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REPORT OF THE
IOC/SEAFDEC REGIONAL TRAINING COURSE
IN FISHERIES OCEANOGRAPHY IN THE WESTERN PACIFIC OCEAN
6-31 May 1985

by

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**REPORT OF THE IOC/SEAFDEC REGIONAL TRAINING COURSE
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1. INTRODUCTION

1.1 Background

The Eleventh Session of the IOC Assembly (Paris, France, 15 October - 3 November 1979), by Resolution XI.17, recognised "the vital need for adequate understanding of the relationships between ocean environmental variability and fish stocks, and ... that IOC activities in ocean science can enhance and complement the study of living resources".

A Working Group was subsequently formed by SCOR and ACMRR on Oceanography, Marine Ecology and Living Resources, which recognised that "management techniques must be applied ... in most fisheries to conserve the resources and maximise the economic and societal benefits. Proper management requires a foundation of research on both the fish and the ocean environment in which they live ... Unfortunately, neither the capability to conduct research in living resources ... nor the scientific infrastructure to do it has kept pace with the ability to catch fish" (doc. IOC-XII/8 Annex 2).

The XII Session of the IOC Assembly (Paris, France, 3-19 November 1985), recalling Resolution XI-17, by Resolution XII-1, approved the development by the Commission of a Programme of Ocean Science in Relation to Living Resources (OSLR), and adopted OSLR as a new scientific programme of the Commission, and invited FAO to co-sponsor it; FAO officially jointed the OSLR programme in September 1984.

In support of this programme, the Intergovernmental Oceanographic Commission, in close co-operation with the Southeast Asian Fisheries Development Center, organised a Regional Training Course on Fisheries Oceanography from 6 May till 31 May 1985 at the Training Department of the Southeast Asian Fisheries Development Center, Phrapradaeng, Samutprakarn, Thailand.

The main purpose of the Training Course was to provide training to about twenty scientists from the developing Member States of WESTPAC and SEAFDEC with a view to increasing their understanding of the oceanography of the region and knowledge of environmental research and their application to fisheries.

The course was developed by IOC in consultation with SEAFDEC and covered the following major topics:

- (a) general oceanography of the Southeast Asian waters;
- (b) instrumentation and analysis related to physical, biological and chemical oceanographic and meteorological parameters as applied to fisheries oceanography problems;
- (c) topic of interest for international and regional collaboration.

The course consisted of regular lectures and one week of sea-borne training on board of the SEAFDEC training vessel R.V. "Paknam".

Dr. Matthias Tomczak, Senior Lecturer at the Marine Studies Centre of the University of Sydney, Australia, was course leader. He was assisted by Mr. Somnuk Pornpatimakorn, fisheries oceanographer at the SEAFDEC Training Department. Lectures were given by experts of the various topics; a list of the lecturers is provided in Appendix 1.

1.2 Participants

The Training Course was attended by 13 participants and 11 observers. IOC sponsored seven of the participants and SEAFDEC sponsored six participants. The observers were sent by their own institutions. A list of all participants and observers is provided in Appendix 2.

1.3 Acknowledgements

The Training Course was made possible by the close cooperation of, and joint funding from, the Intergovernmental Oceanographic Commission and the Southeast Asian Fisheries Development Center which provided facilities and its research vessel R.V. "Paknam" for sea-borne training. The directors and staff of the institutions visited as part of the Training Course showed great interest in contributing to the success of the course; the hospitality and assistance of the Marine Science Center of Srinakharinwirot University at Bangsaen, the Marine Fisheries Laboratory of the Marine Fisheries Division in the Department of Fisheries, of the Department of Marine Science of Chulalongkorn University, and of the Exploratory Fishing Division of the Department of Fisheries, are warmly acknowledged.

2. ORGANISATION AND CONDUCT OF THE COURSE

2.1 Location

The first two weeks of the Training Course were held at the SEAFDEC Training Department at Phrapradaeng, Samutprakarn, Thailand, using the Department's lecture rooms and other facilities for demonstration of instrumentation. The third week was spent at sea on board R.V. "Paknam" in a training cruise which covered part of the western Gulf of Thailand in the vicinity of the Angthong Archipelago and included brief port calls at Ko Angthong and Ko Samui. A cruise map with station locations is provided in Appendix 3. The final week was again spent at the SEAFDEC Training Department for data and course evaluation.

