Final ODINAFRICA II Training Course in Marine Data Management

Supported by the IOC and the Government of Flanders

Brussels, Belgium
1-5 September 2003

UNESCO
Abstract
The third and final ODINAFRICA-II Training Course in Marine Data Management was held in Brussels, Belgium between 1 and 5 September 2003. In this final workshop, attended by 13 data managers from National Oceanographic Data Centres in Africa, the data management aspects of the implementation of the ODINAFRICA-II project were reviewed in order to identify the successes and failures and to consider actions that need to be taken to progress the implementation of the third phase of ODINAFRICA.
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1. INTRODUCTION AND OBJECTIVES

The third and final ODINAFRICA-II training course on Marine Data Management was held at the Vrije Universiteit Brussel (VUB), Brussels, Belgium from 1-5 September 2003. The purpose of the training course was to review the implementation of the ODINAFRICA-II project, in order to identify successes and failures and consider actions that need to be taken to improve on the implementation of the third phase of ODINAFRICA, based on lessons learnt during this phase.

2. PARTICIPANTS

Participants attended the training course from Benin, Cameroon, Comores, Ghana, Kenya, Madagascar, Mauritania, Mauritius, Morocco, Nigeria, Senegal, Tanzania and Tunisia. Resource persons from the IOC and the United States of America who have been actively involved in training within the framework of ODINAFRICA also attended. The list of participants is provided as Annex II.

3. COURSE PROGRAMME

The final program for the workshop is presented in Annex I.

4. REVIEW OF ODINAFRICA

Mr Greg Reed from the IOC Secretariat provided an overview of the achievements of the ODINAFRICA-II project. The project aimed at enabling member states from Africa to gain 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 network of National Oceanographic Data and Information Centres, established by the project, are responsible for the data and information requirements for Africa which have been identified at various regional and international fora. These requirements include in particular:

- Provide Internet access to marine scientists in Africa;
- Provide assistance in the development and operation of National Oceanographic Data Centres and establish their networking in Africa;
- Provide training opportunities in marine data and information management applying standard formats and methodologies as defined by the IODE;
- Assist in the development and maintenance of national, regional and Pan-African marine metadata and data holding databases;
- Assist in the development of marine data and information products responding to the needs of a wide variety of user groups;
- Reinforce the RECOSCIX-CEA and RECOSCIX-WIO networks as mechanisms for the dissemination of marine data and information to various user groups in Africa;
- Assist in the development of linkages with other international projects with similar objectives (eg GOOS-Africa; Gulf of Guinea LME, etc)

National Oceanographic Data Centres have been formally established in 19 out of the 20 countries participating in the project. These NODCs are networked through the ODINAFRICA project and an electronic mailing list has been provided to encourage communication between the partner institutions. Support from the project enabled the centres to cater for a wide range of activities such as operational expenses (including internet connection), development of metadata databases and data archives and development of products and services.

The marine data management training curriculum, developed by the IOC’s International Oceanographic Data and Information Exchange Program (IODE), is the major training tool for the ODINAFRICA-II training programme. This system 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 that forms part of the IODE Ocean Teacher product. The main collection, entitled the IODE Resource Kit, is a 650 megabyte CD-ROM that has been developed by the
IOCEA regional data collection, and (ii) Africa Update (WOD01) Data Collection.

In addition the ‘ODINAFRICA Help Desk’ was established to ensure that the trainees made optimum use of the knowledge gained during the training courses and to ensure full implementation of the intersessional tasks assigned during the course. Regional Datasets have also been prepared for various training classes. These data collections are available for (i) IOCINCWIO Regional Data Collection, (ii) IOCEA Regional Data Collection, and (iii) Africa Update (WOD01) Data Collection.
5. NATIONAL REPORTS

The Heads of the National Oceanographic Data and Information Centres (NODCs/DNAs) provided an overview of the activities of their centres during the project period. National reports were provided by Benin, Cameroon, Comores, Ghana, Guinée, Kenya, Madagascar, Mauritania, Mauritius, Nigeria, Senegal, Tanzania and Tunisia. The full text of these reports is available in Annex III:

6. MEDI REVIEW

This component of the course provided an overview of metadata and demonstrated the installation and use of the MEDI (Marine Environmental Data Inventory) metadata authoring tool. The MEDI authoring tool has been developed by IODE to encourage data collectors and scientists to produce metadata descriptions for their datasets. The MEDI software is browser-enabled and operates in a client-server configuration. Clients can access MEDI on a local network or over the internet. The MEDI system allows users to (i) search for regional or global datasets, and (ii) submit metadata description to the MEDI directory. Participants reviewed the MEDI installation procedures and entered metadata descriptions from their respective institutions. The aim of this exercise was to populate MEDI-AFRICA, a marine metadata directory for Africa, which is a subset of the MEDI directory. MEDI-AFRICA provides a reference point for locating marine and coastal datasets in Africa and has been populated with metadata descriptions of marine datasets collected by ODINAFRICA member states. As a result of the MEDI exercise, a total of 131 metadata descriptions were entered into MEDI-AFRICA.

6. REVIEW OF OCEAN TEACHER

Dr Murray Brown provided an overview of the new material that had been added to Ocean Teacher during the intersessional period. OceanTeacher has been the principal training resource used during all ODINAFRICA-II training courses and consists of two parts: the IODE Resource Kit and the Ocean Teacher Training Manuals. The Training Manuals for ocean data management supplement the IODE Resource Kit and are used in all IODE training courses. There are three training manuals:

- Course 1 provides a basic introduction to marine data management, PC skills, software and data formats;
- Course 2 provides intermediate exercises with Course 1 topics; development of national data archives; data integration; and
- Data Short Course is a special remedial workshop in the development of a national data collection.

The IODE Resource Kit is constantly being updated with newer versions of existing materials (for instance software), and additional sections are being added to support the latest training workshops. Some of the major section updates/upgrades completed in 2003 include:

- IODE Data Centre System > Global Programs
  - All program descriptions have been re-organized and updated.
- Data Analysis & Products > Classroom > Tutorials > Data Roadmaps
  - This section was extensively revised during of 2003. All materials now refer to a single geographic area (Namibia).
- Data Analysis & Products > Formats > Examples
  - All of the former example files have been replaced with examples that cover Namibia. All of these files are integrated into the Data Roadmaps, mentioned above.
- Data Analysis & Products > Formats > Formats Catalog
  - This section became difficult to keep up-to-date, and has been integrated into a separate IOC/IODE product, the OceanPortal catalogue of marine-related websites (see www.oceanportal.org).
- Data Analysis & Products > Data > Datasets > Major Earth Data Publications
This new section contains the IOC Collection of Essential Global Earth Science Data CDs, and the Global Earth Science Online Data Servers catalogue.

- Data Analysis & Products > Software > The Toolbox
  - All software programs have been updated to the newest versions. New titles include ncBrowse (a NetCDF browser), and DXF2XYZ (to convert DXF line files to XYZ format for gridding).

The course participants were reminded that the IODE Ocean Teacher was a dynamic product and the latest version should always be consulted at http://OceanTeacher.org.

7. NEXT PHASE OF ODINAFRICA

The next phase, ODINAFRICA-III: An Integrated Ocean Observation and Service Network for Africa, is expected to be a four-year programme. ODINAFRICA-III will be a cross-cutting project involving data and information management, operational oceanography and ocean science and monitoring. The objective of this next phase is to create and maintain a Pan African Network of in situ coastal observing Stations providing data to the African Ocean Data Information Network. The draft project proposal was outlined and this proposal will be further discussed at the national coordinators meeting on 9 September, following the training course.

8. CONCLUSION

The ODINAFRICA-II project has strengthened the capacity of the data centres in the region. The NODCs now have the capability to collect, process, analyse, store and interpret various categories of datasets. The project has provided up-to-date computer equipment and peripherals, software as well as training for data centre personnel. The NODCs have used this capacity to develop national metadata databases, thereby enabling users to know what datasets are available and how to access them. The progress in developing national data collections has resulted in the development of many types of data products, including national atlases.

The proposed next phase of the project will build linkages between the NODCs and the GOOS and ICAM communities. This will further strengthen the NODCs and provide a data stream from the observing network to be fed into the network of data centres established through the ODINAFRICA Project, and will provide the basis for development of a wide variety of products and services, so as to ensure the widest possible use for the data centres created during the ODINAFRICA Project.
ANNEX I

COURSE PROGRAM

1. Introduction
2. Review of ODINAFRICA-II Data Management Training Component
3. National Reports
4. MEDI Review
   a. Software Installation
   b. Metadata Entry Exercise
5. Review of Ocean Teacher
6. ODINAFRICA – The Next Phase
ANNEX II

LIST OF PARTICIPANTS

I. TRAINEES

BÉNIN
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E-mail2: g.reed@unesco.org
URL: http://ioc.unesco.org/iocweb,
http://iode.org
ANNEX III

NATIONAL REPORTS

1. BENIN

Objectifs du CNDO- (Data manager)

- Réalisation d'inventaires de données océanographiques du Bénin au niveau national et international;
- Collecte et archivage de ces données et information au plan national et international;
- Conception et élaboration de bases de données nationale;
- Mise à la disposition des utilisateurs du domaine des données et informations océanographiques;

Matériels mis à la disposition du CNDO/BENIN par le Programme ODINAFRICA

- Un parc informatique bien fourni avec les différentes périphériques;
- Des logiciels de traitement de données, de conversion et compression de fichiers (Ocean Data View, Surfer, ArcExplorer, WinZip, Import71 etc.);
- Plusieurs CD-ROM de données Météorologiques et Océanographique du monde dont celles du Bénin;

Méthodes

- Des enseignements de qualité sont donnés à chaque cours par d'éminents professeurs (Murray Brown et Greg Reed) qui ne ménagent aucun effort pour faire passer leurs messages par vidéo-projecteur lors des ateliers de formation;
- Des contacts permanents sont établi entre les étudiants du CNDO et ces professeurs qui restent toujours attentifs à nos différents problèmes (des cours par internet).

Activités réalisées dans le cadre de la gestion des données océanographiques

- Inventaire des différentes données océanographiques dans les différentes institutions nationales intervenant dans le domaine;
- Sensibilisation des différentes institutions nationales sur les avantages de la mise en commun des données océanographiques et météorologiques par des ateliers et séminaires;
- Acquisition de données de quelques institutions jusque là inconnu du public;
- Information du public du domaine sur l'existence de données océanographiques au CNDO;
- Formation de 4 agents sur la méthode de gestion de données océanographiques enseignée par le Pr Murray BROWN;
- Archivage du Programme MEDI par les données existantes au niveau national;
- Utilisation des différents logiciels mis à disposition par ODINAFRICA pour:
  - La réalisation de quelques cartes bathymétriques pour certaines institutions de la place sur les critères clairement définis par elles;
  - La réalisation des cartes de chlorophylle, indicateur d'abondance des espèces vivantes de différentes périodes critiques de l'année (SHC\textsuperscript{1} et SHF\textsuperscript{2}) de la zone\textsuperscript{3} d'intérêt du Bénin
  - La compilation des données de la zone à partir des données de "Africa Update World Ocean Database 2001",
  - L'utilisation des données de GEBCO7 pour faire les lignes de côte à différentes profondeurs.

\textsuperscript{1} SHC- Saison Hydrologique Chaude
\textsuperscript{2} SHF- Saison Hydrologique Froide
\textsuperscript{3} Area Of Interest (AOI)- C'est une zone adoptée par le Bénin et le Togo compte tenu de l'étroitesse de leurs côtes; elle est située entre le 10\textsuperscript{ème} Ouest et le 10\textsuperscript{ème} méridien Est et l'équateur Sud et la 8\textsuperscript{ème} parallèle N
Avantage du Programme

- Renforcement des capacités du CNDO/BENIN en matière de gestion des données et du CRHOB ;
- Découverte des capacités des différentes Institutions de Nationales et sous-régionales ;
- Meilleures connaissances du Milieu marins au plan national ;
- Création d’une synergie entre les différentes Institutions nationales.

Implication du CNDO/BENIN dans d’autres Programmes nationaux et sous-régionaux

Le CNDO basé au Centre de Recherches Halieutiques et Océanologique du Bénin, est impliqué dans plusieurs activités liées aux milieux marins et côtiers tels que:

Des Travaux de Recherche sur:
- Suivi environnemental des eaux côtières Bénin
- Evaluation des Stocks démersaux et pélagiques du Plateau continental des pays du Golfe de Guinée
- Lutte contre l’Erosion côtière – l’Est de Cotonou
- Monitoring des Cétacés et Développement de l’Ecotourisme au Bénin
- Mise en œuvre des projets nationaux issus de la Convention d’Abidjan
- Participation comme membre actif au réseau du Système d’Information et Suivi Environnement par l’Internet (SISEI) de l’Agence Béninoise pour l’Environnement
- Participation : l’Elaboration de certains documents de base touchant l’Environnement et la gestion de la zone côtière (Communication nationales sur les changements climatiques; Stratégie nationale de mise en œuvre de la convention – cadre des Nations Unies sur les changements climatiques au Bénin)
- Participation au programme Large Marine Ecosystem (LME- GOG)
- Participation à l’étude d’impact sur la construction du Gazoduc de l’Afrique de l’Ouest
- Implication dans la préparation de la Conférence Internationale sur les Poissons Africains – PARADI
- Implication au Programme d’Assistance au Développement Participatif de la Pêche Artisanale – PADPPA sur financement du FIDA

Perspectives d’avenir

- Création d’un groupe consultatif national sur les question touchant l’environnement marin et la zone côtière ;
- Contribution à l’installation d’un réseau national entre les points focaux d’un même pays.
- Facilitation en équipements appropriés pour la collecte des données au niveau national.
- Facilitation à accorder aux Centres Nationaux de Données Océanographiques pour un branchement satellitaire afin de les rendre indépendant des branchements nationaux qui tombent régulièrement en panne.
- Aide financière et matérielles au CNDO pour la collecte des données récentes.
- Aide à la Formation sur les Logiciels appropriés GIS.

