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**Ocean Data and Information Network for Africa
(ODINAFRICA)**

EXECUTIVE SUMMARY

The Ocean Data and Information Network for Africa (ODINAFRICA) brings together marine related institutions from twenty five (25) Member States of the Intergovernmental Oceanographic Commission of UNESCO from Africa. The earlier phases of development of ODINAFRICA aimed at enabling member states from Africa to get access to data available in other data centres, develop skills for manipulation of data and preparation of data and information products, and develop infrastructure for archival, analysis and dissemination of the data and information products. The goal of the current phase of ODINAFRICA is to improve data flows into the national oceanographic data and information centres in the participating countries, develop data and information products required for integrated management of the coastal areas of Africa, and increase the delivery of services to end users.

The network has assisted the Member States to establish and operate National Oceanographic Data and Information centres, and in particular: to get access to data available in other data centres, develop skills for manipulation of data and preparation of data and information products, and develop infrastructure for archival, analysis and dissemination of the data and information products. Each of the participating institutions has developed a suite of data and information products that have been quality controlled, merged and availed through project website (www.odinafrica.org). These include: Directories of marine and freshwater professionals, Catalogues of marine related data sets, Marine Species data bases, library catalogues, catalogue of marine related publications from/about Africa.

The three thematic work packages being implemented in the current phase of ODINAFRICA are: (i) **Coastal Ocean Observing System**, focusing on upgrading and expanding African network of sealevel stations, provision of near real-time observations of ocean variables, and building adequate capacity for analysis and management of sea-state variables, (ii) **Data and Information Management**, focusing on further development and strengthening of National Oceanographic Data Centres (NODC) to manage data streams from the coastal ocean observing network, and Integrating biogeographic and hydrological data streams into NODC systems, and (iii) **Product Development and end user communication and information delivery**, focusing on identification of end users of marine/coastal data/information products and their requirements, identification and development of set of core products to be prepared by each NODC, development of the African Marine Atlases, improvement of atmospheric and oceanic monitoring databases, promotion and dissemination of outputs of the project, and assessment of the impacts of products on the end-user.

1. COASTAL OBSERVING SYSTEMS

The objectives of this work package is to upgrade and expand the present African network for in-situ measurements and monitoring of ocean variables, provide near real-time observations of ocean variables and build adequate capacity for collection, analysis and management of sea-state variables. The focus is on installation of new tide gauge stations and upgrading existing stations. Additional oceanographic sensors would be installed at selected locations. Training on installation and maintenance of equipment, as well as analysis and interpretation of data would be provided to technicians and scientists. The occurrence of the tsunami in the Indian Ocean on 26 December 2004, and its aftermath demonstrated the urgent need to have an Indian Ocean Tsunami Warning System. The sea level stations installed by ODINAFRICA will be a core element of the warning system.

A survey of the current status of the network was undertaken in 2005 in order to select potential locations for installation of tide gauges, and also to assess which existing equipment required upgrade. This was done on the basis of a questionnaire sent to national contacts, as well as reports from previous surveys (GLOSS, GOOS Africa). The survey revealed the existence of at least 40 operational stations spread unevenly along the African coastline and island states. In the Indian several stations installed by the University of Hawaii within the framework of the TOGA project are still functioning. South Africa has an extensive network of gauges along its coastline. Other countries that have established national tide gauge networks include Morocco, and Mozambique. Large stretches of coastline did not have any operational gauges. There were gauges at eight (8) locations which were not working. Only two stations in the entire network met the specifications for tsunami early warning system (Rodrigues and Port Louis, both in Mauritius). The most common model of installed tide gauge was the OTT float gauge, followed by Handar encoders at stations that are installed and maintained by the University of Hawaii Sea Level Centre in the Indian ocean.

1.1 Selection of sites for installation or upgrade of tide gauges.

ODINAFRICA has established collaboration with the Permanent Service for Mean Sea Level, Indian Ocean Tsunami Warning and Mitigation System, SHOM and Benguela Current LME project to ensure that there is a more comprehensive network of evenly spaced sea level stations, providing data near real-time, and addressing the key oceanographic phenomena along the African coastline. The number of gauges to be installed or upgraded during the project period will therefore increase from the initial 19 envisaged to a total of 33, with the partner projects/programmes contributing as follows:

ODINAFRICA (12): Limbe (Cameroon), Moroni (Comoros), Pointe Noire (Congo), Djibouti (Djibouti), Alexandria (Egypt), Takoradi (Ghana), Nosy Be and Fort Dauphin (Madagascar), Nouakchott (Mauritania), Agadir (Morocco), Dakar (Senegal), and Cap Bon (Tunisia).

IOTWS/GLOSS (9): has already upgraded stations located at Port Louis and Rodrigues (Mauritius), and will also do the same for Mombasa and Lamu (Kenya), Zanzibar (Tanzania), and Pointe de la Rue (Seychelles). GLOSS will also install satellite transmitters at Simonstown, Port Elizabeth and Durban (South Africa)

BCLME (5): plans to install gauges at Lamberts Bay (South Africa), Luderitz and Walvis Bay (Namibia), and Namibe and Luanda (Angola).

SHOM –France (3): plans to instal gauges at Point des Galets-La Reunion, Dzaoudzi- Mayotte (France), and Tamatave (Madagascar).

NATIONAL ORGANISATIONS (2): Malindi (Kenya), Lagos (Nigeria)



Timelines for installation of GLOSS stations along African coastline

In preparation for the installation of ODINAFRICA tide gauges, technical visits have already been undertaken to inspect the sites proposed for the installations in: Mauritania, Cameroon, and Congo (by David Dixon in October 2005); Madagascar and Comoros (by Fredric Simon in May 2006); Egypt (by David Dixon in November 2006), and Senegal (by Angora Aman in December 2006). The report of an earlier mission to Egypt, Sudan and Djibouti (by Cherif Samari) is also available. Other technical missions are planned to Morocco (February 2007) and Tunisia.

As part of the ODINAFRICA collaboration with GLOSS, the Proudman Oceanographic Laboratory –POL (which also hosts the Permanent Service for Mean Sea Level) was approached and kindly agreed to assist with the purchase and configuration of tide gauges to be installed within the framework of ODINAFRICA. The ODINAFRICA Sea Level station configuration consists of (i) A Kalesto radar gauge; (ii) two pressure sensors; (iii) a Logosens-2 datalogger; and (iv) an OTT HDR DCP satellite transmitter for the Meteosat.

1.2 Sea Level Stations already installed by ODINAFRICA

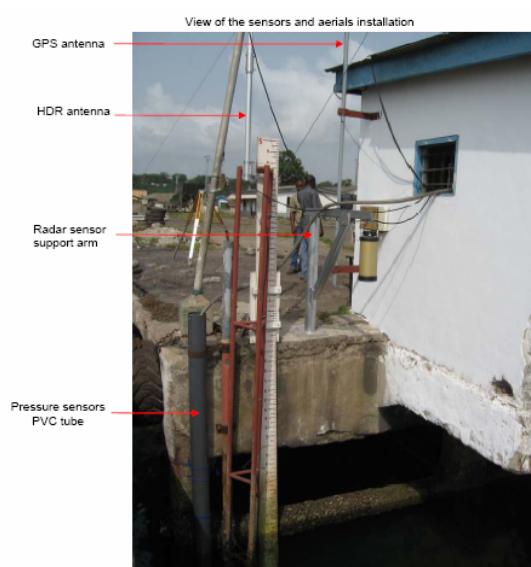
Tide gauges have already been installed at the following locations:

1.2.1 Takoradi, Ghana

The Ghana port of Takoradi has the earliest sea level record along the African coastline, with the data from as early as 1927 available. It was therefore be important to upgrade this station and build on the available historical information. The station recorded the arrival of the signals from the 24 December 2004 Indian Ocean Tsunami in this part of the Atlantic Ocean (see the graph opposite).

The tide gauge house is located at $004^{\circ} 53' 04.4''\text{N}$; $01^{\circ} 44' 42.1''$. In addition to the newly installed ODINAFRICA gauge, there is a pressure gauge installed in the same house by the National Institute of Oceanography (Goa, India) and also maintained by the Survey Department. An OTT Kaelesto tide gauge was installed

during the period 12-16 December 2006. The tide gauge is already transmitting data to the ODINAFRICA Sea Level Data Facility.



The tide gauge house in Takoradi with the new installation

1.1.2 Nouakchott, Mauritania:

The original plan was to install a tide gauge in Nouadhibou. However the location of the old tide gauge in Nouadhibou turned out not to be suitable for a new tide gauge due to boats repairs and general small boat activity, mooring ropes, generators and people working around the site.

Security and maintenance issues at the harbour in Nouadhibou were also not resolved. Subsequent to the visit it was agreed that the new tide gauge be installed at the Nouakchott Port de L'Amitie which offers a secure site, with a Port Hydrographic office which can maintain the tide gauge. The tide gauge was installed from 4-10 December 2006

and is already transmitting data to the ODINAFRICA Sea Level Facility. The photographs below show the installation.



