also interviewed for information regarding food crops, livestock and inland fishery. More detailed information about inland fishery was collected through this activity.

For the purpose of the 1983 Fishery Census all fishery census blocks from the general census sample were identified. Allocation of the total sample blocks for each Province had been obtained by CBS. Selecting sample blocks for the marine fishery census was done systematically. For brackish-water culture, the census blocks selection was determinded by the results of the general census sample listing.

Enumeration execution for marine fishery and brackish water culture was different. Listing all the households for the census blocks selected was the first activity in the marine fishery census.

The results of the listing execution were used as the basis for household selection in getting more detailed information on the fishery households.

The average number of fishery households selected for each census block was 10 households.

The total number of selected census blocks was about 4,435 and included 50,248 households.

Sample households selected for brackishwater culture purposes were based on the results of the general census sample listing.

The total number of selected census blocks was about 903 and included 5,488 households.

4. The 1981 Marine Fishery Survey

4.1 Objectives

The 1981 Marine Fishery Survey was conducted to determine landing place fishery production and in addition to collect data regarding the disposition of the catch by the fishermen.

This survey was conducted to complete the Main Landing Place Survey which was conducted by the DGF.

4.2 Methodology

The survey was conducted at the landing place where all crafts which landed at the landing place were the ultimate units.

The survey was divided into 4 phases. Because a sampling frame was not available, the first and second phases were based on the results of the landing place listing of the 1980 Multipurpose Survey which matched DGF data and the third and forth phases sampling frames were based on the first phase listing execution.

4.3 Landing Place Sample Selection

Landing places were divided into two categories, the first was the main landing place where the production contribution was about 50 per cent or more of that of the Regency.

The other was where the production contribution was less than 50 per cent. Because production data for each landing place was not complete, one landing place in every seashore subdistrict was selected to ensure that every main landing place would be selected.

In every landing place the enumerator listed all boats which landed and selected 6 boats (2 boats for each type of gear). The first two boats landing for each type were selected.

5. Monthly Report From Fishery Auction Places

5.1 Objectives

To collect data from fishery auction places to obtain the regular fishery production sold through each auction place. The data was used to estimate total production after adjustment for the percentage of total production which was not sold through the auction place.

5.2 Scope And Coverage

The geographical area covered in the data collection was Java island, outside Java was not covered.

5.3 Methodology

The data was collected using complete enumeration and a mailing system. The questionnaires were sent out by CBS through the CBS branch offices in the Regencies/Municipalities to every fishery auction place.

6. Problems and Constraints

The main problems and constraints in collecting fishery data were as follows:

6.1 Because of the limited budget an annual survey cannot be done.

6.2 Data obtained from regional reports are significantly different to those resulting from the Census, thus placing doubt on the quality of the data.

6.3 Sometimes the questionnaires used were too detailed and the fisherman had difficulty understanding them.

6.4 Rather difficult to get information, because the time period covered was the previous twelve months. Often crucial information such as production, cost structure, income and expenditure were very difficult for respondents to remember.

7. Fishery Statistical Systems within the Directorate General of Fisheries (DGF)

7.1 Besides CBS, the DGF is also responsible for the collection of current fisheries statistics. The responsibilities of statistical officials at all levels are set out as follows:

Fishery Extension Officer stationed in the subdistrict	- Field enumeration
District Fishery Service (DFS)	- Estimation of all statistics at district level and preparation of reporting forms.
Provincial Fishery Service (PFS)	- Scrutiny of reporting forms and compilation of yearbook at provincial level.
Directorate General of Fisheries (DGF)	- Scrutiny of reporting forms.
PUSDATIK (Central Data & Statistics, Agriculture Department)	- Tabulation by electronic computer.
Directorate General of Fisheries (DGF)	- Compilation of yearbook at National level
Central Bureau of Statistics (CBS)*	- Coordination of statistical activities.

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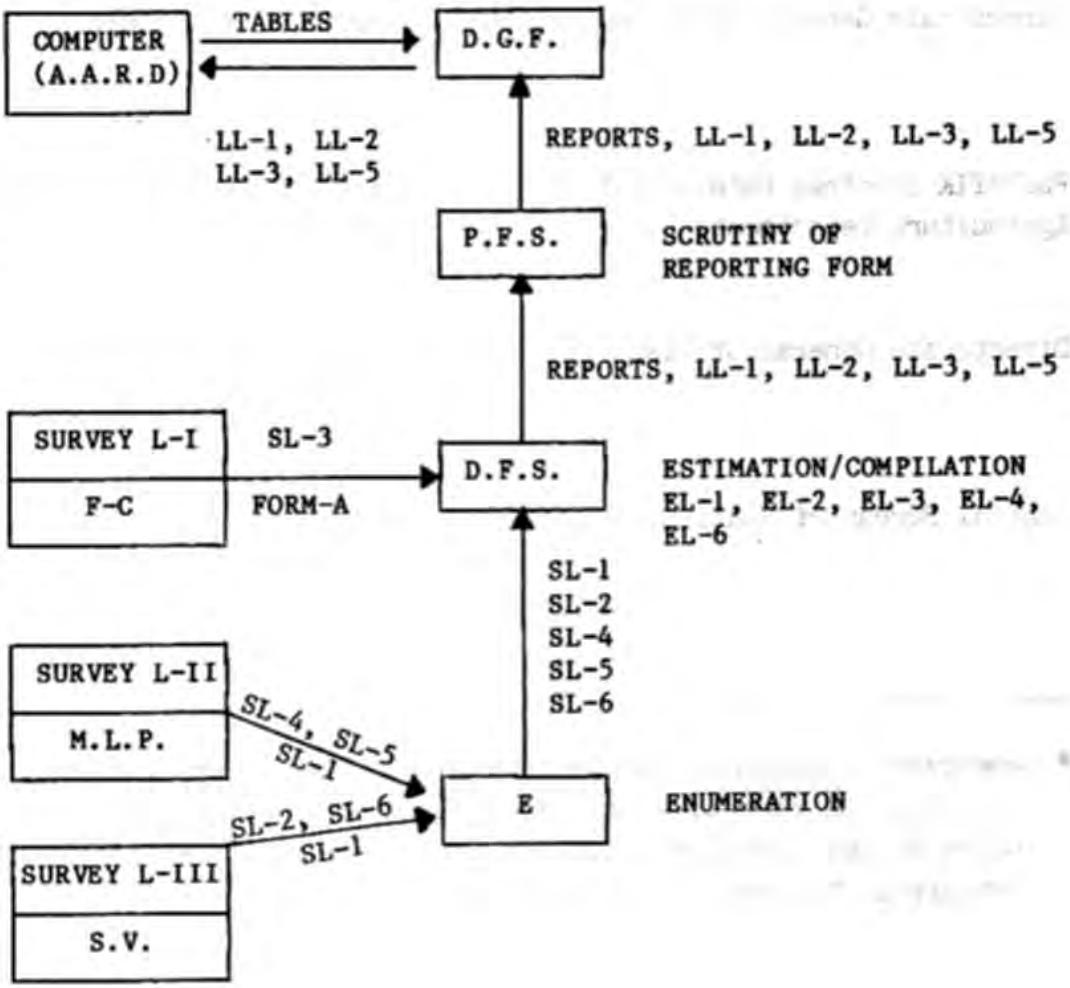
* Whenever a survey is to be conducted, the policy guidelines covering the objectives of the survey, methodology, questionnaire design, field organization, and processing are formulated jointly at the central office.

It maybe noted from the above chart that the survey method has given the highest responsibilities to the DFS, as the estimation of all statistics at district level has been fully entrusted to them. In many areas other than Java, monthly surveys may not be feasible. It was, therefore, finally decided that the reporting forms completed by the DFS be forwarded to the DGF on a quarterly basis, and the deadline by which these reporting forms are forwarded to the DGF would be three months after the respective quarter. Production surveys to collect statistical data were structured as shown in the following diagram.

STRUCTURE OF PRODUCTION SURVEY TO COLLECT STATISTICAL DATA



7.2 The standard survey is commonly called "New National Fishery Production Survey" which covers a variety of statistical items, including:

Fishery Inventory Items:

a) Fishing establishments (culture households)
b) Fishing boats (area of fish ponds)
c) Fishing units

Catch and Effort Data:

a) Number of trips
b) Catch (yield)

Disposition of catch:

a) Disposition of catch
b) Quantity of fisheries commodities produced

The standard survey gives special emphasis to the fishery inventory survey and the fishery production survey. The survey doesn't involve any field survey but catch estimated through the fishery production survey is simply divided into disposition channels, based on the knowledge of district fishery officers.

7.3 Fishing vessel statistics

1) Powered boats

In fishery administration, an accurate number of powered boats is particularly necessary. To meet such a requirement a powered-boat card, which can be used for ten years is prepared for every powered boat. In the first year of the survey these powered boat cards were prepared based on a list of powered boats prepared for the 1974 DGF Fishery Census (see survey form SL-1).

At the end of year, the card is brought up-to-date and the type of fishing gear employed during the past year is recorded, based on an interview with the fishermen.

2) Nonpowered boats

At the end of each year a complete list of fishing households, together with the number of boats in use is prepared with the use of survey form SL-2 for every sample village which was selected for the L-III survey. During the survey year the number of fishing units by type of fishing gear is surveyed on a quarterly basis, mainly for the estimation of catch and the number of trips for the L-III survey.

At the end of each year, the list is brought up-to-date and the number of fishing establishments, the number of non-powered boats by size and the number of fishing units by type of gear are counted from survey form SL-2.

7.4 Catch statistics

1) Catch statistics compiled in terms of both establishment approach and landing place approach

When reference is made to catch of a certain province from the viewpoint of the users of fishery statistics, two different types of catch statistics are required. One is catch which was landed in that province regardless of whether the catch was caught by a fishing boat of that province or another province, and the other is catch taken by fishing boats of that province only. The former are catch statistics compiled in terms of the landing place approach, while the latter are those compiled in terms of the establishment approach. The new survey is capable of providing both types of catch statistics for every province. To meet such a requirement, catch data collected by means of the fish landing approach has been divided according to the provinces of origin of

the fishing boats. This is done with the use of estimation form EL-5 and reporting form LL-4. Both the catch statistics derived from the fish landing place and from the catch divided by the province of origin of the boat, are reported to the DGF, which makes it possible to provide the two types of catch statistics.

2) Survey on number of trips and catch

This survey is composed of three kinds of survey, according to the nature of the survey's objectives.

a. L-I survey

This survey is applied only to some 30 fishing companies, whose catches are mainly for export. As these companies keep good records of their fishing operations, only survey form SL-3 is delivered to the companies for completion. The list of such companies was prepared by the DGF.

b. L-II survey

This survey is applied to major fish landing places, where a large quantity of the catch is landed by trawler, purse seiner, drift gill netter, longliner, pole & liner, etc. At present, throughout the country some 100 major landing places are selected for the L-II survey.

Although there are some 5000 fish landing places (marine fishing villages) throughout the country, it is assumed that about a half of the total marine catches are landed through major landing places. With the progress of fishing boat mechanization, the role of such major landing places will become more important in terms of the fish landed. For this reason, a sample survey with objective measurement is applied to ensure the accuracy of catch data collected.

Two-stage sampling, using a day as a primary sampling unit, and a trip (boat arrival) as a secondary sampling unit is applied. In principle, one day is selected from each week as a sample day. On a sample day all boat arrivals are counted and at the same time a sample of trips are selected for the measurement of catch.

The numbers of trips and catches are estimated on a monthly basis using estimation form EL-2. When records of catch sold to a fish market are available, ratio estimation is applied. When such records are not available, simple estimation is applied.

c. L-III survey

This survey is applied to all marine fishing villages, excluding major landing places covered by the L-II survey. The nature of the marine fishery covered by this survey is the small-scale fishery, which is undertaken by a huge number of small fishing households with nonpowered boats or without boats. The catches are landed all long the sea coast and such landing places are not always easily accessible.

Owing to this problem, a sample survey with subjective measurement is applied, although such a survey method is not always very satisfactory in terms of the accuracy of the calculated estimates. The 1973 CBS Agriculture Census provided, through its complete enumeration method, a complete list of the marine fishing villages together with the number of fishing households in each village. However, for areas which were not covered by the CBS Agriculture Census, a similar sampling frame was obtained through the 1974 DGF Marine Village Survey.

L-III survey is based on "cluster sampling", using the marine village as a sampling unit. "Probability proportional to the size (PPS) of marine fishing villages" was used for

choosing the sampling villages. Specifically, for the collection of the sample villages, the names of all marine villages and the number of fishing households were at first transferred to form KL. Thereafter, the number of fishing households was accumulated in the order of marine villages listed in the form. Then, the sample villages were choosen by means of PPS.

L-III survey is a quarterly survey and actual field enumeration is confined to the sample fishing villages. For every sample village, a complete list of fishing households is prepared using survey form SL-2, with which the number of fishing units by type of gear is sought on a quarterly basis. On the other hand, with the use of survey form SL-6, average catch per trip and average number of trips per quarter is obtained by means of an interview with some sample households. Thus, total catch per quarter for each type of gear is estimated as a product of total number of fishing units, average number of trips per quarter and average catch per trip.

To estimate the number of trips and catch through out a district, estimation form EL-3 is used. As seen in EL-3, the method of estimating is a ratio estimation, and such a ratio is obtained by dividing the total number of fishing households throughout a district by the number of fishing households through all sample villages. All these figures are obtainable from form KL.

d. Survey on distribution of catch and quantity of fisheries commodities produced

From the viewpoint of the users of such data, the statistics do not always require very high accuracy. What is more important is to keep a close link between total catch in live weight, catch disposed of through various channels and, subsequently, the quantity of fisheries commodities produced. When

a survey on the disposition of catch and quantity of fisheries commodities produced is done independently from a fisery production survey, a great discrepancy among these three figures often occurs. Therefore, the idea of combining this survey with the fishery production survey is to eliminate any such unreasonable discrepancy.

