Intergovernmental Oceanographic Commission
Training Course Reports
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IOC-DANIDA Training Course on the Taxonomy and Biology of Harmful Marine Microalgæ

University of Copenhagen, Denmark
31 July-11 August 1995

IOC-SAREC-DANIDA Training Course on the Taxonomy and Biology of Harmful Marine Microalgæ

University of Mauritius, Republic of Mauritius
5-14 February 1996

and

ANNUAL REPORT 1995
IOC Science and Communication Centre on Harmful Algæ

DANIDA
University of Copenhagen
Danish Fisheries Research Institute
Danish National Environmental Research Institute

UNESCO

IOC Training Course Reports

No.	Title	Language versions
1.	IOC Indian Ocean Region Training Course in Petroleum Monitoring Perth, 18 February-1 March 1980	English
2.	IOC Regional Training Course for Marine Science, Technicians Cape Ferguson, Queensland, 1-28 June 1980	English
3.	ROPME-IOC-UNEP Training Workshop on Oceanographic Sampling Analysis, Data handling and Care of Equipment, Doha, Qatar, 3-15 December 1983	English
4.	Stage COI d'initiation à la gestion et au traitement de l'information scientifique et technique pour l'océanologie, Brest, France, 28 novembre - 9 décembre 1983	French
5.	Curso mixto COI-OMM de formación sobre el Sistema Global Integrado de Servicios Oceánicos (SGISO), Buenos Aires, Argentina, 15-26 de octubre de 1984	Spanish
6.	UNESCO-IOC-NBO Training Course on Tidal Observations and Data Processing Tianjin, China, 27 August - 22 September 1984	English
7.	Stage COI sur la connaissance et la gestion de la zone côtière et du proche plateau continental Talence, France, 18 septembre - 4 octobre 1984	French
8.	IOC Regional Training Course on Marine Living Resources in the Western Indian Ocean Mombasa, Kenya, 27 August - 22 September 1984	English
9.	IOC-UNESCO Summer School on Oceanographic Data, Collection and Management Erdemli, Icel, Turkey, 21 September - 3 October 1987	English
10.	IOC-UNESCO Regional Training Workshop on Ocean Engineering and its Interface with Ocean Sciences in the Indian Ocean Region, Madras, India, 17 March - 5 April 1986	English
11.	IOC-UNESCO Training Course on the Use of Microcomputers for Oceanographic Data Management Bangkok, Thailand, 165 January - 3 February 1989	English
12.	IOC Advanced Training Course on Continental Shelf Structures Sediments and Mineral Resources Quezon City, Philippines, 2-13 October 1989	English
13.	IOC/IODE Training Course on GF3 Data Formatting System Obninsk, USSR, 14-24 May 1990	English
14.	IOC Training Course on Microcomputers and Management of Marine Data in Oceanographic Data Centres of Spanish-speaking Countries, Bogotá, Colombia, 21-30 October 1991	English Spanish
15.	IOC Advanced Training Course on Nearshore Sedimentation and the Evolution of Coastal Environments, Kuala Lumpur, Malaysia, 17-29 February 1992	English
16.	First IOC Training Course on the Applications of Satellite Remote Sensing to Marine Studies Caracas, Venezuela, 24-28 September 1990	English
17.	IOC-KMFRI-RECOSCIX (WIO) Regional Training Course on Microcomputer-based Marine Library Information Management, Mombasa, Kenya, 10-21 August 1992	English
18.	ROPME-IOC Regional Training Course on Management of Marine Data and Information on Microcomputers for the ROPME Region, Kuwait, 18-28 October 1992	English
19.	IOC-SOA Training Workshop on Environmental Effects on Benthic Communities Xiamen, China, 19-23 October 1992	English
20.	IOC Training Course for the Global Sea Level Observing System (GLOSS) directed to the African and South American Portuguese and Spanish-Speaking Countries São Paulo, Brazil, 1-19 February 1993	English
21.	IOC-SSTC-SOA Training Course on Marine Information Management and ASFA Tianjin, China, 19-30 October 1992	English
22.	First IOC/IOCARIBE-UNEP Training Course on Monitoring and Control of Shoreline Changes in the Caribbean Region, Port-of-Spain, Trinidad and Tobago, 21-30 July 1993	English Spanish
23.	IOC/WESTPAC Training Course on Numerical Modelling of the Coastal Ocean Circulation Matsuyama, Japan, 27 September - 1 October 1993	English
24.	IOC-JODC Training Course on Oceanographic Data Management Tokyo, Japan, 28 September - 9 October 1992	English
25.	IOC-JODC Training Course on Oceanographic Data Management Tokyo, Japan, 27 September - 8 October 1993	English
26.	IOC Training Course on Ocean Flux Monitoring in the Indian Ocean. Organized with the support of the Government of Germany, Mombasa, Kenya, 15-27 November 1993	English
27.	IOC-UNEP-SPREP Training Course on Coral Reef Monitoring and Assessment Rarotonga, Cook Islands, 23 February - 13 March 1994	English
28.	IOC-JODC Training Course on Oceanographic Data Management Tokyo, Japan, 26 September - 7 October 1994	English
29.	IOC-UNEP-WHO-FAO Training Course on Qualitative and Quantitative Determination of Algal Toxins Jena, Germany, 18-28 October 1994	English
30.	IOC Training Course on Oceanographic Data Management for Black Sea Countries Obninsk, Russian Federation, 1-12 August 1994	English
31.	COI-CEADO Curso Regional de Capacitación en Gestión de Datos e Información Oceanográficos Buenos Aires, Argentina, 17-28 de octubre de 1994	Spanish
32.	IOC-UNEP-FAO Training Course on Nutrient Analysis and Water Quality Monitoring Zanzibar, Tanzania, 21-26 November 1994	English
33.	IOC-IOMAC Advanced Training Course on Marine Geology and Geophysics off Pakistan. Pakistan, 12-26 November 1994	English
34.	Training Course on Management of Marine Data and Information for the Mediterranean Region Valletta, Malta, 10-21 April 1995	English
35.	IOC-UNEP-WHO-FAO Training Course on Toxin Chemistry and Toxicology related to Harmful Algal Blooms Trieste, Italy, 3-12 September 1995	English
36.	MAST-IOC Advanced Phytoplankton Course on Taxonomy and Systematics Naples, Italy, 24 September - 14 October 1995	English
37.	IOC-JODC Training Course on Oceanographic Data Management Tokyo, Japan, 16-27 October 1995	English
38.	IOC/IODE Training Course on Marine Geological and Geophysical Data Management Gelendzhik, Russian Federation, 13-29 September 1995	English
39.	IOC/GLOSS-GOOS Training Workshop on Sea-Level Data Analysis, Geodetic & Research Branch Survey of India, Dehra Dun, India, 21 November- 1 December 1995	English
40.	IOC-DANIDA Training Course on the Taxonomy and Biology of Harmful Marine Microalgæ University of Copenhagen, Denmark, 31 July-11 August 1995; IOC-SAREC-DANIDA Training Course on the Taxonomy and Biology of Harmful Marine Microalgæ University of Mauritius, Republic of Mauritius, 5-14 February 1996; and Annual Report 1995, IOC Science and Communication Centre on Harmful Algæ DANIDA, University of Copenhagen, Danish Fisheries Research Institute, Danish National Environmental Research Institute	English

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ABSTRACT

The IOC has over the past eight years given increasing attention to activities aimed at developing capacity in research and management of harmful marine microalgae. The term 'harmful algae' refers to the detrimental effects caused by these organisms to fisheries, aquiculture, human health, recreation areas, ecosystems, etc.

