

RECOSCIX-WIO: Providing Scientific Information to Marine Scientists in the Western Indian Ocean region

by L. Egghe and P. Pissierssens

ABSTRACT

The paper describes the project RECOSCIX-WIO (Regional Co-operation in Scientific Information Exchange in the Western Indian Ocean Region). Details are given on the project's history, operational structure, communication facilities as well as its comprehensive range of services and products (query handling, document delivery, WIODIR, WIOLIB, WINDOW, WIOCURRENT). The paper provides information on the next phase of the project (1996-1999) which includes the services and products of the previous phase but also adds development of a WWW server and CD-ROM products. The paper highlights the substantial collaboration with other projects and programmes which facilitates its sustainability beyond 1999.

1. INTRODUCTION

Information is one of the most elementary tools used by scientists all over the world and in all scientific disciplines. Communication is a basic requirement for the growth of scientific knowledge, economic and technological development. Both information and communication technologies have seen major changes during the last decades.

Communication

Many countries in the developing world have started the post-colonial era with no or very basic communication infrastructure. Lack of state funding and economic investment for decades has created a substantial gap between the industrialized and developing nations. In the industrial world the geometric growth of the Internet as an 'Information Superhighway' has created an environment where scientists (and other users) can communicate in one-to-one or, one-to-many or many-to-many relations in real or near real time and enjoy almost instantaneous access to information and data, irrespective of their physical location. This obviously has substantial repercussions on the information and data output of the scientific community. Lack of access to modern communication tools on the other hand, can throw a scientist into the backwaters of scientific development just as fast. Especially for developing countries where access to the Internet is becoming reality slowly, this exacerbates an already existing isolation due to lack of scientific literature.

Information

To be able to compete in the rapidly evolving world of science, remaining up-to-date with the latest development and discoveries is crucial. This requires access to at least a number of core journals, participation in scientific meetings or, in more general terms, have timely access to scientific information. Lack of funds and, to some extent, lack of appreciation for the important role of information, has created a situation where most libraries in developing countries are very poorly equipped and do not even subscribe to the most important journals. They often need to rely on donations of (often old) books and journals. Funds for scientific or technological development projects are mostly allocated for equipment, training and operational expenses. Rarely funds are set aside for the development of the library.

2. RECOSCIX-WIO: HISTORY

In 1985 Kenya and Belgium embarked on the 'Kenya-Belgium Project in Marine Sciences (KBP)' funded by the Belgian Administration for Development Co-operation (BADC). The project's main objective was to develop marine science capabilities at the Kenya Marine and Fisheries Research Institute (KMFRI), based in Mombasa, Kenya. Already during the first months of the project it was discovered that scientific literature had been omitted in the project. The project managers (S. Allela, Ph. Polk) realized that information was an essential component in the development process and accordingly they invited L. Egghe of the 'Limburg University Centre' (LUC), Diepenbeek, Belgium to investigate ways and means to provide a 'query handling and document delivery' service. This service was soon set up between KMFRI and LUC. In view of the substantial demand for information by the scientists the KBP and LUC requested P. Pissierssens, a Belgian KBP expert based at KMFRI to investigate whether other marine science institutions in the region were facing the same challenges in terms of lack of access to scientific information. A mission was undertaken in 1986 to Ethiopia, Kenya, Madagascar, Mauritius, Seychelles, Somalia, and Tanzania. The objectives of the mission were (i) to evaluate the status of marine science libraries in the region; (ii) to assess the feasibility of electronic (email) communication between the visited countries and KMFRI, Mombasa. The conclusions of the mission were that (i) all institutions in the region had poorly equipped libraries; and (ii) that electronic communication was technically possible but economically unviable at that moment. On the basis of the mission results a project proposal was drafted by the consultants (P. Pissierssens, H. Onyango) for the development of a 'regional scientific information exchange project'. This proposal was submitted to, and approved by the IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean (IOCINCWIO) during its Second Session in Arusha, Tanzania (1987). The region requested the IOC to identify funds for a pilot project and accepted the offer of KMFRI to host the 'regional dispatch centre' in Mombasa, Kenya.

