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*ADDRESSING LAND BASED ACTIVITIES
IN THE WESTERN INDIAN OCEAN*

Information Management Strategy for the Eastern African Coastal and Marine Environment Clearinghouse Mechanism

Report

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List of Acronyms and Abbreviations

ACEP	African Coelacanth Ecosystems Programme
AOA	Africa Ocean Atlas
ASCLME	Agulhas and Somali Current Large Marine Ecosystem
AU	African Union
CBO	Community Based Organization
CC	Collaborating Centre
CD	Compact Disk
CENECARTA	National Remote Sensing & Cartography Centre
CNRE	Chercheur au Centre National de Recherches sur l'Environnement
COP	Conference of Contracting Parties
CHM	Clearinghouse Mechanism
DEWA	Division of Early Warning and Assessment of UNEP
DCPI	Division of Communications and Public Information
EAF/14	Eastern Africa coastal and marine environment resources database and atlas project
EAC	East Africa Community
GEF	Global Environment Facility
GIS	Geographic Information System
GPA	Global Programme of Action for the Protection of the Marine Environment from Land-based Activities
GPS	Geographical Positioning System
ICT	Information and Communications Technology
IMS	Institute of Marine Sciences
IOC	Inter-Governmental Oceanographic Commission of UNESCO
IT	Information Technology
IUCN	The World Conservation Union
KMFRI	Kenya Marine and Fisheries Research Institute
MPA	Marine Protected Area
MoU	Memorandum of Understanding
NEMA	National Environment Management Authority of Kenya
NC	Nairobi Convention
NEPAD	New Partnership for Africa's Development
NFI	National Focal Institution
NFP	National Focal Point
NGO	Non-Governmental Organization
NN	National Node
NODC	National Oceanographic Data Centre
ODIN-AFRICA	Ocean Data and Information Network of Africa
SADCO	South Africa Data Centre for Oceanography
SDI	Spatial Data Infrastructure
SWIOFP	South Western Indian Ocean Fisheries Project
ToR	Terms of Reference
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Scientific and Cultural Organization
UNEP	United Nations Environment Programme
UPS	Uninterruptible Power Supply
WIO	West Indian Ocean
WIO-LaB	GEF Project: Addressing land-based activities in the Western Indian Ocean
WIOMSA	Western Indian Ocean Marine Sciences Association
WWF-EAME	World Wildlife Fund - Eastern Africa Marine Eco-Region
WWW	World Wide Web

Executive Summary

The WIO-LaB Project, which addresses some of the major environmental problems and issues related to the degradation of the marine and coastal environment due to land-based activities in the Western Indian Ocean (WIO) region aims to improve the existing web-based information system for the Contracting Parties Nairobi Convention (the *Eastern African Coastal and Marine Resources Database*). The database will also serve as a Regional Clearinghouse House Mechanism (CHM) for the Global Programme of Action for the Protection of the Marine Environment from Land Based Activities (GPA). A consultancy assignment was created to develop an information management strategy for the development of CHM. In executing this assignment, data was collected through interviews with key persons from the region and other key stakeholders, review of relevant documents and similar websites. Questionnaires were also administered on key stakeholders in member countries of the Nairobi Convention as well as other stakeholders. Additional information was collected during a Regional Workshop on the development of the Regional CHM for the Nairobi Convention that was held in Nairobi, Kenya in the period 9-11 May 2006.

The key findings of this assessment are as follows:

- (a) The level of access of the existing Eastern African Regional Coastal Database is very low. The key reasons are that (i) most people are not aware of its existence, (ii) most data/information is out of date, (iii) most institutions in the WIO region do not provide data/information for the database update and (iv) some institutions do not have the necessary ICT facilities to access it.
- (b) Most respondents accessed other websites, especially ODIN-AFRICA and WIOMSA as an alternative or in addition to the existing Eastern African Regional Coastal Database.
- (c) There was an overwhelming support for enhancing the existing Eastern African Regional Coastal Database into a Regional CHM.
- (d) The majority of the national institutions that responded to the questionnaire had a functional computer network infrastructure, with access to the Internet. However, some of the institutions did not have a computer network, had limited or no access to the Internet and did not have appropriate computer-based information system for managing coastal and marine resources, which is a challenge in establishing a Regional CHM.
- (e) About 50% of the institutions surveyed did not have adequate ICT staff to support information systems for coastal and marine management. There was overwhelming support for the need to train staff in the CHM focal institution on content management, content uploading and use of the Regional CHM.

The key conclusions of the assessment are as follows:

- (a) The level of access of the existing Eastern African Regional Coastal Database is very low. In addition, respondents had a high preference for other websites, especially ODIN-AFRICA and WIOMSA. This preference was largely because the existing Eastern African Regional Coastal Database did not contain pertinent data/information and was not up-to-date.

- (b) The information requirements of the various categories of users are different and the proposed CHM must ensure that the format/structure and method of presentation of the information suits each category of users.
- (c) There was concern over the sustainability of the WIO CHM. Several strategies for sustainability have been proposed. Key among these is the commitment of financial resources by both governments and national focal points, continuous relevance of the CHM to national and regional issues, the continuous updating of the data and information and appropriate human and ICT resources at the national CHM focal points.
- (d) There were limited partnerships and collaborations between organizations or programmes with related objectives. There is need for the WIO CHM to partner and collaborate with institutions and programmes with related objectives in order to avoid wastage of resources and to exploit the synergies, amongst other benefits.

The following are the recommendations of the assessment:

- (a) **Linkages with related initiatives:** As recommended in the report of the Regional CHM workshop, it is recommended that formal linkages be established with other similar or related initiatives in the WIO region. Specifically, given the overlap with the Africa Ocean Atlas (AOA) being developed under the auspices of IOC's ODIN-AFRICA framework and the positive consultations already taking place, a formal MOU should be developed as a matter of urgency. Linkages with other related initiatives can be brought on board as the respective collaborations mature.
- (b) **Institutional framework:** In order for the WIO CHM to serve the Nairobi Convention, it is important that the implementation and operation of the regional CHM is continuously linked to the needs/programmes of the various countries in the framework of the Nairobi Convention. It is therefore recommended that the human resources administering the regional node be funded from the Convention. However, the operations of the Regional node should be supervised by the most appropriate UNEP Division, e.g. DEWA or DCPI. At the national level, a national node will be designated with staffing as defined in human resource strategy in section 3. In addition, it is recommended that National Working Groups be created to improve on coordination and synergy at the national level. The membership of the working group should ensure representation of all key institutions that will provide data/information, including representation of relevant ministerial departments, such as the departments in charge of environment, natural resources, planning and national statistics; faculties or schools in universities or research institutes in charge of marine/coastal research; NGOs/CBOs working in coastal and marine management; regional programmes based in the country, etc.
- (c) **Selection of national focal institutions:** Given that the IOC-UNESCO ODIN-AFRICA's National Oceanographic Data Centres (NODCs) are already operating in most of the participating countries and given the significant overlaps between these

initiatives, it is recommended that the national nodes for the CHM should be made to coincide with these centres. The NODCs are:

- Centre National de de Documentation et de Recherches Scientifiques (CNDRS) – Comoros
- Kenya Marine and Fisheries Research Institute – Kenya
- Institut Halieutique et des Sciences Marines, Université de Toliara – Madagascar
- Mauritius Meteorological Services – Mauritius
- Instituto Nacional de Hidrografia e Navegação (INAHINA) – Mozambique
- Seychelles Fishing Authority – Seychelles
- Institute of Marine Sciences, University of Dar Es Salaam – Tanzania

The decision in regard to this exercise should be made by the participating national governments who are contracting parties (COP) to the Nairobi Convention. However, the criteria for designation of the CHM national node developed during the CHM regional workshop should be used, with the provision that priority be given to making the CHM national nodes coincide with the NODCs. Where this is not possible, a collaborative mechanism should be developed to facilitate collaboration between the CHM national nodes and the NODC. In certain instances, it may be necessary that staff required for CHM operations could be appointed from both institutions. For example, the Data Coordinator can be from the CHM national node while the Geospatial Information Expert can be appointed from the NODC.

- (d) **Technological and human capacities of national focal institutions:** Given the varying technological and ICT human capacities of the potential NFIs, it is recommended that an assessment of the existing technological and ICT human capacities of the chosen NFIs is carried out. This assessment would enable the appropriate intervention to be designed for a successful CHM implementation. For example, some of the national nodes might have no capacities and may require assistance from the regional node in order to set up national web sites that would be linked to the CHM. Specifically with respect to human capacity, there is a need to train staff in the CHM focal institution on content management, content uploading and use of the Regional Clearing House Mechanism and to carry out awareness campaigns to increase the level of usage of the WIO CHM.

The technological and human capacities outlined in the regional CHM workshop should be expounded to become the criteria for assessment. Ultimately, the national nodes will have uniform staffing and have a similar set of facilities and tools. For the nodes below the national nodes, the national node should be able to provide technological and human capacity support, where necessary, especially in data collection.

- (e) **Updating the WIO CHM:** The strategies to ensure the Regional CHM is updated regularly include strengthening the data collection capacities of institutions that collect data, regular updating of the central national data node, ensuring national focal

institutions are motivated to compete in updating their sites and placing the mandate for updating with the specific institutions that generate data.

- (f) **Data sharing:** The Regional CHM workshop identified three levels of data sets that could be shared: regional data sets (e.g. meteorological data, ocean currents, etc.), national data sets (available upon request) and site specific data. It was suggested that the national/site specific data of regional importance should be highlighted on regional web site and the open access data be stored at a regional level. It was further suggested that the nationally owned data should be stored at the national level. All data sets are candidates for sharing and it would be up to the countries and institutions to decide on best options of sharing their data.

It is recommended, in line with the Regional CHM recommendation, that the lessons from ARSIE (Association de Réseaux des Systèmes d'Informations Environnemental) on a data sharing mechanism at national level should be sought. These lessons would guide in the development of the data sharing policy and mechanism at national levels, subject to the exigencies of prevailing national data sharing policies. It is further recommended, again in line with the Regional CHM agreement, that a working group consisting of ACEP, WIO-LaB, IOC-UNESCO and other interested parties be established to discuss meta-data formats for data documentation and sharing.

- (g) **Design of the Regional CHM:** The design of the Regional CHM must be based on the requirements in this report.
- (h) **Leadership of CHM:** One of the key reasons why the existing EAF-14 database had challenges in meeting the expectations of stakeholders was lack of leadership. It is critical that the WIO CHM has strong and visible leadership at both regional and national levels. The leadership will ensure that sufficient sense of urgency in updating the CHM and stakeholders are engaged and involved in the project. The leadership will also continuously communicate to ensure that the stakeholders have a clear understanding of the CHM and the benefits it delivers.
- (i) **CHM implementation:** The conceptualization of the WIO CHM has been very participative. It is critical that the implementation of the Regional Clearing House system continues to have the same level of participation of the stakeholders. This will create a high level of commitment to and ownership of the CHM at the national level, which in turn will certainly contribute to its sustainability. In addition participation, the implementation of CHM should be phased out, with a careful choice of the first phase. This choice must be made to ensure that it demonstrates the value of the Regional CHM; builds momentum for future project activities; generates interest and enthusiasm from both end-users and stakeholders; delivers tangible and visible benefits; addresses an important, pertinent or urgent information need; and can be clearly communicated to stakeholders. This will assist the CHM in gaining further resources and support, and in turn enhance its sustainability.
- (j) **Practical next steps:** The practical next steps in sub-section 3.6 should be implemented immediately to raise the commitment of the stakeholders, to increase the

ownership of the CHM at all levels and to build momentum to handle the more difficult long-term actions.

1. Introduction

1.1 Background

The UNEP/Nairobi Convention stakeholders, in developing the 2004–2007 work programme and framework, tasked the Convention’s Secretariat with the responsibility of establishing an information system to meet the needs of Contracting Parties in implementing the Action Plan for the protection, management and development of the marine and coastal environment of the Eastern African Region. The Countries in the WIO Region that are Contracting Parties to the Nairobi Convention are the States of Comoros, Seychelles, Madagascar, Mauritius, Mozambique, Reunion (France), Somalia, Kenya, South Africa and Tanzania.

Access to and use of the increasingly diverse, comprehensive data and information on coastal and marine environment is required by Contracting Parties to the Nairobi Convention in order to deal with the vast array of policy, management, scientific and other practical issues. To accomplish this, the Nairobi Convention needs to be able to compile and link disparate sets of data and information to create the required information base and develop access services to quickly provide information to decision-makers.