Through Resolution XVII-2 (March 1993) of the Assembly of the Intergovernmental Oceanographic Commission of UNESCO (IOC) it was decided to establish an IOC Science and Communication Centre on Harmful Algae in order to implement elements of the IOC Harmful Algal Bloom Programme. The Centre was inaugurated on 5 May 1995 as a joint project between the IOC, the Danish International Development Assistance (DANIDA), University of Copenhagen, the Danish Institute for Fisheries Research (DFU), and the Danish National Environmental Research Institute (NERI). The Centre has three staff members, and is located at the Botanical Institute, University of Copenhagen.

The Centre specifically gives direct and educational assistance to developing countries having problems with harmful algae. The capacity building and science activities accounted for in this report is to be seen as a direct follow-up to UNCED, implementation of Agenda 21 and the Recommendations of IOC Member States.

During the first year of operation the Centre organized training courses on the taxonomy and biology of harmful marine microalgae at University of Copenhagen (IOC-DANIDA) and at the University of Mauritius (IOC-SAREC-DANIDA). The Courses had 13 and 11 participants respectively, and the objective was to improve the participants taxonomic skills in order to enable them to make reliable identification of phytoplankton species causative of harmful algal events.

The Centre has assisted in the preparation of training material and publications: (i) Manual on Harmful Marine Microalgae; (ii) Design and Implementation of some Harmful Algal Monitoring Systems; and (iii) International Directory of Experts on Harmful Algae.

During its first year of operation the Centre provided Literature Grants to 30 libraries in developing countries and furnished another 50 with reports and publications.

The establishment of an bibliographic database on harmful algae has begun. In parallel to the data-base a library will be established in order for the Centre to provide papers to individual researchers in developing countries. The Bibliographic base is established in collaboration with ASFA.

The existing culture facilities at the Botanical Institute, the 'Scandinavian Culture Centre for Algae and Protozoa', have been expanded to serve the Centre. The cultures are freely available to scientists in developing countries for research and teaching purposes.

Proposals to the Centre regarding M.SC or Ph. D studies are currently being reviewed. Initiative has also been taken to develop joint projects with partner institutions in the Philippines, Vietnam, Egypt, and India.

Activities and expenditures during the first year of operation corresponded closely to the Workplan and Budget.

1. BACKGROUND

The IOC has over the past eight years given increasing attention to activities aimed at developing capacity in research and management of harmful marine microalgae. Due to the interdisciplinary nature of the topic; taxonomy, toxin chemistry, monitoring, human health, etc, there has so far been no comprehensive source of guidance with respect to both research and management methodologies, nor any coordinated effort aimed at training and capacity building within the field. The activities accounted for in this report, together with other activities of the IOC Harmful Algal Bloom Programme, are intended to help fill this gap.

The term 'harmful algae' is not a scientific one, but a societal, determined by the increasing detrimental effects caused by these organisms to national economies. One aim of supporting research and capacity building on harmful algae is to help mitigate their negative effects on fisheries, aquiculture, human health, recreation areas, ecosystems, etc. Understanding the causes of harmful algal events and developing contingency plans directly links to other major areas of scientific and societal concern, including eutrophication, influence of climate change on marine ecosystems, integrated coastal zone management, fisheries management, and transfer of non-indigenous marine species. These linkages are important in addressing the problem of harmful algae adequately, and in a way where society will understand and appreciate the results of scientific advances within the field.

The United Nations Conference on Environment and Sustainable Development (UNCED, 1992), generated Agenda 21 and the two Conventions on Climate Change and Biological Diversity, and fully recognized the need for scientifically based information and methods for management, and specifically addresses the major areas of concern mentioned above.

The governing bodies of the IOC has given great emphasis to reduce the scientific uncertainties relating to oceans and coastal areas; to strengthen data exchange and ocean services; to enhance capacity-building in developing countries for marine research and systematic ocean observations; and to foster international and regional co-operation in marine science and systematic ocean observations. The research and the capacity building activities accounted for in this report, together with other IOC activities, is thus to be seen as a direct follow-up to UNCED, implementation of Agenda 21 and the Recommendations of Member States.

The IOC is highly appreciative of the Institutions which has made possible the capacity building and research activities on harmful algae of the IOC and its Science and Communication Centre.

2. ESTABLISHMENT OF A SCIENCE AND COMMUNICATION CENTRE

The IOC Science and Communication Centre on Harmful Algae is established based on Resolution XVII-2 (March 1993) of the Assembly of the Intergovernmental Oceanographic Commission of UNESCO in order to implement elements of the IOC Harmful Algal Bloom Programme. The Centre specifically gives direct and educational assistance to developing countries having problems with harmful algae.

The Centre was inaugurated on 5 May 1995 by the Executive Secretary IOC Dr. Gunnar Kullenberg and Professor Øjvind Moestrup at the Botanical Institute, University of Copenhagen, as a joint project between the Intergovernmental Oceanographic Commission of UNESCO, the Danish International Development Assistance (DANIDA), University of Copenhagen, the Danish Institute for Fisheries Research (DFU), and the Danish National Environmental Research Institute (NERI). The Centre may be considered as a contribution of Denmark to the request of the IOC that Member States undertake direct responsibility of the implementation of the Commissions programme activities.

Representatives of the sponsoring agencies, the Danish National Commission for UNESCO, the Danish National Committee for IOC (DNO), the Chair of the IOC-FAO Intergovernmental Panel on Harmful Algal Blooms (IPHAB), guests from Danish institutions, and guests from France, Spain and Sweden assisted at the opening ceremony

2.1 ACCOMMODATION

The Centre is located at the Department of Phycology and Mycology of the Botanical Institute, and has at its disposal three newly renovated rooms to serve as office and library of the Centre. In addition hereto the Centre has permanent access to laboratories and microscopy rooms at the Institute. The Centre has been equipped with computers and related hard- and software required for the foreseen activities. Microalgae culture facilities have been established (see 5).

2.2 STAFFING

The staff is Associate Professor Dr. Jacob Larsen (Ph. D), Project Coordinator Henrik Enevoldsen (MSc), and Documentalist Sonja Hvalkof (MSc). Dr. Larsen has a long research and teaching experience within the field and has been associated to the Botanical Institute for more than 15 years. Mr. Enevoldsen has previously worked at IOC Headquarters on the IOC harmful Algal Bloom Programme. Ms. Hvalkof is an experienced and research librarian previously employed by the World Health Organization.

3. TRAINING AND CAPACITY BUILDING

The training and capacity building activities of the Centre are planned to consist of one major course each year in Copenhagen, one regional course, and individual training. During 1995 an advanced international course was held in Copenhagen, a basic regional course for the Northern and Western Indian Ocean was held at Mauritius, and the Centre assisted at an IOC sponsored international advanced phytoplankton course held in Naples, Italy.