The IOC started the development of the pilot project in February 1989. Mr. Pissierssens was hired as an IOC Associate Expert, funded by Belgium, to co-ordinate the project. After two years the project had developed a query handling and document delivery service, a regional directory of marine scientists and published a regional newsletter (WINDOW).

A project proposal, developed by LUC in close collaboration with KMFRI and IOC was then submitted to, and approved by the Flemish Inter university Council (VLIR). It covered a period of four years and had a budget of nearly US\$ 500,000, provided by BADC. The Flemish Council for Development Cooperation and Technical Support (VVOB) provided a full-time co-ordinator (P. Reyniers), to succeed Mr. Pissierssens. KMFRI provided office space, utilities and local project staff. The project started in 1991.

3. RECOSCIX-WIO: THE OBJECTIVES

The objectives of the RECOSCIX-WIO project can be defined as:

- provide marine scientists in the Western Indian Ocean region with bibliographical information (abstracts of publications, hard copies of documents, ...);
- prepare and distribute various data-products relevant to marine sciences of the WIO region (directory of marine scientists, bibliography of WIO marine scientists, ...);
- promote communication between WIO marine scientists and marine scientists of other parts of the world;
- publicize marine science of the WIO region in the WIO region and in other parts of the world;

- provide information equipment, software and training.

4. THE OPERATIONAL STRUCTURE

The RECOSCIX-WIO operational structure is a network of **Co-operating Institutions (CIs)**, **Associate Institutions (AIs)**, and **Co-operating Libraries (CLs)**. Further there is a 'pool' of contacts spread throughout the world. To link the different components a **Regional Dispatch Centre (RDC)** was established. This centre acts as a traffic controller routing user requests to information sources and information to users.

Co-operating institutions are marine science institutions in Western Indian Ocean region countries including Eritrea, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, and Tanzania. Co-operating institutions are entitled to the services and products, free of charge, as well as to equipment and training. It is their responsibility as a counterpart activity to commit resources to building a local library holding database as a contribution to the WIOLIB database, and to service document requests received from the RECOSCIX-WIO RDC. There are currently 12 Co-operating institutions (See Annex 1).

Associate Institutions: during the project it became clear that the region has many small institutions or projects which need the RECOSCIX services but cannot commit the resources to fully participate in the counterpart activities. It was therefore decided to establish the component 'Associate Institution'. These institutions are entitled to free services and products, but do not receive equipment and training. There are currently 51 Associate Institutions (See Annex 2).

Co-operating libraries are marine science libraries both within and outside the region. They provide a document delivery service upon request by the RDC. There are currently 25 Co-operating Libraries (See Annex 3).

Contacts act as occasional sources of information and also help RECOSCIX-WIO in generating visibility or in support mobilization.

Regional Dispatch Centre is based at the Kenya Marine and Fisheries Research Institute in Mombasa, Kenya.

Electronic communication through E-mail has been available at the RDC since 1989. In fact the RDC was one of the first X.25 packet switching users in Kenya and was a pilot site for the Kenya Posts and Telecommunications Corporation (KP&TC). Initially using Greenet (UK) as its E-mail service provider, RECOSCIX-WIO migrated to a UNIX-based e-mail mirror site agreement with the University of Antwerp (UA) since 1996. This allowed for the creation of over fifty e-mail addresses at KMFRI. However, due to the high cost of international X.25 communication e-mail communication has remained a heavy financial burden on the project. Thanks to the liberalization of telecommunications in Kenya which started in 1996 several Internet service providers (ISP) have now started business in the country. In May 1997 RECOSCIX-WIO has therefore ceased the use of the UA mirror site operation and migrated to a private ISP. A next step will be the loading of a RECOSCIX-WIO web server on the ISP server. (so far RECOSCIX information was available on the IOC web server only).

Whereas communication between the co-operating institutions was mainly paper based between 1989 and 1995, electronic mail is now increasingly being used. Several countries in the region have liberalized communication and ISP are offering affordable Internet access.