1.3 Other sites proposed for installation or upgrade by ODINAFRICA

We provide an overview of the remaining proposed tide gauge sites below:

- 1.3.1 Limbe, Cameroon:** The Ports of Limbe, Kribi and Doula were visited during the technical mission to Cameroon. Kribi port is not suitable for a GLOSS tide gauge. The only possible location for a tide gauge is on the port quay side, which is on the river Kienke. The river water levels would introduce a bias in the tidal data and not be representative of the adjacent oceanic tides. Poor security and potential damage from old cargoes piled up on the very small jetty, as well as numerous passengers from ferries using the jetty mitigate against installation of a tide gauge. Doula port is well inland on River Wouri and therefore not suitable for a GLOSS tide gauge. In the rainy season the river floods carrying sediments and trees which can damage the gauge. The SONARA Oil refinery provides the best option with its long and secure jetty. The installation at this jetty is planned for April/May 2007.
- 1.3.2 Moroni, Comoros:** In the Comoros the northern part of the new quay in Moroni is slowly sinking in water, while the south part doesn't offer enough space and enough water to install the tide house and tidegauge well. Installation of tide gauges at locations in the north of the island at Mitsamiouli and Bangua Kouni are too difficult to realise. Very shallow waters do not allow an installation alongside the coast. The only solution would be to build offshore tide gauge huts far from the coastline. We may have to abandon this location as the costs would be beyond the ODINAFRICA budgets.
- 1.3.3 Pointe Noire, Congo:** The visit to Pointe Noire in Congo (Brazzaville) revealed that the proposed location at the entrance to the port, on the navigation light tower is suitable for radar or pressure gauge. The existing concrete cabin has been repaired since the technical mission. We hope to have the tide gauge installed during March/April 2007.
- 1.3.4 Djibouti, Djibouti.:** The Institute for Earth Physics (IPG) of the University of Paris VII (France) installed an OTT R20 float gauge at the harbour in Djibouti in 1995. Data is retrieved every two weeks in graphic form and digitised by IPG and copies sent to the Djibouti Centre for Studies and Research (CERD). Maintenance and calibration operations are regularly carried out. A new tide gauge will be installed during the period 11-18 February 2007.
- 1.3.5 Alexandria, Egypt:** The proposed site at Alexandria was visited 29 October – 2 November 2006. There are two tide gauges in Alexandria. One was installed in 1944 at the Commercial port (data available from 1982), while the other is maintained by the Egyptian Navy Hydrographic Department at the Western harbour since 1990. It might at first sight look odd to install a third gauge in Alexandria. However, there are a number of good arguments for doing this:
- (i) There is a long sea level record at Alexandria which should be extended.
 - (ii) It is not clear when the old harbour tide gauge will be replaced, (or the model and accuracy of the planned new gauge) as well as the accessibility of the data.
 - (iii) The pressure gauge which the hydrographic office runs in the navy harbour is not the type to be used for long term high accuracy sea level measurements. Moreover it is not certain to what extent the hydrographic office actually will engage in data exchange.

- 1.3.6 Nosy Be, Madagascar:** The jetty at the Centre National de Recherches Océanographiques (CNRO in Nosy Be) was destroyed during a storm and needs to be reconstructed. It is expected that the work on the jetty will be completed by June 2007 to enable installation of the tide gauge by end 2007.



- 1.3.7 Fort Dauphin, Madagascar,** The challenges that need to be addressed before a tide gauge can be installed at the port of Fort Dauphin (South East of Madagascar) include port security, strong swell within the harbour, and limited capacity for maintaining the tide gauge and processing sea level data. Pressure and radar records will be difficult to process due to an irregular variation of the water levels. The influence of winds will have to be taken into account. Previous tide gauges were installed by the French organisation ORSTOM (last operated in 1973), and another installed jointly by the National Institute of Geodesy and Cartography of Madagascar and the Centre National des Recherches sur l'Environnement (last operated in 1978). It may not be advisable to install a new tide gauge at this location during the current phase of ODINAFRICA.
- 1.3.8 Sfax, Tunisia.** The ODINAFRICA National Coordinator undertook consultations with the harbour authorities in Sfax and other appropriate authorities to have the agreement for the tide gauge installation. However, till now they have not managed to resolve the issue of formal permissions and the logistics to proceed with the installation. Plans for a site visit and actual installation at Sfax have therefore been deferred.
- 1.3.9 Agadir, Morocco.** The Service Hydrographie & Océanographie (Ministère de l'Équipement et du Transport, Direction des Ports et du Domaine Public Maritime) has recently installed radar gauges at Agadir and Tan Tan. They have therefore requested that the ODINAFRICA gauge be installed at Essaouira. A technical mission will visit Morocco from 4-9 February 2007 to explore the ways in which ODINAFRICA can assist in strengthening the sea level observing network in Morocco.

It may not be possible to install tide gauges immediately in Comoros, Madagascar, and Tunisia due to the reasons already outlined. The participants at the Sea Level workshop recommended installation of additional stations in Mtwara (Tanzania) and Abidjan (Cote d'Ivoire). These recommendations will be forwarded to the Project Management and Steering Committees for consideration.

ODINAFRICA Sea Level Data Facility.

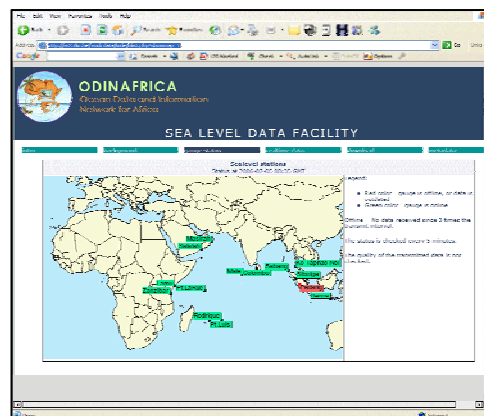
The ODINAFRICA Data Facility, is already operational at the IODE Project Office in Ostend, Belgium. The roles of the facility are: (i) Data capture via GTS and archive in relational database as an OdinAfrica backup to national and GLOSS data centres, (ii) Web-display (including plots and

raw data provision) and provision of tide-gauge operator alert (by email or SMS) in case of equipment mal-function, (iii) semi-automatic data quality control, and (iii) communication with technical consultant and perhaps provide line management. The facility is built in a transplantable format with a view to having it mirrored at a location in Africa. The data will also be mirrored on the respective ODINAFRICA NODC website. The facility receives real time from the sea level data directly via GTS. The GTS link has been made possibly thanks to the kind cooperation of the World Meteorological Organisation. The sea level tide tool can be accessed at: <http://www.sealevelstation.net>

The following prototype services have been developed:

a. sea level station status map: indicates the operational status of each sea level station: green indicates that the station is online, red indicates that the station is offline. The display is shown in the the figure and can be considered as the main “dashboard” of the Service providing a quick visual inspection of the network.

b. Realtime data display: the realtime data display section enables:



- (i) to view a 36 hour plot of a particular station and this for all sea level sensors for that station;
- (ii) to view the data report for that station (for all sea level sensors) for the past 36 hours; and
- (iii) to view the station metadata

The figure to the right shows the station plot. You can also get data report, and the station metadata. The red shading for the Padang station indicates that no data were received for this station during 2 transmission intervals.

c. Database services: through this section of the site data can be retrieved from the database that has started storing received data since 7 June 2006. Users can plot, generate a report (generate table) or download the data.

d. SMS alert service: one of the main objectives of the service is to monitor the operational status of the network of sea level stations. Whereas the online services allow real-time monitoring of the stations it may not be practical to rely only on visual inspection. It is for this reason that an SMS alert service will be implemented as well. This function will send an SMS message to designated contact points within the sea level station operator agency informing them when their station has gone offline. In parallel to the SMS message an email will also be transmitted to the operators.

ODINAFRICA/GLOSS Sea Level Training course

The first ODINAFRICA/GLOSS training course on sea level measurement and interpretation and related fields will be held from 13-23 November 2006 at the IODE Project Office, Oostende, Belgium and attended by 15 trainers from Angola, Cameroon, Congo, Cote D'Ivoire, Djibouti,

Ghana, Kenya, Mauritania, Mozambique, Nigeria, Seychelles and Tanzania. The course will include topics such as:

- introduction to tidal theory;
- analysis of tide gauge data;
- introduction to harmonic analysis;
- introduction to tidal analysis software package;
- use of data within local and regional 'operational oceanography';
- tide predictions.

Resource persons were drawn from the GLOSS network of sea level centres, including the Permanent Service for Mean Sea Level at the Proudman Oceanographic Laboratory in the United Kingdom. The participants were fully briefed on the preparations necessary to ensure that the installations proceed smoothly, i.e. assemble tools; stilling well tubes; mounting arm for radar gauge; check electricity installation; prepare pressure sensor support hardware etc.

It is expected that the participants will be able to assist in the installation and maintenance of the tide gauges after this training course. A second training course is planned in May 2007.

DATA AND INFORMATION MANAGEMENT

The current phase in the development of the national oceanographic data and information centres established within the framework of ODINAFRICA focusses on using the facilities and expertise that have been developed to generate products for effective management of the coastal and marine areas of Africa. The 20 NODC's already established in Benin, Cameroon, Comoros, Cote D'Ivoire, Gabon, Ghana, Guinea, Kenya, Madagascar, Mauritania, Mauritius, Morocco, Mozambique, Nigeria, Senegal, Seychelles, South Africa, United Republic of Tanzania, Togo and Tunisia will be strengthened through upgrade of equipment and software as well as provision of additional training targeted at development of data and information products. NODCs will be established or strengthened where they already exist in the five (5) countries that have joined ODINAFRICA in the current phase (Algeria, Angola, Congo, Egypt and Namibia).

The ultimate goal is for the participating NODCs to develop an integrated data management system that will cover the entire data management cycle, from the initial collection of marine observations to the development of value-added data products required by a wide range of end users. This will include the mainstreaming of new data variables not previously managed by the NODCs, such as near real-time tidal data, biogeographic data and hydrological data.