Remerciements

Les remerciements vont:
- Au Gouvernement des Flandres ;
- A la COI à travers l’UNESCO ;
- Au Coordonnateur Principal du Projet ;
- Au Professeur Murray BROWN ;
- Au Professeur Greg REED ;
- Au Coordonnateurs régionaux ;
- Au Coordonnateur National du CNDO/BENIN, Chef du CRHOB.
Un Exemple de Produit réalisé dans SURFR

MOYENNE ANNUELLE DES TEMPERATURES 1961 à 1990

Couche 0-5m

Couche 40-60m
2. CAMEROON

Background and history of Cameroon’s NODC.

Established: 28 February 2001

Staffing

<table>
<thead>
<tr>
<th>Names</th>
<th>Tasks assigned and proportion of work</th>
<th>Training Level</th>
<th>Training course details</th>
<th>Training requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Folack Jean</td>
<td>Coordinator / 80%</td>
<td>Doctorat 3eme Cycle</td>
<td>Marine Ecology and Environment</td>
<td>Use of Computer in Management</td>
</tr>
<tr>
<td>Gabche Charles Emene</td>
<td>Data Management/50%</td>
<td>M. Sc.</td>
<td>Hydrobiology, Fisheries, environment</td>
<td>PhD, Data Management Aerial photographs and Satellite imagery</td>
</tr>
<tr>
<td>Akwa Gaius Tabe</td>
<td>Information Management (20%)</td>
<td>G. C. E. A’Level</td>
<td>Science</td>
<td>B. Sc. Information Management</td>
</tr>
<tr>
<td>Nwafor Martina</td>
<td>Accountant/25%</td>
<td>R. S. A.</td>
<td>Accounting</td>
<td>Administrative management</td>
</tr>
<tr>
<td>Nsah Immaculate</td>
<td>Secretary</td>
<td>R. S. A.</td>
<td>Secretarial, Duties and Office Work</td>
<td>French &amp; English Languages, Computer Science and Secretarial Duties at R. S. A. Stage III, IV and Diploma. Levels</td>
</tr>
</tbody>
</table>

Facilities

Objectives: The main objective of Cameroon’s NODC is to help improve on capacity building on oceanographic data and information management and information exchange. Specifically:

- It gears towards the collection, processing, stocking/archiving, diffusing and management of Oceanographic data and information holdings in Cameroon;
- The centre participates in the international exchange of oceanographic data and information in meetings of the IODE and develops international inventories of IODE.

National framework:

The National framework of Cameroon’s NODC is made up of the hosting Institution (IRAD) which coordinates the activities of a network of national institutions or organisations.

Network of national institutions or organisations made up of users, holders of oceanographic data and information, managers or decision makers on coastal and marine areas. These institutions or organisations holding oceanographic data or information supply the NODC with their data or information.

All institutions involved, meet annually to discuss/review the programme of activities of the centre geared towards its improvement

Physical infrastructure of Data Centre

Due to difficulties in having access to telephone in Batoke Station (SRHOL) (15Km from Limbe town), the Local Government of Limbe offered a temporary office to the project, at the premises of the Divisional Office in Limbe. This has an office space area of 30m²

Office and computer equipment available
- 9 Tables, 6 chairs and 1 drawer
- 3 computers model Dell Dimension 4100 with 74 Giga of hard disk,
- 260 RAM of Memory CD writer,
- 2 printers type HP DeskJet 990 CXI professional series and
- HP Laserjet 1200 Series.

Communication and Connectivity
A telephone line with connection to internet has been installed
This is shared with the Institute, with all researchers allowed to create individual e-mail addresses.

**Tapes and CDs for consultation on:**
- Ocean Atmosphere space from Office of Naval Research, Fiscal Year 1999 Annual Reports;
- 5th Congreso de Ciencias del Mar, Maracuba 2000;
- A Student’s Guide to the Seashore of West Africa by Mike Kendall and Kobina Yankson;
- Shore Biotopes of West Africa- An Introduction to Biotope Mapping by B. Foster-Smith, E. Antia, M. Kendall, D. John & F. Seku (Copyright, 2001);
- Irvine’s Marine Fishes of West Africa by A. J. Edwards, A. C. Gill & P. O Abohweyere, Copyright, 2001;
- Marine Zooplankton of West Africa by Darwin Project on Marine Biodiversity of West Africa. Collaboration between University of Ghana and University of Newcastle;
- Seaweeds of the Tropical West Africa Sub-region by D. John, G. Lawson, G. Ameca & F. Seku (Copyright, 2001);
- Atlantic Ocean Data Set for the IOCEA (North) Region

**Other facilities**
- Software: Software on Research Systems: The environment for visualizing images
- Books and manuals: Some IOC-UNESCO publications and specialised books in Fisheries and Oceanography
- Reports: Several consultancy and research reports exist
- Maps and atlases: World map with limited details
- Videos, tapes and CDs:

**Centre’s data collection**

There exists two data types:

MEDI data sets and ODV spreadsheets which are described in details as follows:-

**Meta database:** A Medilite file has been developed with meta data for Cameroon. These cover the following areas: Meteorological, Fisheries, Bio-statistics, Fish Catch/Effort Data, Environmental, Marine Pollution, Coastal Processes, Fish Smoking and Conservation. Aspects covered within these include: a summary on the metadata, temporal and geographical coverage; attributes, data centre distribution and origin of meta.

- Database of national institutions involved in ocean and related activities

<table>
<thead>
<tr>
<th>NO</th>
<th>INSTITUTIONS</th>
<th>TYPE OF DATA COLLECTED</th>
<th>AVAIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Institute of Agricultural Research for Development (IRAD), Fisheries and Oceanography Research (SRHOL)</td>
<td>Physical Chemical, Biological, meteorological and Fishery</td>
<td>NO</td>
</tr>
<tr>
<td>1.2</td>
<td>National Cartographic Institute (INC)</td>
<td>Geographical</td>
<td>YES</td>
</tr>
<tr>
<td>1.3</td>
<td>Institute of Geological and Mineral Research (IRGM)</td>
<td>Geology and sedimentology</td>
<td>YES</td>
</tr>
<tr>
<td>2.0</td>
<td>Ministry of Livestock Fisheries and Animal Industries (MINEPIA), Directorate of Fisheries</td>
<td>Fisheries</td>
<td>YES</td>
</tr>
<tr>
<td>3.1</td>
<td>Department of Meteorology</td>
<td>Meteorological</td>
<td>YES</td>
</tr>
<tr>
<td>3.2</td>
<td>Directorate of Merchant Ship</td>
<td>Accidents at sea ,sea traffic</td>
<td>NO</td>
</tr>
<tr>
<td>3.3</td>
<td>Autonomous Port of Douala</td>
<td>Sea/tidal Level, depth, tonnage at port.</td>
<td>YES</td>
</tr>
<tr>
<td>3.4</td>
<td>Limbe Port</td>
<td>Sea level, tonnage at port and tidal level.</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>Kribi Port</td>
<td>Sea level, tonnage at port and tidal level.</td>
<td>YES</td>
</tr>
<tr>
<td>4.1</td>
<td>Permanent Secretariat for the Environment (SPE)</td>
<td>Climatic</td>
<td>NO</td>
</tr>
<tr>
<td>4.2</td>
<td>Mount Cameroon Project (MCP)</td>
<td>Climatic, vegetation cover</td>
<td>YES</td>
</tr>
<tr>
<td>5.1</td>
<td>National Electricity Cooperation (SONEL)</td>
<td>Electricity consumption</td>
<td>YES</td>
</tr>
</tbody>
</table>
5.2 National Water Cooperation (SNEC) Water use, sources and hydrological network YES
5.3 National Refinery Company (SONARA) refinery discharge, YES
5.4 National Hydrocarbons Company (SNH) Hydrocarbon production YES
5.5 Cameroon Petroleum Depots Company (SCDP) Petroleum stocking and marketing YES
6.1 Faculty of Science, University of Buea (UB) Coastal zoology, botany and ecology NO
6.2 Faculty of Science, University of Douala Coastal zoology, botany and ecology NO
7.1 Cameroon Development Cooperation (CDC) Crop production, climate (rainfall, air temperature etc) and land use YES
8.1 Limbe Urban Council (LUC) Land use, housing, sanitation, drainage, gender, household waste, sewage, hazardous and non-hazardous waste, circulation and transportation YES
8.2 Douala Urban Council (DUC) Land use, housing, sanitation, drainage, gender, household waste, sewage, hazardous and non-hazardous waste, circulation and transportation YES
8.3 Edea Urban Council (EUC) Council (EUC) Land use, housing, sanitation, drainage, gender, household waste, sewage, hazardous and non-hazardous waste, circulation and transportation YES
8.4 Kribi Urban Council (KUC) Land use, housing, sanitation, drainage, gender, household waste, sewage, hazardous and non-hazardous waste, circulation and transportation YES
9.0 South West Development Authority (SOWEDA) Fisheries and aquaculture NO
10 TROPENBOS, Kribi Coastal forestry YES
11 Environment and Resources Protection (ENVIREP-Cameroon), NGO Coastal and marine resources and environment NO
12 African Security and Air Navigation Agency (ASECNA), Meteorological YES

ODV Spreadsheet. Datasets (bottle, XBT, etc) for the dry and rainy season are given in excel spreadsheet.

Description of locally collected data
Locally collected data sets are limited to those collected by a cruise in the early 1906. Meteorological data sets exists but are not yet integrated into our database

Metadata holdings.
Metadata holdings described in 2 above have details on:
- Title of data set
- Short abstract
- Sampling beginning date
- Sampling end date
- Northern boundary
- Western boundary
- Eastern boundary
- Southern boundary

National networking.
Cameroon’s NODC was established during a meeting held in Limbe, Cameroon between 27 and 28 February 2001. During this meeting, links to other institutions were ensured through the establishment of a steering committee (SC) which had to oversee the activities of the directorate and its staff. Her functions were defined as follows:
- Define the general political status of the NODC
- Monitoring and evaluation of the centre’s activities
- Appoint and terminate the officials of the centre
- Approve the functioning/running of the investment budgets and programme/activities of the centre;
- Approve the annual reports and financial statement of the centre.

The steering committee is made up of the following 22 NODC member institutions who will work under the guidance of the coordinator and the National Coordinator of UNESCO in Cameroon:
Only a few of these institutions (MINEF and MINEPIA) provide their data to us. We have held several sensitisation meetings but motivation is low. MINTRANS-Department of Meteorology has completely refused to provide data or collaborate with the NODC despite the availability of much data sets.

The NODC has the e-mail and fax numbers of participating institutions and colleagues involved in freshwater and marine sciences. A booklet has been published of freshwater and marine scientists. No national email list and automated fax numbers of participating institutions is available at the NODC. The MINEF has automated email and fax numbers.

Provision of services to researchers

- Offer training workshops,
- Supply products, wall charts and directories of freshwater and marine scientists in Cameroon
- Existing bibliography at the Limbe research Station

Services in terms of training workshops to Researchers are as follows:

  - Training activities during this workshop covered aspects on the introduction to Ocean Teacher with emphasis on the Data Management aspects.
  - It was noted that the geographic location where any data was sampled was very important in processing meta data files.
  - Coordination and collaboration amongst scientists could facilitate the development of a national archive.
  - Standardisation of data collected within national institutions was very important in presenting these at the international level.
- National Training Workshop on Oceanographic data Collection and Management, Kribi, Cameroon, 24-26 April, 2003. The objectives of this workshop were:
  - To promote the national data collection system
o To facilitate data and information exchange between National partner Institutions and the NODC
o To facilitate the use of Ocean Portal and show the advantages of International Ocean Data Exchange System and Improve on Maintenance Capacity of National Partner Institutions and the use of recent software on Data Management.
o Workshop output: Number of participants: 16
o Aspects covered during working sessions
  ▪ Presentation of national data collections (no institution presented)
  ▪ Introduction to IOC/IODE
  ▪ Define information network and maintenance
  ▪ Discuss data concepts(formats) with examples
  ▪ Introduce data management systems
  ▪ Define best output services of data management institutions
  ▪ Introduce, with examples, recent computer packages on data/information management
  ▪ Practical session and
  ▪ Assign specific responsibilities to national partner institutions geared towards efficiency in data and information transmission.
• National Training workshop on product development (August 2003)
o The workshop trained participants on the techniques of national products development
o The future of the ODINAFRICA II Project was widely discussed by proposing improvements on the ‘An Integrated Ocean Observation and Service Network for Africa’ (AFRINET) document. It was widely accepted that the resolutions of this meeting be circulated to the attention of other ODINAFRICA II member countries.

Participation in research programs or other national activities
The Data Centre is involved and participates in the following research programmes/national activities:
• Fisheries, aquaculture & oceanography research
• Soils, air and water
• Geological and Mineral resources research
• Cartographic research

Data products provided to individual clients
• National Directory of Marine and Freshwater Professionals and Institutions in Cameroon
• Bibliography at IRAD’s Fisheries and Oceanographic Research Station Limbe- Cameroon
• Film on the coastal and marine resources
• Wall chart of Some fishes of Cameroon’s coastal and marine environment

Products that can be generated by the data centre.
• atlases of marine data on biological and physical resources including anthropogenic influences.