3.1 IOC-DANIDA TRAINING COURSE ON THE TAXONOMY AND BIOLOGY OF BIOLOGY OF HARMFUL MARINE MICROALGAE, UNIVERSITY OF COPENHAGEN, 31 JULY-11 AUGUST 1995

3.1.1 Background

The IOC-FAO Intergovernmental Panel on Harmful Algal Blooms has adopted a comprehensive Training and Capacity Building Programme on Harmful Algae. The Training Programme include activities on taxonomy, ecology, toxin chemistry, toxicology, and monitoring. The focus of the training and capacity building activities has been defined through a number of international workshops and meetings from 1987-93.

Within the field of taxonomy and identification of harmful microalgae the first course organized within the IOC Harmful Algal Bloom Programme was held in August 1993 as an IOC-DANIDA (Danish International Development Assistance) Training Course at the Botanical Institute, University of Copenhagen. The experience from that course provided the base for the Taxonomy Module of the above mentioned Training and Capacity Building Programme on Harmful Algae. The Taxonomy Module will in particular be implemented by the IOC Science and Communication Centre on Harmful Algae at the University of Copenhagen, Denmark, and in the IOC-WESTPAC Region by the Asian Centre on Marine Living Aquatic Resources, Japan.

The 1995 Course was announced in all IOC Member States through the national IOC Action Addressees. The 13 participants (see Annex I hereto) were selected among 65 applicants. 10 seats were

granted by IOC/DANIDA, and three seats were offered to self paying participants. The participants to be granted full support are those from Member States eligible to receive support from DANIDA, which is presently those with a Gross National Product of less that 2.500 US$. Due to very late cancellations from African participants, seats were offered to very qualified applicants from South American countries which normally would not be grated full support as they are just above the limit as defined by DANIDA, why their travel was sought covered by IOC funds.

3.1.2 Objective

The objective of the Course was to improve the participants taxonomic skills in order to enable them to make reliable identification of phytoplankton species causative of harmful algal events.

The course was aimed at participants who had already a basic knowledge of phytoplankton taxonomy (major taxonomic groups and their characteristics) and who were familiar with the basic use of microscopes. Applicants which were themselves trainers were given priority. The Course was thus what is often referred to as 'training of trainers'.

3.1.3 Programme

On behalf of the Botanical Institute, University of Copenhagen, Prof. Ø. Moestrup welcomed the Participants. Mr. Henrik Enevoldsen, IOC Science and Communication Centre on Harmful Algae, welcomed the participants on behalf of the Executive Secretary IOC, and gave an introduction to the IOC, its Harmful Algal Bloom Programme, and the IOC Science and Communication Centre on Harmful Algae.

The Course was a combination of practical work in the laboratory, microscopy, lectures, and discussion of selected topics in smaller groups. Light microscopes, electron microscopes, and video-equipment were used for demonstration of specimen features and preparation techniques. The lectures focused on taxonomy, but also included ecology, toxin chemistry, and monitoring. The complete Course Programme, and names and addresses of Lectures can be found in Annex I hereto.

Each Participant was provided with a 400 page "take-home" training course compendium, summarizing the state of the art with respect to harmful microalgae taxonomy and identification, as well as a summary of the lectures given during the Course. For a "Table of Contents" of the Training Course Compendium see Annex I hereto.

A large selection of modern and classical taxonomic literature was available during the Course, and Trainees had access to copy-machines for papers of particular interest. More than 5000 photo-copies were provided. An agreement vis a vis Copyrights have been established to allow for this opportunity. Each Trainee was also provided a 20 µm mesh plankton net. In many cases quality plankton nets are not only expensive, but also difficult to purchase in developing countries.

Most Participants had brought their own samples, and time was reserved for them to undertake work according to individual wishes. This provided an opportunity to address specific questions and many Trainees had an opportunity to prepare and bring home quality scanning electron or light microscopy photos of specimens from their own samples.

Trainees and Lecturers were provided with a Certificate stating their participation/contribution in the Course (see Annex I).

Preliminary discussions were held on regional IOC courses on harmful algae in South America, and on possible research projects, Ph. D, and master projects as cooperation between the IOC Centre and University of the Philippines and Chilean institutions respectively.

3.1.4. Evaluation

Towards the end of the Course each Trainee was asked to complete a questionnaire for assessment by trainees in order to evaluate the quality of the Course. A summary of the evaluation with comments is given in Annex I, D, hereto.

In general the Participants expressed that the objectives of the course were well specified, that they had been successfully met, and that the programme was of adequate level and duration. Several participants emphasized the importance of getting - and staying - in contact with persons working in the same field. It was suggested that this course is followed up by shorter, but more specialized courses. The establishment of the 'Science and Communication Centre' was appreciated - in writing or orally - by all the participants. The over-all rating of the course was indicated as 'very good'.

2.1.5 Acknowledgements

The Course greatly benefitted from the in-kind support from the following institutions: University of Tokyo, Dr. Yasuwo Fukuyo (Japan); University of the Philippines, Dr. Rhodora Corrales (The Philippines); Waterways Commission (Australia); International Council for the Exploration of the Sea; Ministry of Fisheries (Denmark).

3.2 IOC-SAREC-DANIDA TRAINING COURSE ON THE TAXONOMY AND BIOLOGY OF HARMFUL MARINE MICROALGAE, UNIVERSITY OF MAURITIUS, 5-14 FEBRUARY 1996

3.2.1 Background

A regional course specifically on the identification and biology of harmful marine microalgae was requested by the IOC Sub-Commission for the Western and Northern Indian Ocean (IOCINCWIO). Occurrences of harmful algae incidents have been known from the region for centuries, but so far harmful effects have been relatively restricted. With the growing interest in shellfish and fish farming, monitoring for harmful species becomes essential in relation to export of seafood products as well as in relation to protection of local consumers.

The local organizer was Professor I. Fagoonee, Dean, Faculty of Science, University of Mauritius, in collaboration with the IOC Science and Communication Centre on Harmful Algae (Denmark). The Course was funded jointly by SAREC (Sweden) and DANIDA. SAREC covered travel, accommodation and local expenses for participants, and DANIDA covered teaching materials, lectures travel, and local expenses.

The course had 11 participants from Member States in the Region short of skilled taxonomists, hereof 9 received full grants. The participants were selected among 25 applicants. The list of participants is included as Annex II hereto.

3.2.2 Objective

Improvement of the participants taxonomic skills in order to enable them to make reliable identification of phytoplankton species causative of harmful algal events. The Course was aimed at participants who had a basic knowledge of phytoplankton taxonomy (major taxonomical groups and their characteristics) and were familiar with the basic use of microscopes. Applicants who were themselves trainers were be given priority.

3.2.3 Programme

The Course was opened by the Minister of Fisheries and Marine Resources Hon. S. Obeegadoo, the Dean, Faculty of Science, University of Mauritius, Prof I. Fagoonee, and H. Enevoldsen, IOC.

The Course was a combination of practical work in the laboratory, microscopy, lectures, and demonstration of methodology in the field. Light microscopes was used for demonstration of specimen features and preparation techniques. At the end of the Course time was reserved for the participants to undertake work of their own wishes. A selection of modem and classical taxonomic literature was available during the Course. Lectures focused on taxonomy, but also included ecology, sampling techniques, and toxicity tests. The complete Course Programme, and names and addresses of Lectures can be found in Annex II hereto.

