



**East-African Co-operation In
Fundamental and Applied
Marine Ecology**

**UNESCO/KBP/KMFRI Regional
Workshop on Fundamental and
Applied Marine Ecology**

REPORT OF THE MEETING

April 1988

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REPORT OF THE MEETING UNESCO/KBP/KMFRI REGIONAL WORKSHOP ON FUNDAMENTAL
AND APPLIED MARINE ECOLOGY

6TH - 9TH APRIL 1988 - MOMBASA, KENYA

Subvention from UNESCO - Nairobi, Kenya

Organizer: Kenyan - Belgian Project in Marine Sciences

1. The meeting was convened on 6th April, 1988 at 10.00 a.m. Mr. Allela the Director of Kenya Marine and Fisheries Research Institute acting as the master of ceremony welcomed Prof. M. Hyder to chair the meeting on behalf of Prof. F. Mutere, Deputy vice chancellor of the University of Nairobi. The bureau of the meeting was as follows:

- Chairman : Prof. M. Hyder (Kenya)
- Vice-Chairman : Dr. E. Martens (KBP)
- Rapporteurs : Prof. P. Bwathondi (Tanzania)
Mr. E. Okemwa (Kenya)

2. Prof. Hyder welcomed the participants to the workshop. He emphasized the need to have a regional programme on research on marine ecology of the area. He noted the strong representation of the countries in the workshop.

Longterm understanding of Marine Ecology must be at the level of the university. The strong university contingent from all countries represented in this workshop must take it on. Ecology does not have boundaries such as those of the countries represented at the workshop, there was need to collaborate on most of the projects researches within the area. Finally, Prof. Hyder expressed his gratitude to UNESCO for its moral and material support to the Belgian Government for supporting this workshop and finally KMFRI for hosting the workshop.

3. The chairman invited Prof. Polk to say a few words about the workshop. He congratulated the organizers of the workshop on the good work they have done to make the workshop a success. He also thanked UNESCO and Belgian Government for their contributions to the workshop. Prof. Polk noted that the idea to hold this workshop originated in a discussion between him and the late Dr. B. Mwaiseje. He was grateful that although it took long to hold the workshop the dream became a reality on 6/4/88. He wished that the workshop should develop a strategy to start the data-bank, develop a strategy to start the exchange of scientific literature and develop a strategy to start a newsletter.

He noted that the international organizations like IOC, UNESCO, UNEP etc. though would like to have their own data banks, are able to some magnitude to finance the data bank envisaged for this region in this workshop.

Although the KBP is scheduled to end this year, it is hoped that a new project, a much higher and advanced project which will focus on higher training and research will be launched. This project should widen its scope to include all countries within the region and in different disciplines.

4. UNESCO representative Mr. G. Kitaka on behalf of the Director General of UNESCO expressed his appreciation for being invited to sponsor the workshop. He expressed that Unesco attaches much importance to the promotion of basic sciences and their application to development. By several previous resolutions, and in particular by Resolution 6.1 (The Sciences and their application to development), the General Conference of Unesco, at its Twenty-third Session held in Sofia, Bulgaria, in October/November 1985, authorized the Director-General to continue the implementation of Major Programme VI 'The Sciences and their application to development'; and invited him in particular; under programme VI.1 "Research, training and international co-operation in the natural sciences":
 - (i) to contribute to the development and strengthening of national programmes in basic and applied research and the training of researchers in mathematics, physics, chemistry and biology, particularly in the developing countries;
 - (ii) to co-operate with higher-education institutions in the improvement of their science teaching programmes, laboratory facilities, postgraduate training, and increased opportunities for women scientists;
 - (iii) to contribute to the strengthening of international co-operation among research and training institutions in natural sciences particularly through international non-governmental organizations, regional scientific associations and specialized regional networks;
 - (iv) By Resolution 10.1 (The Human environment and Terrestrial and Marine Resources), the General Conference also authorized the Director General, among other things, to continue the promotion of Marine Sciences, particularly in the developing countries.

It may also be of interest to the distinguished participants to note that through its Regional Office for Science and Technology in Africa (ROSTA), its Division of Marine Sciences, and its Intergovernmental Oceanographic Commission (IOC), Unesco is co-sponsoring the Unesco/IOC/Kenya/Belgium Project in Regional Co-operation in Scientific Information Exchange RECOSCIX in the Western Indian Ocean.

Furthermore within the framework of Unesco's Major Interregional Project on Research and Training leading to the Integrated Management of Coastal Systems (COMAR), Unesco has just launched a UNDP assisted Project on Research and Training on Marine Coastal Systems of Africa. Unesco's assistance is available in the form of training courses, fellowships and seminars, research support, as well as travel grants to attend regional and international scientific meetings. Requests for such support may be submitted to the Director of ROSTA in Nairobi.

5. The representative of the Government of Belgium Mr. M. Beck thanked the organizers, and thanked UNESCO for funding the workshop. He emphasized that the Kenya/Belgium Project had four main objectives, namely:

- the inventory and description of the different marine biotopes;
- the description of the trophics levels;
- the description of the interaction between the biological and chemical boxes, in order to understand the functioning of the different ecosystems;
- the management of the coastal zone including fisheries.

Although these objectives were too ambitious it is certain that the ending KBP has laid down the foundation for future projects in Marine Ecology. During the implementation of the project a number of aspects have surfaced, namely:

- the necessity to improve information and its diffusion to the different research institutions concerned;
- the necessity to improve and to co-ordinate the training of the researchers.

It is hoped that the resolutions and recommendations reached during this workshop will be presented to donor agencies/countries for appropriate action.