Out of the total catch landed, what percentage is disposed of for fish processing is roughly known by the district fishery officers. Therefore, catch disposed of through various channels is estimated, based on such already known information. Then the quantity of fisheries commodities produced is estimated by applying a relevant conversion factor to the catch disposed through a certain channel.

7.5 The economic survey

The fisheries economic survey is divided into two catagories:

1) Cost and earnings survey for fishery enterprises to clarify the productivity and profitability of a fishing unit; and

2) Income and expenditure survey for small-scale fishing households to clarify the living and working conditions of small-scale fishermen.

Up to now, the DGF has carried out only a few fisheries economic surveys due to budget limitations. Those surveys lay emphasis on some special aspects, including:

a. "Marine Fisheries Socio-economic Survey of the Northern Coast of Java, 1975"

b. "Marine Fisheries Socio-economic Survey of the Malacca Strait and West Coast of South Sulawesi, 1977"

c. "Brackishwater Culture Socio-economic Survey, 1978"

d. "Marine Fisheries Socio-economic Survey of the Northern Coast of Java, 1980"

e. "Pond and Freshwater Socio-economic Survey of Java, 1983"

f. "Freshwater and Brackishwater Culture Socio-economic Survey at the UPP Pilot Project, 1983"

g. "Freshwater and Brackishwater Culture Socio-economic Survey at the UPP Pilot Project, 1985"

h. "Purse Seine Fisheries Case Study at Pekalongan, 1985".

3) The fisheries economic surveys covered: marine capture fisheries, brackishwater and freshwater culture activities.

4) (i) Design of the survey

1975 - 1977 : The number of fishing operations and labourer's households by villages was obtained from the complete enumeration of the 1973 Agriculture Census.

1978 - 1980 : Using the 1973 Agriculture Census, sample villages were selected for the complete enumeration of fishing operator's and labourer's households.

Size of the sample

The size of the sample depends on the budget available where the number of sampling units drawn from its stratum (by the size of fisheries management) is proportional to its size.

(ii) The survey was carried out by means of a sample survey (two stage sampling), using a village as the primary sampling unit and fishing households (fishing operator's or fishing labourer's households) as the secondary sampling unit. The primary sampling unit was selected by means of PPS, while the secondary sampling unit was selected by SRS.

Data collection was done by means of interviews using a questionnaire. Substantially, the questionnaire could be "open" or closed" in nature.

7.6 Fish marketing survey

Due to budget limitations the DGF had done a few marketing surveys, including:

1) "Milkfish juveniles Marketing Survey in Seven Provinces (i.e. D.I. Aceh, West Java, Central Java, East Java, Bali, NTB, and South Sulawesi), 1977" in cooperation with Bogor Agriculture University.

2) "Ornamental Fish and Traditional Processing Products Marketing Survey for Export Purposes in Jambi and Bali, 1979" in cooperation with Bogor Agriculture University.

3) "Demand and Supply of Fisheries Products on the Domestic Market, Volume I and II, 1979" in cooperation with Fac. of Economics, Gajah Mada University.

These surveys were conducted in cooperation with Bogor Agriculture University (IPB), and the Faculty of Economics - Gajah Mada University. The data processing and collection methods were done by the Universities.

7.7 Aquaculture

A sampling frame for brackishwater culture was established through the complete enumeration of the 1973 CBS Agriculture Census, whereas, a sampling frame for freshwater culture was established through the ad hoc frame survey, as mentioned above.

In principle, the survey method for culture is the same as the L-III survey for marine fishery. Therefore, the survey for culture is a sample survey with subjective measurement, and sample villages are selected by means of PPS. For the survey of inventory items such as the number of culture households, area of fish ponds, etc., a complete list of culture households is prepared for every sample village. The survey of such inventory items is done only once at the end of each year.

The survey for yield is done on a quarterly basis with the use of survey form SB-2. The survey is confined to sample villages, within which ten sample culture households are randomly chosen, based on survey form SB-1. Then these sample households are interviewed.

Estimation of inventory statistics and yield are done with the use of estimation form EB-1 and EB-2, respectively. Reporting form LB-1 and LB-2 are used for reporting statistics to the DGF. Unlike the marine fisheries and the inland open water fishery, the yield from culture is seldom used for fish processing therefore, no estimation is done for disposition of the catch.

7.8 Inland fisheries

A sampling frame for the inland water fishery was established with the use of form KB. This ad hoc frame survey was undertaken in the middle of 1976 with the help of the village heads.

Survey methods applied to the inland open water fishery are exactly the same as those developed for the marine fishery. However, major fish landing places, such as are seen in the marine fishery, are rarely seen in this fishery, so that in the majority of districts only the L-III survey is applied.

Since species caught by the inland open water fishery are quite different from those of the marine fishery, different reporting forms are used.

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7.9 Publication of statistics

The Directorate of Planning, DGF is responsible for the publication of:

a) "Fisheries Statistics of Indonesia", which have been published for the last fourteen years; and

b) "International Trade Statistics of Fisheries Commodities", which have been published for the last seven years.

8. Problems and Constraints

The current fishery statistics system seems to be well designed, however, the operational system requires further improvement. In some instances, the survey forms are not properly filled out or completed by the collectors and they are mailed back for rectification. This causes some delay in transferring the data from the DFS to the central terminal. At PFS and at DFS level, qualified personel dealing with the fishery statistics are still limited. They are usually field or technical workers from the DFS and PFS offices, and they do the enumeration as a secondary responsibility to their regular jobs. It would be more effective if the enumerator's primary responsibility was to undertake data collection.

Availability of time series data of CPUE (catch/craft/day, catch/craft/trip) is highly necessary to be able to access the level of fishing on some resources upon which any management measures should be based. Data on cost and return of certain fishing effort would enable cost and return analyses which would also be useful for management purposes.

For fisheries development planning and decission making, fisheries economic and marketing surveys must be continuously undertaken in order to acquire better knowledge of the fisheries industry and analytical tools.

Annex 6

FISHERIES STATISTICS IN MALAYSIA

1. Introduction

1.1 Fishery statistical collection and compilation in Malaysia is done by the Fisheries Department. Within the Department there is a unit known as the Fisheries Management Information System (FMIS) Unit which is responsible for the collection, management and analysis of fisheries data. The FMIS Unit is manned by a Senior Fisheries Officer who is assisted by three Fisheries Officers. At the Headquarters, there are eight Fisheries Assistants and one Assistant Fisheries Officer to process, tabulate and document the data collected.

1.2 In the field there are 27 Fisheries Assistants stationed in the Districts to collect statistics from the landing places. The statistics are submitted to the State Fisheries for compilation at the state level. These are in turn sent to the FMIS Unit for further processing, tabulation, documentation and publication, to give a national presentation.

2. Data Collected

There are various types of data collected by the Fisheries Department, viz:

2.1 Number of fishermen working on licensed fishing boats by gear group, state and ethnic group.

2.2 Number of licensed fishing boats by state, tonnage, length, type of engine, horse-power and gear group.

2.3 Number of licensed fishing boats by gear group, type, tonnage and state.

2.4 Estimated number of fishing gears in operation.

2.5 Catch per unit effort in terms of fishing days, number of trips and number of hauls.

2.6 Landings of marine fish by gear group, state, month and species.

2.7 Prices of marine fish at wholesale market, retail market an ex-vessel.

2.8 Disposition of marine fish landings.

2.9 Miscellaneous statistics - namely:

(i) ice factories and refrigeration facilities.
(ii) fisheries revenue.
(iii) imports and exports of fishery commodities - by type, quantity, value and country of origin and destination.
(iv) aquaculture statistics - acreage of ponds, number of culturists, fish production, wholesale value, retail value, number of nurseries and fry production.

3. Methodology

There are various ways of obtaining and collecting the statistics mentioned in paragraph 2. They vary according to the type of data, i.e.:

3.1 Number of fishermen - this is derived from the licences issued on which the number of crewmen employed are stated by ethnicity.

3.2 Licensed fishing boats - are obtained from the licences issued by the Fisheries Department under the 1952 Merchant Shipping Ordinance. The information on the licences includes:

registration number of boat; date the boat was first registered; name and address of boat owner; type of propulsion used; trade name and horse power of engine; boat dimensions; operational base of boat; main and subsidiary gear used and number of crew members by ethnicity. The information is sent by the District Licensing Fisheries Assistants to Headquarters for compilation and tabulation on a monthly basis.

3.3 Licensed fishing gear - the information is compiled from gear licensing records on a monthly basis. The classification of gears generally follows the categories as laid down in the International Standard Statistical Classification of Fishing Gear (ISSCFG), with the exception that Malaysia does not differentiate between "seine nets" and "surrounding nets".

3.4 Fishing gears estimated to be in operation - A listing (or frame survey) is carried out once every 2 years to determine the population of gears in operation in terms of number and type. This is necessary in view of the fact that there are some unlicensed boats and gears in operation. If this is not taken into consideration it affects the accuracy of the total figure as well as the multiplication factor for the landing statistics. During the interval, it is sometimes necessary to adjust the listing, in particular to take into account the seasonal operation of the gears, inter- and intra-state migration of boats and landings of foreign registered fishing vessels. The listing form is designed in order to obtain information on the types of gear (main and secondary), type of engine (non-powered, inboard and outboard), and tonnage of boats. The listing is very useful in determining the sample size of the cases to be observed in aspects of collection of landing statistics.

3.5 Landings of marine fish and fishing effort

3.5.1 These two aspects are obtained through observation and enquiry by the Fisheries Assistants in the field. Special forms are used to record the required information. The forms

contain information on species landed (in volume) and number of trips, fishing days and hauls made, for all the categories of gear. There are two broad categories; 1st are the commercial gears (i.e. trawlers and purse seines) and 2nd are the traditional gears: gill/drift nets, lift nets, traps, hooks-and-lines, bag nets, push/scoop nets and barrier nets. The commercial gears are further stratified by vessel tonnage class, i.e. as follows:

Below 10 GRT
10 - 24.9 GRT
25 - 39.9 GRT
40 - 69.9 GRT
70 GRT and above.

3.5.2 The sampling frame is prepared from the gear listing, taking into consideration the total fishing gears in operation, number of days in a month available for field work, the categories of gear found in the region and the number of Fisheries Assistants (Data Collection) assigned to each region. On average, each region has to have a sample size of about 520 cases a month, to be divided proportionately among the sub-population (or stratum). Simple random sampling is done with replacement [since there is the possibility of picking the same case (vessel) a number of times]. Observations are only made with regard to landings. The other information (i.e. per unit effort) are obtained by enquiry (i.e. by interviewing the skipper or crew of the sample). The places where such information is obtained are namely; fisheries landing complexes, landing jetties and other landing places on the beach.

3.5.3 The steps taken to estimate the landings are as follows:

Step one - daily estimate where the formula used is:

$$\hat{Y}_{jk} = \frac{M_{jk}}{m_{jk}} \sum_{i=1}^{m_{jk}} Y_{ijk}$$

where:

$\hat{Y}_{jk}$ = estimate of catch for the particular gear stratum on the j th day of the k th region.

M_{jk} = number of units of the gear stratum in operation for the j th day at the k th region.

m_{jk} = number of sample boats observed for the gear stratum on the j th day at the k th region.

Y_{ijk} = catch for the i th sample on the j th day at the k th region.

Step two - estimated monthly catch for the particular stratum in the particular region:

$$\hat{Y}_k = \hat{Y}_{jk} D_k$$

$\hat{Y}_k$ = the estimated monthly catch for the k th region.

D_k = the number of fishing days of gear stratum in a month in the k th region.

$\hat{Y}_{jk}$ = estimated daily catch for the particular gear stratum of the region.

Step three - estimated monthly catch for the particular gear stratum for the state.

$$\hat{Y} = \sum_{k=1}^{n} \hat{Y}_k$$

where:

$\hat{Y}$ = the estimated monthly catch for the particular gear stratum for the state.

n = number of regions in the state.

$\hat{Y}_k$ = estimated monthly catch for the particular gear stratum in a region.

The estimates on total effort are also calculated by following similar steps.

The calculations are made on a monthly basis in the State Offices of the Fisheries Department, these are then forwarded to Headquarters for checking, compilation, tabulation and documentation.

3.6 Prices of Marine Landings

3.6.1 The prices of marine landings at the wholesale market and retail market are obtained by the Fisheries Assistants visiting the markets twice a month. The estimates of the wholesale and retail values are done according to gear group, grade of fish and region. The average wholesale and retail prices of fresh fish for a few selected species are also obtained in a similar manner.

3.6.2 The ex-vessel prices for selected species of fish are obtained through enquires addressed to the fishermen by the Fisheries Assistants. The estimates of producer prices for the State are derived from the data obtained from the selected cases.

3.7 Ice factories and refrigeration facilities

Information concerning ice factories and refrigeration facilities is obtained by the Fisheries Assistants on a regular basis. They make visits to these establishments and interview the operators. Information is on daily production capacity and storage capacity.

3.8 Fisheries revenue

This is actual revenue obtained by the State and Federal Governments in respect of fisheries licences, sale of confiscated boats, boat transfer fees, compounds and fines, etc.

3.9 Imports and exports of fishery commodities

Statistics on imports and exports of fishery commodities are obtained from the Statistics Department of Malaysia. The commodity code used is that of SITC.