Additional training or facilities required
• Training of an information manager
• Development of products from oceanographic and meteorological data
• Training of various staff in areas defined below:

<table>
<thead>
<tr>
<th>Staff</th>
<th>Training requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinator</td>
<td>Use of Computer in Management</td>
</tr>
<tr>
<td>Data Manager</td>
<td>PhD, Data Management Aerial photographs and Satellite imagery</td>
</tr>
<tr>
<td>Information Manager</td>
<td>B. Sc. Information Management</td>
</tr>
<tr>
<td>Accountant</td>
<td>Financial management</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Secretary</td>
<td>French &amp; English Languages, Computer Science and Secretarial Duties at R. S. A. Stage III, IV and Diploma. Levels</td>
</tr>
</tbody>
</table>

- Financial allocation for all sub-projects planned for a year should be sent in time.
- Motivate in the form of monthly allowances to National Staff working with the project (according to UN standards) for a better output. Various countries to pay salaries of their staff.
- Operational expenses for the Data and Information Centre should be increased since there is additional work involving data collection
- Strategy should be developed to pre-finance the development of some data products
3. COMORES

Historique du Centre

a. La création

b. Le personnel
Il est constitué de cinq membres permanents dont: Le Directeur du CNDRS Ainouddine SIDICOordinateur National Aboubakari BoinaLe gestionnaire de données AHMED AbdoulkarimLe gestionnaire de l’information marine Mme ABDOU RAOUF Echata
• a secrétaire de Direction Mme Zainaba Mohamed

L’équipe travaille de façon ponctuelle avec des membres des institutions partenaires du projet à savoir AIDE, service Météorologie, l’équipe du SIG, personnel du CNDRS et de la DGE

c. Le matériel disponible
Le centre est équipé de :
• 3 ordinateurs multimedia2 imprimantes1 scanner3 onduleurs

Les données disponibles

a. Types et quantité de données
Une base de données nationale a été crée sur un logiciel spécialisé ODV au cours de la formation de rattrapage qui a eu lieu à Toulear. Cette base comprend :
• Des données bouteilles OSD data: 75 cruises, 2402 stations, 24192 samplesdes données CTD : 2 cruises, 21 stations, 22059 samplesdes données XBT-MBT : 380 cruises, 3024 stations, 644825 samples
• des données Surface : 1 cruise, 1 station, 2972 samples

Localisation des stations des données bouteilles (OSD) existantes

Données sur CD rom
Nous avons reçu dans le cadre du projet ODINAFRICA II une collection de 33 CD da données océanographiques.

b. Données collectées au niveau national
• Données sur le suivi monitoring des récifs coralliens de 1995 à 2003
• Données sur la ponte de tortues marines
• données sur l’environnement physico-chimique du Cœlacanthe

c. Les systèmes de gestion de données utilisées
Concernant les récifs, nous avons développé dans le cadre d’un projet régional de la Commission de l’Océan Indien (COI) une base de données COREMO.
Une autre base de données nationale a été développé à partir d’un logiciel spécialisé ODV

d. Etat de la Metadonnée.
La base de metadonnées MEDI est installé mais les références des données n’ont pas été remplies.

Mise en réseau.

a. Les partenaires
Nous entretenons des relations d’échange d’information et de données avec les institutions publiques et privées qui interviennent dans les activités liées au milieu marin. Il s’agit de :
- L’ONG AIDE, spécialisé dans les coraux, les tortues et les Aires Protégées marines.
- La Direction Générale de l’Environnement chargé de la politique environnementale
- La Direction Générale de la pêche, chargé de toutes les données pêche et de la convention de pêche avec l’Union Européenne
- Le service de météorologie nationale

b. Moyens de contact
Nous avons développé un répertoire national des experts et un répertoire des emails de tous nos partenaires dans les trois îles.

La Collaboration avec les chercheurs

a. Les Formations
Nous avons organisé des séries de démonstrations du cour sur la gestion de données océanographiques Oceanteacher.
- une formation nationale sur la base de données INMAGIC a été suivi par une équipe de 6 personnes qui ont travaillé dans les travaux bibliographiques du centre d’information.Les partenaires qui interviennent de façon ponctuelle dans les activités du projet sont inscrit dans des cours d’anglais afin de faciliter la compréhension de OceanTeacher et pouvoir participer de façon effective aux activités du projet. des courts d’anglais Formation nationale en anglais.

b. Expertise
- Participation dans le South African Conservation and Genome Resource programmeparticipation dans l’organisation de l’atelier sur la biodiversité du parc marin de Mohéli

c. Les Produits
- publication d’un dépliant d’information sur le CNDOC développement d’une base de données CDOKOM
- production de cartes thématiques par le Système d’information Géographique

Description des produits

a. Les CDs
- Cartes SIG (localisation des ecosystèmes marins, bathymetrie)
carte bathymétrique des Comores
carte de localisation des écosystèmes marins

- Base de données CDOKOM
  C’est une base de données nationale qui gère les experts nationaux, les projets environnementaux passés et en cours et les institutions chargées de la gestion du milieu marin.

On a trios fenêtres de saisie et des requêtes

Fenêtre de saisie
fenêtre de requête

b. Les types de produits demandés
Il s’agit de données physico-chimiques (hydrologie) de la zone marine des Comores. Les pêcheurs nous saisissent souvent pour avoir des cartes bathymétriques plus détaillés de leur zone de pêche. On nous demande également des images de l’évolution de l’état des écosystèmes comme les plages et les mangroves.

les besoins futurs.
a. Besoins en formation et en matériel
   • formation sur la création de page web
   • formation sur l’utilisation des logiciels de contrôle de la qualité des données
   • formation en SIG
   • besoin d’un groupe électrogène
   • besoin d’un ordinateur portable

b. Autres types de produits de données à développer
   • Atlasfilms vidéos sur la vie marine
   • des diaporamas sur les activités de la zone côtière
4. GHANA

Introduction

Ghana Oceanographic Data Centre (GODC) started its operations in May 2001 after the First ODINAFRICA Marine Data Management Training Workshop held in Casablanca, Morocco in March-April 2001.

The formal inauguration of the Centre as a National Oceanographic Data Centre (NODC) took place in Accra on the 15th – 16th August 2002. The First ODINAFRICA National Workshop brought together members of the Ghana National Commission for Intergovernmental Oceanographic Commission (GNC/IOC), Ghana National Commission for UNESCO (GNC/UNESCO) and scientists from other participating institutions. The participants signed an undertaking to collaborate with the Centre and The Roles & Responsibilities and The Policies & Procedures of GODC were adopted.

Progress

In the year 2001, the work of the centre basically centred on the compilation of metadata of the data available in the host institution, MFRD.

In the year 2002, the metadatabase was expanded after the First ODINAFRICA National Workshop. Metadata from three other institutions were added to the existing metadata. The preparation of Data Centre Documents & Metrics started towards the end of the year.

The Data Manager also participated in the Second First ODINAFRICA Marine Data Management Training Workshop held in Tunis, Tunisia in April-May 2002.

In the year 2003, the work at the Centre centred on the development of products. The Data Centre Documents and Metrics were completed. “A Marine Atlas of Ghana was also constructed.” Posters, brochures and calendars have also been made for the Centre.

The Centre has three active institutions in the country that it collaborates with. These institutions submitted metadata. They are Ghana Geological Survey, Meteorological Services Department and the Department of Oceanography & Fisheries of the University of Ghana.

The problem encountered in the project period was basically the delay in the disbursement of funds.

Conclusion

The centre is now capable of providing products and services to its prospective clients.
5. GUINEE

Background

a. History:
CNDO Guinée established in 1990, this active operation started from implementation of project ODINARICA –II.

Data Manager: Diakité Satigui
Information manager: Aïssata Condé
Assistant: Abdoul kaka Traoré

Correspondants from CERESCOR Scientific Departments Physical Oceanography: Ibrahima Diané
Marine biology: Ansoumane Keita
Marine Geology/Environment: Mamadou Oury Bah

Facilities:
3 computers DELL
02 printers Deskjet 990cxi and Laserjet 1200
1 scanner
3 APC chargers

Softwares provided by ODINAFRICA-II

03 Computers ZENITH DATA SYSTEMS
02 printers Laserjet 1100
provided by CERESCOR

b. Centre’s data collection
- types and quantities of data managed
  - from 20 oceanographic cruisers, 2000 stations
  - OSD, CTD, XBT-MBT data: collection in building
b-Data locally collected:
  on guinean shelf: Temperature, salinity, density, phosphates, silicates, nitrates; plancton
  on coastal area: Temperature, salinity, density, phosphates, silicates, nitrates; current, sea level, plankton.

c. Quality control procedures applied:
   By correspondants from scientific departments of CERESCOR
d-Data Management systems used: Management databases by Access software

c. Metadata holdings:
Collection on 5 main topics in guinean coastal area:
- Scientific Research and Environment study
- Fisheries
- Humans establishments
- Management of coastal resources
- Alternative technologies

National networking

a. Centre’s links to other institutions
   Through national network in the framework ODINAFRICA:
   Centre de Recherche Scientifique de Conakry-Rogbané (CERESCOR), Centre National des Sciences Halieutiques de Boussoura (CNSHB), Centre de Recherche et d’Etudes en Environnement (CERE), Direction Nationale de l’Hydraulique (DNH), Direction Nationale de la Météorologie (DNM), Direction Nationale de l’Environnement (DNE), Direction Nationale de la Pêche Maritime (DNPM), Port Autonome de Conakry (PAC),
- Others: Département de Geographie de l’Université de Conakry, Direction Nationale du Genie Rural (DNGR), Institut de Recherche Agronomique de Guinée (IRAG), Centre National de Surveillance de la Pêche (CNSP), Projet Changements Climatiques (PCC/FEM/PNUD), Projet Biodiversité.

b- institutions providing their data to NODC Guinée
   Members of national network: copy of data by exchange or by direct provision
   Others: by request

Services provide to researchers
a. Training:
   - Exercises of utilisation of Oceanteacher
     (translation and comprehension)
   - Access Application for the organization of data provided by marines laboratories of CERESCOR

b. Expertise
   Support to scientific field teams and laboratories for:
   - collection of data
   - data management by Access Application,
   - building of maps
   - GIS training and support to Scientifics Environment Teams.
   The Team of NODC provided an assistance to several scientific programs.

c. Products
   - Directories (Experts, institutions and others groups operating in guinean coastal area)
   - Catalogues on main topics of coastal areas
   - Thematic maps on coastal areas, coastal resources, areas of demonstration of pilot activities of resource management
     - oceanographic parameters maps,
     - Databases OCEAN, ZCôtère

Product Description
a. Electronic and paper versions of all products available in NODC;
b. Type of products requested by our costumers
   - Oceanographic parameters data
   - Data on the sea level and coastal currents (velocity, direction)
   - inventory of needs, typology and planning of elaboration of products in guinean coastal area has been maked through the national workshop. The document named “Strategy of response to services and products needs”. This document very requested by several projects and NGOs in operation in guinean coastal area.

Future
a. Additional training and facilities needed:
   - Remedial training on Ocean teacher

b. New types of data products:
   - National data collection with ODV
   - Atlas (oceanographic cruises data, , plankton data, bathimetry data of shelf and coastal waters)

c. New types of data to manage:
   - Fishing data
6. KENYA

Background
The data centre is part of Kenya Marine and Fisheries Research Institute. As such the centre draws upon Institute’s staff resources as the need arise. The core staff consists of the Coordinator and 1 office assistant.

Facilities. In order to support the operations of the data centre, IOC supplied a number of computer equipment, as listed below:

<table>
<thead>
<tr>
<th>Computers</th>
<th>supplied in</th>
</tr>
</thead>
<tbody>
<tr>
<td>DELL Pentium</td>
<td>1997</td>
</tr>
<tr>
<td>DELL Intel 350 Mhz Pentium II</td>
<td>1998</td>
</tr>
<tr>
<td>DELL Intel 500 Mhz Pentium III</td>
<td>1999</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Printers</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP Deskjet 692C</td>
</tr>
<tr>
<td>HP Deskjet 832Cx</td>
</tr>
<tr>
<td>HP Deskjet 895Cx</td>
</tr>
</tbody>
</table>

In addition, the centre is equipped with a digitizer and a plotter to handle GIS work

Centre’s data collection

Data from three sources, the World Ocean circulation Experiment, World Ocean Database 2001, and the satellite-derived datasets of the Coastal Zone Colour Scanner have been extracted and stored in CD. Further the data has been summarized in various contour charts and graphs. Cross section plots, annual means and monthly means contours are plotted for temperature, oxygen, salinity, nitrate, phosphate and silicate are presented. Minimum and maximum values are given in each case.

Data in World Ocean Database 2001 is grouped in a series of World Meteorological Organization (WMO) squares of 10 degrees. In this convention the data of immediate interest to Kenya, spanning the EEZ and areas adjacent lie in the square 3003 and 3004.

The actual subsets of data were extracted from the squares above bounded by, 1 S, 6 S and 39 E, 45°E, using the Ocean Data View software, forming a national collection of oceanographic data sets of Kenya, for analyses and archiving. Subsequently data sets were exported in ASCII format for spreadsheet work and contouring.

NOAA AVHRR SST and Nimbus-7 CZCS pigment concentration data sets are satellite-derived datasets from the Coastal Zone Colour Scanner. A subset of data for Kenyan waters for monthly climatologies for 1981-1986 both for daytime and nighttime sea surface temperature as well as monthly climatologies for 1978-1986 for pigment concentration have been extracted by a process of converting the HDF files to ASCII gridded files for contouring.