6. The Deputy Secretary in the Ministry of Research, Science and Technology Mr. F.M. Nthenge officially opened the meeting. He emphasized Kenya's commitments to foster co-operation in research in the region by making available the facilities she already has at KMFRI for research work. He emphasized that in order to fully utilize the aquatic resources within the region especially within the 200 miles EEZ, it is necessary to have full knowledge of these resources. This can easily be achieved if researchers within the region get the needed training after which they will do research in the relevant fields.

Mr. Nthenge urged scientists to develop technologies to fully utilise available water resources.

He said that with trained manpower, Africa could exploit marine resources, alleviate food shortages and increase availability of proteins in food.

Mr. Nthenge further expressed the need to preserve the natural resources of the region for future generations. For example, as the population along the coast increases competition of the use of land and marine resources increases, and in doing so, there is pollution of the area as well as actively adding to the erosion of the coastline. Researchers in the region have to, therefore, take this into consideration. He recommended the establishment of RECOSCIX as the quickest means of enabling researchers in the region acquire the research papers in different libraries in the world, a situation which would not be possible due to high increases in subscriptions in Journals.

COUNTRY REPORTS ON THE STATUS OF RESEARCH IN MARINE ECOLOGY

7. MAURITIUS - Mr. D. Gangapersad

There is no systematic work on the study of Marine Ecology in Mauritius. But the country, being an island with highly developed textile industry and tourist hotels, finds that it is important to work on the conservation of the ecosystem especially of the lagoons. The lagoon area of Mauritius is 243 km² and that of Rodrigues is 200 km².

Conscious of the fact that such a level of marine environmental degradation will not only affect the living resources of the lagoon, but will have a direct negative effect on the economy, the Mauritius Government has decided to give all due importance to Marine Ecology. Furthermore, the awareness created both at decision-making level and at national level, to impact of socio-economic activities (housing, sewage, communication, industries, tourism, recreation, etc.) has led to the creation of a National Environment Commission, chaired by the Prime Minister of Mauritius. There is also a National Environment Committee which is chaired by the Minister of Housing, Lands and Environment. Different appropriate sub-committees and task-forces have also come up to deal with specific problem areas.

The sub-committee on Coastal and Marine Resources, chaired by the Minister of Agriculture, Fisheries and Natural Resources, has looked into the multiple facts of problems linked with the coastal and marine ecosystems. A series of recommendations were made. Presently, the Government is

taking the following actions with a view to ensure that:

- a) control is exercised on the discharge of pollutants and on the use of pesticides that may persist in the environment and accumulate in the living organisms;
- b) the extinction of endangered, vulnerable and rare species of flora and fauna is avoided;
- c) existing nature reserves are properly managed;
- d) a resource is not overexploited so that sustainable yield can be maintained;
- e) the mangrove swamps, coral reefs and other coastal and marine habitats are properly managed and maintained.

Government has recently taken the decision to:

- a) ban the sale of local corals and shells;
- b) restrict the exploitation of marine aquarium species (some 100,000 of fish and invertebrates are removed annually for export);
- c) ban the fishing, landing and sale of marine turtles.
- d) control the exploitation of natural oyster beds.

In view of the fact that base-line studies on the physical, chemical and biological aspects are required to assess scientifically the "state of health" of the coastal and marine ecosystem, to monitor the changes and trends in the marine environment and to have at hand the necessary data for programme setting, planning and implementation, the Ministry of Agriculture, Fisheries and Natural Resources has set up a Coastal and Marine Conservation Unit. This is a first step towards "Marine Ecology" studies. The work ahead is gigantic, but with new facilities and additional staff, there is hope that results will soon start appearing.

A project proposal for the creation of a Marine Conservation Centre has already been submitted. It also includes the creation of Marine Parks.

Under the COMARAF Programme (1st phase), (UNESCO Sponsorship) the team in Mauritius has already started the study of the relationship between nutrient levels and productivity at selected sites of the lagoon. Data on these parameters will be collected as a baseline and also for comparative analysis of sites situated in different environments to try to find impact of inputs from land-based sources on the lagoon, pollution, etc.

Following the workshop on coral reefs proposed later this year, our scientists will be trained to study coral reefs and use methodologies taught during the workshop. This will

result in broadening the participation of Mauritian scientists in the COMARAF project.

A vast programme will be undertaken by the Coastal and Marine Conservation Unit and the University of Mauritius with the help of Aix-Marseille University. This study programme will include: geology, sedimentology, coral reef ecology, effluents and pollution, aquaculture and management of living resources, coastal zone management, remedial measures for the protection of the lagoon and reef systems. A survey of Rodrigues Island in relation to marine conservation was carried out in January 1988.

Government is also presently studying the legislation with a view to amend existing laws and regulations, to add new ones so as to consolidate the legal framework for prevention and enforcement with a view to control degradation and to preserve the coastal and marine environment.

8. ETHIOPIA - Prof. E. Bekele

The various aspects of Marine Ecology of the Red Sea is little studied despite of the fact that it is believed to have high potential of natural resources. Such lack of study was partly due to the lack of trained manpower and proper marine research and teaching institution. The demand to overcome such shortages resulted in the establishment of Asmara. At present members of the unit and their associates researchers in Addis Ababa University are involved in various research activities such as monitoring programme, M.Sc. thesis research projects, Fish taxonomy, and Fish Genetic variation studies on the Red Sea Coast.

The present work carried out at the Marine laboratory of the University of Asmara is mainly done by expatriate staff who occasionally come to the laboratory. This has resulted into non completion of some researches especially when these expatriates terminate their stay before they finish the research.

9. SOMALIA - Prof. M.G. Mohamed

There is no Marine Science Institute in Somalia. Several attempts have been made to set up a Marine Science Institute in Somalia but have not so far yielded any fruits. The major drawback to the setting up of the institute has been government bureaucracy and lack of locally available personnel to be engaged in such an institute.