5. THE SERVICES & PRODUCTS

Service: QUERY HANDLING (QH) is a service that informs scientists about the existence of scientific literature on a certain topic, that can be described via key words. In the early stages of the project most of this type of problems were handled by using the DIALOG on-line service (USA). Nowadays it is only used for searches that fall outside the scope of the ASFA database (Aquatic Science and Fisheries Abstracts). The ASFA database has been available at the RDC on CD-ROM since 1989. Scientists describe the required information in free text. At the RDC this is translated into a search query for the ASFA database. The resulting abstracts are mailed back to the scientist on paper or diskette. Since 1996 major CIs receive the ASFA CD-ROM directly. Through joint efforts between RECOSCIX-WIO and IOC 13 institutions in 7 countries receive the ASFA database CD-ROM directly. Since 1996 the KMFRI is an ASFA input centre, taking responsibility for the abstracting of journals and other publications published in the region.

The description of this first service already enlightens the power of dealing with a single scientific subject : one only needs one (or few) database(s), in this case ASFA, to cover the majority of the searches. The advantage of using CD-ROM becomes apparent too: no telecommunication costs are incurred. For more on the use of CD-ROM as a carrier of scientific information, we refer to: Tanui (1995), Bamba (1994), Richer (1994), Abid and Pelissier (1993), Ojo-Igbinoba (1993), Compton (1992), Nkhata (1992), White (1992) and Ephraim (1991). Especially Ojo-Igbinoba (1993) summarises it very well : the paper defines CD-ROMs, describes their advantages and contrasts them with the online industry indicating that : they are a more efficient medium for the storage and publication of large amounts of information, they are cheaper to run, more user friendly and easily searchable; the disc is unaffected by power cuts; they do not require online telephone connection, and are more durable than print or microform. He argues that CD-ROM is a more appropriate technology for the African environment with its poor communications facilities and economics.

Service: DOCUMENT DELIVERY (DD). After receiving the abstracts the user will select relevant publications which can then be requested to the RDC through the Document Delivery service. Through the network of Co-operating Libraries (CLs) the RDC can obtain photocopies of journal articles, extracts from monographs, or theses. Thanks to an extensive set of CL library holding catalogues (printed or electronic) the RDC can identify the quickest and fastest supplier. Whereas most requests were serviced by the extra-regional libraries during the first few years of the project, increasingly requests are now being serviced intra-regionally. This portion has increased from 6.2 % in 1990 to 39.5 % in 1995.

Product: Western Indian Ocean Library Holdings Database (WIOLIB). An important yet largely unknown source of information is stored in the many institution libraries in the region. It was therefore decided to undertake a comprehensive cataloguing exercise. the database thus constructed is called WIOLIB. The CIs each build their own local database and send regular updates to the RDC in Mombasa. UNESCO's Micro CDS/ISIS software was chosen as the database engine in view of its wide distribution and availability in developing countries and because it is freeware (for non profit users). For more information on the use of CDS/ISIS we refer the reader to Rodriguez (1995), Kumar and Kar (1995) and Chisenga (1995) for its use in developing countries, to Sergiou and Kaloyanova (1995) for its use in de production of CD-ROMs and to Kips (1995) as a general references. The ASFISIS format was chosen for the database structure in order to enable easy transport of records to the ASFA database through the ASFA input centre at KMFRI.

Product: Western Indian Ocean Directory of Marine Scientists (WIODIR)

As early as 1989 the RECOSCIX-WIO project has put great emphasis on disseminating information on locally available human capacity through the development and maintenance of the WIODIR. The directory contains comprehensive information on nearly 300 marine (as well as brackish and freshwater) scientists in the region including address, degree, research subject keywords (using the ASFA

subject codes), details on research activities, etc. The database is being updated annually. The 1992 edition was printed by UNEP (United Nations Environmental Program). In 1997 WIODIR has been integrated in the IOC Global Directory of Marine Scientists (GLODIR), made available on the World Wide Web of the Internet on <http://www.unesco.org/ioc/infserv/glodir.htm>

Product: WIOCURRENT

The project subscribes to about 10 journals in marine sciences. They have been selected based on a statistical analysis of their use in the DD service and on the obsolescence rates of these journals. Every month the tables of content of these journals is copied and send to all the AIs and CIs. This service replaces the service previously provided globally by te MSCT (Marine Science Contents Tables) published by FAO. During 1997 this service will be extended considerably by the offering of the database SWETSCAN, an online directory of the tables of content of about 13,500 journals available worldwide.

