

OCEANOGRAPHIC DATA AND INFORMATION NETWORK FOR AFRICA

ODINAFRICA-II



FINAL REPORT 2001-2003



Intergovernmental Oceanographic Commission
(of UNESCO)

Government of Flanders



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PROJECT INFORMATION

Period Covered By Report: 1 January 2001- 31 December 2003.

Project Name: Ocean Data And Information Network For Africa (ODINAFRICA) Second Phase

Project Code: 513RAF2041

Project Objectives:

The second phase of the project for development of an Ocean Data and Information Network for Africa (ODINAFRICA-II) project aimed at enabling member states from Africa to get access to data available in other data centres, develop skills for manipulation of data and preparation of data and information products, and develop infrastructure for archival, analysis and dissemination of the data and information products.

Participating Countries:

Benin, Cameroon, Comores, Cote D'Ivoire, Gabon, Ghana, Guinea, Kenya, Madagascar, Mauritania, Mauritius, Morocco, Mozambique, Nigeria, Senegal, Seychelles, South Africa, United Republic of Tanzania, Togo, and Tunisia (see Annex I for list of institutions and coordinators)

Project Management:

- ODINAFRICA National Coordinators in each of the participating Member States of IOC
- Dr Sekou Cisse, ODINAFRICA Regional Coordinator, IOCEA
- Mr Mika Odido, ODINAFRICA Regional Coordinator, IOCWIO
- Mr Peter Pissierssens, Head of Ocean Services, IOC

Project Funding:

This project was made possible with funding from the Government of Flanders, Belgium (US\$2,317,013). Additional support was provided by:

- Intergovernmental Oceanographic Commission of UNESCO (US\$395,554)
- Participating institutions (US\$1,489,213)
- Experts for capacity building provided by marine science institutions in Belgium, India, United Kingdom, and the United States of America (see Annex II). (US\$167,600)

EXECUTIVE SUMMARY

The second phase of ODINAFRICA was developed to address the requirements that had been identified, taking into account the work already done by RECOSCIX-CEA, RECOSCIX-WIO and ODINEA. ODINAFRICA-II in particular aimed at enabling member states from Africa to get access to data available in other data centres, develop skills for manipulation of data and preparation of data and information products, and develop infrastructure for archival, analysis and dissemination of the data and information products.

The focus was on preparing databases, and data and information products for integrated management of the coastal environments and resources, and in particular enabling the Member States to be able to address the key issues identified in the African Process: (i) coastal erosion, (ii) management of key ecosystems and habitats, (iii) pollution, (iv) sustainable use of living resources, and (v) tourism.

Ten new National Oceanographic Data and Information Centres (NODCs) have been established in Benin, Cameroon, Comoros, Gabon, Ghana, Mauritania, Morocco, Senegal, Togo, and Tunisia during the current phase of ODINAFRICA, bringing the total number of NODCs in Africa to 22.

Support from the project enabled the NODCs in the participating Member States to cater for a wide range of activities such as operational expenses (including internet connection), development of meta databases and data archives, and development of data and information products. The ODINAFRICA activities in each country were publicized through websites, brochures, information sheets, data summaries, calendars, meetings/seminars, lectures to educational institutions, and meetings with key government officials.

In order to improve networking between the ODINAFRICA institutions, databases developed at national level (such as directories of experts and institutions, meta databases, library catalogues etc) are now being collected, quality controlled and formatted for access via the Internet in order to encourage broader usage.

The training and follow-up support has equipped the data and information managers with the tools to effectively manage their centres and develop relevant data and information products for their users. Several of the institutions have embarked on preparation of national marine atlases. However wide disparities in knowledge, capability and background of the trainees as well as the difference in sizes and focus of the libraries and data centres provided a challenge to the resource persons.

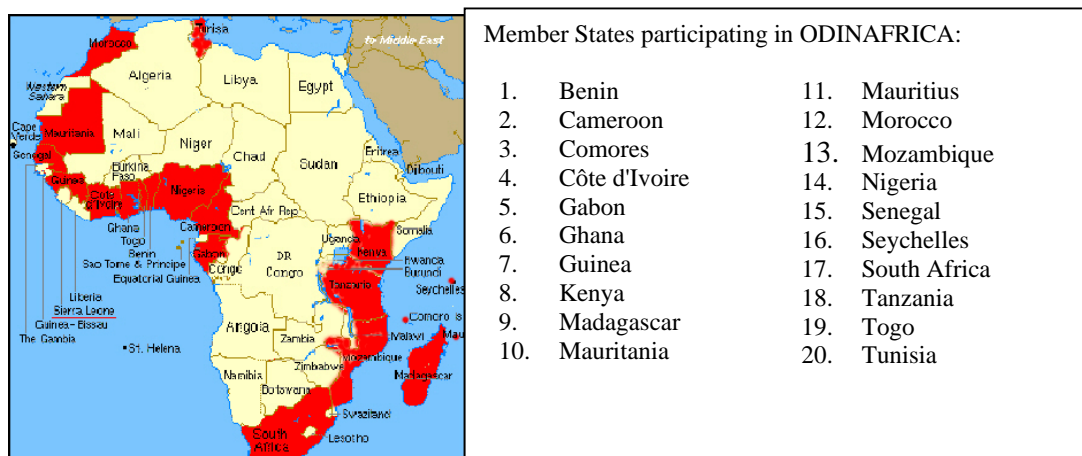
The participants at final planning and review meeting (8-9 September, Brussels, Belgium) endorsed the elements of the proposal for the next phase, which will encompass: development of an African Coastal Ocean Observing System; further development and strengthening of the NODCs to enable them manage data streams from the coastal observation network, and biogeographic and hydrological data streams; and development and dissemination of a wide range of data and information products required for the integrated management of the coastal and marine environment/resources.

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1. INTRODUCTION

The proposal for development of a second phase of the Ocean Data and Information Network for Africa was prepared by Member States of the Intergovernmental Oceanographic Commission of UNESCO which had participated in the earlier phases of the project (Ocean Data and Information Network for Eastern Africa-ODINEA, and the Regional Cooperation in Information Exchange in the Western Indian Ocean and Central Eastern Atlantic regions- RECOSCIX-WIO and RECOSCIX-CEA), with assistance from the secretariat of IOC.



In developing the proposal they took into consideration concerns expressed in various regional and international programme as outlined below:

- IOC's Regional Committee for the Central Eastern Atlantic (IOCEA) at its first session in 1987 requested assistance for development of marine information capabilities, including a regional centre. The second session in 1990 approved the establishment of a regional data centre in Conakry, Guinea. The need for the centre was reiterated at the third session in 1993, which also endorsed the implementation of a project on Regional Cooperation in Scientific Information Exchange in the Central and Eastern Atlantic (RECOSCIX-CEA). The fourth session of IOCEA stressed the need for continuous progress, and importance of inter-regional exchange.
- IOC's Regional Committee for the Western Indian Ocean – IOCWIO (*formerly known as the IOC Regional Committee for the Cooperative Investigations in the North and Central Western Indian Ocean-IOCINCWIO*).at it's second session of IOCINCWIO in 1987, recommended the implementation of the project on Regional Cooperation in Scientific Information Exchange in the Western Indian Ocean (RECOSCIX-WIO). The project was launched in 1989. The third session of IOCINCWIO identified the need for development of capacity for data management, and especially expressed concern that few institutions/scientists in the region have been able to access or analyse/interpret the data acquired from global programmes like TOGA and WOCE for use in national planning and development. These issues were again raised at the fourth session in 1997, which adopted a proposal for development of an Ocean Data and Information Network in Eastern Africa (ODINEA) as a step towards addressing these concerns. The implementation of ODINEA commenced towards the end of 1997.
- The PanAfrican Conference on Sustainable Intergrated Coastal Management (PACSICOM) which was convened in Maputo, Mozambique in 1998 as part of a region wide effort to give impetus to the management of the seas and coasts of Africa also reiterated the

importance of strengthening of the collection and dissemination of scientific information as a basis for effective management of coastal areas through:

- *Collection, use and protection of indigenous knowledge;*
- *Supporting sustained routine and long-term measurements and monitoring of environmental variables as a basis for forecasting change;*
- *Use of appropriate information delivery mechanisms;*
- *Sharing of information, data and experience on integrated coastal area management programmes and projects;*
- *Identification of common methodologies and harmonizing activities in information collection.*

PACSICOM further highlighted the need for provision of a sound information base for local and regional planning. This would require: formation of an Africa-wide network of national ocean data centers, creation of a network of specialists trained in the use of data acquired by remote sensing from space satellites, and facilitation of the further implementation of modern electronic communication systems such as Internet connections and data transfer mechanisms.

They recognized the importance of establishment and strengthening of National Oceanographic Data and Information Centres in the African Member States of IOC. They also emphasized the need to link ODINAFRICA to other on-going and planned initiatives such as GOOS Africa and the LME projects.

2. ODINAFRICA-II ACTIVITIES PLANNING

The first planning workshop was held in Dakar, Senegal from 2-4 May 2000. The workshop was attended by representatives of the 20 Member States of IOC/UNESCO from Africa intending to participate in the project. Also representative of institutions from outside Africa that had expressed an interest in providing support- especially for capacity building. The workshop approved a work plan and budget, and a management structure for the project. The report of this workshop has been published in IOC Workshop Report Series as no.167.