The following activities were planned in order to achieve these goals:

- (i) provision of equipment and software to newly established NODCs
- (ii) basic data and information management training for new NODCs, and existing NODCs that require
- (iii) advanced training on new features of OceanTeacher for existing data centres
- (iv) training on specialized skills required for products development such as GIS, Remote Sensing, and Modelling
- (v) new data types
- (vi) development of national catalogues and databases: experts, institutions, datasets,

Establishment and strengthening of National Oceanographic Data and Information centres (NODCs).

NODCs were established or reactivated in all the five (5) IOC member states that joined the network in the current phase (Algeria, Angola, Congo, Egypt, and Namibia). These were provided with equipment, software, training, as well as funding to enable them commence their operations.

ODINAFRICA has continued to provide support to institutions hosting the NODCs to enable them develop a core set of data and information products. These include but not limited to: library catalogues, catalogues of data national data sets and data sources (meta databases), directories of marine and freshwater professionals, directories of marine related institutions, marine data archives and marine biodiversity databases. The funds provided covered purchase of consumables, communications (including internet access), publishing costs, public awareness, local travel, workshop facilitation, software, equipment upgrade and hardware maintenance. A total of 21 participating countries have benefited during the current phase.

The ODINAFRICA Project Manager undertook missions to Cameroon and Gabon, as follow-up to recommendations of the Project Steering Committee to assess the progress made in implementation of activities in the 2 countries and recommend ways of improving this (as per instructions of the Project Steering Committee).

During the visit to Cameroon, meetings were held at National Refining Company Ltd – SONARA (proposed location for tide gauge), IRAD Headquarters at Yaounde and sub stations at Batoke and Kribi (CERECOMA), as well as the University of Doula. The management of SONARA reaffirmed their commitment in assisting in installation of the tide gauge. We do not expect IRAD/CERECOMA to generate substantial amount of data or literature in the foreseeable future. It is therefore proposed that the focus of the current phase of ODINAFRICA should be to provide access to data/literature on Cameroon available from previous studies. To this end it is important to focus on website development, and mining for literature and data which will be availed through the website. The IRAD station at Kribi should be strengthened as the National Oceanographic Data and Information Centre. Arrangements should be made for experts trained by ODINAFRICA who are based in Batoke, Douala and Yaounde to travel to Kribi when necessary to assist in development and maintenance of databases and other products.

In Gabon, the Omar Bongo University, and Centre National de la Recherche Scientifique et Technologique were visited. It was agreed that arrangements should be made for experts from other ODINAFRICA data and information centres to visit Gabon and provide training locally to the staff of the NODC. It is unlikely that the institution hosting the NODC will generate significant amounts of own data or marine related literature soon. We should therefore explore the possibility of collecting marine related data and literature from/about Gabon available in other institutions world wide and making these available through the NODC website. The Project manager also paid a courtesy call on the Vice Prime Minister and Minister for Environment, Protection of Nature, Research and Technology Mme Georgette Koko. He briefed her on the objectives of ODINAFRICA, status of implementation in Gabon, and the results of the consultations between the Project manager and the contacts for the network in Gabon. Her Excellency said Gabon has been emphasizing a lot on fisheries and forestry. She expressed her determination to ensure that more is done on oceanography and sustainable management of

marine environment and resources. She will ensure that appropriate personnel are identified for ODINAFRICA and re-iterated her support for the implementation of ODINAFRICA activities in Gabon.

Similar visits should be undertaken to Angola and Congo (and possibly Namibia if budgets allow) in 2007.

Provision of equipment and software to newly established NODC's

The order for equipment for NODCs in Algeria, Angola, and Egypt was placed at the end of November 2005. These comprised one Desktop Computer (PC), and Laserjet printer for the data centres, and 2 computers, scanner and Deskjet printer for the information centres. These equipment were delivered in the first quarter of 2006. The funds for equipment for Namibia was included in the local contracts. Egypt and Namibia received the complete set of equipment for the data and information centre. However in the case of Algeria, Angola and Congo the information centre would be provided with a PC and printer to be used by the "users" since no librarian/documentalist was trained.

Data and Information Management training courses.

Data Management training course for new NODCs. The training course was held at the IODE Project Office from 14-29 April 2005, and attended by data centre managers from the countries that have joined ODINAFRICA in the current phase (Angola, Algeria, Congo, Egypt and Namibia), and also those from institutions from the previous phase that required fresh training (Cameroon, Cote d'Ivoire, Gabon, Guinea, Morocco, and Seychelles). The course contents included: (i) Computer Basics, (ii) Internet Basics, (iii) Information, Data and Metadata, (iv) Introduction to Oceanography, (v) Introduction to Ocean Data, (vi) Ocean Data Collection Management, and (vii) Ocean Data Products and Synthesis.

Marine Information Management training course for new NODCs: The ODINAFRICA Marine Information Management training course was held at the IODE Project Office from 14 August to 3 September 2005, and attended by participants from Egypt, Gabon, Madagascar, Namibia, Nigeria, and UNESCO Nairobi. Participants from Algeria, Cote d'Ivoire and Guinea were invited but did not attend for various reasons. The course contents included: Establishing the Need; Strategic Plan- Mission, Goals, Budget, Staff; Info Concepts includes hardware/software, storage; User Services; Collection Development; Cataloging- theory and systems; Integrated Library Catalogs; Cataloging in practice; Information Seeking in Electronic Environment; Electronic Resources General and in Marine Sciences (Ocean portal); E-Journals available for ODINAFRICA and in general; Presentation Skills; Information Skills Training; Document management; Continuing Professional Development- Develop Connections; AFRIAMSLIC, other OceaTeacher and Data Managers/Partners in Service.

New Information Manager for Cote d'Ivoire was trained together with other librarians from ODINCINDIO. The Information centre in Morocco was re-located from Universite Mohammed V in Rabat to Ibn Zohr Universite in Agadir. A new Information Management has consequently been appointment who may require training. Angola and Congo have also requested for training for their information managers who did not participate in earlier courses.

Advanced Data Management training course: This training course (held at the IODE Project Office 25-29 September 2006), was a refresher course to introduce data centre managers to upgrades and changes in the Ocean Teacher software since the data course held in Brussels, Belgium in September 2003. Participants included the heads of data centres in Benin, Ghana, Mauritius, Mauritania, and Senegal. The data centre in Comoro and Kenya did not attend due to unavoidable commitments, while those from the other centres attended a training course held in April 2005. Each of the participants was assigned portions (Road Maps) of the OceanTeacher to go through and make a presentation. The participants all gave a summary report on the progress that has been made in developing their respective data centres.

During the discussions it was pointed out that the increasing availability of Level3 remote sensing data provides an opportunity for the data centres to prepare useful products for their user communities. The participants must make an effort to make use of these datasets, together with Level2 where possible. The focus should be on archive, quality control, and generation of products of economic benefit. They should aim at creating a library of images and improve on materials and skills that they have acquired during the training courses. The data centre activities should be mainstreamed into the host institutions to ensure sustainability. The NODCs should also explore the possibility of collaboration with other NODCs more aggressively. Arrangements should also be made for training of a new group of data managers. The participants were certified as Instructors for OceanTeacher.

Specialized Skills Required for Development of Products.

The staff of the ODINAFRICA data and information centres participated in a number of specialized training courses, organized either by ODINAFRICA, or jointly with other partners. These included:

Regional Training Course on Application of Satellite Altimetry to Oceanography: The training course, organized in collaboration with WIOMSA and the IOC Capacity Development programme, was held at the San Marco Research Centre (*also known as Luigi Broglio Space Center*), Malindi, Kenya) from 6-17 September 2004. It was attended by eight trainees, mainly from ODINAFRICA institutions in Kenya, Madagascar, Mauritius, Mozambique, and Tanzania. The following topics were covered:

- ❑ Principle of satellite altimetry and applications to sea level studies
- ❑ Ocean circulations/currents and eddies from altimetry
- ❑ Marine gravity and geoid from multi-satellite altimetry and applications
- ❑ Altimeter waveform tracking for land/ocean use
- ❑ Bathymetric estimation from altimetry
- ❑ Improved methods/theories of altimeter data processing
- ❑ Inland sea/lake monitoring using altimetry
- ❑ Operational oceanography using altimetry

Though Altimetry and the BILKO software formed the core of the course and practical exercises, other sensors and software (eg ENVI) were also presented to enable participants to compare and appreciate the possibilities available in remote sensing. Other institutions/programmes who provided support for the course included the Italian Space Agency (through the San Marco

Research Centre) provided training facilities and accommodation free of charge in addition to providing resource persons, and the Western Indian Ocean Satellite Application Project – WIOSAP (funded by the European Union through the Meteorological Transition in Africa Project).

ODINAFRICA Marine Biodiversity Data Management training courses. The first ODINAFRICA Marine Biodiversity data management course was held in French at the IODE Project Office, Ostend, Belgium from 18-22 April 2005, while the second training course was held in English at the Verandah Hotel, Mauritius from 22-26 August 2005. Congo, Mozambique and South Africa did not send participants to the courses. The course contents included: (i) Introduction to Access, (ii) Access Metadatabases, (iii) Introduction to OBIS, GBIF and other major metadatabases, (iv) Access Biodiversity databases, (v) Importing, exporting and entering data in access, (vi) Problems of biodiversity data – formats and codes, (vii) Representation of taxonomic hierarchy and synonymy- implementation in access, (viii) Introduction to XML: Darwin core, OBIS and ABCD federation schemas, (ix) Installing MSDE: porting application to MSDE, (x) Diversity of biodiversity issues: from definition to conservation, (xi) Introduction to taxonomy and systematics, (xii) Advanced nomenclature, (xiii) Installing Apache and php: creating vww, (xiv) Installing DiGIR, customizing XML, and (xv) Demonstration of portal applications.

