

TD/RP/29

April 1994

## **STATUS OF FISHERY INFORMATION AND STATISTICS IN ASIA**

---

**Prepared by:**

**Ms. Virgilia T. Sulit**  
(Technical Secretary of the Workshop)  
Special Assistant to the Chief  
SEAFDEC Aquaculture Department

*in consultation with*

**Mr. Kazuo Inoue**  
Deputy Secretary-General  
SEAFDEC

*and*

**Dr. Veravat Hongskul**  
Regional Fishery Officer  
FAO/RAPA

# **STATUS OF FISHERY INFORMATION AND STATISTICS IN ASIA**

**Proceedings of the Regional Workshop on  
Fishery Information and Statistics in Asia**

**Bangkok, Thailand  
18-22 January 1994**

**Volume 1: Report of the Workshop**

*Jointly sponsored by SEAFDEC Secretariat, ASEAN-EEC Aquaculture Development and Coordination Programme (AADCP), Asia and Pacific Commission on Agricultural Statistics (APCAS), Bay of Bengal Programme (BOBP), FAO Fisheries Department, FAO Regional Office for Asia and the Pacific (FAO/RAPA), Mekong Committee, Network of Aquaculture Centres in Asia-Pacific (NACA), and Strategy for International Fisheries Research (SIFR).*

**Published by: SEAFDEC Secretariat  
Bangkok, Thailand**

**April 1994**

## C O N T E N T S

### Vol. I: Report of the Workshop

	Page
<i>Foreword</i>	i
<i>Glossary</i>	ii
Introduction	1
Fishery Information	3
Overview of Fishery Information and Services in Asia	3
Current Status of Fishery Information Programs	10
National Information Programs	10
Regional Fishery Information Programs	12
Compatibility and Complementarity of Fishery Information Programs	14
Information Technology for Integrated Fishery Resource Management	15
Issues and Constraints in Fishery Information	16
Proposed Action Plans for Fishery Information Programs in Asia	19
Fishery Statistics	20
Outlook of Fishery Statistics in Southeast Asia	20
Current Status of Fishery Statistics in Asia	21
SEAFDEC Fishery Statistical Program	26
FAO Fishery Statistics Program	28
Catch-effort Statistics	29
Tuna Fishery Statistics	30
Socio-economic Statistics	32
Aquaculture Statistics	34
Fishery Trade Statistics	37
Recommendations	37
Recommendations on Fishery Information Programs	37
Recommendations on Fishery Statistics	39
Conclusion	45

## **Annexes**

1	List of Participants and Observers	47
2	Opening Remarks by the SEAFDEC Secretary-General	69
3	Agenda and Time Table	71
4	List of Documents	73
5	Proposed Action Plans for Fishery Information Programs in Asia	78
5.1	Action Plan for Indo-China	79
5.2	Action Plan for South Asia	80
5.3	Action Plan for Southeast Asia	83

## FOREWORD

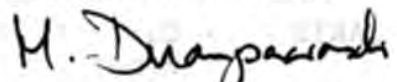
Cognizant of the need to improve fishery data and information services in Asia, the SEAFDEC Secretariat in collaboration with FAO, SIFR and with financial assistance from the Government of Japan, organized the Regional Workshop on Fishery Information and Statistics in Asia from 18 to 22 January 1994, in Bangkok, Thailand.

SEAFDEC has been active in promoting the compilation and dissemination of fishery information and statistics in the South China Sea area. It has published the annual Fishery Statistical Bulletin for the South China Sea Area since 1977, and the annual Regional Bibliography on Fisheries and Aquaculture in Southeast Asia since 1985. SEAFDEC has also organized a number of fishery statistics workshops since 1976 and seminars on fishery and aquaculture information systems.

As a sequel to the various fishery information and statistics workshops, this Workshop had a wider mandate and broader geographical coverage. More than 90 international, regional as well as national experts on fishery statistics and information attended the Workshop, which aimed to (1) review the current status of fishery information programs and services available in Asia, (2) discuss the requirements for improving collection, compilation and dissemination of fishery and aquaculture statistics in the region, and (3) recommend ways and means for international cooperation and coordination in support of national efforts in information dissemination.

The Proceedings of the Workshop is divided into two volumes. Volume I constitutes the report of the Workshop including summary of the discussions, action plans, recommendations, and the list of participants. Volume II, on the other hand, includes an analysis of the status of the fishery information and statistics in Asia and the papers presented at the Workshop.

This publication will be useful to administrators, policy-makers, and planners in this area of the world. The Workshop as well as this publication were made possible through the assistance of the Government of Japan, the collaborating agencies and the SEAFDEC Secretariat staff.



Maitree Duangwasdi  
Secretary-General  
SEAFDEC

## G L O S S A R Y

- AADCP** - ASEAN-EEC Aquaculture Development and Coordination Programme (Thailand)
- ABARE** - Australian Bureau of Agricultural and Resource Economics
- AFS** - Asian Fisheries Society (Philippines)
- AGNA** - Aquaculture Genetics Network of Asia (Philippines)
- AGRIS** - International Information System for the Agricultural Sciences and Technology (FAO, Rome)
- AIBA** - Agricultural Information Bank for Asia (Philippines)
- AIT** - Asian Institute of Technology (Thailand)
- APCAS** - Asia and Pacific Commission on Agricultural Statistics (Thailand)
- ASFA** - Aquatic Sciences and Fisheries Abstracts (FAO, Rome)
- ASFIS** - Aquatic Sciences and Fisheries Information System (FAO, Rome)
- BAS** - Bureau of Agricultural Statistics (Philippines)
- BFAR** - Bureau of Fisheries and Aquatic Resources (Philippines)
- BIOSIS** - Biological Sciences Information System (U.K.)
- BOBP** - Bay of Bengal Programme (India)
- BRAIS** - Brackishwater Aquaculture Information System (Philippines)
- CABI** - Commonwealth Agricultural Bureau International (U.K.)
- CARIS** - Current Agriculture Information System (FAO, Rome)
- ESCAP** - Economic and Social Commission for Asia and the Pacific (Thailand)

- FAO - Food and Agriculture Organization (Rome, Italy)
- FAO/RAPA - FAO Regional Office for Asia and the Pacific (Thailand)
- FIDI - Fishery Information, Data and Statistics Service (FAO Fisheries Department)
- FIPIS - Fishery Project Information System (FAO, Rome)
- FRSS - Fishery Resources Survey System
- FSP - Fisheries Sector Program (Philippines)
- IAMSLIC - International Association of Marine Science Libraries and Information Centers (U.S.A.)
- ICLARM - International Center for Living Aquatic Resources Management (Philippines)
- IDRC - International Development Research Centre of Canada
- IFRM - Integrated Fishery Resource Management
- INFIS - Indonesian Fisheries Information System
- INFOFISH - Intergovernmental Organization for Marketing Information and Advisory Services for Fishery Products in the Asia and Pacific Region (Malaysia)
- IOC - Indian Ocean Commission (Sri Lanka)
- IOTC - Indian Ocean Tuna Commission (FAO)
- IPFC - Indo-Pacific Fisheries Commission (Thailand)
- IPTP - Indo-Pacific Tuna Development and Management Programme (Sri Lanka)
- IT - Information Technology
- MALFIS - Malaysian Fisheries Information System
- MFIS - Management Fishery Information System (Indonesia)
- NACA - Network of Aquaculture Centres in Asia-Pacific (Thailand)

- NFIS - National Fishery Information System (Philippines)
- NTFS - Network of Tropical Fisheries Scientists (Philippines)
- PASFIS - Philippine Aquatic Sciences and Fisheries Information System
- SCORRAD - Standing Committee on Resource Research and Development (IPFC)
- SEAFDEC - Southeast Asian Fisheries Development Center (Thailand)
- SEAFDEC/  
AQD - SEAFDEC Aquaculture Department (Philippines)
- SEAFDEC/  
MFRD - SEAFDEC Marine Fisheries Research Department (Singapore)
- SEAFDEC/  
MFRDMD - SEAFDEC Marine Fishery Resources Development and Management Department (Malaysia)
- SEAFDEC/  
TD - SEAFDEC Training Department (Thailand)
- SEAFIS - Southeast Asian Fisheries Information System (Thailand)
- SEAPOL - South-East Asian Programme in Ocean Law, Policy and Management (Thailand)
- SIFR - Strategy for International Fisheries Research (Canada)
- THAIFIS - Thai Fisheries Information System
- UNCED - United Nations Conference on Environment and Development
- UNCLOS - United Nations Convention on the Law of the Sea
- WPPCC - Western Pacific Fisheries Consultative Committee (Philippines)



**REPORT OF THE  
REGIONAL WORKSHOP ON FISHERY  
INFORMATION AND STATISTICS IN ASIA**

**Bangkok, Thailand  
18-22 January 1994**

-----

**I. INTRODUCTION**

1. The Regional Workshop on Fishery Information and Statistics in Asia was convened by the SEAFDEC Secretariat in Bangkok, Thailand, from 18 to 22 January 1994, in collaboration with the ASEAN-EEC Aquaculture Development and Coordination Programme (AADCP), the Asia and Pacific Commission on Agricultural Statistics (APCAS), the Bay of Bengal Programme (BOBP), the FAO Fisheries Department, the FAO Regional Office for Asia and the Pacific (FAO/RAPA), the Mekong Committee, the Network of Aquaculture Centres in Asia-Pacific (NACA), and the Strategy for International Fisheries Research (SIFR).

2. The Workshop was attended by 45 participants from Australia, Bangladesh, Brunei Darussalam, Cambodia, the People's Republic of China, India, Indonesia, Japan, Laos, Malaysia, Maldives, Nepal, Pakistan, the Philippines, Sri Lanka, Taiwan, Thailand, and Viet Nam, as well as 40 representatives of AADCP, the Economic and Social Commission for Asia and the Pacific (ESCAP), FAO, FAO/RAPA, the International Center for Living Aquatic Resources Management (ICLARM), the Intergovernmental Organization for Marketing Information and Advisory Services for Fishery Products in the Asia and Pacific Region (INFOFISH), the Indo-Pacific Tuna Development and Management Programme (IPTP), the Mekong Committee, NACA, the South-East Asian Programme in Ocean Law, Policy and Management (SEAPOL), SIFR, the Western Pacific Fisheries Consultative Committee (WPFCC), and key officers of the Secretariat and the Departments of SEAFDEC, namely, Training Department (SEAFDEC/TD), Marine Fisheries Research Department (SEAFDEC/MFRD), Aquaculture Department (SEAFDEC/AQD) and Marine Fishery Resources Development and Management Department (SEAFDEC/MFRDMD). There were also observers from the private sector. The list of participants and observers appears as Annex 1.

3. The Deputy Secretary-General of SEAFDEC, Mr. Kazuo Inoue, welcomed the participants and observers to the Workshop. He recalled that the first regional workshop on fishery statistics was organized by SEAFDEC in 1976 with the aim of improving the method of collecting national and regional fishery statistics. He said that SEAFDEC continued to organize regional workshops every few years, and that, as a major output of such workshops, SEAFDEC had published the annual Fishery Statistical Bulletin for the South China Sea Area since 1977. He cited, however, that up to this time there are still problems which need to be tackled as far as standardizing and improving the method of collection of fishery statistics in the region, are concerned.

4. Mr. Inoue commended the participating governments for their interest in the Workshop and more particularly, he expressed appreciation to the Governments of China, Viet Nam, Cambodia and Laos for sending participants to the Workshop. He stressed that the participation of these countries would strengthen mutual cooperation among countries in the region, and expressed the hope that the Workshop would serve as a catalyst for the development and proper management of fisheries in the region.

5. In his opening remarks, the Secretary-General of SEAFDEC, Dr. Maitree Duangsawadi, outlined the importance and rationale of the Workshop. He said that the programs of SEAFDEC on fishery statistics and fishery information are aimed at improving the fishery data and information services in the region. In 1989 SEAFDEC had cooperated with FAO and IDRC in organizing the Seminar on Fishery and Aquaculture Information Systems in Southeast Asia. As a follow-up to the Seminar as well as the fishery statistics workshops which SEAFDEC had organized in the past, the Regional Workshop on Fishery Information and Statistics in Asia was convened in order to (a) review the current status of fishery information and statistics programs and services available to users in Asia, (b) discuss the requirements for improvements of the collection, compilation and dissemination of fishery and aquaculture statistics and information in the region, and (c) recommend ways and means for international cooperation and coordination in supporting and supplementing national efforts in information dissemination and exchanges.

6. On behalf of SEAFDEC, the Secretary-General expressed gratitude to the Government of Japan for its support of the Workshop. He went on to thank the participating countries for their interest in the Workshop, and the collaborating agencies for their technical assistance. He also thanked FAO for its assistance in organizing the Workshop. His opening remarks appear as Annex 2.

7. The Regional Fishery Officer of the FAO Regional Office for Asia and the Pacific, Dr. Veravat Hongskul, reiterated the importance of the Workshop in view of the UN Convention on the Law of the Sea (UNCLOS) which would come into force in November 1994, and the decisions of the UN Conference on Environment and Development (UNCED) under its Agenda 21. There was urgent need to improve the national capacity to collect, analyze, assess and use information and statistics for sustainable use of the resources, including environmental impacts of activities affecting the coastal and marine areas. He added that UNCED stressed the role of international cooperation and coordination in supporting and supplementing national efforts to promote an integrated management and sustainable development of coastal and marine areas. He stressed the need for countries in the region to extend their commitment in these efforts in order to achieve the objectives. He thanked the participating countries and collaborating agencies for their support and interest in the Workshop and expressed the hope that this Workshop would lead to the beginning of a new era of fishery information and statistics programs in Asia.

8. The Agenda and Timetable of the Workshop, as adopted, appears as Annex 3. The list of documents presented to the Workshop is given as Annex 4.

## II. FISHERY INFORMATION

### 2.1 Overview of Fishery Information and Services in Asia

9. The overview of fishery information programs and services was presented by Ms. Yong-Ja Cho, SIFR Consultant. The presentation highlighted the findings of the study based on the survey of and discussions with fishery information users and providers in Southeast Asia.

10. The survey result pointed out that management of the fisheries sector requires a variety of types of information, from biological data, extension packages, policy statements and regulations, scientific and technical literature, to social and economic data and indicators, and that the types of information needed are closely related to the job functions of the users.

11. The results also showed that there existed a number of fishery information sources and services, such as:

- a) International information system, e.g., AGRIS, ASFIS/ASFA

- b) Commercial products, e.g., BIOSIS, CABI, Fish and Fisheries Worldwide, Current Contents, Scisearch, Zoological Records
- c) International and regional bodies, e.g., FAO and FAO's various Commissions, IOC, INFOFISH, BOBP, NACA
- d) Information program of international and regional institutions, e.g., AIBA, ICLARM, SEAFDEC
- e) Professional societies and research networks, e.g. IAMSLIC, AFS, AGNA, NTFS
- f) Regional information systems
- g) National information systems.

12. In examining the utilization of existing international and regional information sources and services by the fishery information users and providers, the following observations were made:

- a) International information sources, covering science and technology (S & T) literature, are providing useful services to the research community
- b) Research information is relatively well organized, and the format, organization and presentation are generally suitable for researchers' use
- c) Research community has relatively good access to international information sources
- d) Researchers consider information gathering as part of their research activities, and have minimum difficulty in obtaining information
- e) Researchers are willing to spend time and effort in pursuit of information
- f) Main frustration of researchers is the time lag in obtaining original articles
- g) Publications of the fishery agencies and organizations, e.g., FAO, ICLARM, INFOFISH, SEAFDEC, NACA, are the important and frequently-used information sources

- h) Fishery information tends to be scattered by subjects or fields, and there seems to be no comprehensive source for mission- or client-oriented fishery information
- i) Fisheries sector suffers from lack of awareness of available information sources and services
- j) Wide gap exists in information products and services for users in the non-research community.