In working with partners, a comprehensive capability is required by the Nairobi Convention to collect, integrate and analyze the rich data collections available in the Western Indian Ocean region and present the results in forms that specialists and non-specialists can comprehend. Within this context, the Nairobi Convention, through the WIO-LaB Project entitled “*Addressing land-based activities in the Western Indian Ocean*” embarked on the development of a web-based information clearinghouse mechanism, building upon the existing Eastern African Coastal and Marine Resources Database and Atlas established under the Nairobi Convention (www.unep.org/easternafrika). The existing Coastal and Marine Database has challenges, as will be explained later, in facilitating the Western Indian Ocean countries to fully participate and benefit from national and cross-border activities and enabling these countries to readily have access to scientific, technical, environmental, legal and policy level information essential for the sustainable development of their coastal and marine environment.

The WIO-LaB Project addresses some of the major environmental problems and issues related to the degradation of the marine and coastal environment due to land-based activities in the Western Indian Ocean (WIO) region. The project was launched in Madagascar in July 2004 during the fourth meeting of the Contracting Parties to the Nairobi Convention. The project is implemented by the United Nations Environment Programme (UNEP) and is regarded as a demonstration project for the UNEP’s Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA). The project represents a strong partnership between the Eastern African countries including the Island states of the Western Indian Ocean (Kenya, Tanzania, Mozambique, South Africa, Madagascar, Seychelles, Comoros and Mauritius), and has three main objectives: 1) Reduce stress to the ecosystem by improving water and sediment quality; 2) Strengthen regional legal

basis for preventing land-based sources of pollution; and 3) Develop regional capacity and strengthen institutions for sustainable, less polluting development.

As one of the activities, the WIO-LaB Project aims to improve the existing web-based information system for the Nairobi Convention (the *Eastern African Coastal and Marine Resources Database*), which will also serve as a Regional CHM Node for the Global Programme of Action for the Protection of the Marine Environment from Land Based Activities (GPA), and will be a repository for coastal and marine data and information for the Eastern Africa coastal region, including geospatial and socioeconomic data, oceanographic data, marine ecological data, etc.

1.2 Terms of Reference

The objective of the consultancy was to develop an information management strategy that will be adopted by UNEP/WIO-LaB Project and Nairobi Convention for the improvement the existing EAF-14 web-based information system. The terms of reference of the consultancy were as follows:

- Review the current status of the Eastern African Regional Coastal Database and existing plans for upgrading thereof.
- Identify and classify existing and potential users of the information system, at the national, regional and international levels.
- Define data and information needs for the different user groups, including the format in which such data and information should be made available, using experiences from similar information systems as well as interviews with representative stakeholders where needed.
- Review technological developments and potential technological limitations for different user groups as a basis for the design of the web-based data and information system. Where appropriate, assess other ways of making data- and information available to users.
- Identify potential third-party sources of data- and information, including national and regional institutes, as well as international organizations and projects active in the region
- In cooperation with the WIO-LaB Project Management Unit, consult potential third party sources of data- and information in order to establish ways in which such data- and information could be made available through the web-based data and information system, either as pure data, or as meta-data.
- Review the proposed structure of the data and information system from an Information Management point of view, and provide relevant advice for improvement in this regard.
- Review and advice on ways in which long-term sustainability of the web-based data and information system could be ensured.

- Review the proposed capacity building and awareness building activities related to the data- and information system, and provide advice with regard to the nature, approach and content of such activities and finally,
- Participate in a regional workshop (in Nairobi) to discuss the results of this assignment and agree on the way forward with regard to the establishment of the data and information management system.

The expected outputs were:

1. A report presenting the results of the assignment, including advice and recommendations with regard to the issues reviewed and assessed as per the above terms of reference, constituting an Information Management Strategy, and,
2. A regional workshop to discuss the results of this assignment and agree on the way forward with regard to the establishment of the data and information management system.

1.3 Methodology

The assessment to fulfill the above terms of reference involved interviewing key staff in UNEP, desk review of relevant documents, review of similar websites, survey using a self-administered questionnaire and a regional workshop of stakeholders. These methods of data collection are outlined below.

- (a) **Interviews:** Interviews were conducted with staff from UNEP/DEWA, the WIO-LaB Project Management Unit, the Nairobi Convention Secretariat and other key stakeholders. Annex 1 shows the names of persons who were interviewed.
- (b) **Desk Study of documents:** Relevant documents on the UNEP/Nairobi Convention and WIO-LaB Project as well as other relevant documents were reviewed. The reference section shows the list of the documents that were reviewed.
- (c) **Websites review.** In a desk-study, the status of the existing UNEP/Nairobi Convention Eastern African Regional Coastal Database was reviewed. In addition, websites that have comparable objectives were reviewed over the Internet. The following are some of the key web-sites that were reviewed:

- <http://www.gpa.unep.org>
- <http://www.wiomsa.org>
- <http://www.odin-africa.net>
- <http://www.africanoceans.net>
- <http://www.unepscs.org>
- <http://www.biodiversity-chm.eea.europa.eu>
- <http://www.biodiv.se>

- (d) **Questionnaire.** A questionnaire was designed to collect data from key stakeholders in the member countries of the Nairobi Convention. This questionnaire was distributed by the WIO-LaB Project Management Unit to all the Collaborating Institutions and other regional and international partners. The questionnaire was also completed by members of the WIO-LaB Project Steering Committee during the second regional meeting that was held on March 7, 2006 in Mombasa, Kenya, as well by most participants of a regional planning workshop held at UNEP Headquarters in Nairobi, Kenya, on May 9-11, 2006. Annex 2 shows the list of stakeholders who completed the questionnaire. The questionnaire itself is attached as Annex 3.
- (e) **Workshop.** A regional workshop on the development of an Eastern Africa Coastal and Marine Environment CHM was held in the period 9-11 May 2006 at UNEP Headquarters in Nairobi, Kenya. The goal of the workshop was to seek opportunities and agree on strategies for development of a consolidated, regionally coordinated and integrated Regional CHM for the exchange of data and information on the coastal and marine environment, for the Nairobi Convention, through establishment of synergies with other regional initiatives. These issues were central to the consultancy assignment and the outcome of the workshop is presented in Annex 4. More details can be found in the Report of the CHM Regional meeting.

The above methods of data collection were effective in that the interviews targeted the most relevant people, with those who were missed out in the interviews making their contributions during the Regional CHM workshop. Further, the questionnaires and the Regional CHM workshop collected similar data/information, achieving a reasonable degree of triangulation of data/information. Finally, data was collected from a representative cross section of stakeholders, from managers during the WIO-LaB Project Steering Committee regional meeting to the technical personnel from regional/international institutions and national governments during the CHM Regional meeting. Additional ideas were obtained by reviewing the contents of websites with comparable objectives.

This report gives the analysis and findings of the data collection exercise in the next section. The following section then synthesizes the results in an Information Management Strategy. The next section gives the conclusions of the assignment. The final section provides recommendations for action.

2. Analysis of Results and Findings

The detailed results of analysis of the completed questionnaires, as referred to under point (d) above, are presented in Annex 6. These results are shown question by question as per the questionnaire given in Annex 3. Annex 4 presents the results of the workshop, as referred to under point (e) above. In this section, we shall extract from these annexes the necessary results to report the findings in line with the terms of reference.

2.1 Review of Existing Eastern African Regional Coastal Database

In 1993, UNEP initiated, within the framework of UNEP's Regional Seas Programme, the project entitled the "*Eastern Africa Coastal and Marine Environment Resources Database and Atlas.*" The project, which is also referred to as Eastern Africa Action Plan project number 14 (i.e EAF/14), was implemented by UNEP's Division of Early Warning and Assessment (DEWA). It focused on the Eastern Africa Region, with countries that participated being Kenya, Tanzania, Mozambique, Seychelles, Comoros, Madagascar and Mauritius.

The overall goal of EAF 14 Project was to improve the understanding of Eastern Africa's coastal and marine resources and its multiple uses through correct and usable information, careful management and planning, accessible information, and public awareness on the vulnerability of resources. The objectives of the project were the assessment of the coastal and marine resources through:

- (i) Strengthening the capacity of national institutions in the collation of data on the coastal and marine environment, and in the storage, management and retrieval of such information;
- (ii) Development, together with national institutions and the wider community, an electronic database system as a management tool towards integrated coastal zone management;
- (iii) Development, together with national institutions and the wider community, coastal resources maps;
- (iv) Strengthening the capability of national institutions in the use and management of an electronic database system and coastal resource maps
- (v) Creating awareness and facilitating the participation of the private sector, the academic fraternity, NGO's, the wider community and the general public, in the decision-making regarding the management of coastal and marine resources, through the provision of data and information in the form of a coastal resources atlas.

The information that was to be compiled in the database included:

- Physical Environment (Climate, Oceanography, Geomorphology, Hydrology, Landcover)
- Biological Resources (Fauna, Flora, Conservation)
- Mineral Resources
- Cultural And Recreational (Historical/Archeological sites, Recreation and tourism)
- Socio-Economic Environment (Population, Industry, Fisheries, Ports and shipping, Administration)

In 1996, the pilot phase of the project was evaluated and the conclusion was that the project was still relevant to end users and had a potential for creating a sizeable impact on the management of coastal and marine resources in Eastern Africa. The project was completed in 2002. Its key achievements were:

- a) Established geospatial databases in the region through institutional capacity building and training to promote effective utilization of environmental information and computer technologies at the national level,
- b) Developed operational Geographic Information System (GIS) coastal databases installed in the government-designated collaborating institutions in the participating countries,
- c) Produced and distributed comprehensive national assessment atlases on the status of coastal resources of Kenya (1998), Tanzania (2001) and Comoros (2002),
- d) Public awareness campaigns that generated public interest in environmental issues leading to:
 - acceptance and active participation of all stakeholders supporting the Nairobi Convention,
 - development of a significant scope for horizontal exchange of information through a prototype website and online database that currently provides diversified information, data, and a demo version of internet mapping, and
 - creation of an enabling environment for relevant policy making as was evidenced by the enactment of a marine protected area by Parliament in Tanzania.

The following are the results of the review of the existing Eastern African Regional Coastal Database.

(a) Access (see B1-B6 of Annex 6)

Of the 29 people who completed questionnaires, more than 50% (16) had never accessed the existing EAF-14 database. The key reasons for not accessing the database were lack of knowledge on the existence of the database and lack of Internet access in some of the institutions. A review of the database showed that the average number of hits on the website per day or per month was very low. Indeed, the questionnaire results show that those who had access accessed the database very infrequently (see part B3 in Annex 6). Table 1 below shows that even with the few hits, only about 10% or less comes from the WIO region (assuming the rest of the world includes significant part of the region). This is an indication that the database is visited more by people outside the WIO region.

Table 1: Access to the existing Eastern African Regional Coastal Database by countries

Country	No. of pages viewed from April 3, 2003 to May 5, 2006	Percent
United States (and UN)	1740	49.6 %
United Kingdom	220	6.3 %
The Netherlands	179	5.1 %
France	162	4.6 %
South Africa	152	4.3 %
Belgium	152	4.3 %
Canada	104	3.0 %
Kenya	86	2.5 %
Israel	75	2.1 %
Italy	73	2.1 %
Unknown	38	1.1 %
The rest of the world	526	15.0 %
Total	3507	100.0 %

Also, those who access the database generally do not do so to update the information but rather to access content (see part B4 in Annex 6). The key uses of the accessed content were stated to be (see part B5 in Annex 6):

- To know what other countries are doing
- To help develop projects
- To inform on-going research activities
- To inform decision making processes

The database was found to contain maps and GIS data, pictures, journal articles, few published reports and a limited number of contacts. It was suggested that it could be more useful if it included the following (see Annex 4 and part B6 in Annex 6):

- Description of the data using some of the established meta data management standard parameters.
- Information on national and regional legal instruments or laws.
- Information and contacts of relevant national and regional organizations.
- Current information on status of conservation, management and development of coastal and marine resources
- Information on best practices and demonstration projects.
- More regional data on marine biodiversity data.
- More scientific data.
- Similar amounts of data for all WIO countries (some countries have more data than others).
- More spatial data would be advantageous since users tend to rely on such data and specific maps for various purposes.
- Newsletter for new information and reports.
- A portal for key literature and reports for the Nairobi Convention.