ODINAFRICA Websites Improvement workshops. Two training courses on websites improvement were held at the IODE Project Office and attended by webmasters from Cote d'Ivoire, Egypt, Kenya, Senegal, Seychelles, Tanzania, and representatives of ACEP and WIOMSA (5-9 December 2005), and Cote d'Ivoire, Ghana, Guinea, Nigeria, Senegal, and Seychelles (2-6 October 2006). The following topics were covered: (i) Definitions and elements of website – (web page, Hypertext, URL, provider, server, webmaster, user, developing a website, formats of files composing the website, compromise between text and graphics), (ii) different technologies of developing a website (html definition, interactive webpage, Php perl CGI or Java, flash-multimedia, with or without database, publishing systems); (iii) HTML (the meaning of the tags of the head and body, formatting text, insert image, hyperlink, formatting table, miscellaneous); (iv) Web editors (frontpage, Dreamweaver, GoLive, Mozilla composer); (v) Front page (screen layout, page properties, text, hyperlinks, tables, graphics and pictures, frames); (vi) Improving graphical quality of your website (compromise between size and graphic resolution, adobe photoshop elements, creating simple graphic tools such as bullet, button, banner and logo); (vii) Uploading your HTML document on the server (downloading and configuring CuteFTO, live transfer configuring the html editor); (viii) Application of skills learnt in developing NODC website; (ix) OWIP distance learning (using synchronous and asynchronous tools, how to use the evaluation tests; and (x) Frequently asked questions and suggestions.

Discussions at the websites workshops focused on the need for the webmasters/trainees to have access to equipment, software and reasonable speed internet access to enable them do their work. Participants should strive to complete their sites by end of the 2006 and continually update the sites. They should learn additional skills from all sources possible. The possibility of organizing an advanced course should be explored, and also providing an award to the institution with the best website.

Repository of Marine Related Publications from/about Africa (OceanDocs-Africa, formerly OdinPubAfrica). The program OdinPubAfrica is funded by the government of Flanders for implementation in the period August 2004 to August 2006. It is focussing on the development of an electronic repository to make publications in marine science from scientists affiliated to

ODINAFRICA institutes electronically available. It also helps to preserve those publications. Preliminary results are available at the website: see <http://iodeweb1.vliz.be/odin/>.

The first training course on development of Electronic repositories was held at the Hasselt University in February 2005, and a second one in December 2005 at the IODE Project Office. The libraries (and librarians) of institutions participating in ODINAFRICA are playing the lead role in developing the repository.

The following are some of the benefits we expect from the repository:

- Make scientific publications of ODINAFRICA institutes more easily and freely accessible to the African region research and management community. This will enhance internal scientific communication.
- Facilitate publishing of research findings by African scientists thereby promoting African research and increasing access by African scientists to the international research forum.
- Increase the profile and status of the research and that of the institution
- Preserve and maintain research output for the future generations
- Facilitate more timely access to research
- Increase citation
- Links to projects and web pages

The repository will cover ONLY contents of authors working in an ODINAFRICA affiliated institution, and will include: (i) Articles, Scientific reports, Technical reports, Theses, Conference papers, Grey literature, and preprints. The program involves librarians, researchers and directors. The creation of a repository for an institute and for each researcher is a very important task in the present world of scientific communication. It is of great importance to the visibility of scientific work of an individual, an institution and hence an entire country.

IODE/JCOMM training courses and workshops: ODINAFRICA has participated in a number of activities organized jointly by IODE and JCOMM. These include:

- i) Modelling and data management at the IODE Project Office, Ostend, Belgium in September 2005 and October 2006 which covered the following topics: Operational oceanography, Wave research, Modelling Tropical Cyclone and storm surges, Applications in ocean modeling (search and rescue), Circulation, Ecological modeling, and Requirements for ocean data in support of numerical regional ocean models.
- ii) JCOMM/OCG workshop on the establishment of a pilot project to collect in real-time metadata from SST and temperature profile data (March 2006): to establish a Pilot Project for real-time distribution of metadata regarding SST and sub-surface temperature profile data. This followed recommendations by the Ocean Observing Panel for Climate (OOPC).
- iii) DBCP users and technology workshop (March 2006): to establish better links between drifting buoy data users on one hand (e.g. NWP, Ocean modelling, science), and buoy operators, manufacturers, and satellite data telecommunication providers on the other hand. The goal is to design drifting buoys in such a way that they last longer and still meet user requirements.

Inclusion of new data types in the ODINAFRICA NODCs archives.

The planning workshop for ODINAFRICA-III recognised the importance of broadening the scope of the NODCs to include more data types so as to have a wider user base. The workshop in particular recommended the inclusion of biogeographic and hydrological data sets. In addition to this a programme of data archaeology was proposed in order to establish a database of historical sea level information from all the ODINAFRICA partner countries. The progress has been varied for the three initiatives.

It was agreed right from the outset that the biogeographic data streams would link existing systems such as OBIS, which provides global geo-referenced information on accurately identified marine species and is developing on-line tools for visualizing relationships among species and their environment. Linkages would also be established to MASDEA (the Marine Species Database for Eastern Africa) developed in the earlier phase of ODINAFRICA, which is a comprehensive species register for the Western Indian Ocean region and contains species records that have been published in peer-refereed publications. Substantial progress has been made, with two marine biodiversity data management training workshops organised, and data compilation workshops for two taxa (molluscs and sponges) already held. Three data compilation workshops for echinoderms, polychaetes and stony corals are under consideration. These are discussed in detail in other parts of this report. The experts have also embarked on development of national inventories of experts, datasets, institutions and species lists.

There has been little progress in mainstreaming of hydrological data sets into the NODCs. Hydrological data types include some of the climatological data types such as precipitation (rainfall), evapotranspiration, wind speed, temperature and others. Other data types included are: runoff, stream/river/basin discharge and flow, flow duration, flood frequency, soil moisture and properties, groundwater table, sediment transport and sedimentation, slope, stream/river/basin parameters (width, depth etc) and others. The responses to a questionnaire circulated to the NODCs indicated that few of them currently archive hydrological datasets. In some cases there are Departments of Hydrology in the respective countries that are responsible for the data, whilst in others there are no established structures. It was recommended that contacts be established with all the stakeholders in each country in order to chart the best way forward. The approach may differ from country to country. At the pan African level it is also important to establish contacts with the LOICZ, IHP and the World Hydrological Observation System (WHYCOS). These linkages will be explored in the coming year.

The first ODINAFRICA/GLOSS Sea level training course held at the IODE Project Office (13-23 November 2006) provided an opportunity to explore the best way to implement the sea level data archaeology. Several participants indicated that their institutions hold sea level data in analogue format (eg charts and internal reports) that need to be digitised. This will facilitate electronic access, back up for data security, as well as quality control and data analysis.

Another category of data sets that has been discussed at length is satellite imagery. These are increasingly available freely. The NODCs that are interested in archiving, quality control and interpreting such data should be identified and the type of support that ODINAFRICA can provide be explored. It may be useful for some of the centres to create a library of images that can be of use to their stakeholders.

DEVELOPMENT OF CATALOGUES AND DATABASES.

Development of meta databases

In an initiative to improve the quality of the collection of meta databases developed by ODINAFRICA data centres, two managers of data centres were commissioned to assess the quality of the databases. The aim of the initiative was to: (i) Review the metadata records collected from ODINAFRICA Data centers in both electronic and hard copy format, (ii) Reformat, quality control, and enter the metadata records into the MEDI Africa database, and (iii) Advise on any additional information that may be required from the Odinafrica national Data centers to ensure that the records submitted are complete.

The quality control performed included check on the agreement between information provided in the title and the summary of the record and the other fields information such as the measured parameters, the sensor name, the unit, the distribution format, etc. A quality control between records was also performed to avoid information redundancy, often noticed in the submitted records. The mandatory fields required for metadata edition were often subject to additional requests, in the case they are not furnished within the submitted material.

The total number of records in MEDI Africa at the end of the exercise was 286, an increase of 55%. The records per country were: Angola (4), Benin (21), Comoros (2), Cote d'Ivoire (1), Gabon (7), Ghana (19), Guinea (44), Kenya (30), Madagascar (19), Mauritania (17), Mauritius (11), Mozambique (9), Namibia (1), Nigeria (22), Senegal (27), Tanzania (18), Togo (18), Tunisia (16)

Some technical problems are encountered during the edition phase, some of them are related to the exportation of data from the IOC server (i.e. some records are missed in the selected package of records to export) and others come from the MEDI software.

Development of AFRILIB

The catalogue of library holdings developed by ODINAFRICA librarians were collected and their quality checked. The objective was to identify errors and make necessary corrections and advise the relevant librarians. The exercise revealed that: (i) cataloguing rules in the Guidelines for entries to ODINAFRICA Libraries catalogues were not always followed, in some cases this was because the cataloguing was not done by the information managers themselves, (ii) difficulties in managing the structure of the databases in some institutions (Togo, Tunisia, Cote d'Ivoire), (iii) lack competence in handling the use of Importing and Exporting applications of Inmagic; yet this process is required to exchange data or submit databases, and (iv) irregular input into the databases.

Good progress was made in the development of the web interface to enable on-line access to the union catalogue of libraries of ODINAFRICA institutions. This is now available at <http://www.odinafrica.org/afrilib/> (<http://193.191.134.12>) and is to the right.