2.2 Course programme

The training schedule for the course is provided as Appendix 4.

The course was opened in a ceremony at the SEAFDEC Training Department by Dr. Mario Ruivo, Secretary of IOC, and Dr. Veravat Hongskul, Secretary-General of SEAFDEC. Both speakers stressed the importance of physical oceanography in relation to living resources and expressed their hope that the new concept of courses of the type organised jointly by IOC and SEAFDEC will be successful and contribute to rational management of the living resources of the region.

Most of the participants and observers are employed by their home institutions as marine chemists or fishery biologists. Consequently, emphasis during the first two weeks of the course was placed on an introduction into the concepts of physical oceanography, including familiarization with standard procedures and equipment used in the observation of the basic environmental parameters. Marine chemistry included a review of the composition of sea water, nutrients, dissolved and particulate organics, primary productivity, and aspects of pollution. Planktology and Fisheries Oceanography were covered in additional lectures.

The programme included visits to a Marine Museum and Science Center in Bangsaen and to government and university laboratories in the Bangkok area.

The third week of the course continued training with a cruise of R.V. "Paknam" into the Gulf of Thailand, in the vicinity of the Angthong archipelago. A total of twelve oceanographic stations were completed. Nansen bottles with reversing thermometers were used on all stations. A temperature-salinity bridge and a dissolved oxygen meter

were used on most stations (These two instruments were brought from overseas for the course). Determination of nutrients was done in the laboratory during the cruise, while the salinity determination was done on an inductive salinometer at the SEAFDEC laboratory after the cruise. Two determinations of primary productivity were obtained.

The final week of the course consisted of sample processing (determination of salinity), data analysis and data presentation. The arrangement of the cruise allowed vertical sections and horizontal maps of various properties to be drawn. These graphs formed the basis for a discussion of possible processes responsible for the observed property distributions. Time was also set apart during the last week for some lectures on more advanced techniques such as remote sensing and numerical modelling.

The course concluded with a presentation of marine science activities at national level by the participants, and a general discussion.

Certificates of achievement were presented to all participants by Mr. Vanich Varikul, Director-General of Department of Fisheries and SEAFDEC Council Director for Thailand, at a closing ceremony held at the Asia Hotel in Bangkok.

2.3 Documentation

At arrival at the SEAFDEC Training Department, participants and observers received documents and papers related to the topics of the course. This material was selected from the publication produced by IOC, UNESCO and SEAFDEC. A list of the material received by the participants and observers is provided in Appendix 5.

As the course progressed, the instructors provided lecture notes for all lectures. Additional material, such as manuals on instruments and methods were provided by Mr. Somnuk Pornpatimakorn.

3. EVALUATION AND CONCLUSIONS

A questionnaire covering all aspects of course contents and course facilities was handed out to all participants and observers towards the end of the course. It formed the basis for the general discussion at the end of the course.

In general, arrangements made for the course were judged adequate and satisfactory. Most participants and observers said in the discussion that the course had been very good and had covered topics of interest to them. Complaints and suggestions for improvement were received in three main areas:

- 1) The time allocated for data evaluation was far too short.
- 2) It had not become clear through the course how the material presented related to fisheries oceanography.
- 3) The range of equipment used and demonstrated did not include modern instruments used in oceanography and marine chemistry.

The course coordinator arrived at the same conclusions from an evaluation of his experience during lectures and data evaluation. It appears therefore justified to address these points in some detail.

3.1 Data evaluation

The original course schedule had allowed time for data processing and data presentation in graphical form. It became evident fairly soon that many participants had never produced vertical sections or horizontal maps before and did not know how to interpret them. There was therefore quite a degree of dissatisfaction, because many felt that they had not completed the job at the end of the course.