- Promotional materials of the national nodes.
- Online fora for guided discussion of relevant issues.
- Disaster management plans.

(b) Challenges

Interviews and analysis of the questionnaires (see part B7 in Annex 6) indicated that the following are the key challenges facing the existing regional database:

- No new updates for several months/years. As a result, the content is inappropriate or not useful.
- Lack of incentives or obligatory mechanisms for collaborating institutions to update the website.
- Local institutions are not aware of the database.
- ICT capacity problems in collaborating institutions, including Internet access and required skills to access.
- Inadequate funding (largely because there has been no proposals for funding from the Nairobi Convention).
- No clear institutional structure for administering and managing the website.
- The EAF/14 project in DEWA did not have any institutional link to the Nairobi Convention, which it was supposed to support.

At the same time, participating countries/institutions had their challenges, which had negative implications for the EAF-14 regional database. The regional workshop established the following challenges at the national levels:

- Lack of specialized human skills.
- Need to harmonize existing data to avoid overlaps and ensure ease of data exchange (e.g. compatibility of database platforms).
- Data sharing is limited.
- Inadequate ICT infrastructure, including lack of GIS facilities in most national institutions and poor maintenance of existing ICT facilities.
- Lack of policies and standards on information management. In particular, lack of information and data exchange policy at both institutional and national levels.
- The marine biodiversity is not well studied (thus limited content).
- Existing data is dispersed in several institutions and most often is not available at the national level.
- Lack of financial and logistical resources in the existing facilities.
- Poor dissemination and marketing of environmental data and information.
- Lack of sustainable programmes.
- Inadequate commitment of stakeholders.
- Lack of harmonisation of indicators / indices / parameters / units of measurement and methodology.
- Inadequate co-ordination, networking and collaboration among various institutions.
- Inadequate capacity to analyze the collected data into useful information applicable in decision making processes.

2.2 Existing and Potential Users

The current users of the existing regional database are very few. They constitute largely research agencies or institutions. Key users in these institutions are the scientists as well as M.Sc. and Ph.D. students in “Western” countries (see 2.1 (a) above). If however the existing database is enhanced and made a true Regional CHM, the potential users could be categorized as shown in Table 2 below (see Annex 4 and parts B8 & C7 of Annex 6):

Table 2: Potential users of a regional Clearing House Mechanism

Category	Potential users
1. Central and local government	Policy makers, Policy implementers, Coastal & marine resource managers
2. Research and academic institutions	Scientists, Researchers and Students
3. Community (NGOs, CBOs)	Coastal & Marine Resource Managers, Public
4. Private sector	Consultants, Chief Executives and Managers of private firms
5. Media	Media Managers, Journalists
6. Partners (national, regional and international)	Technical and Programme staff, Conservationists

2.3 Data/Information Needs and Sources

The survey findings show a high preference by respondents for ODIN-AFRICA and WIOMSA websites as alternatives for access to appropriate coastal and marine content (see part C1 in Annex 6). The respondents access these websites to access the following key data and information (see C2 in Annex 6):

- Coastal and marine resources (maps, coastline topography, marine bio-diversity database, GIS info, climate data, currents...)
- Up-coming events or news
- On-going research activities in the WIO region
- Funding sources or calls for proposals for funding

The fact that respondents were able to access ODIN-AFRICA and WIOMSA websites implies that Internet access in those participating institutions is not the reason why the Nairobi Convention System was not visited by people in the region. This is corroborated by information given in 2.1 (a) and (b) above.

The respondents of the questionnaire overwhelmingly agreed that the following are the key benefits of enhancing the current regional database to become a Regional CHM (see part C3 in Annex 6):

- Access to relevant marine and coastal environmental data and information.
- Increased collaboration among partners and stakeholders.
- Raised awareness on marine and coastal environmental issues.

- Getting informed of what is happening.

The key data/information required to establish the Regional CHM and the possible sources are summarized in Table 3 below (see parts C4 and C5 in Annex 6).

Table 3: Data/Information required for the Regional Clearing House Mechanism and its sources

Data or information	Source
1. All Nairobi Convention initiatives/projects	UNEP/NC Secretariat , National Focal Points
2. Relevant scientific publications	Scientific journals, scientists, universities, relevant national institutions (e.g. KMFRI, IMS, CNRE, ORI and INRAPE), regional projects (e.g. ODIN-AFRICA)
3. Technical reports	Research institutions (e.g. KMFRI, AIDE, CNDSRS), regional programmes/bodies (e.g. ODIN AFRICA, WIOMSA), Data Centres, UN Agencies
4. Policy analysis documents	Research/Development institutions, govt. depts & ministries (e.g. Min. of Environment), regional institutions (e.g. Indian Ocean Commission, NEPAD, etc.)
5. Socio-economic data	Research/ development institutions, national statistical offices, relevant govt. depts.
6. Environmental challenges or hotspots and GIS data	Institutions with GIS Depts, research institutions (e.g. KMFRI, IMS, CNRE, ORI, INRAPE), regional programmes/bodies (e.g. ODIN-AFRICA, WIOMSA)
7. Trends in ecosystem management in an area	Research institutions (e.g. KMFRI, IMS, CNRE, ORI, INRAPE), govt. depts & ministries (e.g. Min. of Environment), regional programmes/bodies (e.g. ODIN-AFRICA, WWF, IUCN WIOMSA)
8. Raw scientific data, meta data	Hydrographic offices, National Data Centres, ESRI, Research institutions (e.g. KMFRI, IMS, CNRE, ORI, INRAPE)
9. Relevant projects or activities being carried out by partners	Partners, National Focal Points
10. Land use and land cover	Aerial photographs & satellite maps, land use maps, topographical sheets
11. Research projects	Donor funded projects, Research institutions (e.g. KMFRI, IMS, CNRE, ORI, INRAPE)

2.4 Capacities of National Institutions

The following are the results of the review of the technological and human capacities of national institutions (see parts D1 – D8 of Annex 6).

(a) Technological capacities

From the questionnaire survey, the majority of the national institutions had a computer network and a functional network infrastructure. However, of the 29 respondents, 24% (7) indicated that their institutions did not have a computer network (see part D2 in Annex 6). The same seven (7) respondents confirmed that their institutions had computers which were not networked. In addition, just more than 50% (4) of the seven (7) pointed out that their

institutions had a dial-up connection to the Internet while another three (3) indicated they had no Internet connection at all. The rest had leased analog or digital Internet connections using a variety of media and with varying speeds of connection (see parts D3 and D4 in Annex 6). Finally, about 10% (3) respondents indicated that their institutions had no computer-based information systems to collect, process, store and disseminate data/information on marine and coastal resources. Of these three, two (2) are the same institutions which did not have a computer network.

Although only a few of the respondents were from national focal institutions which are involved in the development of the regional CHM, the lack of computer networks, Internet connections and information systems for management of marine and coastal resources in some of the institutions represents a challenge in establishing a Regional CHM. In general, the survey questionnaire established that the technological challenges are lack of a corporate database platform, lack of an appropriate computer-based information system for managing coastal and marine resources and lack of or limited Internet connection (see part D7 in Annex 6).

The regional CHM workshop recommended that the designated national focal institution for the Regional CHM should have the following ICT technical capacities:

- Good and functional equipment hardware and software requirements for all the data custodians (computers, plotters, scanners, printers, GPS, etc.).
- Reliable internet access (preferably 24/7) with appropriate bandwidth.
- Good back-up system (data storage media and devices, mirrored onsite storage, offsite data storage), Uninterrupted Power Supply (UPS), all backed up by a good Data Storage Policy.
- Workable IT plans

It will therefore be necessary to carry out an audit of the existing institutional ICT infrastructural capacities at designated national CHM focal institutions. The results of such an audit would provide an objective indication of where an intervention may be required in order to make the national nodes ready for CHM implementation.

(b) Human capacities

In about 50% of the cases, the institutions that responded to the questionnaire indicated that they had internal dedicated or part-time staff to support their information systems for coastal and marine management. However another 50% had only external persons (contractors or consultants) or no one supporting their information systems for coastal and marine management (see part D6 in Annex 6). Of the four (4) institutions that did not have any staff (internal or external), two (2) are the same institutions that did not have a network.

Overall, the most critical challenge is the lack of dedicated data/information management personnel. Other key human resource capacity challenges include lack of leadership in information and communication technology, lack of ICT skills amongst most potential users and lack of awareness of the role of ICT amongst institution's management (see part D8 in Annex 6).

Almost all respondents of the survey questionnaire agreed that the key ICT human capacities to be built in the national CHM focal institutions to ensure regular updating of the CHM are dedicated and trained content manager, training on uploading onto the web-based CHM, and training on the use of the CHM. In terms of raising awareness to ensure wide usage of the CHM, the respondents of the questionnaire identified the following strategies (see part E3 in Annex 6):

- Organize awareness campaigns, workshops or seminars for policy makers and new and existing users.
- Wide distribution of promotional materials, e.g. leaflets, CDs, brochures, posters, user manuals, etc.
- Public awareness campaigns using a variety of media.
- Advertising (e.g. publicity and news articles) in key national and regional marine electronic websites and links to database.
- Wide and regular distribution of an electronic newsletter.

2.5 Summary of Findings

The following is a summary of the findings:

- (a) The level of access of the existing Eastern African Regional Coastal Database (EAF-14) was very low. The key reasons are that most people are not aware of its existence and most data/information is out of date. Also, most institutions do not provide data/information for the database update and some institutions do not have the necessary ICT facilities to access it.
- (b) Most respondents accessed other websites, especially ODIN-AFRICA and WIOMSA as an alternative or in addition to the existing Eastern African Regional Coastal Database.
- (c) There was an overwhelming support for enhancing the existing EAF-14 regional database into a Regional CHM for Nairobi Convention, largely because the stakeholders believed the CHM had benefits in their efforts to manage and protect the coastal and marine environment. The data/information required for this mechanism and its sources were identified as shown on Table 3.
- (d) The majority of the national institutions that responded to the questionnaire had a functional computer network infrastructure, with access to the Internet. However, some of the institutions did not have a computer network, had limited or no access to the Internet and did not have appropriate computer-based information system for managing coastal and marine resources, which is a challenge in establishing a Regional CHM.
- (e) About 50% of the institutions surveyed did not have ICT staff to support information systems for coastal and marine management. There was overwhelming support for the

need to train staff in the CHM focal institution on content management, content uploading and use of the Regional CHM.

3. Information Management Strategy

3.1 Information Management Framework

The information management strategy recommended in Section 3 is based on the framework shown in Figure 1 below.

Figure 1: Information management framework

Information management construct	Construct meaning
1. Vision	A vision is a shared image of what an entity wants to become within a broad time horizon. It answers the question: “What will success look like”?
2. Mission	A mission defines the basic reasons for the existence of an entity and helps legitimize it in its environment. It captures the broad purpose and functions of the entity to achieve the purpose.
3. Principles	These are the key notions or rules to ensure that information management activities are effective and successful
4. Objectives	Objectives give <u>what</u> is to be achieved in a broad time horizon. Guided by the principles, the objectives should be able to achieve the vision and mission of the entity.
5. Strategies	Strategies are statements that set <u>how</u> the entity will achieve its objectives. Information management strategies should address content, people, processes, technology and institutional arrangements for successful implementation
6. Practical next steps	These are the short-term actions or commonly referred to as “quick wins”. They require minimal resources, are visible, are in line with the objectives and strategies and can be implemented in the short term. They provide evidence that the entity is on track to achieve the long term vision, facilitate commitment from the stakeholders and build momentum towards the more longer term actions.

Based on the above framework, the information management strategy of the Regional CHM is described below.