The WOCE Upper Ocean Thermal data and the WOCE Hydrographic Program data have been compiled for ease of use in a CD-ROM set called the eWOCE, the electronic atlas of WOCE data. Subsets of these data for the Kenyan waters have been extracted and various illustrations made using graphic utilities in the Ocean Data View software.

High resolution vector maps of the Kenyan coastline was digitized using ARC/INFO software and converted to GIS shapefiles (ESRI ref). Survey of Kenya topographic map sheets of 1:250,000 series covering the entire Kenyan coastline were used.

The following means have been worked out:

- Mean annual distribution of salinity (psu) at standard depths 0 - 4000m
• Mean annual silicate (µmol/l) at standard depths 0 - 4000m
• Annual mean temperature (°C) at standard depths 0 - 4000m
• Annual mean oxygen (micromol/l) at standard depths 0 - 4000m
• Annual mean nitrate (micromol/l) at standard depths 0 - 4000m
• Annual mean phosphate (µmol/l) at standard depths 0 - 4000m
• Mean monthly sea surface daytime temperature (°C) 1981-1986 – January - December
• Mean monthly sea surface chlorophyll concentration (mgm³) 1975 – 1986 – January - December

The centre acts as a clearinghouse, whereby requests are directed to various custodians of the locally collected data. The data is stored in ODV spreadsheet format especially the ones extracted from the World Database 2

The KeNODC meta-database describes the content, condition, and other characteristic of data sets wherever the data is located. This will identify potentially useful data sets to interested parties. The database structure is modelled on the MEDI fields (see MEDI for more details). The database has been implemented in MS-Acess97. Newer entries will be done in MEDI software once the software is successfully installed.

**National networking.**

One of the key areas of networking has been the annual national workshops organized by the data centre. Participation in the three National Workshops have helped in cementing networking

The following institutions attended the first national workshop held in 18-19 October 2000:
• Oil Spill Mutual Aid Group
• District Environment Officer (based at the Provincial Forest Officer)
• Fisheries Department
• Kenya Marine and Fisheries Research Institute
• Meteorological Department
• Coral Reef Degradation in the Indian Ocean (CORDIO-East Africa
• Kenya Wildlife Services, Coast Regional Headquarters
• Provincial Planning Office, Coast Province
• Provincial Water Office, Coast
• Central Bureau of Statistics, Nairobi
• National Museums of Kenya,
• Ichthology Department
• Kenya National Commission for UNESCO
• National Council for Science & Technology
• Mombasa Municipality
• Social Services
• Tourism Department
• Coast Development Authority

The following institutions attended the second national workshop held in 2-4 October 2002:
• Fisheries Department
• Kenya Marine and Fisheries Research Institute
• Kenya Meteorological Department
• Coast Development Authority
• Kenya Meteorological Department
• Kenya Wildlife Service

**Training**
The Kenya National Oceanographic Data Center (KeNODC) in collaboration with KIDACE (KMFRI Kisumu Data Center) organized the training workshop on management of existing aquatic datasets using some widely recognized tools and techniques recommended by the Intergovernmental Oceanographic Commission’s (IOC) committee, the International Oceanographic Data and Information Exchange (IODE).

The main aim of the workshop was to promote the use of aquatic data in decision-making, and therefore contribute to the process of Integrated Management of natural resources.

The workshop encouraged interactive environment whereby participants were introduced to resources available, and in turn they would apply the workshop experience to develop systems that will encourage dissemination of information.

Basic data concepts
Formats
Special Concepts and Terminologies in Ocean Data
Global Sources of Data
Internet and networks
Library as information centres
Activities of the Information Centre
Services of the Information Centre
Metadata
Exercises
Gridding and Contouring
Utilities Software

Participation in research programs and other national activities
- Contribution to the South West Indian Ocean Fisheries Project design of the data management component
- Ungwana Bay fisheries stock assessment research carried out to determine optimal fishing grounds. KeNODC plotted the various sampling positions as well as deriving iso-planes for fish stock assessment, temperature, salinity.
- GIS work for use in environmental profile for the Diani-Chale marine reserve and the surrounding terrestrial area to assist in drawing up a management plan for coastal resources, within the framework of Integrated Coastal Zone Management.
- The UNESCO sponsored project on ground water quality monitoring using GIS modelling
- Resource person on Dispersants and other Chemicals training for Oil Spill Response Team (OSRAT) organised annually by the Ministry of Transport and Communications, and the Oil Spill Mutual Aid Group
- Contribution to the map database of the Nairobi convention website (http://www.unep.org/eastafrica)

Advice
Statistics of the fish caught yearly, fish species mainly caught for both local and international market (if any), the exact locations of fish schools, the depth of the continental shelf where the fish is mainly located, a geographical map indicating the exact locations, nutrient richness of the fishing zones and a contour map indicating the various depths below sea level.

The data centre continues receive inquiries on availability of remote sensing products.

Support has also been provided to scientists on utility software such as WinZip, Acrobat PDF reader. The OceanTeacher CD has been most resourceful on this.

We maintain a logbook of various requests received.

Products
• Digitizing various maps into GIS form
• Providing base maps for various management programs

One of the important products from the Data Centre is tide prediction. This is now produced in KMFRI. Predictions are in form of High-Low listings and hourly values. They are based on sea level observations from two GLOSS tide gauges installed at the ports of Mombasa and Lamu. Software prepared by the Toga Sea Level centre in collaboration with the University of Hawaii is used to produce the predictions.

The Centre can produce profile plots and contours of various data sets in the World Ocean Atlas 2001 and the ocean colour data obtained from the Coastal Zoze Color Scanner satellite.

The Centre also uses the GIS software to integrate various data by describing them in the same geographic coordinates.

Majority of requests at the centre consist of maps of the coastal ecosystems, the mangroves and coral reefs. The data is normally extracted from the large set of data holdings available in GIS format and other ocean observations.

**The future of the data centre.**

In order for the Centre to answer to the priorities of the countries there is need to offer specialized training in operational areas. Some of these may include

• Bio-physical modelling of the existing datasets to support fisheries industries
• Geo-physical modelling to assist in studies of shoreline erosion and sea level rise as a way of resolving impacts on coastal tourism
• Supporting efforts to control pollution agents including sensitivity maps of coastal ecosystems

The centre would need more superior computing facilities once demand is created for use of data.
7. MADAGASCAR

Information Generale sur le CNDO

Le Centre National de Données Océanographiques a été officiellement établi en décembre 2000, suite à un atelier national tenu à Antananarivo réunissant les quatre ministères concernés, à savoir : le Ministère de l’Enseignement Supérieur, le Min. chargé de la Météorologie, le Min. de l’Environnement et le Min. de la Recherche Scientifique. L’Université de Tuléar, par le biais de l’IH.SM, a été choisie héberger le Centre.

État des facilités du CNDO - Equipement, logiciels, etc.

Depuis 1997, le Centre a bénéficié, dans le cadre du projet ODINAFRICA-I, d’une dotation en matériel informatique et accessoire, d’une série de formation du personnel du Centre en gestion de données et informations océanographiques. Dès lors, et dans un premier temps nos activités sont orientées sur l’inventaire des données nationales, leur archivage et mise en catalogue. Par ailleurs, le Centre est équipé d’une bibliothèque spécialisée riche d’environ 5000 d’articles et de journaux. Pour assurer son fonctionnement le Centre est équipé de matériels suivants :

- une ligne téléphonique (permettant la connexion vers le réseau Internet) ;
- un réseau Intranet (LAN) d’une vitesse de 100 mbps
- 1 PC (DELL, Pentium IV – 37.2 GB de capacité disque, équipé d’un graveur et un lecteur Zip Iomega100 (pour la communication et la gestion de données)) ;
- 1 PC (DELL, Pentium II – 15 GB de capacité disque (service administratif)) ;
- 1 PC (DELL, Pentium III - 20 GB de capacité disque, équipé d’un lecteur Zip Iomega250 (Gestion d’informations)) ;
- 1 PC (DELL, Pentium III – 15 GB de capacité disque, équipé d’un lecteur Zip Iomega250 (service administratif du Centre d’Information)) ;
- 2 Scanners (HP ScanJet 6300C) ;
- 1 Imprimante HP LaserJet 1200 series ; 1 imprimante HP DeskJet 692C ;
- Logiciels de gestion de données : 10 communs en océanographie; 25 pour l’analyse de données; 50 programmes de conversion.

Implication dans d’autres activités nationales ayant trait aux milieux marins et côtiers

Le Centre travaille en collaboration avec de nombreuses institutions, organismes et sociétés nationaux : le CNRO (Centre National de Recherche Océanographique), le Ministère de l’Enseignement Supérieur, le Ministère de la Pêche, le Ministère de l’Environnement, le Ministère de la Météorologie et le Ministère de l’Aménagement du territoire. Ainsi, et à titre d’exemple, le Centre a participé à l’élaboration de cartes de sensibilité des zones côtières dans le cadre du programme national de lutte contre le déversement des hydrocarbures (Pollution Marine). Il est aussi membre du comité régional du réseau d’informations, dans le cadre du programme provincial.

Activités mises en oeuvre dans le pays (2001 - 2003)

Les activités entreprises par le Centre se repartissent en deux grands volets : 1) la gestion des données et 2) la gestion d’information. Une somme de USD 25.300 a été octroyée cette année par l’UNESCO-COI, pour assurer le fonctionnement du Centre.

Liste des activités

a. En matière de gestion de données, nous avons planifié de réaliser les activités suivantes :
- Collecte et archivage des données
- Création de la collection nationale de données océanographiques
Mise à jour du catalogue (metadonnée) de données
Edition d'un CD-ROM des espèces marines du Musée de la Mer de l’IH.SM
Edition d’un CD-ROM de l’Atlas de données et informations océanographiques de Madagascar
Edition des dépliants et posters pour le centre

b. Quant au Centre d’information, les activités ci-après ont été planifiées :
 • Mise en catalogue des informations du centre de documentation (basée sur INMAGIC)
 • Edition de produits de sensibilisation (posters, prospectus)
 • Mise à jour du répertoire des scientifiques océanographes et/ou d’eau douce
 • Edition d’un recueil bibliographique national

Résultats

le CNDO

• L’année 2001 (au mois de septembre), le CNDO a participé à une campagne océanographique menée conjointement avec l’IRD dans le canal de Mozambique. Etude de la planctonologie et de l’hydrologie ont été menées durant cette campagne.

• Par ailleurs, une collection nationale de données océanographiques a été créée à partir de la base de données Océanographiques mondiale (WOD01) et délimitée comme suit : latitude Nord : -10, latitude Sud : -37, longitude Ouest : +35 et Est : +57. La période de la collection s’étale entre 1850 et 2003.

Un fait marquant cette période fut la tenue d’un atelier en vue de la création d’un atlas de données et informations océanographiques de Madagascar. Dans le cadre du Projet ODINAFRICA et en collaboration avec les experts nationaux et internationaux, l’atelier a eu lieu à Tuléar durant deux semaines au cours du mois de juillet de cette année. L’atlas est le premier en son genre réalisé à Madagascar et concerne les paramètres physiques et chimiques des eaux environnantes de la Grande Ile, les nutrients, la Géologie, la végétation primaire restante et la précipitation dans l’ensemble. La première version de cet atlas a été éditée au mois d’aout de la même année et est disponible au centre.

• En outre, la mise à jour du catalogue des données a été entretenue sur MEDI version 3.0. 16 collections nationales de données y sont répertoriées touchant le domaine de l’océanographie, l’environnement côtier et les pêcheries.


• En matière de renforcement des capacités, la construction du nouveau local pour le centre est terminée au mois de mars 2003. Une somme d’un montant de USD 10.000 a été alloué par le Gouvernement malgache à cet effet. Il comprend deux compartiments : une salle de travail et un bureau administratif.
le centre de documentation

Le Centre documentation de l’IH.SM constitue une des composantes non négligeables de notre banque de données. Créé avec l’ancienne Station Marine, il est le pair du centre de documentation spécialisée en océanographie de l’île avec celui du CNRO (Centre National de Recherches Océanographiques). L’informatisation du centre des documentations a débuté en 1998 dans le cadre du Projet ODINEA et RECOSCIX-WIO. Contigué au centre de données, elle comprend une grande salle de travail et de lectures.

A l’heure où nous éditons ce rapport, 4.200 articles et journaux sont déjà enregistrés. En matière de formation, une de nos responsables du centre de documentation a participé, depuis 2001, aux ateliers de Cape Town (2001) et de Tunis (2002) sur la gestion d’information. Une copie de la base de données a été envoyée à la coordinatrice régionale (Seychelles) cette année, qui assurera le contrôle de la base de données d’information régionale.

En matière de sensibilisation, des posters et prospectus ont été édités. Un récueil bibliographique national a aussi été édité cette année, réunissant environ 750 références indexées. La mise à jour du répertoire des experts et institutions opérant dans les eaux marines et douces est entreprise vers la fin de l’année.

Problèmes et impacts de la mise en œuvre des activités ODINAFRICA dans le pays

Impacts

Nul ne doute de l’impact positif de la mise en œuvre du Projet ODINAFRICA dans le pays. L’accès au réseau Internet, les échanges entre étudiants, chercheurs et scientifiques au niveau national et régional et international permettent, à titre d’exemple, de réduire considérablement les temps impartis à l’échange et à la recherche d’informations pour la réalisation des travaux de recherche entrepris.