The following were identified as the data and information management requirements for Africa, and formed the basis for development of ODINAFRICA-II:

Requirement 1 Provision of Internet access to marine scientists in Africa;

Requirement 2 Assistance in the development and operation of National Oceanographic Data Centres and establish their networking in Africa;

Requirement 3 Training opportunities in marine data and information management applying standard formats and methodologies as defined by the IODE;

Requirement 4 Assistance in the development and maintenance of national, regional and Pan-African marine metadata and data holding databases;

Requirement 5 Assistance in the development of marine data and information products responding to the needs of a wide variety of user groups;

Requirement 6 Reinforcement of the RECOSCIX-CEA and RECOSCIX-WIO networks as mechanisms for the dissemination of marine data and information to various user groups in Africa;

Requirement 7 Assistance in the development of linkages with other international projects with similar objectives (eg GOOS-Africa; Gulf of Guinea LME, etc)

The participants agreed on the objectives, management structure and a range of activities that were to be implemented at both the national and regional levels in order to achieve these objectives:

2.1 Objectives of ODINAFRICA-II

The second phase of ODINAFRICA was developed to address the requirements that had been identified, taking into account the work already done by RECOSCIX-CEA, RECOSCIX-WIO and ODINEA. ODINAFRICA-II in particular aimed at enabling member states from Africa to get access to data available in other data centres, develop skills for manipulation of data and preparation of data and information products, and develop infrastructure for archival, analysis and dissemination of the data and information products.

The focus was on preparing databases, and data and information products for integrated management of the coastal environments and resources, and in particular enabling the Member States to be able to address the key issues identified in the African Process: (i) coastal erosion, (ii) management of key ecosystems and habitats, (iii) pollution, (iv) sustainable use of living resources, and (v) tourism.

2.2 Management Structure

Each of the member states participating in the project designated an **ODINAFRICA National Coordinator** who ensured that the projects activities are implemented in the country as planned. In order to improve email communication between the now 60 or so contacts (national coordinators, data managers, information managers) it was necessary that frequent changes in email addresses and/or email systems be avoided. To this end the domain name odinafrica.net was registered and all the project contacts provided with a unique and permanent email address (f.surname@odinafrica.net).

The member states participating in the project have been divided into two groups based on the IOC Regional Subsidiary bodies (IOCEA and IOCWIO). South Africa, which is a member of both bodies, has been grouped with IOCWIO while Tunisia, which is a member of neither has been grouped with IOCEA.

Two Regional Coordinators (Mika Odido Kenya for IOCWIO and Sekou Cisse –Guinea for IOCEA) were elected during the first ODINAFRICA planning workshop held in Dakar, Senegal in May 2000. Subsequently IOC contracted them as Consultants and their responsibilities included:

- (i) Administrative management of the project;
- (ii) Monitoring progress;
- (iii) Organising; training courses and workshops
- (iv) Ensuring effective follow-up to training activities; and
- (v) Promoting extensive communications and exchange of expertise between the project partners.

The Regional Information Centres established under RECOSCIX-CEA and RECOSCIX-WIO at the Centre de Recherches Oceanologiques (CRO), in Abidjan, Côte d'Ivoire, and the Kenya Marine and Fisheries Research Institute (KMFRI), in Mombasa, Kenya would continue to provide the same services for ODINAFRICA-II.

The progress in implementation of the project is evaluated at an **Annual Project management workshop** attended by the national and regional coordinators, as well as other partners. The workshop reviews the activities already implemented and approves work plans and budgets for the

subsequent year. Four management workshops were held in Dakar, Senegal (2-4 May 2000), Nairobi, Kenya (14-17 November 2001), Limbe, Cameroun (19-22 November 2002), and Brussels, Belgium (September 2003). The final workshop also revised and endorsed the plans for the third phase of ODINAFRICA. (Reports are available as workshop reports nos: xx xxx xxx and xxx)

2.3 Activities to be implemented at the National Level

Activity 1.1: Organization of national coordination meetings to identify suitable host institutions for NODC/DNA (including information management).

Activity 1.2: Provision of Hardware and Software Package.

Activity 1.3: Provision of support for operational expenses data and information center.

Activity 1.4: Development of national and regional meta databases.

Activity 1.5: Development and maintenance of national and regional data archive.

Activity 1.6: Support for national workshops on data/information service and product requirements for the sustainable management of coastal resources and the coastal zone.

Activity 1.7: Support for development of data and information products.

Activity 1.8 : Support for public awareness creation on the project services and products.

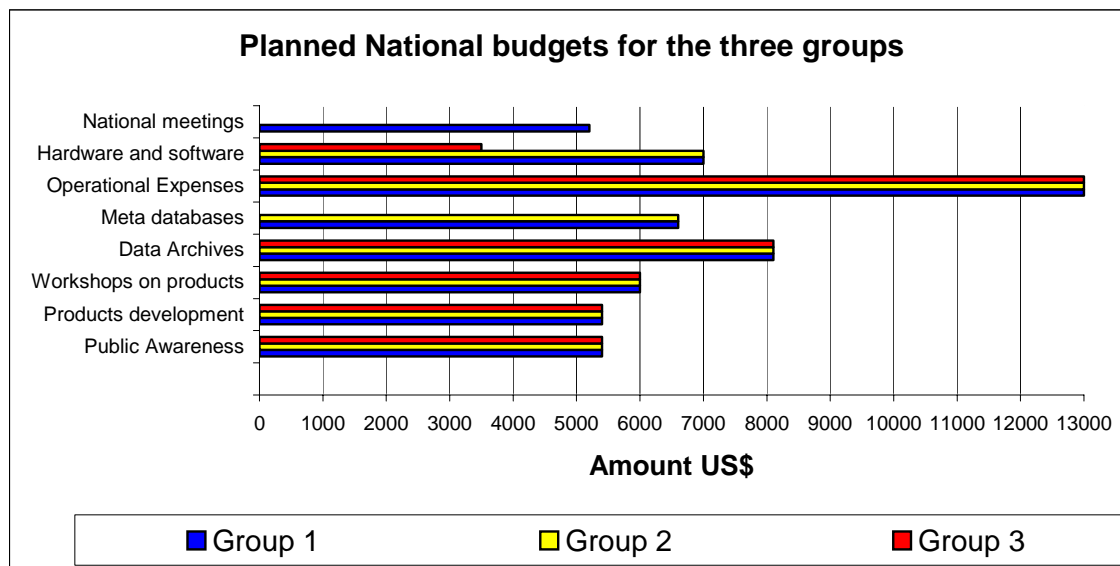
The participating countries were divided into three groupings for budget allocations:

GROUP 1: (BENIN, CAMEROON, COTE D'IVOIRE, GABON, MAURITANIA, SENEGAL, TOGO, AND TUNISIA). This included the countries that did not participate in ODINEA, and those countries that had not established NODC's/DNA's. They were expected to implement all the activities described above.

GROUP 2: (GHANA, GUINEA, MOROCCO AND NIGERIA). This included countries that had established formally established NODC's/DNA's but did not participate in ODINEA. The participants felt that they did not require support to organise national meetings to discuss the establishment of NODC's/DNA's since these already existed.

GROUP 3: (KENYA, MADAGASCAR, MAURITIUS, MOZAMBIQUE, SEYCHELLES, SOUTH AFRICA AND TANZANIA). These are the countries that had participated in "Ocean Data and Information Network for Eastern Africa-ODINEA". They were supposed to have established NODC's/DNA's and also developed national metadatabases. They were already provided with data centre equipment. However they will receive data for their information centres in line with the recommendations of the RECOSCIX-WIO review meeting.

The three groups were allocated budgets of US\$56,700, US\$51,500, and US\$41,400 respectively to implement the activities at the national level.



2.5 Activities to be implemented jointly.

The following activities would be implemented jointly:

Activity 2.1: Annual Project Management Workshop .

Activity 2.2: Project Staffing and Management costs (The national project staff cost will be absorbed totally by the cooperating institutions)

Activity 2.3: Development of ODINAFRICA/IODE Resource Kit.

Activity 2.4: Regional Data Management Training Course.

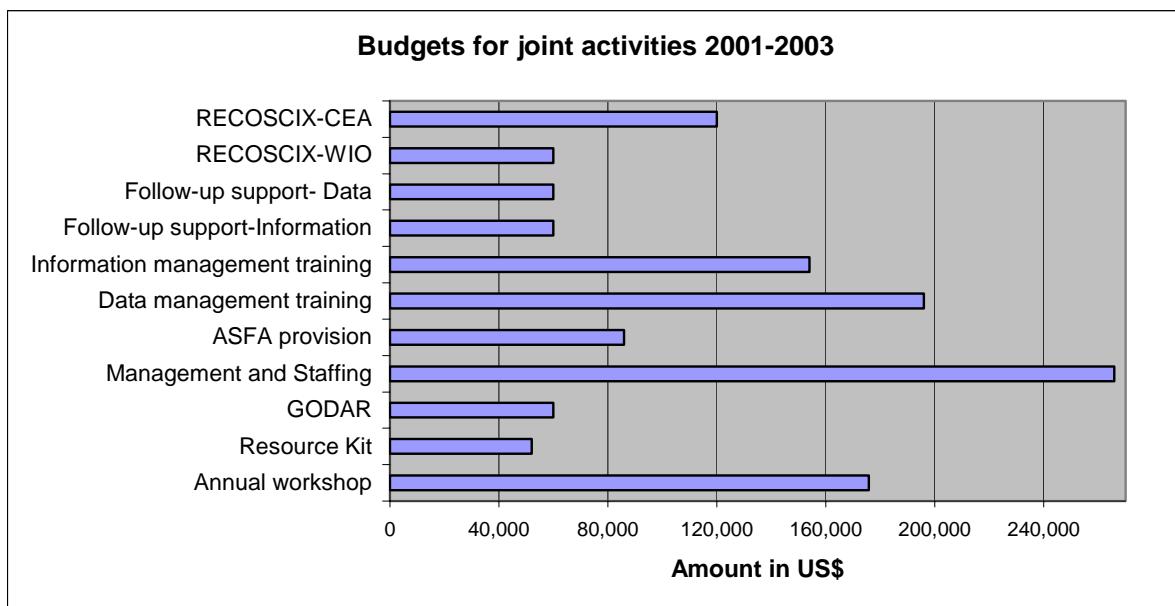
Activity 2.5: Regional Data Management Training Course Follow-up and Support.

Activity 2.6: Regional Information Management Training Course.

Activity 2.7: Regional Information Management Training Course Follow-up and Support .