It appears that future courses should aim at a data report as a final product. Such a report should list all data obtained, present the data in suitable graphical form and contain a brief section of text giving the background of the study, the methods used during the study, and a preliminary interpretation of the findings. Production of such a report should be part of the contents of the course.

3.2 Relation to fisheries oceanography

It can be argued - a view supported by the lecturers - ~~that~~ "fisheries oceanography" is not a discipline of marine sciences and that the course should rather be called "oceanography applied to problems of fisheries research". This would indicate more clearly that knowledge of general aspects of oceanography is needed before attention could be focussed on application to problems of fisheries. A course advertised under "fisheries oceanography" raises expectations of solutions to practical problems. To fulfil such expectations is virtually impossible. A well-posed problem in fisheries oceanography

is based on several years' data on fish behaviour and environmental conditions, which cannot be generated during a four-week training course. A training course can only teach the basic techniques, and the physical principles behind them, which will be found useful in problems of fisheries management and research.

The possibility of this misunderstanding, and of the wrong expectations that come with it, is particularly likely in the South-East Asian environment. The countries of the region have a long tradition of advanced fish harvesting, including aquaculture, shrimp farming etc. their efforts in marine sciences have been directed mainly towards improved management of these traditional activities. Physical oceanography has been badly neglected, to the extent that many of the scientists thought to be the most suitable ones to participate in a training course on "fisheries oceanography" had no background knowledge in oceanography at all. It is not surprising that they felt that the lectures were not directly related to their day-to-day duties. Their reaction underscores the need for establishing physical oceanography in their countries.

3.3 Range of equipment for the course

During the preparation of the course, the course coordinator had suggested inclusion of a conductivity/temperature/depth (CTD) system in the equipment for the course. This would enable participants to get a feeling for the range of possible instrumentation in oceanography, including instrumentation which they may not be likely to use for many years to come. The alternative approach, favoured by IOC at the time, is restriction of equipment to a level usually found in laboratories of the region. Eventually, the approach taken was a compromise: most of the work was based on classical water sampling and salinity determination by benchtop inductive salinometer, but a temperature-salinity bridge and a dissolved oxygen meter were used as examples of inexpensive modern equipment.

The response during the course clearly shows that participants expect to be able to see and handle equipment which they find mentioned in the literature - and which has become an integral part of modern oceanography - but which they cannot afford to use themselves at present. Some participants stated that as a result of the Training Course they intend to ask their governments for oceanographic equipment. A fuller knowledge of the existing range of instrumentation could assist them in submitting a better case.

**LIST OF LECTURERS FOR THE IOC/SEAFDEC TRAINING COURSE
IN FISHERY OCEANOGRAPHY
6-31 May 1985**

- Dr. Matthias Tomczak : Department of Geology and
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- Dr. Gary Sharp : IOC Consultant
- Ms. Sunee Suvapepun : Marine Fisheries Officer
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- Dr. Piamsak Menasveta : Director of Sichang Marine
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- Dr. Manuwadi Hungsprugs : Associate Professor
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**LIST OF PARTICIPANTS OF IOC/SEAFDEC TRAINING COURSE
IN FISHERY OCEANOGRAPHY
6-31 May 1985**