Problèmes rencontrés

Quoique de progrès aient été marqués jusqu’ici, il reste encore beaucoup à faire quant à l’effectivité du service assuré par le centre à travers le pays :

i) la période conjoncturelle à laquelle le pays a récemment vécu, a beaucoup affecté nos activités. Certaines activités n’ont pu être réalisées du fait du retard du paiement de contrat suite aux perturbations dans l’acheminement des courriers ;

ii) l’insuffisance du personnel du centre travaillant en plein temps affecte significativement la réalisation de certaines activités du centre ;

iii) suite aux problèmes d’installation du logiciels INMAGIC, la base de données de notre centre d’information n’était pas intégrable à temps à celle de la région, ce qui nécessite l’intervention de la coordinatrice régionale pour la reinstallation correcte et ainsi la correction de la base elle-même ;

iv) en matière de communication, la vitesse de connexion (messagerie et Internet) par dial-up entrave lourdement l’émission et la réception d’informations ; l’absence de l’appareil FAX au centre pose parfois de sérieux problème quant à la réception des documents. Néanmoins, les perspectives suivantes sont à envisager.

Perspectives

Pour mieux satisfaire les besoins de nos usagers (étudiants, chercheurs, opérateurs), nous envisageons de renforcer encore la capacité du centre en matière de communication.

i) A cet effet, le Ministère de tutelle (Enseignement supérieur) vient de doter le centre d’un réseau Intranet et Internet permettant une connexion permanente. Deux serveurs sont déjà installés localement assurant la gestion du domaine univ-toliara.mg et qui sans doute hébergera le site web du Centre National de Données Océanographiques de Madagascar ;

ii) en outre, l’UNESCO/IOC accorde au centre la mise en place d’un VSAT pour améliorer la qualité d’échange d’informations via Internet ;

La sensibilisation des détenteurs de données (scientifiques, institutions, etc) à coopérer avec le centre va être renforcée en vue d’enrichir la collection du centre en données et informations.
La prochaine étape serait donc beaucoup plus consacrée à :
  i) l’élaboration des produits utilisables par une large game d’utilisateurs ;
  ii) l’intégration du centre aux diverses activités nationales et ;
  iii) la recherche des moyens de renforcement des capacités et des coopérations régionales et internationales.
8. MAURITANIA

Information Générale sur le CNDO

Centre Nationale de Données Océanographique (CNDO) crée en janvier 2001, il est installé dans les locaux du Laboratoire Environnement et Milieu de l’institut Mauritanien des Recherche Océanographiques et des Pêches (IMROP). Le Data Manager et ses assistants assurent son fonctionnement (collecte, traitement des données océanographiques). Il dispose de matériel informatique et des logiciels adéquat. Le CNDO, à pour objet :

- de disponibiliser, organiser et gérer la base de données océanographiques (de la saisie aux traitement).
- Coordonner les activités de collecte de données.
- Assurer la sensibilisation sur le milieu océanique.

Staffing

Le Centre Nationale de Données Océanographiques (CNDO), est géré par le Data Manager plus 15 personnes entre des chercheurs et des techniciens.

Facilities

Le Centre Nationale de Données Océanographiques (CNDO), dispose de hards word (Deux ordinateurs ; une imprimente ) et de softword ( Océn Data View ODV ; Arcview ; FoxPro6 ; Surfer7. ...etc), pour sont fonctionnement.

Centre’s data collection

Les données utilisés au CNDO ce sont des données de différent types :

- Données collectés par des différents bateaux nationale et internationale (1952 – 2003), 3579 stations.
- Données de WOD01 exporté du ODV (mp), 16151 stations.
- Données satellitaires (weekly SST de 1981 a 2003 ).

What quality control procedures do you apply?

What data management systems do you use

Le système de gestion de données utilisé pour le stockage des données c’est la BASSE DE DONNEES.

Describe your metadata holdings.

Metadata comprend des bases de données sur :
- Données océanographiques.
- Données biologiques
- Données de statistiques de pêche industrielle et artisanale
- Données sur les outils de pêche
- Données météorologiques
- Données socio – économiques

National networking

Le Centre Nationale de Données Océanographiques (CNDO) a des liens avec les établissements nationales suivantes :
- Université de Nouakchott.
- Parc Nationale du Banc d’Arguin (PNBA).
- Parc Nationale de Diawlling (PND).
- Port Autonome de Nouakchott.
- Port Autonome de Nouadhibou.
- Météo Nationale.

Do these institutions provide their data?

Oui, c’est institutions fournissent leurs données au Centre Nationale de Données Océanographiques (CNDO).

Do you have a national email list or an automated FAX list to contact your colleagues?

Le Centre Nationale de Données Océanographiques (CNDO) dispose les emails ou les téléphones pour contacter les institutions: ci – dessus.

How do you provide services to researchers?

Des cours de formation sur les bases de données; ODV; et surfer.
- Participation aux campagnes de suivi des paramètres hydrologiques au Banc d’Arguin et à la Baie de Lévrier.
- Réalisation des rapports de campagnes.
- Publication d’un article sur le régime hydrologique du Banc d’Arguin.
- Participation aux campagnes hydrologiques ; démersales et acoustiques dans la ZEE Mauritanie.
- Réalisation des rapport de campagnes.
- Elaboration d’un document sur la méthodologie utilisée pour la collecte et le traitement de données.
- Réalisation d’un Atlas saisonnier de la température
- Des consultations ont été faites par le CNDO aux différents services de l’Institut Mauritanien des Recherches Océanographiques et des Pêches (IMROP), concernant le format et l’analyse de données (Température ; Salinité ; indice d’upwelling ... etc).
- Une autre consultation a été faite pour le Parc Nationale du Banc d’Arguin, sur le régime hydrologique du Banc d’Arguin.
- Distribution spatiale de la température de l’eau en surface et aux niveaux 50 et 100 mètres sur la ZEEM, pendant la saison froide et chaude.
• Distribution spatiale de la salinité de l’eau en surface et aux niveaux 50 et 100 mètres sur la ZEEM, pendant la saison froide et chaude
• Distribution spatiale et temporelle de l’indice d’upwelling pendant la saison froide et chaude

Describe the products that can be generated by your data centre
a) Le CNDO Mauritanie peut offrir les données sous forme d’un produit électronique ; des données brutes ou des données analysés selon la commande du client.

b) Nos clients demandent généralement les données brutes et les cartes de distribution spatio-temporelle.

c) Nos clients dans la plus part demandent de produits de données.

The future of the data centre.
a) What additional training or facilities does your centre need? Notre centre a besoin de cours de formations en anglais, et également de formation sur les logiciels de traitement et d’analyse de données. Le besoin va aussi vers l’acquisition des programmes de gestion de données ; de matériels informatiques (ordinateurs ; imprimantes; CD.. Etc.).

b) What new types of data products could be generated? Notre centre peu produire: Des Atlas de température; salinité; oxygène dissous; courant marin; analyse des séries temporelles; modèles hydrodynamiques… etc.

c) What new types of data could be managed?
- Données observées.
- Données WOD01.
- Données satellitaires.

EXEMPLE DE TRAITEMENT DE DONNEES
Régime hydrologique saisonnier dans le Banc d’Arguin pour la période de 2000 à 2001

INTRODUCTION :
• Évolution mensuelle de la température de l’eau en surface par apport à la normale.
• Caractéristiques hydrologiques pendant les deux grandes saisons chaude et froide.

Matériels et Méthodes :
• Les données hydrologiques collectées proviennent de 479 stations visitées lors des campagnes du N/O Amrigue de juillet 2000 à avril 2001 dans le Banc d’Arguin.
• Les paramètres sont collectés à l’aide d’une sonde CTD et d’une sonde multifonction de type HORIBA.
• Le traitement a été réalisé à l’aide des programmes Microsoft Office, Surfer7.0 pour la cartographie et Statistica 5.0 pour la classification des eaux.
Résultats :

Fig. 2: La moyenne saisonnière de la SST au Banc d'Arguin par rapport à la normale 2000 - 2001
Saison chaude
Conclusions :

Saison chaude :
• Eaux d’upwelling (T°c≈18.97 à 23.86; s‰≈35.78 à 36.03).
• Eaux courant guinéen (T°c≈22.23 à 26.61; s‰≈36.27 à 36.53).
• Eaux côtières du BA (T°c≈23.47 à 26.57; s‰≈38.27 à 39.59).

Saison froide :
• Eaux d’upwelling (T°c≈16.97 à 23.86; s‰≈35.64 à 36.94).
• Eaux courant canarien (T°c≈19.83 à 21.60; s‰≈35.95 à 37.74).
9. MAURITIUS

Background and History of NODC (Mauritius)

1.1 Background

During the third session of the regional committee for the cooperation Investigation in the North and Central West Indian Ocean (IOCINCWIO – III) of the Intergovernmental Oceanographic Commission (IOC) of UNESCO, it was noted that the capabilities of most of the countries including Mauritius in the region were limited in the collection and archival of marine data.

One of the firm recommendation of the committee was to build up the knowledge of the IOC member states of the region through appropriate and adequate training programme.

The job was undertaken by ODINAFRICA which although focussed successfully on information management during its first phase, gradually expanded to include data management in Eastern Africa in its current phase.

1.2 History of NODC (Mauritius)

The University of Mauritius (UOM) played a significant role in the development of the NODC in its initial stage. Two consultants commissioned to provide guidance on the development of a Mauritius Oceanographic Institute recommended that an NODC be established at the Meteorological Services in view of its long history in archiving and manipulation of data and services offered to the marine community at large.

In November 1999, the NODC was officially set up at the Meteorological Services in association with the various national institutions following the approval of the Prime Minister’s Office.

Stakeholders:-
- University of Mauritius (UOM)
- Mauritius Oceanographic Institute (MOI)
- Ministry of Environment (MOE)
- Central Statistics Office (CSO)
- Ministry of Fisheries c/o Albion Fisheries Research Centre (AFRC)
- Central Informatics Bureau (CIB)
- Shoals of Capricorn (Rodrigues) shoals

In the year 2001, 3 stakeholders were added to the established list:-
- Ministry of Housing and lands (MOH)
- Ministry of Agriculture – National Remote Sensing Centre (MOA)
- National Coast Guard (NCG)

The NODC (Mauritius) thus became a member of the IOC – sponsored International Oceanographic Data and Information Exchange (IODE) network of the NODCs.

1.3 Aim

Marine and coastal resources, an economic dependence, are feared to be degraded further through erosion and sea-level rise. Therefore the understanding of the surrounding ocean is imperative to mitigate the negative impacts of the ocean to an already vulnerable island state. The abilities to acquire, manage, archive and disseminate data and information to research scientists and policy makers are of utmost importance.

1.4 Objectives

NODC, (Mauritius), has been indeed designed to be the body with prime responsibility for the data management, data archival and in particular to provide an integrated stream of oceanographic and
1.5 **Facilities and staffing**

The Republic of Mauritius has benefited much from the ODINAFRICA Project. The Albion Fisheries Research Centre (AFRC), the University of Mauritius and the Meteorological Services have participated in various training and Management workshops organised under the aegis of IOC/ODINAFRICA. The AFRC and UOM have received valuable computer equipment and softwares for active participation. The data centre at the host institution is equipped with a local area network and internet facilities attached to three computers and a staff comprising 4 part-time technical officers, supervised by 2 part-time senior scientists. Telephone/fax/email is also available during normal office hours.

The NODC is often solicited for past data by researchers, individuals, shipping companies and university students for planning design and research activities. A comfortable space with additional furniture has been identified in the host building with trained staff to handle the data supplies.

Training have been provided to the staff in order to handle requests for data supplies from other institutions and private bodies. 2 members of the staff are trained to manipulate the day to day functioning of the NODC website. The data centre is looking forward to be connected to ADSL or some other alternative faster mode of communication.

**NODC (Mauritius) Data Collection and archiving**

2.1 **Data Collection**

The NODC in consultation with other stakeholders has adopted the distributed system for data management and archival. Presently, all data in a rectangular array bounded by 50ºEast – 95ºEast and 10ºS to 25ºS have been extracted from world ocean database 2001 and compiled. The dataset converted in excel format is available for subsequent local research. Products of salinity, temperature, nitrate, silicate, oxygen, phosphate against depth have been worked out using the Ocean Data view Software. Marine Data for the Mauritius EEZ have been extracted from the Maritime Meteorological Dataset 2003 edition, from the KOBE Collection. ARGO data are also being regularly extracted for our area of interest and assembled in compact discs.

2.2 **Local Data**

The main institutions collecting data locally are MMS, MOI, MOE, AFRC, UOM, and MOH.

2.3 **Mauritius Meteorological Services (MMS)**

The Mauritius Meteorological Services is involved in collecting sea surface temperature (SST), the sea-level and the wave parameters.

The SST is being collected on a daily basis from the GTS through a multitude of voluntary observing ships, buoys available in the South West Indian Ocean and bucket thermometers fixed at St Brandon, Rodrigues, and the Port Louis harbour. The datasets is archived since 1971.

The sea-level data is compiled since 1986 from the tide gauge stations located at Port Louis Harbour and Rodrigues (Port- Mathurin).

The wave-rider installed in 1996 off the south east coast of Blue Bay at open seas generates wave records with gaps occurring during maintenance of equipment.