Each Participant was provided with a 400 page "take-home" training course compendium, summarizing the state of the art with respect to harmful microalgae taxonomy and identification, as well as a summary of the lectures given during the Course. After the Course the participants have been provided with a copy of the IOC Manual on Harmful Marine Microalgae which eventually is partly replacing the compendium. For. a "Table of Contents" of the Training Course Compendium see Annex I hereto.

A selection of modern and classical taxonomic literature was available during the Course, and Trainees had access to copy-machines for papers of particular interest.

Each Trainee was provided a 20 µm mesh plankton net, a Sedgewick Rafter Counting Slide for quantitative work, and basic equipment for simple Artemia toxicity tests. In many cases such quality equipment is not only expensive, but also difficult to purchase in developing countries.

Most Participants had brought their own samples, and time was reserved for them to undertake work according to individual wishes. The microscope facilities at the University of Mauritius were excellent, but library facilities were limited.

Trainees and Lecturers were provided with a Certificate stating their participation/contribution in the Course (see Annex II).

Preliminary discussions were held on regional follow-up action with the Chair of IOCINCWIO, Prof. Ragoonaden and the Dean of the Science Faculty of University of Mauritius, including possible research projects, Ph. D, and master projects as cooperation between the IOC Centre and research institutions in the region.

3.2.4 Evaluation

At the end of the course a questionnaire for assessment by trainees was distributed. A summary of the assessment with selected comments is given in Annex II, D, hereto.

In general the participants found that the objectives of the course had been successfully met, and all participants with one exception found that the standard of the course programme was adequate. Many participants noted that they would feel more confident in their future work in identifying toxic algal species. Also the demonstration of various techniques and equipment was commented on positively.

The need for a more advanced course as a follow-up to the present one was expressed. Several indicated that going home to continue their monitoring work, they would reconsider their previous species identifications. The over-all rating of the course was indicated as very good to outstanding.

3.3 MAST-IOC ADVANCED PHYTOPLANKTON COURSE ON TAXONOMY AND SYSTEMATIC, STAZIONE ZOOLOGICA 'A. DOHRN' DI NAPOLI, 24 SEPTEMBER-14 OCTOBER 1995

The IOC cosponsored this course and the Centre contributed through Dr. J. Larsen of the Centre, who was one of the lecturers of this 3 week course. A report on the course has been separately published as IOC Training Course Report No. 36.

3.4 PREPARATION OF TEACHING MATERIAL AND RELATED PUBLICATIONS

The Centre has during the first year of operation assisted in the preparation of training material in relation to three IOC projects. Two of them were within the HAB Training and Capacity Building Programme, namely the preparation of a comprehensive training 'Manual on Harmful Marine Microalgae', and a guide on 'Design and Implementation of Harmful Algal Monitoring Systems'. The Centre also assisted in the compilation of an 'International Directory of Experts on Harmful Algae'.

3.4.1 IOC Manual on Harmful Marine Microalgae

A 500 page Manual on research and monitoring methodology has been prepared by an international group of 42 authors. The Manual will be interdisciplinary, and the only existing of its kind. The Editor-in-Chief, Dr. Gustaaf Hallegraeff, University of Tasmania, Australia, visited the Centre in relation to the finalization of the manuscript. The Centre has contributed with chapters, and has acted as the technical editor and coordinator of the project. The Manual will be published by the IOC during spring 1996, and a stock will be held at the Centre for distribution to scientists and libraries in developing countries.

3.4.2 HAB Monitoring guide

An IOC-UNESCO/DANIDA Funds-in-Trust Project has over the last two years worked on development of training materials and activities in relation to monitoring and management of harmful algae. The project has enabled the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB) to established a Task Team on 'Design and Implementation of Harmful Algal Monitoring Systems'. In cooperation with the International Council for the Exploration of the Sea (ICES) a worldwide survey has been carried out to collate information on existing monitoring practices and experience in order to provide an information basis for improved monitoring systems or/and to serve as a basis of inspiration to Member States not yet monitoring for the occurrence of harmful marine microplankton. The survey has been the main source of data for the preparation of a comprehensive report (Report No. 44 in the IOC Technical Series: 'Design and Implementation of some Harmful Algal Monitoring Systems'). The Third Session of IPHAB recommended that the report should serve a the background document for an international capacity building workshop on HAB monitoring. The training workshop is now being prepared.

The Centre has coordinated as well as participated in the implementation of the project.

3.4.3 Directory of Experts

In cooperation with the NOAA National Marine Fisheries Service of the United States of America the Centre prepared and finalized the compilation of 'An International Directory of Experts in Toxic and Harmful Algae and Their Effects on Fisheries and Public Health'. Apart from being of general use to all those working within the field, the Directory is in particular valuable to scientists in developing countries who are often isolated from colleagues with similar interests. The Directory is intended to strengthen networking. It is free of charge, and published in 2000 copies.

4. LITERATURE SERVICE

4.1 LITERATURE GRANTS

One service of the Centre is specified to be assistance to marine science libraries in developing countries short of key publications in relation to harmful algae. During its first year of operation the Centre provided Literature Grants to 30 libraries and furnished another 50 with reports and publications. A list of receivers is attached hereto as Amex III. The list also includes separately those who requested

support but were not granted. The Grants are announced currently in the IOC newsletter on toxic algae and algal blooms *'Harmful Algae News'*.

In deciding whether a request is to be met or not, the current GNP list of the World Bank is applied. Nevertheless it has in some cases been problematic in the sense that workers in e.g. Argentina and Chile (both GNP above 2.500 US$ GNP) are in a no better position than their colleagues in Ecuador or Colombia (both below 2500 US$ GNP). Therefore grants have been provided to these countries in the first months of operation, also due to the fact that the Centre did not have in hand the above mention GNP List. As of 1 January 1996 the administration of the book grants is taken care of by the Documentalist of the Centre and the GNP list will be applied strictly.

During training courses held in Copenhagen and elsewhere, it has been noted that access to well-furnished to science libraries is a major constraint to many researchers in developing countries. Research institution often succeed in obtaining substantial support for buildings, advanced equipment, and maybe even funds for salary, but it appears that establishment of research libraries is only rarely included.

4.2 HAB BIBLIOGRAPHIC DATA-BASE

The objective is to establish a bibliographic database containing all literature, papers, reports etc, published on harmful algae and closely related subjects within taxonomy, biology, toxin chemistry, toxicology etc. In parallel to the data-base a library will be established in order for the Centre to provide the titles identified using the ASFA-ISIS Base to individual researchers at research institutions in developing countries, with the shortest possible delay.

The data-base will primarily be used at the IOC Science and Communication Centre on Harmful Algae, but fully established it would be highly desirable to make it accessible via World-Wide-Web or CD-ROM.

The Aquatic Science and Fisheries Abstracts (ASFA), a joint UNEP-FAO-IOC undertaking, already contains a high number of relevant titles, and these titles will be exported into the ASFA-ISIS version to avoid double work. Supplementary titles from 1978 and onwards as well as titles from before 1978 will be entered at the IOC Centre following the ASFA format, in order to ensure the compatibility of the new entries into the Harmful Algae ASFA-ISIS with the ASFA system. The Centre Documentalist, Ms. Hvalkof, who is creating the base is receiving the required training at the ASFA Input Centre, Bundesanstalt fur Fisherei, Information und Dokumentationsstelle, Hamburg, Germany.

