

## **REGIONAL CENTRE FOR MAPPING OF RESOURCES FOR DEVELOPMENT (RCMRD): GEO-INFORMATION CAPACITY BUILDING ACTIVITIES IN AFRICA**

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### **ABSTRACT:**

Geographic information or geo-information is very important and crucial in social-economic development and well being of mankind. About 80% of geographic information is used in all forms of development planning and decision making at local, regional, national, continental and global levels. Thus when information about the geography, social and economic conditions and the policies and institutions is readily accessible, creative problem solving can lead to sound decisions with a lasting positive impact on people's lives. Sustainable development requires access to data, information, knowledge and understanding about the environment and natural resources including socio-economic opportunities. Prior to the advent of earth observation satellite technology in the early 1970s, geographic information was mainly collected using a diversity of ground and aerial based conventional methods. With the rapid development in satellite technologies, most of the geographic data and information is currently acquired through earth observation satellites in real time and on a continuous basis. This data and information is important and crucial for sustainable development of developing countries particularly African countries. However, the use of this data and information in Africa is still limited due to numerous reasons. Among the reasons are lack of awareness among planners and decision makers of the importance of geo-information in sustainable development, inadequate capacity (qualified human resources and facilities-hardware & software), lack of institutional and policy arrangements, data accessibility problems, uncoordinated application of geo-information technologies in sustainable development as well as in the development Spatial Data Infrastructures (SDI) etc. The Regional Centre for Mapping of Resources for Development (RCMRD) whose mission is to promote the use of geo-information in sustainable development in Africa has adopted a partnership strategy to achieve its mission. The strategy entails collaborating with international, regional and nation institutions and organizations as well private sector in addressing the above constraints in an effort to promote the use of geo-information in sustainable development in Africa. This paper presents some of the Centre's on-going geo-information capacity building activities.

### **INTRODUCTION**

The Regional Centre for Mapping of Resources for Development (RCMRD), previously known as Regional Centre for Services in Surveying, Mapping and Remote Sensing (RCSSMRS) was established in Nairobi, Kenya in 1975 under the auspices of the United Nations Economic Commission for Africa (UNECA) and the then Organization of African Unity (OAU). Its founder members are Kenya, Uganda, Somalia, Tanzania and Malawi and the Government of the Republic of Kenya hosts it. It is a non-profit intergovernmental organization and currently has 15 contracting member States, namely: Botswana, Comoros, Ethiopia, Kenya, Lesotho, Malawi, Mauritius, Namibia, Seychelles, Somalia, Sudan, Swaziland, Tanzania, Uganda and Zambia. Apart from the member States the following countries are affiliated to the Centre: Angola, Mozambique,

Zimbabwe, Rwanda, Burundi, Madagascar, Djibouti, Eritrea, Zaire and South Africa.

The operations of the Centre are funded in part by contributions from contracting member States and revenue generated from sales of its products and services.

The original objectives of the Centre were:

- To provide services in the fields of surveying and mapping including aerial photography, photogrammetry, photo-interpretation, first order geodesy, remote sensing, calibration and maintenance of surveying and mapping equipment;
- To provide training for nationals of contracting parties in surveying, mapping and remote sensing, and;
- To provide advisory services upon request

on problems relating to surveying and mapping to the governments of member States.

The new mission of the Centre is, **“To Promote the Development and Use of Geoinformation in Sustainable Development in Africa”** and its key objectives are:

- To develop and constantly update harmonized and standardized land resources and urban development digital data and information infrastructure for the region, based on demand;
- To develop a regional early warning system for food security, environmental monitoring and disaster management using mainly satellite technology;
- In collaboration with member States, national institutions, undertake projects for creation of spatial information system suitable for development planning at national, regional and community levels;
- Coordinate the harmonization of the fragmented regional and African datum using accurate geodetic GPS techniques and research into the field of data processing methodologies;
- Develop capability and capacity in the maintenance of surveying and mapping equipment and offer advisory and maintenance services to the member States; and
- In collaboration with national and international institutions, undertake research and training in the application of geo-information in land resources and urban development mapping and assessment for sustainable development.