13. There were many reasons for the under-utilization of existing international fishery information sources and fishery information. These are related to the contents and coverage of information sources, language and professional barriers, and the way information is organized and presented. The users in the non-research community were particularly affected by the following factors:

- a) Information sources tend to cover S & T literature, i.e., mainly research outputs, that are discipline-oriented, rather than mission- or clients-oriented
- b) Most of international information sources are produced in the North
- c) Collection and organization of literature needed by developing countries are not the main objective of the international fishery information sources
- d) Research information or research outputs are packaged or presented for researchers' use
- e) Most research papers deal with highly specialized and narrow aspect of fisheries
- f) Research papers use scientific and technical terminology, and jargon
- g) Information in research papers is not presented in the context of the local resource management needs
- h) Information is disseminated through inappropriate medium of communication and presentation
- i) Trickle-down process, from research to utilization, takes too much time

- j) Little concerted efforts to bridge gaps between research, extension, planners and policy-makers, and information communities
- k) English, common language of the research community and international information sources, is not the working language of the majority of information users and providers
- l) Users in the non-research community are more of information receivers rather than information seekers. Abstracts or databases are not an effective information dissemination mechanism for information receivers.

14. The observations, more specific to the information communities in Southeast Asia, were:

- a) Information exists, but the users do not benefit because it is not synthesized and digested for the needs of the users, i.e., in the context of local problems and needs
- b) Many libraries and information centers struggle to do a good job of collecting and organizing information, but are not effective in disseminating and providing appropriate and relevant information
- c) Lack of awareness of available information sources and services limits the accessibility
- d) Information providers are aware of international sources and services, but not of gaps in utilization
- e) Fishery information programs in Southeast Asia tend to be either inactive, reactive and passive, rather than proactive and initiative
- f) Poor understanding of users' needs and lack of systematic analysis of information needs, infrastructure and resources, result in unfocused and uncoordinated information programs
- g) Lack of a strategy for developing and strengthening information resources and services both at national and regional levels

h) Support given to the information programs are inadequate to meet the needs, resulting in lack of sustainability

i) There is a gap in regional leadership.

15. Subsequently, the main issues and constraints that affect effective and efficient utilization of fishery information, were summarized as follows:

Issues/Constraints

a) Accessibility, availability and timeliness of services

- i) Poor local or institutional information resources and services
- ii) Unawareness of accessible information resources and services
- iii) Lack of qualified information staff
- iv) Lack of cooperation between information programs
- v) High cost of information and services
- vi) Language, bureaucratic, and professional barriers
- vii) Poor local communication and transportation infrastructure

b) Compatibility, reliability and currency of information

- i) Lack of cooperation between information programs
- ii) Lack of systematic methods and mechanisms for collection, organization, analysis, synthesis and dissemination
- iii) Lack of qualified information staff

c) Appropriateness, completeness, relevance, suitability, and utility

- i) Poor local information resources and services

- ii) Lack of knowledge and understanding of users and users' needs
  - iii) Lack of subject knowledge on the part of information staff
  - iv) Lack of digested, integrated and appropriately packaged information
  - v) Lack of locally appropriate information
  - vi) Lack of qualified information staff
  - vii) Language and professional barriers
- d) Sustainability
- i) Lack of support and commitment of senior managers and policy makers
  - ii) Lack of funds or financial resources
  - iii) Lack of leadership
- e) Qualification of information staff
- i) Lack of trained staff
  - ii) Lack of training opportunities
  - iii) Narrow view and definition of information program
  - iv) Low salary and status of positions of information staff

16. On the basis of the above observations, the actions required to improve the utilization of fishery information in Southeast Asia, were summarized as follows:

- a) To improve local or national information resources and services
- b) To digest, package and disseminate fishery technology in locally appropriate form
- c) To analyze and synthesize information in the context of national and local fishery resources management needs and issues



- d) To compile, produce and disseminate comprehensive directories and inventories on fisheries infrastructure
- e) To network and share information resources and skills
- f) To develop national and regional capabilities to facilitate information flow and utilization
- g) To ensure sustainability.

17. Finally, assuming that the decision makers at all levels (a) recognize that information is an essential input to the development plans and actions, and (b) are committed and willing to support the activities designed to facilitate and promote effective and efficient delivery and utilization of fishery information, it was recommended that regional and sub-regional information programs be formulated, along the following three themes:

- a) Development of national fishery information resources and services
- b) Analysis and synthesis of fishery resource management information
- c) Fishery technology transfer.

18. Noting that funds and development of skills and facilities should be linked to the activities that need to be carried out, the Consultant suggested that constraints related to funds, training, and facilities should be addressed within each of the suggested themes. Development of a strong regional leadership was also recommended in order to pull together and share the regional resources and efforts, and to formulate coordinated action plans ensuring common benefits and multiplier effects.

19. The report of the study on "Fisheries information needs in developing countries: issues, constraints and opportunities", which contain the above findings, will be published by SIFR in early 1994.

## 2.2 Current Status of Fishery Information Programs

### 2.2.1 National Information Programs

20. The country representatives outlined the status of fishery information in their respective countries, including (a) relevance and utility of information services by the fishery sector, (b) factors affecting use and non-use of fishery information, (c) priority information needs that are not met, and (d) difficulties in meeting the information needs of users.

21. The fishery information system in Brunei Darussalam was initiated by the establishment of the Information Unit in the Fisheries Department in August 1993. A study carried out in 1991 indicated that data and information are scattered among the various sections of the Department as well as in the various ministries. A population and housing census conducted in August 1991 by the Economic Planning Unit of the Ministry of Finance, provided useful information of the socio-economic characteristics of the fishery population. Studies indicated that in order to upgrade the dissemination of information services, suitable training is required for proper data collection and analysis. In addition, suitable computer programs or packages are also needed.

22. In the case of Cambodia, its fishery information program was completely phased out in 1975. It was only in 1985 that a small library was established at the Fisheries Department where several remaining books donated by surviving fishery staff are being stored. The collection has been improved through the years, mainly through donations from various sources, including FAO, ICLARM, and the Mekong Committee. However, dissemination of fishery information has not been carried out, as there are no libraries established at the provincial offices of the Fisheries Department. This made compilation of fishery information difficult to undertake. The participant from Cambodia was however, optimistic that, with his country's reactivated membership in IPFC and its recent membership in NACA, more active information-sharing with various organizations in the region could be initiated, especially as regards to aquaculture information.

23. The fishery information management in China is undertaken by both the government as well as the non-government sectors. The main users of the fishery information are the government officers for formulating policies, planning of fishery development programs, and in making micro-economic adjustments. The information is also highly utilized as reference in conducting research on fishery

economy and resource management. The data and information are being updated regularly in order to meet the requirements of the fishery enterprises and research agencies. However, the information services still could not match with the rapid development of the market economy and of the fishery industry. It was also observed that there is a need to make reforms within the fishery information system of the country in order to collect and compile appropriate and updated information.

24. For Indonesia, the establishment of a Management Fishery Information System (MFIS) in the Directorate-General of Fisheries was deemed essential in order to supplement INFIS by maintaining an updated, accurate, and reliable information for policy makers and program implementors. MFIS shall aim to (a) improve and develop statistical methodology and communication data collection, processing and dissemination, (b) improve and develop institutional capability through human resource development, and upgrading of statistical and information facilities, (c) design hardware necessary to operate the statistical and management information system, and (d) develop software for effective information system.

25. Fishery information in Malaysia takes the form of research results, investigation and survey outputs, and extension work recorded in documentation form, computer diskettes, tapes, microfilms. Information from research are classified by area such as biology, aquaculture, environment, water quality, pollution, resources and management, and these are obtained by various research institutions, government agencies as well universities and colleges throughout the country. The users of this information are (a) general public, fish farmers, fishermen, (b) non-academic users such as general investors and entrepreneurs, (c) academicians, and (d) researchers. The information required has always been updated. However, the users' requirements were not always met. In this regard, national and international organizations in charge of information services are urged to device a plan for speedy compilation, processing and reporting of information.

26. Fishery information in Nepal is being carried out by the Department of Agriculture Development, and is disseminated within the country through radio broadcasts, publications, and is also occasionally shown in television. However, the system is still not sufficient to meet the information needs of the users within the country. The establishment of an information unit headed by a national coordinator, in the Fisheries Development Division provided with adequate facilities and trained manpower, would improve the existing fishery information program of the country.

27. It was reported that the fishery information system in the Philippines is faced with several major difficulties, i.e., dispersion of data and information among many agencies, lack of integration of and access to research findings, lack of continuity in information handling methods, and lack of information processing facilities. Furthermore, much of information needs of the users can not be met because (a) information is presented in highly technical manner without appropriate synthesis and packaging, and (b) information sources available from many related agencies are not organized and known to the users. In order to improve the current situation, the National Fishery Information System (NFIS) is being established as part of the policy reforms underlying the country's Fisheries Sector Program. The objectives of NFIS are to (a) serve as a center for a well distributed-networked information system, and (b) collect, process and provide timely and accurate fishery information and data.

28. Due to the short notice given to them, participants from the South Asian countries were not able to present written country statements. However, the representatives of Bangladesh, India, Maldives, Pakistan, and Sri Lanka presented brief descriptions of the existing fishery information infrastructures of their countries, and stated that the needs, issues and constraints expressed by other countries can equally be applied to the South Asian countries.

#### 2.2.2 Regional Fishery Information Programs

29. The fishery information programs and services at the regional level were discussed by the representatives for the Mekong Committee, NACA and SEAFDEC.

30. The information services provided by the Mekong Committee are, by and large, in the form of technical advice mainly to the three Indo-Chinese countries as part of the fishery and freshwater aquaculture development program in the lower Mekong Basin.

31. The information program of NACA supports research and development activities as well as policy needs of NACA governments. Key elements that relate to a sustainable and relevant regional information program, were described, namely, (a) the scheme of having National Coordinators, (b) a sustained information exchange among governments through the publication and dissemination of reports of regional and national studies coordinated or participated in by NACA, (c) development of reviews on specific topics on aquaculture and

the environment, including exchange of staff, and (d) the planned development of a regional numeric database on aquaculture farm performance and the environment. NACA's information thrust is geared towards the support of its holistic regional program on aquaculture development and the environment.

32. The SEAFDEC information programs comprise general information services including publications, audio-visual programs and other information-based activities being carried out by the SEAFDEC Departments, as well as the Southeast Asian Fisheries Information System (SEAFIS) implemented by the SEAFDEC Secretariat since 1984, and the Brackishwater Aquaculture Information System (BRAIS) implemented by the SEAFDEC/AQD since 1984.

33. SEAFIS has assisted the establishment of national fishery information systems in Thailand (THAIFIS), in Indonesia (INFIS), in the Philippines (PASFIS), and in Malaysia (MALFIS). Although the activities of SEAFIS were scaled down since 1989 owing to budgetary constraints, publication of the *Regional Bibliography of Fisheries and Aquaculture in Southeast Asia* and the *Thai Fisheries Bibliography* continued. It now concentrates on bibliography production utilizing Mini-micro CDS/ISIS as a database program.

34. BRAIS, as a specialized information system for brackishwater fisheries and aquaculture, collaborated with aquaculture centers in Indonesia and Malaysia, and the Fishery Science Society of Thailand. The Philippine center for BRAIS is based at SEAFDEC/AQD. The services provided by BRAIS included access to SEAFDEC/AQD library collection, document delivery and photocopying, question-and-answer including written replies, database search, and referral services.

35. BRAIS continues to undertake information analysis and has enhanced databases, such as the "Filipiniana" database consisting of citations on Philippine fisheries and aquaculture which is being used as the source of the Philippine contribution for the SEAFIS publication, "Spec" database consisting of citations on selected species, serial holdings covers all types of serials received, and "Book" database comprising a collection of citations of monographs, general references, technical books, conference proceedings and pamphlets.

### 2.3 Compatibility and Complementarity of Fishery Information Programs

36. In order to assess the relevance and utility of national, regional and international information systems and services, and to study the compatibility and complementarity of the national fishery information systems, a study on the current fishery information services was conducted in the region by ICLARM on behalf of SIFR. The output of the study was included in the papers presented by the representatives for ICLARM to the Workshop.

37. In the first paper entitled "Non-statistical Information Sources for Fisheries in Asia," Mr. Jay Maclean, highlighted that there are some 27 international, regional and national major information sources for Asian fisheries workers, as well as some 200 institutions offering various forms of fishery information. However, there is much overlap between the databases being used, and it was therefore recommended that a merger of all databases that relate to the Indo-Pacific region into a single database, is necessary. He added that the resulting dataset should be further merged with ASFA along with records from two global databases, ie., CARIS and FIPIS of FAO, which offer information about research projects.

38. Mr. Maclean recommended steps to rationalize the Asian fishery information systems. Firstly, he suggested that, all Asian projects and bibliographic databases should be merged to form an "Asian database". Secondly, he encouraged that, the Asian database and all other relevant project information globally may be merged with ASFA. This would require re-allocation of inputting responsibilities in the ASFA network. However, until ASFA can provide cheap access, the Asian database should be made available separately. He also recommended the use of second generation database, such as the present "FishBase" and "ReefBase" which are being developed by ICLARM, FAO and collaborating agencies, for information on fishes and reefs.

39. The second paper entitled "Status of a Union Catalog of Fisheries Serial Holdings in Asia" was presented to the Workshop by Ms. Rosalinda Temprosa. The study was a collaborative effort between ICLARM and some participating libraries, which was aimed at developing a computerized "Union Catalog" of fisheries-related serial titles in Asia. The study identified the need for a common database of serial holdings of aquatic and fisheries science libraries and information centers in the Asian region, especially those which provide fishery information services.

40. The Union Catalog attempts to compare serial holdings from major sources within the region in order to be able to identify gaps in their collections. Specifically, the Union Catalog aims to (a) facilitate easy and quick access to serial sources available in the Asian region, and (b) promote resource sharing and active inter-library loans. The software used is "DataEase" (version 4.5), which is a "DataBase Management System."

41. The study further recommended that ICLARM manages and maintains the database. However, regional organizations such as SEAFDEC, FAO/RAPA, NACA and other interested organizations are encouraged to participate and continue working for the development of this project.

#### 2.4 Information Technology for Integrated Fishery Resource Management

42. The World Bank/SIFR Consultant, Mr. Jorgen R. Hansen, presented his report on the "Identification of Present and Future Information Technology (IT) Tools for Integrated Fisheries Resource Management," which was based on his study undertaken in Thailand, Malaysia, and the Philippines in late 1993. The main objective of the study was to inventory existing information management tools for collecting, organizing, processing, analyzing, presenting and disseminating fishery data and information, in support of fishery resource management.

43. The study identified the absence of sufficient common standards and organizational structures within the fishery community, as the most significant constraint in the development and implementation of an Integrated Fishery Resource Management (IFRM). Mr. Hansen opined that a commonly shared, formal and conceptual framework where all efforts, activities, documents, application relating to fisheries can be considered as meaningful constituents of one coherent whole, has not yet been established in the fisheries sector. He therefore encouraged the use of a reference model for IFRM which has been designed for the fishery community.

44. The Consultant finally recommended some priority actions for the development of IFRM in the region, which included the development of a "Systems Architecture for Integrated Fishery Resource Management" for the region. This requires all key personnel to be trained and acquainted with applied modelling technology. He recommended that organizations and structures within the fishery community in the region should identify and assign a coordinator to undertake and control the activities required for the development and implementation of IFRM. He also encouraged

technology transfer purposes, as in seven countries, and (d) lack of standard, information handling methods and tools, identified in seven countries.