3.10 Aquaculture Statistics

3.10.1 Aquaculture statistics refer to two main categories i.e. those on freshwater and marine/brackishwater. They are in turn divided into 2 types/culture systems i.e. in ponds and mining pools and cages. The statistics pertaining to these aspects are: number and acreage of ponds, mining pools and cages, number of culturists, estimated fish production (volume and value), average wholesale and retail prices and number of private hatcheries and nurseries and their fry production.

3.10.2 The statistics on aquaculture are very conservative. The enumeration covers mainly the culturists who are given subsidies by the Government. This is inevitable due to certain factors. Firstly, limited manpower and secondly, cooperation is easily rendered by this group of culturists. Efforts are underway now to improve the aquaculture statistics collection methods and coverage. A format is being designed to update the listing of the number and types of culture systems. The sampling frame is also being redesigned in order to have a better representation of the 'population'. The methods used to provide the total estimates will be very similar to those for marine statistics. One new feature introduced will be statistics on aquaculture in public water bodies (eg. rivers, lakes and dams).

3.10.3 There are, however, some basic differences in the collection of aquaculture statistics. The main difference being the absence of special field enumerators assigned to collect only aquaculture statistics. The field staff are also responsible for fisheries extension services. The widely dispersed nature of aquaculture landings also affects the coverage of the enumeration. Another difference is the timing of the landings. Under such constraints the enumerators are unable, in most cases, to observe the landings, thus having to rely on enquiries. Another difference is the presence of casual or part-time culturists of old mining ponds and public water bodies. Their harvest is of significant commercial value, but their activities are not easily detectable.

4. Socio-economic Surveys

Surveys and studies on the socio-economic aspects of the fisheries sector and fishermen are done on an ad hoc basis. The studies done include:

4.1 Cost and earnings of important fisheries - this is to determine the relative costs and benefits of the different major fishing operations in Malaysian waters. They are collected from selected cases whose averages are taken into consideration in estimating the margin and cost-benefit ratio. As from 1986 the study on costs and earnings will be done on a regular basis using a standard form so as to cover the whole nation and have a better sample size. The field work will be done by the same Marine Statistical Collection Fisheries Assistants mentioned in paragraph 3 above. However a smaller sample size than that for marine fisheries is planned.

4.2 Census

A census was carried out in 1983 to determine the various characteristics of fishing households in selected development areas.

4.2.1 The information obtained on the fishing households and their members pertains to: size of household, educational level, age, marital status, ownership of houses or land and basic amenities, occupational status, income level, sharing system, area of operation, landings and gears.

4.2.2 The enumeration is done by a group of enumerators engaged specifically for such a purpose. The selection of the districts was based on their importance and potential for growth. A census covering all the fishery districts is not feasible because of limited manpower, financial resources and time. Every household in the boundary of the fishing district was included in the enumeration. However, the final information and statistics analyse only those aspects relevant to fishing households and fishermen.

4.2.3 The census, which was jointly carried out by the Department of Fisheries, Ministry of Agriculture and Fisheries Development Authority of Malaysia, covered some 45% of the total fishing households in Peninsular Malaysia, 18,035 units involving some 22,165 fishermen. The next phase (not planned yet) might cover enumeration of the other fishing districts. However, it is planned that the revised census of the initial 19 districts will be done every 10 years.

4.3 Fish Marketing Survey

4.3.1 A fish marketing survey was carried out in 1984 and involved the two fisheries agencies mentioned in paragraph 4.2.3 and the Agriculture University of Malaysia. It was:

(a) to indicate whether or not the present marketing arrangements are satisfactory.

(b) to explain the general roles of traders in fish distribution and, in particular, in price determination.

(c) to ascertain whether intervention is necessary to improve efficiency and equity.

(d) to make recommendations on an efficient marketing system.

4.3.2 Primary and secondary data were used for the study. Collection of the former was done by using structured formats and questionnaires. The formats were generally used to collect data on a daily basis at specific locations during one week in every month over a period of one year.

4.3.3 The respondents were producers at the landing complexes, wholesalers and retailers at the markets, also importers and exporters at exit points.

5. Management and Analysis of Data

5.1 The statistics and data collected are acquired by various means. They are mainly tabulated for publication in the Annual Fisheries Statistics (AFS). The data tabulated in AFS pertain to those found in paragraph 2 above. An analysis of some of the important aspects is also done in AFS, i.e. on landings, boats, gear, fishermen, imports and exports and aquaculture production.

5.2 Manual computation and tabulation is practised. Special formats are designed for this purpose. It is realised that modernisation should be introduced in order for the FMIS Unit to be the information centre for fisheries management and planning. A computer is needed for this purpose. A micro-computer has been purchased. Primarily it is now being used to key-in processed and tabulated fisheries data. A more advanced use of the computer is envisaged when codes for the variables have been designed and it can then be used as a sophisticated tool for processing and analysis. The data managed by the FMIS will then include information collected by other sections of the Department, i.e. mainly on resource potential.

5.3 Malaysian fisheries data compiled for general use could be considered as very elaborate. It is realised that not all the data are being referred to by the users of AFS. More concise sets of data will be published in the future. A hand book on vital fisheries statistics will also be produced (i.e. as an extract of AFS).

5.4 Statistics and analyses of the census and other studies appear in report forms which are not normally made available to the public. Special requests to obtain them can be made by certain agencies and organisations.

6. Suggestions

6.1 Various steps are being taken to streamline and improve the methods of data collection, processing, tabulation and presentation. This is very much in line with the requirement of a better information system for planning and management purposes. The data have to be reliable, comprehensive and up to date for better effective planning programmes. It is also vital that the fisheries information system be in line with the progress made in other parts of the world.

6.2 One prerequisite which has to be met is additional staff in the field. However, this will not be forthcoming in the near future in view of the economic constraints. Furthermore, there is no possibility of reshuffling existing staff in view of the given work load.

6.3 The respondents are still suspicious of the purpose of the data collection which is generally believed to be for income tax purposes. Therefore wider publicity needs to be given mainly by the politicians through the mass media.

6.4 There is an urgent need for familiarization with the various techniques used in the setting up of a fisheries information system. A reliable framework already exists that is in the form of existing staff, computer hardware and software, and a vast supply of available information. The aim should be to make full use of the information currently available, to decide immediate and longterm plans and to assess the biological and economic effects of alternative management and development policies.

6.5 Malaysia needs assistance in the following:

6.5.1 training of key personnel in developing formats for the processing, presentation and analysis of the variables.

6.5.2 the development of a management manual for use on the computer.

6.5.3 development of new software requirements and data preparation facilities.

6.6 Ultimately the final objective of the FMIS Unit is to manage and analyse not only relevant data collected by the Unit but also information gathered by other sections and agencies.

Annex 7

FISHERIES STATISTICS IN THE REPUBLIC OF THE PHILIPPINES

1. The Bureau of Fisheries and Aquatic Resources is the only government agency which collects comprehensive statistics on the fishing industry in the Philippines.

   The organizational structure of the Bureau of Fisheries and Aquatic Resources is shown on page 88.

   1.1 Allocation of local enumerators:

      1.1.1 Commercial Fisheries Survey:

One or more enumerators are employed to survey one commercial fish landing center monthly. There are 59 major commercial fish landing centers throughout the country.

      1.1.2 Municipal Fisheries Survey:

There are 190 enumerators employed in the municipal monthly fish landing surveys all over the country.

      1.1.3 Aquaculture Survey:

The number of enumerators employed in this survey depends upon the percentage of sample fishponds/fish farms covered by each region. This survey is done yearly.

      1.1.4 Other Surveys:

Survey of Bangus and Sugpo Fry. - This is a monthly survey. The number of enumerators depends upon the number of concessioners/brokers in the province. This activity is seasonal.

1.2 Data Collection:

This is by actual enumeration at the sample landing centers for the commercial fisheries survey and the municipal fisheries survey. For aquaculture, the fish farm approach by inquiry is used. For bangus and sugpo fry, the brokers/concessioners are interviewed.

1.3 Compilation and Reporting of Fishery Statistics:

The survey results are submitted to the Regional Statistical Supervisor who compiles the regional data needed. These are forwarded to the Central Office for editing and coding. Computerization is applied for municipal fisheries data and manual processing for the rest of the survey.

2. Statistical Survey Methods:

2.1 Fisheries Census:

The National Census and Statistics Office is the only government agency authorized to undertake censuses. A fisheries census is conducted every five years.

The last Fisheries Census was done in 1981. This was undertaken in two phases: Phase I - was a listing of all household heads in all barangays throughout the country. From this list was drawn a list of all fishing operators or self-employed persons engaged in fishing; this was used as the frame for Phase II of the operation. All households with at least one member engaged in any fishing activity (capture fishing with or without the use of fishing craft and/or gathering and/or raising fish, crusteceans, molluscs and aquatic plants) anytime during the calendar year from January to December, 1980 were included.

In the second phase, a 10 per cent sample size of municipal fishing operators was taken at the municipal level while a 100 per cent coverage was used for aquaculture and commercial fishing boat operators.

Data were obtained by personal interviews of household heads or members (responsible).

For the collection of data on aquaculture the "area approach" or observation method was used. The enumerators visited the project site and conducted an on-sight inspection of the project. They observed and verified the aquafarm characteristics —— that is, species cultured, size or area, extent of development, stocking rate per hectare, frequency, type of culture, etc.

Major Items covered in Fisheries Censuses:

2.1.1 Major survey items taken up in censuses of commercial and municipal fishing:

(1) Total number of household members.

(2) Total number of household members engaged in fishing.

(3) Income from fishing.

(4) Characteristics of household members by:

a. Sex, age, highest grade completed, class of worker, whether owner-operator or none owner-operator, unpaid family worker, paid worker, extent of activity - full-time fishing, part-time fishing, occasional fishing.

b. Location or place of operation.

c. Non-fishing activity.

(5) Data on Fishing Craft:

a. type of fishing craft.

b. number of crew.

c. type of boat - motorized and non-motorized.

d. rented/owned.

e. source of funding.

(6) Fishing gear used.

(7) Marketing/disposal of catch.

(8) Problems encountered.

2.1.2 Aquaculture:

(1) Name of operator.

(2) Form of ownership.

(3) Fishing household population and number of members engaged.

(4) Aquafarm complex-area operated and type of owner-ship.

a. type of aquafarm.

b. type of water.

c. type of culture operation.

(5) Type of culture operation and practices.

(6) Input.

(7) Employment.

(8) Fixed assets, value of development and sources of financing.

(9) Marketing outlet.

(10) Sources of fry/fingerlings.

(11) Problems encountered.

2.2 Fishing Vessel Statistics:

2.2.1 Commercial Fishing Vessels are those vessels over three gross tons which are registered with and licensed by the Bureau of Fisheries and Aquatic Resources. Licensing/Registration of a fishing vessel includes the following information.

a. Name of operator;

b. Address;

c. Name of vessel;

d. Gear used, Gross tonnage, Horsepower;

e. Structure, machinery, certificate of inspection number;

f. Date issued and expiration date.

The listing of vessels is derived from the record of licensed fishing vessels. The statistics produced are those on the total number of commercial fishing vessels, whether powered or non-powered by tonnage class and gear, horsepower and gear, and total number of accessory craft by tonnage class. These are renewed yearly.

2.2.2 Municipal fishing boats are the boats of three gross tons or less, the number of which is taken from the Fisheries Census. These are motorized boats, non-motorized boats and craft.

2.3 Catch Statistics:

2.3.1 Industrial Fisheries:

a. Commercial Fisheries Survey - This survey is conducted to gather data on marine catch by vessels of more than three gross tons, by fishing ground, gear used, species and fishing effort. Data on prices are also collected. The survey covers the 59 major landing centers, selected from a total of 201 landing centers from all regions. These major landing centers are places where most of the fishing boats land their catch and where the major wholesale markets are situated.

Data from all minor landing centers are taken from the monthly fish caught reports submitted by fishing boat operators. The gathering of data is carried out by actual survey of the major landing centers. This is conducted every other day continuously during landing times. Where the boats landed are few, a complete enumeration of total fishing units unloading their catch is done. But when they are numerous, systematic sampling is adopted, based on the type of gear used. Two different forms are used for the collection of data:

1. Form I-A records the time of landing of the fishing units by gear.

2. Form I records the details of catch by gear, by species and fishing effort relating to sampled fishing units.

2.3.2 Small-scale Fisheries:

a. Municipal Fisheries Landing Center Survey - This survey is to provide data on marine fish catch by boats of three gross tons or less, by gear, by species, by fishing ground and by fishing effort. Data on prices are also collected.

The survey covers more or less 1,700 sample landing centers monthly, selected at random from a total of 5,491 landing centers for municipal fisheries throughout the country. Listings of landing centers are updated semi-annually by the enumerators. These landing centers are places where most of the fishing boats land their catch and where marketing of the catch is done.

b. The design involves sampling over area and time. The coastline of the province is divided into one or more zones each having more than 15 landing centers geographically arranged.

A calendar month is divided into three ten-day periods or intervals. A group of six consecutive days will be selected at random from each period, giving a total of eighteen (18) half-day surveys per month. A landing center is selected at random (with replacement) and will be made the area of observa- tion for two consecutive half-days. Thus, in a month, a total of nine (9) landing centers per zone are observed.

The gathering of data for each selected landing center is done from 12:00 noon to 6:00 p.m. on the first day and from 5:00 a.m. to 12:00 noon on the following day. Landings from 6:00 p.m. to 5:00 a.m. of the following day are considered night landings and data on these are taken by inquiry in the morning of the following day. The landing centers sampled are surveyed for 24 hours. Where boats landed are few, a completed enumeration of the boats is carried out, but where boats are numerous, systematic sampling is used, based on the type of gear used.