The promotion of geo-information entails capacity and capability building and provision of advisory and consultancy services to member states and other clients. The main geo-information technologies promoted by the Centre are Geographic Information System (GIS), Satellite Remote Sensing (SRS), Global Positioning system (GPS) and Information Technology (IT). The Centre is also vigorously involved in the promotion of the development of National Spatial Data Infrastructure (SDI) in its member States. SDI is defined as an “umbrella” of policies, standards and procedures under which organizations and technologies interact to foster more efficient use, management and production of geo-spatial data.

This paper presents a brief on the Centre’s geo-information capacity building strategy and activities.

## **GEO-INFORMATION CAPACITY BUILDING STRATEGY**

Our geo-information capacity building activities mainly focus on awareness creation among decision makers on the importance of geo-information in sustainable development, conducting of various short-term applications oriented training courses for different clients and implementation of geo-information related projects.

There are many institutions, companies and initiatives in the world that are involved in geo-information capacity building programs or activities. Since geo-information is a new emerging discipline that is rapidly developing and is being embraced by various institutions, its promotion requires collaboration with various relevant partners. Our centre has chosen to collaborate with various partners in its effort to promote the use of geo-information in sustainable development in Africa.

Partnerships are usually established through identification and initiation of discussions with prospective partners as regards to agreement on areas and modalities of collaboration. This is then formalized through signing of a Memorandum of Understanding (MOU) whose implementation is evaluated and monitored periodically. Among our current partners are:

- International Institute for geo-Information Science and Earth Observation (ITC)
- Clarke University, U.S.A
- University of Texas A & M, U.S.A
- University of Trieste, Italy
- University of Dar es Salaam, Tanzania
- University of Nairobi
- Jomo Kenyatta University of Agriculture and Technology
- United Nations Environment Programme (UNEP)
- United Nations- Habitat, Nairobi
- United Nations Economic Commission for Africa
- US Geological Survey, FEWSNET and EROS Data Center
- Environmental systems Research Institute (ESRI)
- International Centre for insect Physiology and Ecology
- IGAD-Drought Prediction Centre
- International Cartographic Association (ICA)
- Maps Geo-systems Ltd, UAE
- Creative Associates Ltd, U.S.A

We also promote geo-information capacity building through promotion of Public Private Partnerships.

## GEO-INFORMATION ACTIVITIES

The main geo-information capacity building activities undertaken by the Centre are:

- Awareness creation on the importance of geo-information
  - Promotion of GIS as a planning tool
  - Conducting of various short term training courses
  - Implementation of geo-information related projects
  - Promotion of establishment of Spatial Data infrastructures (SDI)
  - Building capacity in the use of satellite data in early warning for food security, environment and disasters
  - Coordinate the activities of the African Reference Frame (AFREF) and UNEDRA Initiatives
  - Research and Development
- Creation of awareness among planners and decision makers;
  - Preparation and demonstration of prototype applications of GIS for both public and private sectors;
  - Capacity building of relevant member state nationals; and
  - Working collaboratively with its member states and development partners in the creation of spatial information systems suitable for development planning.

### Awareness Creation

Geo-information is vital for sustainable development. Thus when information about the geography, social and economic conditions and the policies and institutions is readily accessible, creative problem solving can lead to sound decisions with a lasting positive impact on people's lives. Geo-information is particularly vital for optimizing the productive use of a country's human and natural resources. It can also help direct development in ways that meet maximum human needs at lowest environmental cost by, for example, identifying key land, water and wildlife resources and how to maintain their productive capacity. Lastly important social benefits are derived from using geo-information to make decisions about provision of services in a manner that is transparent and fair to all.

Because of the importance of geo-information in sustainable development, our Centre conducts awareness activities in our member states that are aimed at sensitizing the decision makers and planners on the need to develop and use geo-information in all planning and decision making processes. The activities entail mainly presentations and demonstrations at workshops, seminars and meetings normally attended by decision makers, planners and politicians.