2.4 **Albion Fisheries Research Centre (AFRC)**

The AFRC is actively involved in the development and management of living aquatic resources in the national waters of Mauritius. The Institution is also implicated in the survey of corals, fish and benthic communities along permanent transects set at monitoring stations. The datasets collected by AFRC comprises among others:-
• Data on coastal ecosystem
• Field data on substract cover (coral, seagrass, algae etc)
• Data from ground truth exercises for refinement of classified thematic maps.
• Data on current patterns, salinity, temperature, in lagoonal waters.
• Biological parameters
• Tuna data in relation to its stock structure, spatial distribution and catch rates.
• Records of fisheries statistics
• Records of fishing vessels.

2.5 **Mauritius Oceanographic Institute (MOI)**
The MOI have collected data on Bathymetry around Mauritius and East of Rodrigues. Using CTD metres, the institution have collected temperature, salinity and depth profiles at open seas in areas bounded by coordinates. (29.31 to 30.46) (-14.51 to 11.58) (-18.57)

Magnetic data in the following areas - 20.55 to – 21.57
- 19.65 to – 20.65 during scientific cruise Magofond II, using deep tow magnetometer

Gravity data: - 20.55 to –21.57
- 19.65 to –20.65, using gravimeter during Magofond II

2.6 **Ministry of Environment (MOE)**
The Ministry of Environment is the biggest user of the Environmental data to make crucial decisions at the National level. Occasionally, it conducts studies in collaboration with various organizations during which local data are generated. The Ministry is also in the process of developing an Environmental Information System (EIS) which will comprise different sets of Environmental data. The Director of Environment has agreed to provide the available data to NODC stakeholders. Data have been collected by the stakeholder to produce a coastal sensitivity atlas. Their datasets includes among others:-
• Coastal land use,
• Marine pollution,
• Coastal erosion.

2.7 **Shoals**
The dataset of shoals includes the followings:-

**Biological:**
• Zooplankton species distribution and total biomass near –19.40 and 63.25 E at open seas using 125 um net
• Counts of indicators fish and invertebrate species, percentage cover of sessile organisms

Locations: Rivere Banane, passe cabri, passe Armand, passe Ile aux Fou, Grand Bassin, passe Demi, passe aux Sables, located in lagoon and reef front

• Temp, salinity, PH, dissolved oxygen, B.O.D, nitrate, nitrite phosphate, close to fringing reef at the locations in 2.
• Concentration of suspended particulate matter, salinity, temperature. Near point Monier, Baie du Nord, Baie Topaze in the lagoon using Vale Port 600 mk II CTD equipment
• Lagoonal currents using Drogue buoys.
• Water depth, sediment depth, sediment grain size from the lagoon using measuring pole, set of graduated series.

2.8 **University of Mauritius (UOM)**
The University of Mauritius collects short-term data in line with the student’s project. The compilation of the data has not yet been assembled and categorised.

2.9 **Quality control of data**
Simple methods for quality control is practiced in the data centre and encouraged to be used by all stakeholders.

- Duplicates are identified from the datasets using Ocean Data View utility menu and the redundant stations are then eliminated after careful selection.
- Another quality control tool used for the marine data sets is simply from the derived analytical products of the datasets using ODV which very often reveals problems otherwise not visible through statistical or visual inspections.
- The selection criteria of ODV is extensively used to exclude or flag the questionable or bad data by using both the obvious visual patterns in the graphic display and subtle relationship requiring prior theoretical knowledge of the behaviour of concerned parameters.

2.10 Data Management systems in use

The national coordinator has requested the stakeholders of the NODC Mauritius to standardize the format of collected datasets in line with the IODE principles and guidelines. Although these requests are regularly being reiterated, little progress has been achieved in this field. Some of the agencies use dataease or other similar databases while others stores their data in spreadsheets in or similar to Excel.

The main partners of the National Coordinating Committee of NODC (Mauritius) have completed their metadata database using Excel software. The Marine Environmental Data Inventory (MEDI) software package is not yet popular among the local stakeholders.

The National agencies comprising the NODC (Mauritius) have undertaken the responsibility to archive their future incoming data using the standard resolution format in line with the International agreed procedures. Efforts have been intensified to maximize the use of ODV or any other compatible software to store their historical records. The NODC has already adopted the above software and it is anticipated that all the National partners would join hands together towards its practical implementation.

2.11 Metadata Database

The relatively new MEDI application software implies the need to standardize and maximize information on the collected samples. The stringent sets of rule have unfortunately not been strictly enforced. A few of them complained about the user-friendliness of the software while others find it simply complicated to handle.

Most of the metadata holdings have been saved in excel spreadsheet on a format designed by the NODC in collaboration with other stakeholders, which is simply a simplified version of MEDI. An example of the metadata format is given below.

National Networking

Some of the institutions have a local Area Network but it is anticipated that the Government of Mauritius will create a networking on the National basis. On the occurrence of this event, the datacentre may be linked to all the other organization.

3.1 Data Acquisition

The NODC (Mauritius) in accordance with the National agencies have adopted a distributed system. The data extracted from the World Data Centres and other sources are archived at the Data Centre. There is an informal agreement among the coordinating institutions to provide their data collected to other stakeholders upon request. A data exchange policy will be shortly discussed as a top priority agenda of the next national coordinating committee and implemented in case of a positive consensus.

The collecting data Institutions, after applying a minimum quality control of the datasets then supply the data relevant to the needs and sometimes against payment to the commercial organisations.

3.2 Communications
The communications among member-institutions and the public at large is very efficient at the data centre. Phone/fax and email system are rigorously used among members. The colleagues are generally convened through e-mail and fax for the coordinating committees.

Services

4.1 Training

The development of Mauritians in data skills, observations and monitoring of parameters are vital for capacity building and the sustainability of the data control in the future. Principal counterparts from related agencies are invited to train the nationals during workshops and seminars organised by the National Oceanographic Data and Information Centre.

The most recent one day-seminar took place on the 30 July 2003 at the seat of Mauritius Port Authority. Officers of the National Coast Guard and the shipping community attended the course. Essentials of data collection and observing techniques have the main theme of the seminar.

The ocean Teacher (OT) and MEDI software were also introduced during the workshop held on 27-28 February 2003 at La Pirogue Hotel, Flic-en-Flac. Resource persons from the NODC coordinating committee are also encouraged to deliver lectures in secondary schools to train the students population on the importance and uses of ocean data and the derived products.

A five day training course on the Imagic DBText works for libraries was held at the AFRC from 30 June to 4 July 2003 in collaboration will IOC/ODINAFRICA. Mrs Josette Confait from Seychelles was the resource person responsible for conducting the course. Students from other institutions participated in the training programme to develop some basic skills in library management with an aim to assist Mrs Clivy Lim Shung in her tasks.

4.2 Participation in other Programs

The NODC (Mauritius) through its host institution is very active on the global scale as well as at the national level. It is a member of the steering committee to study the impacts of coastal erosion in Mauritius. It is also involved in many other projects such as Marine pollution, setting up of Sky lanes and Marina Parks, GLOSS network of tide gauges for monitoring sea level rise, MPERSS, GMDSS, and ARG0. The NODC have also been donated an ARG0 float by the UK Met Office which was launched in collaboration with the Mauritius National Coast Guard. The ARG0 profiler float was deployed at open seas on Friday 20 June at 1910 UTC at - 016º29.89 South and 058º44 East. A project proposal has been submitted to the donors for the upgrading of the existing tide gauge stations.

4.3 Data Supplies

The Data Centre also provides data on Sea level, waves and surface temperature to students of University and research scientists regularly.

International Organisations contracted by different Ministries request for data on the above parameters to ingest into their model. The most recent is the ongoing project on the study of coastal erosion in Mauritius where the contracted company have made extensive use of data supplied by the NODC to simulate a wave model.

Analyses on Waves, Tides and SST are regularly requested by end users. Requests for data or derived products not in the possession of the Data Centre are re-directed to the appropriate Institutions.

4.4 Products

Each institution forming part of the NODC generates its own products or Cooperates with other stakeholders by supplying its available data for the production of specialised products.

The following products have been generated.

• Coastal sensitivity Atlas
• Coastal land use
• Marine Atlas of South Eastern Coasts
• Marine climatological charts based on data collected locally.
• Production of fishing charts
• Maps of fish specimens
• Statistical bulletins on coastal fisheries
• Forecasts of fish population
• Automated treatment of sea surface temperature which leads to objective production of analysed charts with isotherms at regular intervals and gridded data field on a monthly basis.
• Frequency distribution of surface wind speed and direction in the form of wind along the coastal areas.
• Wave charts of frequencies of total wave height
• Swell charts on data based on the wave rider buoy
• Tidal predictions
• Frequencies of occurrence and tracks of cyclones, distribution for the months of the year
• Precipitation given as frequencies or percentages of the number of hours during which precipitation was observed.
• Frequencies of various degrees of cloud cover (total and low) and heights.

Data Centre products

All the products described in section 4.4 may be generated by the Data Centre. The products are supplied in the format requested by the clients. Generally, electronic products of marine charts are preferred although occasionally hardcopies are needed. The centre provides data as well as analyses, to suit the purposes of the customers. Awareness campaign on the services the centre provides should be emphasized through public media in order to maximise clients. Workshop/seminar to discuss the customer's needs to be organised regularly.

An open day for the public/marine research scientist/students highlighting the services offered by the centre together with the products display should be organised in an annual basis where they will be exposed to the facilities available at the NODC. Such action may induce the desire for other's to maximise the use of the data centre and at the same time avoid duplication and enhance coordination with existing national bodies on related themes including ocean data management, climate monitoring and prediction, communications (such as the PUMA project), coastal area management and fisheries management amongst others.

Future Actions

The training should be geared towards products and services.
• Specialised applications software be made available at low cost with training facilities
• National marine atlas to be produced
• Global datasets be accessible and exploited through groups
• Ocean teacher contributions perpetually updated
• The data centre in collaboration with local, regional or international bodies build up project documents to cater for data in data sparse areas.
10. NIGERIA

Establishment
The centre was established in 1990 and was designated an IODE National Oceanographic Data Centre in 1994

Staffing
4 senior officers, a secretary and an office assistant staff the center. The senior officers are research officers who routinely collect, analyse data and make available to the center. They also liaise with other research officers in the institute to ensure their participation in the activities of the center.

Facilities
- Computer network for data archiving and retrieval
- Internet services
- Fax
- Digitizing tablet
- Printers

Data collection
- Oceanographic Data
- Meteorological Data
- Marine fisheries resources
- Bathymetric and Topographic Data

Quality control measures include
- Visual assessments of the figure for any abnormally high or low values.
- Labelling such values as suspects.

Data Management system
The centre is using the following for data management
- Spreadsheet
- Database
- ODV

Metadata
The centre metadata holding is in the spreadsheet format with entries in
- Physical oceanography
- Marine Geology/Geophysics
- Marine Fisheries Resources
- Statistics & Economics
- Marine Biology
- Aquaculture

National Networking.
The centre has established links with the following institutions:
- The Department of Meteorology services of the Federal ministry of Aviation
- Department of surveying & Geo-informatics university of Lagos
- Department of Geology Obafemi Awolowo University Ile-Ife.
- Department of Zoology, marine biology and fisheries of the university of Lagos.
- The federal ministry of environment
- The Shell Petroleum Development Corporation
- Chevron Texaco Nigeria Limited

Products generated
Products are generated in the following formats.
- Electronic products-Graphic plots
- Hard-copy products – Hard copy plots of charts/plans
- Data-Datasets that is available for various users and analysts.
- Analysis-Graphic plots of oceanographic parameters

Data submission
The department of Meteorological services and the oil companies make available their data sets and plans are underway by others to make data available to the centre.

Contact with national colleagues
The centre maintains a national catalogue of marine professionals.

Services to Researchers
The centre has organized two national coordinating meeting one in July 2002, and another in April 2003 during these meetings presentations were made by the manager demonstrating basic skills in data management.

In the year 2003, a staff of the Department of Geology, Obafemi Awolowo University Ile Ife, and 2 members of staff of the Department of Zoology, marine biology and fisheries attended a one-day training on the use of the ODV, surfer and basic skills in data management.

Expertise
The Marine Geology/Geophysics Division of the Nigerian Institute for Oceanography and Marine Research is mandated with the responsibility of monitoring the entire Nigeria coastline erosion, mapping the sea bead topography among other responsibilities, Beach profiling has always been measuring distances from each monitoring station to the low water level, and obtaining the heights.

Now GPS positions for every heightened point has been included so that Data generated are stored in more acceptable formats.

Advice
Advises are given to researchers and colleagues on a regular basis on how they can improve the quality of data they collect. They are also advised on methods of analysis and software available in the centre that can improve the quality of their works.

Specific Products generated.
The centre has generated a 3-D view of the shoreline changes on the Victoria Island beach between march 2001 November 2002 for the federal government and other stakeholders, the data used for the generation are from datasets available from monthly monitoring of the beach.

Products generated from ODV include the following:
- Depth-Temperature-Salinity plots in scatter mode from Nigeria Bottle data collection

Plots were also made on surface Salinity and surface Temperature from the bottle data collection

Future of NODC, Nigeria
More advanced training will be required for the data Manager and scientist working in the centre especially in the management of satellite datasets and imageries. The centre is working towards publication of CDs of datasets and products.

The following data products could be generated in future at the centre. Various atlases of Marine/Oceanographic
- Satellite datasets.
- Digital Topographic and bathymetric charts.
11. SENEGAL

RAPPEL MISSION DU PROJET ODINAFRICA

‘La création de capacité en Afrique de centres de données et d’informations permettant le développement de produits contribuant à l’utilisation et à la gestion soutenue des océans et des zones côtières’.