A very rough estimate is that approximately 40-50% of 6000 relevant titles on harmful algae are presently in ASFA. Upon completion of the base we can offer the ASFA Board to consider inclusion of the entire ASFA-ISIS Harmful Algae base into ASFA itself.

The work with establishing the Bibliographic Data-base began February 1997. Mr. Peter Pissierssens, IOC Secretariat, Paris, visited the Centre to advice on establishment of the Data-base.

5. CULTURE FACILITIES

The culture facilities at the Botanical Institute are centred around the 'Scandinavian Culture Centre for Algae and Protozoa', and these facilities are shared by the IOC Science and Communication Centre on Harmful Algae. At the Botanical Institute, there is a long tradition for culturing algae from particularly temperate and Arctic areas whereas the facilities for culturing tropical algal species are limited. However, many toxic species occur in tropical waters, and therefore, in connection with the establishment of the Centre, two culture cabinets were purchased to supplement the existing culture facilities at the Botanical Institute.

At the Centre are currently maintained 84 strains representing 35 species of toxic or potentially toxic algae in culture. Several cultures have been given to the Centre by colleagues and collaborating

scientists from various parts of the world. This include the species *Pyrodinium bahamense* var. *compressum* which forms severe blooms in many areas in South East Asia, and which is one of the major responsible species for outbreaks of paralytic shellfish poisoning (PSP) in that part of the world.

The cultures are freely available to scientists in the developing countries for research and teaching purposes. Detailed studies of selected species is also planned to be included as part of future joint research projects, see below. Finally, the cultures have been used intensively for demonstration and practical exercises during the training courses.

6. COOPERATIVE RESEARCH

6.1 SUPERVISION OF STUDENTS

Several individuals have contacted the Centre regarding M.Sc or Ph. D studies. In reply to these inquiries, a letter briefly explaining the Ph. D programme of the University of Copenhagen as well as the expectations with regard to the contents of the individual study programmes was prepared. It is the intention that the M. Sc/Ph. D students should focus mainly on issues pertaining to problems in their home area or country, and that field and laboratory work - at least in part - should be carried out at local research institutions in the developing countries. The Centre and the Botanical Institute at the University of Copenhagen will supervise the students, but they should spend only a limited period of time each year in Copenhagen in order to carry out work which is difficult or impossible to do at their home institution (e.g. electron microscopy, literature search etc.).

At present, 4 persons - from the Second Institute of Oceanography, Hangzhou, China; Universidad Austral de Chile, Puerto Mont, Chile; University of Mauritius, Mauritius; and Institute of Oceanography, Nhatrang, Vietnam - have responded to the reply letter by submitting draft proposals for Ph.D studies. Proposals are currently being reviewed together with the Chair of the Institute, Helge A. Thomsen, and Professor Øjvind Moestrup, Botanical Institute, University of Copenhagen. Suitable Ph.D programmes will be presented to DANIDA as grant applications.

6.2 JOINT RESEARCH

During the first year of operation a number of contacts have been made with the view to investigate potential subjects and partner institution for joint research projects. Interest in such projects have specifically come from the Philippines, Egypt, and India.

A project proposal for a joint project with the University of the Philippines has been prepared and submitted to the Danish Embassy in Manila. The project is aimed at a floristic survey in Philippine water for the distribution of harmful or potentially harmful microalgae. The output of the project is envisaged to be two Philippine master degrees and a monograph on harmful and potentially harmful microalgae in Philippine waters. The project also includes a smaller ecological sampling programme aimed at describing the bloom dynamics of one of the most harmful algal species in the region, *Pyrodinium bahamense* var. *compressum.* Parts of the project are planned to be funded by and carried out in cooperation between University of the Philippines and University of Tokyo.

A joint project with University of Alexandria (Egypt) is in preparation. The project aims at describing the occurrence distribution of harmful algae in the waters around Alexandria. In particular studies on *Alexandrium minutum* which has caused severe problems since 1960. The project also includes culturing and experiments with cultures as well as toxin analysis of the species in question.

7. COMMUNICATION STRATEGY

The main mean of communication for the Centre has been the quarterly IOC newsletter *'Harmful Algae News.* The newsletter has around 2000 subscribers who thus currently receive information on the activities of the Centre, including details on application for training courses, literature grants, direct assistance, and research cooperation.

In August 1996 a specific pamphlet on the Centre and its activities was distributed along with the newsletter. The pamphlet was sponsored by the Danish National Environmental Research Institute.

An expanded information folder is in preparation, and will include details not only on the Centre in Copenhagen, but also on the complementary service activities of IOC HAB Programme in Spain, Japan and the USA.

The Centre was presented with an exhibit at the Third Session of the IOC-FAO Intergovernmental Panel on Harmful Algal Blooms, Paris June 1996, at the Seventh International Conference on Toxic Phytoplankton, Sendai, Japan, July 1996, and at the 9th Danish Oceanography Meeting, January 1997.

8. ADVISORY COMMITTEE

The Advisory Committee for the Centre is composed of representatives of the University of Copenhagen, the Danish Institute for Fisheries Research, the Danish National Environmental Research Institute, the Danish National Committee for IOC (DNO), the Chair of the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB), and the IOC Project Coordinator.

The Advisory Committee meets no less than once a year and is expected to evaluate the project including the Centre Staff, and submit a report to the Executive Secretary IOC. During the first year of operation the Committee met 7 December to discuss the progress made and the draft 1996/97 work plan.

9. EVALUATION AND FINANCIAL STATEMENT

In general the Workplan and Budget for the first year of operation corresponded closely to actual expenditures and requirements. The implementation of the training courses and the establishment of the Centre has proceeded as planned and has had no major logistic or other problems. The interest for the Courses and services offered have been strong and steadily increasing since establishment of the Centre.

Budget posts related to salary, establishment, training courses, and operation have in general been as foreseen. Operational cost were somewhat less than budgeted though, mainly due to less activity in the first six months of operation during which time was spent on actually establishing the Centre and disseminating information on the services offered. A significant part of the operational expenses is related to the co-financing with Swedish SAREC of the IOC/SAREC-DANIDA Training Course, Mauritius, February 1996. The Financial Statement is attached as Annex IV hereto.

The Budget foresaw expenses related to the 'copyright issue' in relation to the establishment of a bibliographic data-base on harmful algae. During early 1996 an agreement was made between the Danish Ministry of Education and the Danish agency for copyrights (COPYDAN), allowing the University of Copenhagen to provide a service as the one of the Centre. There will thus be no copyright cost to the Centre for providing single copies of papers to individuals. The amount foreseen for this purpose has instead been spent on items in relation the establishment of the Bibliographic data-base, and in relation the literature service (see 3). In the budget for the second year of operation the budget post has been suggested redefined for expenses in relation to visits of students and guests to the Centre.