3.2 Vision and Mission

(a) Vision

The suggested Vision of the WIO Region Clearing House Mechanism for Nairobi Convention is:

To be a sustainable first port of call for information on the coastal and marine environment in the Western Indian Ocean Region

(b) Mission

The suggested Mission of the WIO Region Clearing House Mechanism for Nairobi Convention is:

To provide accurate and relevant data and information for improved management and protection of the coastal and marine environment in the Western Indian Ocean Region

3.3 Objectives

The Clearinghouse Mechanism should promote the advertising, discovery, access, dissemination and use of information and data held by many organizations using the Internet. The regional workshop recommended that the proposed WIO Region Clearing House Mechanism should serve the interests of the Contracting Parties of the Nairobi Convention and act a node of the UNEP/GPA CHM. To this extent, and in line with the vision and mission above, the objectives of the WIO CHM are:

- (a) To support the collection of timely and relevant data and information from appropriate CHM nodes;
- (b) To facilitate access to information and data (actual data or metadata) by stakeholders;
- (c) To provide search engine facilities for relevant web resources, with ratings on their usefulness for different subjects or themes;
- (d) To provide communication and discussion fora relevant for all stakeholders; and
- (e) To avail data and information to support decision-making in the field of the management and protection of the coastal and marine environment of the WIO Region;

3.4 Principles

The key principles that will govern the operation of the proposed Regional Clearing House Mechanism are:

- (a) There should be a broad participation of all key stakeholders.
- (b) Lower level nodes will collect and store data working under the guidance of the national nodes.
- (c) The national nodes will act as coordinating bodies to facilitate data sharing between national institutions.
- (d) The national nodes will set the data/information sharing policies and required meta data standards.
- (e) Data and information should be kept relevant, accurate and up to date.
- (f) Data and information ownership is at the lower level nodes that generate it.
- (g) General data or meta-data and information will be freely and readily accessible to stakeholders who need it. Lower level nodes however have a right to deny access to specific data which they consider to have significant intellectual value or charge appropriately for its access.

3.5 Information Management Strategies

3.5.1 Content Strategy (Information Requirements)

The information requirements of the potential users of the Regional Clearing House Mechanism are as recommended in Table 4 below:

Table 4: Information requirements of the Regional CHM

Users	Information requirements
Central and local government (policy makers)	<ul style="list-style-type: none"> ▪ Reports and data on economic activities of various parts of the coast ▪ Reports and/or outlines of on-going research projects/activities ▪ Technical reports ▪ Reports on coastal and marine environmental status and challenges in various countries ▪ Processed data, graphics, maps, etc ▪ Links to government websites with relevant socio-economic information ▪ Static maps/GIS maps ▪ Information on demonstration projects ▪ Newsletters from partner institutions ▪ Calendar of meetings in the WIO Region and elsewhere ▪ UNEP/Nairobi Convention publications ▪ Information on Nairobi Convention initiatives or projects ▪ Long-term development plans and strategies of key institutions ▪ Information on other ongoing initiatives and projects ▪ Annual reports of key institutions in the WIO Region

Users	Information requirements
Research and academic institutions	<ul style="list-style-type: none"> ▪ Reports and /or outline sof on-going research projects/activities ▪ Technical reports of various research /assessment activities ▪ Reports on environmental status and challenges in participating countries ▪ Raw and processed data, graphics, maps, etc ▪ Links to government websites with relevant socio-economic information ▪ Static and dynamic maps/GIS maps ▪ Information and data on demonstration projects ▪ Newsletters of partner institutions ▪ Calendar of meetings in the WIO Region and elsewhere ▪ Existing opportunities for research collaboration ▪ Information on research grants/consultancies ▪ Research publications (journal papers, reports, conference proceedings, etc) ▪ UNEP/Nairobi Convention publications ▪ Reports and summaries of research outputs ▪ List of scientific publications with links to full articles, where possible (and where possible, full articles) ▪ Contacts of other researchers and scientists, sorted by areas of research ▪ Research institutions annual reports ▪ Discussion forums on specific disciplines
Community (NGOs & CBOs)	<ul style="list-style-type: none"> ▪ Newsletters of partner institutions ▪ Calendar of meetings in the WIO Region and elsewhere ▪ Index of all NGOs & CBOs ▪ Reports and data on economic activities of various parts of the coast ▪ Outline of on-going research projects/activities ▪ Summary of technical reports ▪ Technical reports of various research /assessment activities ▪ Reports on environmental challenges in various parts of the coast ▪ Processed data, graphics, maps, etc ▪ Links to government websites with relevant socio-economic information ▪ Static maps/GIS maps ▪ Information on demonstration projects ▪ UNEP/Nairobi Convention publications ▪ Information on community projects
Private sector	<ul style="list-style-type: none"> ▪ Reports and data on economic activities of various parts of the coast ▪ Summary of technical reports ▪ Reports on environmental challenges in various parts of the coast ▪ Processed data, graphics, maps, etc ▪ Links to government websites with relevant socio-economic information ▪ Static maps/GIS maps ▪ Information on demonstration projects ▪ Information on Nairobi Convention initiatives or projects ▪ Long-term development plans and strategies of key institutions ▪ Information on other ongoing initiatives and projects

Users	Information requirements
Media	<ul style="list-style-type: none"> ▪ Reports and data on economic activities of various parts of the coast ▪ Outline of on-going research projects/activities ▪ Summary of technical reports ▪ Reports on environmental status and challenges in participating countries. ▪ Processed data, graphics, maps, etc ▪ Links to government websites with relevant socio-economic information ▪ Static maps/GIS maps ▪ Information on demonstration projects ▪ Newsletters of partner institutions and projects ▪ Calendar of meetings in the WIO Region and elsewhere ▪ UNEP/Nairobi Convention publications ▪ Information on Nairobi Convention initiatives or projects ▪ Long-term development plans and strategies of key institutions ▪ Information on other ongoing initiatives and projects ▪ Annual reports of key institutions in the WIO Region
Partners (national, regional and international)	<ul style="list-style-type: none"> ▪ Reports on economic activities of various parts of the coast ▪ Outline of on-going research projects/activities ▪ Summary of technical reports ▪ Reports on environmental status and challenges in participating countries. ▪ Processed data, graphics, maps, etc ▪ Links to government websites with relevant socio-economic information ▪ Static maps/GIS maps ▪ Information on demonstration projects ▪ Newsletters of partner institutions and projects ▪ Calendar of meetings in the WIO Region and elsewhere ▪ UNEP/Nairobi Convention publications ▪ Information on Nairobi Convention initiatives or projects ▪ Long-term development plans and strategies of key institutions ▪ Information on other ongoing initiatives and projects ▪ Annual reports of key institutions in the WIO Region

The format and the means of presentation of the above information to the various users was not sought through the questionnaires. The format or structure of the information required by each user group and its technological limitations is proposed in Table 5 below based on experience with other systems. The table also summarizes the recommended methods of presentation of the information to the various users.

Table 5: Proposed format/structure and methods of presentation of information to users

Users	Format/ structure of information	Technological limitations of users	Methods of information presentation
Central and local government (policy makers)	<ul style="list-style-type: none"> ▪ Summaries ▪ Trends ▪ Highlights ▪ Feature articles 	<ul style="list-style-type: none"> ▪ May only appreciate the role of technology in their business ▪ May use desk top applications, access Internet and communicate electronically 	<ul style="list-style-type: none"> ▪ Static GIS maps ▪ Graphs, tables and other charts ▪ Static text
Community (NGOs and CBOs)			
Private sector			
Media			
Partners (national, regional and international)			
Research and academic institutions	<ul style="list-style-type: none"> ▪ Summaries ▪ Trends ▪ Highlights ▪ All details 	<ul style="list-style-type: none"> ▪ None 	<ul style="list-style-type: none"> ▪ Static and dynamic GIS maps ▪ Graphs, tables and other charts ▪ Static and interactive text

The key strategies to ensure that the regional CHM is kept up-to-date are (partly from part E4 in Annex 6):

- Strengthen the capacities of institutions that collect data to do this and update the central national data node. For more effective updates, this capacity building support should be tied to actual updating exercises.
- A mechanism should be put in place for the national focal institutions to compete in updating. This mechanism may involve competition for access to additional resources.
- Mandate to update the system should be given to the specific institutions that generate data through memoranda of understanding with the national nodes.

3.5.2 Institutional Framework Strategy

The Regional CHM will depend on a decentralized process of gathering, organizing and managing information in a network of national nodes. At the centre of this network is the regional node. This node will be located at UNEP under the auspices of the Nairobi Convention Secretariat. The coordination and management of the Regional CHM must be integrated into the Nairobi Convention structures. It is therefore recommended that the human resources administering the regional node be funded from the Convention. However, the operations of the Regional node should be supervised by the most appropriate UNEP Division, e.g. DEWA or DCPI. With this integration, the Nairobi Convention should then be able to drive sustainably the development and operation of the WIO CHM.

The next level in the network is the national nodes. These nodes will be in designated national focal institutions. The roles of these institutions will be:

- To identify useful data from lower level nodes.
- To define the roles of lower level nodes and assign responsibilities for data collection (e.g. which institution collects what data).
- To act as coordinating bodies to facilitate data collection and sharing.
- To facilitate data and information integration.
- To manage data according to national priorities.
- To undertake data quality control.
- To publish metadata on agreed standards from the various sources.

In order to improve on coordination and synergy at the national level, it is recommended that national working groups be created. These would involve focal points of different national institutions and projects. In countries where there are existing inter-agency environmental Working Groups and Inter-Ministerial Committees, efforts should be made to facilitate collaboration with the national CHM Working Group.

The national nodes should have a similar suite of facilities and tools in order contribute effectively in the mechanism. The recommended staffing at each national node is as outlined in the human resource strategy below.

The institutions below the national nodes form the next layer of nodes. These are the institutions that collect and collate data in line with guidelines provided by the national node.

3.5.3 Human Resources Strategy

The Regional CHM workshop recommended that the chosen national focal institutions should have the following minimal human resource capacities:

- A dedicated Information and Database Coordinator in the national node with a good knowledge of the technical aspect of data management e.g. data formats. The Coordinator may not necessarily sit at the node but must be available to it. The Coordinator will also be responsible for identification of capacity-building needs for the institutions that are part of the national node. Coordinators without the appropriate knowledge/skills should be trained and strategies be devised to facilitate subsequently passing of knowledge to the members of the national node. The Coordinator will also have the role of establishing linkages with the regional CHM node.
- The Data Coordinator should preferably have staff with the following expertise:
 - Library cataloguing.
 - Data management capability.
 - Geospatial information expertise.
 - Database design expertise.

However, in addition to addressing the human resource situation in national nodes, it is important to address the regional human-capacity required for sustainability of the system. The responsibility of administering the existing Eastern African Regional Coastal Database

has so far been the UNEP's Division of Early Warning and Assessment (DEWA), which is not part of the division's core business. The recommendation here is that the CHM should be integrated into the Nairobi Convention programmes in line with the recommendations of the fourth COP meeting of 2004. In this respect, a CHM Administrator (a management information specialist) should be established as a resource of the NC Secretariat. This resource can then be supervised by the most relevant division in UNEP. This will be DEWA in the initial period given the long history and the interest and commitment this division has exhibited with the existing East African Coastal and Marine Resource Database and Atlas. However, in the longer term, the supervision of the resource should be transferred to DCPI, whose mandate is more relevant to the functions of the CHM.

The CHM Administrator would work with national node Data Coordinators to ensure the CHM is always up-to-date and provide the necessary on-line support to the National Data Coordinators.

3.5.4 Technology Strategy

The WIO CHM needs to be linked to the systems in the national nodes in order to facilitate easy update of the CHM and exchange of information between the CHM and national systems. In this respect, it is necessary to ensure seamless integration with these systems. The technologies chosen for implementation must therefore have open standards. In addition, the user interfaces should be "human-friendly" and they should present a consistent "look-and-feel" across all applications, including standard navigation and page layouts. This will increase user acceptance of the CHM and reduce the need for extensive user training.

3.5.5 Sustainability Strategy

It is one thing to implement the proposed CHM but quite another to ensure its operations are sustainable. It is critical that the operations of the CHM are sustainable from financial, technical and organizational points of view. The stakeholders must ensure that the system is sustainable on long-term basis; otherwise it would become an unsuccessful project that fails to deliver the expected benefits. Partly based on some of the ideas of the regional CHM workshop, the recommended sustainability strategies are:

- (a) **Commitment and ownership by national governments and focal institutions:** As a part of its commitment to the Nairobi Convention, each government is expected to facilitate the appointment of a national focal institution and to provide part funding of the CHM activities in this institution. In addition, each national focal institution is expected to institutionalize the regional CHM requirements into the national development programs and mobilize appropriate financial resources. More specifically, governments will have to provide for financial resources to sustain their national CHM operations. This commitment will have to be obtained at the highest level of the Nairobi Convention, i.e. Conference of Contracting Parties. At the same time, national CHM focal institutions will have to create a budget for their CHM operations.