MISE EN PLACE DU PROJET

- Lancement du projet et création du Centre National de Données Océanographiques, hébergé par le Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT) et du Centre d’information base a la Direction des Pêches Maritimes (DPM)
- Acquisition de matériels
  - 03 PC DELL avec les logiciels de traitement, d’analyse et de gestion des données et informations océanographiques
  - 02 Imprimantes
  - 02 Scanners
- Connexion a Internet (Connexion a haut débit ADSL en cours)
- Création d’un réseau national avec un mailing liste (ODINSEN)

RENOEUFMENT DES CAPACITES

- Formation en gestion de données (Casablanca, 12-13/08/2001 ; Tunis, 29/04/-10/05/2002 ; Bruxelles, 01-06/09/2003)
- Formation en gestion d’information (Johannesburg, xx/xx/2001 ; Tunis, 29/04/-10/05/2002 ; Bruxelles, 01-06/09/2003)
- Deux sessions de formation interne en gestion de données au sein du CNDO-SN
- Formation en gestion de données (Brest, France : du 05/10/ au 05/12/2003
- Organisation de trois ateliers nationaux (12-13/10/2001 ; 21/12/2001 ; 06-07/11/2002)

COLLECTION NATIONALE

A.- DONNEES OCEANOGRAPHIQUES

1.- Les données rapatriées à partir de World Ocean Data 2001 (WOD01)
   - OSDO, données bouteilles (observées) CTD, basse résolution, (16/06/1911 - 20/11/1989 avec , 232 campagnes / 7170 stations / 58008 échantillons);
   - CTDO, données haute résolution, (29/03/1972 – 13/12/1992 avec, 29 campagnes / 259 stations / 103159 échantillons);
   - XBTO, données bathythermographes, (09/02/1968 – 23/05/2000 avec, 413 campagnes / 2322 stations / 349207);
   - MBTO, données expansibles bathythermographes, (214 campagnes / 6382 stations / 102342 échantillons);
   - DRBO, données bouées flottantes (30/08/1999 – 19/06/2001 avec 4 campagnes / 868 stations / 6650 échantillons);

2.- Les données locales
   - Données de surface (température et salinité) à partir de 07 stations côtières le long de la façade maritime (1960-1997) (2000-2003);

B.- DONNEES D’INFORMATIONS

- ODINSEN, base de données bibliographiques avec plus de 800 références sous INMAGIC/DB ;Textwork ;
• SENOCEAN, ancienne base avec 3600 références sous CDISIS devenue opérationnelle avec INMAGIC ;
• SENDIR, base de données des experts nationaux qui interviennent dans le domaine de l’océanographie, la pêche et les eaux continentales, sous WINISIS et conçue selon le modèle AFRIADDR. Elle complète la base mondiale OCEANEXPERT ;
• Base de données DSB sous CDISIS, convertie sous INMAGIC ;
• Base de données des publications internes du CRODT en fichier électronique sous PDF en Full text ;
• Base données sur les textes de base de l’Environnement au Sénégal ;
• Compédium des législations des pays membres de la Commission Sous Régionale des Pêches (CRSP).

PRODUITS & SERVICES

A.- PRODUITS DE DONNEES
• Données océanographiques de qualité (1944-2003) ;
• Profils de variations de paramètres physico-chimiques de la mer ;
• Atlas de Température et de Salinité de surface de la mer par décennie ;
• Atlas pluviométriques, par saison et par pentade ;
• Catalogue des méta données des ressources naturelles ;
• Catalogue des méta données marines et environnementales ;
• Logo du CNDO-SN ;
• Poster. Tous ces produits sont réalisés en versions document et électronique.

B.- PRODUITS D’INFORMATION
• Catalogue des publications relevant du domaine de l’océanographie et de la pêche (SENCAT) ;
• Répertoire des Experts nationaux (SENDIR) ;
• Dépliant, support de sensibilisation et d’information du public sur le projet ;
• Mise à disposition de la liste de nouvelle acquisitions et publications ;
• Prêt, Consultation et Copies de documents (via les réseaux de document delivery : RECOSIX-WIO, CEA, Z39.50 IAMSLIC ; SAIAB)

APPUI AU DEVELOPPEMENT DURABLE & A LA GESTION DES RESSOURCES MARINES
• fourniture de données de qualité pour la compréhension des écosystèmes et du milieu marin et côtier en vue d’une meilleure connaissance des milieux et des ressources (Recherches, Enseignement)
• fourniture de données de qualité (séries) pour la modélisation (Recherche, Enseignement) ;
• fourniture de cartes de température et de salinité de surface (Recherche, Développement, Pêcheurs) ;
• Profils de variations des masses d’eaux, apparition des thermoclines (Recherche, Pêcheurs) ;
• Atlas des températures, pour suivre les évolutions décennales (Recherche, Développement, Producteur) ;
• Mise à la disposition en temps réel ou très court les informations aux différents utilisateurs (valorisation de l’information scientifique).

12. TANZANIA

Summary

The ODINAFRICA project started in the year 2000 to assist African coastal states to establish structured mechanisms in managing their oceans and coastal resources. The main focus was on ocean data and information management. This was implemented through capacity building in terms of human resources and infrastructure that was coupled with training. This paper presents the impact and achievements of ODINAFRICA since 2001. Tanzania has benefited a lot from ODINAFRICA; perhaps one of the major achievements is the establishment of the Tanzania National Oceanographic Data Centre (TzNODC) at the Institute of Marine Sciences, and the major impact is the increased level of awareness on the importance of ocean data and information management as well as the acceptability of the TzNODC. The TzNODC has now started creating products and various services to its stakeholders.

Background and history of IMS and the TzNODC

The Institute of Marine Sciences (IMS) was established on 17th October 1978 as an institute of the University of Dar Es Salaam (UDSM). IMS mandate in three areas as follows: (i) undertaking research in all aspects of marine sciences, (ii) providing postgraduate (and when necessary undergraduate) training and (iii) providing advisory and consultancy services. IMS was nominated by the Government of Tanzania to be the Designated National Agency (DNA) in 1996, and in December 2002 the status was upgraded (PLATE 1) to full National Oceanographic Data Centre (NODC).

IMS has 18 academic members of staff (researchers), 2 research scientists and 9 technicians. For organizational purposes, IMS has four departments: living resources and ecology, Chemical and environmental marine sciences, physical and applied marine sciences and information and communication technologies (ICT). The ICT department includes two major units which are (i) the Marine Education Extension and Development (MEED) unit and (ii) the Geographical Information System (GIS). Additionally, the ICT department oversees the daily functioning and activities of the TzNODC. The TzNODC is manned by two data managers, one information manager and one technician.

PLATE 1: TzNODC Inauguration

Launching of the Tanzania National Oceanographic Data Centre (NODC). The Minister for Science, Technology and Higher Education, Hon. Ambassador Dr Pius Y. Ngw’andu (first standing right in white suite) admiring an animated PowerPoint placard after he pressed a computer button to launch the NODC. Others admiring with Guest of Honour are: (front row from right) next to Minister Ngw’andu is Hon. Harun A. Suleiman, Minister for Education, Culture and Sports (Zanzibar); Hon. Sultan M. Mugheiry, Deputy Minister for Education, Culture and Sports (Zanzibar) and Prof. M. Luhanga, Vice Chancellor, University of Dar Es Salaam. Standing on the rear row (from left) are: Mr. E. Chijoriga, Acting Director General, Tanzania Commission for Science and Technology; Prof. Idris Kikula, Principal, University College for Land and Architectural Studies; Mr. Brems Dirk, Attaché for International Co-operation in the Embassy of Belgium; Dr Desiderius CP Masalu, National IODE/ODINAFRICA Coordinator, and a workshop participant.
A group photo of the workshop participant with the guest of honor Prof. M. Luhanga (Seated fourth from right). On Prof Luhanga’s, right is Honorable Sultani M. Mugheiry, Deputy Minister for Education, Culture and Sports (Zanzibar), and on the left is Dr Alfonse Dubi, Director, Institute of Marine Sciences. First seated on the right is Mr. Brems Dirk, Attaché for International Co-operation in the Embassy of Belgium, and next to him is Mr. E. Chijoriga, Acting Director General, Tanzania Commission for Science and technology. On the Minister's right is Prof. Idris Kikula, Principal, University College for Land and Architectural Studies.

Workshop in progress.

IMS/TzNODC facilities

IMS has several well-equipped laboratories to support research work, a museum, an aquarium, a library (which is the Information Centre), reliable Internet connectivity and several boats. All these facilities are well maintained. The ICT department (including the TzNODC) among other facilities has: one mail/web server, one database server and one heavy duty network laser printer.

TzNODC’s data collection

Most of the data that are physically available at the TzNODC were obtained from various data centres world-wide through ODINAFRICA by IOC/UNESCO. These data include: GEBCO97, ETOPO2, TOGA data, core data from deep sea drilling project, marine geophysical tracklines data, world ocean data view 2001, etc. The availability of these data to developing African countries has helped much is improving research outputs from these countries as local researchers can now have access to global data for comparison and to a more wide data window from their own oceans.

As of now, the only locally collected data available at the TzNODC is the sea water temperatures from two locations off Zanzibar Island. A summary of these data has been completed and will be published soon. Several other data summaries may be completed soon depending on the seed of the local scientists concerned. These include, sediment budget and wave dynamics data.

Data Quality Methods at the TzNODC

One of the most important activities of any data centre is to ensure the quality of its data holdings. Three methods are used at the TzNODC to ensure quality control its data holdings. These are: (i) the TzNODC makes use of the specialists at IMS to scrutinize and verify the quality of the data, (ii) using of quality flags associated to each data record and (iii) visual inspection of outlier/inconsistent data points, e.g., with ODV for WOD01.
Data Management Systems at the TzNODC

Due to the varied nature of oceanographic and coastal data available at the TzNODC the data centre uses four main data management systems in managing it data holdings. These systems are as follows:

a. Most of the data sets obtained from other data centres world-wide are available in CD-ROMS.
b. Some (e.g., ETOPO2 data, Tanzania coastline coordinates) have been extracted into simple ASCII format files for easy use by TzNODC clients.
c. The World Ocean Database 2001 (WOD01) and the various products created from it are managed using the Ocean Data View software. After finishing quality control of this database the various products will also be converted and saved into ASCII and Exel formats for easy use by TzNODC clients.
d. The TzNODC also maintains an online Ocean and Coastal Meta-Database for Tanzania which is powered by FileMaker Pro software.

Metadata holdings at the TzNODC

The TzNODC meta-database (PLATE 2) is composed of ten sub-databases which are self explanatory from their names. These are: (i) Institutions, (ii) Scientists, (iii) Coastal Districts Information, (iv) Marine Protected Areas, (v) GIS Layers Available, (vi) Datasets, (vii) Software, (viii) Documents, (ix) Programmes and Projects and (x) IMS Publications.

PLATE 2: The TzNODC Ocean and Coastal Meta-Database for Tanzania

National networking

Linkages to other institutions

The TzNODC has been working hard to establish linkages at national level with and amongst all relevant stakeholders, i.e. institutions, projects etc. These efforts have implemented in several different ways such as visits to stake holders, participation in seminars/workshops, provision of services etc. In particular the following achievements have been realized.

i) The TzNODC has establish close working relationship with the ICAM community in Tanzania through cooperation with the Tanzania Coastal Management Partnership (TCMP) which a major project between the Tanzania Government and the United States of America (through USAID) to help Tanzania establish sustainable coastal management.
All ICAM projects in Tanzania are guided by TCMP. Through this collaboration the TzNODC, for instance, has signed Memorandum of Understanding (MoUs) with some of the ICAM projects e.g., the Tanga Coastal Zone Conservation and Development Project.

ii) The TzNODC has also been instrumental in sensitizing institutions to create databases for the data they collect and monitor. Through these efforts the TzNODC is working closely with the Fisheries Division to see that they establish a working database that will be accessible online. The aim is to ensure that data collected in coastal districts are immediately entered into the main database and therefore readily available. The Fisheries Division is enthusiastic about this and they have already made major milestones for instance by providing computers to all major coastal districts. It is hoped that these aim will be realized very soon.

iii) One of the areas within the ICAM community that has been very weak in data management was in coastal forest management particularly the mangrove forests. Recognizing this, the TzNODC organized a training workshop in mangrove forest data collection in April 2003.

iv) One of the databases in the TzNODC meta-database is on Marine Protected Areas (PLATE 2). This database has been a source of close collaboration between the TzNODC and the Marine Parks and Reserves Unit (MPRU). MPRU has opted to update the Marine Protected Areas database and ensure that it is up-to-date for their own use. In so doing they will also provide a copy to the TzNODC which will be available online.

v) The TzNODC has also been working hard in recovering grey literature data from scientists and institutions in the country. As an effort towards this, the TzNODC offered a small contract to the Mbegani Fisheries Development Centre to enable them to digitize the many data they have in grey literature. When this work is completed a copy of the data will be provided to the TzNODC.

vi) The TzNODC has also been working closely with all relevant authorities in coastal districts. This involves the regular visits to coastal districts and consultations with the officials (PLATE 3). Coastal districts are the main data collection centres for ICAM, fisheries etc.

vii) The TzNODC have also been collaborating with other key stakeholders such as the Tanzania Meteorology Agency, Tanzania Commission for Sciences and Technology and others through participation in workshops and seminars.

PLATE 3: Visits to coastal districts and stakeholders

Consultation with coastal district officers and demonstrations at the Tanga Coastal Zone Conservation and Development Programme.
Data management in Tanzania

Tanzania has adopted the distributed data/database management model for ocean and coastal data management. Under this system/mechanism emphasis is on helping institutions/programmes to properly manage their data while ensuring that they are willing to share it with other institutions readily. Those who can not institute proper and secure management of their data should submit data to the TzNODC.