The major part of the funds for the Project are provided by DANIDA (77%). The remaining cosponsors are the Danish Fisheries Research Institute (17 %), the Danish National research Institute (3 %) and the IOC (3%). University of Copenhagen provides office and laboratory accommodation, scientific, technical and administrative support, etc The agreement with the Danish Fisheries Research Institute implies that the Centre will establish advisory and research activities with the Institute within relevant subject areas, including incidents of harmful algae in Danish waters. In case of cooperation in relation to incidents in Danish waters, the activities will not draw on the resourses originating from DANIDA.

10. OUTLOOK FOR 1996-98

10.1 TRAINING COURSES

In addition to the regular courses held at the Centre, three regional courses are in preparation.

The Asian Pacific Economic Cooperation (APEC) has requested the Centre to conduct two training courses on their behalf as a part of the activities of the APEC Marine Resource Conservation Working Group and their 'Management of Red Tides and Harmful Algal Blooms in the APEC Region' project. The first course is planned for August 1996, and will be held at the University of Copenhagen. The Centre will contribute with trainers, training materials and partly cover expenses related to participants from IOC Member States in the APEC region, which are eligible to DANIDA support. The remainder costs will be covered by APEC. The second course is planned by APEC to be held in 1998 at a location in the APEC region to be determined. Costs will be covered by APEC.

The regional IOC working group on harmful algae in South America (FANSA) have through the IOC Governing Bodies requested a regional training course. FANSA has made a survey among the countries in the region to identify the institution most suitable as host for a training course. At the Second IOC Regional Science Planning Workshop, Mar del Plata, Argentina, October 1995, the Universidad de Rio Grande, Brazil, was decided upon as the most appropriate location. The Centre and IOC will work towards implementation of the Course in February 1997. The Centre will provide trainers and training material and assist with support to participants from Latin American Member States eligible to DANIDA support.

10.2 RESEARCH ACTIVITIES

The research activities of the Centre will concentrate on the development of the joint research and Ph. D projects described above. Some of these projects include general surveys of the toxic and potentially toxic algae in defined geographical areas, and it is intended to present the results of some of these surveys as bi-lingual publications (the local language / English) to increase their usefulness in local monitoring programmes. Results of Centre activities will be presented at international meetings and conferences as appropriate.

The Centre will continue to work on the series 'ICES Identification Leaflets for Plankton'. Potentially Toxic Phytoplankton' which will contain a comprehensive treatment of the toxic or potentially toxic species.

ANNEX **I**

IOC-DANIDA Training Course, University of Copenhagen, 31 July-n August 1995

A. PROGRAMME AND TIMETABLE

Teachers: Dr. Rhodora Corrales (RC), University of the Philippines; Henrik Enevoldsen (HE), IOC Science and Communication Centre, University of Copenhagen; Dr. Jacob Larsen (JL), IOC Science and Communication Centre, University of Copenhagen; Dr. Kazumi Matsuoka(KM), Nagasaki University; Professor Øjvind Moestrup (ØM), University of Copenhagen,

	Morning, 9.15-12.30	Afternoon, 14-17.30
Monday, 31.7	Introduction and presentation of the IOC Science and Communication Centre, HE. Lecture: the different algal groups in the phytoplankton, ØM	Short presentations and introductory talks by the participants (approx. 15 rein)
Tuesday, 1.8	Lecture: introduction to dinoflagellate taxonomy, JL. Lecture: surveillance and control of mussel harvest (Dr. P. Andersen, Bio-Consult).	Technique sessions -3 groups, each following one programme per session. 1. Identification of dinoflagellates, JL 2. Electron microscopy, ØM 3. Quantitative techniques, PA
Wednesday, 2.8	Technique sessions	Technique sessions
Thursday, 3.8	Isolation and maintenance. of cultures, JL	Toxic raphidophytes, ØM
Friday, 4.8	Toxic prymnesiophytes, ØM	Toxic prymnesiophytes, continued - lecture: The South-East Asean Red Tide network, RC
Saturday, 5.8	Toxic blue-green algae, Peter Henriksen (Univ. of Copenhagen)	
Sunday, 6.8	Whole day excursion	
Monday, 7.8	Unarmored dinoflagellates, JL	Tropical, toxic dinoflagellates, KM
Tuesday, 8.8	Critical identification of Alexandrium, KM	Alexandrium, continued - lecture: The biology and culture of Pyrodinium bahamense var. compressum, RC
Wednesday, 9.8	Dinoflagellate cysts, KM	Dinoflagellate cysts, continued - preparation of samples and microscopy, KM
Thursday, 10.8	Toxic diatoms, Jette Skov (ØM)	Analytical methods for determination of marine algal toxins: sanitary control in the EU, regulations and national reference lab. network, Dr. M. Fernández, Vigo
Friday, 11.8	'Student group work - lecture: Hypotheses on the bloom dynamics of Pyrodinium bahamense var. compressum in Manila Bay, RC	Student group work

TOPIC:	LECTURER:
Taxonomy:	
Overview	Prof. Ø. Moestrup, University of Copenhagen
Dinoflagellates	Dr. J. Larsen, IOC Sci.and Comm. Centre on Harmful Algae
Unarmored Dinoflagellates	Dr. J. Larsen
Tropical Dinoflagellates	Prof. K. Matsuoka, Nagasaki University, Japan
Dinoflagellate Cysts	Prof. K. Matsuoka
Toxic Diatoms	Jette Skov, University of Copenhagen
Raphidophytes	Prof. Ø. Moestrup
Prymnesiophytes	Prof. Ø. Moestrup
Cyanobacteria	P. Henriksen, University of Copenhagen
Microalgae Cultures:	
Isolation and Maintenance	Dr. J. Larsen
The Biology and Culture of *Pyrodinium bahamense var. compressum*	Dr. R. Corrales, University of the Philippines
Presentation of the Scandinavian Culture Collection	Dr. J. Larsen, Mr. N.H. Larsen
Techniques:	
Quantitative Techniques	Dr. Per Andersen, Bio/consult, Denmark
Scanning Electron Microscopy	Ms. Lisbeth Haukrogh, Prof. Ø. Moestrup
Dinoflagellate Cysts, preparation of samples and microscopy	Dr. K. Matsuoka
Critical Identification of *Alexandrium*	Dr. K. Matsuoka
Analytical Methods for Determination of Marine Algal Toxins	Dr. M. Fernandez, European Communities Reference Lab., Spain
Identification of Thecate Dinoflagellates using Epiflourescense Microscopy	Dr. J. Larsen
Eco1ogy:	
Hypotheses on the Bloom Dynamics of *Pyrodinium bahamense var. compressum* in Manila Bay	Dr. R. Corrales
Monitoring and Management:	
The South-East Asian Red Tide Network	Dr. R. Corrales
Surveillance and Control of Mussel Harvest	Dr. P. Andersen
Sanitary Control in the EU, Regulations and National Reference Network	Dr. M. Fernandez

B. LIST OF PARTICIPANTS AND LECTURERS

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C. TRAINING COURSE COMPENDIUM

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D. CERTIFICATE

Intergovernmental Oceanographic Commission
(of UNESCO)

Certificate

IOC-DANIDA Training Course on the Taxonomy and Biology of Harmful Marine Microalgae

This is to certify that

attended and successfully completed the IOC-DANIDA Training Course on the Taxonomy and Biology of Harmful Marine Microalgae, 1 July - 11 August 1995, at the IOC Science and Communication Centre on Harmful Algae Botanical Institute, University of Copenhagen, Denmark.