- (b) **Tangible and visible benefits of the WIO CHM:** The CHM will be supported by the WIO-LaB Project until 2008. However, for participating governments to commit resources beyond this period and sustain the regional system, it is critical that the system demonstrates its usefulness and relevance by producing tangible and visible benefits in addressing national and regional coastal and marine issues. These benefits may include increased visibility or exposure in the WIO region, enhanced cooperation, new funding opportunities arising from new cooperations, income generation opportunities arising from ability to sell data and services, and so on.
- (c) **Relevant and up-to-date data/information:** It is critical that Regional CHM is relevant to the needs of users. It is therefore important that there is regular feedback from users in order to ensure that data/information remains relevant to their requirements. In addition, there should be regular updates to ensure the data/information contained in the CHM is always up-to-date.
- (d) **Regular review:** The requirements of the users of the CHM are dynamic. It would therefore be important to facilitate regular monitoring and review of the regional system in order to meet the changing needs of various users.
- (e) **Collaboration:** The WIO CHM will loose value if it duplicates what is being done by other projects and/or programmes in the WIO Region. It is therefore crucial that effort is made to secure mutual collaboration with other regional/global programs, initiatives and other CHMs, e.g. IOC-UNESCO's ODIN-AFRICA framework.
- (f) **Dedicated and skilled human resources:** It is not possible to sustain the regional CHM system without dedicated human resources both at the regional and national level institutions. It is therefore recommended that a CHM Administrator is funded from Nairobi Convention programme budget and that dedicated personnel as proposed in the human resource strategy above are funded at the national focal institution level. These personnel must have the pertinent skills as well as clear roles and responsibilities or job descriptions, linked to the regional and national CHM mandates, respectively.
- (g) **Appropriate ICT infrastructure in national nodes:** The WIO CHM will not be reality without an appropriate ICT infrastructure in national nodes. This infrastructure includes appropriate hardware and software to support national coastal and marine resource management and a fast connectivity to the Internet.

3.6 Practical Next Steps

The following are the key next steps.

- (a) Develop and sign an MOU on collaboration with the IOC's ODIN-AFRICA framework.

- (b) Carry out research on what other related regional initiatives or programmes are doing, what data/information can be shared and the nature of collaboration with the respective institutions. This research could initially be undertaken by UN volunteers.
- (c) Recruit a Systems Administrator (an information management expert) to develop and implement the CHM and build the necessary technical and user capacity. This Administrator will be responsible to the Nairobi Convention Secretariat but will be initially supervised by DEWA. This person must be retained on a full-time basis or on such a part-time basis as is necessary to transfers the knowledge to a lower level full-time resource person.
- (d) Finalization of the selection of CHM's national nodes by the Contracting Parties (COP) to the Nairobi Convention. Using the criteria developed during the CHM regional workshop, the Project Management Unit of the UNEP/GEF WIO-LaB Project should work with the Nairobi Convention and the National Focal Points to finalize the designation of outstanding cases.
- (e) Appoint the national Data Coordinators, who would provide the required leadership of the CHM during implementation and into operational usage. The national governments must be involved in these appointments.
- (f) Develop and sign MOUs with designated national nodes. Funds would then be transferred based on the terms and condition specified in the signed MOUs.
- (g) National governments to integrate CHM into national environmental planning and create a budget to support national CHM activities from 2008.
- (h) Carry out an assessment of the existing technological and ICT human capacities of the chosen CHM national nodes to determine the intervention required during the system implementation. The assessment should be done using agreed criteria, the basis of which was developed during the regional CHM workshop. This assessment could be carried out by UN Volunteers. ICT facilities and human capacity building for each national node would be based on this assessment.
- (i) Develop a data sharing policy and mechanism at national levels. This policy should be discussed and agreed upon by the national stakeholders.
- (j) Develop and distribute promotional material on the CHM and compile the first newsletter of the WIO CHM. This could be carried out by UN Volunteers.

4. Conclusions

The conclusions presented in this section are based on the assessment made. Specifically, they are based on analysis of the questionnaires and interviews as well discussions during the Regional CHM workshop.

- (a) The level of access of the existing Eastern African Regional Coastal Database (EAF-14 Database Project) was very low. In addition, respondents had a high preference for other websites, especially ODIN-AFRICA and WIOMSA. This preference was largely because the EAF-14 database did not contain pertinent data/information and was not up-to-date.
- (b) The information requirements of the various categories of users are different and the proposed CHM must ensure the format/structure and method of presentation of the information suites each category of users.
- (c) There was concern over the sustainability of the WIO CHM. Several strategies for sustainability have been proposed. Key among these is the commitment of financial resources by both governments and national focal points and continuous relevance of the CHM to national and regional issues. Also, there is a need for continuous updating of the data and information and appropriate human and ICT resources at the national CHM focal point institutions.
- (d) There were limited partnerships and collaborations between organizations or programmes with related objectives. There is need for the WIO CHM to partner and collaborate with institutions and programmes with related objectives in order to avoid duplication of effort and wastage of limited available resources and to exploit the synergies, amongst other benefits.

5. Recommendations

From the assessment, the implementation of the WIO CHM has some challenges. Key among these are leadership, commitment and ownership of the CHM at both regional and national levels; institutional framework at both regional and national levels; human and ICT resource capacities at national and sub-national nodes; partnerships and collaborations with related initiatives; and data sharing. The recommendations given in this section are meant to address these challenges and ensure successful implementation of the WIO CHM. They are based on the assessment made as well as on the Consultant's experience in implementing information systems in organizations.

- (a) **Linkages with related initiatives:** As recommended in the report of the Regional CHM workshop, it is suggested that formal linkages be established with other similar or related initiatives in the WIO region. Specifically, given the overlap with the Africa Ocean Atlas (AOA) being developed under the auspices of IOC-UNESCO ODIN-AFRICA framework and the positive consultations already taking place, a formal MOU should be developed as a matter of urgency. Linkages with other related initiatives can be brought on board as the respective collaborations mature.
- (b) **Institutional framework:** In order for the WIO CHM to serve the Nairobi Convention, it is important that the implementation and operation of the regional CHM is continuously linked to the needs/programmes of the various countries in the framework of the Nairobi Convention. It is therefore recommended that the human resources administering the regional node be funded from the Convention. However, the operations of the Regional node should be supervised by the most appropriate UNEP Division, e.g. DEWA or DCPI. At the national level, a national node will be designated with staffing as defined in human resource strategy in section 3. In addition, it is recommended that National Working Groups be created to improve on coordination and synergy at the national level. The membership of the Working Group should ensure representation of all key institutions that will provide data/information, including representation of relevant ministerial departments, such as the departments in charge of environment, natural resources, planning and national statistics; faculties or schools in universities or research institutes in charge of marine/coastal research; NGOs/CBOs working in coastal and marine management; regional programmes based in the country, etc.
- (c) **Selection of national focal institutions:** Given that the IOC-UNESCO ODIN-AFRICA's National Oceanographic Data Centres (NODCs) are already operating in most of the participating countries and given the significant overlaps between these initiatives, it is recommended that the national nodes for the CHM should be made to coincide with these centres. The ODIN-AFRICA NODCs are:
- Centre National de Documentation et de Recherches Scientifiques (CNDRS) – Comoros
 - Kenya Marine and Fisheries Research Institute – Kenya

- Institut Halieutique et des Sciences Marines, Université de Toliara – Madagascar
- Mauritius Meteorological Services – Mauritius
- Instituto Nacional de Hidrografia e Navegação (INAHINA) – Mozambique
- Seychelles Fishing Authority – Seychelles
- Institute of Marine Sciences, University of Dar Es Salaam – Tanzania

The decision in regard to this exercise should be made by the participating national governments who are contracting parties (COP) to the Nairobi Convention. However, the criteria for designation of the CHM national node developed during the CHM regional workshop should be used, with the provision that priority be given to making the CHM national nodes coincide with the NODCs. Where this is not possible, a collaborative mechanism should be developed to facilitate collaboration between the CHM national nodes and the NODC. In certain instances, it may be necessary that staff required for CHM operations could be appointed from both institutions. For example, the Information and Database Coordinator can be from the CHM national node while the Geospatial Information Expert can be appointed from the NODC.

- (d) **Technological and human capacities of national focal institutions:** Given the varying technological and ICT human capacities of the potential NFIs, it is recommended that an assessment of the existing technological and ICT human capacities of the chosen NFIs is carried out. This assessment would enable the appropriate intervention to be designed for a successful CHM implementation. For example, some of the national nodes might have no capacities and may require assistance from the regional node in order to set up national web sites that would be linked to the CHM. Specifically with respect to human capacity, there is a need to train staff in the CHM focal institution on content management, content uploading and use of the Regional Clearing House Mechanism and to carry out awareness campaigns to increase the level of usage of the WIO CHM.

The technological and human capacities outlined in the regional CHM workshop should be expounded to become the criteria for assessment. Ultimately, the national nodes should have uniform staffing and have a similar set of facilities and tools. For the nodes below the national nodes, the national node should be able to provide technological and human capacity support, where necessary, especially in data collection.

- (e) **Updating the WIO CHM:** The strategies to ensure the Regional CHM is updated regularly include strengthening the data collection capacities of institutions that collect data, regular updating of the central national data node, ensuring national focal institutions are motivated to compete in updating their sites and placing the mandate for updating with the specific institutions that generate data.
- (f) **Data sharing.** The Regional CHM workshop identified three levels of data sets that could be shared: regional data sets (e.g. meteorological data, ocean currents, etc.), national data sets (available upon request) and site specific data. It was suggested that the national/site specific data of regional importance should be highlighted on regional web site and the open access data be stored at a regional level. It was further suggested that the nationally owned data should be stored at the national level. All data sets are eligible for sharing and

it would be up to the countries and institutions to decide on best options of sharing their data.

It is recommended, in line with the Regional CHM recommendation, that the lessons from ARSIE (Association de Réseaux des Systèmes d'Informations Environnemental) on a data sharing mechanism at national level should be sought. These lessons would guide in the development of the data sharing policy and mechanism at national levels, subject to the exigencies of prevailing national data sharing policies. It is further recommended, again in line with the Regional CHM agreement, that a working group consisting of ACEP, WIO-LaB, IOC-UNESCO and other interested parties be established to discuss meta-data formats for data documentation and sharing.

- (g) **Design of the Regional CHM:** The design of the Regional CHM must be based on the requirements in this report.
- (h) **Leadership of CHM:** One of the key reasons why the existing EAF-14 database had challenges in meeting the expectations of stakeholders was lack of leadership. It is critical that the WIO CHM has strong and visible leadership at both regional and national levels. The leadership will ensure that sufficient sense of urgency in updating the CHM and stakeholders are engaged and involved in the project. The leadership will also continuously communicate to ensure that the stakeholders have a clear understanding of the CHM and the benefits it delivers.
- (i) **CHM implementation:** The conceptualization of the WIO CHM has been very participative. It is critical that the implementation of the Regional Clearing House system continues to have the same level of participation of the stakeholders. This will create a high level of commitment to and ownership of the CHM at the national level, which in turn will certainly contribute to its sustainability. In addition participation, the implementation of CHM should be phased out, with a careful choice of the first phase. This choice must be made to ensure that it demonstrates the value of the Regional CHM; builds momentum for future project activities; generates interest and enthusiasm from both end-users and stakeholders; delivers tangible and visible benefits; addresses an important, pertinent or urgent information need; and can be clearly communicated to stakeholders. This will assist the CHM in gaining further resources and support, and in turn enhance its sustainability.
- (j) **Practical next steps:** The practical next steps in sub-section 3.6 should be implemented immediately to raise the commitment of the stakeholders, to increase the ownership of the CHM at all levels and to build momentum to handle the more difficult long-term actions.

