1 Introduction

1 Introduction

The IODE capacity building activities in Africa were initiated in 1989 with the Regional Cooperation in Scientific Information Exchange in the Western Indian Ocean (RECOSCIX-WIO) project.

The Intergovernmental Oceanographic Commission (IOC) launched RECOSCIX-WIO after a fact-finding mission undertaken in 1987 (Onyango and Pissierssens, 1987), funded by UNESCO. The objective of this mission was to investigate the feasibility of establishing a regional network (with point-to-point electronic links using modems) for the exchange and sharing of scientific literature. The study concluded that such a network was indeed feasible and this led to the RECOSCIX-WIO project being founded in 1989. The programme evolved to incorporate data management, and extended to other regions in Africa as illustrated below:
Between 1989 and 1996 RECOSCIX-WIO created an effective network of marine libraries in Eastern Africa. The network not only established institutional linkages but also human networks. This led the region to request support from UNESCO/IOC to expand the scope of the network to include exchange of oceanographic data.

The start of the cooperation between the Government of Flanders and UNESCO/IOC in 1997 enabled UNESCO/IOC through IODE to respond to the request and this led to the establishment of the Ocean Data and Information Network for Eastern Africa (ODINEA).

ODINEA focused on providing basic infrastructure in 7 African countries (Kenya, Madagascar, Mauritius, Mozambique, Seychelles, South Africa and Tanzania). An important element in the project was support provided to institutes to access the Internet. This was crucial in exposing the participating institutions to the rapidly expanding Internet through which data could be obtained and through which fast communication with colleagues became possible. During the final ODINEA workshop the project participants stated:

> *"The capacity of the data centres to collect, process, analyze, store and interpret various categories of data sets was strengthened through the provision of up-to date computer equipment and peripherals, software as well as training for data centre personnel.*
>
> *The centres have used this capacity to develop national meta databases, thereby enabling users to know what data sets are available and how to access them. The development of national data archives has contributed to the preservation of data sets which were in danger of being lost. Through linkages established within the framework of the project, the centres have been able to access data sets from regional and international data centres."*

Figure 1. Development of IODE projects in Africa 1989-2008.

A pilot information exchange project for Western Africa – the Regional Cooperation in Scientific Information Exchange for the Central Eastern Atlantic (RECOSCIX-CEA) was implemented at the same time as ODINEA.

The achievements of ODINEA and RECOSCIX-CEA laid the foundations for establishment of a truly pan-African Ocean Data and Information Network (ODIN) for Africa. Thanks to funding from the Government of Flanders it was possible for IODE to implement the ODINAFRICA-II[1] project. Twenty Member States of IOC from Africa (Benin, Cameroon, Comoros, Cote d'Ivoire, Gabon, Ghana, Guinea, Kenya, Madagascar, Mauritania, Mauritius, Morocco, Mozambique, Nigeria, Senegal, Seychelles, South Africa, Tanzania, Togo and Tunisia) participated in this project.

The main objectives of ODINAFRICA-II were:

1. Providing assistance in the development and operation of National Oceanographic Data (and Information) centres and establishing their network in Africa;
2. Providing training opportunities in marine data and information management by applying standard formats and methodologies as defined by the IODE;
3. Assisting in the development and maintenance of national, regional and Pan-African marine metadata, information and data holding databases;
4. Assisting in the development and dissemination of marine and coastal data and information products by responding to the needs of a wide variety of user groups using national and regional networks.

Ten new National Oceanographic Data and Information Centres (NODCs) were established in Benin, Cameroon, Comoros, Gabon, Ghana, Mauritania, Morocco, Senegal, Togo, and Tunisia during ODINAFRICA-II.

Support from the project enabled the NODCs in the participating Member States to cater for a wide range of activities such as operational expenses

[1]Note: ODINEA and RECOSCIX-CEA were considered as ODINAFRICA-I

Figure 2. A librarian at one of the ODINAFRICA institutions assists a user access information.