Notable products finalised by ODINAFRICA Information Centres in this period include: Entry of 6676 records in library catalog of INSTM (Tunisia); completion of the South African library webpage with online catalogue; www.gilchrist.gov.za (South Africa); inclusion of KMFRI library catalogue in the IAMSLIC libraries database (Kenya); publication of newsletters to publicise library

and NODC activities in Mauritania and Togo; availing of Senegal library webpage as part of the NODC website :http://www.ioc.unesco.org/odinafrica_sites/senegal/ressources_sn.htm.

Development of an African Union lists of Journals from information centers

This has been developed and made available through IAMS LIC. Currently, nearly 800 serial holdings are represented in the African Union List.

The direct address for the African Union List <http://library.csumb.edu/iamslic/africa/unionlist/> and it is also accessible via the main Union List page at <http://library.csumb.edu/iamslic/unionlist/>.

All holdings are also indexed for searching via the Z39.50 Distributed Library. There are now eight AFRIAMS LIC libraries with five (5) from ODINAFRICA in IAMS LIC resources sharing. Many of these serials are local or institutional publications that may not be widely available elsewhere, adding significant breadth to the coverage of the combined IAMS LIC Union List of Marine and Aquatic Serials.

This has reinforced the ODINAFRICA information managers within AFRIAMS LIC and their visibility and participation the IAMS LIC resources sharing program. More Assistance is being provided to the ODINAFRICA information center which have not yet their journal holding in IAMS LIC to do it as soon as possible and make in use this valuable and growing resource.

PRODUCT DEVELOPMENT AND DISSEMINATION.

The goal of the work package is to ensure that the data and information centres utilise the facilities and expertise developed to generate products for effective management of the coastal and marine areas of Africa. In particular the centres should: (i) identify the users of the services and products offered by the ODINAFRICA data centres and their requirements, (ii) develop a programme of services and products that would serve these requirements, and (iii) develop the mechanisms to disseminate the outputs of the project to target groups. Some of the products that were identified during the ODINAFRICA-3 planning were: tidal forecasts for ports and harbours, storm surge forecasts, maps of sea surface temperatures, forecasts of changing oceanic and atmospheric conditions on a variety of time scales. The importance of forging partnerships with other organisations at the national and regional levels to develop these products was emphasised.

Funds were provided to the countries participating in ODINAFRICA-3 to hold national consultation workshops on data and information products necessary for ICAM. The reports of national consultation meetings were collated to identify priority themes that should be addressed by the participating institutions jointly. The priority themes that recurred in many of the national reports included: (i) Shoreline changes, (ii) Critical habitats, (iii) Storm Surges and Coastal flooding, and (iv) Biodiversity. These are very similar to the core themes identified during the Africa Process for the Development and Conservation of the Coastal Areas which was implemented by 11 countries with technical support from UNESCO/IOC and incorporated as the basis for the NEPAD Coastal and Marine sub-theme. These were: (i) Coastal erosion, (ii) management of key ecosystems and habitats, (iii) pollution, (iv) sustainable use of living resources (especially fisheries), and (v) tourism.

Three types of products have been identified by the national consultation workshops. These are (a) databases/atlasses, (b) trends (eg population of cities along the coastline, fisheries, or evolution of shorelines), and (c) scenario development (e.g. impact of a 20cm rise in sea level, impact of oil spill, impact of reduction in flow of main rivers on coastal areas). It is important to focus on a

limited number of products and services, and develop capacity that will be required to prepare and disseminate them, rather than stretching the limited resources available.

The ODINAFRICA Project Steering Committee decided that the focus for the current phase would be on:

- (i) development of marine biodiversity databases for the five taxa identified (mollusks, polychaetes, echinoderms, sponges, stony corals). ODINAFRICA will organise data compilation workshops to cover three taxa, while collaboration with other partners will be sought for the other two.
- (ii) Development of the Marine Atlas
- (iii) Development of national NODC websites and the ODINAFRICA websites
- (iv) Quality control and availing of databases, directories, catalogues and other products through the websites.

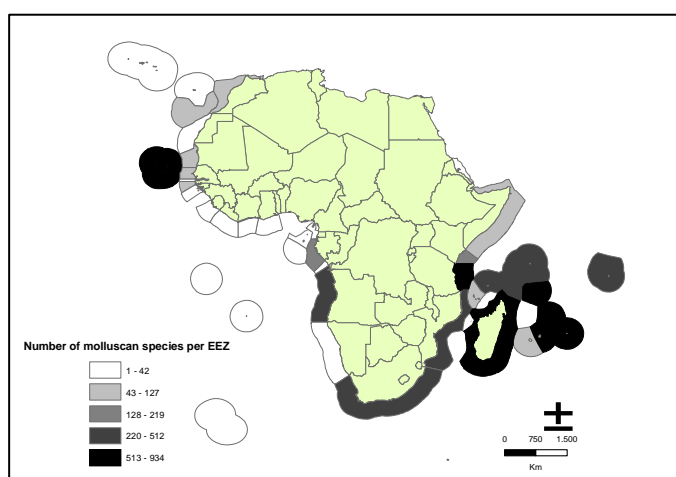
Development of Marine Biodiversity Databases

Participants in the Marine Biodiversity Data management courses held in Ostend, Belgium (April 2005), and Mauritius (August 2005) emphasised the need to immediately commence preparation of inventories of experts, datasets, institutions, and species lists. Five workshops, each lasting 2-weeks will be organized to compile input for the OBIS system on taxonomic groups of particular importance [data entry]. Data sources (databases, publications) should be identified on beforehand, and made available during the workshop.

Marine Molluscs Database: The first ODINAFRICA Marine Biodiversity Data Mobilization workshop was held at the IODE Project Office from 13-22 March 2006 and focussed on molluscs. A total of 6,460 records on Mollusca were entered into the aphia-database. The majority of these species belong to the class of the Gastropoda (3,505 species or 73%), followed by 1,105 species (or 23%) belonging to the class of the Bivalvia. Up till now, only 224 of all these records are considered to be invalid taxon names. For 82% or 3,955 species, the authority is already known to the database.

When further analyzing the species distributions within Africa, the highest number of molluscan species are found in the EEZs of Madagascar (934), Mauritius (932), Tanzania (720) and Cape Verde (704). A number of species were described to be found in e.g. the Atlantic and Indian Ocean. These species were not coupled to a specific EEZ and were thus not comprised in this analysis.

A comparison was then made between South-, East- and West-Africa. The following conclusions could be made:



- Most molluscan species are found in East-Africa (3184), followed by 1382 species in West-Africa and 407 species in South-Africa
- 165 species are shared between South- and East-Africa, 104 between West- and East-Africa and 29 between South- and West-Africa

- 13 species are shared between South-, East- and West-Africa

Number and distribution of molluscan species in the African EEZs

During the workshop, a large number of species have been entered into the database. All species were extracted from (monographic) literature and articles at our disposal. A lot of sources on African marine molluscs are present at the VLIZ-library; other sources were introduced by the participants themselves. An overview of the present sources at VLIZ and other literature concerning African molluscs is given in the annex “Monographic literature on African marine Mollusca”.

Although a lot of information on literature concerning marine Mollusca in Africa is readily available, there is still a lot of information out there. This stresses the fact that – in the future – it will be very important not only to enter the species of the available literature into the database, but also to look for yet unknown literature. Further completing the database will be necessary to stay up to date with the available literature and existing species.

The second workshop, which focused on sponges was held from 6-16 November 2006 at the IODE Project Office. A report will be available by mid- December 2006.

Development of the African Marine Atlas.

The ODINAFRICA Marine Atlas Project (OMAP) was initiated in 2006 to synthesize geospatial data products for the African continent (emphasizing especially the marine and coastal environment). The Atlas incorporates existing geo-referenced datasets available in the public domain (but tailored to meet specific scope requirements), and also data products created from national and international marine data collections by scientists participating in the ODINAFRICA program of capacity building projects. The Atlas project commenced in June 2006 and, consisted of three phases: (1) Data mining to gather global, continental and national data according to an agreed-upon scope of topics, geographic limits and temporal considerations; (2) Conversion of the collected datasets into GIS-compatible forms and products; and (3) Documentation and compilation of the GIS resources into three well-organized, user-friendly digital Atlas that can be distributed as stand-alone resources within the wider community of marine and coastal scientists on the African continent. 6 editorial groups have been created to mobilize data for different aspects of the atlas. These included:

- Base Map
- Geosphere and Atmosphere
- Hydrosphere
- Biosphere
- Human Environment

The work on the first version of the atlas is expected to be finalized by end of June 2007.

ODINAFRICA Websites Improvement Project (OWIP)

The ODINAFRICA Websites Improvement Project has been initiated to assist the webmasters in institutions participating in the project to improve the quality of their sites (or

develop sites where these do not exist). This is in recognition of the key role that the internet should play as a medium for dissemination of project services and products. The webmasters will attend a training workshop, and be provided with email support. The workshop covers the following topics: what is a website, different technologies of developing a website, HTML, Web editors, Front page, Improving graphical quality of your website, Uploading your HTML document on the server, African Ocean Portal (SIMPLIFY software), Application of skills learnt, OWIP distance learning, and Frequently asked questions and suggestions. The training materials and other details of OWIP are currently available at: www.cndio-maroc.org/owip/. Domains have been registered for each of the ODINAFRICA institutions in the format www.nodc-countryname.org and are hosted at the IODE Project Office in Ostende, Belgium.