49. Geographically, the major constraints identified by the participants from South Asia include lack of packaged information for fishery resource management, and lack of packaged information for extension and technology transfer purposes. Participants from the Indo-Chinese countries identified lack of trained information staff and expertise, poor national or local information handling methods and tools, as major constraints in fishery information.

50. Participants from Southeast Asia considered lack of trained information staff and expertise, and lack of standard information handling methods and tools, as major constraints in fishery information. These are followed by lack of timely information services, low priority given to information programs, lack of packaged information for extension and technology transfer purposes, and lack of packaged information for fishery resources management.

51. Specifically, the participants from China identified the following major constraints in their country's fishery information services: (a) lack of timely information services, (b) limited information processing facilities, (c) lack of trained information staff and expertise, and (d) unawareness of information programs and services.

52. The list of issues and constraints identified and prioritized by the participating countries, are summarized below:

Issues and Constraints	Countries
a) poor national or local information resources and services	Cambodia, Laos, Indonesia, Philippines, Maldives
b) lack of coordination and collaboration among related programs	Nepal, Philippines, Viet Nam
c) lack of standard information handling methods and tools	Malaysia, Bangladesh, Brunei, Indonesia, Maldives, Philippines, Pakistan
d) language barrier: Common language-English?	All countries with different degree of difficulty



- |    |  |   |
|----|--|---|
| e) | lack of timely information services  | China, Malaysia, Indonesia, Bangladesh, India, Brunei   |
| f) | limited information processing capabilities and facilities                       | China, Nepal, Bangladesh, Pakistan, Indonesia, Viet Nam, Cambodia, Maldives                                     |
| g) | lack of trained information staff and expertise                                  | China, Malaysia, Nepal, Cambodia Viet Nam, Thailand, Brunei, Pakistan, Philippines, Indonesia, Bangladesh, Laos |
| h) | lack of funds for information programs   | All countries   |
| i) | unawareness of information programs and services                                 | Philippines, China  |
| j) | ineffective regional cooperation   | Malaysia, Thailand  |
| k) | low priority given to information programs, i.e., lack of support and commitment | Malaysia, Bangladesh, Pakistan, Thailand, Cambodia, Philippines   |
| l) | poorly organized information   | Philippines   |
| m) | lack of packaged information for extension and technology transfer purposes      | Pakistan, Philippines, Indonesia, Malaysia, Bangladesh, Maldives, India   |
| n) | lack of packaged information for fishery resource management                     | India, Indonesia, Philippines, Sri Lanka, Malaysia, Pakistan, Maldives, Bangladesh                              |

53. In order to facilitate the formulation of action plans based on the issues and constraints identified by the participants, the participating countries were grouped into three sub-regional areas, namely: Indo-Chinese countries, which comprised Cambodia, Laos and Viet Nam; South Asian countries comprised Bangladesh, India, Pakistan, Sri Lanka, Maldives, and Nepal; and Southeast Asian countries comprised

Brunei Darussalam, Indonesia, Malaysia, Philippines and Thailand. The fourth group which comprised Australia, China, Japan and Taiwan served as the resource and reference group.

## 2.6 Proposed Action Plans for Fishery Information Programs in Asia

54. Representatives of the three sub-regional groups identified various actions which would best solve the constraints identified by them on fishery information. The Proposed Action Plans for Fishery Information Programs in Asia appears as Annex 5.

55. The Action Plan for Indo-China (Annex 5.1) stressed the need to formulate a national policy for strengthening the information systems to support national research and development and to establish national information centers and sub-centers to form the fishery information network. This system should link to the Asian regional system for exchanging of information. An international assistance is required to assist the Indo-Chinese countries to implement their fishery information programs.

56. The Action Plan for South Asia (Annex 5.2) addressed a mechanism required for improved collection and dissemination of fishery information in the sub-regional level, including the fishery resources survey system (FRSS), strengthening of existing information services, cooperation and coordination among agencies concerned at both national and regional levels, and assistance in training and upgrading manpower and facilities.

57. The Action Plan for Southeast Asia (Annex 5.3) identified priority actions and regional programs required to strengthen national and regional fishery information systems. Three major programs were proposed, i.e., reactivation of national fishery information centers, analysis and dissemination of fishery resource management information, and fishery technology transfer and extension. It was also suggested by the representatives that regional bodies, such as SEAFDEC and FAO/RAPA should take the leading role in coordinating, formulating and disseminating exchange of information in the region.

### III. FISHERY STATISTICS

#### 3.1 Outlook of Fishery Statistics in Southeast Asia

58. The outlook of fishery statistics in Southeast Asian countries was summarized by Mr. Kazuo Inoue, Deputy Secretary-General of SEAFDEC. He noted that, in most countries in the region, fishery censuses were undertaken by central statistical organizations at intervals of ten years. Malaysia, however, has not conducted a fishery census but collected its basic data through the country's population census.

59. In almost all countries considered, the national fishery departments are responsible for the collection of annual fishery statistics, except in the Philippines where the task was transferred from the Bureau of Fisheries and Aquatic Resources (BFAR) to the Bureau of Agricultural Statistics (BAS) since 1989.

60. Mr. Inoue also noted that the capabilities of the staff engaged in fishery statistics in the region had been strengthened through the establishment of fishery statistical sections within the national fisheries departments. Moreover, computerization of data has been implemented in many countries. Thailand was the first country to use computers for processing of fishery statistics but data processing is centralized in its Bangkok Office. In Malaysia, a computerized system of data processing had been introduced throughout the country. This made fast availability of fishery statistics at most six months after the end of the survey year. Indonesia has also started recently to use microcomputers for data processing.

61. However, Mr. Inoue pointed out that there are still various constraints encountered in the collection and compilation of fishery statistics in the region. He identified possible solutions and recommended measures to improve the reporting of fishery data. Specifically, he cited that the conduct of a periodic fishery census would improve the collection of data as the result would show the economic structure of a fishery at a specific time.

62. He noted that, in spite of the established guidelines provided to data collectors, some countries ceased to compile data on catch value or catch by fishing gear. Also, in the case where a fishing activity is a joint-venture among countries, there is always the possibility of double reporting and double counting of catches. For this, Mr. Inoue recommended that countries should strive to abide by the guidelines and, as much as possible, eliminate double reporting of data in joint-venture fishery.

63. Owing to the recent rapid development of aquaculture and fishery post-harvest technology in the region, Mr. Inoue encouraged the participating countries to include data on species cultured and production as well as the number of fish processing plants, cold storage and their production. He also urged the countries in the region to undertake economic surveys as results would facilitate the implementation of their coastal fishery management programs.

64. SEAFDEC has provided several classifications used in the compilation of data for the publication of the Statistical Bulletin. Countries in the region have also established national fishery statistical standards. However, the standards of some countries may have to be reviewed and improved in order to conform with the standards of the other countries as well as the classifications provided by SEAFDEC. It was also observed that there is a time lag in the publication of the national statistical yearbooks, making the data useless and redundant to planners and policy-makers. For this and for the other constraints related to data collection and compilation, Mr. Inoue finally suggested that a training course on fishery statistics including design and compilation of useful statistics as well as economic analysis of fisheries, should be offered to all statisticians and information staff in the region.

### 3.2 Current Status of Fishery Statistics in Asia

65. The country participants presented the current status of fishery statistics in their respective countries, including problems and constraints encountered in the collection and compilation of fishery data.

66. In the case of Australia, the collection of economic statistics for fishery management purposes, is being undertaken by the Australian Bureau of Agricultural and Resource Economics (ABARE), through economic surveys. These surveys are fishery-based using boat characteristics and fishing performance differences established from licensing and catch-effort log books. Results of the surveys are used to assess the success of fishery management programs, assess the impact of policy and other changes on the efficiency of the industry, and evaluate the impact of different management options on the fishing industry. Bio-economic models of fishery management are developed to bring together all the pertinent information affecting the fishery industry.

67. In Bangladesh, fishery statistics is collected through a Fishery Resources Survey System (FRSS) established by the Department of Fisheries. FRSS conducts survey and data collection programs, inventory or survey of different types of

water bodies and their areas, including fishermen, fishing crafts and gear used; and makes estimation of fish catch by species, gear and season, and types of water bodies. Some problems were, however, encountered in improving the collection of fishery statistics in Bangladesh, and these include, inter alia, shortage of manpower in data collection from the field, inadequate transport facilities for data collectors, insufficient budget allocation for the field level officers, shortage of manpower for data analysis in the head quarters, shortage of computer facilities, lengthy official procedures for the publication of the annual statistical report causing in the delay in releasing such report, and lack of coordination among the agencies and departments involved in fishery information collection activities.

68. The Fisheries Department of the Ministry of Industry and Primary Resources of Brunei Darussalam, is responsible for compiling all fishery statistics. Publications on statistics, such as the Brunei Statistical Yearbook and the External Trade Statistics, are however, produced by the Economic Planning Unit of the Ministry of Finance. The former publication includes information on fresh fish marketed by groups, quantity and value from local production and imports, and fishing gears licensed by type of gear and vessel. The external trade statistics includes information on seafood imports by commodity item and country of origin and are expressed in quantity and value. Also included is the information on seafood re-exports by commodity item and country of destination. The problems identified in the country's effort to improve fishery statistics were (a) lack of a systematic and organized training in statistics collection, (b) lack of interest and cooperation among fishing vessel owners and farm operators in providing information on production, expenses, prices and revenue of their operations, and (c) lack of suitable computer programs or package for processing raw data.

69. The absence of a statistics specialist may have led to the unavailability of an organized fishery statistics information in Cambodia. However, data collection is being continuously undertaken based on the declaration of licensed fishermen, fish farmers, fish processors, and fish exporters who are obliged to record their activities in log books provided by the provincial fisheries. The data are submitted monthly and annually to the central department of fisheries. As no fishery census has taken place in Cambodia since 1970, there is no adequate data processing activities in the country.

70. Fishery statistics program in China is undertaken by each level of the fishery administrative departments, from the Ministry of Agriculture of the central government to the local

provincial governments, autonomous regions, municipalities, counties, townships, and villages. The Fishery Statistics and Information Division of the Fisheries Department, Ministry of Agriculture, is responsible for the compilation of the national statistics and edits the Yearbook of Fishery Statistics of China based on the annual fishery statistics data collected from the local governments. Due to lack of computers and communication facilities, statistics data could not be made available for users immediately. Other problems identified were (a) shortage of basic data and systematic information network, (b) unstable statistics agencies and posts, (c) untrained statisticians, and (d) inadequate experience in market economic system on the part of the information staff.

71. The overall coordination for the collection, compilation and dissemination of fishery data in India is done by the Planning and Statistics Unit of the Fisheries Division in the Department of Agriculture and Cooperation, Ministry of Agriculture. The 25 states and seven union territories of the country have statistical units in their fisheries department which look after the collection of fishery statistics in their states or territories. The data compiled are sent to the Planning and Statistics Unit of the central government. A number of gaps were identified in the collection of fishery statistics in India, such as (a) inaccurate data on inland fishery resources and production, (b) unscientific way of processing and analyzing production data from deep sea fishing, (c) large time lag in reporting of fisheries data, (d) absence of a coordinated system of collection and compilation of fishery data, (d) inadequate computer facilities, and (e) inadequate trained manpower.

72. Indonesia is presently working towards the establishment of a statistical and management information system (MFIS) in the Directorate-General of Fisheries aimed at improving statistical methodology and communication data collection, processing and dissemination. Hopefully, the establishment of MFIS will solve the problems of the present fishery statistics system especially as regards to sampling as well as the publication of the fishery statistical yearbook.

73. Fishery census in Japan is being conducted every five years after 1949. It is aimed at clarifying the existing situation and variation of basic conditions concerning fishery production such as production structure and employment structure of fisheries, fishery-related facilities, and fishing area environment; and providing basic data for fishery administrative measures. However, the need to review the classification of type of fishing gear and species may be necessary in view of the changes in the fishing methods and fishery resources in the country.

74. In the case of Laos, an organized fishery statistics information is not yet available, indicating the need for a proper fishery statistical data collection system for the country. This constraint is a result of an acute dearth of funds and trained manpower in the country.

75. The main organization responsible for the collection, compilation, processing and reporting of fishery statistics in Malaysia is the Department of Fisheries Malaysia, Ministry of Agriculture. Trade data on fish and fishery products, on the other hand, are the responsibility of the Department of Statistics Malaysia. No census has been carried out for fisheries in Malaysia. However, population census, a major national census which is carried out once in 10 years, is conducted by the Department of Statistics. In the national population census, certain items pertaining to fisheries such as fishing population and fishery establishments are incorporated. These are extracted from the national census for planning purposes by the Department of Fisheries. Data projections are done to obtain reliable statistics for the intervening years between each national census. The major constraints included inadequate field and skilled staff, and lack of a unified system of collecting data.

76. Fisheries and catch-effort data collection, analysis and publication are the responsibility of the Economic Planning and Coordination Section of the Ministry of Fisheries and Agriculture in Maldives. The present system of analyzing fishery information is based on total enumeration, making use of conversion factors and extrapolation procedures which are believed to have contributed to the large source of errors in the statistical system. One major constraint in the collection of fishery statistics is the absence of a fishery census. Another constraint identified was the shortage of trained and experienced manpower.

77. In Nepal, the Central Bureau of Statistics has been responsible in the collection and compilation of fishery statistics since 1992. The methodology being adopted has not been disseminated properly, and there has been no proper channel in the districts to collect fishery statistics. There is no adequate communication facilities, not enough trained manpower, and funds is not adequate for collecting fishery data. All these hindered the flow of information and collection of fishery statistics, which is believed to be incomplete and may also be inaccurate.

78. The representative of Pakistan identified the problems in collecting and compiling fishery statistics in his country. These are (a) the absence of proper statistical data

collection system, (b) shortage of trained manpower for data processing and collection, (c) lack of computer facilities, and (d) inadequate budgetary allocation.

79. Fishery statistics in the Philippines are now being generated by the Bureau of Agricultural Statistics (BAS) while before 1988, these were done by the Bureau of Fisheries and Aquatic Resources (BFAR). Efforts of BAS to collect fishery statistics have been sustained through the country's National Fishery Information System Project (NFIS) which is funded through the country's Fisheries Sector Program (FSP). This arrangement led to a more timely and reliable statistics on commercial and municipal fishery as well as on aquaculture. However, FSP may not be able to sustain this activity for a longer period of time due to budgetary constraints and this could lead to a major problem on the part of BAS in the future.

80. In Sri Lanka, fishery statistics data are compiled by the Ministry of Fisheries and Aquatic Resources. Data includes fish production by sub-sector, exports of fish and fishery products, imports of fish and fishery products, local production, gross imports and total dry fish available for local consumption, and number of fishermen and source of income by province. Among the major constraints were (a) insufficient data processing facilities, (b) inadequate trained staff, and (c) inadequate funds.

81. Fishery census in Taiwan started in 1955 and has been repeated once every five years. This is part of the country's Agriculture, Forestry, Fishery and Husbandry Census. Processing and publication of fishery statistics data are done by the Taiwan Fisheries Bureau. Problems and constraints related to improving the collection of fishery statistics in Taiwan included the fact that (a) the FAO sea area and data definition could not be completely carried out, (b) fisheries categories have overlapping areas, (c) smuggled fish products can not be recorded, (d) over-sea landing data may be overlapping with local landing data, and (e) low educational level among the fishermen who seem to lack interest in the purpose and rationale of the fishery data collection.

82. Although the statistical system in Thailand is decentralized, the National Statistical Office plays a leading role in conducting censuses including marine fishery census, aimed at establishing a sound fishery statistics system. The fishery production surveys include marine fisheries production survey, fishing community survey, coastal culture survey, and particular survey. The passing of catches from one boat to another made it difficult for data collectors to record accurate information. It was also noted that skilled staff for field assignment are not adequate.



requested that participating countries should submit their data as early as possible in order to meet the urgent need of data by the users.