Product: Western Indian Ocean Waters newsletter (WINDOW)

WINDOW has been considered since 1989 as the current awareness flagship of the project. It is a newsletter made for the scientists by the scientists. Edited and composed locally (at the RDC) WINDOW has a print run of 1500 copies and is being mailed to readers in over 50 countries. Printing and distribution were done locally between 1989 and 1994. In 1995 IOC of UNESCO offered to print and mass mail in Paris. This enabled substantial cutting of cost for the project.

6. RECOSCIX-WIO 1996-1999: INFORMATION AND DATA

The success of RECOSCIX-WIO as a regional information dissemination network and its effectiveness as a model for information networks in other regions has been widely accepted (IOC, 1992a). We can also state that RECOSCIX-WIO has contributed to creating closer links between scientists in the region, thereby paving the way for free exchange of data and information between the countries. In this respect we cite the report of the Third Session of the IOC Regional Committee on the Co-operative Investigation in the North and Central Western Indian Ocean (IOCINCWIO-III), held in Mauritius, December 1992, where the Member States stated:

"The Regional Committee noted that regional capabilities to interpret and use the results from large-scale experiments like TOGA¹ & WOCE² are very limited. There is a need to enhance this capability and train human resources to both use the data and interpret the results so as to provide the advice on actions to the governments. The TOGA data can be delivered to Member States through the RECOSCIX dispatch centre where relevant facilities exist, as demonstrated through the related ASFA activities."

and further:

"The printed bathymetric chart and, if desired, the transparent chart original, will be delivered for further use to the countries of the region. In this way the countries of the region were introduced to the evaluation of bathymetric charts. Later on the chart will be digitized and transferred to a digital data bank. The provision of the data could perhaps be achieved through the RECOSCIX mechanism, as in the case proposed for TOGA data."

¹TOGA : Tropical Ocean and Global Atmosphere

²WOCE : World Ocean Circulation Experiment.

The region has thus given RECOSCIX-WIO a clearly expanded mandate to include both information **and** data in its terms of reference.

In this regard we need to mention the issue of **Metadata**. "Metadata refers to data that are used to describe a database (e.g, describing the extent of the data, coverage, scale, what methods were used to collect the data, by whom and when the data were collected, etc.) With valid and complete metadata, someone can learn enough about a database (without communicating with the "owner" of the data) to determine if the data would be of use or interest to them.". Metadata make the boundaries between (numerical) data and information fade. In fact Metadata illustrate the need for data managers and information managers to collaborate closely as they both provide crucial services to the scientist. The importance of managing these 'parcels' of work is therefore most obvious. This management is the task of data and information managers. The tool to refer to the parcels and to find them is the Metadatabase.

Based upon the recommendations by IOCINCWIO-III, the Limburg University Centre (LUC), in collaboration with the University of Antwerp, and with advice from the IOC, submitted a new project proposal entitled **RECOSCIX-WIO-II**. The new project (January 1996 - March 1999) proposed to continue the already established services and products, but added a new component: development of WWW and CD-ROM products containing information, metadata and data. The project was submitted to, and approved by VLIR and BADC with a budget of approx. US\$ 250,000 over a period of three years. The project has hired E. Vanden Berghe as manager of the project.

We already pointed out the value of CD-ROM as a medium for storage and dissemination of scientific literature. The envisaged CD-ROM will include the following data and information products:

Information databases:

WIOLIB, WIODIR, several databases provided by the major players in the world of document delivery : BLDSC (British Library Document Supply Centre), Technical University Delft (the Netherlands), etc.;

Numerical databases:

TOGA and WOCE data; Bathymetric data; World Ocean Atlas extracts for the Western Indian Ocean (environmental parameter data),...