ODINAFRICA WEBSITES IMPROVEMENT PROJECT- REGISTERED DOMAIN NAMES

COUNTRY	INSTITUTION	PROPOSED DOMAIN	WEBMASTER
1. Algeria	ISMAL	1. www.nodc-algeria.org	Mr Mokhtar GUERFI
2. Angola	INAP	2. www.nodc-angola.org	Mr Bomba Bazik Sangolay
3. Benin	CBRST	3. www.nodc-benin.org	Mr Zacharie SOHOU-
4. Cameroon	IRAD	4. www.nodc-cameroon.org	Mr Richard Awah
5. Comoros	CNDRS	5. www.nodc-comoros.org	Mr Ahmed Abdoukarim
6. Congo	IRD	6. www.nodc-congo.org	Mr Maloueki Lucien
7. Cote d'Ivoire	CRO	7. www.nodc-cotedivoire.org	Mr ASSEMIAN N. Clément
8. Egypt	NIOF	8. www.nodc-egypt.org	Mr Ahmed El Nemr
9. Gabon	CENAREST	9. www.nodc-gabon.org	Mr Brice Befana
10. Ghana	MFRD	10. www.nodc-ghana.org	Mr Emmanuel Kwame DOVLO
11. Guinea	CERESCOR	11. www.nodc-guinea.org	Mr Mr Satigui Diakité
12. Kenya	KMFRI	12. www.nodc-kenya.org	Mr Samuel Ngete
13. Madagascar	IHSM	13. www.nodc-madagascar.org	Mr John Bemiasa
14. Mauritania	IMROP	14. www.nodc-mauritania.org	Mr Cheikh Sakho
15. Mauritius	MMS	15. www.nodc-mauritius.org	Mr Mohamudally BEEBEEJAUN
16. Morocco	Ibn Zohr	16. www.nodc-morocco.org	Mr Hassan EL-OUIZGANI
17. Mozambique	INAHIAN	17. www.nodc-mozambique.org	Ms Clousa Maueua
18. Namibia	NATMIRC	18. www.nodc-namibia.org	Mr Josef Wedeinge
19. Nigeria	NIOMR	19. www.nodc-nigeria.org	Mr Larry Awosika
20. Senegal	CRODT	20. www.nodc-senegal.org	Mr Anis Diallo
21. Seychelles	SFA	21. www.nodc-seychelles.org	Mr. Richard Jasmin
22. Tanzania	IMS	22. www.nodc-tanzania.org	Dr. Desiderius C.P. MASALU
23. Togo	CGILE	23. www.nodc-togo.org	Mr Pessiezoum ADJOUSI
24. Tunisia	INSTM	24. www.nodc-tunisia.org
25. OWIP site		25. www.odinafrica-owip.org	Mr Hassan EL OUIZGANI

Implementation of ODINAFRICA Communication Plan

A Communication Plan, outlining how the various the communication tools available through IOC projects implemented in Africa was endorsed by the Project Steering Committee. The plan will be implemented in collaboration with the secretariat for the Coastal and Marine sub-theme of NEPAD which provides the link to other initiatives in Africa.

The following is the focus of the communication tools:

- i) The ODINAFRICA posters were revised, and the websites are being improved to provide information on the project to users/potential users. A booklet providing details on project activities at national, sub-regional and continental level will be published in 2007.
- ii) COSMARNews: contains information and news on marine related activities from Africa, and especially be used to publicize the contents of the Africa Ocean Portal. The newsletter is prepared in collaboration with the secretariat for the Coastal and Marine sub-theme of

- NEPAD. Six issues have been produced in the current phase (3 in 2005 and 3 in 2006) and circulated
- iii) WINDOW: remains as the ODINAFRICA project newsletter focussing on project activities, and is published and distributed quarterly in electronic version. Five issues of the WINDOW Newsletter have so far been produced during the current phase of ODINAFRICA (2 in 2005 and 4 in 2006). Another 4 issues will be produced in 2007.
 - iv) <http://www.odinafrica.org>: is the projects WINDOW to the world, giving information on the project and access to its services and products such as databases (directories of institutions and experts, catalogues of library holdings, marine related documents about/from Africa, catalogues of datasets and details of their location and accessibility) and services (document delivery services,)
 - v) <http://www.africanoceans.net>: This is the African Ocean Portal through which users are able to access all sort of marine related information relevant to Africa- including links to useful sites, directories and catalogues.
 - vi) African repository of marine related publications: Users are able to access marine related publications from Africa through this site

ODINAFRICA SEMINAR

The second ODINAFRICA Seminar was held at the IODE Project Office in Ostende, Belgium from 24-26 April 2006 and attended by more than 60 people representing all the 25 countries participating in ODINAFRICA, Regional projects/programmes and organisations involved in marine related programmes, the government of Flanders (Belgium), ODINAFRICA trainers, and members of the ODINAFRICA Project Management and Steering Committees. The theme of the seminar was “Ocean Data and Information for Management and Development in Africa”.

An exhibition and poster presentation on the activities of the ODINAFRICA National Data and Information Centres (NODCs), and the proposed ODINAFRICA Sea Level Data Facility was held during the seminar and opened by the Hon. Fientje Moerman, the Vice-Minister-President of the Flemish Government and Flemish Minister for Economy, Enterprise, Science, Innovation and Foreign Trade.

The session was also attended by Dr David Pugh, the President of the Intergovernmental Oceanographic Commission of UNESCO, and Dr Alfonse Dubi who is the Vice President representing the Africa region (who is also the Director of the Institute of Marine Sciences in Zanzibar, Tanzania).

The objective of the seminar was to review progress in implementation of the activities planned for the current phase of the project, recommend ways of improving implementation, and explore the potential collaboration with other programmes/projects.

Presentations were made on the following themes, with focus on experiences of the ODINAFRICA National Oceanographic Data and Information Centres:

- The Role of IODE Data Centres for Management of Marine and Coastal Areas: example of the Senegal National Oceanographic Data Centre, *Mr Anis DIALLO, Centre de Recherches 'Océanographues de Dakar- Thiaroye (CRODT)*

- Marine Libraries in Africa: New Technologies for Sharing Knowledge and Expertise – *Mrs Josette CONFAIT, Seychelles Fishing Authority, Seychelles.*
- Reaching the Public: Generating Awareness about Marine and Coastal Issues, *Prof. Adoté BLIVI, Centre de Gestion Intégrée du Littoral et de l'Environnement, Université de Lomé, Togo.*
- Building a National Data Service: Challenges and Experiences, *Dr Desiderius MASALU, Institute of Marine Sciences, Tanzania.*
- Managing natural disasters in the Gulf of Guinea through effective data and information management and early warning system, *Dr Regina FOLORUNSHO, Nigerian Institute of Oceanography and Marine Research, Nigeria*

Representatives of the following programmes also made presentations on the activities they are implementing and potential for collaboration with ODINAFRICA: South West Indian Ocean Fisheries Project (SWIOFP), the African Monsoon Multidisciplinary Analyses (AMMA) and the PIRATA, the Guinea Current Large Marine Ecosystem (GCLME), the African Coelecanthe Ecosystem Programme (ACEP) & the Agulhas Somali Large Marine Ecosystem (ASCLME), the Benguela Current Large Marine Ecosystem (BCLME), and the Western Indian Ocean Marine Science Association (WIOMSA).

The IOC Capacity Building programme also presented plans to organise a series of workshops on (i) Leadership skills for head's of institutions and senior role models, (ii) Proposal writing, (iii) team building, (iv) Use of Modelling, Remote Sensing and GIS for management of coastal resources and environment. These workshops will be organised within the framework of the IOC Regional Programmes. The first Leadership workshop for IOCWIO was held (in collaboration with ODINAFRICA) in Maputo, Mozambique in November 2005.

The Seminar participants reviewed implementation of the project at national and regional level, under each of the work packages and made recommended actions that should be taken to improve this. The ODINAFRICA Project Steering Committee, meeting at the IODE Project Office in Ostende, Belgium 27-29 April 2006 (immediately after the ODINAFRICA Seminar adopted a work plan on implementation of the project during the period 2006-2008.

COLLABORATION WITH OTHER PROGRAMMES AND ORGANISATIONS.

1. *The African Ocean Portal (www.africanoceans.net)*

ODINAFRICA has contributed actively to the development of the African Ocean Portal which was initiated through the UNESCO/IOC OceanPortals project started in May 2002, and supported under the cross cutting theme "The contribution of information and communication technologies to the development of education, science and culture and the construction of the knowledge society".

The portal provides access to information and data on all aspects of ocean/coastal research and management related to Africa for the benefit of various communities such as decision makers, the private sector, the research and education community and the general public. The portal has demonstrated that despite the 'digital divide' expertise and enthusiasm exist in Africa and to develop and maintain OceanPortals as a wide-scoped information resource for many layers of society. It has laid solid foundations for a long-term initiative that will bring research and management closer to the public. Translating content from 'scientific language' into 'public

language' is often a problem for the editors who all have a scientific background. This has been addressed by recruiting a journalist as content editors so that they can assist in bridging the divide.

Substantial amount of information has been included in the portal or linked to it. This enables users to access a wide range of information, data and sources for their work. Poor internet access in some of the countries limited the ability of some content editors to submit materials. However the installation of VSAT links at IHSM in Madagascar, and the Nigerian Institute of Oceanography and Marine Research (NIOMR) improved the access in these countries and enabled the editors to be more effective.

The linkage with the Coastal and Marine sub-theme of NEPAD (NEPAD/COSMAR) provides an opportunity to broaden the reach of the portal, by accessing key players in the field of marine resource management and research in Africa. The African Ocean Portal editors produce a quarterly newsletter "COSMARNews" jointly with NEPAD/COSMAR. The newsletter highlights relevant marine issues and provides a pointer to information in the portal.