The catch of all units landed in a sample landing center are recorded on Form I-A. Detailed or specific data as contained in Form I are gathered from sample fishing units. Data on weight of catch per species, price, fishing effort and other related data for fishing units using the same fishing gear are recorded on the same form. Another survey form is used to record data for fishing units using another type of gear.

c. Data collection is by actual observation of the fishing units, species caught, quantity, gear used and by interviewing the fishermen to acquire other necessary information.

d. Survey reports are compiled, edited and processed in the regional office for their data needs, then forwarded to the Fishery Statistics Section, Central Office for final editing and manual processing. In the case of a municipal fisheries survey, reports are edited and coded for processing by computer. These are forwarded to the Bureau of Agriculture Economics (BAEcon) for computerization.

2.4 Economic Survey:

2.4.1 Cost and earnings survey.

2.4.2 Income and expenditure survey.

a. Type of Fishery Covered

i- Municipal Fishery

b. Sample Survey

i- Statistical Frame

a. identification of fishing barangays in the study area.

b. census of households in the study area.

ii- Sample Size

a. one sample barangay is selected in one Municipality based on the high proportion of fishing households in the identified fishing barangay.

b. a 10 per cent sample of the households is taken in the selected sample barangays. The sampling used is stratified simple random sampling.

c. Criteria for depreciation of fishing assets

i- economic life of assets

ii- purchase value of assets revalued using consumer price index.

iii- depreciation obtained by straight-line method.

d. Method of Enumeration

i- Personal interview using a prepared questionnaire.

2.5 Fish Marketing Survey:

2.5.1 This survey is conducted daily at selected landing centers and markets in all regions of the country. Producers price and wholesale and retail prices of all available species are collected daily and transmitted to the BFAR Central Office by Telex or Telegram or mail. In Metro Manila retail prices of fish are also gathered daily from nine major markets.

2.5.2 Prices are gathered by actual observation and by interviewing each respondent.

2.5.3 The data are compiled and tabulated to show computed monthly averages for all prices by species.

2.6 Aquaculture:

2.6.1 Type of aquaculture covered:

a. Brackishwater and Freshwater Fishponds

b. Fish Pens

c. Fish Cages

d. Mussel Farms

e. Oyster Farms

f. Seaweed Farms

2.6.2 The frame used covers the listings of government and privately-owned fishponds and areas for brackishwater and freshwater fishponds. For other types of aquaculture, the list of farmers and size of farms operated is used. The frames are obtained from the Fisheries Census and from the Fishpond Lease Agreement issued by the BFAR. For other aquafarms, the frames are taken from the Fisheries Census and actual verification of the area by the field enumerator. Sample size is from 5 to 10 per cent depending upon the logistics.

A survey of aquafarms is conducted to obtain the average production per hectare by species cultured, a parameter used in estimating aquafarm production. Systematic sampling with replacement is used in the selection of samples by type of product. The survey is conducted once a year.

2.6.3 Methods of Collection:

The enumerator visits the sample aquafarm area and interviews the respondent, who is the caretaker or the operator of the aquafarm.

2.7 Inland Fisheries:

2.7.1 Area Covered:

The area consists of lakes, dams, marshes, rivers and swamps.

2.7.2 Landing centers of big lakes, dams, marshes and rivers compose our frame. The sampling procedure is the same as in the marine municipal fisheries survey and the same survey forms are used. For small rivers, dams and swamps, data gathering is by inquiry, using the same forms.

2.7.3 Method of Collection:

The enumerator visits the sample landing center and does the actual enumeration in the same way the marine municipal fish landing center survey is done. For other areas where there are no regular landing centers, the enumerators interview the fishermen in the area, completing the prescribed survey form.

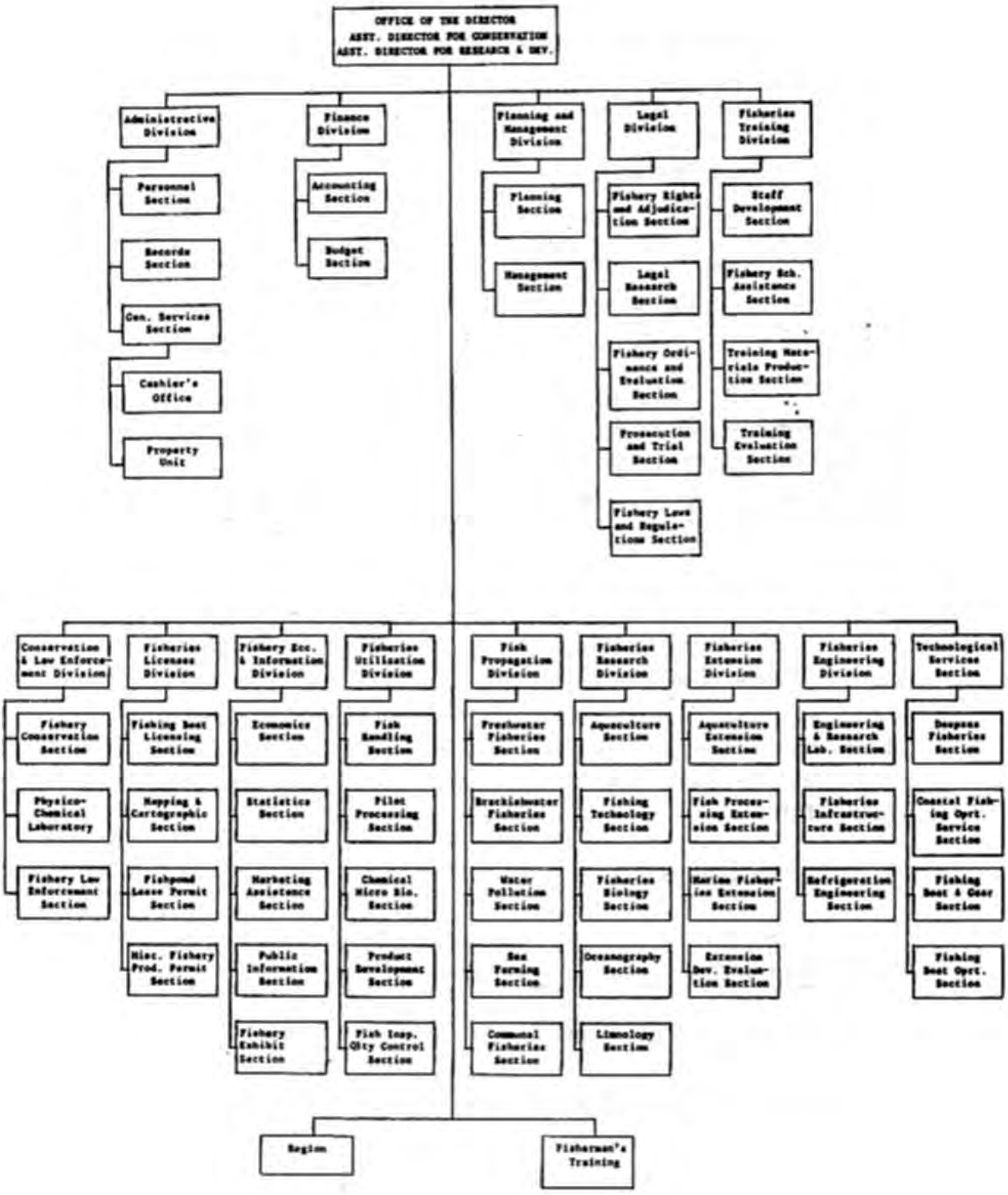
2.8 Publication:

The Bureau of Fisheries and Aquatic Resources publishes the Fisheries Statistics of the Philippines yearly.

3. Problems and Constraints:

Lack of necessary personnel and inadequate funds.

BFAR ORGANIZATIONAL STRUCTURE



Annex 8

FISHERIES STATISTICS IN TAIWAN

1. INTRODUCTION

There are four fishery statistical publications available in Taiwan. The Fisheries Yearbook for the Taiwan Area, the first of which was published in 1954, today the Yearbook includes data on fishermen, fishing vessels, fishery production, value, fish marketing, fish processing, etc. All the fish related activities of Taiwan are included and the document has become the main source of fishery information for both practical and academic uses. Annual reports on tuna longline, demersal fishes, and drift net fishery are statistics based on the type of fishery published by the Institute of Oceanography, National Taiwan University, they supply basic information on these 3 fisheries for various oceans. The Fishery Census which is carried out at 5 year intervals was first issued in 1956. The Fishery Census is a broad investigation of the social and economical aspects of fisheries which are neglected or roughly covered in the Yearbook survey. The census is highly valued by those concerned and by decision makers.

In this report, the development and implementation of the statistical systems of the four publications and the fishery census are described. The deficiencies and problems of the statistical survey and publications are also discussed.

Over the past 30 years, the development of fisheries in Taiwan has been stable with on average growth rate of about 18 per cent. This was not only because of the suitable environment and diligent fishermen but also because of a reasonable fishery policy made by the government of Taiwan. Soon after World War II, it had been found that basic fishery data needed to be established in order to provide accurate information for decision making and research; in order to advise the administration and

fishermen; to judge the utilization of stock and resources management; and to improve marketing and other related fields.

Fishery statistical data for Taiwan is widely found in agricultural and economic periodical publications. There are many fishery statistical reports based on type of fisheries such as the annual report on tuna longline, demersal fishes and gill net fishery. The fishery census have been carried out at intervals of 5 years since 1956, however, the Fishery Yearbook of Taiwan Area is the most popular and basic annual book used by all concerned. The content of the Fishery Yearbook includes information on the activities of fishermen, fishing vessels, production, value, marketing, fishponds, fish processing, fishery equipment, and fishery investments. The first Yearbook independent from the Agriculture Yearbook was edited in 1954. Since then the tabulation and survey methods have gradually been improved and modified, the national fishery statistical standards and survey system was established in 1969. The hand book of fishery investigation and statistics has been handed out to all concerned. In 1983, data treatment was computerized within the Taiwan Fisheries Bureau.

Recently there are many comments coming from users of the Fishery Yearbook. They stated that the Fishery Yearbook of Taiwan Area should be reviewed and evaluated so as to suit all their needs and to make the best use of the data. The Taiwan Fisheries Bureau also found that there are many deficiencies in the Yearbook and in survey methods. A two-year project on "Fishery Statistics and Fishery Yearbook Improvement" has been carried out since 1985. Experts in various fields such as statisticians, economists, fisheries experts, government officers and extension workers were invited to join the Committee to evaluate and improve the Yearbook. The final report will be finished in 1987.

This report describes the present fishery statistical system, national standards, and major current fishery statistical publications. Problems and shortcomings are also discussed.

2. BASIC FISHERY STATISTICAL DATA IN 1985

In the Fishery Yearbook, Taiwan fisheries are traditionally classified as deep-sea fishery, inshore fishery, coastal fishery and aquaculture. Deep-sea fishery includes fishing vessels over 50 tons fishing in distant waters. There were over 1,900 deep-sea fishing vessels in Taiwan in 1985. Inshore fishery includes fishing boats of less than 50 tons fishing in the water close to Taiwan. There were about 12,000 inshore fishing boats in Taiwan in 1985. Coastal fishery covers fishing rafts with or without engine or other fishing methods employed in coastal waters. There were over 16,000 rafts or sampans in 1985. Aquaculture consists of freshwater, brackishwater and seawater culture, total culture area was about 66,000 hectares in 1985.

In 1985, fish production of Taiwan was 1,037,721 tons. The deep-sea fishery produced 441.747 tons, the main products were squid, tuna, skipjack, marlin, shark and demersal fishes. Inshore fishery caught 293,748 tons which included shrimp, tuna, mackerel, skipjack and sardines. Coastal fishery produced 51,491 tons which included shrimps, seabream, hairtail, sardine, mackerel, etc. Aquaculture harvesting totalled 250,735 tons, the major species were carps, tilapia, eel, milkfish, shrimp, oysters, and clams. Total fish product value was 1,737.5 million US dollars of which deep-sea fishery was 578.5 million; inshore fishery 432.5 million; coastal fishery 69.5 million and aquaculture 657 million dollars. (Figures 1 & 2). Imported fish products amounted to 332,834 tons which was valued at 222 million US dollars where as fish products exported from Taiwan amounted to 222,885 tons worth 842 million US dollars. Fishmeal was the most important imported fish product, at 313,805 tons i.e. 94.28% of the total imported fish products. The major export fishes were frozen tuna, live eel, prepared eel, frozen shrimp and squid.

In 1985, there were 208,086 fishing household members which included 140,384 males and 53,630 females belonging to 37 Local Fishermen's Associations. There were 582,097 people in 122,432 fishing households in Taiwan. Last year there were 165 fishing boat casualties, of which 61 cases were boats sinking, 92 boats damaged, 8 boats landing on reefs and 4 boats disappearing. 157 persons died, 106 disappeared, 248 were badly injured and 501 were harmed slightly.