- CHINA, PEOPLE'S REPUBLIC OF** * Mr. Mao Xing Hua
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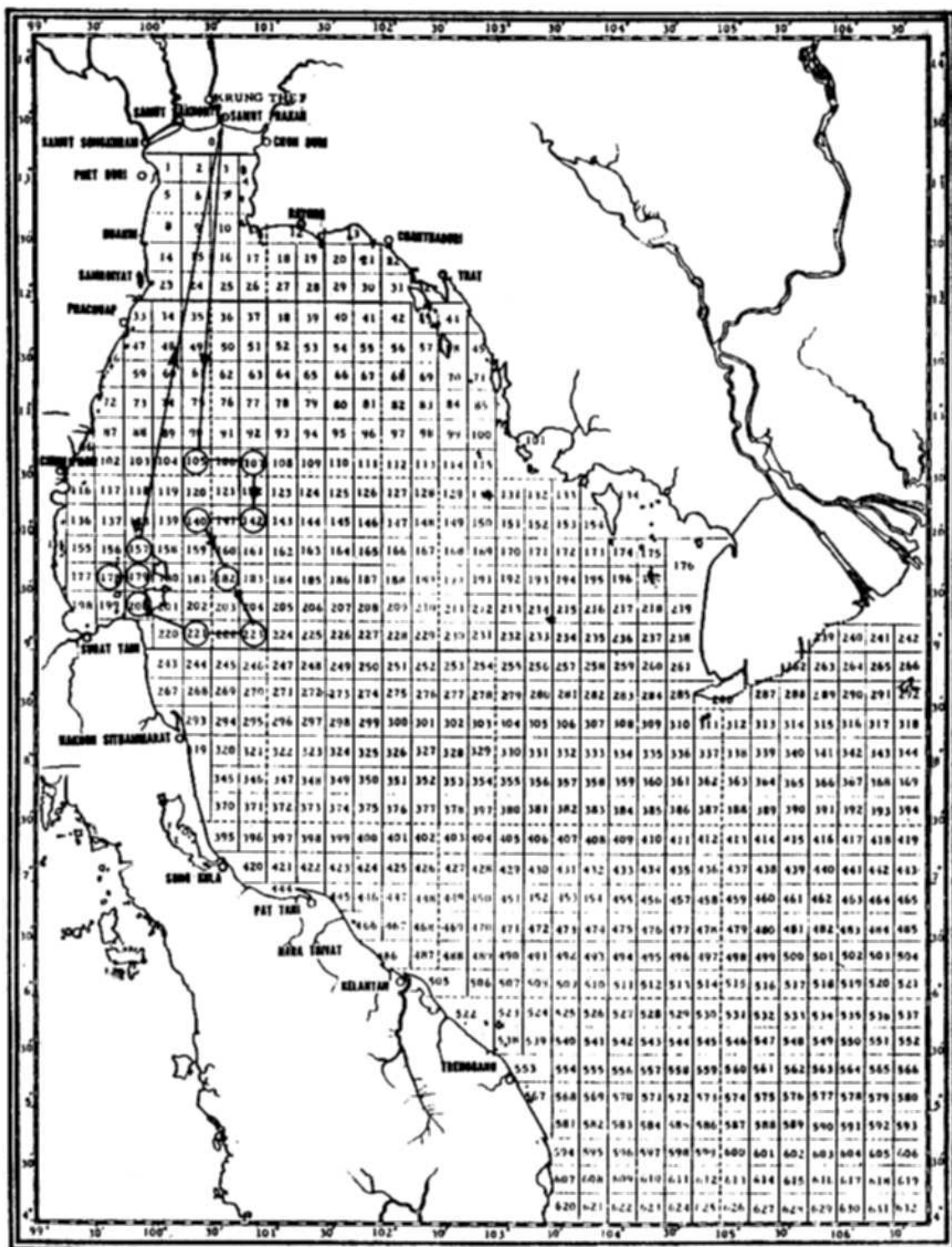
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**IOC/SEAFDEC REGIONAL TRAINING COURSE
IN FISHERIES OCEANOGRAPHY IN THE WESTERN PACIFIC OCEAN
6-31 May 1985**

TRAINING SCHEDULE

Mon.	6 May:	1000-1030	Opening Ceremony (Dr. Ruivo, Dr. Veravat)
		1100-1200	Course Overview (Dr. Tomczak)
		1300-1600	Fisheries Oceanography: An overview (Dr. Tomczak)
Tue.	7 May:	0900-1200	Physical Oceanography: (1) Properties of sea water ✓ (Dr. Tomczak)
		1300-1630	Marine Chemistry: (1) Basic parameters (Dr. Manuwadi)
Wed.	8 May:	0900-1200	Marine Chemistry: (2) Nutrients (Dr. Manuwadi)
		1300-1630	Physical Oceanography: (2) Fluid dynamics ✓ (Dr. Tomczak)
Thur.	9 May:	(National holiday)	Excursion: Khao Keaw Bangsean Marine Science Center Pattaya (Mr. Somnuk)