87. A suggestion was presented to the Workshop by the SEAFDEC/Marine Fisheries Research Department (SEAFDEC/MFRD), to amend the classification of fishery commodities in the Statistical Bulletin. The amendment was based on the results of a survey on fish products in Southeast Asia which SEAFDEC/MFRD conducted in 1985 and 1989. Specifically, the suggested amendments are as follows:

- a) Product categories should include "powdered/flaked" as this is now produced in Thailand as prawn dust and in Malaysia as fish floss
- b) Under Fish Processing, Dried/salted/smoked category should be changed to "Dried/smoked" since salting is a necessary part in processing
- c) Listing of fish products in the Sections on Disposition of Fish and Fish Processing should include "Cured and Comminuted Products," and that Comminuted should be reclassified into "Surimi and other Comminuted Products."

88. SEAFDEC/MFRD also proposed that FAO amends its classification data so that frozen surimi which is currently listed under the category "Frozen" be placed under the category "Comminuted" as frozen surimi is now widely used for the production of comminuted products.

89. SEAFDEC/MFRD further proposed that the definition of items listed under "Miscellaneous Category" be clarified, as cultured aquarium plants and seaweeds are utilized differently. Seaweeds, for example is important commercially for human food. Brown algae, on the other hand, is used either as human food, animal feed or as fertilizer. Specifically, it was also suggested that data on red seaweeds of Southeast Asia be recorded in a separate column to give emphasis on this product which is gaining popularity in the region.

90. During the discussion, the representatives for FAO agreed to endorse the amendment for the FAO guidelines as suggested by SEAFDEC/MFRD. However, due to time constraints, it might not be possible to incorporate the amendments immediately in the forthcoming issue of the FAO Yearbook of Fishery Statistics.

### 3.4 FAO Fishery Statistics Program

91. The representatives for FAO informed the Workshop on the fishery programs being carried out by FAO on catches and landing statistics, aquaculture statistics, fish and fishery products, as well as comments on the quality of catch and aquaculture statistics submitted to FAO by its member nations.

92. It was pointed out that the collection, analysis, interpretation and dissemination of information on nutrition, food and agriculture is embodied in the FAO Constitution. The Fishery Information, Data and Statistics Service (FIDI) of the FAO Fisheries Department is responsible for the above-mentioned functions. Information on catches and landings is collected annually from national offices concerned with fishery statistics. Other data on some aquatic products are obtained from trade associations or other specialized international organizations. Information on trade are derived from the national sources, either from published volumes of trade statistics or from other available databases provided to FAO.

93. At present, FAO makes use of two questionnaires, the FISHSTAT NS and STATLANT, for collecting statistics on fishing. FISHSTAT NS (National Summary) has five components, NS1 is for national totals of species by area of capture in tonnes, for the previous seven years; NS6 is similar to NS1 but this is for information on marine mammals; NS7 is for information on alligators; NS8 is for information on sponges, pearls and corals; and NS9 is for information on aquatic plants. On the other hand, STATLANT forms are for information on a more detailed basis, on the area where fish are caught and is operative only in those marine areas which are subdivided into small sub-areas. The STATLANT system has also been adopted to collect information on other aspects of fisheries including aquaculture.

94. The Workshop was informed that the catch statistics collated by FAO and published in the **FAO Yearbook of Fishery Statistics: Catches and Landings**, include aquaculture production, and thus represent total production from wild and farmed stocks in terms of weight. The quality of statistics was considered in terms of the need for FAO to make estimates of missing data or of data which FAO considers unreliable. The representative for FAO specified that, catch statistics reported to FAO, should ideally refer to individual species. However, in some situations this is not being done and data are reported for groups of species instead. In the case of broad groupings, the statistics would be difficult to validate.

requested that participating countries should submit their data as early as possible in order to meet the urgent need of data by the users.

87. A suggestion was presented to the Workshop by the SEAFDEC/Marine Fisheries Research Department (SEAFDEC/MFRD), to amend the classification of fishery commodities in the Statistical Bulletin. The amendment was based on the results of a survey on fish products in Southeast Asia which SEAFDEC/MFRD conducted in 1985 and 1989. Specifically, the suggested amendments are as follows:

- a) Product categories should include "powdered/flaked" as this is now produced in Thailand as prawn dust and in Malaysia as fish floss
- b) Under Fish Processing, Dried/salted/smoked category should be changed to "Dried/smoked" since salting is a necessary part in processing
- c) Listing of fish products in the Sections on Disposition of Fish and Fish Processing should include "Cured and Comminuted Products," and that Comminuted should be reclassified into "Surimi and other Comminuted Products."

88. SEAFDEC/MFRD also proposed that FAO amends its classification data so that frozen surimi which is currently listed under the category "Frozen" be placed under the category "Comminuted" as frozen surimi is now widely used for the production of comminuted products.

89. SEAFDEC/MFRD further proposed that the definition of items listed under "Miscellaneous Category" be clarified, as cultured aquarium plants and seaweeds are utilized differently. Seaweeds, for example is important commercially for human food. Brown algae, on the other hand, is used either as human food, animal feed or as fertilizer. Specifically, it was also suggested that data on red seaweeds of Southeast Asia be recorded in a separate column to give emphasis on this product which is gaining popularity in the region.

90. During the discussion, the representatives for FAO agreed to endorse the amendment for the FAO guidelines as suggested by SEAFDEC/MFRD. However, due to time constraints, it might not be possible to incorporate the amendments immediately in the forthcoming issue of the FAO Yearbook of Fishery Statistics.

### 3.4 FAO Fishery Statistics Program

91. The representatives for FAO informed the Workshop on the fishery programs being carried out by FAO on catches and landing statistics, aquaculture statistics, fish and fishery products, as well as comments on the quality of catch and aquaculture statistics submitted to FAO by its member nations.

92. It was pointed out that the collection, analysis, interpretation and dissemination of information on nutrition, food and agriculture is embodied in the FAO Constitution. The Fishery Information, Data and Statistics Service (FIDI) of the FAO Fisheries Department is responsible for the above-mentioned functions. Information on catches and landings is collected annually from national offices concerned with fishery statistics. Other data on some aquatic products are obtained from trade associations or other specialized international organizations. Information on trade are derived from the national sources, either from published volumes of trade statistics or from other available databases provided to FAO.

93. At present, FAO makes use of two questionnaires, the FISHSTAT NS and STATLANT, for collecting statistics on fishing. FISHSTAT NS (National Summary) has five components, NS1 is for national totals of species by area of capture in tonnes, for the previous seven years; NS6 is similar to NS1 but this is for information on marine mammals; NS7 is for information on alligators; NS8 is for information on sponges, pearls and corals; and NS9 is for information on aquatic plants. On the other hand, STATLANT forms are for information on a more detailed basis, on the area where fish are caught and is operative only in those marine areas which are subdivided into small sub-areas. The STATLANT system has also been adopted to collect information on other aspects of fisheries including aquaculture.

94. The Workshop was informed that the catch statistics collated by FAO and published in the **FAO Yearbook of Fishery Statistics: Catches and Landings**, include aquaculture production, and thus represent total production from wild and farmed stocks in terms of weight. The quality of statistics was considered in terms of the need for FAO to make estimates of missing data or of data which FAO considers unreliable. The representative for FAO specified that, catch statistics reported to FAO, should ideally refer to individual species. However, in some situations this is not being done and data are reported for groups of species instead. In the case of broad groupings, the statistics would be difficult to validate.

### 3.4 FAO Fishery Statistics Program

91. The representatives for FAO informed the Workshop on the fishery programs being carried out by FAO on catches and landing statistics, aquaculture statistics, fish and fishery products, as well as comments on the quality of catch and aquaculture statistics submitted to FAO by its member nations.

92. It was pointed out that the collection, analysis, interpretation and dissemination of information on nutrition, food and agriculture is embodied in the FAO Constitution. The Fishery Information, Data and Statistics Service (FIDI) of the FAO Fisheries Department is responsible for the above-mentioned functions. Information on catches and landings is collected annually from national offices concerned with fishery statistics. Other data on some aquatic products are obtained from trade associations or other specialized international organizations. Information on trade are derived from the national sources, either from published volumes of trade statistics or from other available databases provided to FAO.

93. At present, FAO makes use of two questionnaires, the FISHSTAT NS and STATLANT, for collecting statistics on fishing. FISHSTAT NS (National Summary) has five components, NS1 is for national totals of species by area of capture in tonnes, for the previous seven years; NS6 is similar to NS1 but this is for information on marine mammals; NS7 is for information on alligators; NS8 is for information on sponges, pearls and corals; and NS9 is for information on aquatic plants. On the other hand, STATLANT forms are for information on a more detailed basis, on the area where fish are caught and is operative only in those marine areas which are subdivided into small sub-areas. The STATLANT system has also been adopted to collect information on other aspects of fisheries including aquaculture.

94. The Workshop was informed that the catch statistics collated by FAO and published in the FAO Yearbook of Fishery Statistics: Catches and Landings, include aquaculture production, and thus represent total production from wild and farmed stocks in terms of weight. The quality of statistics was considered in terms of the need for FAO to make estimates of missing data or of data which FAO considers unreliable. The representative for FAO specified that, catch statistics reported to FAO, should ideally refer to individual species. However, in some situations this is not being done and data are reported for groups of species instead. In the case of broad groupings, the statistics would be difficult to validate.

95. The representative for FAO also pointed out the very common cases related to the quality of catch and aquaculture statistics submitted to FAO. He observed that catch statistics for Asian and Pacific countries, in terms of quantities caught, are reasonably well reported in comparison with the world average. However, he specified that catch quantity statistics could still be improved by upgrading the collection systems employed by some countries including Viet Nam, Malaysia, and other Asian countries. Reports from these countries are either incomplete or considered unreliable by FAO.

96. He added that aquaculture production statistics for Asian and Pacific countries, in terms of quantity and value, are also reasonably well reported. However, in terms of value, large estimates were made for statistics reported by countries like China, India, and Viet Nam. He contended that, if statistics for the top 10 countries could be based on reported data, the estimated component of the value of aquaculture for the Asian and Pacific countries would be reduced by 99%.

97. He summarized the most serious problems observed in the fishery statistics reported to FAO by countries in Asia and the Pacific, and opined that there is lack of detailed breakdown of data concerning the species composition of the catches. He therefore encouraged national reporting offices to provide more specific data on the catches. He suggested one solution to the problems which is improving the data collection schemes through the introduction and maintenance of efficient sampling programs.

### 3.5 Catch-effort Statistics

98. A proposal was presented to the Workshop, by the SEAFDEC Marine Fishery Resources Development and Management Department (SEAFDEC/MFRDMD), to revise the format of the Catch-effort Statistics for the South China Sea Area, which is being published presently by SEAFDEC/TD. Specifically, the revision includes the compilation of three categories of catch-effort statistics, namely: Annual Catch-effort Statistics, Monthly Catch-effort Statistics, and Specific Data on Catch-effort.

99. It was pointed out that the catch-effort statistics will continue to be compiled from the returns submitted by respondent countries through questionnaires, this time to be provided by SEAFDEC/MFRDMD. The revised bulletin shall therefore, include classification by fishing gears, fishing

boats (according to tonnage) and major species or species groups. The effort units shall include number of fishing units, number of trips, number of days, number of hauls, number of hours fishing, and number of hooks. Species classification and coding will be amended to conform with the classification adopted and endorsed during the Seventh Regional Workshop on Fishery Statistics in 1989.

100. On the other hand, the representative for IPTP proposed that the hook-and-line category should be further categorized separately into pole-and-line and long-line. He also suggested that the swordfish and sailfish statistics should be separated.

101. During the discussion, the Chairman of the session, Dr. Shigeo Hayase, observed that the revised format will essentially provide additional catch-effort data by months and breakdown by a slightly larger number of major fishing gear as well as minor ones, and that the improved data would benefit the assessment of fish stocks.

102. An example of a published catch-effort statistics, the "Catch-effort Statistics for the Japanese Squid Drift Net Fishery in the North Pacific in 1991," by the Fisheries Agency of Japan, was presented for the information of the Workshop.

103. The publication indicated that the catch-effort statistics for the squid drift net fishery were observed through a log book system which the fishing skippers are required to fill in the details of their fishing activities. The log books are then submitted to the Fisheries Agency of Japan for processing, compilation, and analysis, as soon as the vessels return to port. The statistics data collected includes catch-effort as well as fishing areas.

### 3.6 Tuna Fishery Statistics

104. A paper on the "Current Status of the IPTP Database" was presented by J.D. Ardill, Programme Coordinator of the Indo-Pacific Tuna Management and Development Programme (IPTP). The Workshop was informed that IPTP maintains substantial databases related to tuna fisheries and resources in the region. IPTP presently implements five major databases incorporating data related to nominal catches, fishing boats, catch and effort, length-frequency, and trans-shipment statistics.

105. IPTP had mainly been concerned with the timeliness of the data supplied by the participating countries. However a number of problems have been identified which need to be addressed in order to improve the tuna fishery statistics compilation. These include problems associated with nominal

catches, time frame, species breakdown by fishing gear categories, non-reporting as a result of trans-shipment, re-delineation of FAO's statistical areas, fishing boat statistics, catch-effort statistics, and data set associated with length-frequency statistics undertaken by participating countries.

106. The Workshop was also informed that, with the establishment of the Indian Ocean Tuna Commission (IOTC), the activities currently undertaken by IPTP will be taken over by IOTC. However, these activities are associated with FAO Statistical Areas 51 and 57 exclusively, and during the Twenty-fourth Session of the Indo-Pacific Fishery Commission held in Bangkok, Thailand from 23 November to 4 December 1994, it was recommended that IPTP should transfer its responsibilities on the collection of tuna statistics for the Southeast Asian region to SEAFDEC.

107. In the ensuing discussion, the representative for FAO suggested that the quality of the IPTP data sets may be counter-checked against the export/import data of the countries concerned. He also cautioned against the disruption of the existing systems already in place when the re-alignment of data collection according to the new FAO Statistical Area boundaries will be undertaken by the countries concerned. However, he agreed that there is a need for such an exercise to be implemented.

108. The participant from Japan informed the Workshop that it would be difficult to convert tuna export/import data into whole fish wet weights for counter-checking tuna catch statistics. He mentioned that Japan is currently using a log book system for reporting tuna statistics and this has proved effective.

109. The representative for IPTP noted that the data supplied by Japan has been accurate although there is still a problem on timeliness in the date of reporting. He suggested that this problem can be addressed by utilizing real-time reporting through the use of satellite communication system.

110. In response, the participant from Japan informed the Workshop that although the use of satellite system for data collection is very useful, the system of recording still needs improvement.

111. Specifically on squid fishery in Japan, the real-time location and actual fishing effort could not be accurately recorded. However, the volume of catch could be obtained from the skippers. The representative for IPTP



therefore, supported the fact that catch data recorded by skippers were found to be more accurate than the trans-shipment data.

112. On the other hand, it was also observed that data from the log book system were not significant from the data from the satellite system. However, landing data would still be necessary for cross-checking the data reported by the log book or satellite system.

113. The Workshop was informed by the representative for WPFCC regarding training and research in tuna fisheries which WPFCC undertakes. He also informed the Workshop that WPFCC will organize the second Tuna Research Workshop in August 1994 and that interested countries in Asia would be invited to send their participants to this workshop.

### 3.7 Socio-economic Statistics

114. The Workshop was invited to take note of the increasing requirements for fishery socio-economic studies. Information papers on bio-economic analysis of fisheries and the data requirements for basic bio-economics, which were presented at the recent Seventh Session of the IPFC Standing Committee on Resources Research and Development (SCORRAD), were given for the information of the Workshop.