(including internet connection), development of meta databases and data archives, and development of data and information products. The ODINAFRICA-II activities in each country were publicized through websites, brochures, information sheets, data summaries, calendars, meetings/seminars, lectures to educational institutions, and meetings with key government officials.

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

One of the conclusions of ODINAFRICA-II was that data management capacity had now been created in all participating countries but that more emphasis should be put on stimulating data collection through the establishment of observing systems.

Figure 3. Installation of equipment for VSAT internet access at IHSM, Tulear, Madagascar.

The third phase, ODINAFRICA-III started in 2004 as a large scale project funded under the UNESCO-Flanders Trust Fund for Science (FUST). An additional five Member States (Algeria, Angola, Congo, Egypt, and Namibia) joined the network, bringing the total to twenty-five.

ODINAFRICA-III aimed to construct a Pan-African coastal observing system including a core network of tide gauges, but also making other in situ measurements where appropriate. The core network was to capitalize on existing systems like the global network of tide gauges established by IOC's Global Sea Level Observing System (GLOSS) programme. The data stream from the observing network would be fed into the network of data centres established through the ODINAFRICA project, and would 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. The observing network would make a fundamental contribution to in situ ocean observing system of Regional Ocean Observing and Forecasting System for Africa (ROOFS AFRICA) and to global networks of ocean-related data and information. ROOFS-AFRICA is part of the Global Ocean Observing System for Africa (GOOS AFRICA) and has been accepted as a key project of NEPAD.

One of the core methodologies of ODINAFRICA-III was the concept of national versus regional work plans. Although the project had a number of regional objectives and expected deliverables, each partner institution was expected (and provided with the support) to address specific national needs for data or information products. This approach resulted in a wide and rich variety of data and information products being generated.

The implementation progressed well, with the achievements including:

- Each of the participating institutions developed a suite of data and information products that have been quality controlled, merged and availed through the project website (www.odinafrica.org). These include: library catalogues, catalogues of national data sets and data sources (meta databases), directories of marine and freshwater professionals, directories of marine related institutions and their profiles, marine data archives and marine biodiversity databases. These are also available from NODC websites (www.nodc-countryname.org e.g. www.nodc-senegal.org). Training was provided on a wide range of topics such as data and information management, development of e-repositories, websites development, application of remote sensing and GIS to coastal management, marine biodiversity data management, modeling; end to end data management; and sea level data analysis and interpretation.

- New tide gauges were installed in Cameroon, Congo, Djibouti, Egypt, Ghana, and Mauritania. The installation of Global Navigations Satellite Systems – GNSS receivers at the sea level stations in Takoradi (Ghana), and Inhambane and Pemba (Mozambique) provides the connection between the horizontal and

the vertical datum at these locations. This brings the total number of tide gauges installed along the African coastline to more that 40. Information on the network is available on the African Sea Level Network website (www.iode.org/glossafrica), while the data from 22 of the stations can be accessed near-real time at www.sealevelstations.net.

- The African Marine Atlas developed in collaboration with the African Coelacanth Project (ACEP), and the United Nations Environment Programme (UNEP) provides access to maps, images, data and information to a wide range of users. The static website (http://omap.africanmarineatlas.net) contains over 800 downloadable data products derived from the fields of marine geo-sphere, hydrosphere, atmosphere, biosphere, geopolitics and human socio-economics.

- ODINAFRICA used several mechanisms to publicize its activities and products. These included: posters and brochures, newsletters (WINDOW and COSMARNews), and websites (http://www.odinafrica.org; African Ocean Portal: http://www.africanoceans.net; African repository of marine related publications - OceanDocs-Africa: http://iodeweb1.vliz.be/odin/handle/1834/1337; African marine atlas www.africanmarineatlas.net; the Sea level data facility www.sealevelstation.net; the sea level information site www.iode.org/glossafrica).

These and other products and activities are described in details in other chapters of this book.