Activity 2.8: GODAR Participation: identification, repatriation and digitization of Africa related datasets from outside (and within) Africa.

Activity 2.9: Support to the RECOSCIX networks to enable them to continue their 'traditional' information services (query handling, document delivery), as well as to assist in the effective dissemination of information products to end users.



* Management and staffing includes both financial and in-kind support from IOC

** Resource Kit development includes support from IOC

***Annual workshops includes support from IOC

3. IMPLEMENTATION AND ACHIEVEMENTS OF ODINAFRICA-II

Though it had been envisaged that the project would commence in May 2000, it was not until August that the funds were transferred to UNESCO.

Due to the already tight schedule planned for the second half of the year 2000, including the sixteen session of IODE and the final workshop for the first phase of ODINAFRICA it was not possible to start the implementation of planned activities. The coordinators, in consultation with the participating institutions decided to defer the commencement of the project to January 2001. Consequently all the activities planned for 2000 were moved forward.

3.1 ESTABLISHMENT AND OPERATION OF NATIONAL OCEANOGRAPHIC DATA AND INFORMATION CENTRES.

The member states that had not established NODCs/DNAs at the start of the current phase (ODINAFRICA-II, 2001-2003) of the project were provided with support to organise national coordination meetings. These meetings are used to identify a suitable national host institution for the NODC/DNAs as per IODE guidelines as well as to brief stakeholders in the participating countries on the objectives of the ODINAFRICA project and the IODE system. Several countries organised the coordination meetings in order to 'restart' centres that had become moribund. Participating countries were encouraged to base the data and information centres in the same institutions.

In order to ensure that the data and information centres fully participate in the technical aspects of the project (and in a harmonised way), a standard hardware and software package was provided. The data centres which participated in the first phase of the project had already received data centre equipment, and therefore only received Systems 1 and 2. The participating institutions were required to set up or strengthen internal computer networks to improve local, institution-wide access to data and information.

Ten new National Oceanographic Data and Information Centres (NODCs) have been established in Benin, Cameroon, Comoros, Gabon, Ghana, Mauritania, Morocco, Senegal, Togo, and Tunisia during the current phase of ODINAFRICA, bringing the total number of NODCs in Africa to 22.

	INFORMATION	DATA
Activities implemented	<ul style="list-style-type: none"> -Bibliographic search service -Document delivery services -Development of library catalogue -Database of aquatic science publications published in/about the country -Directory of marine/freshwater professionals -Directory of marine science related institutions 	<ul style="list-style-type: none"> -Data services -Marine metadata-base -Data archive -Collection of all data related to the country's waters -National Marine atlas -National data CDs
Basic equipment provided	<p>System 1: Dell Dimension L700C (933MHz PIII processor, 256MB RAM, 40GBHD, MS Windows 2000, MS Worksuite 2000) HPScanJet5300 <i>(for library staff to use in developing and maintaining library databases)</i></p> <p>System 2: Dell Dimension L700C (700MHz Celeron processor, 256MB RAM, 20GBHD, MS Windows 2000, MS Worksuite 2000) HP LaserJet 1200 printer ASFA CD or IDS <i>(for users to access library databases and services)</i></p> <p>INMAGIC DB/Textworks software for library management (2 to 4 licenses per library); web version at IOC Secretariat.</p>	<p>System 3: Dell Dimension 4100 Multimedia (1000MHz PIII processor, 256MB RAM, 20GBHD, DVD/CD-RW COMBO, MS Windows 2000, MS Office 2000) HP 990 printer</p>

Table 1: Planned activities and equipment provided to the ODINAFRICA data and information centres

The identification of services and products required at the national level is crucial in deciding the priorities of the centres. Resources were therefore been allocated to enable each of the institutions to organise a national workshop to identify these requirements. Support from the project enabled the NODCs in the participating Member States to cater for a wide range of activities such as operational expenses (including internet connection), development of meta databases and data archives, and development of data and information products.

The ODINAFRICA activities in each country were publicized through websites, brochures, information sheets, data summaries, calendars, meetings/seminars, lectures to educational institutions, and meetings with key government officials. In order to improve networking between the ODINAFRICA institutions, databases developed at national level (such as directories of experts and institutions, meta databases, library catalogues etc) are now being collected, quality controlled and formatted for access via the Internet in order to encourage broader usage.

3.1.1 National Data Services and products

- **National data collections:** This consists of ocean station data (from global and local sources), satellite analyses, ocean climatologies, weather climatologies, geology, base mapping, ecology, fisheries. The institutions participating in ODINAFRICA have been provided with a data CD containing data from the IOCEA and IOCWIO regions obtained from other IODE data centres around the world. There is also a programme to identify, digitise and repatriate other datasets which are available in foreign institutions to the regions. This is done within the framework of the GODAR programme.

Each NODC must mine all published sources for relevant data (data on CD's, ongoing national and international programmes, and internet sources). They identify, obtain and digitize unpublished data sets as well as seek original documentation for newly identified data sets. The data centres make data freely available to scientists and agencies, except data restricted by the originator. The centres are also expected to develop policies for providing data to commercial interests.

- **National data catalogues-** Each data centre participating in the project is developing a metadata-base containing information on location and availability of marine and coastal data/information in the respective countries using the MEDI format and MEDI software. The national and regional metadata-base will be availed on the project website when completed.

In order to improve users access, the centres work closely with the marine information centres to produce "titled" data publications such as CDROMs and technical reports. The MEDI catalogue is updated by including local and national data not previously published. The national MEDI records will be combined into one server (MEDI Africa catalogue). In future XML files from the Global Change Master Directory (GCMD) to the MEDI catalogues.

- **Data Analysis and Quality Control:** It is important to ensure that the centre provides reliable data and products. This is done by: visual inspection and statistics with spreadsheets; visual inspections of scatter plots, station plots and section in ODV; gridding and contouring ODV spreadsheet products ("bulls eyes"); comparison and analyses with figures from websites and publications; careful documentation in MEDI (including units and parameters; and special attention to basemap material (beware of "projected data").

The analyses performed by the data centres include: station maps, station plots, scatter plots, section plots, data grids, contour plots, vector plots, hovmuller plots and time history plots.

- **Data products –** The centres will have to keep a logging system for requests and services. Some of the products foreseen will be original data files, ODV spreadsheet exports, analysis graphics, extracted graphics, maps, atlases (data files, graphics), animations and special formats, and special requests (format conversions, grid maths products etc)

Maps have proved to be very popular product with users. Some of the types of maps are station maps, special project maps, borders, roads, RR, rivers, lakes, cities, relief contours, stations/labels, coastlines and graticules.

The Madagascar and Tunisia NODC's have embarked on development of national marine atlases, which are now available on CD.

- **National services-** All the data centres are now in a position to provide basic outreach services. This is based on national data collection catalogue and national data collection

products. The ultimate target is preparation of a National Marine Atlas. The data managers have been able to provide training at the national level, based on the Ocean Teacher. They also advise and help national colleagues, provide access to internet data sources unavailable to national colleagues, and receive, display and distribute publications and literature.

- International services: The MEDI catalogue will provide international services. The centres are aiming at ensuring submittal of national data to the IODE data centre system, development of regional (multi-national) product suites, data management services for national and international research and monitoring programmes, and advise and consultation to international programmes on local/national resources.

3.1.2 National Information Services and Products

- *Bibliographic Search Services and Document Delivery:* The ASFA publisher (Cambridge Scientific Abstracts- CSA) in collaboration with the UN-partners FAO and IOC-UNESCO have initiated a programme to distribute ASFA CDs to Low Income Food Deficient Countries in Africa. Through the project, 26 institutions received the ASFA CDs, while an additional 6 have been provided free access to the ASFA Internet Database Services (IDS). ODINAFRICA has worked closely with the ASFA secretariat based at FAO to identify the institutions to benefit from this offer.

Several ODINAFRICA institutions are participating in the Programme for the Enhancement of Research Information (PERI) implemented by the International Network for the Availability of Scientific Publications (INASP). This is a programme of support to information production, access and dissemination for research partners in developing and transitional countries utilizing new information and communication technologies (ICTs). Through this we have been able to access several journals free of charge. Another source of electronic publications for the centers has been the programme for AGORA -- Access to Global Online Research in Agriculture initiated by the Food and Agriculture Organization (FAO) and other organisations. The AGORA site (<http://www.aginternetwork.org/en/index.php>) provides access to over 400 journals from major scientific publishers in the fields of food, agriculture, environmental science and related social sciences. AGORA is available to qualifying not-for-profit institutions in eligible developing countries. Over 40 of the 400 journals are core fisheries / aquatic sciences journals.

- *Library Catalogues:* ODINAFRICA aims at making library materials of the marine science libraries in Africa accessible locally through the creation of a collective catalogue of co-operating institutes' library holdings. Training, equipment and library management software (INMAGIC) has been provided to librarians/documentalists from each of the marine information centres to enable them prepare their library databases. The librarians from Seychelles (Ms Josette Confait) and Senegal (Ms Arame Keita) have been contracted to check the quality of the databases for the English and French speaking institutions respectively before they are merged into a union catalogue. The *union catalogue of libraries of ODINAFRICA institutions (AFRILIB)*, can be searched via the ODINAFRICA website.
- *Directories of experts and institutions:* The librarians of the ODINAFRICA institutions have collected information on marine and freshwater professionals and institutions in their countries for inclusion in the Global Directory of Marine and Freshwater Professionals (www.oceanexpert.org). The information includes addresses, fields of interests, recent publications and qualifications.
- *Participation in Aquatic Sciences and Fisheries Abstracts (ASFA) database development:* Three ODINAFRICA national marine information centres have been designated as ASFA

input centres. These are: Kenya Marine and Fisheries Research Institute –KMFRI (Kenya), Centre de Recherches Oceanologiques – CRO (Côte d'Ivoire), and the Sciences et Technologies de la Mer- INSTM (Tunisia). The designation of these centers will increase the visibility (and citation) of marine related publications from African experts. The Flanders Marine Science Institute (VLIZ) will transfer a collection of African marine science literature to KMFRI for inclusion in the ASFA database. KMFRI is also responsible for inclusion of IOC and UNEP publications in ASFA.