Fri. 10 May:	0900-1200	Marine Chemistry: (3) Dissolved and particulate organics (Dr. Gullaya)
	1300-1630	Physical Oceanography: (3) Hydrography of Southeast Asian Water (Dr. Tomczak)
Sat. 11 May:		Excursion: Bangkok (Mr. Somnuk)
Sun. 12 May:		Excursion: Ayuthaya Bang pa-in (Mr. Somnuk)
Mon. 13 May:	0900-1200	Physical Oceanography: (4) Circulation pattern of water of masses (Dr. Tomczak)
	1300-1630	Marine Chemistry: (4) Primary productivity (Dr. Wilaiwan)
Tue. 14 May:	0900-1015	Physical Oceanography: (5) Coastal upwelling
	1030-1200	(6) Estuaries (Dr. Tomczak)
	1300-1630	Planktonology (Miss Sunee)
Wed. 15 May:	0900-1200	Marine Chemistry: (5) Oil and sediment pollution (Dr. Manuwadi)
	1300-1630	Fisheries Oceanography: (1) Influence of changes in the marine environment on productivity (Dr. Sharp)

Thur. 16 May:	0900-1200	Fisheries Oceanography: (2) Influence of marine environment variability on juvenile stages of fish (Dr. Sharp) ✓
	1300-1630	Fisheries Oceanography: (3) Influence of environmental variability on fish behaviour (Dr. Sharp) ✓
Fri. 17 May:	0900-1015	Instrumentation: (1) Physical oceanography (Dr. Tomczak) ✓
	1030-1200	Instrumentation: (2) Shipboard equipments (Dr. Tomczak)
	1300-1630	Instrumentation: (3) Manual and automated chemical analysis (Dr. Sirichai)
Sat. 18 May:		Preparation for training cruise (Dr. Tomczak, Dr. Sirichai, Dr. Wilaiwan, Mr. Somnuk)
Sun. 19 May:		Shipboard training on board M.V. PAKNAM (Dr. Tomczak, Dr. Sirichai, Dr. Wilaiwan, Mr. Somnuk)
Fri. 24 May:		
Sat. 25 May:		Excursion: Nakhon Pathom, Rose garden, Buddha Monton (Mr. Somnuk)
Sun. 26 May:		Free
Mon. 27 May:		Evaluation of data obtained (Dr. Tomczak, Dr. Wilaiwan, Mr. Somnuk)
Tue. 28 May:	0900-1200	Evaluation of data obtained (Dr. Tomczak, Dr. Wilaiwan, Mr. Somnuk)

	1300-1500	Visit the Marine Fisheries Laboratory, Marine Fisheries Division, Department of Fisheries (Mr. Somnuk)
	1530-1630	Visit the Department of Marine Science, Faculty of Science, Chulalongkorn University (Mr. Somnuk)
Wed. 29 May:	0900-1015	Evaluation of data obtained (Dr. Tomczak, Mr. Somnuk)
	1030-1200	Physical Oceanography: (7) Remote sensing ✓ (Dr. Tomczak)
	1300-1430	Physical Oceanography: (8) Numerical models ✓ (Dr. Tomczak)
	1430-1630	Visit the Exploratory Fishing Division, Department of Fisheries (Mr. Somnuk)
Thur. 30 May:	0900-1200	Marine Fisheries Research at national level (presentations by participants)
	1300-1630	International and Regional Cooperation: - IOC/FAO Programme on Ocean Science in Relation to Living Resources (OSLR) (Dr. Tomczak) - IOC/WESTPAC (Dr. Piamsak) - SEAFDEC (Dr. Matics)

Fri. 31 May: 0900-1200

General Discussion
(Dr. Tomczak, Dr. Manuwadi,
Mr. Somnuk)

1500

Participants move to
Asia Hotel, Bangkok
(Mr. Somnuk)

1900-2100

Closing Ceremony
(Mr. Vanich Varikul, Mr. Inoue)