The fourth phase of ODINAFRICA (2009 – 2012) will focus on application of data and information products to the sustainable management of marine and coastal resources, as well as reducing the risks of ocean related hazards. The following are the expected outcomes and deliverables of ODINAFRICA-IV:

(i). Strengthened and sustainable marine data and information management infrastructure in the ODINAFRICA countries

(ii). National multi-sectoral and multi-stakeholder data networks to maximize the use of available data and to make available IODE NODC's data management expertise to other stakeholders

Figure 4. Technicians practice levelling of tide gauge benchmarks at a training course in Ostende, Belgium.

(iii). Prioritize customized products such as forecasts, predictions, models, atlases, scenarios addressing the key issues which were identified such as shoreline change, marine related hazards and disaster management, management of key ecosystems and sustainable use of resources.

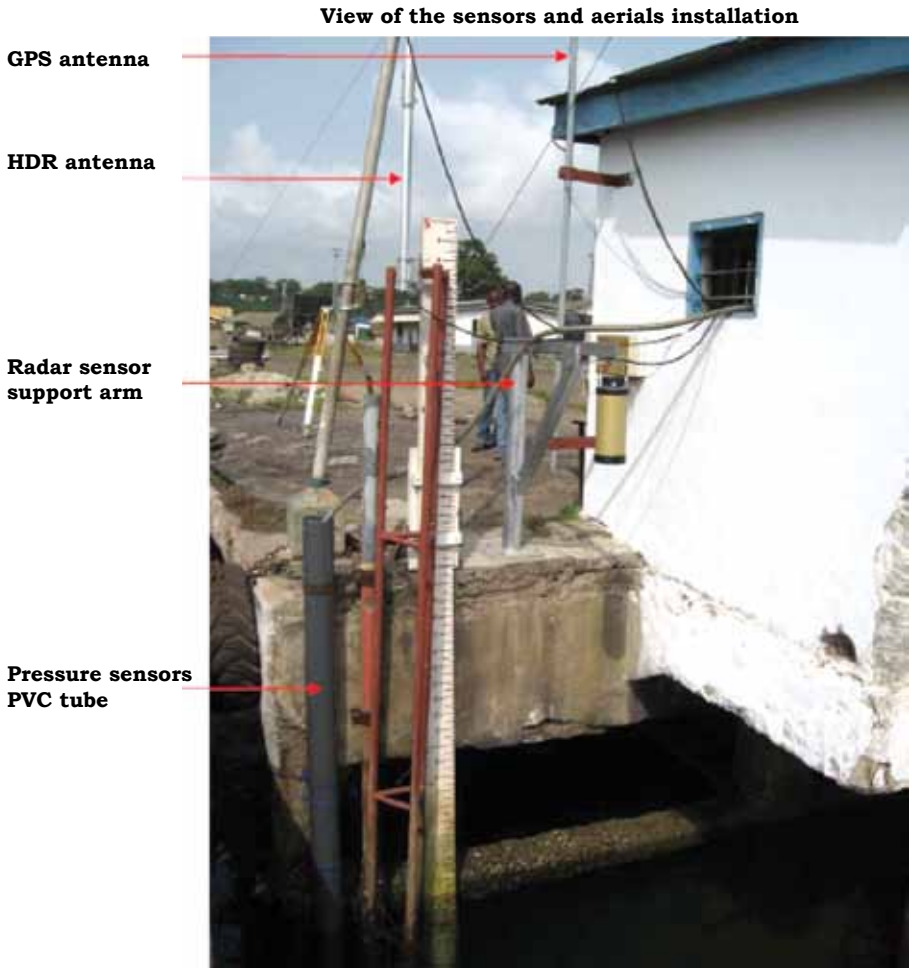

Figure 5. Tide gauge installed at Takoradi, Ghana.

(iv). Improved mechanisms for the dissemination and application of data, information and products through standards based catalogues of data and metadata and integrated web based portals and connection to the IODE Ocean Data Portal

More than the previous phases, ODINAFRICA-IV will be product and user driven. ODINAFRICA-IV will aim to assist decision makers by coordinating the data management and product development through a multi-sectoral approach.

Figure 6. Students on a pilot boat at the Port of Lomé, Togo during an awareness course organized by ODINAFRICA.