115. Two papers on fishery socio-economic studies, undertaken at the national level, were also presented, namely: "Cost and Earning Statistics on Shrimp Culture in Thailand," and the "Socio-economic Status of Small-scale Fisherfolk Communities in Sri Lanka."

116. The methodologies used in the surveys in Thailand and Sri Lanka were highlighted and the results and findings of the surveys summarized. The importance of socio-economic statistics for the management and sustainable development of fisheries was stressed. These statistics included the same kind of data obtained from the two surveys in Sri Lanka and Thailand and other economic statistics related to fishery development and the economic and social well-being of fishermen and their families.

117. The delegate from Australia reported that, economic statistics had already been incorporated into the fishery management programs in Australia and that these statistics were used systematically to assess the success of fishery management programs, to identify the likely impact of alternative management programs, and to assess the impact of external factors on the fishing industry.

118. The Workshop however, noted the difficulties that fishery administration encountered in convincing their industries on the need for effective fishery management, and emphasized that socio-economic statistics and analyses have a very significant role in implementing improved fishery management methods.

119. The Workshop also noted that a large scope of socio-economic statistics was required for fishery management, and recognized the fact that data could be derived from different surveys or sources. In addition to specific survey covering the fisheries sub-sector, general socio-economic or household surveys could produce useful information regarding households involved in fisheries. It was pointed out that these latter surveys were conducted by national statistical offices and that it would be useful for fisheries departments to tap the results of these surveys and for them to collaborate in the planning of the surveys.

120. Results of the survey in Thailand showed marked differences between intensive and semi-intensive shrimp farming. The Workshop stressed the importance of taking into account different types of fisheries or aquaculture in designing the surveys. Some types of fisheries could be covered through complete enumeration as in the case of large-scale, as what was employed in the fishery economic surveys of Japan.

121. The survey in Thailand covered only one crop at a specific time. The Workshop therefore, stressed that it would be advantageous for socio-economic surveys to be repeated in order to assess the changes over time and the long-term economic impacts on the industry. These surveys would also be useful for environment accounting, although the methodology for the latter is still being developed at international level.

122. As regards the survey on small-scale fisheries in Sri Lanka, the Workshop noted that unemployment was very high among female members of the surveyed population. Countries were, therefore, urged to make an effort to dis-aggregate data on employment and other social information, by sex, in order to have a better presentation of the economic data.

123. Noting the increasing importance of economic data for efficient fishery management, the Workshop encouraged countries to collect economic data and to make more analytical studies. It was noted that countries which had established licensing system for their fisheries, collected data on fishing vessel specifications from the license forms. The capital investment of the fleets by category is also determined from the forms. In this connection, the attention

of the Workshop was directed to the importance of assessing the costs involved in production as well as comparisons in economic performance between gear types. It also concurred that member governments of FAO should consider the collection and publication, whenever feasible, of data on catch value at landing place of world catches.

### 3.8 Aquaculture Statistics

124. The Chairman of the session, Mr. Michael B. New, emphasized that reliable statistics on aquaculture production has become increasingly important with the growth and increasing prominence of aquaculture in the region. In order to obtain reliable and comparable data, a clear definition of aquaculture is necessary for statistical purposes and with the end view of providing useful information for resource management. The papers on "Aquaculture Statistics: Status and Problems" by Messrs. Imre Csavas and Michael B. New, and on the "Quality of Catch and Aquaculture Statistics Submitted to FAO" by the Fisheries Statistics Unit of the Fishery Information, Data and Statistics Service of the FAO Fisheries Department, were presented for the information of the Workshop. Discussions were therefore made on issues related to (a) the understanding and interpretation of the definition which FAO has reformulated, (b) the problems arising from the varying interpretations of the definition, and (c) the ways to improve the questionnaire which FAO developed and which is now being used for data collection by the national centers.

125. The participants made some observations on the definition of aquaculture as well as other factors affecting the collection and compilation of aquaculture statistics. It was noted that some countries report data previously recorded as "inland capture fisheries production" now as "aquaculture production." This would falsely reduce inland fisheries catch if aquaculture data were deducted from the total catch. "Capture fisheries production" data should not be included in "aquaculture production statistics" as an attempt to establish the national importance of aquaculture or indicate the dynamism of its expansion, as this would result in incorrect conclusions.

126. Some countries regard fish harvested as a result of restocking as owned (hence, product of aquaculture), others do not, and record its production under capture fisheries, resulting in incomparable data from different countries. The incorrect application of the ownership concept may exclude the result of all stock enhancement and ranching activities from aquaculture statistics, which is not acceptable to those involved in salmon ranching activities which belong clearly to aquaculture.

127. Some countries report aquaculture production of species that are not included in the total catch data, making it unclear whether these species have been inaccurately identified in the total catch data (i.e., "carps" are included in "freshwater fishes") or simply omitted. When species are both captured and farmed, such inconsistencies would lead to strange results, such as "zero" or "negative" capture fisheries production when aquaculture production data are subtracted from the totals.

128. Some countries may omit aquaculture production data from the total catch and this could result in falsely low figures for capture (especially inland) fisheries data if aquaculture data is subtracted from total catch data.

129. In the returns on aquaculture production, it has been observed that some species are placed in categories (freshwater, brackishwater and marine) that are different from those of the total catch returns. This could also give incorrect capture fisheries figures when aquaculture data are subtracted from total catch data.

130. In several countries, total catch and aquaculture data originate from different national authorities and this could result in double counting or omission of some data.

131. The currently used categories of non-freshwater aquaculture (brackishwater and marine) could also cause some confusion as FAO's definitions could be different from the national ones. This would entail more work for the reporting organization because statistics have to be prepared twice, one for the national government and another for FAO.

132. The representative for FAO informed the Workshop that it would be more useful and more reliable for resource management purposes to obtain and report statistics on "capture fisheries production" separately from "aquaculture production." She added that efforts are now being made to dis-aggregate past years' data by species in order to obtain a consistent time series. Work on marine shrimps and salmon has already been completed and the results will be published soon. However, she also said that work on the freshwater species would be more difficult.

133. Many participants considered various cases which could result in incorrect recording of data, such as (a) unclear distinction of the concept of common property resource as in the "quota system" in marine fisheries, (b) unclear distinction between stock enhancement and aquaculture with respect to the ownership of stock, (c) definition of stock trapped in privately-owned bodies of water after the flood-waters recede, (d) when to classify fish harvested from sea

ranching activity as "captured" or "product of aquaculture," and (e) how to classify fish that are captured, kept in an enclosure for a few days with feeding, and sold again to consumers or for further rearing by other farmers. In fact, a clarification was sought on whether the latter case would be considered "conditioning" or "aquaculture."

134. During the discussions, it was argued that keeping fish for only a brief period before it is disposed either for further culture or direct consumption, may be more related to fattening or conditioning rather than aquaculture, in spite of the fact that this procedure meets the conditions of the definition of aquaculture from the point of view of ownership and human intervention.

135. The participants concurred that the aforementioned problems caused difficulties in completing the questionnaires. They also pointed out some inherent shortcomings in the questionnaires, such as ambiguity and insufficient instructions, especially the word "others". They were not sure whether this refers to other species cultured or other culture systems.

136. The participants mentioned that aquaculture data which have only been recently separated from total inland fishery data in the national statistics, were mostly best estimates only. However, they gave the assurance that appropriate improved reporting will be done subsequently.

137. The present practice of some participating countries to report all "carps" under "cyprinidae" was explained. Various carp species are being cultured in a composite system and harvested together. In order to solve this problem, it was therefore suggested that, in view of the difference in the value of the species, carp data should be reported in terms of quantity and value by species.

138. On the issue concerning data on cultured ornamental fishes, whether to consider this as aquaculture production, and whether such data should be reported by weight or by number of fish, it was contended that although systematic collection of data on ornamental fishes would be difficult using standard methods, available data may be reported in terms of numbers and/or values. The representative of FAO insisted that mass-produced ornamental fishes should be included in the report, as these are within the current FAO definition of aquaculture.

139. The Workshop also noted other problems and situations which were particular to some participating countries, such as (a) the difficulty in the distinction between mono- and polyculture, (b) difficulty in collecting

data when the industry became privatized, (c) unreliability of customs data as a result of unmonitored cross-border trading in fish, (d) differences in the national system from the FAO statistical system, (e) differences in units of measures used, and (f) having to start the statistical activity after several years of interruption.

140. On the other hand, the timely availability of statistical data to the various users was emphasized during the Workshop. In this regard, a computerized aquaculture database developed by FAO, known as AQUASTAT-PC, was explained and demonstrated. The program could cover a wide range of meaningful analysis and presentation of data.

### 3.9 Fishery Trade Statistics

141. The representative for INFOFISH informed the Workshop on the activities of INFOFISH. Noting that several countries in the region provide fish trade data related to exports and imports to INFOFISH on a monthly basis, the Workshop recommended that other countries also consider the provision of such data as soon as it is compiled. INFOFISH in turn, should provide such data to the governments concerned, as and when requested, on a reciprocal basis.

142. The Workshop recognized the role being played by INFOFISH in the collection, compilation and dissemination of fish marketing data. In this connection, INFOFISH encouraged countries concerned to make full use of the INFOFISH data in their fish trade-related information needs.

## IV. RECOMMENDATIONS

### 4.1 Recommendations on Fishery Information Programs

143. The Workshop discussed the actions required to improve fishery information programs at national, regional and international levels, based on the proposed action plans formulated by the sub-regional working groups (Annex 5).

144. In addition to the proposed action plans, the Workshop unanimously adopted the following recommendations for the improvement of the fishery information programs in Asia:

1. In order to strengthen the fishery information systems in Asia to serve more effectively the needs of users within and outside the region, the Workshop recommended the following actions for consideration by the participating governments and international organizations/agencies concerned:

- 1.1 Actions recommended to be taken at the national level:
  - a) To establish or strengthen the national fishery information system with a definite national program
  - b) To encourage exchange of fishery information among the national agencies through a national fishery network
  - c) To improve national efforts for an effective national fishery system through adequate financial and manpower support, facilities and regular training of staff
  - d) To establish an effective system of compilation, dissemination and information exchange and distribution.
- 1.2 Actions recommended to be taken at the regional level:
  - a) To establish or strengthen the effective sub-regional and regional fishery information systems in close collaboration with the national fishery information programs of the participating countries
  - b) To coordinate and provide training on information technology and management for national information staff
  - c) To develop appropriate information tools and methods
  - d) To promote and facilitate regional cooperation and collaboration in exchange and management of fishery information
  - e) To conduct a regular review on the progress, problems and constraints on information programs in the region.
- 1.3 Actions recommended to be taken at international level:
  - a) To support and supplement national efforts in developing and/or strengthening their national information capability

## (1) National Level

Country	Recommendations
Australia	
Bangladesh	Existing fishery resources survey system (which is responsible for fishery statistics) in the Department of Fisheries should be strengthened  Frame survey should be conducted
Brunei Darussalam	Suitable training of staff should be conducted for proper data collection and analysis
Cambodia	Fishery census should be carried out as soon as possible  Staff should be trained to improve the statistical system  Computer facilities should be provided for data processing  International assistance is required to implement the aforementioned recommendations
People's Republic of China	Under the changing conditions, from planning economy to market economy, the administrative structure of agencies should be improved so that statistical agents and posts can be lawfully established at each level of the Department of Fisheries  Statisticians should be properly trained
	Fishery information cooperation should be expanded internationally
India	Assistance for computer facilities is needed, for software as well as hardware, in order to develop the statistical network



- Indonesia A management fishery statistics and information system should be established in the Directorate-General of Fisheries or the whole nation
- Japan
- Laos A management fishery statistics and information system should be established
- Malaysia A complete networking and computerization of data processing and analysis should be developed
- Maldives The whole statistical system should be reviewed
- Fishery census should be conducted
- Senior and junior staff should be trained
- Assistance from international organizations is required for the above-mentioned recommendations
- Nepal Statistical units must be stationed in the districts in order to collect various data of the districts
- A National Coordinator for information and statistics should be appointed in each country in Asia
- Technical cooperation should be promoted among the Asian Countries
- A data collection system should be developed
- Pakistan A proper fisheries data collection system should be established

## Philippines

Adequate budget should be provided in order to improve the fishery statistical system

A system should be developed on the generation of catch-effort statistics

Staff should be trained

The existing statistical system should be reviewed

A more sustainable data collection system should be developed

## Sri Lanka

Computerization of fishery data processing analysis with suitable computer facilities such as hardware and software, should be carried out

Training in computer data processing should be implemented

Training facilities already available for fishery statistical staff, should be strengthened

## Thailand

Training course on the use of computer-on-line system for data processing at central and provincial levels should be conducted

Regional training course on the analysis of catch statistics should be conducted so that the analysis part can be included in the statistics yearbook of each country

## Taiwan

Review process should be undertaken constantly by fishery statistics authority to ensure international standards

Bilateral cooperation should be established as soon as possible

Viet Nam

The system of data collection and validation should be improved and modernized

A centralized computerized information system should be established

Masters and owners of all motorized fishing boats should be enforced to make notebook or log book recording of their fishing activities

Training of technical staff, provision of micro-computers and software technology at all levels, should be carried out

Necessary training and organization of appropriate data analysis and communication systems should be implemented

Cooperation and coordination with countries and organizations at regional and international levels should be established

## (2) Regional and International Levels

2.1 FAO in cooperation with SEAFDEC should work on the standardization of the classification used for collating fishery products, production and fish trade statistics for the region

2.2 In order to fully utilize the potentials of computerization, the current wide diversity of computer hardware and software used by the national agencies should be made compatible.

Moreover, compatible standard procedures and formats should be developed for reporting fishery statistical data at regional level using electronic and magnetic media. FAO/RAPA should organize such a work in cooperation with SEAFDEC.

2.3 Participating countries should strive to submit complete and accurate data, and to make use of the database package developed by FAO and SEAFDEC for faster reporting of data.

(3) **Catch-effort Statistics**

- 3.1 The format of the **Catch-effort Statistics for the South China Sea Area**, should be amended as proposed by SEAPDEC/MFRDMD. The revised format will include three categories of catch-effort statistics, namely: Annual Catch-effort Statistics, Monthly Catch-effort Statistics, and Specific Data on Catch-effort.

(4) **Fishery Statistical Bulletin for the South China Sea Area**

- 4.1 The classification of fishery commodities on disposition of catch, fish processing and exports by fishing commodity should be revised as proposed by SEAPDEC/MFRD and supported by FAO.

(5) **Socio-economic Statistics**

- 5.1 Noting the increasing importance of economic data for efficient fishery management, the Workshop encouraged countries to collect them and to make more appropriate analytical studies.
- 5.2 The fisheries departments should collaborate closely with national agencies in conducting socio-economic surveys on fisheries.
- 5.3 Different types of fisheries/aquaculture should be taken into account in the design of socio-economic surveys.
- 5.4 Countries were urged to make efforts to disaggregate data on employment and other social information, by sex, in their surveys.
- 5.5 Participating countries and FAO should consider the collection and publication, as soon as feasible, of data on catch value at the landing place.

(6) **Aquaculture Statistics**

- 6.1 For resource management purposes, it would be more useful and more reliable to obtain and report separate statistics on capture fisheries and aquaculture production, rather than subtracting aquaculture data from total catch to obtain capture production figure. Until this change can be made

and for greater clarity, the current FAO yearbook should be labelled as "Fishery Production Statistics Including Aquaculture", rather than "Catches and Landings".

- 6.2 On the criteria on units of measure for aquaculture facilities, it was recommended that "hectares" should be used for ponds and pens while "cubic meters" for cages.
- 6.3 Many participating countries endorsed the proposed amalgamation of "brackishwater" and "marine" aquaculture to "coastal aquaculture" to avoid confusion and simplify statistical work.
- 6.4 Participating countries should make greater efforts to specify returns of aquaculture production by species and not to aggregate them into simple groups like "natantian decapods" or "cyprinidae", as the case may be.
- 6.5 The instructions for completion of the FAO questionnaire should be improved by giving more guidance on the designation of type of fisheries, on type of production by environment, and to explain that "cultured ornamental fish" should be reported as "aquaculture," where feasible.