Kazumi Matsuoka	Øjvind Moestrup	Jacob Larsen
Professor Professor, PhD	Professor, DSc	Associate Professor, PhD
Nagasaki University	University of Copenhagen	IOC Centre, Univ. of Copenhagen

Rhodora Corrales	Henrik Enevoldsen
Associate Professor. PhD	Project Coordinator, MSc
University of the Philippines	IOC Centre, Univ. of Copenhagen

E. EVALUATION

Towards the end of the Course each Trainee was asked to complete a questionnaire for assessment by trainees in order to evaluate the quality of the Course. A summary with selected comments is given below:

		Poor I	II	III	IV	Excellent V
1.	How were the local arrangements					
	a. Accommodation			*1*	*3*	*6*
	b. Teaching conditions including facilities and classroom			*3*	*7*	
	c. Transportation etc.				*1*	*9*
2.	Are the objectives of the course well specified and have they been successfully met ?				*3*	*7*

		Poor I	II	III	IV	Excellent V
3.	Were the lectures given by instructors, and the practical exercises adequate to meet the objective ?			3	*7*	
4.	Was the course useful to you ? Did you learn anything that is new and useful for you ?				*1*	*9*

	Comments:	*There were positive comments on i) the use of cultures which allow observation of live cells; ii) the technical parts including LM and EM methods, and cyst studies; iii) the presentation of the most recent literature.*
5.	Do you think that the course programme was: too advanced, just adequate, or too low ?	*All participants found that the programme was adequate*
6.	Was the duration of the course: too long, adequate, too short	*Too long (l), adequate (7), too short (2)*
7.	Do you feel a need for modification of the course programme ? Comments:	Yes *(4), no (6)* *Several participants expressed the need of more time for their own work; others would include field trips, visit to institutions, or more technical work. Less time might be spend on chemistry.*
8.	Have you attended a UNESCO- or IOC short-term course previously ?	*Yes (4), no (6)*
9.	In what way do you plan to apply the knowledge you gained during the course	*Half of the participants found that the course would support them in establishing, or improving existing, monitoring programmes on harmful algae in their home countries. Several commented specifically on the knowledge they gained on certain algal groups and techniques.*

10. In your workplace, do you have adequate facilities in terms of equipment, trained personnel, publications etc. If not, what are the needs at your institution?

The comments here reflected the different background of the participants, but most of them did not have modern microscope facilities, especially electron microscopes, nor sufficient library facilities.

11. Other comments and suggestions regarding the course including the following

(i) Were all subjects of specific interest to you covered?
With one exception, all participants answered 'yes' to this question.

(ii) Did you have adequate opportunity to work in specific areas or obtain specialized help ?
The participants were generally content - a few would wish to have more time to work in specific areas such as cyst preparation, or identification of Alexandrium and Dinophysis.

(iii) What do you think IOC/UNESCO should do as a follow-up in this region ?
Several participants emphasized the importance of getting - and staying - in contact with persons working in the same field. It was suggested that this course is followed up by shorter, but more specialized courses. The establishment of the 'Science and Communication Centre' was appreciated - in writing or orally - by all the participants.

(iv) Do you think other regions could benefit by training courses such as this ?
-All participants found that regional courses should be implemented.

(v) Other comments
It is important to maintain the contact established during the course between the Centre and the participants. It should be considered to' include 1) freshwater algae; 2) lecturers from the seafood industry.

12. How do you rate this activity ?
Unacceptable, poor, adequate, good, *very* good, outstanding.

The over-all rating of the course was indicated as very *good (7), or outstanding (3).*

ANNEX II

IOC/SAREC-DANIDA Training Course, University of Mauritius, 5-14 February 1996

A. PROGRAMME AND TIMETABLE

Teachers: Henrik Enevoldsen (HE), IOC Science and Communication Centre, Univeristy of Copenhagen, Denmark; Dr. Jacob Larsen (JL), IOC Science and Communication Centre, University of Copenhagen, Denmark; Professor F.J.R. ("Max") Taylor, University of British Columbia, Canada.

	Morning, 9-12	Afternoon, 13-16
Monday 5.2	Introduction: IOC, the HAB Programme, and the IOC Science and Communication Centre, HE Lecture: the different algal groups in the phytoplankton, JL Short presentations by the participants (approx. 20 rein)	Short presentations and introductory talks by the participants (ea. 20 rein), continued
Tuesday 6.2	Toxic prymnesiophytes, JL Toxic raphidophytes, JL	Isolation and maintenance of cultures, JL
Wednesday 7.2	Unarmored dinoflagellates, JL	Toxic diatoms, JL Demonstration of Artemia bioasay I, JL, HE Toxic blue-green algae, JL
Thursday 8.2	Quantitative techniques, HE	Demonstration of Artemia bioasay II, JL, HE
Friday 9.2	Excursion, collection of samples	Introduction to dinoflagellate taxonomy, examination of live samples, Max
Saturday 10.2	Examination of live samples, lecture: Ciguatera (Pascal Quod, Reunion)	Examination of live samples, continued, Max
Sunday 11.2	Excursion	Excursion
Monday 12.2	Microscopy of own samples	Microscopy of own samples
Tuesday 13.2	Microscopy of own samples	Microscopy of own samples - lecture: dinoflagellate ecology, Max
Wednesday 14.2	Examination of cultures, microscopy of own samples	Microscopy, course evaluation

TOPIC	LECTURER
Taxonomy:	
Overview	Prof. F.R.J Taylor, University of British Columbia
Dinoflagellates	Dr. J. Larsen, IOC Sci.and Comm. Centre on Harmful Algae
Unarmored Dinoflagellates	Dr. J. Larsen
Tropical Dinoflagellates	Prof. F.R.J. Taylor
Toxic Diatoms	Dr. J. Larsen
Raphidophytes	Dr. J. Larsen
Prymnesiophytes	Dr. J. Larsen
Cyanobacteria	Dr. J. Larsen
Microalgae Cultures:	
Isolation and Maintenance	Dr. J. Larsen
Techniques:	
Quantitative Techniques	Mr. H. Enevoldsen, IOC Sci.and Comm. Centre on Harmful Algae
Artemia Toxicity Test	Mr. H. Enevoldsen
Sampling of benthic dinoflagellates	Prof. F.R.J. Taylor
Ecology:	
Bloom Dynamics	Prof. F.R.J. Taylor
Ciguatera in the Western Indian Ocean	Dr. J.P. Quod, ARVAM, Ile de La Reunion

B. LIST OF PARTICIPANTS AND LECTURERS

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C. CERTIFICATE

Intergovernmental Oceanographic Commission
(of UNESCO)

Certificate

IOC-DANIDA Training Course on the Taxonomy and Biology of Harmful Marine Microalgae

This is to certify that

attended and successfully completed the IOC-DANIDA Training Course
on the Taxonomy and Biology of Harmful Marine Microalgae, 15-26 July 1996,
at the IOC Science and Communication Centre on Harmful Algae
Botanical Institute, University of Copenhagen, Denmark.