The funding for the African Ocean Portal through UNESCO Cross-Cutting initiatives was extended for the 2006/2007 biennium.

2. *UNESCO-IOC Self-driven Capacity development programme*

ODINAFRICA is an active participant in the implementation of the UNESCO/IOC Leadership programme in Africa. Two Advanced Leadership workshop for Head's of Marine Related Institutions from the Western Indian Ocean region have been held (November 2005, Maputo, Mozambique; and October 2006, Zanzibar, Tanzania) and attended by 35 participants representing more than 22 national marine related institutions in Kenya, Mauritius, Mozambique, Seychelles, South Africa and Tanzania and regional/international organizations. The objective of the workshops was to: (i) Improve the management and protection of the ocean and coastal zones by strengthening the leadership capacity of senior role players who can and want to make a difference in these domains, (ii) nurture a network of highly influential leaders who can integrate regional and local initiatives in a manner that builds sustainable outcomes which deliver high impacts, and (iii) create an opportunity for personal learning and renewal. The workshops covered a wide range of topics including: the challenges of leadership; core building blocks of world class leadership in science and technology; Personal mastery as the foundation for effective leadership; Building a high performance Science and Technology organisation; Leadership versus management; Competences for effective leadership; and Initiating and leading Change; Tools for performance improvement; Creating systems for accelerated learning, error detection and correction; Process engineering and improvement; Performance benchmarking; Incentives, rewards and recognition; Key skills for improving performance; Regional Issues and priorities; and Setting a plan for Improved Performance, Relevance and Impact.

The Leadership programme has 3 components spread over 3 years.

Component 1 is designed to strengthen institutes by conducting workshops that:

- a. Empower networks of directors with leadership skills
- b. Support networks of scientists with proposal-writing skills
- c. Build scientific teams to collaborate on funded projects

Component 2 is designed to raise awareness of the importance of marine scientific research by strengthening institutes through training workshops in Decision Support System tools that:

- a. Deliver visible local benefits based on science

- b. Use existing data & operational products where possible
- c. Create openings for research & education

Component 3 will be designed to enrol civil society's support for marine science capacity-building and develop participatory skills in good governance.

The programme is implemented in the WIO region in collaboration with WIOMSA.

3. Clearing House Mechanism for WIO Region

The UNEP-WIO-Lab project (on “Addressing land-based activities in the Western Indian Ocean”) hosted a Regional workshop on development of Eastern African Coastal and Marine Environment Clearing House Mechanism and Information sharing system in Nairobi from 9-11 May 2006. The aim of the workshop, which drew participants from the Nairobi Convention contracting parties as well as interested Regional Organizations including New Partnership for Africa's Development (NEPAD/COSMAR), WIOMSA, IOC/UNESCO, WWF and IUCN, was to seek opportunities and agree on strategies for development of a consolidated, coordinated and integrated regional information clearing house mechanism, under the auspices of the Nairobi Convention, in synergy with other regional initiatives.

The need to develop a Clearing House Mechanism (CHM) for the region was identified by stakeholders while developing the 2004–2007 work programme for the Nairobi Convention. Stakeholders involved in the process emphasized that access to and use of the increasingly diverse, comprehensive data and information on coastal and marine environment is essential to the Contracting Parties to the Nairobi Convention in order to deal with the vast array of policy, management, scientific and other practical issues. The Contracting Parties include Comoros, Seychelles, Madagascar, Mauritius, Mozambique, Reunion (France), Somalia, Kenya, South Africa and Tanzania.

Participants at the workshop made important recommendations with respect to establishment of the CHM particularly on its general purpose, design, policies and collaboration in setting up the system. Development of the CHM, to be implemented under the auspices of the Nairobi Convention, was agreed to be executed by national institutions in order to encourage ownership. Setting up of the system will be based on existing or planned national information systems. Once the system is in place, it will be the role of the national focal institution to coordinate the collection of data and meta-data for the Information System. National working groups will also be established to facilitate the identification and collection of data from various sources at the national level. Recognising the National Oceanographic Data Centres (NODCs) established under the ODINAFRICA Project spearheaded by IOC/UNESCO, participants noted that consideration should be given to the possible designation of the NODCs as the national focal point institution for the CHM, where appropriate, in order to operate most efficiently. At the regional and international level, the project will cooperate with other institutions active in data management such as IOC of UNESCO (including ODINAFRICA), ACEP, IUCN, WWF, NEPAD COSMAR and WIOMSA in order to create synergy and efficiency. Coordination of actual data collection exercise for the CHM with IOC/UNESCO's ongoing initiative to develop African-wide Marine Atlases was also considered important.

ODINAFRICA in the period 2007-2008.

The current focus is the finalization of planned activities, and in particular:

- ensuring that the basics of the coastal observing system are in place, operational, and delivering data in real (or near real) time,
- the core databases, directories and catalogues have been developed at national level, quality controlled, merged and availed through the project website
- the development of data/information products has commenced in the NODCs, and specialized skills such as application of modeling, remote sensing, and GIS are provided to national experts to enable them develop a wide range of products for management of coastal and marine environment/resources
- availing the African Marine Atlas online, and commence discussions with potential partners on ways of improving the information in the atlas, as well as development of national and sub-regional components of the atlas
- completion of websites for the NODCs participating in ODINAFRICA, and encourage them to offer services/products through the websites.

The following activities will be implemented under each of the work packages:

WP1: Management and Coordination.

The focus will be ensuring timely implementation of activities, following up on institutions and countries that have not been able to make good progress to ensure that they are able to benefit from the network, developing proposal for a bridging project, and finalizing a concept paper for a possible next phase of ODINAFRICA.

WP2: Coastal Observing System.

Sea level stations will be installed/upgraded in Djibouti (Djibouti), Limbe (Cameroon), Pointe Noire (Congo), Alexandria (Egypt), Nosy Be (Madagascar) and Dakar (Senegal). The installations/upgrades in Morocco, Tanzania and Cote d'Ivoire will depend on the additional information received from these institutions in these countries, and the reports of any assessment visits that may be organised. The installation of meteorological sensors at some of the tide gauge locations will be explored.

ODINAFRICA will work with Instituto Geofísico D. Luís (IDL), Lisbon, Portugal in collocating Global Navigation Satellite Systems (GNSS), in particular GPS, GLONASS and GALILEO receivers at tide gauge locations in Pemba and Inhambane (Mozambique), and Takoradi (Ghana) within the framework of the project on GNSS Upgrades In Tide Gauges of Africa (GUITA). The densification of the GNSS network through GUITA will support research on the following topics (a) the study of the plate boundary between the Nubian and Somalian Plate; (b) the implementation of a unique reference frame for Africa, AFREF; and (c) the development of Tsunami Early Warning Systems (TEWS) for Indian and Atlantic Ocean.

The second ODINAFRICA/GLOSS Sea Level training course will be divided into two: (i) training course for technicians to be organised at the Proudman Oceanographic Laboratory in Southampton, United Kingdom in the second quarter of 2007 and funded by GLOSS, and (ii) training course on analysis and interpretation of sea level data to be organised at a location in East Africa in the last quarter of 2007.

The development of ODINAFRICA online services, including the Sea Level facility will be continued at the IODE Project Office in Ostende, Belgium.

WP3: Data and Information Management.

The established National Data and Information Centres will be strengthened through the provision of support for operational expenses, equipment upgrades and internet access.

The core databases, directories and catalogues developed at national level will be collected, quality controlled, merged and availed through the ODINAFRICA website. These include the data catalogues (MEDI Africa), Directory of professionals and institutions (AFRIDIR), and library catalogues (AFRLIB). Assistance will be provided to some of the institutions that have not been able to develop these core products, in the form of experts assigned from other ODINAFRICA NODCs for this purpose.

Access to literature will be strengthened by further development of the repository of marine related publications from Africa (OceanDocs Africa), and a literature access system based on AFRLIB, AGORA, HINARI, INASP/PERI, and the IAMS LIC and ODINAFRICA-MIM mailing lists.

WP4: Products Development and Dissemination.

The ODINAFRICA website will be improved so as to provide access to all products and services developed by the network of institutions. Brochures and posters will be revised to publicize the activities of the network. A book on the development of the network and its achievements will be published by mid-2007. ODINAFRICA will use the opportunity of high profile meetings such as the joint session of contraction parties to the Abidjan and Nairobi convention (UNEP Regional Seas programme) planned for Cape Town, South Africa in September 2007 to publicize its activities and achievements so as to increase the user base for the products and services developed.

Most of the ODINAFRICA NODCs have now developed websites through which their services and products can be advertised and accessed. This development will be consolidated by provision of expert advice to enable them improve the quality of their websites. The development of an e-learning platform for web training, and the possibility of an advanced course will be explored.

In addition to the databases, directories and catalogues already described, ODINAFRICA has developed marine biodiversity databases focussing on molluscs and sponges. A third workshop is planned in April 2007 for the development of a database on decapods.

The African Marine Atlas will be one of the main products of the current phase of ODINAFRICA. A final workshop to develop the web interface is planned for June 2007, and a workshop bring together other organisations/programmes in Africa that could collaborate in the further development of the atlas is planned ahead of the final ODINAFRICA seminar.

ODINAFRICA work plan 2008-2009.

Due to the late start of ODINAFRICA-III (July 2004 instead of January 2004) the end of the current phase of ODINAFRICA should be 30 June 2008, so as to enable full implementation of planned activities.