Source of record	2001	2002	2003
CRO	63	0	0
INSTM	0	0	28
KMFRI	700	133	124
IOC (entered by KMFRI)	109	77	113
UNEP (entered by KMFRI)	0	0	100

No of records entered into the ASFA database by ODINAFRICA institutions

3.2 ODINAFRICA TRAINING AND FOLLOW-UP SUPPORT.

The training and follow-up support has equipped the data and information managers with the tools to effectively manage their centres and develop relevant data and information products for their users. However wide disparities in knowledge, capability and background of the trainees as well as the difference in sizes and focus of the libraries and data centres provided a challenge to the resource persons.

3.2.1 Data Management Training Course:

The first ODINAFRICA-II Training Workshop in Marine Data Management, held in Casablanca, Morocco, April 2-13, 2001, was designed to provide participants with knowledge and skills in the following areas: Basic computer skills; the importance of marine data in general, and particularly within participants' national and regional environments; how to set up an oceanographic data center within the IODE System; infrastructure requirements, including hardware and software tools; how to manipulate and analyze the principal types and formats of marine data ; and how to produce ocean data products and to disseminate the products, both over the Internet and by traditional methods. The second course in Tunis, Tunisia 29 April- 10 May 2002 covered: setting up and use of Internet clients for WWW browsing and email fundamentals of data analysis (document and spread sheets formatting, creation of hydrographic datasets, gridding), development of metadata-base and data archives; use of GIS (creation of GIS files, image and data synthesis); preparation of project proposals. During the final data managers workshop held in Brussels, Belgium (1-5 September 2003), the participants reviewed the achievements of the data centers within the framework of the project and identified areas that should be addressed in a possible third phase.

In addition to these training workshops in which all the data managers participated, other training was organized to address the disparities between the different centers. Remedial training sessions were held in Accra, Ghana (April, 2003) and Maputo, Mozambique (August, 2003) for those member states that were lagging behind in finalizing the assigned tasks. Reasons for such delays included departure of staff who had been initially trained from the institution, selection of staff without proper background for the training, or problems with language. Special workshops on preparation of National Marine Atlases were organized for Tunisia (Tunis, xx xx xx), and Madagascar (Tulear, August 2003). A training attachment was also organized for a staff of the Senegalise NODC at the IFREMER.

3.2.2 Marine Information Management Training Course:

The IODE OceanTeacher has a Marine Information Management training module on which the ODINAFRICA training courses are based. The first training course was held from 29 October- 9 November 2001 at the *Research Aquarium of the Directorate of Marine & Coastal Management* in Cape Town South Africa and focused on basic skills in Marine Information Management, including introduction to Information Technology and development of library catalogues using INMAGIC which is an Integrated Library Management Software. The second course, hosted by the *Institut National des Sciences et Technologies de la Mer, (INSTM)* in Tunis, Tunisia from 29 April – 10 May 2002 covered further training on utilizing INMAGIC (cataloguing, web-upload, serials management), setting up user services, information seeking in an electronic environment, and exploitation of information resources in marine sciences. During the final training course held in Brussels, Belgium (1-6 September 2003), the participants reviewed all the materials from the earlier courses and were also given lectures on making presentations. They reviewed the achievement of their libraries in ODINAFRICA-II and considered areas that could be addressed in ODINAFRICA-III.

3.2.3 OCEAN TEACHER and HELPDESK

The marine data management training curriculum developed by the IOC's International Oceanographic Data and Information Exchange Program (IODI) is based on an extensive collation of international public documents on marine data, formats, software, program and data management procedures, manuals, protocols, and associated tutorials. The main collection, entitled the IODE OceanTeacher system, is a 600 megabyte CD-ROM that has been under development by the IOC training staff since 1997. It is accompanied by data CDs, that contain data sets relevant to the two regions covered by ODINAFRICA, ie IOCWIO and IOCEA. The CD-ROMs are the principal training resource used during data management courses. The OceanTeacher is also available through the Internet: <http://www.oceanteacher.org> Participants in the training courses are furthermore encouraged to use the OceanTeacher system to refresh and continuously update their knowledge.

In order to ensure standardization of software, formats methodology as well as training curricula, and to enable students to undertake self-study subsequent to group training courses, the OceanTeacher system was developed, as described above.

In addition a small team of experts was contracted to provide internet-based (email) follow-up and support, including maintaining an 'ODINAFRICA Help Desk'. They ensure that the trainees can make optimum use of the knowledge gained during the training course and it ensures full implementation of 'take home' tasks assigned during the course. The experts involved are some of the trainers used during the training courses.

4.63.3 ODINAFRICA REGIONAL INFORMATION CENTRE

The RECOSCIX networks pioneered in the provision of information services and products through the two regional dispatch centres (RDC) located at the Kenya Marine & Fisheries Research Institute (KMFRI) in Mombasa, Kenya and Centre de Recherches Océanologiques (CRO) in Abidjan, Côte d'Ivoire. However due to the unstable situation in Côte d'Ivoire during the duration of the project, it was agreed that the Information Centre located at KMFRI would serve all the ODINAFRICA institutions. The information services and products offered by the centres include:

3.3.1 Document Delivery (including improved access to Electronic journals)

The ODINAFRICA Information Services Centre in Mombasa provides a document delivery service to experts from the ODINAFRICA institutions. The documents are sourced through a network of more than 13 marine science libraries worldwide. The most active of the collaborating libraries include Limburg Universitair Centrum (Belgium), IFREMER (France), Fresh Water Institution (Canada), the National Museum (Kenya), the National Institute of Oceanography (India), FAO Fisheries Branch Division (ITALY), University of Nairobi (Kenya), the International Centre for Insect Physiology and Ecology (Kenya), International Centre for Living Aquatic Resources and Management (Malaysia), Southampton Library (UK), Oregon State University (USA), Rosentiel School of Marine and Atmospheric Science (USA) and the National Centre for Marine Research Library (Greece). The ARIEL electronic document delivery software is now used at the regional to reduce delays in delivery. The project office is coordinating the participation of information centres in Kenya, Senegal, Seychelles, and Tanzania in trials of electronic document delivery using PROSPERO. This software is free and will be an alternative to ARIEL which the project has been unable to supply to all the institutions because of budgetary limitations.

3.3.2 Catalogue of Aquatic and Fisheries Publications from/about Africa (AFRIPUB).

In addition to maintaining the Union Catalogue of Libraries of ODINAFRICA institutions, the ODINAFRICA Information Services Centre has also been coordinating the development of a *Catalogue of Aquatic and Fisheries Publications from/about Africa (AFRIPUB)*. This is database of publications about marine and freshwater science in Africa has steadily grown with the rise in the number of institutions and libraries collaborating with the Project. The AFRIPUB database has more than 6600 records. These publications include books, journal articles, technical reports, theses, etc. The database is maintained at the ODINAFRICA Information Services Centre in Mombasa. AFRIPUB will form the basis for the planned electronic repository of publications.

3.3.1 Development of Directory of Experts and Institutions.

The ODINAFRICA Information Services Centre maintains and updates the Director of Marine and Freshwater professionals in Africa (AFRIDIR), which is part of the global directory of marine and freshwater professionals on the basis of information sent by the librarians of the ODINAFRICA institutions. The Directory of Marine And Freshwater Research Institutions & Information Centres in Africa is also maintained by the information center. This is a directory of marine, coastal and freshwater research institutions and information centres in Africa. The directory includes information resources and services of international organisations, regional bodies and national institutions and organizations in Africa. It is intended to provide an up-to-date inventory of national capacities in aquatic information resources. This database is accessible on the ODINAFRICA web site and has records of 284 institutions from all parts of Africa

3.3.4 ODINAFRICA website and WINDOW Newsletter

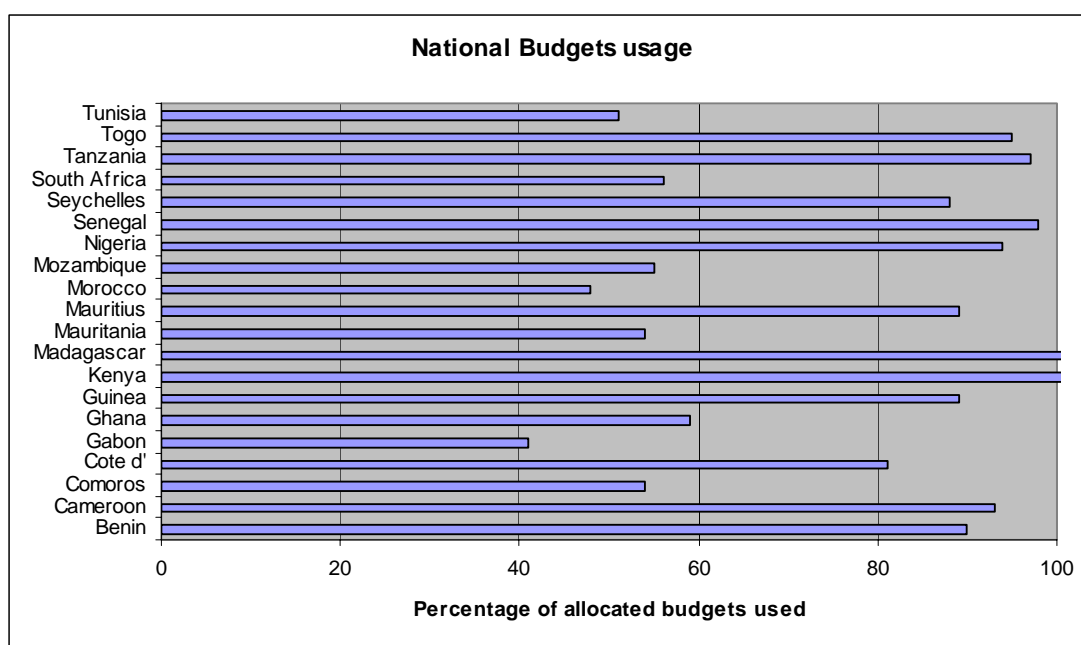
The ODINAFRICA Information Services Centre maintains the ODINAFRICA website (www.odinafrica.net) and publishes the WINDOW Newsletter in order to publicise the activities of ODINAFRICA, and also to keep partners informed on developments.