147. The Workshop adopted the summary of recommendations on fishery information programs in Asia as well as the summary of recommendations on fishery statistics in Asia, on 22 January 1994.

## V. CONCLUSION

148. In his closing statement, the Deputy Secretary-General of SEAFDEC, Mr. Kazuo Inoue, thanked the participants for the active role they played for the success of the Workshop. He encouraged the participants to work more actively in improving their national fishery statistics after they return to their countries.

149. The Regional Fishery Officer of FAO/RAPA, Dr. Veravat Hongskul, thanked SEAFDEC and the other collaborating organizations, for organizing the Workshop and assured the participants that FAO/RAPA will assist the participating countries in seeking the assistance of donor agencies and other international organizations for the effective implementation of the recommendations adopted at the Workshop.

150. The Secretary-General of SEAPDEC, Dr. Maitree Duangsawasdi, encouraged the participating countries to continue promoting the mutual cooperation and collaboration they had established in order that the fishery information and statistics systems in Asia will be improved. He assured the participants that a follow-up workshop will be organized in order to assess the implementation of the recommendations adopted during the Workshop. He thanked the participants for their active participation and wished them success in their fishery information and statistics efforts.

## ANNEX 1

## LIST OF PARTICIPANTS AND OBSERVERS

## AUSTRALIA

Mr. Perry Smith  
Principal Research Officer  
Fisheries Economics Section  
Australian Bureau of Agriculture  
and Resource Economics  
G.P.O. Box 1563, Canberra ACT 2601  
Australia  
Tel: (61-62) 272-2024  
Fax: (61-62) 272-2318

## BANGLADESH

Mr. Mosharraf Ullah  
Deputy Secretary  
Ministry of Fisheries and Livestock  
Dhaka, Bangladesh  
Tel: (880-2) 242-225

Mr. Md. Mokammel  
Hossain  
Principal Scientific Officer  
Department of Fisheries  
Room 609, 6th Floor  
Matshya Bhaban, Ramna  
Dhaka, Bangladesh  
Tel: (880-2) 234-992

## BRUNEI DARUSSALAM

Ms. Ranimah Haji  
A. Wahab  
Fisheries Officer  
Department of Fisheries  
Ministry of Industry and  
Primary Resources  
P.O. Box 2161  
Bandar Seri Begawan 1921  
Brunei Darussalam  
Tel: (673-2) 42-067, 42-068  
Fax: (673-2) 42-069

Mr. Idris Haji  
Abdul Hamid

Assistant Fisheries Officer  
Department of Fisheries  
Ministry of Industry and  
Primary Resources  
P.O. Box 2161  
Bandar Seri Begawan 1921  
Brunei Darussalam  
Tel: (673-2) 42-067, 42-068  
Fax: (673-2) 42-069

**CAMBODIA**

Mr. Touch Seang  
Tana

Fisheries Adviser  
Department of Fisheries  
Ministry of Agriculture, Forestry  
and Fisheries  
186 Bd. Norodom  
Phnom Penh, Cambodia  
Tel: (855-15) 912-638  
Fax: (855-23) 60-127

Mr. Ly Sina

Fisheries Officer  
Department of Fisheries  
Ministry of Agriculture, Forestry  
and Fisheries  
186 Bd. Norodom  
Phnom Penh, Cambodia  
Tel: (855-15) 912-638  
Fax: (855-23) 60-127

**CHINA**

Mr. Zhang Yanhua

Program Officer  
Department of International  
Cooperation  
Ministry of Agriculture  
11 Nongzhanguan Nanli  
Beijing 100026  
People's Republic of China  
Tel: (86-1) 500-4390  
Fax: (86-1) 500-2448



Mr. Chen Yide

Division Chief  
Fishery Information and Statistics  
Fisheries Department  
Bureau of Aquatic Products  
Ministry of Agriculture  
11 Nongzhanguan Nanli  
Beijing 100026  
People's Republic of China  
Tel: (86-1) 500-3366 Ext. 3444  
Fax: (86-1) 500-2448

**INDIA**

Mr. Sripada  
Venkatachalam

Deputy Commissioner (FY. STA.)  
(Fisheries Statistics)  
Fisheries Division  
Department of Agriculture and  
Cooperatives  
Ministry of Agriculture  
Room No. 478A, Krishi Bhavan  
New Delhi 110001  
India  
Tel: (91-11) 381-557  
Fax: (91-11) 384-030

Mrs. Padma  
Venkatachalam

Deputy Commissioner (FY. ECON.)  
Fisheries Division  
Department of Agriculture and  
Cooperatives  
Ministry of Agriculture  
Room No. 445, Krishi Bhavan  
New Delhi 110001  
India  
Tel: (91-11) 389-207  
Fax: (91-11) 384-030

**INDONESIA**

Mr. Sihar Siregar

Chief  
Subdirector of Statistics  
Directorate-General of Fisheries  
Indonesia  
Jl. Harsono Rm. No. 3  
Ragunan, Pasar Minggu  
Tromol Pos No. 17941 Jks  
Jakarta 12017  
Indonesia  
Tel: (62-21) 780-0208  
Fax: (62-21) 780-3196

Mr. Edi Mahyudi

Fishery Officer  
Subdirector of Monitoring and  
Evaluation  
Directorate-General of Fisheries  
Indonesia  
Jl. Harsono Rm. No. 3  
Ragunan, Pasar Minggu  
Tromol Pos No. 17941 Jks  
Jakarta 12550  
Indonesia  
Tel: (62-21) 780-0208, 780-4116  
Ext. 3508  
Fax: (62-21) 780-3196

**JAPAN**

Mr. Noritaka  
Yamamoto

Senior Adviser for Statistics  
Planning and Coordination Division  
Statistics and Information  
Department  
Economic Affairs Bureau  
Ministry of Agriculture, Forestry  
and Fisheries  
1-2, 1-chome, Kasumigaseki  
Chiyoda-ku, Tokyo  
100 Japan  
Tel: (81-3) 3502-8111 Ext. 3053  
(81-03) 359-9681  
Fax: (81-3) 3504-2649

Mr. Kiyoshi  
Katsuyama

Assistant Director  
Marine Resource Division  
Research Department  
Fisheries Agency  
Ministry of Agriculture, Forestry  
and Fisheries  
1-2, 1-chome, Kasumigaseki  
Chiyoda-ku, Tokyo  
100 Japan  
Tel: (81-3) 3502-8111 Ext. 5653  
Fax: (81-3) 3592-0759

Dr. Shigeo Hayase

Senior Researcher  
 Fisheries Division  
 Japan International Research  
 Center for Agricultural Sciences  
 Ministry of Agriculture, Forestry  
 and Fisheries  
 1-2 Ohwashi, Tsukuba, Ibaraki  
 305 Japan  
 Tel: (81-298) 38-6302  
 Fax: (81-298) 38-6316

#### LAOS

Mr. Thonsathith  
 Xayxanadasy

National Project Director  
 Indigenous Fishery Development  
 Project  
 Department of Livestock and  
 Veterinary Service  
 Ministry of Agriculture-  
 Forestry  
 Vientiane  
 Lao People's Democratic Republic  
 Tel: 5660

Mr. Sisom  
 Thammavong

Director  
 Project for Management  
 and Extension of Fisheries in  
 Nam Ngum Reservoir  
 Department of Livestock  
 and Veterinary Service  
 Ministry of Agriculture-  
 Forestry  
 Vientiane  
 Lao People's Democratic Republic

#### MALAYSIA

Mr. Gan Bon Hua

Head  
 Fishery Management and  
 Information Division  
 (FMIS Branch)  
 Department of Fisheries Malaysia  
 Ministry of Agriculture  
 Tingkat 8 & 9, Wisma Tani  
 Jalan Sultan Salahuddin  
 50628 Kuala Lumpur  
 Malaysia  
 Tel: (60-3) 298-2011  
 Fax: (60-3) 291-0305

Mr. Hiew Wai Phang

Director of Fisheries-  
State of Johor  
Department of Fisheries  
Johore Block A  
Tingkat 6, Wisma Persekutuan  
Jalan Air Molek  
8062 Johor Bahru  
Malaysia  
Tel: (60-7) 244-079

Mrs. Thalathiah Bj.  
Saidin

Fisheries Officer  
Department of Fisheries Malaysia  
Ministry of Agriculture  
Wisma Tani, 8 & 9 Floor  
Jalan Sultan Salahuddin.  
50628 Kuala Lumpur  
Malaysia  
Tel: (60-3) 298-2011 Ext. 616  
Fax: (60-3) 291-0305

#### MALDIVES

Mr. Hassan Rasheed

Senior Data Processing Officer  
Economic Planning and  
Coordination Section  
Ministry of Fisheries and  
Agriculture  
Chalhee Building  
Male 2005  
Republic of Maldives  
Tel: (960) 326-225  
Fax: (960) 356-558

#### NEPAL

Mr. Kanti Bahadur  
Karki

Assistant Fisheries Development  
Officer  
Fisheries Development Division  
Department of Agriculture  
Development  
Harihar Bhawan, Lalitpur  
Kathmandu  
Nepal  
Tel: (977-1) 522-121

**PAKISTAN**

- Mr. Jameel Ahmad  
Fisheries Development Commissioner  
Ministry of Food and Agriculture  
79-Al-Rehman Chambers  
Islamabad, Pakistan  
Tel: (92-51) 216-936  
Fax: (92-51) 820-216
- Mr. Anwar-Ul-Islam  
Deputy Director Fisheries  
Directorate of Fisheries Sindh  
Block No. 50, Pakistan Secretariat  
Saddan, Karachi  
Pakistan  
Tel: (92-21) 568-1766
- Mr. Ghulam Mujtaba  
Wadahar  
Assistant Director Fisheries  
Directorate of Fisheries Sindh  
Block No. 50, Pakistan Secretariat  
Saddan, Karachi  
Pakistan  
Tel: (92-21) 568-2261, 568-1766
- Mr. Ghulam Mohammad  
Mehar  
Deputy Director Fisheries  
Directorate of Fisheries Sindh  
Block No. 50, Pakistan Secretariat  
Saddan, Karachi  
Pakistan  
Tel: (92-21) 568-1766

**PHILIPPINES**

- Miss Erlinda M.  
Ramos  
Chief  
Fishery Statistics Section  
Bureau of Agricultural Statistics  
Department of Agriculture  
Ben-Lor Building  
1184 Quezon Ave., Quezon City  
Philippines  
Tel: (63-2) 968-020  
Fax: (63-2) 968-966

**TAIWAN**

Mr. Johnson Sun  
Chien Fu

Division Chief  
Taiwan Fisheries Bureau  
Taiwan Provincial Government  
8, Sec. 1, Chung Shiao East Road  
Taipei, Taiwan, Republic of China  
Tel: (886-2) 321-9451, 321-9511  
Ext. 521  
Fax: (886-2) 341-2647

Mr. Chin-Yaw  
Wang

Section Chief  
Taiwan Fisheries Bureau  
Taiwan Provincial Government  
8, Sec. 1, Chung Shiao East Road  
Taipei, Taiwan, Republic of China  
Tel: (886-2) 321-9511 Ext. 521  
Fax: (886-2) 341-2647

**THAILAND**

Mr. Chumphol  
Nakalak

Chief  
Fisheries Statistics Subdivision  
Fishery Planning and  
Policy Division  
Department of Fisheries  
Kasetsart University Campus  
Phaholyotin Road  
Bangkok 10900, Thailand  
Tel: (66-2) 562-0529  
Fax: (66-2) 562-0530

Miss Sompaung  
Vichyavichien

Fishery Extension Officer  
Department of Fisheries  
Fishery Extension Division Building  
Kasetsart University Campus  
Phaholyotin Road  
Bangkok 10900, Thailand  
Tel: (66-2) 561-4689  
Fax: (66-2) 561-4684

Mrs. Boonrat  
Laead-dee

Director (Acting for the Director)  
Economic Statistics Division  
National Statistical Office  
Larn Luang Road  
Bangkok 10100, Thailand  
Tel: (66-2) 281-8606  
Fax: (66-2) 281-3815, 281-3848

Ms. Ruamporn  
Siriratrakul

Chief  
Fisheries Statistics Section  
Economic Statistics Division  
National Statistical Office  
Larn Luang Road  
Bangkok 10100, Thailand  
Tel: (66-2) 281-0333 Ext. 1804  
Fax: (66-2) 281-3815, 281-3848

Miss Molrudee  
Nipanpong

Statistician  
Statistics and Data Processing  
Subdivision  
Fishery Planning and  
Policy Division  
Department of Fisheries  
Kasetsart University Campus  
Phaholyotin Road  
Bangkok 10900, Thailand  
Tel: (66-2) 561-1974

Mrs. Marisa  
Sukprasert

Statistician  
Statistics and Data Processing  
Subdivision  
Fishery Planning and  
Policy Division  
Department of Fisheries  
Kasetsart University Campus  
Phaholyotin Road  
Bangkok 10900, Thailand  
Tel: (66-2) 561-1974

Dr. Kungwan  
Juntarachote

Associate Professor  
Faculty of Fisheries  
Department of Fishery Management  
Kasetsart University  
Bangkok 10900, Thailand  
Tel: (66-2) 579-5578  
Fax: (66-2) 579-5579

Mrs. Piboonsin  
Watanapongse

Director  
Kasetsart University Library  
Kasetsart University  
Bangkok 10900, Thailand  
Tel: (66-2) 579-2539  
Fax: (66-2) 561-1369

**VIET NAM**

Dr. Vo Tiem

Vice Director  
Research Institute of Marine  
Products  
57 Ngoc Khanh St.  
Hanoi  
Socialist Republic of Viet Nam  
Tel: (84) 345-674  
Fax: (84-42) 54702

Mr. Chu Tien Vinh

Assistant Director  
Research Institute of Marine  
Products  
Ministry of Fisheries  
170 Le-lai St., Haiphong  
Socialist Republic of Viet Nam  
Tel: (84-4) 46-664, 46-656  
Fax: (84-31) 45-153

**AADCP**

Mr. Michael B. New

Coordinator  
ASEAN-EEC Aquaculture Development  
and Coordination Programme  
(AADCP)  
AADCP Coordination Office  
P.O. Box 1006  
Kasetsart Post Office  
Bangkok 10903, Thailand  
Tel: (66-2) 561-3022  
Fax: (66-2) 561-3023

Mr. Hassanai  
Kongkeo

Technical Officer  
AADCP  
AADCP Coordination Office  
P.O. Box 1006  
Kasetsart Post Office  
Bangkok 10903, Thailand  
Tel: (66-2) 561-3022  
Fax: (66-2) 561-3023



**ESCAP**

Mr. Andrew J.  
Flatt

Chief  
Statistics Division  
Economic and Social Commission  
for Asia and the Pacific (ESCAP)  
United Nations Building  
Rajadamnern Avenue  
Bangkok 10200, Thailand  
Tel: (66-2) 282-9161, 282-9200  
Fax: (66-2) 282-9602

Mr. Bishnu Dev  
Pant

Chief  
Statistical Information Services  
Section  
Statistics Division  
ESCAP  
United Nations Building  
Rajadamnern Avenue  
Bangkok 10200, Thailand  
Tel: (66-2) 282-9161 Ext. 1659  
282-9200  
Fax: (66-2) 282-9602, 280-1814

**FAO**

Dr. C.H. Newton

Chief  
Fishery Information, Data and  
Statistics Service (FIDI)  
Food and Agriculture Organization  
(FAO) of the United Nations  
Viale delle Terme di Caracalla  
00100 Rome, Italy  
Tel: (39-6) 5225-6414  
Fax: (39-6) 5225-3020