National e-mail list

Immediately after IMS got full internet connectivity a national e-mail list of all stakeholders was created i.e., stakeholders@ims.udsm.ac.tz. Together with that a general TzNODC e-mail account was created i.e., odinea@ims.udsm.ac.tz. However, because many institutions do not have institutional domain and e-mail accounts, most of them use the public e-mail accounts such as yahoo and hotmail that have proved to be not reliable. Many e-mails sent to the stakeholders e-mail list would bounce back due to quota limitations and regular changes of email addresses. Therefore, the list was abolished and since then most communications are done by phone. The TzNODC do not have an automated FAX list.

Services provided

As expected of any data centre, the TzNODC has been working hard to ensure that it serves the various relevant client communities in the country and if possible beyond the borders. Provision of has been done in several different ways such as training, expertise advise/assistance, advice, and development of user oriented products.

Training

The TzNODC has been providing training to stakeholders in various ways as explained below.

In-house training
In-house training was provided as follows:

i) Since year 2000, each year the TzNODC receives two/three students from the Department of Computer Sciences (University of Dar Es Salaam) for their fourth term/practical training for eight weeks from mid of June.

ii) In August 2000 the TzNODC was requested by the Tanzania Fisheries Research Institute (TAFIRI) to provide training in ACCESS database development and management to one staff involved in the Lake Victoria Environment Management Project (LVEMP).

iii) In July 2003 one staff of the TzNODC gave a lecture to marine biology class on introduction of computer and data processing.

iv) Also the TzNODC staff do show various demonstrations of databases as well as their management when they visit stakeholders.

Training workshops

Two training workshops related to ocean data and information management were organized by the TzNODC in the year 2003 as follows:

i) A workshop on mangrove data collection was organized in April 2003 (TzNODC, 2003a). This workshop brought together various stakeholders involved in mangrove forest management from all over the country to chart down data collection structures and parameters.

ii) In May 2003 the TzNODC organized another workshop on ocean data and information management to all stakeholder institutions in the country (TzNODC, 2003b). This workshop was aimed at giving participants the very basic principles and hands-on training on data and information management to ground the concept.

Participation in workshops/seminars

The TzNODC staffs have also been participating actively in seminars/workshop by presenting educative papers in ocean data and information management. Examples are as follows:

i) In December 2002 one staff participated in a national ICT workshop that was organized by the Tanzania Commission for Science and Technology where he presented a paper on ODINAFRICA and its objectives.

ii) The TzNODC has been participating effectively in all local ICM retreat workshops that are organized twice each year by the TCMP. At these retreats TzNODC staff usually present papers on various themes of ocean and coastal data and information management.

Expertise

The TzNODC has also been providing various expert services to various stakeholders as follows:

Directly related to research

Expert services directly related to research was provided to two institutions. These are:

i) The Tanga Coastal Zone Conservation and Development Programme which was assisted in coastal area monitoring of coral status and in database design.

ii) The Kinondoni was assisted in the mapping of coastal resources which included also provision of GIS map products.

Others

Other expert services provided include the following:

i) IMS webpage, databases and Local Area Network design and maintenance.
ii) WIOMSA (Western Indian Ocean Marine Science Association) webpage and database design.

iii) Database design for the Fisheries Division.

iv) Database design for the Northern Zone Mangrove Management Project.

v) Information centre set up and personnel training for the Lindi Municipal.

vi) Information centre personnel training and set up advise for the Tanga Coastal Zone Conservation and Development Programme.

vii) Library set up and personnel training for the Mnazi Bay Marine Park.

Advice

The TzNODC has provided various advices to various stakeholders as follows:

i) Advice on data formats, graphical/processing software and on base-mapping products were given to several IMS staff members.

ii) On the other hand the TzNODC provided a lot of advice to TCMP on mangrove distribution of Tanzania when TCMP was in the processes of re-assessing the mangrove forest cover and health in Tanzania.

Products

The TzNODC has already created several products that are user oriented. These are as follows:

i) The Ocean and Coastal meta-database for Tanzania that is available online and has been widely distributed locally on CDROMS to stakeholders who do not have internet connectivity.

ii) The most popular product of the TzNODC is GIS maps and related information on coastal resources and their distribution (PLATE 4). These are created easily on request.

iii) One major problem with earth science related manuscript preparation was the lack or difficulty of creating a base map on the part of researchers. To alleviate this problem the TzNODC has created several base-mapping products as BLN files for the coastline of mainland Tanzania, Pemba Island, Unguja Island, Mafia Island, and all small islet along the Tanzania mainland coast (PLATE 5). The coordinates were extracted from Marine Trackline geophysics data (NOAA, 2001) using GEODAS software.

iv) Another product is the ASCII data for the Tanzania EEZ bathymetry that were extracted from the global ETOPO2 (NGDC, 2001) elevations data set (PLATE 6). These data can be easily used in a simple graphical software.

v) The TzNODC has also created a national data collection based on the World Ocean Database 2001 (WOD01) which is maintained using the Ocean Data View (ODV) software. Currently this product is undergoing quality control and once this is completed several standard data products will be created.

vi) The IMS publications database is an online product which shows all the work emanating from IMS staff members. This product has been very useful especially within IMS and the University of Dar Es Salaam as it can be used to indicate the performance of the institute as well as that of individual researchers.

vii) One data summary on sea water temperature, macro-algal abundance and coral settlement density off Zanzibar town (PLATE 7) has been completed and is in press.

PLATE 4: Example of GIS map products
PLATE 5: BLN files for Base-mapping. Top row shows Tanzania Mainland coastline (L) and coastal Islands (R). Bottom row shows Pemba Island (L), Unguja Island (C), and Mafia Island (R).
PLATE 6: Tanzania EEZ maps created from ETOPO2 data. Data for this region is now available in ASCII format. Left is two dimension map and right is a three dimension map of the same area.

Products that can be generated

Given the current capacities and capabilities the TzNODC can generate several products in different formats as follows:

The TzNODC can generate electronic products such as databases and webpages. It can also generate hard-copy products such as data summaries, information products (e.g., brochures, folders and fliers). Depending on the need and availability of data the TzNODC can also generate data only products for instance based on national ODV data collection. Additionally, using the professional diversity of researchers at IMS the TzNODC has a potential of doing better in generating data analyses only.

Despite the several varieties of products generated at the TzNODC few are most requested by customers. Most customers are interested in receiving finished GIS maps on the information they need, and this is the leading popular product. Secondly, many scientists are interested in receiving the ODV data products in spreadsheet format. Although this data product is still undergoing quality control several requests have already been received. Another product which is new but is gaining popularity is the base-mapping products in BLN and ASCII formats (PLATES 5&6). Information products i.e. brochures,
webpages and databases are also becoming popular. Some customers have requested TzNODC to put
download link for some of these products on the data centre webpages.

For the customers and potential stakeholders to user better the TzNODC they need to know
several things. Firstly, they need to that that the TzNODC exists. They also need to known the capacities
and capabilities that exist at the TzNODC, and the various services that the data centre offers and those
that it can offer. This should go hand in hand with the customer’s knowledge of the potentials of the host
institution of the TzNODC i.e. the IMS. It is also important for customers to know the linkage of the
TzNODC with other data centres world-wide within the IODE network. Within this network the
TzNODC can play a key role of referral to other data centres which extremely widens the services that it
can offer to its customers. The TzNODC has been doing a lot of efforts to ensure availability of these
information to customers as well as potential customers through publicity. This has been done using
several methods such as generation and distribution of information products e.g., brochures and folder;
ensuring web presence of the TzNODC by having a webpage with many information; participation in
various national activities e.g., conferences and workshops; and doing regular consultative visits to key
stakeholders where they are updated on the TzNODC activities.

The future of the TzNODC

The TzNODC is now faced with a very challenging but fascinating future. First, as more people
and institutions become aware of the capability/capacity and services of the TzNODC the demand for
more services, some new, is rapidly increasing. This trend is bound to increase in future. Additionally,
the TzNODC needs to cope with the rapid advances in science and technology which brings along with it
new data types. To cope with these demands the needs to do several things. First, it needs more training
in creation of web applications. These products will enhance and enable the TzNODC to provide more
and better services online. More training is also needed in the design and creation of data products
(packages) including data summaries. This is important as more customers prefer to know general trends
and information before they invest more resources. Because the most request product at the TzNODC is
GIS maps, the TzNODC needs more training in GIS and needs updated GIS software. Along with this a
large size plotter (A0) of good quality is urgently needed. Currently the TzNODC can provide color maps
of A3 size maximally.

The possible new type of data products that is currently under consideration is on environmental
changes based on satellite data. The TzNODC/IMS received one satellite receiver from IOC/UNESCO
under ACMAD. However, training in using this facility including downloading and processing/handling
of the data has not been provided. Given the current capacity at the TzNODC and the various potentials
at IMS, the TzNODC can easily adapt itself to manage many of the new ocean or coastal data provided
proper training and facilities are provided.

Conclusion

Tanzania has benefited a lot from ODINAFRICA which has played a key role in shaping ocean
data and information management in the country. Before ODINAFRICA there was no established
mechanism for the management of these data and information.

Tanzania extends sincere appreciation to the Government of Flanders and IODE/IOC/UNESCO
for this generous support which has been very important. Finally, Tanzania welcomes and fully supports
all efforts and initiatives that are aimed at ensuring the sustainability and advancement of the current
achievements.

References

NGDC, 2001, ETOPO2 Global 2’ Elevations, CDROM, National Geophysical Data Centre,
NOAA, USA.
NOAA, 2001, Marine Trackline Geophysics, CDROMs, National Geophysical Data Centre, NOAA, USA


13. TUNISIA

1 - Nom et adresse du Chef du Centre de Données et son staff technique / Name and address of Head Data Centre and his technical staff

Malika Bel Hassen: Gestionnaire de données
Institut National des Sciences et Technologies de la Mer
28, rue 2 mars 1934- Salammbô 2025- Tunisia
Tél : 00216 71 730 420
Fax : 00216 71 732 622
Email : belhassen.malika@instm.rnrt.tn
L’équipe comprend, hormis le gestionnaire de données, quatre cadres en développement et maintenance informatique.

2 - Etat des facilités du CNDO / Status of facilities of NODC

<table>
<thead>
<tr>
<th>Equipement, logiciels, etc</th>
<th>Nombre</th>
<th>Caractéristiques</th>
<th>Disponibilité</th>
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<td>Compaq deskpro</td>
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<td>Surfer</td>
<td>Centre de données</td>
</tr>
</tbody>
</table>

* : Equipements fournis par Odinafrica

3 - Implication dans d'autres activités nationales ayant trait aux milieux marin et côtier / involvement in the other national activities focused on marine and coastal areas

- Conceptualisation de bases de données des différents programmes de recherche
- Développement de base de données cartographiques sur les données recueillies sur le littoral Tunisien

4 - Activités mises en œuvre dans le pays (novembre 2001-septembre 2002) / Activities implemented in the country (November 2001-september 2002)

- Collecte, traitement des données recueillies dans les travaux de recherche à une échelle nationale
- Collecte et traitement des travaux scientifiques publiés au niveau national et traitant des sciences aquatiques et halieutiques.

5 - Liste des activités / List of activities
Collecte des données marines générées dans les différentes institutions nationales
• Structuration de ces données sous forme de bases de données facilement interrogables
• Développement de bases cartographiques pour les données côtières sous forme de systèmes SIG
• Vulgarisation et diffusions de produits de données au cours de journées d’information et sous formes de CD-ROMS, sites web, atlas ...
• Diffuser et vulgariser les résultats de recherche.

6 –Résultats / Results

• Atlas Océanographique de Tunisie : Collection de données océanographiques publiées dans de nombreuses bases de données spécialisées à travers le monde. Il inclut également les données marines produites à l’échelle nationale et locale.

• CD-Rom intitulé GISPABES : ce CD récapitule l’ensemble des travaux effectués dans le Golfe de Gabès, ayant trait à la bionomie, hydrobiologie, ressources, activités anthropiques, activités de pêche et les statistiques de pêche. Ont été intégrées dans ce travail essentiellement les données géoréferencées (c’est à dire aux quelles on a pu attribuer des coordonnées géographiques).

• CD-Rom intitulé GISTUNIS : la même architecture que le CD GISGabès a été adoptée pour celui du golfe de Tunis.
• CD-Rom intitulé GIS Hammamet : la même architecture que le CD GISGabès a été adoptée pour celui du golfe de Hammamet.
• Base de données Access pour les données de chalutage expérimental des ressources démersales
• Base de données Access regroupant les données recueillies dans de la lagune de Bizerte
• Catalogue des experts et institutions opérant dans les eaux marines et douces, développée sous forme de base de données Access
• Brochure du Centre de données

7 –Perspectives
• Compléter et mettre en ligne le catalogue des experts et institutions opérant dans les eaux marines et douces
• Elaborer la deuxième version de l’Atlas Océanographique de Tunisie. Cette nouvelle version va incorporer plus de données produites à des échelles nationales et locales, ainsi que des animations des formats images proposés.
• Compléter le développement et la mise en ligne la base de données sur les réseaux de surveillance des zones de production de coquillages le long du littoral tunisien.

Les réseaux de surveillance ont comme attribution principale la détection des risques de contamination des sites de production des mollusques bivalves vivants sur les côtes Tunisiennes.

Cette base englobe un réseau sur le phytoplancton toxique, un réseau sur les contaminant chimiques et un dernier réseau sur l’épidémiosurveillance.