The ODINAFRICA website (www.odinafrica.net) provides access to the databases developed by ODINAFRICA as well as a forum for exchange of information on the project's activities. WINDOW newsletter is prepared at the ODINAFRICA Information Services Centre in Mombasa and a camera-ready copy sent to IOC-UNESCO headquarters for printing and circulation. It is mailed to over 1600 addresses worldwide.

3.4. UTILIZATION OF BUDGETS.

The delays in the transfer of funds that occurred in 2002 and 2003, caused serious delays in implementation of the project activities at the national level. These delays were caused in part by the introduction of the new UNESCO financial management system (FABS), incomplete submission of payment requests by the participating institutions or delays in completion of contracts for the previous years.

The institutions in Gabon and Morocco utilized less than 50% of the allocated budgets, while another six countries (Comoros, Tunisia, Mauritania, Mozambique, South Africa and Ghana) utilized between 50-60% of allocated budgets. Some of these countries were able to implement a number of activities from their institutions budgets while others were hampered by the factors described below. The remaining 12 (twelve) countries used an average of 93% of the allocated budgets.



Gabon (41%): The person initially designated as ODINAFRICA National Coordinator departed to France on study leave without appropriate alternative arrangements for implementation of activities at the national level. It was only towards the end of 2002 that Gabon responded to a request by the IOC secretariat to designate a new national coordinator. The NODC was formally established in early 2003. Though equipment was delivered, Gabon did not participate in all the data management training courses. It is hoped that training will be provided during the next phase of ODINAFRICA.

Morocco (48%): The low budget utilization in Morocco was caused by delays in processing of contracts, busy schedules of the ODINAFRICA national coordinator and data managers who are both professors at the Université Mohammed V. The person initially designated as information manager left the institution after attending the first training course. Training was organised for new staff in Rabat in July 2003. Additional staff have also been identified for data management and we now expected the level of implementation of activities to improve substantially.

Tunisia (51%): The National Oceanographic Data and Information Centre located at Institut National des Sciences et Technologies de la Mer (INSTM) was able to implement many of the activities within the INSTM budget. However delays in completion of contracts for previous years

caused the low utilization of available funds. However this not serious impair the implementation of activities.

Comoros (54%): The implementation of ODINAFRICA activities in Comoros faced three major challenges, (i) both the data and information managers were not fluent in English and therefore had problems catching up during the training sessions, (ii) delays in processing of contracts and also in submitting financial statements and reports, and (iii) frequent power blackouts at the institution, sometime lasting several weeks. Remedial training for the information manager was provided by her counterpart from Seychelles, Mrs Josette Confait in Moroni in xxx, 2003. The data manager attended a training session organised in Tulear, Madagascar in July 2003 where, his counterpart from Madagascar, Mr John Bemiasa, assisted him.

Mauritania (54%): There were delays in processing of contracts for Mauritania due to delays in submission of work plans and budgets, as well as late submission of reports for previous contracts. In some instance the signed contract was not returned to UNESCO, leading to cancellation. We are yet to receive the final returns from UNESCO Rabat Office which was to process some of the contracts. It may turn out that the amounts of allocated funds used by Mauritania is much less than envisaged. It is important that in the next phase of ODINAFRICA efforts are made to ensure that the staff of IMROP are conversant with the procedures for processing UNESCO contracts.

Mozambique (55%): The departure of two (2) staff members from the oceanography department of the Instituto Nacional de Hidrografia e Navegação (INAHINA), which hosted the NODC, and the death of the head of the section had very adverse effects on the development of the centre. This was especially so since INAHINA was one of the most active centres at start of ODINAFRICA. INAHINA recruited new staff for the section in 2003, and training was provided them and other Mozambican institutions in Maputo in August 2003. We expect that they will be able to catch up with the other countries very rapidly.

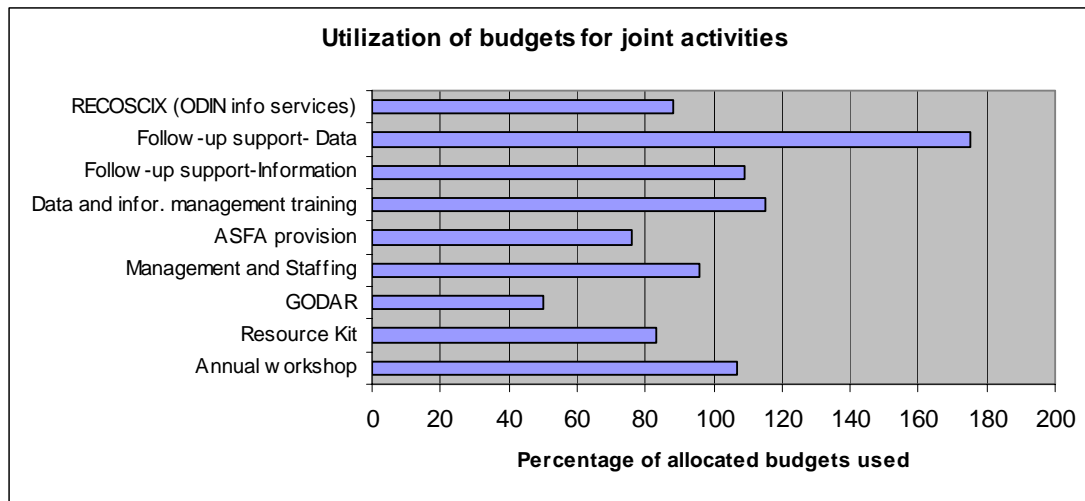
South Africa (56%): The Directorate of Marine and Coastal Management (MCM), which host the ODINAFRICA data and information centre in South Africa was not allowed to directly receive funding from foreign organisations by the accounting regulations governing state institutions in the country. They were able to receive equipment, and some local experts were contracted to assist their library and data centre in developing catalogues and metadatabases. MCM was able to implement a number of activities with its own resources. However it is unfortunate that the data manager was able to attend only one of the training sessions.

Ghana (59%): The departure of the person who represented Ghana in the planning stages of ODINAFRICA led to a delay in commencement of implementation of activities in Ghana. The newly established data and information centre took time to refurbish and equip. This coupled with delays in processing of contracts and submission of reports led to the low budget utilization. A remedial training course for data management was held in Tema, Ghana in April 2003 for the data managers from several countries in West Africa.

The funds which were not utilised by these countries were re-allocated to cover the training courses, and the remedial training which cost much more than originally anticipated. In particular the follow-up support for data management, which included remedial training courses in Tema, Ghana (for xx,xx, xx,) and Maputo, Mozambique as well as workshops on preparation of national marine atlases in Tunis, Tunisia and Tulear, Madagascar had an increase of 75% on allocated budgets.

Most of the institutions received the ASFA database free through an initiative by IOC, FAO and the publishers of ASFA (Cambridge Scientific Abstracts-CSA) to provide access to Low Income Food Deficient Countries. The funds allocated for this were therefore used to provide the INMAGIC library management software to all the participating institutions.

The cost of the GODAR activities was reduced mainly due to in-kind contribution from the US-NODC who assisted in identifying, collecting and quality control of data from several institutions in the former Soviet Union. These data and other data sets available from international data centres were provided as part of the ODINAFRICA data CD published by the US-NODC.



4. SMALL QUICK DISBURSEMENT PROJECTS

The UNESCO-Flanders Trust Funds through which the ODINAFRICA and the Hydrology programme of UNESCO draw their budgets accrued interest on the capital amount transferred to UNESCO in 2001. These funds were availed for use in funding small activities within the two programmes. The following are the proposals from institutions participating in ODINAFRICA that were successful in getting funded:

4.1 Oceanographic and coastal database for sustainable management of coastal and marine resources in Tanzania

This initiative was aimed at improving and strengthening the capability and capacity of the Tanzania National Oceanographic Data Centre's (TzNODC) in coastal and oceanographic data and information management and archiving. This included data archeology from grey literature and a major improvement of equipments (infrastructure) and databases to add-on new services and facilities to clients. The overall objective was to consolidate and improve the functionality and services of the TzNODC and coastal and oceanographic database for Tanzania in order to increase usefulness and efficiency in managing the coastal resources and marine/coastal environment.

A workshop on Mangrove Ecosystem Data Collection was held to consider: (i) existing mangrove data and information collection procedures, (ii) priority mangrove ecosystem parameters suitable for mangrove management, and (iii) how best to collect, analyze, archive and disseminate mangrove data and information. A training workshop on Oceanographic Data and Information Management was organized for participants from Zanzibar and mainland Tanzania who are responsible for ocean data and information management at their institutions. The workshop also addressed the issue of management of oceanographic data and information in Tanzania through improved collaboration and networking between organizations.

Assessment/consultative visits to key stakeholders were organized with the aim of recovering data that is under threat to be lost or which is not readily accessible to the public, and also to improve networking between institutions and the various databases at national level. Several datasets in need

of rescue were identified during the visits and arrangements made with institutions holding the datasets and how this will be done.

TzNODC's web pages were improved by adding a download page for the various reports and research publications, pages on employment opportunities at IMS. Other databases such as the metadatabase, GIS database, and the directory of scientists have also been upgraded.

The development of the national data archive begun with extraction of Tanzanian data from global databases, including: (i) bottle, CTD, and XBT-MBT data from the World Ocean Database 2001 and eWOCE database, (ii) coastline data for base-mapping purposes from the high resolution marine trackline geophysics data using the GEODAS software, and (iii) Bathymetry data of the Tanzania EEZ has been extracted from the ETOPO2 Global elevations grid data. Summary of locally collected data has also been completed (covers the variations in seawater temperature, macroalgal abundance and coral settlement density off Zanzibar town, Tanzania).