Yasuwo Fukuyo
Associate Professor, PhD
University of Tokyo

Øjvind Moestrup
Professor, DSc
University of Copenhagen

Jacob Larsen
Associate Professor, PhD
IOC Centre, Univ. of Copenhagen

Henrik Enevoldsen
Project Coordinator, MSc
IOC Centre, Univ. of Copenhagen

D. EVALUATION

		Poor I	II	III	IV	Excellent V
1.	How were the local arrangements					
	a. Accommodation			*4*	*5*	
	b. Teaching conditions including facilities and classroom				*4*	*5*
	c. Transportation etc.			*1*	*8*	
2.	Are the objectives of the course well specified and have they been successfully met ?				*1*	*8*
3.	Were the lectures given by instructors, and the practical exercises adequate to meet the objective?					*9*
5.	Was the course useful to you ? Did you learn anything that is new and useful for you ?					*9*

4.	Do you think that the course programme was: too advanced, just adequate, or too low ?	*All participants with one exception found that the standard of the course programme was adequate; one person indicated that the programme was adequate-too low.*
	Other comments:	*There were several positive comments on the programme which was found appropriate both in the local and in the regional perspective. Many participants noted that they would feel more confident in their future work in identifying toxic algal species. Also the demonstration of various techniques and equipment was commented on positively. One participant requested better library facilities which unfortunately were not particularly good at the University of Mauritius.*
6.	Was the duration of the course: too long, adequate, too short	*Too long (0), adequate (7), too short (2)*
7.	Do you feel a need for modification of the course programme ? Comments:	Yes *(4), no (5)* *Two participants expressed the need of a more advanced course as a follow-up to the present one; others would include more ecology on the individual species.*
8.	Have you attended a UNESCO- or IOC short-term course previously ?	*Yes (2), no (7)*
9.	In what way do you plan to apply the knowledge you gained during the course in establishing, or improving existing, monitoring programmes on harmful algae in your home countries.	The *general comment of the participants was that they now felt more capable in identifing organisms. Several indicated that going home to continue their monitoring work, they would reconsider their previous species identifications. Also the teaching material distributed during the course were appreciated.*
11.	How do you rate this activity? Unacceptable, poor, adequate, good, very good, outstanding.	*The over-all rating of the course was indicated as very good (7), or outstanding (3).*

ANNEX III

LITTERATURE GRANTS

BOOK REQUESTS 1995 - 1996

IOC SCIENCE AND COMMUNICATION CENTRE ON HARMFUL ALGAE, COPENHAGEN

Litterature Grants offered:

1. Proceedings from the Sixth International Conference on Harmful Marine Phytoplankton (funded by IOC and DANIDA)
2. The Genus Alexandrium Halim (Dinoflagellata), E. Balech, 1994 (funded by DANIDA)
3. Marine Phytoplankton. A Guide to Naked Flagellates. C. Thomas et al. (eds.), 1994 (funded by DANIDA)
4. Identifying Marine Diatoms and Dinoflagellates. C. Thomas et al. (eds), 1996 (funded by DANIDA)

Books requested and provided:

COUNTRY	INSTITUTION	BOOKS PROVIDED	DATE	NOTES
Argentina	Consejo Nacional de Investigaciones Cientificas y Technicas, Biblioteca, Centro Nacional Patagónico, Puerto Madryn (Chubut)	1	19960315	
Argentina	Universidad Nacional de la Patagoina "San Juan Bosco", Biblioteca "Gabriel Fuentes", Fontana y Rawson, Trelew (Chubut)	1	19960316	
Brazil	Biblioteca Sectorial de Oceanografia, Dept. de Oceanografia, Fundaçao Universidad do Rio Grande, Rio Grande	1	199511	
Brazil	UNIVALI, Universidade do Vale do Itajaí a) Biblioteca Central Comunitaría (UNIVALI General Library), Itajaí, Santa Catarina b) Library of the Faculdade de Ciências do Mar (Marine Sciences Faculty)	1	19960108	

Brazil	Companhia de Tecnologia de Saneamento Ambiental, São Paulo	1	19960108	
Brazil	Instituto Oceanográfico, Universidade de São Paulo, São Paulo	1	19960108	
Bulgaria	Institue of Fisheries, Varna	1	199511	
Chile	Universidad Austral de Chile, Facultad de Pesquerias & Oceanografia, Puerto Montt	1	199511	
Chile	Instituto de Fomento Pesquero (IFOP), Zonal Punta Arenas, Punta Arenas	1	19960316	
China	Biological Division, Institute of Marine Environmental Protection, Dalian	1	199511	
China	Insitute of Oceanology, Academia Sinica, Qingdao	1	19960108	
Egypt	Alexandria University, Faculty of Science, Alexandria	1	199511	
India	University of Agriculatural Sciences, Bangalore, University of Fisheries, Mangalore, Karnataka	1	19960227	
India	University of Agricultural Sciences, College of Fisheries, Mangalore, Karnataka	1	19960108	
India	Anna University, Institute for Ocean Management, Centre for Water Resources, Madras	1	19960125	
India	Mandapam Regional Centre of Central Marine Fisheries Research Institute (Indian Council of Agricultural Research), Marine Fisheries, Mandapam Camp, Ramanathapuram Dt. , Tamil Nadu			
Indonesia	Lembaga Ilmu Pengetahuan Indonesia, Indonesian Institute of Sciences, Pusat Penelitian dan Pengembangan Oseanologi (Puslitbang Oseanologi - LIPI), Research and Development Centre for Oceanology, Jakarka	1, 2, 3, 4	199604?	not yet send
Indonesia	Kelompok Studi Ekologi, Pekanbaru	1	19960108	
Korea	Joon-Baek Lee, Department of Oceanography, College of Ocean Sciences, Cheju National University, Cheju	1	19960322	

Lebanon	National Council for Scientific Research, Marine Research Centre, Jonnieh	1	19960108	
Lebanon	Marine Research Centre, Plankton Ecology Department, Jonnieh	1	199511	
Malaysia	Fisheries Research Institute Malaysia, Sarawak Branch, Kuching, Sararak	1	19960227	
Mauritius	Albion Fisheries Research Centre, Albron, Petite Rivière	1	199511	
Nigeria	Faculty of Science, Department of Biological Sciences, University of Lagos, Lagos	1	19960109	
Peru	Instituto del Mar del Peru (IMARPE), Biblioteca	1, 2, 3, 4	199604?	not yet sent
Phillipines	Bureau of Fisheries and Aquatic Resources, Department of Agriculture, Quezon City, Metro Manila	1 2, 3, 4	199511 199604?	1 sent to Melita S. Consulta 2, 3, 4 to the Library - not yet sent
Slovenia	National Institute of Biology, Library, Ljubljana	1	19960227	
Thailand	Marine Fisheries Division, Department of Fisheries, Bangkok	1	199511	
Turkey	Institue of Marine Sciences, Middle east Technical University, Erdemli	1	19960108	
Turkey	Karadeniz Technical University, Faculty of Marine Sciences, Camburnu Trabzon	1	19960108	
Turkey	Karadeniz Technical University, Central Library, Trabzon	1, 2, 3, 4	199604?	not yet sent
Venezuela	Nucleo de Sucre, Biblioteca Instituto Oceanografice, Cetto Colorado, Cumana	1	19960322	
Vietnam	Institute of Oceanography, Nhatrang, Khanhhoa	1	199511	