References

1. UNEP, 2006. Addressing Land-based Activities in the Western Indian Ocean. Report of the First Regional Workshop on the Development of a Clearinghouse Mechanism and Information Sharing System on Eastern African Coastal and Marine Environment Resources. UNEP /GEF/ WIO-LaB/CHM.1/2006
2. UNEP, 2005. UNEP-GEF WIO-LaB Project Annual Report 2005, UNEP-GEF WIO-LaB Project Management Unit, Nairobi, Kenya
3. UNEP, 2006. Summary of the Eastern African Coastal and Marine Environment Resource Information System Project (Project no. EA/1025-06-02)
4. UNEP, 2006. Addressing Land-based Activities in the Western Indian Ocean. Report of the Second Meeting of the Regional Steering Committee Meeting. UNEP/GEF/WIO-LaB/PSC.2/2006
5. UNEP. 2004. Report of the Fourth Meeting of the Contracting Parties to the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region, Madagascar.
6. The Nairobi Convention, 2002-2003 Reports, UNEP, Kenya, August 2003.
7. Eastern Africa Atlas of Coastal Resources, UNEP, Kenya, 1998.
8. Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region and Related Protocols, United Nations, 1985

Annexes

Annex 1: List of Persons Interviewed

1. Dr. Peter Scheren, Project Manager, UNEP/GEF WIO-LaB Project
2. Dr. Johnson Kitheka, Project Officer/Environmental Scientist, UNEP/GEF WIO-LaB Project
3. Mr. Dixon Waruinge, Programme Officer, Regional Seas (Nairobi and Abidjan Conventions), Division of Environmental Conventions, UNEP
4. Mr. Mwangi Theuri, Associate Programme Officer, Division of Early Warning and Assessment (DEWA), UNEP
5. Ms. Ulrika Gunnatz, Junior Programme Officer, Regional Seas (Nairobi and Abidjan Conventions), Division of Environmental Conventions, UNEP
6. Dr. Julius Francis, Executive Secretary, Western Indian Ocean Marine Science Association (WIOMSA)
7. Ms. Jackline Uku, Research Scientist, Kenya Marine and Fisheries Research Institute (KMFRI)

Annex 2: List of Stakeholders Who Completed the Questionnaire

Name	Institution/Programme	Country
1. Aboubacar Anabelle	Environmental Research	Comoros
2. Hachime Abderemane	Biodiversity Conservation	Comoros
3. A. Fouad	Marine Parc (CBO)	Comoros
4. Farid Anasse	Environment Institute	Comoros
5. Yahaya Ibrahim	CNDRS	Comoros
6. Hamza Abdou Azali	INRAPE	Comoros
7. Ahmed Ali Mouridi	INRAPE	Comoros
8. Joseph Masinde	National Environment Management Authority (NEMA)	Kenya
9. Harrison Ong'anda	Kenya Marine & Fisheries Research Institute (KMFRI)	Kenya
10. Jackline Uku	Kenya Marine & Fisheries Research Institute (KMFRI)	Kenya
11. F. Tom Otieno	DRSRS	Kenya
12. Jean Roger Rakotoarijaona	Office National pour l'Environnement	Madagascar
13. Satyanand Buskalawa	Ministry of Environment	Mauritius
14. Simao Joaquim	National Remote Sensing & Cartography Centre, CENECARTA	Mozambique
15. Joseph Rath	Pollution Control and Environmental Impacts Division, Department of Environment, Ministry of Environment & Natural Resources	Seychelles
16. Rodney Quatre	SCMRT – MPA	Seychelles
17. Abirami S. Pillay	Department of Environment, Ministry of Environment & Natural Resources	Seychelles
18. Francis Coeur De Lion	Centre for GIS, Ministry of Land Use and Habitat	Seychelles
19. Riaz Aumeeruddy	Seychelles Fishing Authority	Seychelles
20. Rudy van der Elst	Oceanographic Research Institute	South Africa
21. Carl K. Wainman	Southern African Data Centre for Oceanography	South Africa
22. Lucy Scott	African Coelacanth Ecosystem Programme	ACEP/ASCLME, South Africa
23. Christopher Muhando	Institute of Marine Sciences, University of Dar-es-salaam	Tanzania
24. Desiderius Masalu	Institute of Marine Sciences, University of Dar-es-salaam	Tanzania
25. Melita Samoily	IUCN	IUCN
26. Julius Francis	WIOMSA	WIOMSA
27. Modesta Medaid	WWF – EAME Programme	WWF

Note:

It is to be noted that two of the hard copy questionnaires got lost while moving offices. However, the data from these questionnaires had been analyzed. It is only for purposes of compiling this annex that the questionnaires were not available.

Annex 3: Questionnaire for an Information System for the Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern Africa Region

The Project entitled “Addressing land-based activities in the Western Indian Ocean”(herein referred to as “WIO-LaB”) addresses some of the major environmental problems and issues related to the degradation of the marine and coastal environment due to land-based activities in the Western Indian Ocean (WIO) region. The project is designed to serve as a demonstration project for the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities. As one of the activities, the WIO-LaB Project aims to improve the existing web-based information system for the Nairobi Convention (the *Eastern African Coastal and Marine Resources Database*), which will serve as a regional CHM node for the Global Programme of Action (GPA) for the Protection of the Marine Environment from Land Based Activities, and will host a geospatial and socioeconomic data repository for the Eastern Africa coastal region. The objective of collecting data through this questionnaire is to come up with the requirements to improve the existing web-based information system for the Nairobi Convention and develop an information management strategy, especially how such a system can be sustained in the longer term. The requirements and the information management strategy will then be the basis for the implementation of the system to facilitate the ability of the countries to readily access scientific, technical, environmental and legal information essential for the sustainable development of their coastal and marine environment.

A. General

1. Date: Name of Interviewee:
2. Institution: Position:
3. Role:
4. Type of institution

(Fill in the appropriate choice{separate with commas for multiple choices})

a. National government	b. Local government	c. Other governmental organizations	d. International organization	e. Non-Governmental Organization (NGO)
f. Community-based Organization (CBO)	g. Private sector	h. Academic/ Research Institutions	i. Other (specify)	

5. City/Town: Country:

B. Existing Eastern African Regional Coastal Database (www.unep.org/easternafrika)

1. Do you access the existing Eastern African Regional Coastal Database? YES (Y) or NO (N)

(Fill in the appropriate choice)

2. If NO, please explain why.

(Fill in the appropriate choice{separate with commas for multiple choices})

a. No knowledge of the existence of the database	b. Lack of Internet access in my institution	c. Limited IT human capacity in my institution	d. Other (specify)
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Please go to Section C after answering the above question, otherwise continue below.

3. If YES, how frequently, on average, do you access the database?

(Fill in the appropriate choice{separate with commas for multiple choices})

a. Several times in a month	b. Once a month	c. Once in a quarter	d. Twice a year	e. Once a year	f. Other (specify)
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4. Why do you access the database?

(Fill in the appropriate choice{separate with commas for multiple choices})

a. To update the database	b. To access data & information	c. To find out what is available	d. Other (specify)
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5. How do you use the information extracted from the database?

(Fill in the appropriate choice{separate with commas for multiple choices})

a. To inform decision making processes	b. To know what other countries are doing	c. To help develop projects	d. To inform on-going research activities	e. Other (specify)
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6. In your view, what data or information is missing in the database?

7. What key challenges has the database system faced over the years?

(Fill in the appropriate choice{separate with commas for multiple choices})

a. System no longer sending periodic email alerts on new updates	b. Database is inaccessible	c. No new updates for several months/years	d. Data and information is not relevant or is outdated	e. No incentives for collaborating centres to update the website
f. Local institutions are not aware of the database	g. Limited IT capacity in collaborating institutions	h. Other (specify)		

8. If the database was improved or upgraded, who are the potential users?

(a) In your institution?

(b) In your country?

(c) At regional/international level?

C. Enhanced Web-based Information System for the Eastern Africa Coastal Region

1. Which web-based marine and coastal information systems do you regularly access?

(Fill in the appropriate choice{separate with commas for multiple choices})

a. Odin Africa(ODIN- AFRICA.net)	b. African Oceans.net(AfricanO ceans.net)	c. Wiomsa(wio msa.org)	d. UNEP GPA clearing house(gpa.unep .org)	e. Other (specify)
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2. What data or information do you access from these information systems?

3. What benefits would you expect from an enhanced information system for the Eastern Africa Coastal Region?

(Fill in the appropriate choice{separate with commas for multiple choices})

a. Increased collaboration among partners and stakeholders	b. Get informed of what is happening	c. Raised awareness on marine and coastal environmental issues	d. Access to relevant marine and coastal environmental data and information	e. Other (specify)
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4. What are the key data/information required to establish such a system?

(Fill in the appropriate choice {separate with commas for multiple choices})

a. All Nairobi Convention initiatives/projects	b. Relevant scientific publications	c. Technical reports	d. Policy analysis documents	e. Socio-economic data
f. Environmental challenges or hotspots (GIS format)	g. Trends in ecosystem management in an area (GIS format)	h. Raw scientific data	i. Relevant projects or activities being carried out by partners	j. Links to partners
k. Other (specify)				

5. Where could the data/information in 4. above possibly come from?

Type/nature of data/information	Source	Type/nature of data/information	Source
a)		d)	
b)		e)	
c)		f)	

6. What data/information do you produce that can be useful for such an information system?

7. Who are the possible users of the data/information that will be uploaded by your institution into the Eastern Africa Coastal and Marine information system?

(Fill in the appropriate choice {separate with commas for multiple choices})

a. Policy makers	b. Policy implementers	c. Researchers, scientists and students	d. International organizations	e. Non-Governmental Organizations (NGOs)
f. Community-based Organizations (CBOs)	g. Private sector organizations	h. Other (specify)		

8. What data/information would your institution wish to access from such an information system?

D. Institutional Capacity

1. Are the computers in your institution connected together into a network? YES (Y) or NO (N)

(Fill in the appropriate choice)

2. How would you best describe the network infrastructure in your institution?

(Fill in the appropriate choice {separate with commas for multiple choices})

a. An integrated network of personal computers with servers (application, web, mail, etc.) and software	b. Isolated local area networks with servers for specific networks	c. Isolated local area networks with no servers (application, web, mail, etc.) and no software	d. One or two local area networks which do not cover all offices/spaces
e. Personal computers which are not networked	f. No personal computers	g. Other (specify)	

3. What type of Internet access does your organization have?

(Fill in the appropriate choice {separate with commas for multiple choices})

a. None	b. Dial-up	c. Leased analog line	d. Leased digital line	e. Other (specify)
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4. What is the highest Internet connection speed available to your organization?

(Fill in the appropriate choice {separate with commas for multiple choices})

a. 64 Kbps	b. 128 Kbps	c. 256 Kbps	d. 512 Kbps	e. 1,024 Kbps	f. > 1,024 Kbps
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5. What technologies does your institution have to collect, process, store and disseminate data and information on marine and coastal management?

(Fill in the appropriate choice {separate with commas for multiple choices})

a. Integrated management information systems	b. Web-based databases	c. Geographical information system	d. Non-web-based databases	e. Excel tables	f. None	g. Other (specify)
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6. What technical human capacity do you have to support your information systems (IS) for marine and coastal management?

(Fill in the appropriate choice {separate with commas for multiple choices})

a. Dedicated IS personnel	b. Staff from other departments on part-time basis	c. Outsourced contractors	d. Occasional consultants	e. None	f. Other (specify)
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7. Outline the key technological challenges that your institution has in collecting, processing, storing and disseminating data/information on marine and coastal management.

(Fill in the appropriate choice {separate with commas for multiple choices})

a. Lack of a computer-based system	b. No or limited access to the Internet	c. Lack of database software	d. No access to computers	e. Other (specify)
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8. Outline the key human resource challenges that your institution has in collecting, processing, storing and disseminating data/information on marine and coastal management.

(Fill in the appropriate choice{separate with commas for multiple choices})

a. Lack of leadership in information & communication technology (ICT)	b. No dedicated data/information management personnel	c. Lack of awareness of the role of ICT	d. No ICT skills amongst most potential users	e. Other (specify)
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E. Sustainability Strategy

1. What in your view are the possible sources of sustainable funding for the operations and management of the web-based information system?

2. What capacity should be built in the institutions charged with regularly updating the system?

(Fill in the appropriate choice{separate with commas for multiple choices})

a. Dedicated and trained content manager	b. Training on uploading onto the web-based database	c. Training on the use of the web-based database	d. Other (specify)
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3. What awareness campaigns should be put in place to ensure optimal use of the information system?

4. What strategies should be put in place to ensure that data and information is always up-to-date?

(Fill in the appropriate choice{separate with commas for multiple choices})

a. Mandate to update the system from institutions that generate data	b. Capacity building for institutions that update the system	c. Resource allocation for institutions that update the system	d. Other (specify)
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5. What strategies should be put in place to ensure that the system is sustainable in the longer term?