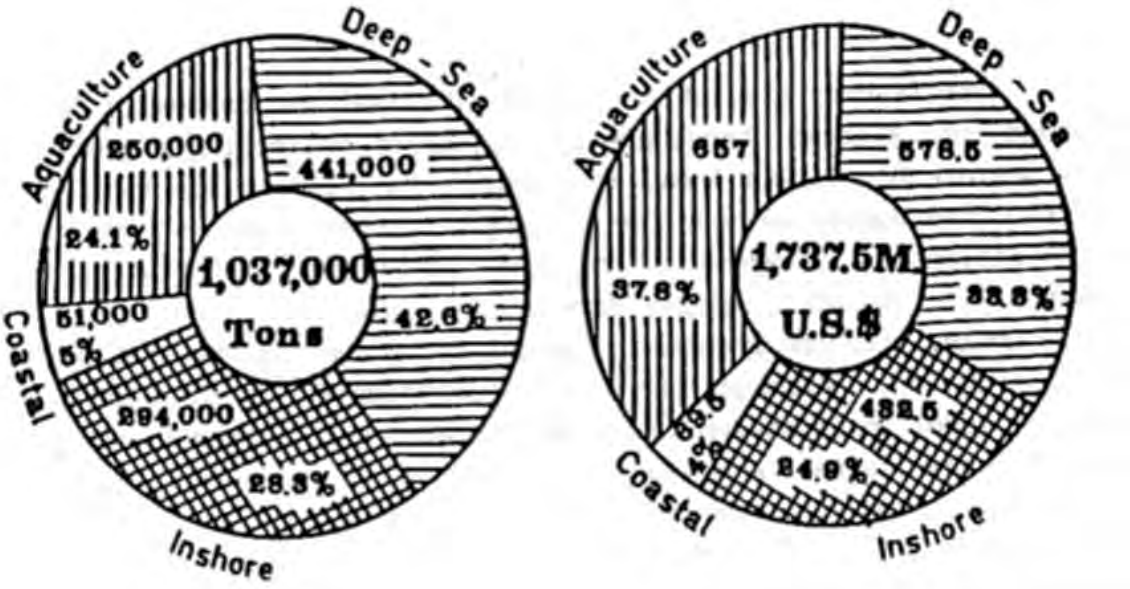


Fig. Total fishery production and value for Taiwan in 1985

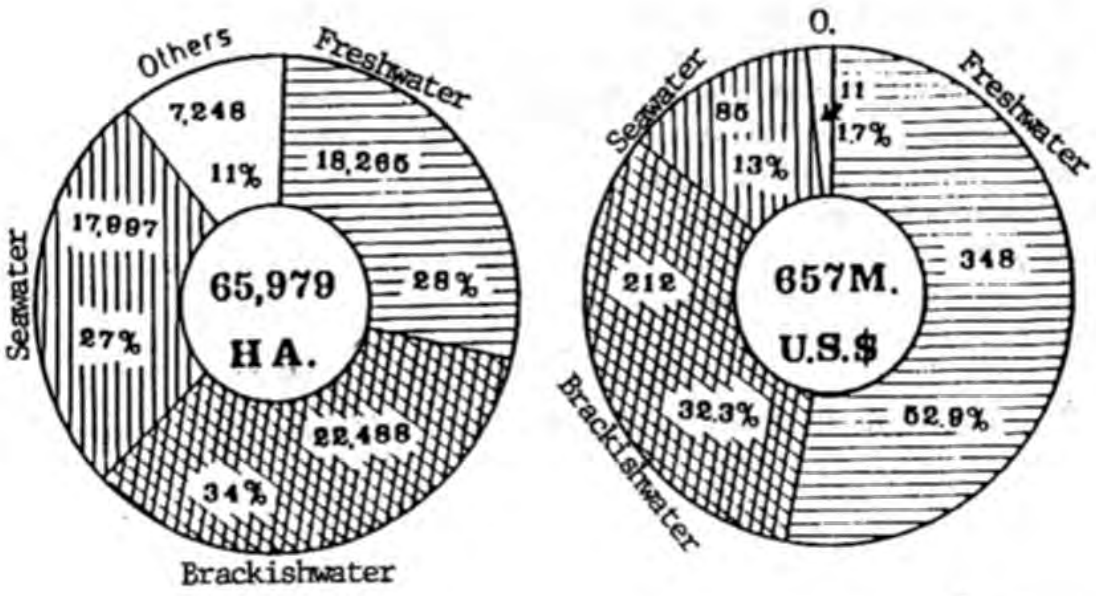


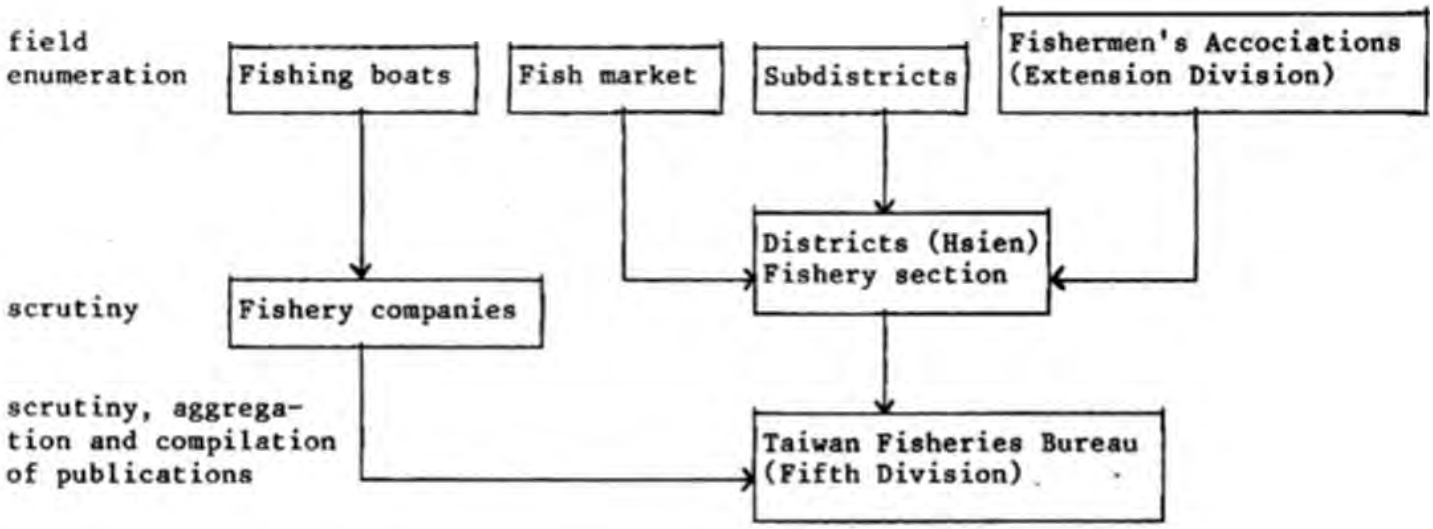
Fig. Culture area and production value of Taiwan in 1985

3. FISHERY STATISTICAL SYSTEM OF TAIWAN

The fishery statistical system of Taiwan can basically be divided into 3 areas, these are the system of collecting fishery data within the Taiwan Area, methodology for fishery statistics overseas and survey methods for fishery censuses. There are many organizations and agencies related to fishery statistics, however, the Taiwan Fisheries Bureau (TFB) plays a major role in the 3 areas, with the greatest responsibility for fishery statistics in Taiwan. Although the Taiwan Fisheries Bureau is a provincial level organization Taiwan province covers all the fisheries for the Taiwan Area except Kaohsiung City. The Taiwan Fisheries Bureau has been engaged in Fishery Statistics for the Taiwan Area for many years and the Fifth Division (Statistics Division) is responsible not only for survey system methodology and programme tabulation but also for the scrutinizing of coming data and the compilation of publications.

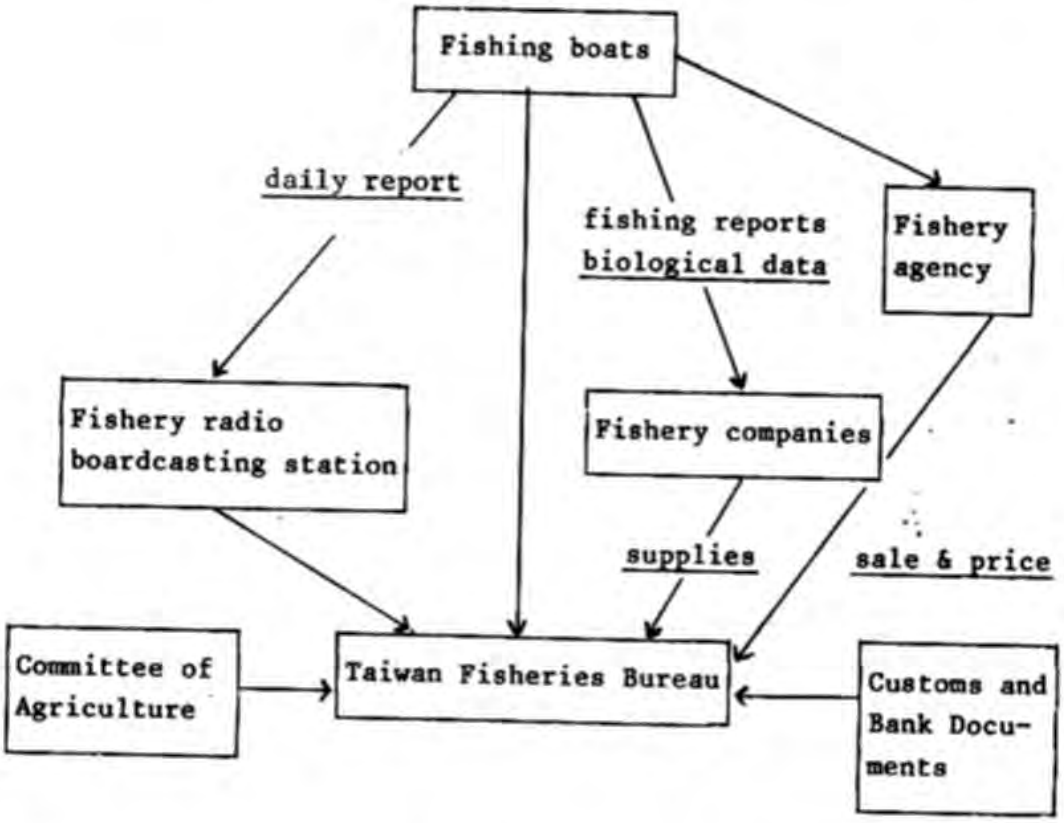
There are 21 district level offices in Taiwan province 18 of which have a Fishery Section attached to the Agriculture Bureau. Today fishery statistical reporting is officially part of the routine work of the Fishery Section. Fishery statistics along with agricultural statistics feature in the yearly report to the district Magistrate and director of the Bureau of Agriculture. There are no full-time employees at subdistrict level in Taiwan, usually fishery work in a subdistrict is done by the local veterinarian. Because there is no inland fishery in Taiwan, 37 fishermen's associations and their offices along the coast of Taiwan have become major fishery statistical data collection stations.

The fishery statistical system within Taiwan Area is set up as follows:



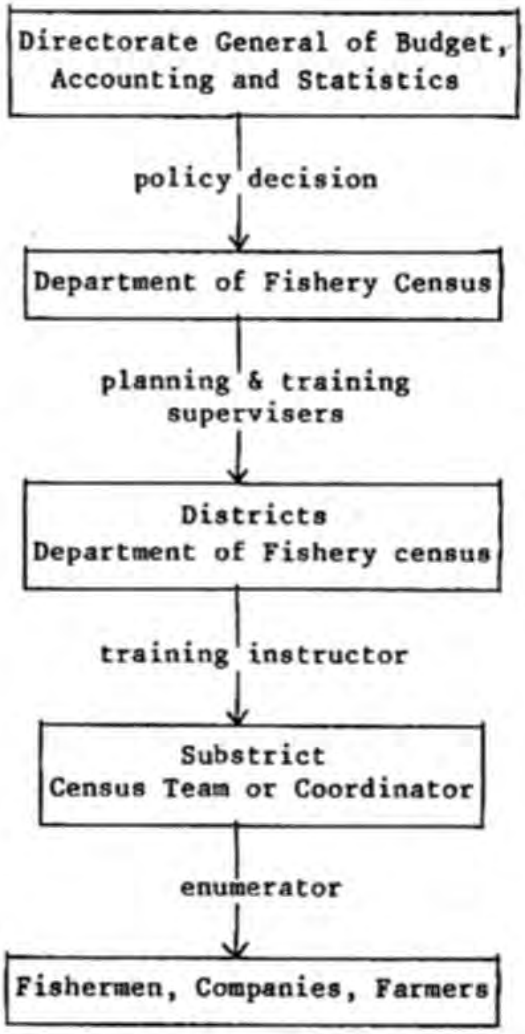
The subdistrict office, fishermen's association and fish-market complete the reporting forms from formal or informal records or investigations following the standard methods in the fishery statistical handbook. The data is transferred to district level according to the time schedule and tabulation programme. The completion of reporting forms is done initially by the Fishery Section at district level, with the view of obtaining more realistic estimates. Then complete reporting forms are forwarded to the Fifth Division of the Taiwan Fisheries Bureau for further scrutiny and aggreation. In special cases, statistical data is sent directly from fishery companies or from fishing boats to the Taiwan Fisheries Bureau.