4.2 ODINAFRICA National Training Workshop on Ocean Data collection and Management (Cameroon).

The ODINAFRICA Training Workshop on Ocean Data collection and Management was held in Kribi, Cameroon from 24 to 26 April 2003 and attended by 16 participants from 15 National partner institutions. Resource persons were Dr Jean Folack (ODINAFRICA National Coordinator), Charles Gabche (Data Manager for the National Oceanographic data and Information Centre) and Awah Richards (from the Headquarters of the Institute for Agricultural Research for Development).

The following topics were covered during the workshop:

- introduction of the IODE system of IOC / UNESCO
- Introduction of Micro-computers
- Data Formats and Data Management Systems
- Introduction of Preventative maintenance of Micro-computers
- Use of ODINAFRICA Software for Data Management
- Definition of best outputs / services of data management institutions
- Products Development and co-operation within the National Partner Institution Network . Sustainability of the project after the IOC/Flanders financing

The training course improved the knowledge of experts from national partner institutions and also contributed to strengthening of linkages between them and the National Oceanographic Data and Information Centre. It is expected that this will result in improved data flow between the institutions and experts.

4.3 Preparation of guide's for better knowledge and understanding of the Guinean coastal zone

This initiative made it possible for the Guinea National Oceanographic Data and Information Centre (NODC) to contribute to the improvement of knowledge and understanding of the Guinean coastal zone through implementation of the following activities:

- ❑ Inventory of the sources of information relating to the activities in the Guinean coastal zone in various fields of study.
- ❑ Collection and processing of data, as well as the development of data and information products,
- ❑ Organisation of a three day workshop bringing together around fifty (50) participants (researchers, resource managers, teachers, agents of development, and other users) from 22 national institutions and non-governmental organisations (NGOs).

The workshop was devoted to the evaluation and validation of the data and information products prepared by the NODC. These products included catalogues, reports, data bases, meta-databases, and posters.

The execution of this small-scale project enabled the:

- (i) Dissemination of data and information products on coastal resources and environment
- (ii) Highlighting the importance of the results from the various activities
- (iii) Demonstration of the importance of the management tools provided by ODINAFRICA in particular INMAGIC,
- (iv) Creation of meta-databases at the Guinean NODC related to Research and Environment, fisheries and associated activities, Exploitation and Management of Resources, Coastal human settlements, and Alternative technologies.

The development of these information sources on the Guinean coastal zone has provided an impulse for collaboration by the national institutions operating in Guinean coastal zone.

4.4 “Small Window on Oceanography for students” (Togo)

As part of the ODINAFRICA II project, Togo’s National Oceanographic Data and Information Centre (NODC-Togo) organized a series of ocean-related technical and scientific activities for 93 selected final-year secondary pupils in scientific and technological streams. The aim was to interest them in the idea of research in oceanography, the Law of the Sea and maritime economics. The activity was called “Small Window on Ocean”. The NODC-Togo is located in the Integrated Coastal and Environmental Management Centre (CGILE) of the University of Lomé.

The activities took place in Lomé from 17 to 20 March 2003. Several national institutions connected with the ocean participated in the event – in particular the Port Authority of Lomé (PAL), the International Fertilizer Group (IFG) and the National Navy.

The pupils attended a general course on oceanography and took part in field trips and in a conference conducted by a panel of marine specialists in different fields. The course, which was held in the amphitheatre of the Continuing Education Department (DIFOP) on the University of Lomé campus, covered general ocean characteristics, marine biology, various uses of the ocean and environmental issues, in particular pollution, coastal erosion and maritime regulations.

Field trips were used to illustrate the course and to ensure that it was better understood. The pupils were taken to the Port Authority of Lomé (PAL) and visited the wharves, where freight was loaded and offloaded, and the national naval base. They were then taken to sea-sand and gravel extraction sites and the sewage area to observe environmental problems caused by using the beach in these ways. The pupils saw the problem of coastal erosion at Gumukopé Village, where the second coastal road is no longer being used, and then visited the protective defences built since 1998 at Kpémé and Aného. A visit to the Kpémé phosphate factory, a major user of the ocean for the washing and marketing of phosphates, enabled pupils to understand the importance of the ocean in the functioning of national economies and the related forms of pollution.

The conference, conducted by seven marine specialists, enabled the pupils to crystallize recently acquired knowledge. The lecturers described in turn their respective fields of activity and the various educational pathways leading to their fields of specialization. Documents were provided to the schools and films on specific topics were shown in the evenings.

4.5 Improvement of internet access in ODINAFRICA institutions

The External Evaluation of the ODINAFRICA project in 2002 declared that “There is a severe problem with communications in Africa which is a particular source of difficulty for ODINAFRICA”. The report recommended that alternatives means of improving communications such as satellite (VSAT) or ADSL should be investigated ways of addressing this problem should be investigated.

In response to this recommendation, and similar concerns raised at the ODINAFRICA Planning and Review meetings and the fifth session of IOC’s Regional Committee for the Cooperative Investigations in the North and Central Western Indian Ocean (IOCINCWIO-V), a survey of the current status of internet/email access in the institutions participating in ODINAFRICA was undertaken, and possibility (and need) for improving these investigated.

The survey reveals wide disparities in requirements and available connectivity in the different institutions. The internet access in the ODINAFRICA institutions can be categorised as follows:

- Good (64kbps): Guinea (when the satellite connection will be installed), Kenya, Mauritania, Morocco, Seychelles, South Africa, Tanzania
- Medium (32kbps): Benin, Comoros, Ghana, Mauritius, Mozambique, Senegal, Togo
- Bad (14.4kbps): Cameroon, Côte d’Ivoire, Madagascar, Nigeria, Tunisia
- Unknown : Gabon

In most of the institutions the access is less than sufficient for the users.

On the basis of practicability and sustainability, the following were been identified for a pilot programme to improve connectivity:

- *Benin*: CBRST and CRHOB. Support was provided for wireless access to improve connectivity
- *Cote d’Ivoire*: Support provided for connecting leased line
- *Mauritius*: Support provided to the Meteorological Services to connect ADSL
- *Senegal*: Support provided for ADSL connection to CRODT and DOPM
- *Seychelles*: Support provided to increase bandwidth of their current wireless connection from 64K to 128kbps.

In addition, support was provided for installation of VSAT connection to IHSM (Madagascar) and NIOMR (Nigeria) within the framework of the African Ocean Portal project.

5. LINKAGES WITH OTHER PROGRAMMES/PROJECT

There are several regional or international programmes and other initiatives that address coastal and marine environmental issues in Africa. Their effectiveness depends on their ability to share information across national, sectoral and disciplinary boundaries. ODINAFRICA should play an active role in the development of the data management plans for such programmes and also provide the mechanism for an exchange of information between individuals and organisations through its wide network.

ODINAFRICA is also playing a key role in the implementation of the “Cross Cutting” project on development of UNESCO Knowledge portals by coordinating the development and maintenance of the “African Ocean Portal” which is part of the UNESCO/IOC OceanPortal. The portal will provide access to information and data on all aspects of ocean/coastal research and management for the benefit of various communities such as decision makers, the private sector, the research and education community and the general public. The OceanPortal’s main objective is to provide a communication forum for all layers of society with an intellectual, economic or political interest in the oceans and coastal areas. The OceanPortal takes into consideration the need to provide a targeted, personalized communication and information provision service using both pull

(enabling users to locate information for themselves) and push (suggesting information to users based on their preferences) technology.

ODINAFRICA provides technical support for the development and maintenance of the Global Sea Level Observing System (GLOSS) website for Africa (www.ioc.unesco/glossafrica). The information on the site is provided by the GLOSS Regional Coordinators in Africa, and includes: information on the status of sea level stations in Africa, capacity available for sea level related activities, ongoing and planned activities, national and regional GLOSS contacts etc

ODINAFRICA has participated actively in the development of three GOOS initiatives, which will cover Africa or parts of it: GOOS Africa, WIOMAP, and IOGOOS. These initiatives aim at creating networks for observation, monitoring and forecasts of the oceans and coasts. They also propose capacity building especially for remote sensing and modeling. ODINAFRICA will work closely with them to realize their objectives, which are complementary to those of ODINAFRICA.

The Institut National des Sciences et Technologies de la Mer (INSTM), has proposed the creation of Institut Afro Japonais des Sciences et Techniques de l'Océan (AJIOST) in order to improve networking, and encourage the ODINAFRICA institutions to initiate joint activities, which would enable them to share resources and expertise. The association, which will be based in Tunis, Tunisia will formulate collaborative research programmes between African coastal countries and Japan. It will particularly involve the countries participating in ODINAFRICA, and will rely on the network of National Ocean Data and Information Centres (NODCs) and African experts developed with the framework of the ODINAFRICA project.

Other programmes with which ODINAFRICA is established linkages include: the African Process for the Development and Protection of the Coastal and Marine Environment, Abidjan and Nairobi Conventions (UNEP Regional Seas Programme), International Ocean Institute (IOI), the Gulf of Guinea Large Marine Ecosystem Project (GOG-LME), Western Indian Ocean Marine Science Association (WIOMSA), Secretariat for Eastern Africa Coastal Area Management (SEACAM), and the project on "Advancing the Understanding and Management of Small Scale Fisheries in the Western Indian Ocean" initiated by IUCN and NORAD.