(Fill in the appropriate choice{separate with commas for multiple choices})

a. Involvement of stakeholders in system enhancement	b. Adequate capacity in the institutions that update the system	c. Regular review of the system to ensure relevance to emerging challenges
d. Relevant and up-to-date content	e. Other (specify)	

Please return the completed questionnaire to the following address:

Prof. Timothy Waema
 School of Computing and Informatics
 University of Nairobi
 P.O. Box 30197, Nairobi, Kenya
 e-mail: waema@uon.ac.ke

Annex 4: Results of the Workshop on Regional Clearing House Mechanism

A regional workshop on the development of an Eastern Africa Coastal and Marine Environment Clearinghouse Mechanism (CHM) was held in the period 9-11 May 2006 at UNEP Headquarters in Nairobi in Kenya. The meeting was attended by 25 delegates from Western Indian Ocean Region countries participating in the implementation of WIO-LaB Project, namely South Africa, Mozambique, Tanzania, Kenya, Seychelles, Comoros, Madagascar and Mauritius. The meeting was also attended by representatives of international and regional organizations and programmes including WIOMSA, NEPAD, IOC-UNESCO, ODIN-AFRICA, SADC, WWF-EAME, ASCLME, SWIOFP and ACEP. The goal of the workshop was to seek opportunities and agree on strategies for development of a consolidated, regionally coordinated and integrated Regional CHM for the exchange of data and information on the coastal and marine environment, for the Nairobi Convention, through establishment of synergies with other regional initiatives. The following is an outline of the key outcomes that are relevant to the consultancy assignment.

A4.1 Regional initiatives

Similarities and differences between regional initiatives

- Projects such as ACEP, ASCLME, SWIOFP are or will all be generating databases on more narrow issues which can be integrated within the CHM. In this regard it was noted there was need for collaboration and or integration between these databases.
- CHM may overlap with Africa Ocean Atlas (AOA) being developed under the ODIN-AFRICA Framework. AOA is more general for a broader base of users. There are however differences in operational structures and functions as well as products and outputs of CHM and ODIN-AFRICA's AOA. The CHM for the Nairobi Convention has a unique niche since it focuses on the needs of participating governments and the focus would specifically be on the dissemination of data and information to the governments of the countries that are contracting parties to the Nairobi Convention. It was recommended that further analysis and communication between the two systems will be initiated to avoid duplication

Options for CHM

- Countries can be organized to collect information and contribute the same centrally.
- Where countries cannot provide information and if information is not on the web, they can put it on a national website or institutional websites. CHM would provide a link to national institutional website. CHM would support national websites.

A4.2 What is the value of the CHM

- Exploiting the synergies in multiple benefits.
- Cost effective in duplication of data and also efforts of collection of data

- Standardization for regional analysis and error reduction.
- CHM acts as a guiding mechanism to assist the National Nodes in getting the software license, working methodologies and coordinating process.
- CHM have a general purpose data and links to other data from regional and national nodes - the links leads to marketing of the national nodes.
- Harmonization of methodologies between countries which improves networking capabilities and information sharing.
- Certain regional donor agencies may be attracted for data.
- Promotion of regional cooperation and development.
- To facilitate priority areas for action for coastal management areas.
- Adds value to national programmes.
- Links to other CHM should be provided like ACHM, CBT and other MEA's.
- Announcement of funding opportunities.

A4.3 What are the roles and responsibilities of the CHM?

- Serve the interests of the Nairobi Convention member states.
- Facilitate access to information and data (actual data or metadata) from national and regional projects, for governments (build on the EAF/14 project).
- Provide coordination for regional initiatives.
- Act as a list of directories of:
 - Experts (scientists, stakeholders, institutions)
 - Metadata
 - Data
- Provide a search engine for relevant web sites, with ratings on their usefulness for different subjects or themes.
- Act as a catalyst for capacity building in the region.
- Provide assistance to country nodes (financial, technical).
- Communication (email list-server) but language diversity must be considered.
- Provide linkages to national nodes and relevant resources in line with the key thematic areas of the Nairobi Convention.
- Provide decision-support for policy-making.

A4.4 What are the products and services of the CHM?

- Central server that can also serve national nodes that do not have the ability to host their own sites, while their capacity is built up to take this over.
- Map server.
- Publication of metadata.
- Newsletter for new information and reports.
- Portal for key literature and reports for the NC.
- Promote/publicize the services of national nodes.
- Provide an online forum for guided discussion of relevant issues.
- Provide information about each country (on the website).
- Provide information on disaster management plans.

A4.5 Who are the end-users of existing regional coastal and marine information systems?

- Managers/practitioners
- National and regional programmes
- Policy makers (central and local governments)
- Policy makers
- Researchers & scientists (research institutions & universities)
- Students
- Consultants
- Media
- Public
- NGOs
- Other stakeholders

A4.6 Who are the end-users of existing national coastal and marine information systems?

- Resource managers
- Policy makers & other government managers
- Private sector
- Education institutions
- Scientific community
- Consultants
- Regional and international institutions
- Public
- The National organizations and institutions
- Local authorities
- NGOs
- Local communities
- Development projects
- Pollution control agencies

A4.7 What are the challenges of existing regional coastal and marine information systems?

- Databases are scattered in several projects.
- Data not in easily accessible format.
- Limited GIS-based information systems.
- Limited or lack of adequate human capacity, especially data management specialists.
- Most data still in Grey literature.
- Irregular updating.
- Absence of clearly defined strategy for data and information management.
- General lack of institutional standards and data management.

A4.8 What are the challenges of existing national coastal and marine information systems?

- Lack of specialized human skills.
- Need to harmonize existing data to avoid overlaps and ensure ease of data exchange (e.g. compatibility of database platforms).
- Data sharing is limited – defining clear strategies for data sharing.
- Inadequate ICT infrastructure, including lack of GIS facilities in most national institutions.
- Lack of policies and standards on information management. In particular, lack of information and data exchange policy at both institutional and national levels.
- The marine biodiversity is not well studied (thus limited content).
- Existing data is dispersed in several institutions and most often is not available at the national level.
- Lack of financial and logistical resources in the existing facilities.
- Poor dissemination and marketing of environmental information.
- Lack of sustainable programmes.
- Inadequate commitment of stakeholders.
- Harmonisation of indicators / indices / parameters / units of measurement and methodology.
- Inadequate co-ordination, networking and collaboration among various institutions.
- Inadequate capacity to analyze the collected data into useful information applicable in decision making processes.
- Maintenance and replacement of existing equipment.

A4.9 National institutional framework for managing coastal and marine information systems

Considerations for national institutional framework

- Ensure that data management activities are coordinated between existing NODCs and NC national and regional task forces.
- With respect to linking regional projects on a national level, it was noted that it was important to create national working groups involving focal points of different national institutions and projects in order to enhance coordination and establish synergies between various related activities at national level. It was noted that where in some countries, inter-agency environmental working groups and inter-ministerial committees exists, effort should be made to facilitate collaboration
- Work with the NC to ensure that the national governments support the concept of CHM.
- Look at other CHMs when defining the structure.

Institutional arrangements

- The structure should recognize the distributed nature of the CHM - centralized services at regional level and more specialized service at national level.

- In order to ensure provision of services at national level, it was noted that it would be important for countries to come up with a development plan that clearly defines the requirements of the national nodes.
- The national nodes should also strive to obtain buy-ins from regional partners such as UNDP, World Bank and other multilateral agencies. They could become members of the CHM. With strong basis on a national level, regional entities will follow. Strengthen national basis and then scale up to regional level, keeping the process open and participatory.
- Nodes could be different things in different countries depending on national structures. It is possible to have more than one coordinating agencies.
- Request the participating national governments, who are contracting parties (COP) to the Nairobi Convention, to confirm and formalize the national centre or node.

Proposed structure

- CHM nodes in each country (that are the same as, or closely linked to NODCs) in a focal institution, with a focal contact person.

Recommended roles of national data centres as the key national institutional framework

- National Data Centre (NDC) acts as coordinating body to facilitate other institutions in data sharing and NOT to collect data.
- NDC is to manage data according to national priorities.
- Spatial Data Infrastructure (SDI) can be used as a mechanism to assist in the coordination.
- Identify existing data externally and once the data is available, the NDC facilitates integration.
- Define role of lower level nodes in data collection (which institution is collecting what data – metadata base, locate experts on quality control).
- Publish (and enforce?) metadata on agreed standards from the various sources (lower level nodes to hold the data).
- Set policies to define and assign responsibilities to the institutions which can themselves be defined as a node.

A4.10 What human resources will be required at National Nodes?

- A dedicated Data Coordinator in the NN with a good knowledge of the technical aspect with regards to data e.g. data formats, etc. The Data Coordinator may not necessarily sit at the node but must be available to it. The Coordinator will also be responsible for capacity building for the institutions under the NN. The Coordinator without the appropriate knowledge/skills can be trained and consequently pass on the knowledge. The coordinator will also have the role in coordinating with the regional node.
- The Coordinator will have staff with the following expertise:
 - Library cataloguing
 - Data management capability

- Geospatial information expertise
- Database design expertise

A4.11 What ICT resources will be required at National Nodes?

- Good and functional equipment hardware and software requirements for all the data custodians (computers, plotters, scanners, printers, GPS)
- Reliable internet access (preferably 24/7) with appropriate bandwidth
- Good backup system (data storage media and devices, mirrored onsite storage, offsite data storage, Uninterrupted Power Supply (UPS), all backed up with a good Data Storage Policy. Storage by default ensure sustainability
- Workable IT plans

A4.12 Recommended sustainability strategies

- (a) Commitment and ownership by national governments – e.g. institutionalized part funding, appointment of appropriate NFIs, ...
- (b) Commitment by the national focal institutions e.g. institutionalization into national development programs – research priorities and needs, resource mobilization
- (c) Adequate human, financial and ICT capacities in national focal institutions
- (d) Relevant and up-to-date data/information
- (e) Collaboration with other regional/global programs, initiatives & other CHMs, e.g. IOC-UNESCO's ODIN-AFRICA framework
- (f) Willingness and commitment of development partners (UNESCO, UNEP, etc)
- (g) Dissemination of information to resource users and other key stakeholders in a way that is appropriate
- (h) Information produced is used for policy formulation, decision-making processes, etc.
- (i) CHM work plan is integrated into Nairobi Convention work plan
- (j) CHM to support the implementation of the mandates of NFIs
- (k) Regular monitoring and review of CHM system
- (l) Information provided adds value to stakeholder activities
- (m) Constant communication and exchange of information between NFIs
- (n) Permanent structure for CHM at regional level
- (o) Dedicated staff at NFI with appropriate incentives

A4.13 Relevant Recommendations

1. Representatives of Participating Countries and international/regional organizations recognized the importance of the Regional Clearinghouse Mechanism as a facility for exchange and sharing of information in the Western Indian Ocean Region and agreed to fully participate in and support this initiative.
2. Participants took note of the national and regional data and information management initiatives focused on coastal and marine resources/environment, based upon the presentations made by participating countries and regional organizations including

NEPAD, IOC-UNESCO ODIN-AFRICA framework, ACEP, WWF-EAME, SADC, WIOMSA, among others, and recognized the need for CHM project to establish links with such initiatives at both national and regional levels.

3. Participants took note of the current status of the EAF-14 Eastern Africa Coastal and Marine Resources Database and efforts initiated by UNEP (Nairobi Convention/WIO-LaB Project and DEWA) to improve/update the system in order to play an expanded role of a Clearinghouse Mechanism.
4. In order to ensure its relevancy and sustainability, the CHM should be owned by the national focal institutions in the WIO region and be responsive to the needs of the various categories of stakeholders/users at both national and regional levels.
5. The CHM should ideally be built upon the existing national institutional frameworks and mechanisms and participating countries should explore strategies of ensuring long-term sustainability of the system through mobilization of support from the respective governments and other stakeholders.
6. While recognizing the importance of using the existing National Oceanographic Data Centres of IOC-UNESCO ODIN-AFRICA framework as the focal Points for the CHM, it was decided that the National Focal Points for the UNEP/Nairobi Convention should facilitate consultation at national level in regard to the designation of an appropriate national institution as a CHM focal point, based upon criteria developed during the meeting.
7. A Technical Working Group composed of ODIN-AFRICA, ACEP, DEWA representatives and other interested parties, be constituted at regional level to review the existing metadata formats and recommend the most appropriate standard metadata format that will be adopted by the Clearinghouse Mechanism.
8. Reviewed and adopted with amendments the draft implementation plan for the development of the Clearinghouse Mechanism.
9. Representatives from participating countries agreed to widely share the outcome of this meeting with relevant national institutions and organizations at the country level.