Ms. Adele Crispoldi  
Hotta

Fishery Statistician  
Fishery Information, Data and  
Statistics Service (FIDI)  
FAO  
Viale delle Terme di Caracalla  
00100 Rome, Italy  
Tel: (39-6) 5225-6454  
Fax: (39-6) 5225-3020

Dr. Veravat  
Hongskul

Regional Fishery Officer  
FAO Regional Office for Asia and  
the Pacific (FAO/RAPA)  
Maliwan Mansion, 39 Phra Atit Road  
Bangkok 10200, Thailand  
Tel: (66-2) 281-7844  
Fax: (66-2) 280-0445

Mr. Imre Csavas

Regional Aquaculture Officer  
FAO/RAPA  
Maliwan Mansion, 39 Phra Atit Road  
Bangkok 10200, Thailand  
Tel: (66-2) 281-7844  
Fax: (66-2) 280-0445

Mr. Hiek Som

Regional Statistician and  
Secretary of the  
Asia and Pacific Commission on  
Agricultural Statistics  
FAO/RAPA  
Maliwan Mansion, 39 Phra Atit Road  
Bangkok 10200, Thailand  
Tel: (66-2) 281-7844  
Fax: (66-2) 280-0445

Miss Nid Swetarak

Librarian  
FAO/RAPA  
Maliwan Mansion, 39 Phra Atit Road  
Bangkok 10200, Thailand  
Tel: (66-2) 281-7844  
Fax: (66-2) 280-0445

**ICLARM**

Mr. Jay L. Maclean

Director  
Information Division  
International Center for Living  
Aquatic Resources Management  
(ICLARM)  
2nd Floor, Bloomingdale Bldg.  
205 Salcedo St., Legaspi Village  
Makati, 1200 Metro Manila  
Philippines  
Tel: (63-2) 818-0466, 818-9283  
Fax: (63-2) 816-3183

Ms. Rosalinda  
Temprosa

Chief Librarian  
ICLARM  
2nd Floor, Bloomingdale Bldg.  
205 Salcedo St., Legaspi Village  
Makati, 1200 Metro Manila  
Philippines  
Tel: (63-2) 818-0466  
Fax: (63-2) 816-3183

Ms. Norma I. Jhocson

Librarian  
ICLARM  
2nd Floor, Bloomingdale Bldg.  
205 Salcedo St., Legaspi Village  
Makati, 1200 Metro Manila  
Philippines  
Tel: (63-2) 818-0466  
Fax: (63-2) 816-3183

Mrs. Erlinda  
Gonzales

Associate Librarian  
ICLARM  
2nd Floor, Bloomingdale Bldg.  
205 Salcedo St., Legaspi Village  
Makati, 1200 Metro Manila  
Philippines  
Tel: (63-2) 818-0466  
Fax: (63-2) 816-3183

#### INFOFISH

Dr. K.P.P. Nambiar

Director  
Intergovernmental Organization  
for Marketing Information and  
Technical Advisory Services  
for Fishery Products in the  
Asia and Pacific Region  
(INFOFISH)  
1st Floor, Wisma PKNS  
Jln. Raja Laut  
50350 Kuala Lumpur  
Malaysia  
Tel: (60-3) 291-4466, 291-4614  
Fax: (60-3) 291-6804

Dr. J. Prado

FAO Fishery Industry Officer  
INFOFISH  
P.O. Box 10899  
50728 Kuala Lumpur  
Malaysia  
Tel: (60-3) 291-4466  
Fax: (60-3) 291-6804

**IPTP**

Mr. John David  
Ardill

Programme Coordinator  
Indo-Pacific Tuna Development  
and Management Programme  
(IPTP)  
c/o FAO Representative in  
Sri Lanka  
202 Baudhaloka Mawatha  
Colombo, Sri Lanka  
Tel: (94-1) 522-369, 522-370  
Fax: (94-1) 522-371

**MEKONG COMMITTEE**

Mr. Jorgen G.  
Jensen

Senior Project Office (Fisheries)  
Mekong Secretariat  
Kasatsuk Bridge, Rama I Road  
Bangkok 10330, Thailand  
Tel: (66-2) 225-0029  
Fax: (66-2) 225-2796

Mr. Khamphiou  
Vissapra

Project Officer  
Mekong Secretariat  
Kasatsuk Bridge, Rama I Road  
Bangkok 10330, Thailand  
Tel: (66-2) 225-0029  
Fax: (66-2) 225-2796

**NACA**

Dr. Banchong  
Tiensongrusmee

Coordinator  
Network of Aquaculture Centres  
in Asia-Pacific (NACA)  
Freshwater Aquaculture Research  
Institute  
Kasetsart University Campus  
Bangkhen, Bangkok 10900, Thailand  
Tel: (66-2) 588-3190  
Fax: (66-2) 561-1727

Mr. Pedro B. Bueno

Information Specialist  
 NACA  
 Freshwater Aquaculture Research  
 Institute  
 Kasetsart University Campus  
 Bangkhen, Bangkok 10900, Thailand  
 Tel: (66-2) 561-1728 to 1729  
 Fax: (66-2) 561-1727

**SEAPOL**

Dr. Phiphat  
 Tangsubkul

Director  
 South-East Asian Programme in Ocean  
 Law, Policy and Management  
 (SEAPOL)  
 c/o Sukhothai Thammathirat Open  
 University  
 Academic Bldg. 2 (3rd Fl.), Rm 2320  
 Pakkred, Nonthaburi 11120  
 Thailand  
 Tel: (66-2) 503-2121 to 24  
 Ext. 2571, 2572  
 Fax: (66-2) 503-3608

Dr. K.I. Matics

Programme Development Officer  
 SEAPOL  
 c/o Sukhotai Thammathirat Open  
 University  
 Academic Bldg. 2 (3rd Fl.), Rm 2320  
 Pakkred, Nonthaburi 11120  
 Thailand  
 Tel: (66-2) 503-2121 to 24  
 Ext. 2571, 2572  
 Fax: (66-2) 503-3608

Ms. Ankana  
 Sirivivatnanon

Chief Administrator  
 SEAPOL  
 c/o Sukhotai Thammathirat Open  
 University  
 Academic Bldg. 2 (3rd Fl.), Rm 2320  
 Pakkred, Nonthaburi 11120  
 Thailand  
 Tel: (66-2) 503-2121 to 24  
 Ext. 2571, 2572  
 Fax: (66-2) 503-3608

**SIFR**

Mr. J.R. Hansen

WB/SIFR Consultant  
 Strategy for International  
 Fisheries Research (SIFR)  
 RHEH Consult  
 Bredevej 2  
 DK 2830 Virum, Denmark  
 Tel: (45-42) 856-500  
 Fax: (45-42) 856-556

Ms. Yong-Ja Cho

Consultant  
 Strategy for International  
 Fisheries Research  
 31 Soi Aladin  
 Phaholyotin Road Soi 30  
 Bangkhen, Bangkok 10900  
 Thailand  
 Tel: (66-2) 511-1247  
 Fax: (66-2) 939-6023

**WPFCC**

Mr. Miguel D. Lopez

Deputy Director  
 Western Pacific Fisheries  
 Consultative Committee (WPFCC)  
 502, Manila Luxury Condominium  
 Pearl Drive, Pasig, Metro Manila  
 Philippines  
 Tel: (63-2) 633-9052, 633-3717  
 Fax: (63-2) 634-7340

**SEAFDEC**Dr. Maitree  
Duangsawasdi

Secretary-General and Chief of the  
 Training Department  
 Southeast Asian Fisheries  
 Development Center (SEAFDEC)  
 24th Floor, Unit B  
 Charn Issara Tower II  
 2922/278 New Petchburi Road  
 Bangkok 10310, Thailand  
 Tel: (66-2) 308-2460 to 61  
 Fax: (66-2) 308-2462

Mr. Kazuo Inoue

Deputy Secretary-General and Deputy  
Chief of the Training Department  
SEAFDEC  
24th Floor, Unit B  
Charn Issara Tower II  
2922/278 New Petchburi Road  
Bangkok 10310, Thailand  
Tel: (66-2) 308-2460 to 61  
Fax: (66-2) 308-2462

Mr. Hooi Kok Kuang

Chief  
SEAFDEC Marine Fisheries Research  
Department ( SEAFDEC/MFRD)  
Changi Fisheries Complex  
Changi Point, Singapore 1749  
Republic of Singapore  
Tel: (65) 542-8455  
Fax: (65) 545-1483

Mr. Lui Yean Pong

Chief  
SEAFDEC Marine Fishery Resources  
Development and Management  
Department (SEAFDEC/MFRDMD)  
Fisheries Garden, Chendering  
21080 Kuala Terengganu  
Malaysia  
Tel: (60-9) 675-135  
Fax: (60-9) 675-136

Dr. Hiroyuki  
Yanagawa

Fishery Expert  
SEAFDEC/MFRDMD  
Fisheries Garden, Chendering  
21080 Kuala Terengganu  
Malaysia  
Tel: (60-9) 675-135  
Fax: (60-9) 675-136

Mr. Damrong  
Silpachai

Training Division Head  
SEAFDEC Training Department  
(SEAFDEC/TD)  
P.O. Box 97, Phrasamutchedi  
Samut Prakan 10290  
Tel: (66-2) 425-8040 to 45  
Fax: (66-2) 425-8561

- Mrs. Pouchamarn  
Wongsanga  
Researcher  
SEAFDEC/TD  
P.O. Box 97, Phrasamutchedi  
Samut Prakan 10290  
Tel: (66-2) 425-8040 to 45  
Fax: (66-2) 425-8561
- Mrs. Ng Mui Chng  
Research Officer  
SEAFDEC/MFRD  
Changi Fisheries Complex  
Changi Point, Singapore 1749  
Republic of Singapore  
Tel: (65) 542-4428  
Fax: (65) 545-1483
- Mrs. Rungtiwa  
Saranyapipat  
Librarian  
SEAFDEC/TD  
P.O. Box 97, Phrasamutchedi  
Samut Prakan 10290  
Tel: (66-2) 425-8040 to 45  
Fax: (66-2) 425-8561
- Mr. Somnuk  
Pornpatimakorn  
Training Aids and Audiovisual  
Section Head  
SEAFDEC/TD  
P.O. Box 97, Phrasamutchedi  
Samut Prakan 10290  
Tel: (66-2) 425-8040 to 45  
Fax: (66-2) 425-8561
- Miss Amelia  
Arisola  
Librarian I  
SEAFDEC Aquaculture Department  
(SEAFDEC/AQD)  
Tigbauan, Iloilo 5021  
Philippines  
Tel: (63-33) 271-009  
Fax: (63-33) 271-008
- Mr. Ibrahim B.  
Johari  
Fishery Officer  
SEAFDEC/MFRDMD  
Fisheries Garden, Chendering  
21080 Kuala Terengganu  
Malaysia  
Tel: (60-9) 675-135  
Fax: (60-9) 675-136



Miss Haslinda Bte.  
Md. Yusof

Librarian  
SEAFDEC/MFRD  
Changi Fisheries Complex  
Changi Point, Singapore 1749  
Republic of Singapore  
Tel: (65) 542-8455  
Fax: (65) 545-1483

#### OBSERVERS

#### PRIVATE SECTOR

Mr. Robledo M.  
Salvador

1, Sukhumvit Road, Soi 61  
Wattanawadee Court  
Bangkok 10110, Thailand  
Tel: (66-2) 391-1774

Mr. H. Arthur  
Vespry

130 Soi Phranang  
Rajvithi Road (Soi 4)  
Bangkok 10400, Thailand  
Tel: (66-2) 246-3434  
Fax: (66-2) 245-3991

#### SEAFDEC

Mr. Kasemsant  
Chalayondeja

Program Officer  
SEAFDEC Secretariat  
24th Floor, Unit B  
Charn Issara Tower II  
2922/278 New Petchburi Road  
Bangkok 10310, Thailand  
Tel: (66-2) 308-2460 to 61  
Fax: (66-2) 308-2462

Miss Supaiboon  
Kitchluksana

Information Officer  
SEAFDEC Secretariat  
24th Floor, Unit B  
Charn Issara Tower II  
2922/278 New Petchburi Road  
Bangkok 10310, Thailand  
Tel: (66-2) 308-2460 to 61  
Fax: (66-2) 308-2462

Mrs. Ariya Sotneam  
Information Officer  
SEAFDEC Secretariat  
24th Floor, Unit B  
Charn Issara Tower II  
2922/278 New Petchburi Road  
Bangkok 10310, Thailand  
Tel: (66-2) 308-2460 to 61  
Fax: (66-2) 308-2462

Miss Phattareeya  
Sounrattanachai  
Assistant Researcher  
SEAFDEC/TD  
P.O. Box 97, Phrasamutchedi  
Samut Prakan 10290  
Thailand  
Tel: (66-2) 425-8040 to 45  
Fax: (66-2) 425-8561

Ms. Supaporn  
Anuchiracheeva  
A-V Officer  
Training Aids and Audiovisual  
Section  
SEAFDEC/TD  
P.O. Box 97, Phrasamutchedi  
Samut Prakan 10290  
Thailand  
Tel: (66-2) 425-8040 to 45  
Fax: (66-2) 425-8561

Mr. Jo Fukui  
SEAFDEC/TD  
P.O. Box 97, Phrasamutchedi  
Samut Prakan 10290  
Thailand  
Tel: (66-2) 425-8040 to 45  
Fax: (66-2) 425-8561

Mr. T. Ito  
SEAFDEC/TD  
P.O. Box 97, Phrasamutchedi  
Samut Prakan 10290  
Thailand  
Tel: (66-2) 425-8040 to 45  
Fax: (66-2) 425-8561

Mr. I. Yamamoto  
SEAFDEC/TD  
P.O. Box 97, Phrasamutchedi  
Samut Prakan 10290  
Thailand  
Tel: (66-2) 425-8040 to 45  
Fax: (66-2) 425-8561



**OPENING REMARKS**  
by  
**Dr. Maitree Duangsawasdi**  
**Secretary-General**  
**SEAFDEC**

Distinguished Colleagues, Ladies and Gentlemen:

On behalf of the Southeast Asian Fisheries Development Center, I have the great pleasure to welcome you to the FAO/SEAFDEC Regional Workshop on Fishery Information and Statistics in Asia. The need to improve fishery data and information services in Asia is recognized. Thus, SEAFDEC, is collaborating once again, with FAO in order to make this Workshop possible.

SEAFDEC, as an international organization, has been active in promoting the collection and dissemination of fishery statistical information in Southeast Asia. SEAFDEC has initiated programs on fishery statistics and fishery information systems since 1976 and has published the annual Fishery Statistical Bulletin in the South China Sea Area since 1977 as well as the annual Regional Bibliography on Fisheries and Aquaculture in Southeast Asia since 1978.

From 1976 to 1989, SEAFDEC, in collaboration with FAO, organized six fishery statistical workshops aimed at improving the collection and dissemination of fishery statistics in the region. SEAFDEC also collaborated with FAO and IDRC in organizing the Seminar on Fishery and Aquaculture Information Systems in Southeast Asia in 1989. To follow-up this seminar as well as the fishery statistical workshops, it is therefore, timely and appropriate for SEAFDEC to cooperate once again, with the FAO Fisheries Department and also with FAO/RAPA to convene this Regional Workshop on Fishery Information and Statistics in Asia.

For this Workshop, FAO and SEAFDEC strived to bring together the national and international experts in the fields of fishery statistics and in fishery information. Sharing their expertise at this forum is of great importance in order to review the current status of fishery information programs

and services available in Asia; discuss the requirements for improving the collection, compilation and dissemination of fishery and aquaculture statistics in the region; and recommend ways and means for international cooperation and coordination in supporting and supplementing national efforts in information dissemination and exchanges.