The National University of Somalia is carrying out research in marine pollution. Researchers have found chlorinated hydrocarbons (from pesticides) in the snappers. Such

studies have been carried out by the Chemistry Department. At the moment there are no important research activities going on in Marine Sciences in Somalia.

10. MADAGASCAR - Mrs. H. Razanfindrainibe

The main institutions and laboratories involved in marine science are the Centre National de Recherches Oceanographiques (C.N.R.O.) of Nosy-Be which is attached to the Ministry of Research and the Station Marine de Toliara (S.M.T.) attached to the University of Madagascar.

The C.N.R.O. leads in investigations dealing with marine themes. In relation with Universities for training courses. C.N.R.O. has bilateral and international projects of multidisciplinary research programmes among which is marine ecology especially physical and chemical oceanography as a support of biological investigations.

Before 1980 hydrological characteristics of coastal and narrow offshore waters (currents, physical and chemical parameters) were studied by many authors among whom PITON, MAGNIER, PRONTIER, ANGOT. A few reports concerning mangroves are available as well.

Since 1980 Marine Ecology is considered within multidisciplinary research programmes and concerns mainly physical and chemical water conditions, marine resources biology and exploitation. Research programmes on shrimp nursery and shrimp biology together with mangrove ecology are being studied.

11. TANZANIA - Prof. A.M. Nikundiwe

The University of Dar es Salaam offers training in both undergraduate and postgraduate studies in marine sciences: this is done through the Departments of Zoology, Botany, Geology and through the Institute of Marine Sciences (IMS) in Zanzibar. Besides the University there are other institutions which offer training and/or research in marine sciences, namely: Tanzania Fisheries Research Institute (TAFIRI), Mbegani Fisheries Development Centre (MFDC), Kunduchi Fisheries Training Institute.

The Marine research programmes carried out in Tanzania over the past decade are divided into 7 departments namely:

a) Biology - which include studies in fisheries biology and stock assessment, coral ecology which encompasses taxonomy of corals, coral destruction by dynamite-fishing, benthic ecology, algae ecology, plankton studies both zooplankton and phytoplankton, and mangrove studies (taxonomy and ecology).

b) Chemistry - This deals with the quality of seawater and nutrient cycles in the sea.

c) Physics - This deals with currents, waves and tides. Because of lack of equipment for physical oceanography studies investigations have largely been confined to numerical modelling. With the installation of tide gauges in Dar es Salaam, Zanzibar and later Mtwara, monitoring of sea level fluctuations along Tanzania waters will be carried out.

d) Geology - This deals with monitoring of sea level changes in the last 250,000 years in the Dar es Salaam area and investigations on the stratigraphy and tectonics. Current investigations are now being conducted on the analysis of heavy mineral sands occurring along the Tanzanian beaches.

e) Ocean engineering - This deals with beach erosion in north of Dar es Salaam, and later offshore structures and drillings for oil .. etc.

12. KENYA - Prof. V. Jaccarini

12.1. TRAINING

The University's basic input into the National research effort is to train skilled manpower in the various aspects of Aquatic Sciences at the undergraduate levels. This is done in various Departments, principally the Zoology, Botany, Chemistry and Meteorology Departments. However, in order to accomplish this, the University is involved in the discovery of new knowledge and compilation of information by research work. Research is done by staff and postgraduate students. At the undergraduate level the Zoology Department offers a two-unit option in Aquatic Ecology in third year, approximately half of which is dedicated to Marine Biology and Ecology. Each unit comprises 24 hour lectures and 10 3-hour practicals. Part of the practicals include a week-long field course at the coast in which the most important littoral habitats are studied. Other relevant courses include arthropod biology, invertebrate and vertebrate zoology courses which have a large component of marine biology. At the postgraduate level the Department of Zoology, with inputs from Botany, and Chemistry, offers an M.Sc. programme in Hydrobiology, consisting of a first year taught course and a second year research leading to a thesis. Ph.D. candidates are trained by supervised research and thesis only.

University Academic staff from the Department of Zoology, Botany, and Meteorology in conjunction with KMFRI and Belgian academics have launched a programme of investigation into the total system functioning of the mangal. This

involves a study of primary production (mangroves, benthic algae, sea-grasses, and phytoplankton); The fate of litter; secondary production with special emphasis on the macro- and meiobenthos, nutrient flow, and water movement in the creek. Initial funding for this work has been obtained from the Kenya National Council for Science and Technology (NCST). Further funding is being sought from the Commission of the European Communities under the Research Programme on "Science and Technology for Development: Tropical and Subtropical Agriculture". Work on the production of the mangrove trees and the fate of litter, as well as on the zoobenthos has already been started by University of Nairobi personnel. This multidisciplinary study should be a major contribution to our knowledge of the mangrove ecosystem and will be relevant not only to East Africa but also to all maritime tropical countries. The mangal was targeted not only because of its relative neglect by researchers, but also as being a major maritime wetland resource, which is fragile and threatened by development and population pressures.

The Department of Botany offers options in Aquatic Botany and Aquatic Ecology in its B.Sc. programmes, and at the postgraduate level the M.Sc. in Plant Ecology includes five units in Marine Botany. The Botany Department has a Marine Field Station in the South Coast of Kenya at Diani Beach. The Department of Chemistry offers an M.Sc. programme in Environmental Chemistry which includes consideration of various aquatic habitats.

The Geology Department offers a third-year one-unit option on the Geology of the Oceans at the undergraduate level, and courses in Marine Geology, and Environmental Geology in the M.Sc. programme.