6. EXTERNAL EVALUATION OF THE ODINAFRICA PROJECT

The Government of Flanders commission two experts Dr G. L. Holland and Dr H.S. Wheeler to perform an evaluation of the Flanders UNESCO Science Trust Fund (FUST) through which the ODINAFRICA project is funded. The primary purpose of the evaluation is to provide advice to the Government of Flanders and UNESCO concerning the extension of the FUST agreement. Visits to Brussels and to the UNESCO Headquarters were carried out jointly by the two consultants. The effectiveness and efficiency of the FUST projects within the International Hydrological Programme and the ODINAFRICA project within the Intergovernmental Oceanographic Commission, respectively, were evaluated using the annual reports and other documentation supplied. Separate field trips for the two consultants, to Cairo and to Zanzibar, respectively, completed the evaluation process.

6.1 Major findings

UNESCO and the Government of Flanders each have their own financial and administrative rules and regulations to respect and these are not necessarily easy to harmonise and co-ordinate. Some evidence of difficulties faced is apparent in the minutes of the Steering Committee and the members are to be commended on the resolution of potential issues.

In ODINAFRICA, regional networking, considered of immense importance to the development of an African renaissance in the future, is being promoted through the increased connectivity of data centres, through improved communication amongst regional scientists and through the distribution of scientific publications and journals. Similarly, networking within a country is essential for the development of a sustainable infrastructure. The activities funded by FUST in Tanzania were found to be well integrated into the national priorities and objectives. The funding and equipment provided by FUST have been catalytic in the transfer of capacity and in the development of national responsibilities in the context of coastal area management and the indigenous support has been real and sustainable. Progress in the modernisation of marine data management is having a beneficial impact on other national resource responsibilities in Tanzania.

One of the objectives of the FUST is the multiplication effect of its program. For the IOC, apart from the funds levered from the regular budget, ODINAFRICA, although widely acclaimed at governing body meetings, does not seem to have attracted other major partners from Member States.

6.2 Lessons learned

- ❑ There is considerable merit in funding complementary small-scale activities using the accrued interest on unexpended moneys.
- ❑ Although many of the regional objectives in ODINAFRICA are common, there are significant differences in national priorities and how each participating national centre can best manage the allocated funds.
- ❑ Communication is a particular source of difficulty for ODINAFRICA. Problems occur with data and information transfer and with the vulnerability to disruptions caused by electronic virus infections. These problems also impact on communications from the region to the outside partners. Language issues are apparent, but appear to be being slowly overcome.
- ❑ The ODINAFRICA programme suffered a substantial delay on two separate occasions due to the late arrival of funds. There were too many differences between the planned budgets and those finally implemented, although overall objectives remained constant.
- ❑ The participating countries in Sub-Saharan Africa are not at the same level of capability or capacity and training courses need to take these differences into account. As more countries join, the problem will be accentuated and future plans may need to be amended to allow for multi-tier training approaches. More use could be made of indigenous expertise for initial training purposes.
- ❑ The Tanzanian visit demonstrated a lack of visibility for the Government of Flanders at the local level, which should be addressed as ample opportunities exist for co-operation. There seemed little knowledge of how to make contact with potential Flemish scientists. The partners see the support of Flemish counterpart expertise as essential in providing access to state-of-the-art methods, awareness of current research developments, and in supporting training.

6.3 Synopsis of Recommendations

- Complementary proposals, below an agreed maximum amount, should be supported from the accrued interest on the Trust Fund.
- Part of the management fee for the Trust Fund, combined with the considerable expertise present in the UNESCO Bureau for Extrabudgetary Funding, should be used to find additional funding partners.

- The efforts to increase the participation of African States must be continued.
- The cost and advantages of satellite communication should be investigated.
- An effort should be made to increase the number of contributing institutes in developed countries.
- Regional managers and the ODINAFRICA Co-ordinators should be funded to organise regional activities and workshops and to prepare materials for basic instruction.

The evaluators found that the first phase of the FUST Agreement has been successful, despite some delays in the completion of projects due to start-up difficulties in the transfer of funds. Individual projects under the Agreement have been well managed and the desired results have been achieved. Important contributions have been made to the general programme objectives, as well as to the specific project deliverables.

The evaluators agree that the success of the respective programmes warrants the continuation of the Agreement.

7. CONCLUSIONS AND RECOMMENDATIONS

The final review workshop for ODINAFRICA-II was held in Brussels, Belgium from 8-9 September 2003. During the meeting, the National Coordinators expressed their appreciation to the Government of Flanders for the substantial financial support provided, to IOC for managing the project, and to the resource person for their substantial contribution to the training programme.

The National Coordinators stated that the project objectives had been achieved: national oceanographic data and information centres had been established in most participating countries, staff had been trained and products and services have been developed at the national and regional level. The level of development, and activities implemented by the national data and information centres vary widely depending on the focus of the centre, staffing levels, and resource availability.

The National Coordinators of Benin and Cameroon reported that the establishment, operation and success of the national oceanographic data and information centres had generated additional government support benefiting oceanographic research (through the establishment of a specific oceanographic research facility). In Gabon this is also planned.

The National Coordinators noted that, although the training programme had been successful, some difficulties had been suffered by the French speaking participants as the training programme had been taught in English only. The heterogeneity in backgrounds, attitudes, skills, experience and motivation posed a challenge to the trainers.

Some National Participants, while noting the success of ODINAFRICA, reported with regret that personnel instability in their institution had resulted in the loss of trained staff. This jeopardized the future effectiveness of these centres and remedial action to train replacement staff would need to be organized, either at the national or regional level. It was noted that the training of only two staff per country (one for data management and one for information management) carried the inherent risk of easily losing the training investment, but it was appreciated that the cost of training more staff at the regional level (within the project) would be very expensive.

The end of the ODINAFRICA training period gives rise to a potential for development of a wide range of technical and operational products and services by the participating NODCs. Individual initiative will be required for remedial education and/or review, and the OceanTeacher software will be the principal training resource.

This should lead to the development of a Pan African Network of Marine Services Centres which will integrate data centres, libraries, resource catalogues, data and product streams, and programme

outreach elements. Some of the elements of these services include Data Services (national and regional atlases) , OutreachAFRICA (national website development, including HTML training), Master workshops focusing on specialized skills (new/upgraded software orientation, GIS training and forum, sea level system and technology in collaboration with GLOSS, and satellite data methods in collaboration with BILKO), inclusion of new methods and materials in oceanteacher (GIS, HTML webpages, graphics, new tutorials), Oceanteacher instructor project to train and certify at least 2 francophone and 2 anglophone instructors from the previous students group. This will allow the delegation of all remedial training to partner states. The project will also have to address the provision of hardware for training, upgrade of internet connectivity and training of new partner states.

8. FUTURE DEVELOPMENTS

8.1 E-repository and Access to E-journals.

The third session of ODINAFRICA Planning and Review meeting held in Limbe, Cameroon (November, 2002) request a feasibility study for e-journal access and e-publishing. The feasibility study was done by Dr Marc Goovaerts (Limburg Universitaire Centrum, Belgium), and the report presented during the final ODINAFRICA-II workshop in Brussels, Belgium (September 2003).

To evaluate the opportunities available in ODINAFRICA information was collected about the different information centers (see results in Annex ???)

The extent of the library collection and the origins of the information centres gives a good indication about the availability of library facilities. The quantity of the books ranges from less than 1000 to 20000 volumes, sometimes in a specific marine science collection, sometimes in a general library collection. Some of the information centres have already a history; others are only established since or even after the start of the ODINAFRICA program. There is a library tradition and an extensive collection in Côte d'Ivoire, Ghana, Guinea, Kenya, Mauritania, Nigeria, Senegal, Seychelles, South Africa, Tunisia and Zanzibar. There is only an embryonic structure and limited collections available in Benin, Cameroon, Comoros, Madagascar, Mauritius, Mozambique, Togo. The information about Gabon and Morocco, where the superstructures seems to be very good but where the information centres of ODINAFRICA are not really working, makes it difficult for me to bring them in one of both groups. The reports do not give an indication of the quality and age of the collections. However it appears that there are few recent acquisitions for all institutions involved.

To get access to marine science journals through the Internet, ODINAFRICA had to contact some major publishers. While already some projects, PERI and eJDS in the first place, make journals available for institutions in different countries in Africa, it was our option to make an agreement with different publishers specifically for ODINAFRICA. Therefore we started to negotiate with two publishers, Elsevier and Wiley. Through different programs (AGORA, HINARI, eJDS, INASP, Open Access Journals) many interesting journal collections of major publishers are becoming available for low-income countries. The ODINAFRICA partners can use these opportunities to access an important part of the scientific literature. All the titles about marine science available for the whole community or for an important part of it, are being integrated in a Directory of ODINAFRICA eResources. In the end the best way to integrate this collection in the information structure of ODINAFRICA is by adding it to the InMagic catalogue. Training for information managers, but also for the end users (researchers) is necessary to introduce these new resources.

The Internet creates the opportunity for publishing on a large scale. Commercial publishers have adapted themselves to the new medium. Universities and scientific institutes are also taking the publishing process in their own hands. A new model of publishing is based on local collections (repositories) made accessible through the OAI-protocol. An ODINAFRICA repository can enhance the scientific communication between the ODINAFRICA partners and make the scientific

research in the ODINAFRICA region visible for the marine science community. Training and support for hosting, administering and using the repository will be necessary. All sort of electronic documents can be stocked in a repository. Articles, reports and working papers are the first sort of documents to collect. It is important to create from the beginning a large literature collection. Without a critical mass of documents the repository will not be attractive. It is also necessary to realize a support service for librarians and publishing scientist. Also the problem of long-term archiving has to be solved. An ODINAFRICA repository is a good starting point for an ODINAFRICA e-journal. But the relation between such an e-journal and the existing journals has to be defined.

The bandwidth for internet access is essential for the realization of access to e-resources and for the creation of a platform for e-publishing. To take part effectively to these e-projects many ODINAFRICA partners will have to upgrade their internet connection to minimal 32 kbps.

The participants at the ODINAFRICA review meeting (Brussels, Belgium, September 2003) agreed that the e-repository/e-journals provides an exciting opportunity for improving access to information and a detailed supplementary proposal on this should be developed for consideration.