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LIST OF DOCUMENTS

Lecture Notes

- LN 1 Fisheries Oceanography: An Overview
(Dr. Matthias Tomczak)
- LN 2 Fisheries Oceanography: Influence of Changes
in the Marine Environment on Productivity
(Dr. Gary D. Sharp)
- LN 3 Fisheries Oceanography: Ocean Sciences in
Relation to Living Resources
(Dr. Gary D. Sharp)
- LN 4 Fisheries Oceanography: Influence of Marine
Environment Variability on Juvenile Stage
of Fish
(Dr. Gary D. Sharp)
- LN 5 Fisheries Oceanography: Influence of
Environmental Variability on Fish
Behaviour
(Dr. Gary D. Sharp)
- LN 6 Physical Oceanography: Properties of Sea
Water
(Dr. Matthias Tomczak)
- LN 7 Physical Oceanography: Geophysical Fluid
Dynamics
(Dr. Matthias Tomczak)
- LN 8 Physical Oceanography: Hydrography of
WESTPAC and Southeast Asian Waters
(Dr. Matthias Tomczak)

- LN 9 Physical Oceanography: Water Masses and
Circulation
(Dr. Matthias Tomczak)
- LN 10 Physical Oceanography: Upwelling
(Dr. Matthias Tomczak)
- LN 11 Physical Oceanography: Estuaries
(Dr. Matthias Tomczak)
- LN 12 Physical Oceanography: Remote sensing
(Dr. Matthias Tomczak)
- LN 13 Physical Oceanography: Numerical models
(Dr. Matthias Tomczak)
- LN 14 Marine Chemistry: Basic Parameters
(Dr. Manuwadi Hungspreugs)
- LN 15 Marine Chemistry: Nutrients
(Dr. Manuwadi Hungspreugs)
- LN 16 Marine Chemistry: Dissolved and Particulate
Organic Matter
(Dr. Gullaya Wattayakorn)
- LN 17 Marine Chemistry: Primary Productivity
(Dr. Wilaiwan Thumtrakul)
- LN 18 Marine Chemistry: Oil and Sediment Pollution
(Dr. Manuwadi Hungspreugs)
- LN 19 Marine Chemistry: Defining Marine Pollution
A Comparison of Definitions Used by
International Conventions
(Dr. Matthias Tomczak)
- LN 20 Marine Chemistry: Heavy Metal Contamination
in Estuarine and Coastal Sediments:
Sources, Chemical Association and
Diagenetic Effects
(Dr. Manuwadi Hungspreugs)

- Ref. 3 Fisheries Oceanography by O. Suzuki, SEAFDEC Training Department, TRB/5 (Revised Edition) 1978.
- Ref. 4 Guide to Oceanographic and Marine Meteorological Instruments and Observing Practices, Unesco, 1975.
- Ref. 5 Chemical Methods for use in Marine Environmental Monitoring, Unesco, 1983.
- Ref. 6 The Practical Salinity Scale 1978 and the International Equation of State of Seawater 1980, Unesco, 1981.
- Ref. 7 International Oceanographic Tables, Volume 3 Unesco, 1981.
- Ref. 8 The Determination of Petroleum Hydrocarbons in Sediments, Unesco, 1982.
- Ref. 9 Manual for Monitoring Oil and Dissolved/ Dispersed Petroleum Hydrocarbons in Marine Waters and on Beaches, Unesco, 1984.
- Ref. 10 Guide to Operational Procedures for the Collection and Exchange of Oceanographic Data (Bathy and Tesac), Revised Edition, Unesco, 1984.
- Ref. 11 Scientific Report of the Intercalibration Exercise.
- Ref. 12 A Framework for the Implementation of the Comprehensive Plan for the Global Investigation of Pollution in the Marine Environment, Unesco, 1984.
- Ref. 13 Pollution in the Marine Environment, Unesco, 1978.
- Ref. 14 IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources. First Session, Paris, 16-20 July 1984.

- Ref. 15 Proceeding of the Technical Seminar on South
China Sea Fisheries Resources, Bangkok,
21-25 May 1973. Japan International Co-
operation Agency, Japan, 1977.
- Ref. 16 A Manual on Chemical Analysis of Coastal
Water and Bottom Sediment, Singapore, 1984.