It is hoped that the co-operation between University of Nairobi's Departments of Sciences, KMFRI and the Fisheries Department will expand and tackle more problems related to our National Development, goals and aspirations.

Work is starting on plankton - fish interactions in exploited and unexploited areas on the North Coast.

2.2. PRIORITIES IN MARINE RESEARCH IN KENYA - Mr. R. Nzioka

Marine research in Kenya addresses various aspects to fisheries, aquatic biology environmental and ecological studies, and chemical and physical oceanography.

KMFRI Mombasa laboratory carries out research programmes on the physico-chemical parameters, of particular importance is research on effects of pollutants of hydrocarbon origin on the environment and associated animal life.

Other research activities include coastal aquaculture, particularly cultivation of shrimp. This work includes Artemia production with aid from Belgium, Dr. P. Sorgeloos - "Artemia Systems" - Ghent. The Biological Oceanography programme which is a Kenya/Belgium Co-operation covers biological and chemical studies of the inshore waters, mangrove ecosystems as well as oyster culture in creeks.

Research is going on in the field of marine science in different aspects.

13. KENYA NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY -
Mrs. G.N.Thitai

In 1977, through an Act of Parliament the National Council for Science and Technology NCST was established. The council offers advisory machinery for matters pertaining to scientific, technological activities and research necessary for the proper development of the country.

Council supports the KMFRI for its efforts in seeking co-operation with international research bodies within and outside Kenya where similar research is being undertaken. The NCST would like to encourage KMFRI to launch a Newsletter that would enable the researchers to exchange information on programmes currently going on. Such a newsletter would enable the scientists to identify common problems and to seek better ways of conservation and economic exploitation of marine resources. This being an important shared natural resource on the East African Coast, it is our hope that research co-operation will be strengthened and used to offset the impact of large costs of such activities.

14. UNEP - Dr. B. Nielsen

The Regional seas programme was started for the East Africa region in 1985.

East African Governments are expected to adopt their Action plan, along with the Convention and two Protocols. One is to cover co-operation in pollution emergencies, the other in specially protected areas and endangered species.

Priorities of the Regional Seas Programme to the area include the following:

A network of environmental pollution laboratories, on providing training facilities for environmental control technicians, and on developing a network of oil pollution monitoring centres. Assessment of the environmental impact of economic and social developments and a regional

environmental education programme.

The constraints are:

The fate of the Regional Seas Programme rests ultimately in the hands of Governments. UNEP can co-ordinate activities and relies on Governments' priorities. It is up to the Governments to carry out the pledges they make. Most Governments of the region have not signed the convention Dr. Nielsen asked the participants to request their respective countries to sign the convention.

A REPORT ON THE SESSION OF THE REGIONAL COMMITTEE FOR CO-OPERATIVE INVESTIGATIONS IN THE NORTH AND CENTRAL WESTERN INDIAN OCEAN (IOCINCWIO II) WHICH WAS HELD IN ARUSHA IN DECEMBER 1987. - Prof. A.S. Msangi

The session was preceded by a three day symposium which reviewed progress in marine science research in the region since IOCINCWIO I and prepared the agenda for the session.

The following main topics of oceanography were discussed:

1. Ocean dynamics and climate
2. Ocean science in relation to living resources (OSLR)
3. Ocean science in relation to non-living resources (OSNLR)
4. Marine pollution
5. Integrated global ocean service system (IGOSS)
6. Marine scientific information exchange
7. Training, education and mutual Assistance (TEMA)

The twenty first session on the executive council of the Intergovernmental oceanographic commission (IOC) held in Paris March 1988 agreed on the following:

1. Focus in areas of pelagic fisheries resources in Indian Ocean
2. Marine pollution
3. Sea level measurements
4. Charter a research vessel to carry out a scientific expedition to cover the region, and include local scientists

Concerning the role of the regional universities in training marine scientists. In most countries there are little capabilities.

The meeting in Arusha in 1987 identified problems of the region in advancing marine science. The countries of Africa should be assisted to train manpower up to university level.

It should be re-emphasized to UNESCO/IOC/ECA a need for another look into the project which Prof. Msangi carried out in 1980/83 of training Marine Scientists of the region.

16. AN OVERVIEW OF KBP - Dr. E. Martens

It was emphasized that the goal of KBP was to obtain an integrated and multidisciplinary research programme. As for training and research KBP encourages that both be done in the host country (Kenya) in order to avoid situations that have been happening in most developing countries where researchers get frustrated when they return home and find that either they do not have the infrastructure needed for their research or do not have appropriate/similar material for conducting research on. Students/researchers are, however, given some time to go to Belgium to specialize on certain fields upon completion of which they carry back with them the necessary infrastructure to continue their work in Kenya. KBP also funds both the documentation and the computer centre.

17. V.V.O.B. - Mrs. M. Naessens

The participants were introduced to V.V.O.B. (Flemish Association for Educational Programmes Abroad). This is a non profit making body offering cooperation to overseas institutions or governments. Usually the hosts meet the local expenses for the expert (e.g local salary, transport, accommodation) whereas V.V.O.B. tops up the salary (in foreign money in Belgium) and pays his/her insurance etc in Belgium. The system has already worked in many developing countries.

18. POSTGRADUATE TRAINING PROGRAMME BETWEEN KBP AND KMFRI - Prof. Ph. Polk

The delegates were informed in the present postgraduate training programme between KBP and KMFRI whereby students are selected to go to Belgium for the course under FAME programme. It was noted that the South East Asian countries benefit alot under the FAME programme whereas in Africa only Kenya has made use of it. It was desirable that for higher (postgraduate) training it would be meaningful for the students to do it locally using locally available facilities (Universities) and expertise. It was therefore recommended that a committee be formed to look at the possibility of organizing postgraduate training programme acceptable to all/most countries in the region. The committee was required to report their deliberations before the workshop

ended/see annex 1 being the report of the committee)

As for the present programme, it was left for KBP, KMFRI and the University of Nairobi to work out how they are going to carry it out as it was felt that this was local domestic matter not suitable for comments by this international meeting.