A WWW server will be set up by the RDC in Mombasa (the system will be physically located in Nairobi, Kenya on the server of the ISP). The RECOSCIX-WIO WWW server will contain information on the RECOSCIX-WIO project, but will also offer to host pages prepared by the Co-Operating Institutions. It will also provide several database services including WIOLIB, WIODIR, MSCP (Marine Science Country Profiles: these are 'fact sheets' on the national marine science capabilities of IOCINCWIO Member States).

At KMFRI a National Oceanographic Data Centre (NODC) was established in 1995. RECOSCIX-WIO will closely collaborate with the NODC.

Another area of cooperation will be the Ocean Data and Information Network for Eastern Africa (ODINEA). This project can be considered as a data exchange equivalent of RECOSCIX-WIO. The project proposal was presented by KMFRI to the 15th Session of the IOC Committee for International Oceanographic Data and Information Exchange (IODE-XV), Athens, Greece, January 1996, where it was endorsed. The Committee noted:

"It has been observed that the participation of IOCINCWIO Member States in IODE programme activities is minimal: no NODCs or RNODCs have been established in this region; only one DNA is registered in Tanzania. At the Third Session of IOCINCWIO, held in Mauritius in December 1992, it was noted that regional capabilities to interpret and use the results from large-scale experiments like TOGA and WOCE, are very limited. The Regional Committee identified a need to enhance this capability and train human resources to use both the data and interpret the results so as to provide advice on actions to the governments. RECOSCIX-WIO was identified as a centre through which such data could be delivered.

It is stated that, in order to ensure increased participation of IOCINCWIO Member States in the IODE programme, two major activities have to be undertaken: (i) strengthen national capabilities and assist in the development of NODCs; (ii) develop a regional data and information network for the IOCINCWIO region. It is noted that a regional information exchange network is already operational through the RECOSCIX-WIO (Regional Co-operation in Scientific Information Exchange in the Western Indian Ocean region) project. The existing network can be adapted to include data exchange."

The project's objectives are to, within the framework of IODE:

- Provide a regional co-operative structure linking national oceanographic data centres (NODC). This linkage will ensure access of all scientists in the region to the data collected by national stations.
- Ensure active involvement of national institutions in the IODE programme.
- Adhere to the IODE data management procedures and ensure the use of standard methods for data collection and storage in the region.
- Ensure access of scientists in the region to datasets not located in the region including satellite datasets.
- Develop and disseminate data products for the benefit of scientists and policy makers in the region.
- Establish exchange of data and information with the WDCs (World Data Centres) Oceanography.

7. Conclusion

It is a classical question for a coordinator of a development project : what if the support stops, in other words what is the sustainability of the project beyond its current support ? In the case of RECOSCIX-WIO this moment is defined as March 31, 1999.

As seen from the above it is clear that RECOSCIX-WIO must be seen as a part of a comprehensive regional scientific undertaking involving many partners: national marine science institutions as well as donors. The tasks currently undertaken by RECOSCIX-WIO and limited to information management are gradually becoming part of a larger entity which will cover both information and data. This entity will be closely linked to the national and regional marine science programmes and activities. Continuing and expanding participation of WIO institutions in regional as well as international/global projects will maintain RECOSCIX-WIO's programme. However, it must be emphasized that the activities at the RDC will require commitment by the WIO Member States as well as by the host country Kenya.

BIBLIOGRAPHY

Abid A. and Pelissier D. (1993), CD-ROM in developing countries : a UNESCO perspective. *Alexandria* 5 (3), 175-183.

Bamba Z. (1994), L'utilisation du CD-ROM en Afrique : resultats d'une enquête exploratoire. *Documentaliste* 31 (6), 305-309.

Chisenga J. (1995), Micro CDS/ISIS software in Lesotho. *COMLA Newsletter* 87, 5-10.