Annex 5: Names and Addresses of Participants of the Regional CHM Workshop

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Annex 6: Questionnaire Analysis Results

Question											
A4. Type of institution responding	National government	National government	Other governmental organizations	International organization	NGO	CBO	Private sector	Academic/ Research Institutions			Total
	16	1	1	1	4	1	1	4			29
A5. Country of institution	Comoros	Seychelles	Madagascar	Mauritius	Mozambique	Kenya	South Africa	Tanzania	Regional institutions		Total
	7	5	1	2	1	5	2	2	4		29
B1. Do you access the existing Eastern African Regional Coastal Database?	Yes	No									Total
	13	16									29
B2. If NO, please explain why.	No knowledge of the existence of the database	Lack of Internet access in my institution	Limited IT human capacity in my institution	Access to other databases that satisfy needs	Out of date and inactive	Restricted access/ syntax errors					Total
	11	5	1	1	1	1					20
B3. If YES, how frequently, on average, do you access the database?	Several times in a month	Once a month	Once in a quarter	Twice a year	Once a year						Total
	5	4	3	0	2						14

B7. What key challenges has the database system faced over the years?	System no longer sending periodic email alerts on new updates	Database is inaccessible	No new updates for several months/years	Data and information is not relevant or is outdated	No incentives for CCs to update the website	Local institutions are not aware of the database	Limited IT capacity in CCs	Being up to date and relevant	Lack of internet connection		
	2	3	4	2	7	5	2	1	1		
B8a. If the database was improved or upgraded, who are the potential users in your institution?											
1	Technical and programme staff in marine programmes										
2	Research officers										
3	It would need to be superior to our own system before we make use of it										
4	Students										
5	Academic staff										
6	Scientists										
7	Chief executive and other decision makers										
8	WWF field sites										
9	Consultants										
10	Public										
11	GIS units in ministry of Environment, SFA, SCMRT, ICS										
12	Division dealing with town & country planning and land use										
B8b. If the database was improved or upgraded, who are the potential users in your country?											
1	Coastal resource managers										
2	Decision generators and makers										

3	International organizations										
4	Students										
5	Academic members of staff										
6	Scientists and researchers										
7	Same as in B8a. above										
8	Government planners and managers										
9	NGOs										
10	Regional programmes and projects										
11	Consultants										
12	CBOs										
13	General public										
14	Policy makers										
15	MLUH, MENR, Parastals of government of Scychelles										
16	Several ministries e.g. Min of Land Use & Habitat and Min of Environment & Natural resources										
B8c. If the database was improved or upgraded, who are the potential users at regional/international level?											
1	Researchers										
2	Managers										
3	Policy makers										
4	CBDS										
5	Regional research programs and organisations (e.g. WIOMSA, SWIOFP, ASCLME, IOTC, etc)										
6	Same as in B8b. above										
7	Decision generators and makers										
8	International organisations										
9	Students										
10	Academic members of staff										
11	Scientists and researchers										

12	Coastal zone institutions										
13	Governments										
14	NGOs										
15	Users or consumers										
16	Global conservationists										
17	Consultants										
18	Indian Ocean Commission, SADC, African Union (Regional), UN bodies, Educational institutions										
19	Private sector (international)										
C1. Which web-based marine and coastal information systems do you regularly access?	Odin Africa (Odinafrica.net)	African Oceans (AfricanOceans.net)	Wiomsa (wiomsa.org)	UNEP GPA clearing house (gpa.unep.org)	FAO, IOTC, IUCN (global), Fishbase UBC Fisheries centre	SADCO	NOAA, ESRI, IAO	None			Total
	15	5	15	6	1	1	1	5			49
C2. What data or information do you access from these information systems?											Frequency
1	Up coming events or news										6
2	Call for papers										1
3	Funding sources or calls for proposals for funding										3
4	On-going research activities in the WIO region										5
5	Information on research and grants										1
6	Coastal and marine resources (maps, coastline topography, marine bio-diversity database, GIS info, climate data, currents...)										9
7	Capacity building programs Odin Africa and Wiomsa										2
8	Fishery status reports										1
9	Data management tools and tutorial from ODINAFRICA										1

10	Meta data											1
11	Training courses opportunities											1
12	Directories											1
13	Contact information											2
14	Publications (reports, papers, ...)											2
15	Conferences and meetings											1
16	Consultants											1
17	Just to see what they have											
C3. What benefits would you expect from an enhanced information system for the Eastern Africa Coastal Region?	Increased collaboration among partners and stakeholders	Getting informed of what is happening	Raised awareness on marine and coastal environmental issues	Access to relevant marine and coastal environmental data and information	Monitoring and evaluation and decreased duplication	Depends on what is meant by 'enhance'						
	23	19	23	24	1	1						
C4. What are the key data/information required to establish such a system?	All Nairobi Convention initiatives/projects	Relevant scientific publications	Technical reports	Policy analysis documents	Socio-economic data	Environmental challenges or hotspots (GIS format)	Trends in eco-system mgnt in an area	Raw scientific data	Relevant projects or activities being carried out by partners	Links to partners	Contacts and HR profiles	
	22	20	21	17	17	22	19	13	20	16		3
C5. Where could the data/information in C4. above possibly come from?	All Nairobi Convention initiatives/projects	Relevant scientific publications	Technical reports	Policy analysis documents	Socio-economic data	Environmental challenges or hotspots, GIS data	Trends in eco-system mgnt in an area	Raw scientific data, meta data	Relevant projects or activities being carried out by partners	Land use and land cover	Research projects	

Source	NC Secretariat (UNEP), National focal points	Scientific journals, scientists, universities, relevant national institutions (e.g. KEMFRI, NEMA), regional projects (e.g. ODIN AFRICA), SCIRUS	Research institutions (e.g. KEMFRI, AIDE, CNDRSRS), regional progs/bodies (e.g. ODIN AFRICA, WIOMSA), Data Centres, UN bodies	Research/ development institutions, Govt. depts & ministries (e.g. Min. of Environ.), regional institutions (e.g. NEPAD)	Research/ development institutions, national statistical offices, relevant govt depts	Institutions with GIS depts, research agencies, personal knowledge, regional progs/bodies (e.g. ODIN AFRICA, WIOMSA)	Research bodies (e.g. KEMFRI), national bodies (e.g. DRSRS)	Hydrographic offices (hydro. parameters), WIO-LaB, Data Centres, ESRI, Universities	Partners	Aerial photo & satellite maps, topo sheets ?	Donor projects, national institutions
C6. What data/information do you produce that can be useful for such an information system?											
1	Relevant scientific publication and environmental challenges (sea grass eco-system)										
2	State of the coast report - mangrove monitoring (GIS data)										
3	Habitats										
4	Most of the information in C4. above										
5	GIS Data on coastal resources, data on ecological studies, oceanographic data obtained from IOC-UNESCO data exchange programs										
6	Marine resources and coastal pollution data/information plus selected indicators (e.g. coastal water quality, marine fish biodiversity)										
7	Summary project reports already sent to UNEP										
8	Data on state, pressure and responses on coastal and marine environment										
9	Scientific publications										
10	Research institutions annual reports										
11	Technical reports (e.g. on fisheries)										

12	On-going research activities										
13	Maps (land use maps, topographic maps)										
14	Policy documents										
15	Acts and laws										
16	Socio-economic data										
17	Specific development to individual plots										
18	Raw data, graphs										
19	National marine biodiversity data										
20	Marine resources database										
21	GIS data										
22	Biodiversity data, oceanographic data,										
23	Brochures and newsletters										
24	Fisheries management										
C7. Who are the possible users of the data/information that will be uploaded by your institution into the Eastern Africa Coastal and Marine information system?	Policy makers	Policy implementers	Researchers, scientists and students	International organizations	NGOs	CBOs	Private sector organizations	Decision makers			
	27	19	29	19	21	14	17	1			
C8. What data/information would your institution wish to access from such an information system?											Frequency
1	On-going projects to avoid duplication of work										3
2	Information on funding sources										1
3	Historical data										1
4	Environment and fisheries relevant information										1

D4. What is the highest Internet connection speed available to your organization?	64 Kbps	128 Kbps	256 Kbps	512 Kbps	1,024 Kbps	> 1,024 Kbps	Not sure				Total
	8	4	3	5	0	4	3				27
D5. What technologies does your institution have to collect, process, store and disseminate data and information on marine and coastal management?	Integrated management information systems	Web-based databases	Geographical information system	Non-web-based databases (access, ..)	Excel tables	None					
	15	10	22	10	11	3					
D6. What technical human capacity do you have to support your information systems (IS) for marine and coastal management?	Dedicated IS personnel	Staff from other departments on part-time basis	Outsourced contractors	Occasional consultants	None	Trained researchers and technicians	Staff on part time basis				
	11	6	5	10	4	2	1				
D7. Outline the key technological challenges that your institution has in collecting, processing, storing and disseminating data/information on marine and coastal management.	Lack of a computer-based system	No or limited access to the Internet	Lack of database software	No access to computers	No dedicated staff in-house	None	Funding	Optimized networks	Unreliable Internet access		
	11	7	12	1	1	3	1	1	1		

D8. Outline the key human resource challenges that your institution has in collecting, processing, storing and disseminating data/information on marine and coastal management.	Lack of leadership in information & communication technology (ICT)	No dedicated data/information management personnel	Lack of awareness of the role of ICT	No ICT skills amongst most potential users	Lack of an ICT budget	Lack of ICT staff development programs	None	Limited ICT skills	Limited ICT staff			
	9	15	5	7	1	2	2	1	1			
E1. What in your view are the possible sources of sustainable funding for the operations and management of the web-based information system?												
1	Institutions - financial or in kind support & consultancies to do work ordinarily done by expatriates									2		
2	Partners (technical & financial support)								1			
3	National and regional collaborative projects								3			
4	Government & international partners (latter to provide seed funding)								1			
5	Institution (income generation, mainstreaming in budgets, etc.) & partners								3			
6	Institution, partners, government & national & regional projects/initiatives								1			
7	Govt, program/project and private sector								1			
8	UNEP regional seas & Nairobi Convention								2			
9	Govt, UNEP & international partners (seed money from the latter)								3			
10	If services are outstanding and significantly better than others								1			
11	Being an integral part of Nairobi Convention programmes								1			
12	Government								1			
13	UNEP/Nairobi Convention								1			
14	The web based information system should be programme instead of project which is carried on only for a certain duration of period									1		

E2. What capacity should be built in the institutions charged with regularly updating the system?	Dedicated and trained content manager	Training on uploading onto the web-based database	Training on the use of the web-based database	Structured training programs for critical number of personnel, key equipment and software	Funding						
	21	20	17	1	1						
E3. What awareness campaigns should be put in place to ensure optimal use of the information system?											Frequency
1	Wide and regular distribution of an electronic newsletter										3
2	Wide distribution of promotional materials, e.g. leaflets, CDs, brochures, posters, user manuals, etc.										6
3	Identify product linked to national policies and develop at least one or more of the management products										1
4	Advertising (publicity, news articles, ...) in key national & regional marine electronic websites & links to database										4
5	Formation of staff and equipment in data processing in national institutions										1
6	Sensitize persons in charge of Ministry of environment, NGOs and students on the existence of this database										1
7	Organize awareness campaigns, workshops or seminars for policy makers and new and existing users										7
8	Provide threshold capacity for staff to provide training and support for users										1
9	Provide incentives for users										1
10	Usefulness of the new system										1
11	Consultation and negotiations with govt bodies and institutions as well as with existing programmes										1
12	Public awareness campaigns using a variety of media										5
E4. What strategies should be put in place to ensure that data and information is always up-to-date?	Mandate to update the system from institutions that generate data	Capacity building for institutions that update the system	Resource allocation for institutions that update the system	Make data and information demand driven. Usage will create pressure for updates & the managers will appreciate	System is part of Nairobi Convention programs	Regular meetings at NFPs to verify and validate activities in updating	System managed by outsourced centre				

	22	19	24	1	1	2	1				
E5. What strategies should be put in place to ensure that the system is sustainable in the longer term?	Involvement of stakeholders in system enhancement	Adequate capacity in the institutions that update the system	Regular review of the system to ensure relevance to emerging challenges	Relevant and up-to-date content	Adoption of a common policy by NFPs & govts	Integration of system update in NC country programmes	Review set indicators	Serious content and funding	Good ICT support	A secondary NFPs	
	22	21	20	17	1	1	1	1	1	1	