19. INFORMATION EXCHANGE IN THE WEST INDIAN OCEAN REGION - -
Mrs. J. Mwobobia KMFRI

It was noted that the region has an extensive network of libraries and documentation centers which have over the years developed valuable information in marine sciences and related disciplines. However, inspite of considerable financial and manpower resources spent on scientists and the community at large has lagged behind. Active co-operation could give greater use of these resources at very little cost. However, directories of libraries, union lists, catalogues and bibliographies are major tools that are lacking in the region. There is, therefore, an urgent need to organise the compilation of these guides by various information institutions through a well co-ordinated regional system. A programme should be initiated for the establishment of the Regional documentation dispatch centre which would strengthen regional co-operation with a view to especially in the field of marine sciences through a network of resource centres comprising some existing regional institutions. The successful development of this centre will depend on the support of various national, regional and international organisations.

20. On documentation it was realized that many Universities and Scientific Institutes are facing financial limitations. Usually the first victims in budget restrictions are the libraries. Periodicals which are essential for Research are no longer subscribed to, leaving scientists in a position isolated from the current research continuously advancing in the rest of the world.

Exchange between libraries from the various institutes are scarce in the region. Therefore scientists are not aware that valuable literature may be available somewhere in East-Africa.

Requests for literature person to person to scientists overseas can take quite long (up to several months).

For the above reasons, a Regional Documentation Dispatch Centre would prove to be extremely useful. A proposal, named Regional Co-operation in Scientific Information

Exchange in the West Indian Ocean (RECOSCIX-WIO) has been designed:

IOC and UNESCO are now searching funds for the first phase of this project, as well as for the following phases. Money for the next two years is available already. It was recommended that the idea of establishing RECOSCIX-WIO in the region was good and should be encouraged and implemented. This will enable researchers in the region benefit from the materials available in libraries abroad. It was however left to the individual governments to decide to adopt the system in their respective countries. Due to logistic problems some countries could not be fitted in the system.

21. REGIONAL DATA - EXCHANGE - Mr. P. Pissierssens

The establishment of a Regional Documentation Centre is covered within the RECOSCIX-WIO Project Proposal, formerly proposed to the Region during the Second Session of the IOC Regional Committee for the Co-operative Investigation on the North and Central Western Indian Ocean. Noting that

- 1) the proposal was agreed upon in principle and the pilot phase in practice,
- 2) that it was agreed upon that the Regional Dispatch Centre is to be located in Mombasa, at the Kenya Marine and Fisheries Research Institute at least during the Pilot Phase,
- 3) that Belgium will provide a Junior Expert for the Project,
- 4) that IOC will provide the ASFA Compact-Disc (be it through external funding or of own means),
- 5) a budget proposal, has been introduced at UNESCO.

Many marine researchers in the East-African Region are working on identical or closely related subjects. It is clear that data, coming from this research, are important not only for the one scientist, but for the whole region. Modeling of the marine ecosystem as well as handling oil spills and other ecological disasters could be better handled if more data could be used in the region.

It was felt that research data is confidential and was a decision of the individual scientist to give it or not to give it. However, monitoring data e.g meteorological, sea level fluctuation, solar radiation data ... etc. should be made available for consultation. Also historical data e.g data collected during the former E.African Community should be put in a central computer to be used by the scientists from the member countries.

On the whole the idea of data/information exchange was acceptable to all delegates. The mechanism of exchange was left to the individuals concerned. At the moment, it is premature to start a data base at the centre. It was noted, however, that some countries within the region have already set up their data bases in certain fields including fisheries. It could be important to ask such countries whether it is possible to borrow such data for consultation.

22. REGIONAL NEWSLETTER - Mr. P. Pissierssens

A Regional Newsletter can be envisaged in which all sorts of relevant information can be communicated to the Region. A Regional Newsletter focusing on Marine Sciences for the East African Region is an important tool for the establishment of professional contacts between Scientists working in marine environment of the Region.

Such a Newsletter is a fine way of promoting Marine Sciences of the East African Region.

The necessary hardware and software is now available at the Regional Dispatch Centre, established in the framework of the RECOSCIX-WIO Project.

The necessary supporting staff is now available at the Regional Dispatch Centre, established in the framework of the RECOSCIX-WIO Project. The idea of a Newsletter of the region was accepted.

Dr. Nielsen from UNEP said that his organization would consider assisting the printing and distributing the newsletter under Regional seas Program. This implies that the contents of the newsletter should be all marine or marine related projects and not freshwater. The delegates requested Mr. Pissierssens to work out the format of the newsletter and suggest a title for it and then present it to the workshop for comments.

This newsletter can be sent to all the Marine Science Institutes in the Region, to UN and other International organizations and to important Marine Stations in the rest of the world. It was recommended that the Newsletter should not polarise the existing newsletters such as that of the SWIOP in Seychelles.

23. GUIDELINES OF THE COMARAF PROJECT - Dr. S.G. Zabi.

Dr. S.G. Zabi of COMARAF Project informed the delegates on the guidelines of the project. He told members that since the nineteenth session of the General Conference of UNESCO, Members States have attached great importance to coastal zones by developing research programmes with the general objective of improving scientific understanding of the

coastal ecosystems functioning.

In order to achieve this objective, UNESCO has launched a MAJOR INTER-REGIONAL PROJECT ON RESEARCH AND TRAINING, leading to the INTERGRATED MANAGEMENT of COASTAL SYSTEMS (COMAR).