Compton A.W. (1992), Opportunities for CD-ROM information services in Africa. *Information Services & Use* 12, 283-290.

Ephraim P.E. (1991), The development of CD-ROM and its potential for African researchers. *Journal of Information Science* 17, 299-306.

IOC (1992a), IOC Workshop on Donor Collaboration in the Development of Marine Scientific Research Capabilities in the Western Indian Ocean Region. Brussels, 1992. UNESCO, IOC Workshop Report 83.

IOC (1992b), IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean. Third Session, Vacoas, Mauritius, 1992. UNESCO, IOC Reports of Governing and Major Subsidiary Bodies.

IOC (1993a), Development of Marine Scientific Research Capabilities in the Western Indian Ocean Region, Mombasa, Kenya, 1993. UNESCO, IOC IOC/INF-944.

IOC (1993b), SAREC-IOC Workshop on Donor Collaboration in the Development of Marine Scientific Research Capabilities in the Western Indian Ocean Region, Brussels, 1993. UNESCO, IOC Workshop Report 95.

Kips E. (1995), Explore CDS/ISIS, a training vehicle. *FID News Bulletin* 45, 275.

Kumar S. and Kar D.C. (1995), Library computerization : an inexpensive approach. *Library Review* 44, 45-55.

Nkhata B.W.M. (1992), The use of CD-ROM technology in the sharing of bibliographic information in countries with under-developed telecommunications networks. *Proceedings of the Conference on Library and Information Services for future Development of Southern Africa (Pretoria, 1992)*. Info Africa Nova CC, 555-564.

Ojo-Igbinoba M.E. (1993), The potential of CD-ROM technology in African libraries. *African Journal of Library, Archives and Information Science* 3, 157-165.

RECOSCIX-WIO Annual Report (1992, 1993, 1994, 1995), Annual Reports published by RECOSCIX-WIO. Available from LUC.

Richer S. (1994), Le disque compact dans la francophonie du sud. *L'Ecluse* 6, 18-21.

Rodriguez (1995), CDS/ISIS : a statistical analysis of usage in Latin America and the Caribbean. *International Information and Library Review* 27, 225-235.

Sergiou G. and Kaloyanova S. (1995), Application of Micro-CDS/ISIS and HEURISKO for the preparation of CD-ROMs. *Electronic Library* 13, 477-482.

Tanui T.A. (1995), CDROM - what is its future in Africa ? *Online and CD-ROM Review* 19, 27.

White W. (1992), CD-ROM databases in Africa : some ideas for making their use sustainable. *Proceedings of a Workshop held by the Technical Centre for Agricultural and Rural Cooperation, Geneva, Switzerland, 1991. Technical Centre for Agricultural and Rural Cooperation, the Netherlands, 107-109.*

WINDOW (1993), Newsletter of RECOSCIX-WIO. Since 1995 published and mailed by IOC, Paris.