8.2 ODINAFRICA-III

The proposal for a third phase of ODINAFRICA was discussed during the final ODINAFRICA-II Planning and Review meeting held in Brussels, Belgium from 8-9 September 2003.

The proposal was developed as a result of the recommendations of (i) Evaluation of ODINAFRICA II, (ii) IOCINCWIO-V, (iii) ODINAFRICA Planning and Review meeting (November 2002) Limbe, Cameroon, (iv) IODE XVII, and (v) ODINAFRICA meeting March 2003 Paris, France. These meetings identified the need to improve data flows into the centres, focus on products development for ICAM (esp. GIS and satellite), increase service delivery, and improve communication (especially internet) as being the key components of a possible next phase of ODINAFRICA. The 22nd session of the IOC Assembly approved the recommendations of IOCINCWIO-V and IODE-XVII. Subsequently, IOC member states from Africa provided guidelines on development of proposal. On the basis of this, the IOC programmes met and agree on elements of project and each programme prepared outlines, which were compiled and circulated for comments.

The participants agreed that the main objectives of the project will be:

- Strengthen GLOSS network in Africa
- Additional sensors on sea level stations
- Creation of African Ocean Biogeographic Information System
- Data and Information requirements of these and other initiatives, including development of services and products
- Reinforcement of capacity of NODCs to better provide better services

The participants discussed the elements of the proposal at length in plenary before breaking into working groups to revise the work packages. The new project will encompass data collection, processing and quality control, analysis and interpretation, products development and delivery to users. The implementation will therefore involve the IOC programmes IODE, GOOS and ICAM. This should be reflected in the title and introductory texts. Participants decided to merge work package 4 on Product Development, including numerical modeling and forecasting, and work package 5 on End user communication and information delivery. The following work packages were agreed on:

WP 1: Project Management and Coordination: will focus on ensuring that the work programme is implemented as expected, ensuring expected deliverables are produced in a timely fashion with respect to the agreed time frame, and reporting and disseminating information on project activities

WP 2: Coastal Ocean Observing System: will focus on upgrading and expanding African network for in-situ measurements and monitoring of ocean variables (e.g. sea-level, temperature, salinity, currents, winds, etc), provision of near real-time observations of ocean variables, and building adequate capacity for collection, analysis and management of sea-state variables.

WP 3: Data and Information Management: will focus on further development and strengthening of National Oceanographic Data Centres (NODC) to manage data streams from the coastal ocean observing network, upgrading infrastructure in the NODCs (including internet access and computer systems), Integrating biogeographic and hydrological data streams into NODC systems, Building capacity for data and information managers for new NODCs established as part of this project, and Rescue historical data (especially sea level data)

WP 4: Product Development and end user communication and information delivery will focus on identification of end users of marine/coastal data/information products and their requirements, identification and development of set of core products to be prepared by each NODC, development of Regional and National Marine Atlases, improvement of atmospheric and oceanic monitoring databases, promotion and dissemination of outputs of the project to all stakeholders, and assessment of the impacts of products on the end-user.

The participants emphasised the need for close consultation with GOOS Africa in finalization of the project. Other organizations mentioned as collaborators such as OBIS and SEACAM should also be consulted and their consent assured before submission of the proposal, otherwise the reference to them should be as potential partners.

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Annex III: ODINAFRICA Trainers.

The project has identified a group of experts to provide training and follow-up support for marine data and information management.

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ANNEX IV: DETAILS OF LIBRARY CAPACITY AND COMMUNICATION INFRASTRUCTURE

Name	(CNDO) / Benin	MINREST-IRAD, Cameroun	CNDRS, Comores	CRO - Côte d'Ivoire	UOB - Gabon
Library capacity	540 books / 5 journals / 70 CD-roms in marine science collection	2000 books / 10 journals / 4 CD-roms in a general collection	3000 books in a general collection	20000 books / 800 journals / 10 CD-roms in marine science collection	23000 book / 600 journals in a general collection
	IC not described - National Report 02	IC not defined separately of the Data Center in National Report 02	IC not described - National Report 02	nill	nill
Informatics infrastructure	1 PC - institutional network	1 PC - shared with data center	3 PC's	2 PC's in library network	8 PC's in library network
Internet infrastructure	1 PC - modem (+20kbps) - fixed rate	nill	1 PC - modem (+20kbps) - rate: ?	2 PC - modem (-20kbps) - rate: \$ 1-3/hour	0 PC - fast connection (?)
	MFRD, Ghana	Cerescor, Guinea	KMFRI, Kenya	CNDO, Madagascar	SDIS, Mauritanie
Library capacity	7427 books / 8 journals / 11 CD-roms in marine science collection	4500 books / 5 journals in a general collection	+5000 books / 122 journals / 60 CD-roms in marine science collection	2660 books / 65 journals / 4 CD-roms in marine science collection	9000 books / 95 journals in marine science collection
	Restructuring IC/Library (NR 02)	IC/Library established Nat. Report 02	IC/Library established Nat. Report 02	IC not described National Report '02	Library established National Report '02
Informatics infrastructure	1 PC - institutional network	5 PC - library + institutional network	3 PC - library + institutional network	4 PC - library + institutional network	2 PC - library + institutional network
Internet infrastructure	6 PC - modem (+20kbps) - rate: ?	1 PC - modem (+20kbps)/satellite - fixed rate	+10 PC - leased line (32 kbps) -fixed rate	14 PC - modem (-20kbps) - rate: ?	2 PC - fast connection - fixed rate
	AFRC, Mauritius	Bibl. Centrale - Fac. Sciences - Rabat, Morocco	INAHINA, Mozambique	NIOMR/LIBRARY, Nigeria	BD - Direct. Pêches Maritimes, Senegal
Library capacity	2000 books / 200 journals / 13 CD-roms in marine science collection	9250 books (200 marine science) / 8 journals / 35 CD-roms in a general collection	1102 books / 81 journals / 18 CD-roms in a general collection	5700 books / ? Journals+cd-roms in marine science collection	6800 books / 65 journals / 18 CD-roms in marine science collection
	IC not described National Report 02	nill	IC: Only since 2001 hosted by INAHINA	Library established National Report 02	Library established National Report '02
Informatics infrastructure	2 PC - library network	8 PC - library (exp.) + institut. network	1 PC - institut. network	6 PC - library network	3 PC stand alone
Internet infrastructure	1 PC - modem (+20kbps) - rate: \$ 1,6/hour	institut. fast connection (256k) - fixed rate	1 PC - modem (+20kbps) - rate: ?	3 PC - modem (<20kbps) - fixed rate	? PC - modem (+20kbps) - fixed rate
	DC - Fish. Authority, Seychelles	MCM - South Africa	CNDO, Togo	Bibliothèque - INSTM, Tunisia	IMS, Zanzibar
Library capacity	3265 books / 48 journals / 2 CD-roms in marine science collection	6159 books / 880 journals / 6 CD-roms in marine science collection	1000 books / 2 journals / 7 CD-roms in a general collection	10000 books in marine science collection	3500 books / 10 journals in marine science collection
	Library established National Report 02	Library established National Report 02	IC not described National Report 02	Library/IC established in 01	Library established National Report 02
Informatics infrastructure	2 PC - institut. network	5 PC - institut. Network	? PC - library + institut. network	3 PC - library + institut. network	3 PC - institut. network
Internet infrastructure	2 PC - modem (64kbps) - rate: \$ 8/hour	3 PC - fast connection - fixed rate	PC - modem (+20kbps) - rate: ?	PC - modem (<20kbps) - rate: ?	33 PC - leased line (64kbps) - fixed rate

ANNEX VI: JOURNALS SUBSRIBED TO BY ODINAFRICA INFORMATION SERVICES CENTRE

TITLE	ISSN	PUBLISHER
African GeoScience Review	1117-370X	Rockview International
Applied Ocean Research	0141-1187	Elsevier Sciences Ltd
Aquaculture Research	1365-2109	Blackwell Science Ltd
Aquatic Microbial Ecology	0948-3055	Inter Research, Germany (F)
Botanica Marina	0006-8055	Walter de Gruyter & Co, Germany
Bulletin of Marine Science	0007-4977	
Coastal Engineering	0378-3839	Elsevier Sciences Ltd
Coral Reefs-Journal of the International Society for Coral Reef Studies	0722-4028	Springer Verlag
Crustaceana- International Journal of Crustacean Research	0011-216X	Koninklijke Brill NV
Current Contents: Agric, Biol, & Environ.	0090-0508	ISI
Estuarine Coastal and Shelf Science	0272-7714	Academic Press Ltd
Fish and Fisheries	1467-2960	Blackwell Science Ltd
Fisheries Management & Ecology	1365-2400	Blackwell Science Ltd
Fisheries Oceanography	1365-2419	Blackwell Science Ltd
Indian Journal of Fisheries	0970-6011	Central News Agency Private Ltd
Indian journal of Marine Science	0379-5136	Council of Scientific & Industr. Res.
JMBA Journal of the Marine Biology Association of the UK	0025-3154	Cambridge University Press
Journal of Fish Biology	0022-1112	Academic Press Ltd
Journal of Marine Research	0022-2402	Yale University
Journal of Oceanography	0916-8370	Kluwer Academic Publishers
Journal of Plankton Research	0142-7873	Oxford University Press
Journal of Waterway Port Coastal & Ocean Engineering	0733-950X	ASCE
Limnology and Oceanography	0024-3590	ASLO
Marine & Freshwater Research	1323-1650	CSIRO publishing
Marine Chemistry	0304-4203	Elsevier Science Ltd
Marine Ecology-Berlin	0173-9565	Blackwell wissenschafts verlag
Marine Policy	0308-597X	Elsevier science Ltd
Marine Resource Economics	0738-1360	University of Rhode Is.
Nature	0028-0836	Macmillan magazines ltd
Oceans and Coastal Management	0964-5691	Elsevier Science Ltd
Regional Environmental Change	1436-3798	Springer Verlag
Science- International Edition	0036-8075	AAAS