The COMARAF Project aims at establishing a comprehensive framework for regional and sub-regional cooperation among the member countries in the study and rational management of coastal ecosystems. The project is also designed to formulate and consolidate an integrated programme of research and training on the multi-disciplinary basis.

Several seminars and workshops have been organized in Africa to prepare the region for the COMARAF Project implementation. The following themes will be covered :

- i) - the productivity of marine coastal zones;
- ii) - the hydrodynamics and the geology of coastal areas and of the continental shelf.

The Coastal Zones concerned are lagoons, estuaries, mangroves, Coral reefs and nearshore continental shelf.

It was also decided to establish a regional network for exchange of information, scientific and technical literature, with a view to management of marine and coastal resources. The project has been allocated US\$ 1 million to run its activities for the next three years (1987 - 1990).

24. SCIENTIFIC CONTRIBUTIONS

The following scientific papers were presented:

- 1. Nutrients regeneration in a typical tropical estuary (Tudor Creek, Mombasa, Kenya) during long rainy season (9186).
Mr. J.M. Kazungu
- 2. The distribution and abundance of Hermatypic corals along the Kenya Coast.
N. Muthiga
- 3. Water movement and salinity gradient in Tudor inlet adjoining Mombasa Island.
M.N. Mutua
- 4. Planktonic copepods from coastal and inshore waters of Tudor Creek, Mombasa.
E. Okemwa

5. Hydraulic modelling: Model of the Kilindini - Port Reitz creek.
M.O. Odido
6. A study of some pigments from sea urchin eggs: Diadema setosum.
S. O'Omolo
7. The eulittoral macrophytic flora of the selected points, Kanamai, McKenzie Point and Gazi Bay along the Kenya Coast.
H.A. Oyieke
8. The effects of habitat complexity created by mangroves on macrofaunal composition in the brackish water intertidal zones in Kenya.
R.K. Ruwa
9. The settling of Penaeid larvae along the shoreline of Tudor Creek.
E. Wakwabi
10. Seasonal changes in intertidal Marine algae along the Kenya coast.
G. M. Wamukoya
11. Physical and chemical water conditions inside the mangrove are of Ambanoro (Nosy-Be- Madagascar) from June 1986 to June 1987.
H. Razafindrainibe
12. Variation studies of quantitative characters in Lutajinus Bohr collected from three sites in the Red Sea.
Prof. Dr. E. Bekele

25. IDEAS WHICH WERE DISCUSSED FOR THE RECOMMENDATIONS

1. Starting with the RECOSCIX -WIO Project. If computer links are not yet feasible, then use other means of communication (mail, telex,...). The establishment of a Regional Documentation Centre is covered within the RECOSCIX-WIO Project Proposal, formerly proposed to the Region during the Second Session of the IOC Regional Committee for the Co-operative Investigation on the North and Central Western Indian Ocean.
2. Starting with a Newsletter. Number 0 will be the report of the Workshop (after discussion).
Requesting IOC, UNEP and UNESCO to fund together one Newsletter for the East African Region.
 - (i) a Regional Newsletter focusing on Marine Sciences for the Eastern African Region is an important tool for the establishment of professional contacts between Marine scientists of the Region.

- (ii) such a Newsletter is a fine way of promoting Marine Sciences of the Eastern African Region.
- (iii) the necessary hardware and software is now available at the Regional Dispatch Centre, established in the framework of the RECOSCIX-WIO Project within the KBP at KMFRI
- (iv) the necessary supporting staff is now available at the Regional Dispatch Centre, established in the framework of the RECOSCIX-WIO.

3. Starting a Regional Postgraduate Programme in Eastern African Marine Ecology.

RECOMMENDATION REGARDING THE ESTABLISHMENT OF A REGIONAL DOCUMENTATION CENTRE FOR THE EAST-AFRICAN REGION

The participants in the workshop recommended that

1. Having noted that these facilities exist and it was allowed to start, the participants recommended that interested agencies like UNESCO, IOC, UNEP and others to be invited and requested to contribute financially to the project.
2. The participating countries decide upon the location of one or more subcentres of the network in their country, taking into consideration the necessity of the presence of a computer section with relevant hardware, a marine Scientific Library and a photocopier.
3. The participating countries seek funding to obtain the necessary computer hardware to contribute to the building up of the WIOLIB Data-base, be it by their own means or through other fundings. A grouped request could be introduced to FAO, taking into consideration the organization's initiatives in the provision of microcomputers to the Region.
4. The participating countries seek appropriate staff for the respective subcentres in their country, taking into consideration that specific training courses will be organized in the framework of the Project. Co-operation can be sought from NGO's (e.g. VVOB) for supplying experts for training of local staff.

RECOMMENDATIONS REGARDING THE ESTABLISHMENT OF A REGIONAL NEWSLETTER, FOCUSING ON MARINE SCIENCES FOR THE EASTERN-AFRICAN

- 1 The Newsletter will be called WINDOW (Western Indian Ocean Waters) A Marine Ecology Newsletter for Eastern Africa.
- 2 The Newsletter will be printed at the RECOSCIX-WIO Regional Dispatch Centre.

3. The Newsletter will have an informative character, excluding publication of formerly unpublished scientific information. A board of editors will be established, composed of one member from each participating country to revise the submitted documents from their respective countries prior to publication in the Newsletter.
4. International Organizations are requested to co-operate by sending relevant information for publication.
5. Participating countries are requested to contribute on a regular basis by supplying information for publication.
6. International Organizations (UNESCO, IOC, UNEP) are requested to fund the Newsletter amounting to US\$ 1000 to 1500 per annum.
7. International Organizations (UNESCO, IOC, UNEP) are requested to investigate the possibility and necessity to provide funds for the purchase of additional equipment (e.g. Matrix-printer or Laser-printer) for the Newsletter.