With the active participation of these experts, we are optimistic that the Workshop will come up with a set of concrete recommendations in these issues for the concerned agencies, including SEAFDEC and FAO, to consider.

Once again, on behalf of SEAFDEC, I wish to extend my sincere gratitude to the Government of Japan for its continuous support in the activities of SEAFDEC and more specifically, for its support in this Workshop. My gratitude is also due to FAO for its effort and expertise in helping us organize this Workshop, which has a wider mandate and broader geographical coverage. I also wish to thank all of you, Distinguished Colleagues, for accepting our invitation to participate in this Workshop.

Lastly, I hope that you will enjoy your stay in Bangkok.

Thank you and Good Day to one and all!

## AGENDA AND TIMETABLE

18 January 1994Morning Session (0900-1200 hrs.):

1. Opening of the Session
2. Adoption of the Agenda
3. Fishery Information
  - 3.1 Overview of fishery information programmes and services in Asia

Afternoon Session (1400-1700 hrs.):

- 3.2 Country statements on fishery information programs
- 3.3 Compatibility and complementarity between national fishery information programs
- 3.4 Issues, constraints and opportunities in effective flow and utilization of fishery information

19 January 1994Morning Session (0900-1200 hrs.):

- 3.5 Regional and national priorities in fishery information

Afternoon Session (1400-1700 hrs.):

4. Fishery Statistics
  - 4.1 Current status of fishery and aquaculture statistics in Asia
  - 4.2 Country reports on fishery statistics programs

4.3 SEAPDEC fishery statistical programs

4.4 FAO statistics programme

20 January 1994

Morning Session (0900-1200 hrs.):

4.5 Catch-effort statistics

4.6 Tuna fishery statistics

4.7 Socio-economic statistics

Afternoon Session (1400-1700 hrs.):

4.8 Aquaculture statistics

21 January 1994

Morning Session (0900-1200 hrs.):

5. Requirements for the improvement of the collection, compilation and dissemination of fishery and aquaculture statistics in the region

Afternoon Session (1400-1700 hrs.):

6. Options for action plan for fishery information services in Asia
7. Any other matters

22 January 1994

8. Adoption of the Recommendations

## ANNEX 4

## LIST OF DOCUMENTS

## FISHERY INFORMATION:

FAO/SEAFDEC/WS/94/

- |          |   |
|----------|---|
| WP/PI- 1 | Background to SEAFDEC Information Programs  |
| WP/PI- 2 | Philippine Fisheries Information Programs and Services  |
| WP/PI- 3 | The BRAIS Project since April 1989: Sustaining an Information System  |
| WP/PI-3A | Information Services on Fisheries and Aquaculture for Asia: The SEAFDEC Aquaculture Department Experience                                 |
| WP/PI- 4 | Overview of Information Programs and Services. Fisheries Information Needs in Developing Countries: Issues, Constraints and Opportunities |
| WP/PI- 5 | Identification of Present and Future Information Technology (IT) Tools for Integrated Fisheries Resource Management                       |
| WP/PI-5A | Prototype of a Reference Model for Integrated Fisheries Resource Management (IPRM)  |
| WP/PI-5B | Summary concerning Identification of Present and Future IT Tools for Integrated Fisheries Resource Management                             |
| WP/PI- 6 | Current Status of Fisheries Information Program and Service in Malaysia   |



- WP/FI- 7 National Fisheries Information Programs and Services in Cambodia
- WP/FI- 8 Information Programs and Services of China's Fisheries
- WP/FI- 9 Status of a Union Catalog of Fisheries Serial Holdings in Asia
- WP/FI-10 Non-statistical Information Sources for Fisheries in Asia
- WP/FI-11 Improvement and Development of the Management Fisheries Information System in Indonesia
- WP/FI-12 The Information Program of NACA

**FISHERY STATISTICS:**

FAO/SEAFDEC/WS/94/

- WP/FS- 1 Fishery Statistical Bulletin for the South China Sea Area
- WP/FS- 2 Proposed Format for the Catch-effort Statistics for the South China Sea Area
- WP/FS- 3 Suggested Amendment to the Classification of Fishery Commodities in the Fishery Statistical Bulletin for the South China Sea Area
- WP/FS- 4 Catch and Effort Statistics for the Japanese Squid Drift Net Fishery in the North Pacific
- WP/FS- 5 Outlook of Fishery Statistics in Southeast Asian Countries
- WP/FS- 6 The 1990 Costs and Earning of Semi-Intensive and Intensive Shrimp Culture Survey in Thailand

- WP/FS- 7      Aquaculture Statistics - Status and Problems
- WP/FS- 8      The Quality of Catch and Aquaculture Statistics Submitted to FAO
- WP/FS- 9      Fish and Fishery Products: International Trade and Production Statistics in the Asia/Pacific Region and Developments in Commodity Classification
- WP/FS-10      The Fishery Statistics Program of FAO
- WP/FS-11      The Current Status of the IPTP Database
- WP/FS-12      The Socio-economic Status of Small-Scale Fisherfolk Communities in Sri Lanka
- WP/FS-13      INFOFISN and INFO-NETWORK
- WP/FS-14      The Use of Economic Survey Information in Fisheries Management
- WP/FS-15      FAO Graphical Summary of Catch and Aquaculture Statistics for Asia and Pacific

**COUNTRY PAPERS:**

FAO/SEAFDEC/WS/94/

- CP/WS- 1      Fishery Information and Statistics of Bangladesh
- CP/WS- 2      Current Status of Fishery Statistics in Brunei Darussalam
- CP/WS- 3      Fishery Statistics of India
- CP/WS- 4      Fishery Statistics of Japan
- CP/WS- 5      Fishery Statistics of Lao P.D.R.

CP/WS- 6	Current Status of Fishery Statistical System in Malaysia
CP/WS- 7	Fishery Statistics of the Maldives
CP/WS- 8	Fishery Information and Statistics of Nepal
CP/WS- 9	Fishery Statistics of the Philippines
CP/WS-10	Fishery Statistics of Taiwan
CP/WS-11	Fishery Statistics of Thailand
CP/WS-12	Fishery Statistics of Sri Lanka
CP/WS-13	Fishery Statistics of Viet Nam
CP/WS-14	Fishery Statistics of China
CP/WS-15	Fishery Statistics of Cambodia

**INFORMATION PAPERS:**

## FAO/SEAFDEC/WS/94/

Inf. 1	List of Participants
Inf. 2	Information Notes for Participants
Inf. 3	Notes on the Completion of Questionnaire for Compiling the Fishery Statistical Bulletin for the South China Sea Area (1991)
Inf. 4	Evaluation of the Annual Fishery Statistics of Malaysia, Philippines and Thailand
Inf. 5	Statistical Area for South China Sea (71)/FAO
Inf. 6	Review of the State of the World Fishery Resources: Part 2. Inland Fisheries and Aquaculture
Inf. 7	Bio-economic Analysis of Fisheries

- Inf. 8 Trends of the Fishery Fleets in Asia (1980-1991)
- Inf. 9 Fishery Statistical Bulletin for the South China Sea Area 1990
- Inf. 10 Catch-effort Statistics for the South China Sea Area 1990
- Inf. 11 Regional Bibliography on Fisheries and Aquaculture in Southeast Asia
- Inf. 12 Thai Fisheries Bibliography 1986-1990
- Inf. 13 Problem in the Application of the FAO Definition of Aquaculture
- Inf. 14 Comment on Aquaculture Statistics
- Inf. 15 FAO Questionnaire on Aquaculture Statistics
- Inf. 16 Questionnaire on Aquaculture Statistics for Thailand
- Inf. 17 Newsletter to the Fishing Industry

**PROPOSED ACTION PLANS  
FOR FISHERY INFORMATION PROGRAMS  
IN ASIA**

**Summary**

The participants of the Workshop were grouped into three sub-regional groups in order to facilitate the formulation of action plans which would best solve the issues and constraints which they identified as regards fishery information in their respective countries.

The sub-regional groups were: Indo-Chinese countries, comprising Cambodia, Laos, and Vietnam; South Asian countries, comprising Bangladesh, India, Pakistan, Sri Lanka, Maldives, and Nepal; and Southeast Asian countries, comprising Brunei Darussalam, Indonesia, Malaysia, Philippines, and Thailand.

The fourth group, comprising Australia, China, Japan, and Taiwan, served as the resource and reference group.

During the Workshop, the three sub-regional groups identified the following action plans, which the Workshop unanimously adopted on 22 January 1994:

**Action Plan for Indo-China  
(Cambodia, Laos, Viet Nam)**

1. To formulate a national policy for strengthening the information systems in support of national research and development
2. To establish national information centers and sub-centers located in different regions of the country to form the fishery information network
3. To strengthen the information network by setting up suitable libraries in the centers and sub-centers with appropriate facilities for development, processing, and dissemination of information, and training of staff for them to function effectively
4. To build up the targeted national fishery information to meet the users' needs by conducting a fishery census, proper statistics activity and required research for appropriate decision-making on development management
5. To link the Indo-China and Asian regional systems to be able to exchange information through the coordination of NACA and the Mekong Committee
6. To link the different fishery information centers and services such as FAO, ICLARM, SEAFDEC, AIT, INFOFISH
7. To require immediate international assistance for the first and second items in this proposed action plan, and long-term assistance for the third item and especially the fourth item specifically for Cambodia and Laos
8. FAO, NACA and Mekong Secretariat, to assist the Indo-Chinese countries in preparing project proposals based on the above action plans.

**Action Plan for South Asia**  
(Bangladesh, India, Pakistan, Sri Lanka,  
Maldives, Nepal)

Action Plan of the South Asian sub-group on "fishery information, constraints encountered, and suggestions for their solutions".

The South Asian sub-group sat together and enumerated the constraints encountered on fishery information in the participating countries and came up with priorities on certain constraints peculiar to some of them and some common to all of them. The priorities fixed up by them are enumerated below along with suggestions for their solutions:

Mechanisms for Collection and Dissemination of Information

1. Poor national and regional information on resources and services. A Fishery Resources Survey System (FRSS) should be re-organized through frame survey. Coordination of information at one place for compilation and dissemination should be developed. Existing computer facilities should be improved in the participating countries.

Trained Expertise

2. Absence of adequate skilled and trained manpower, and infrastructure for the fishery information system, is a great hindrance in the participating countries except India. The national institutes may be extended the necessary assistance by international and regional bodies.

Compilation, Processing and Reporting of Data

3. Absence of a central information unit in some participating countries is a hindrance for framing fishery information. This will enable countries to compile, process and report data from different agencies involved in data collection.

#### Cooperation and Collaboration with International Agencies

4. Absence of regional offices of ICLARM, SEAFDEC, BOBP and other international and regional offices in some participating countries is also a hindrance to the proper collection of fishery information. These offices should be set up in the participating countries, while existing offices should be strengthened.

#### Strengthening of Information Service

5. Existing library facilities in connection with fishery information in some countries is not adequate. These should be strengthened.

#### Necessity of Information Tools

6. Inadequate transport and other equipment and facilities needed in data collection are also great hindrances in fishery information. These facilities should be developed.

#### Finances

7. Absence of adequate funds necessary in undertaking programs in connection with fishery information is a common constraint. Adequate funds should be made available to overcome this problem.

#### Necessity of Liaison with International Regional Bodies

8. Inadequate liaison with international and regional fisheries bodies is also a hindrance in the formulation of proper fishery information system. The liaison should be strengthened by organizing seminars/workshops in the participating countries and supplying them with all publications.



Coordination of Fisheries Information

9. Lack of coordination among participating countries is also another constraint. Member countries should have national coordinators who should meet regularly in order to exchange fishery information.
10. Donor agencies like FAO, BOBP and SEAFDEC, assisting the Southeast Asian countries, will be approached to assist the South Asian countries in strengthening their information systems.

## ANNEX 5.3

**Action Plan for Southeast Asia  
(Brunei Darussalam, Indonesia, Malaysia,  
Philippines, Thailand)**

**1. Introduction**

- 1.1 The participants from Southeast Asia representing Brunei Darussalam, Indonesia, Malaysia, Philippines, and Thailand, identified common issues and constraints and formulated a common approach or action plan.

**2. Priority Actions Identified**

- 2.1 Various issues and constraints common to the group were identified. The more important and critical issues and constraints to be addressed are:
- a) Inadequate national or local information resources and services
  - b) Poor coordination and collaboration among related programs, either local, national or international
  - c) Poor and ineffective information handling methods and tools
  - d) Inadequately trained expertise and staff
  - e) Lack of high level commitments and support
  - f) Inappropriate packaged information for extension and resource management
  - g) Unavailability of timely information services.

**3. Regional Program**

- 3.1 The issues and constraints identified are further related to the programs as follows:
- a) Implementing and strengthening the national fishery information resources and services

b) Analysis and dissemination of fishery resource management information

c) Fisheries technology transfer and extension.

#### 4. Objective of Program

4.1 The group identified the objectives for each program. The main objectives to be addressed were also identified.

#### 4.2 Re-activation of National Fisheries Information Centers

The issue requires the re-activation of existing national fishery information systems (MALFIS, THAIFIS, INFIS, NFIS) and the establishment of new national fishery information system in Brunei Darussalam. This involves proper training of personnel and the commitment of the national leadership to support the centers.

#### 4.3 Analysis and Dissemination

There is a national need to analyze and disseminate fishery information for resource management purposes, for both the policy makers and researchers. These should be effectively disseminated in a uniform format for timely utilization of the information.

#### 4.4 Technology Transfer and Extension

The group felt the need to have the national fishery information obtained, properly analyzed and packaged ready for extension. The ready packaged information should be timely transferred to the relevant target groups within the national framework.

#### 4.5 Regional Transfer and Exchange

There is a need for an effective regional transfer and exchange. The existing system of information transfer and exchange, i.e., SEAFIS could be re-activated and enhanced for the timely transfer of information.

#### Actions to be Taken at the National Level

- a) To establish or strengthen a focal point for the national fishery information system with a definite national policy
- b) To encourage the exchange of fishery information among the national agencies through a national fishery network

- b) To encourage the exchange of fishery information among the national agencies through a national fishery network
- c) To improve national efforts for an effective national fishery system through adequate financial and manpower support, facilities and regular training of staff
- d) To establish an effective system for compilation, dissemination and information exchange/distribution.

#### Actions to be taken at the Regional Level

- a) To establish an effective regional center for fishery information
- b) To provide training on information technology and management for information staff
- c) To strengthen information exchanges within the region and with outside the region
- d) To develop appropriate information input tools and methods
- e) To conduct a regular review on the progress, problems and constraints on information programs in the region.

#### Action to be taken at International Level

- a) To assist participating countries in developing and/or strengthening their national information input capability.

### 5. National and Regional Needs

- 5.1 The group felt that there is a need for strong national fishery information program to provide leadership and coordination and to develop and implement training program in the areas of information management, development communication and information repackaging both at national and sub-national levels.

- 5.2 Nationally, the group felt that there is a need for the existing national information to be reactivated. Information staff at the national level should be reactivated and retrained while at the grass-roots level, intensive training of staff should be regularly given.
- 5.3 There is a need for a strong leadership at the regional level to coordinate, formulate and disseminate exchange of information program. In this respect regional bodies, i.e., SEAFDEC, FAO/RAPA could take the leading role.
- 5.4 Appropriate software should be developed and an effective networking linkage should be evolved to resolve the problem of time lapse of information.

#### 6. Follow-up Procedures

- 6.1 The group urged appropriate regional agencies namely, SEAFDEC and FAO/RAPA, to engage an appropriate consultant to look into the needs for an effective information program with proper terms of reference. The group also urged the regional agency in conjunction with appropriate international agencies, e.g., SIFR, for funding and expertise support.