The systems of fishery data collection from overseas are:

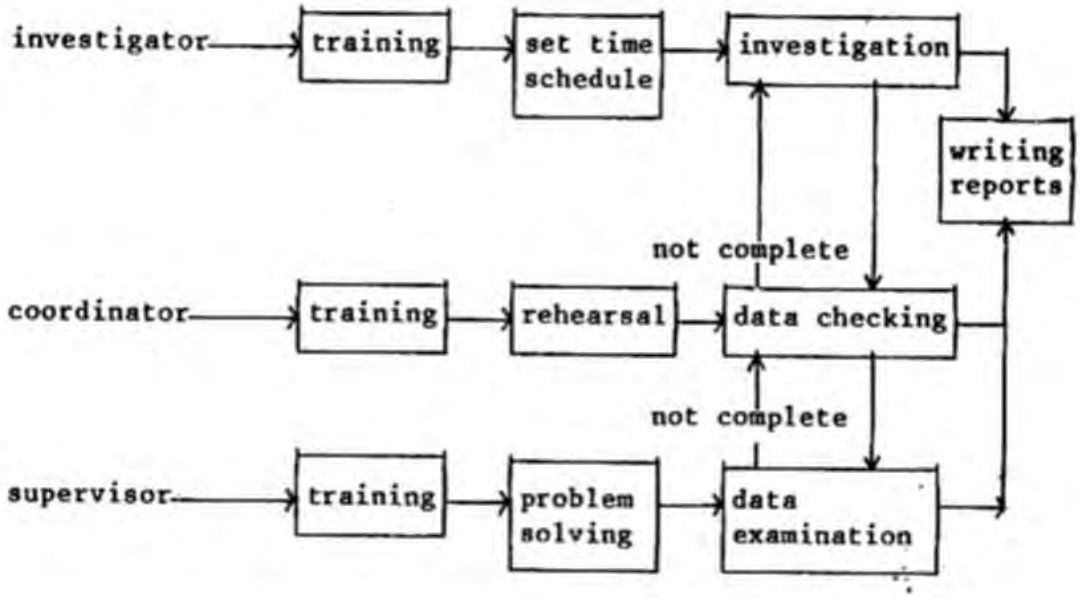


Deep-sea fishing boats send their report forms through the fishery companies or directly to the Taiwan Fisheries Bureau. In the case of fishing boats landing their catch and getting their supplies in overseas bases, the fishery agency will transfer all fishery data including sales and price to the Taiwan Fisheries Bureau. It is obligatory for all the fishery companies to report their fishery statistical data. The fishery radio boardcasting station in Kaohsiung also reports on the fishery activity of fishing boats to the Taiwan Fisheries Bureau. There are some other documents such as those from customs and banks which can be used for checking landings and the value of overseas fishery production.

The procedures for fishery censuses are:



Fishery censuses in Taiwan are taken every five years at the same time as the agriculture censuses. A fishery census covers all areas of Taiwan and is engaged by the Directorate General of Budget, Accounting and Statistics. There is no formal organization for censuses in Taiwan, therefore a taskforce "Department of Fishery Census" is assigned 6 months before the census is due to start. The Department plans the census frame, trains supervisors and prepares the documents. At district level, a Department of Fishery Census is also assigned, the selecting and training of instructors and coordinators is done at this level. At subdistrict level, Census teams are formed and the selecting and training of investigators is done. The tasks of an investigator, coordinator and instructor are as follows:



After fishery census training, an investigator plans the time schedule of his assignment and informs those concerned. Once the investigation has been carried out, the finished report forms are delivered to the coordinator every 5 days. If a report form is not complete, it will be returned to the investigator to be redone. The report forms which pass the coordinator are sent to the supervisor every 10 days. The supervisor will examine the data before it is transferred to the Department of Fishery Census. In general, investigators are selected from among government employees, staff of fishermen's associations, teachers and students of fishery schools and other related persons.

4. FISHERY STATISTICAL STANDARDS OF TAIWAN

The fishery statistical standards of Taiwan have been established gradually as the fishery statistical work was carried out over the past few years. In 1970, the "Fishery Statistical Handbook" was edited and sent to districts, subdistricts, fishermen's associations, fishmarkets, fishery enterprises and any others concerned in the Taiwan area. The Fishery Statistical Handbook has become the basis for the fishery statistical

standards of Taiwan. After modifications in 1975 and in 1983, 20 tabulations with clear instructions in the handbook are recorded.

The reporting forms and major contents are:

1) Workers in the fishery field (annual report)

The report form covers full- or part-time workers in all capture fisheries and aquaculture. Data comes from households, registrations in subdistricts and fishery records from fishermen's associations.

2) Powered fishing boats (mouthly report)

The form covers the fluctuations in powered fishing boats. The reasons, tonnage and horse-power are included. Data come from fishing boat registrations, licences, shipyards, fishing boat crews and fishmen's associations. The deadline is the 15th, of the following month.

3) Newly built powered fishing boats (monthly report)

The table includes all powered fishing boats by tonnage and fishery in detail. Data are from registrations, licences and shipyards. The deadline is the 15th, of the following month.

4) Non-powered boats or rafts (annual report)

Data cover all licenced non-powered fishing boats, rafts and sampans, but those working with a mother ship or used in aquaculture are excluded. Data sources are from registrations, licences, and fishermen's associations. The deadline is the 20th January of the following year.

5) Fishermen's associations and membership (annual report)

Information includes Type A licenced fishermen; Type B persons working in a fishery related field and workers in fishmen's associations. Data is from fishermen's associations. The deadline is February of the following year.

6) Fishery production (Monthly report)

The report includes all production by type of fishery, by species and by district and aquaculture. Data is taken from fishing boats, fishery companies agencies, customs, banks, districts and fishermen's associations. The deadline is the 15th, of the following month.

7) Aquaculture area by species (6 month report)

The report includes all aquaculture with or without licence, classification by species refers to freshwater, salt-water, mariculture and others, monoculture and polyculture are separated. Data is taken from registrations and interviews. The deadline is the 20th July, and the 20th January every year.

8) Edible processed fishery products (annual report)

The report covers production and value of all edible processed fishery products, classified in detail. Data is taken from processing plants and investigations. The deadline is February of the following year.

9) Non-edible processed fishery products (annual report)

The report covers production and value of non-edible fishery products and by-products from processing. Data is collected from processing plants and investigations. The deadline for reporting is February of the following year.

10) Canned fishery products by species (annual report)

The contents cover all canned fishery production by species, boiled, in oil and spiced. Data is from processing plants and investigations. The deadline for reporting is February of the following year.

11) Casualties of fishermen (annual report)

The report covers all fishermen's casualties from death, bad injuries, those slightly hurt and disappearances. Data is returned from the substrict, fishermen's associations and relief records. The deadline for reporting is February, of the following year.

12) Fishing boat casualties (annual report)

It covers numbers, results and condition of fishing boat casualties. Data is obtained from districts, fishermen's associations and relief records. The deadline for reporting is February, of the following year.

13) Powered fishing boats fishery classification (annual report)

The report covers numbers, tonnage, horse-power, and other fishing boat details for fishery classification. Data is supplied from licences, government registrations and fishermen's associations. The deadline for reporting is the 15th January of the following year.

14) Fishing households and fisherfolk population (annual report)

The contents include all families whose major income is derived from fisheries, people in fishing households are fisherfolk. Data is obtained from profession registrations, income tax and fishermen's associations. The deadline for reporting is February of the following year.

15) Fish fry and aquatic seeds (monthly report)

The table covers production and value of all fish fry and a quatic seeds by species, both wild and artificially bred. Data is obtained from investigations and interviews with farmers, dealers, and fishermen's associations by district. The deadline for reporting is the 15th of the following month.

16) Production and fishing vessels on harbors (annual report)

The report includes landings and fishing vessels (by tonnage and fishery) in each harbor. Data comes from fish-markets, fishermen's associations and fishing boat crews. The deadline for reporting is February, of the following year.

17) Fish processing plants (annual report)

The table covers production and itemizes all products processed at a plant with or without licence. Data is obtained from processing plants and investigations. The deadline for reporting is February, of the following year.

18) Investment in fisheries (annual report)

The report covers investments from governments, private or others in fishery including equipment and services. Data is supplied from government, fishery company, bank, fisher-man's association and others. Deadline of reporting is February, of the following year.

19) Refrigeration facilities (annual report)

The table covers ice making, storage and freezing capacities of offical and private facilities. Data is taken from refrigeration facilities and investigations in the districts. The deadlline for reporting is February of the following year.

20) Fish markets (monthly report)

The form covers daily supplies and prices by species in production and consumer markets. The data is obtained from these markets. The deadline for reporting is January of the following year.

An example of the first reporting table "Workers in Fisheries" and its instructions will give a general outline of the Handbook (see Appendix). The appendix in the Handbook also gives some standards and references to help the people completing the reporting forms. The appendix of the Fishery Statistical Handbook includes:

1. Units of measure
2. Common and dialect name of major fish species
3. Common and dialect name of fisheries
4. References of fisheries and fish species
5. National fish canning standards
6. Taiwan Provincial Government regulations for statistical reporting
7. Taiwan Provincial Government grades for statistical reporting
8. Governmental statistical reporting methodology

For each type of deep-sea fishery the tabulation programme is designed depending on the characteristics and area of the fishery. The purpose of the statistical data is also an important factor in designing the reporting form. Usually catch, species, area, season, effort, CPUE, are all mentioned on the reporting form. But in certain types of fishery such as tuna longline length composition of fish and hookings are of interest rather than fishing gear and hours as in demersal or gill net fishery. Identical reporting forms are sent to fishing boats, companies and agencies in a certain fishery. There are about 10 reporting tabulations needed for each fishery, including: tuna longline fishery, demersal fishes fishery and gill net fishery.

In a Fishery Census, the reporting forms cover all the basic fishery data on resource distribution, manpower, capital, equipment, operation, household and structure changes. The major items include 1. fishery enterprises and employees, 2. fishing households, 3. fishing boats, equipment and operation, 4. fishery operations, 5. aquaculture area, equipment and management, 6. fishery investments, and 7. financing of fishery operations. In the fishery census of 1986, investigations covered fishing households, fishery enterprises, fishing companies and private or government fishery research statistics. All the fishery enterprises, companies and research stations were investigated but for fishing households only a 20 per cent specimen was sampled in the census.

5. CURRENT FISHERY STATISTICAL PUBLICATIONS IN TAIWAN

Current fishery statistical publications include four fishery yearbooks, 3 on specific fisheries and a fishery census.

The "Fishery Yearbook of Taiwan Area" has been published by Taiwan Fisheries Bureau since 1954. The Yearbook carries changes in fishermen fishing housesholds, fishing vessels, casualties, catch and value; by type of fisheries, species, area, season; variations in market, prices, trading, fish processing and freezing, aquaculture and fishery investments. Both Chinese and English are used in the Yearbook.

"Annual Catch Statistics of Taiwan Tuna Longline Fishery" and "Annual Report of Effort and Statistics by Area on Taiwan Demersal Fish Fisheries" both have been published by the Institute of Oceanography, National Taiwan University since 1970. The tuna report includes change of catches, hooking rate effort, CPUE, landings, value and biological data by species of tuna, by season and by fishing ground. The demersal fish report covers variations in catch, species, area, effort, CPUE and environmental conditions of otter and pair trawlers. The publications are printed in both Chinese and English.

The "Annual Report of Effort and Catch Statistics on Taiwan Gill Net Fisheries" has also been published by the Institute of Oceanography, National Taiwan University since 1980. The major contents include variations in catch, weight, effort, CPUE, etc. by species, season and fishing area. Both Chinese and English are used in the publication.

The "Fishery Census" has been published by the Directorate-General of Budget, Accounting and Statistics every 5 years since 1956. Fishery Censuses cover fishermen, fishing households, fishery enterprises and employees, fishing vessels, equipment and cooperation, aquaculture area, aquaculture equipment and operation, fishery capital and investment, fishing village economics, etc.. The Fishery Census is printed in Chinese.

6. PROBLEMS OF FISHERY STATISTICS IN TAIWAN

The fishery statistical system was established many years ago and although the structure of the fishery statistics have been modified year by year, there are few changes to the frame of methodology and the Fishery Yearbook. Some sections seem to be too old to adapt to the complex circumstances of fisheries today. The requirement for fishery statistics to establish consistency, continuity and comparability are not satisfied. The problems of the present fishery statistics in Taiwan are:

6.1 Old fashioned classification of fisheries in Yearbook

Current classification of deep-sea fishery, inshore fishery, coastal fishery and their definitions used in fishery statistics are unsuitable. Ship size is no longer a limiting factor for a vessel to go fishing in distant waters especially since 50 tons is set to differentiate deep-sea and inshore fishing boats. There is some confusion about inshore and coastal fisheries. Inshore fishing boats and powered rafts or sampans always fishing overlap in coastal areas.

Marine environments in Taiwan are quite different from east to west and from north to south, but there is no classification of coastal zones for Taiwan. At present, the capture fishery statistical data for Taiwan are based on landing place (production fishmarket) and it is impossible for the data users to know where the catches are from. Coastal area classification would solve this problem.

6.2 Incomplete yearbook contents

The Fishery Yearbook was split into a Fishery Yearbook and a Fishing Boat Yearbook in 1977. This caused inconvenience to the users especially for economical and resource analysis, but it was reunited into a Fishery Yearbook in 1986. The rearrangement of the contents such as separating time series data and new coming data in the Yearbook and adding some data from Fishery Censuses etc., will improve the efficiency of the Yearbook. Some new species should be added in accordance with the order of the FAO International Standard Classification of Aquatic Animals and Plants (ISCAAP).

6.3 Fishery statistical work is still done on a project level

There is no permanent census office in Taiwan. Annual reports on tuna longline and demersal fish fishery have been produced for more than 15 years and reports on gill net fishery for 5 years. The three annual reports are supported each year by a project from the Committee of Agriculture. Since fishery statistical data are so important formal manpower and a permanent budget should be set as soon as possible.

6.4 Limitations of manpower and budget

Over the past 20 years, production, environment and the complexities of fisheries have changed very fast but appropriate actions were not usually found at government level. Fishery statistical work has doubled or trebled but the manpower and budget have not kept pace with the growth rate of the statistical

work. It is obvious that a shortage of manpower and budget exists at each level especially district and subdistrict and unless there is an increase in full-time workers in subdistricts and statisticians in districts, plus enough funds to support the fishery statistics at each level; the problems faced today will still exist in the fishery statistics of Taiwan tommorrow.