RECOMMENDATIONS REGARDING REGIONAL POSTGRADUATE PROGRAMME IN EASTERN AFRICAN MARINE ECOLOGY

1. It was agreed that Prof. Nikundiwe of Zanzibar in Tanzania be the Co-ordinator, and Prof. Polk his Associate Co-ordinator.
2. It was also agreed that a steering committee be set up to follow up the report. The following members from the Steering Committee are:
 - a) Prof. A. Nikundiwe - Co-ordinator
 - b) Prof. P. Polk - Associate Co-ordinator
 - c) Prof. E. Bekele - member
 - d) Prof. V. Jaccarini - "
 - e) Mr. D. Gangapersad - "
3. It was agreed that both the Co-ordinator and his Associate Co-ordinator should work out a document on this subject and make it ready by latest 15 June 1988.
4. KMFRI and Prof. Polk promised to look for funds for the Steering Committee to meet in June 1988, and to scrutinize the report before it is finally distributed to the relevant institutions of the member countries.
5. It was finally agreed that the final document should be distributed to relevant Universities in all the member countries of the region for their final scrutinizing, comments and suggestions. It was further suggested that the final report should be sent to Dean or Head of the relevant

within the region for quik action and response.

6. The steering Committee or the Workshop should work out the machinery of receiving and syntesising the final information to be received from the member countries on the report.

Annex 1: Report of Committee Meeting on:

POSTGRADUATE COURSE IN MARINE ECOLOGY FOR THE EASTERN AFRICAN REGION.

A. Introduction:

On the first day of the Workshop (6 April 1988) a Committee was appointed to discuss Agenda item No.6 and make recommendations as to how best the proposal to establish a postgraduate in Marine Ecology for the Eastern Africa Region could be implemented. The Committee was comprised of the following workshop participants:

1. Professor A.S. MsangiChairman
2. Professor J. Kokwaro Secretary
3. Professor P. Polk ...Kenya/Belgium Project
4. Professor V. Jaccarini ..University of Nairobi Kenya
5. Professor A.M. Nikundiwe Tanzania
6. Professor E. Bekele Ethiopia
7. Professor M.G. Mohamed Somalia
8. Mr. D. Gangapersad Mauritius
9. Ms. H. Razafindrainibe Madagascar
10. Mr. S.O. AllelaKMFRI, Kenya

B. Discussion:

The Committee agreed that :

- (i) There was a great need for the establishment of a postgraduate training programme in Marine Ecology for the Eastern African Region.
- (ii) Although the experience gained in introducing the F.A.M.E. programme of the Free University of Brussels to Kenya, under the Kenya/Belgium Project, was useful, the proposed programme for Eastern Africa should be oriented to the conditions in Eastern Africa.
- (iii) The proposed programme should include both M.Sc. and Ph.D. training.
- (iv) The proposed programme should be run as a joint venture between the Universities of the region which should co-operate in its execution, i.e. in teaching, supervision of students research and examinations.
- (v) The proposed programme should be established on the model of the African postgraduate programme in Insect Science (APPIS) based at the International Centre of Insect Physiology and Ecology (ICIPE), Nairobi, Kenya.

- (vi) Prospective students for the proposed programme should be sponsored by their national governments, and on successfully completing the training course, they should be awarded the respective degrees of their national universities.
- (vii) A co-ordinator, who should be a national of the region, should be appointed to work out the details of the programme.
- (viii) Professor A.M. Nikundiwe should be the co-ordinator.
- (ix) The co-ordinator should work in close collaboration with Professor Polk who should play the role of Associate Co-ordinator.
- (x) In carrying out their work the Co-ordinator and the Associate Co-ordinator should make all the necessary consultations with the national universities in the region and with relevant national and international organisations, in order to establish a smooth establishment of the programme.
- (xi) The terms of reference of the co-ordinator should be:
 To work out the details of the training programme including:
 - (a) Philosophy and Rationale
 - (b) Conditions for admission
 - (c) Course content and duration
 - (d) Administration and management
 - (e) Funding
 - (f) Existing facilities
 - (g) Staff and facility requirements
 - (h) Possible location
- (xii) The Co-ordinators should complete their task and submit a comprehensive report by the end of June, 1988 at the latest.
- (xiii) The Co-ordinator's report should be scrutinized by a Steering Committee comprising :
 - 1. Professor A.M. Nikundiwe Co-ordinator
 - 2. Professor P. Polk Associate Co-ordinator
 - 3. Professor E. Bekele Member
 - 4. Professor V. Jaccarini Member
 - 5. Mr. D. Gangapersad Member

- (xiv) After the Co-ordinators Report has been scrutinized and approved by the Steering Committee it should be distributed by the Co-ordinator to all national universities in the region for consideration and approval. The Universities should be requested to send in their response to the Co-ordinator within one month of receipt.
- (xv) After receiving the responses of the Universities the Co-ordinators should, after consultations with national universities and other interested parties arrange a meeting of representatives of these bodies to discuss and agree on the launching of the programme.

C. Recommendations:

1. A postgraduate programme in Marine Ecology for Eastern Africa should be established as a co-operative venture for the countries of the Eastern African Region.
2. The programme should be centred in one suitable location in the region but should be executed through a joint effort of all the member countries of the region.
3. The course content of the programme should reflect the needs of the countries of the region in the development of marine science and technology and in the rational exploitation of their marine resources.
4. All the member countries of the region and all the relevant international organisations including UNESCO, FAO, UNEP and IOC should be requested to give their material and moral support to enable the launching of this project within the next two years.
5. Professor A.M. Nikundiwe and Professor P. Polk should be recognised by the national and international institutions concerned as the Co-ordinator and Associate Co-ordinator respectively of the proposed project.