ANNEX I

LIST OF CO-OPERATING AND ASSOCIATED INSTITUTIONS

- Asmara University, Marine Biology & Fisheries Department; ASMARA (ERITREA)
- University of Addis Ababa, Department of Biology; ADDIS ABABA (ETHIOPIA)
- Coral Reef Conservation Project; MOMBASA (KENYA)
- Egerton University, Departments of Botany & Zoology; NJORO (KENYA)
- Kenya Forestry Research Institute; NAIROBI (KENYA)
- ★ Kenya Marine and Fisheries Research Institute; MOMBASA (KENYA) & substations in Kampi ya Samaki, Kisii, Kisumu, Nairobi, Naivasha, Pap Onditi and Lodwar
- ★ Kenyatta University, Departments of Botany & Zoology; NAIROBI (KENYA)
- Kenya Wetlands Working Group, NAIROBI (KENYA)
- Kenya Wildlife Service, Marine Parks and Reserves; MOMBASA (KENYA)
- Lake Basin Development Authority; KISUMU (KENYA)
- Maseno University College, Department of Zoology; MASENO (KENYA)
- ★ Moi University, School of Environmental Studies (KENYA)
- Moi University, Departments of Fisheries, Tourism & Zoology; ELDORET (KENYA)
- National Museums of Kenya; NAIROBI (KENYA)
- Sagana Fish Culture Farm; SAGANA (KENYA)
- ★ University of Nairobi, Departments of Botany, Geology, Veterinary Pathology & Zoology; NAIROBI (KENYA)
- Centre National de Recherches sur l'Environnement; ANTANANARIVO (MADAGASCAR)
- ★ Centre National de Recherches Océanographiques; NOSY-BE (MADAGASCAR)
- Institut Halieutique et de Sciences Marines; TOLIARA (MADAGASCAR)
- ★ Albion Fisheries Research Centre; ALBION (MAURITIUS)
- Food and Allied Research Ltd.; MOKA (MAURITIUS)
- Meteorological Services; VACOAS (MAURITIUS)
- ★ University of Mauritius, Faculty of Science; REDUIT (MAURITIUS)
- ICLARM - Africa; ZOMBA (MALAWI)
- Eduardo Mondlane University, Dept of Biological Sciences; MAPUTO (MOZAMBIQUE)
- ★ Instituto de Investigacao Pesqueira; MAPUTO (MOZAMBIQUE)
- National Environment Commission; MAPUTO (MOZAMBIQUE)
- ★ Division of Environment; VICTORIA-MAHE (SEYCHELLES)
- ORSTOM, Antenne aux Seychelles; VICTORIA-MAHE (SEYCHELLES)
- Seychelles Bureau of Standards; VICTORIA-MAHE (SEYCHELLES)
- ★ Seychelles Fishing Authority; VICTORIA-MAHE (SEYCHELLES)
- Kunduchi Marine Fisheries Research & Training Institute; DAR ES SALAAM (TANZANIA)
- National Museums of Tanzania; DAR ES SALAAM (TANZANIA)
- Tanzania Fisheries Research Institute; DAR ES SALAAM (TANZANIA) & substations in Kyela and Mwanza
- University of Dar es Salaam, Departments of Botany, Geology & Zoology; DAR ES SALAAM (TANZANIA)
- ★ University of Dar es Salaam, Institute of Marine Sciences; ZANZIBAR (TANZANIA)
- Fisheries Research Institute; JINJA (UGANDA)
- Makerere University, Department of Zoology; KAMPALA (UGANDA)
- Lake Kariba Fisheries Research Institute; KARIBA (ZIMBABWE)
- National Museums and Monuments; BULAWAYO (ZIMBABWE)
- University of Zimbabwe, Lake Kariba Research Station; KARIBA (ZIMBABWE)

Institutions marked ★ are the co-operating institutions

Institutions marked - are the associated institutions

ANNEX 2

LIST OF CO-OPERATING LIBRARIES

Belgium

Limburg University Centre (Hasselt)
State University of Ghent (Ghent)
Institute of Marine Science Research (Ostend)

Canada

Pacific Salmon Commission (Vancouver)
Freshwater Institute (Manitoba)

Fiji

University of the South Pacific (Suva)

France

IFREMER - Centre de Brest (Plouzan=E9)
IOC of UNESCO (Paris)

Germany

Alfred Wegener Institute fur Polar und Meeres Forschung

Kenya

UNEP OCA/PAC Library and Documentation Centre (Nairobi)
National Museums of Kenya (Nairobi)
University of Nairobi (Nairobi)

India

National Institute of Oceanography (Goa)

Italy

FAO Fisheries Branch Division (Rome)

The Netherlands

Centre for Estuarine and Marine Ecological Research (Yerseke)

Philippines

ICLARM (Makaty)
SEAFDEC (Illoilo)

United Kingdom

Southampton Oceanography Centre (SOC) (Southampton)

USA

Skidaway Institute of Oceanography (Savannah)
Rosentiel School of Marine and Atmospheric Science (Miami)
Oregon State University - Marilyn Potts Guin Library (Oregon)
National Oceanographic and Atmospheric Administration (Maryland)
Woods Hole Oceanographic Institute (Woods Hole)