6.5 Data accuracy unstable

There are many factors affecting the accuracy of fishery statistical data: There are 135 fishing ports but only 70 of them have a fishmarket and facilities. The absence of properly controlled landings and marketing in some ports makes it difficult to obtain good statistical data. Local fish names used cause confusion. Recently the recovery of reports from fishing boats and enterprises decreased. In 1984, the recovery from fishing boats and enterprises was only 60 per cent which was 20 per cent lower than the recovery in 1981 (Fig. 3).

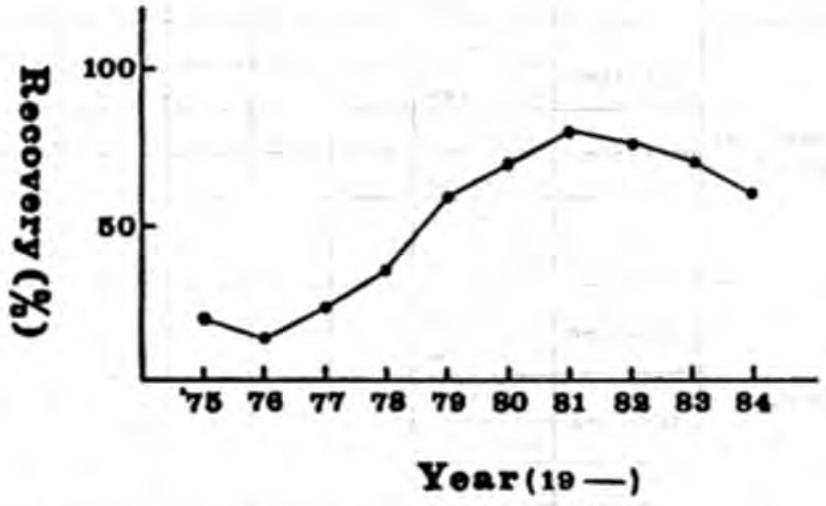


Fig. 3. Fluctuation of data recovery of tuna longline

Appendix

Year book | before Jan. 20th, next year. | No. 9-1

Taiwan Fisheries Bureau

district workers in fisheries

Subdistrict										Total
Aquaculture			full-time							
			part-time							
			Total							
Type of Fishery	Coastal Fishery	full-time	crew							
			non-crew							
		part-time	crew							
			non-crew							
		Total	crew							
			non-crew							
	Inshore Fishery	full-time	crew							
			non-crew							
		part-time	crew							
			non-crew							
		Total	crew							
			non-crew							
	Deep-Sea Fishery	full-time	crew							
			non-crew							
		part-time	crew							
			non-crew							
		Total	crew							
			non-crew							
	Total	full-time	crew							
			non-crew							
		part-time	crew							
			non-crew							
		Total	crew							
			non-crew							
Total			full-time							
			part-time							
			Total							

Agriculture Bureau

Director | register | Reporter | Yr. Mon. Day.
Size 297x420 cm

Data source: from fishmen's association and subdistrict reports.
Note: fishery worker means actually working in fisheries, not fishery processors.

Instructions & Definitions

1. Purpose : to get data on fishery workers in order to provide information to the government for fishery development.

2. Coverage : people living in the district actually working in fishery including both full-time and part-time workers.

3. Standard time : end of December.

4. Classification : Capture fishery and aquaculture. Capture fishery including deep-sea fishery, inshore fishery and coastal fishery.

5. Definition :

   a. Capture fishery worker: persons who capture aquatic animals in deep-sea, inshore, coastal, river and other public water surfaces, regardless of working independently or hired by others.

   b. Aquaculture worker: persons who culture fishes, shellfishes, crustaceans, seaweeds, etc., in fish ponds, reservoirs, or at sea, regardless of hired or independent.

   c. Deep-sea fishery: fishing boats over 50 tons or fishing boats obtaining supplies outside the Taiwan area.

   d. Inshore fishery: powered fishing boats of less than 50 tons whose base is in Taiwan.

   e. Coastal fishery: non-powered boats or rafts, or fishing in coastal areas using other fishing methods.

f. Full-time worker: person who's total income is from fisheries.

g. Part-time worker: persons who's income is not entirely from fisheries.

h. Crew: persons who work on fishing boats or rafts including captain, fishing worker, technician, telegramer, cook etc. People without licences working on rivers, reservoirs, lakes are excluded.

6. General description:

a. Persons who work in capture fishery and/or aquaculture.

b. Persons who invest in fishery but do not actually work in fisheries are excluded.

c. Students or boys under 15 are not included. However, students over 15 studying at night school are.

7. Data collection methods and table report:

Subdistrict and fishermen's Associations complete the table based on household and fishing registration data. It is then sent to the district government.

8. Statistic results: complete table No.9-1, "Table of fishery workers".

Annex 9

FISHERIES STATISTICS IN THAILAND

The Department of Fishery (DOF), Ministry of Agriculture & Cooperatives is the agency responsible for the collection and publication of all fisheries statistics. The District Fisheries Office is the lowest administrative level of the DOF. Currently, there are 268 district offices, 58 provincial offices and 30 fisheries research stations located throughout the country. Fisheries statistics is the responsibility of the Fisheries Statistics Section, Fishery Policy and Planning Division. The Section has about 70 field staff who are presently assigned to work as enumerators in the Provincial Fisheries Offices, mostly in coastal areas.

1. Fisheries Census

Only two censuses of marine fisheries have been conducted in Thailand, the first one was undertaken in 1967 and the second in 1985. Brackishwater fisheries were also included in these censuses. However, no freshwater fisheries censuses have ever been conducted in the country.

1.1 1967 Census of Marine Fisheries

The census was carried out jointly by the Department of Fisheries and the National Statistical Office.

a. Objectives

1) To secure the data related to the number and nature of fish producing factors such as fisheries households, fishing boats, fishing manpower, fishing units, etc., and thus to clarify the economic structure of the fishing industry.

2) To provide the frame for the planning of the fisheries production survey, input and output survey on fisheries, etc.

b. Date of the Census

The census was carried out on May 1, 1967 and the reference period was between May 1, 1966 to April 30, 1967.

c. Scope and Coverage

The census covered the following types of households which were engaged in capture or culture in marine water for one year prior to the date of the census.

1) Fishing households or firms that were engaged in the capture or culture of aquatic animals and plants, regardless of sale or home use.

2) Households whose family members were employed by others as fishery labourers.

Fishing households covered by the census were:

(1) Fishing households located along the coast of "Lake Songkhla" and

(2) Enterprise fishing households whose residences were located in non-coastal provinces such as Bangkok were identified, based on the "Fishing gear registration records".

Fishing households not covered by the census were:

(1) Any fishing households or fishery labourers' households that were located outside the area of the coastal provinces,

(2) Any fishing household engaged in fresh water fishing or culture,

(3) Fisheries experimental stations, and

(4) The fishing households, located in the following communities were not covered due to difficulties in accessment: Tambon Paknam, Community (Village) No.3, Tambon Saidang, Community Nos.1, 2, 3 and 4, Ranong Province and Tambon Dato, Community Nos.1 and 2 Pattani Province.

d. Methodology

A complete enumeration was employed in the census. The list-type form was used for identification of fishing households and recorded some basic items such as fishing boat, manpower, and acreage of culture farm. The questionnaire form was used for the recording of more detailed information, from the households who employed more than three permanent fisheries labourers, e.g., the number and type of fishing boats, the number of fishing units, the source of fisheries financing, etc.

1.2 1985 Census of Marine Fisheries

This census was also carried out jointly by the DOF and the NSO.

a. Objectives

1) To find the basic structure of fisheries in the country.

2) To provide the necessary data for formulating policy and planning national fisheries development.

3) To use the data as the frame for sample surveys to collect other detailed data on fisheries.

b. Date of the Census

The reference period was between March 1, 1984 and February 28, 1985. The field operation was between March 1-31, 1985.

c. Scope and Coverage

The 1985 Census of Marine Fisheries covered all fishing/aquaculture establishments/households, fishing/aquaculture employees' households and activities related to processing and marketing of fisheries products. The Census covered both municipal and non-municipal areas of 24 coastal provinces - Bangkok, Chachoengsao, Chon Buri, Rayong, Chanthaburi, Trat, Samut Prakarn, Samut Sakhon, Samut Songkhram, Phetchaburi, Prachuap Khiri Khan, Chumpon, Surat Thani, Nakhon Si Thammarat, Phatthalung, Songkhla, Pattani, Narathiwat, Ranong, Phangnga, Phuket, Krabi, Trang and Satun.

d. Methodology

The data were collected by complete enumeration. Three different forms were used in this census. The CF-1 form was used for listing purposes. The CF-2 was used for fishing/aquaculture establishments households and the CF-2/1 was for fishing/aquaculture employee's households.

2. Fishing Vessel Statistics

These statistics are collected from the fishing gear registration form issued by the Provincial Fisheries Office, and are sent to the Fisheries Statistics Section for data processing annually.

3. Fisheries Survey

The following surveys are the major activities of the Fisheries Statistics Section.

3.1 Marine Production Survey

This survey is further divided into 4 surveys as follows:

Production from the Major Fishing Gears Survey

Major fishing gears included in this survey consist of 1) Otter board trawl, 2) Pair trawl, 3) Beam trawl, 4) Thai purse seines, 5) Chinese purse seines, 6) Anchovy purse seines, 7) Luring purse seines, 8) Mackerel encircling gill nets, 9) King mackerel gill nets 10) Push nets, and 11) Bamboo stake traps. For otter board trawl, pair trawl, and Thai purse seines, they are broken down further into several strata according to the length of the vessel used.

In each stratum simple random sampling is used in selection of the sample fishing gears. The sample fishermen are requested to record the total catches for each trip in a book (log book) provided by the DOF. Enumerators will visit the sample fishermen regularly to record all needed data and forward this data to the Fisheries Statistics Section in Bangkok for processing. Sometimes the enumerator may have to interview the sample fishermen himself if he finds that some information is missing. The estimator for this survey is:

$$\hat{Y}_h = \frac{N_h}{n_n} \sum_{i=1}^{n_h} Y_{hi}$$

where:

$\hat{Y}_n$ = total monthly production (catches for the h-th stratum (type and size of fishing gear)

y_{hi} = monthly production for the i-th sample in the h-th stratum

N_h = total number of fishing units in the h-th stratum

n_n = number of sample fishing units in the h-th stratum

The total monthly production for the population (all types and sizes) is:

$$\hat{Y} = \sum_{h=1}^{L} \hat{Y}_h, \qquad L = \text{number of strata}$$

The annual production is the sum of the monthly productions.

3.2 Production from the Fishing Community Survey

A stratified two-stage sampling is used for this survey. The fishing communities (villages) in each area are stratified into two strata based on the number of boats, each mechanized boat is assigned a weight equal to 2 and the non-mechanized boats a weight equal to 1. The fishing communities are selected at random from each stratum. Enumerators then list all types and the quantity of fishing gear available in the sample villages. Any fishing gear not covered in the major fishing gear survey (11 types) will be included in this survey. These fishing gears will be selected at random not more than 5 units for each type. The estimator for the total production for each type of fishing gear in all villages in the area is:

$$\hat{Y} = \sum_{h=1}^{2} \frac{N_h}{n_n} \sum_{i=1}^{n_h} \frac{M_{hi}}{m_{hi}} \sum_{j=1}^{M_{hi}} y_{hij}$$

where:

$\hat{Y}$ = total production from each type of fishing gear in the area

N_h = total number of fishing communities in the h-th stratum in the area

n_n = number of sample fishing communities in the h-th stratum

M_{hi} = total number of fishing gears of a particular type in the i-th community in the h-th stratum

m_{hi} = number of sample fishing gears in the i-th community in the h-th stratum (≤ 5)

y_{hij} = production of the j-th sample fishing gear in the i-th community in the h-th stratum

The total production for all types of fishing gears is the sum of the total estimate for each type. This survey is conducted annually and the information is obtained through interviews with the sample fishermen in the sample communities.

3.3 Production from Coastal Aquaculture Survey

Coastal aquaculture is divided into 7 types of farming as follows:

1) Shrimp farming
2) Fish Farming
3) Blood cockle farming
4) Green mussel farming
5) Oyster farming
6) Horse mussel farming
7) Short-necked clam harvesting

For each type, the survey is conducted monthly, except shrimp farming, fish farming and short-necked clam harvesting are conducted annually. The sample farms are systematically selected from the list of all farms for each type of farming. In this survey the following ratio estimator is used.

$$\hat{Y} = \frac{\sum_{i=1}^{n} y_i}{\sum_{i=1}^{n} x_i} X$$

where:

$\hat{Y}$ = total production for each type of farming

y_i = production of the i-th sample farm

x_i = cultivated area of the i-th sample farm

X = total cultivated area in the population

n = number of sample farms

Miscellaneous Marine Products Survey

The objective of this survey is to estimate the production of miscellaneous marine products from particular fishing methods other than the above surveys. These products include seaweed, sea cucumber, jellyfish and turtle eggs. This survey is undertaken annually and no specific questionnaire is used. Enumerators from the Fisheries Statistics Section are urged to contact as many as possible of the local people in the identified villages to avoid any unreasonable error.

3.4 Freshwater Fish Production Survey

There are 3 major activities involved in freshwater fish surveys.