A.S. Msangi
Chairman

ANNEX 2 :

LIST OF PARTICIPANTS PRESENT AT THE UNESCO/KBP/KMFRI REGIONAL
WORKSHOP ON FUNDAMENTAL AND APPLIED MARINE ECOLOGY
6TH - 9TH APRIL 1988 - MOMBASA KENYA

MAURITIUS

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Mr. R. Nzioka
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Research officers KMFRI: Mr. R. Ruwa, Mr. E. Okemwa,
Mr. J. Kazungu, Mrs. H. Oyieke, Mr. G. Wamukoya,
Ms. N. Muthiga, Mr. M. Mutua, Mr. M. Odido, Mr. D. Oteko,
Mr. E. Wakwabi, Mr. D. Munga, Mr. S.O. Omolo

Librarian KMFRI: Mrs. Mwobobia

KBP - MOMBASA

Prof. Ph. Polk
Director Kenyan-Belgian Project
Free University Brussel
BELGIUM

Dr. E. Martens
Assistant Director KBP

Mr. P. Pissierssens
Computer Section KBP

ANNEX 3 :

AGENDA

UNESCO/KBP/KMFRI REGIONAL WORKSHOP ON FUNDAMENTAL AND APPLIED
MARINE ECOLOGY
6TH - 9TH APRIL 1988 - MOMBASA, KENYA

Subvention from UNESCO - Nairobi, Kenya

Organizer: Kenyan - Belgian Project in Marine Sciences

Venue: Nyali Beach Hotel - Tel. 471551/471567 Mombasa

Tuesday: 5 April : Registration of participants.

Wednesday: 6 April

8.30 - 9.00 : Registration of participants, administrative
arrangements

9.00 - 10.30 : Opening session of the meeting :
Master of ceremony: Mr. Allela, Director KMFRI
Chairman: Prof M. Hyder, Nairobi University.
Vice-Chairman: Dr. E. Martens, Asst. Director KBP
Rapporteurs: Prof. Bathwondi- Mr. Okemwa

Introduction Mr. Allela, Prof. Hyder
Director KBP: Prof. Polk
UNESCO Representative: Kitaka
Belgian Government Representative: Mr. Beck

Official Opening: Government of Kenya Representative:
Mr. F.N. Nthenge, Dupt. Secr. Ministry Research
Science & Technology

10.30 - 11.00 : Coffee break

11.00 - 12.30 : State of Research on Marine Ecology -
Review of national progress in Marine Sciences in
the different countries represented.
(Mauritius - Ethiopia - Somalia)

12.30 - 14.00 : Break - Lunch

- 14.00 - 16.15 :- State of Research on Marine Ecology
(Continuation)(Madagascar - Tanzania - Kenya)
- UNEP - Representative: Dr. B. Nielsen.
- Kenya National Council for Science & Technology:
Mrs. G. Thitai
- Tanzania National Scientific Research Council:
Prof: A.S. Msangi
- KBP - overview of ongoing research:
Dr. E. Martens
- 16.15 - 16.30 : Coffee break
- 16.30 - 17.30 : Post-Graduate Course in Marine Ecology for the
collaborating E. African countries - Prof. Ph. Polk
KMFRI - KBP - Univ. NBI. - UNEP
- 18.00 : Drink Nyali Beach Hotel

Thursday: 7 April.

- 8.30 - 10.30 : Discussions on the setting up of a Regional
Documentation Centre for E. African Countries:
KMFRI - KBP - UNEP. Mrs. J. Mwobobia.
Possibilities in other countries by the
representatives.
- 10.30 - 10.45 : Coffee break
- 10.45 - 12.30 : Potentialities of a Regional Database for
exchange of scientific data for E. Africa: KMFRI
- KBP. Mr. P. Pissierssens. Possibilities in
other countries by the representatives.
- 12.30 - 14.00 : Lunch
- 14.00 - 15.30 : Organisation to set up a Newsletter for the
collaborating E. African Countries: KMFRI - KBP,
Mr. P. Pissierssens. Representatives of other
countries.
- 15.30 - 17.00 : Visit to KMFRI in 2 groups alternating:
1. Visit to Computer Section KMFRI and
demonstration of computer connection for Regional
Documentation Centre and Database.
2. Visit to the laboratories KMFRI.

Friday: 8 April

8.30 - 10.30 : Scientific contributions (4)

10.30 - 11.00 : Coffee break

11.00 - 12.30 : Scientific contributions (3)

12.30 - 14.00 : Lunch

14.00 - 16.00 : Scientific contributions (4)

16.00 - 16.30 : Coffee break

16.30 - 18.00 : Scientific contributions (3)

Saturday : 9 April

9.00 - 12.00 : Discussions on planning of activities -
recommendations and adoption.

12.00 - 13.00 : Lunch

13.15 Departure for visit to Gazi at South Coast:
Pilot culture of oysters and of marine algae.



**East African Co-operation
In Fundamental and Applied Marine
Ecology**

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- 9.1.1 J.M. Kazungu
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- 9.1.3 M.N. Mutua
- 9.1.4 M.O. Odido
- 9.1.5 E. Okemwa
- 9.1.6 S. O'Omolo
- 9.1.7 H.A. Oyieke
- 9.1.8 R.K. Ruwa
- 9.1.9 E.O. Wakwabi
- 9.1.10 G.M. Wamukoya

9.2 Ethiopia (Asmara University)

Prof.Dr. E.Bekele

9.3 Madagascar (CNRO)

Ms. H.Razafindrainibe

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