An evaluation of the projects implemented within the framework of the Flanders UNESCO Science Trust fund, including ODINAFRICA is planned for May-September 2007. We intend to submit a proposal for an extension to build on the achievements that have been made by ODINAFRICA and enable the NODCs that have been established to be fully operational and link up with the users and potential users of the products that they generate.

It will be necessary to identify resources to keep the programme running during the intervening period. This will cover maintenance of tide gauges and operations of the NODCs during the intersseseional period, as well as the maintenance of all the ODINAFRICA online services.

Beyond ODINAFRICA - III

The drive for ocean based services and industry to sustain an increasing population is gaining momentum. Tourism, maritime transport and emerging oil and gas industry are taking centre stage. Similarly the requirements for Article 76 are xx xx xx xx with the approaching deadline of 2009. Climate change and its possible impact on coastal areas including marine biodiversity, floods/storm surges and droughts is another area of concern. It will therefore important to look at both oceanographic and atmospheric parameters. Collaboration between the oceanographic and meteorological communities will be important. Models will increasingly be used to address these issues. The models will require good quality measurements for calibration.

ODINAFRICA must position itself to service the greater demands that will be put on it and its NODCs.

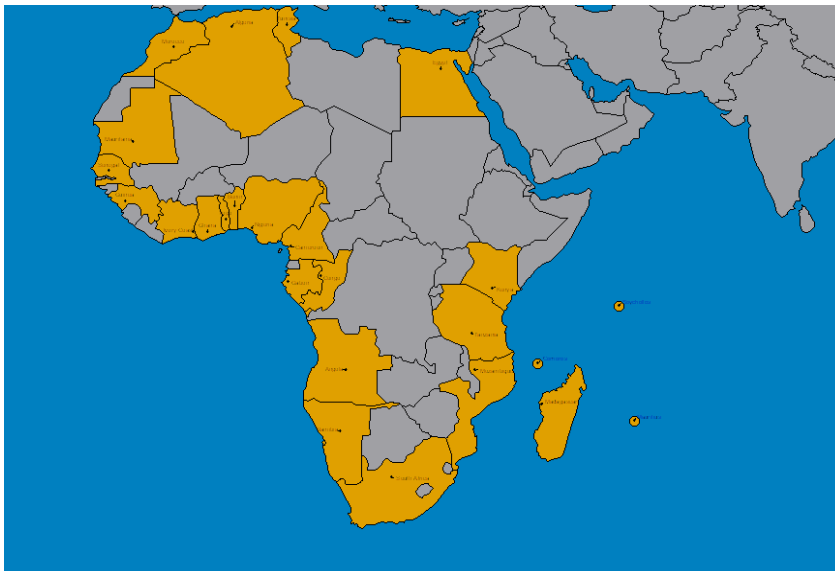
The following were considered the possibilities for development of the network beyond the current phase and recommended the following:

- development of a Pan African Geo spatial data clearing house
- increase number of sensors at the tide gauge locations
- what are the tools we have provide?? Can we provide tools for someone to site hotels
- where is the toolbox to show how to site wells or ground water extraction, and other such products
- ODINAFRICA-IV should deal with the four threads that had been identified
- Produce high level interactive, integrated, high profile products,
- Further development and strengthening of the information centres to pro-actively service the needs of users, rather than acting as book stores. The centres will have to focus on development of their communication capacities (digital libraries)

The process of developing a proposal on the basis outlined above has already commenced.

	2007			2008			2009		
	EB exp	EB req	TOTAL	EB exp	EB req	TOTAL	EB exp	EB req	TOTAL
1. Management and Coordination									
Coordination costs (Project Manager and Regional Coordinators)	66,000			33,000	33,000				
Management costs WP2, WP3A, WP3B, WP4	6,000								
Management costs IOC	10,000								
Project Management Committee meeting Feb 2007	8,000								
Project Steering Committee meeting	11,200								
Coordination travel	15,000			5,000	10,000				
2. Coastal Observing System.									
Installation of 9 tide gauges	60,000								
Purchase of 4 tide gauge	80,000								
Meteorological sensors for selected locations	10,000				80,000				
Technical Assessment missions (3 locations)	8,000								
Sea level training course	25,000								
Shipment of equipment	3,700								
Collocation of GPS at tide gauge sites in Mozambique and Ghana	20,000								
Maintenance visit for sealevel stations 2007/8	-			10,000	80,000				
Sea level stations operational costs	10,000				15,000				
ODINAFRICA online resources	20,000				20,000				
3. Data and Information Management.									
Operational expenses data centres	44,000				25,000				
Operational expenses information centers	44,000				25,000				
Support for internet access	26,400				25,000				
Support for countries to develop core data/information services and databases (Cameroon, Gabon and Guinea)	15,000			10,000	20,000				
Basic data management training for 2 nd generation		40,000							
Development of databases, directories and catalogues	12,000				15,000				
Atlas assembly workshop (feb 2007)	13,000								
Support for participation in meetings IODE-XIX,DBCP workshop, COPs	25,000			10,000	15,000				
MIM training course (Advanced)	10,000								
Interlibrary loans and IAMSLIC membership	10,000				10,000				
MIM training for Angola	3,000								
4. Products development and dissemination.									
Maintenance and improvement of websites	10,000			10,000					
Support ABELOS	6,000								
Final ODINAFRICA Project Seminar, Jul/Aug 2007	80,000								
Atlas final workshop June 2007	25,000								
Biodiversity workshop – echinoderm	20,000								
Publication/ publicity (WINDOW, posters) and book	20,000				40,000				

	696,000			78,000	413,000				
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IOC MEMBER STATES PARTICIPATING IN ODINAFRICA

COUNTRY	INSTITUTION
Algeria	Institut des Sciences de la Mer et de l'Aménagement du Littoral – ISMAL
Angola	Instituto Nacional de Investigação Pesqueira – INIP
Benin	Centre de Recherches Halieutiques et Océanologiques du Bénin –CRHOB
Cameroon	Specialized Centre for Marine Ecosystems, Agricultural Research Institute for Development - IRAD/CERECOMA
Comoros	Centre National de de Documentation et de Recherches Scientifiques – CNDRS
Congo	Le Centre Institut de recherche pour le développement de Pointe – Noire – IRD
Cote d'Ivoire	Centre de Recherches Oceanologiques – CRO Laboratory of Atmospheric Physics and Fluid Mechanics, UFR- SSMT Cocody University
Egypt	National Institute of Oceanography and Fisheries - NIOF
Gabon	Marine Sciences department, Institut de Recherche en Sciences Humaines , Omar Bongo University Centre National de la Recherche Scientifique et Technologique (CENAREST)
Ghana	Marine Fisheries Research Division, Directorate of Fisheries, Ministry of Food & Agriculture - MFRD Department of Fisheries and Oceanography, University of Ghana Legon
Guinea	Centre de Recherche Scientifique de Conakry -Rogbane - CERESCOR
Kenya	Kenya Marine and Fisheries Research Institute - KMFRI
Madagascar	Institut Halieutique et des Sciences Marines - IHSM
Mauritania	Institut Mauritanien de Recherches Océanographiques et de Recheches - IMROP
Mauritius	Mauritius Meteorological Services – MMS Albion Fisheries Research Centre (AFRC)
Morocco	Laboratoire d'Océanographie & Limnologie, Département de Biologie , Ibn Zohr Universite
Mozambique	Instituto Nacional de Hidrografia e Navegação - INAHINA School of Marine Sciences and Oceanography, Eduardo Mondlane University - EMU
Namibia	National Marine Information and Research Centre (NatMIRC)
Nigeria	Nigerian Institute for Oceanography and Marine Research - NIOMR
Senegal	Centre de Recherches 'Océanographues de Dakar- Thiaroye - CRODT Direction de l'Océanographie et des Pêches Maritimes - DOPM
Seychelles	Seychelles Fishing Authority - SFA
South Africa	Directorate of Marine and Coastal Management – MCM South African Institute for Aquatic Biodiversity - SAIAB Southern Africa Data Centre for Oceanography - SADCO
Tanzania	Institute of Marine Sciences, University of Dar Es Salaam
Togo	Centre de Gestion Intégrée du Littoral et de l'Environnement, Université de Lomé - CGILIE
Tunisia	Institut National des Sciences et Technologies de la Mer - INSTM

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Budget Summary

Work Package	Total	%
WP1. Project Management and Coordination	\$300,000	13
WP2. The Coastal Observing System	\$740,000	32
WP3. Data and Information Management	\$800,000	35
WP4. Product Development, End-user Communication and Information Delivery	\$460,000	20
TOTAL	2,300,000	100
Overhaed UNESCO (10%)	230,000	
GRAND TOTAL	2,530,000	

SUMMARY OF REVISED BUDGETS

Work Package	2004	2005	2006	2007	TOTAL
WP1. Project Management and Coordination	49,600	115,300	108,700	108,700	382,300
WP2. The Coastal Observing System	-	92,000	341,000	147,000	580,000
WP3. Data and Information Management	80,540	466,560	189,000	103,000	839,100
WP4. Product Development, End-user Communication and Information Delivery	33,800	62,800	338,000	110,000	544,600
SUB-TOTAL	163,940	736,660	976,700	468,700	2,346,000
Overhead UNESCO (10%)	16,394	73,666	97,670	46,870	234,600
GRAND TOTAL	180,334	810,326	1,074,370	515,570	2,580,600

The total amount exceeds the available budget by USD50,600. This will be covered by trying to reduce costs under some budget lines, and collaboration with other programmes and projects in implementation of activities.