Freshwater Fish Farm Production Survey

The fish farms in each district are classified into 4 groups according to farming practices as follows:

a. Pond culture
b. Paddy field culture
c. Ditch culture
d. Pen or cage culture

The sample farms for each district are selected systematically, one out of ten farms from each group, regardless of type of culture and species raised. The ratio estimator is employed to get the estimate of total production for each type of farm.

$$\hat{Y} = \frac{\sum_{i=1}^{n} y_i}{\sum_{i=1}^{n} x_i} X$$

where:

$\hat{Y}$ = total production estimate for each type of farm in the district

Y_i = production of the i-th sample farm

x_i = farming area for the i-th sample farm

X = total farming area in the district

Luring Pond or Small Water Tank Survey

A 10 per cent sample of ponds in each district are drawn at random from the list at the District (Amphoe) Fisheries Office of applicants requesting permission to catch fish.

3.5 Natural Water Tank Survey

Natural water tanks are stratified by size and type of tank such as reservior, lake, swamp, and water tank created under the national rural job raising program.

4. Other Surveys

4.1 Fish Landing Place Survey

The objective of the survey is to estimate monthly quantity and value landed by species at each landing place. The surveys are conducted for both marine fishes and freshwater

fishes. The sample size is about 10 per cent of all fishing vessels landing at each survey place. An enumerator will visit the landing place at least once a week to record all the necessary information. The mean per unit estimator is used to get the total estimate.

4.2 Associated Industries Survey

The industries included are ship yards, docks, ice plants, cold storage facilities, processing plants, fish meal plants, etc. The data is collected on a monthly basis. The complete enumeration is used for every industry except fish/shrimp paste plants, dry shrimp/squid plants, and salted fish plants where a 10 per cent sampling is used.

5. Fisheries Statistical Publications

The annual statistical publications published by the Fisheries Statistics Section are:

1. Fisheries Records of Thailand
2. Thai Fishing Vessel Statistics
3. Statistics of Fisheries Factories
4. Marine Fisheries Statistics Based on Sample Surveys
5. Landing Place Survey
6. Freshwater Fish Farm Production

6. Economic Surveys

6.1 Cost and Earnings Survey for Fishery Enterprises

Two surveys of Cost and Earnings for Fishery Enterprises have been conducted by the Fisheries Economic Section (FES):-

1) Cost and Return Analysis of Trawl Fishery, 1977
2) Cost and Return Analysis of Demersal and Pelagic Fishing Gear, 1986 (on-going study)

Objectives of the studies

- To clarify the cost structure of some major fishing gears
- To analyse and compare the cost, gross return, accounting profit and economic profit among different types of gear
- To analyse the return on investment to fishermen

Type of Fisheries covered

In 1977 FES conducted the study on Cost Benefit Analysis of Pelagic Fisheries which covered four major fishing gears, namely:

- Otter board trawl
- Pair trawl
- Beam trawl
- Push net

All data and information from the study has proven very useful to fishery administrators and planners as well as to fishermen.

In order to obtain updated essential data and information on cost and return of both demersal and pelagic major fishing gears, FES has been conducting a project on Cost and Return Analysis of Demersal and Pelagic Fishing Gears. The fishing gears were extended to ten types as follows:

- Otter board trawl
- Pair trawl
- Beam trawl
- Thai purse seines
- Anchovy purse seines
- Luring purse seines

- King mackerel drift gill nets
- Mackerel encircling gill nets

The otter board trawls and pair trawls are classified by boat length into 4 classes:

Class 1. less than 14 metres
Class 2. 14-18 metres
Class 3. 18-25 metres
Class 4. longer than 25 metres

while the purse seines are classified as Class 1. and Class 2.

Data requirements

a. Fishing Assets
b. Catch and Effort
c. Fixed Cost and Variable Cost
d. Revenue or Income
e. Financial

Methods used to obtain data

The data needed were collected by means of interviews and observations. The appropriate questionnaires were prepared previously as tools for interviewing the boat owners. The samples were selected by means of purposive sampling.

Statistical frame and sample size

Samples were selected from fishing communities located along the coast of the Gulf of Thailand and Andaman Sea which included 16 provinces.

Table shows number of samples by type of gear

Type of fishing gear	Number of samples surveyed 1977	1986
Trawl	134	177
Push net	35	*
Purse seines	-	62
Gill net	-	45
Total	169	284

* Push net is being employed less in many areas, therefore in 1986 this fishing gear was not selected for the sample.

Criteria for the depreciation of fishing assets

Fixed cost consists of depreciation and opportunity cost of fishing assets. The straight-line Method was used to calculate the depreciation cost, the formula is:

$$\text{Annual depreciation cost} = \frac{\text{Purchasing value - Scrap value}}{\text{Working life}}$$

The monthly depreciation cost is computed by dividing the annual depreciation cost by number of operating months per year.

The items of fishing assets with depreciation cost are boat, engine and other equipment (capstan, dynamo, eco-sounder, discharger, etc.)

Scrap value and standard working life

Items		Working life	Scrap value %
Hull	< 14 m.	15	10
	> 14 m.	15	30
engine	- mobile engine	5	10
	- boat engine	10	10
other equipment (capstan, dynamo, echo-sounder), discharger		10 6	10 0

Opportunity cost of fishing assets consists of the opportunity cost of boat, engine and other equipment, using the current interest rate multiplied by the present value of those assets. The labour opportunity cost is assumed to be zero due to the very low occupational alternatives.

6.2 Income and Expenditure Survey for Small-scale Fishing Households

The definition of small-scale fisheries has been given by many institutions, FES adopted the definition of the Department of Fisheries (DOF) for its studies.

DOF defines the fisheries carried out using small traditional fishing gears, fisheries operated on a subsistance basis and coastal aquaculture which utilizes a small culture area as small-scale fisheries. Artisanal fisheries and traditional fisheries are understood as small-scale fisheries which involue a large number of poor fishermen residing in the villages along the coast.

Recognizing that 70% of marine fishermen are small-scale operators who face chronic socio-economic problems, the government has sought technical assistance to study ways and means to improve their standard of living.

An income and expenditure survey for small-scale fisheries is always a part of the socio-economic study. Studies relevant to the socio-economic status of small-scale fisheries in Thailand have been conducted by various institutions using different analytical frameworks, depending on individual interests.

The socio-economic study of Fishermen and Fishing Communities is one of the major tasks of FES. In 1978 FES completed a socio-economic survey of five fishing communities in Songkhla lake and seven fishing communities in Phang Nga Bay.

The general objective of the studies is to provide socio-economic data on coastal fishermen. These data have been used for decision making, planning and for program implementation.

Data requirements concerning income and expenditure

1) Income in cash and in kind

The annual income is composed of fishing income and non-fishing income. Fishing income is derived from three sources: own fishing, fishing labour and fish processing whereas non-fishing income is derived from farming, hired labour and others such as public service, car driving, handicrafts and fish trading.

2) Expenditure in cash and in kind

The annual expenditure is composed of cost of fishing activities and household expenses. The components for cost of fishing are divided into fixed cost and variable cost.

Statistical frame and methods used to obtain data

The site selection was made in connection with the small-scale fisheries development programmes. Five villages in Songkhla lake were selected under the Fisheries Rural Development Pilot Project and seven villages in Phangnga Bay were selected under the Small-scale Fisheries Development Project on Aquaculture Demonstration in Phangnga Province.

The survey unit was the fishing household in the villages which were selected randomly. The household head was interviewed and data for the previous year of activities were recorded on a questionnaire provided.

Criteria for the depreciation of fishing assets

Fixed cost consists of depreciation and opportunity cost of fishing assets. The straight-line method was used to calculate the depreciation cost, the formula is:

$$\text{Annual depreciation cost} = \frac{\text{Purchasing value - scrap value}}{\text{Working life}}$$

The small-scale fishermen use traditional fishing gear and small boats with an engine not greater than 30 H.P., this could explain their low efficiency. Therefore, the scrap value of fishing assets was assumed to be zero. The working life of a fishing boat is 10 years while that of an engine is 5 years.

The opportunity cost of fishing assets and labour was also assumed to be zero.

6.3 List of some socio-economic studies of small-scale fisheries by various institutions

	Title	Institution/author
1)	Report on the Socio-economic Survey at Huaphad Village, Patthalung Province, 1978	FES
2)	Report on the Socio-economic Survey at Tub Lamu Village, Phangnga Province, 1978	FES
3)	Report on the Socio-economic Survey at Ta Sao Village, Songkhla Province, 1978	FES
4)	Report on the Socio-economic Survey at Lung Kao Village, Songkhla Province, 1978	FES
5)	Socio-economic Study Village Group 3 Tambol Tan Yong Po, Satun Province, 1981	FES
6)	Socio-economic Study of Small-scale Fishermen in Phangnga Bay, 1983	FES
7)	Socio-economic Conditions of Coastal Fishermen in Phangnga Bay, 1978	Kasetsart University
8)	Socio-economic Status, Living Conditions and Income Conditions of Marine Fishing Households in Paknam Pran Buree, 1982	SEAFDEC
9)	Socio-economic Status, Living conditions and Income Conditions of Fishing Households in Ban Pae, 1981	SEAFDEC

	Title	Institution/author
10)	Socio-economic and Demographic Aspects of Thai Fishing Communities, 1979	Institute of Population Studies, Chulalongkorn University
11)	Socio-economic Conditions of Coastal Fishermen in Thailand, 1980	Panayotou, T
12)	Production and Profitability Analysis of Small-scale Fisheries : The Case of Chumphon, Thailand, 1978	Ladawan Kumpa

7. Semi-Fisheries Census

7.1 Objective : The ultimate objective is to follow the changes in the structure of marine fisheries/coastal aquaculture every three years after the second National Fisheries Census in 1985. The major indicators are composed of the number of fishing vessels; fishermen's population; fishing communities; and number of fish farmers, etc. The findings will be used as guidelines in the formulation of the national fisheries development plan and conservation measures for the maximum exploitation as well as the continued utilization of the natural resources.

7.2 Survey Methodology : The survey is based on the simple sampling technique. The sample units of fishing coastal aquaculture communities were compiled during the Second National Fisheries Census in 1985. Fishing communities are divided into 2 catagories, as follows:

Catagory A : More than 200 fishing vessels in the fishing community

Catagory B : Less than 200 fishing vessels in the fishing community.

Note : Two non-mechanised fishing vessels will be counted as one mechanised fishing vessel.

7.3 Sampling Techniques:

Fishing communities classified as Catagory A will be based on the complete enumeration technique.

Fishing communities classified as Catagory B will be based on systematic sampling at a rate of 15 per cent and the total sample will not exceed 200 samples.

7.4 Survey Coverage : When all fishing communities along the coastal area throughout the Kingdom have been categorized, these fishing communities will be selected as sample units. The listing and enumerating of each sample unit will be carried out (estimated not more than 400 samples).

7.5 Time Frame : It is expected to accomplish the survey during the month of March 1988, 1991 and 1994. Then the Third National Fisheries Census will be formulated in 1995.

7.6 Field Work Arrangement : Field enumerators and Provincial Statisticians located at the Provincial Fisheries Offices/District Fisheries Offices along the 22 coastal provinces of the Kingdom, are assigned to carry out all field work under the supervision of Provincial Fisheries Officers/District Fisheries Officers and the statisticians from the central office will be the technical coordinators.

7.7 Survey Form : There are two forms being used as follows:

Form 801 : for listing all fishing households in the sample unit (fishing community).

Form 802 : for enumerating all fishing households carrying out fishing operations with an in-board engine.

Fisheries Statistical Forms

1. FSF 6 (Revenue from fees and licenses)
2. FSF 10 (Utilization of freshwater fish/annum)
3. FSF 10/1 (Utilization of marine species/annum)
4. Form 101 (Otter board trawl, pair trawl/month)
5. Form 102 (Purse seiner, Gill netter/month)
6. Form 103 (Beam trawl and push net/month)
7. Form 107, 108 (Production and Listing of bamboo stake traps/month)
8. Form 201 (Number of vessels/month)
9. Form 202 (Quantity and value/trip/vessel)
10. Form 205 (Number of vessels/fish dealers/month)
11. Form 206 (Quantity and value/trip/vessel)
12. Form 207 (Number of vessels/day/month)
13. Form 301 (Number of fishing gear/annum)
14. Form 302 (Production/fishing gear/annum)
15. Form 401 (List of shrimp farmers names)
16. Form 402 (Additional list of shrimp farmers names)
17. Form 403 (Marine shrimp production/annum)
18. Form 404 (List of mollusc farmers names and production/month)
19. Form 405 (Production of green mussel from bamboo stake traps/month)
20. Form 406 (Natural production of mollusc/annum)
21. Form 501 (Production of turtle egg/annum)
22. Form 502 (Production of sea-weed/annum)
23. Form 503 (Production of sea cucumber/annum)
24. Form 504 (Production of jelly fish/annum)
25. Form 601 (List of freshwater fish farmers names)
26. Form 602 (Production/annum)

27. Form 603 (Additional list of names)
28. Form 604 (List of luring fish pond owners names)
29. Form 605 (Production/annum)
30. Form 606 (Production/annum)
31. Form 607 (List of natural water bodies)
32. Form 608 (Freshwater fishing gear)
33. Form 609 (Production/annum)
34. Form 701 (Number of fisheries entrepreneurs/annum)
35. Form 702 (Number of shipyards-docks/annum)
36. Form 703 (Number of ice plants/annum)
37. Form 704 (Number of cold storage facilities/annum)
38. Form 705 (Number of canneries/month)
39. Form 706 (Number of fish meal plants/month)
40. Form 707 (Fish processing/year)
41. Form 801 (Fishing households/3 years)
42. Form 802 (Fishing vessels/3 years)