### Promotion of GIS as a Planning Tool

GIS is a tool that has the capability to integrate complex data sets (physical, economic and social) in order to facilitate the rational exploitation of such data in decision-making, development planning, environmental monitoring and resource management. Since most African countries have not embraced the

use of this tool in their planning and decision-making processes, the Centre has formulated a strategy for GIS promotion and application in its member States, which entails:

### Training Courses

Training of nationals from our member States in the application of geo-information in sustainable development is our core business. We undertake short courses (two weeks to three months) that focus mainly on the application of geo-information technologies in resource mapping, planning and management; environmental management and monitoring; database development and management and servicing of surveying and mapping equipment. We also undertake customer tailored training courses. The following are our general training courses, which are conducted throughout each year:

- Land Use, Land Degradation Assessment and Monitoring using Remote Sensing and GIS (February and July)
- Application of Remote Sensing and GIS to Early Warning Systems for Food Security and Environmental Monitoring (March and August)
- Application of Remote Sensing and GIS in Natural Resources Assessment and Management (April and September)
- Geo Spatial Database Development and Management for use in planning process and decision making (May and October)
- Introduction to the principles of Geomatics (Integrated course in RS, GIS and GPS)
- GIS and Digital Cartography (June and November)
- Fundamentals of Modern Land Surveying and Positioning Systems (March and August)
- Maintenance of electronic and optical-mechanical surveying instruments (throughout the year)

Apart from these courses we also undertake customer tailored training courses.

### **Promotion of the Development of Geo-spatial Data Infrastructure (SDI)**

SDI is defined as an “umbrella” of policies, standards and procedures under which organizations and technologies interact to foster more efficient use, management, and production of geo-spatial data. The Centre will assist African countries to develop fully-fledged and coordinated SDI, in order to improve planning and rationing management of resources and access to information.

To promote the development of SDI, the Centre in collaboration with other development partners (e.g. UNECA, USGS, Global Mapping, GSDI, national Mapping Agencies etc) organize workshops in which planners and decision makers are sensitized on the importance of SDI. Also the Centre in collaboration with development partners the Centre trains relevant nationals in the development of SDI. The ultimate goal of the Centre is to promote the establishment of SDI in its Member States and SDI as a “business investment”.

### **Implementation of Geo-Information Related Projects**

The Centre in collaboration with its partners and member

States prepares and implements various geo-information related projects. Normally these projects have capacity building components which include training packages for the project clients and relevant hardware and software. Among the projects implemented are:

- Land cover mapping of eastern African countries (FAO-AFRICOVER Project)
- Preparation of National Wind Atlas for the Ministry of energy, Kenya (2002-3).
- Preparation of Landover Database and Maps for South Sudan (Contracted by GIBB (Africa) and Yam Consultants Ltd, Sudan)(2003-4)
- Development of Somalia Hydrological Database for FAO, Nairobi office (2003).
- Preparation and dissemination of Greater Horn of Africa (GHA) Bulletin on Food Security. The bulletin is prepared in collaboration with FEWSNET, DMC, ILRI, WFP, USGS, DLCO and USAID.(on-going)
- The coordination of African Reference Frame (AFREF) Project in collaboration with IAG, ECA, AOCRS and other Regional Centres (on-going).
- Development of Digital Urban Databases for Nairobi, Kisumu, Eldoret and Malindi in Kenya. (2003). Contracted by Physical planning Division of Ministry of Lands and Settlement, Kenya;

- Lake Victoria Wetland Mapping (2005), funded by Lake Victoria Environmental Programme
- Development of Djibouti Spatial Database (2005), funded by USAID
- Gums and Resins Resource mapping in the Greater Horn of Africa, funded by FAO (2005)
- Mapping of 11 towns in Southern Sudan, funded by USAID (2005-2006)
- Mapping of 14 towns on the shores of Lake Victoria, funded by UN Habitat (2006)
- Creation of Digital Spatial database for Mumias Sugar Company, Kenya (2006)

### **Building Capacity in the Use of Satellite Data in Early Warning for Food Security, Environment and Disasters:**

In collaboration with its partners (USGS, ILRI, LEWS, DLCO, ICPAC, FEWSNET etc), the Centre continues to train government and NGO officials in the use of satellite data in early warning for food security, environment and disasters in the Greater Horn of Africa. Also in close collaboration with its partners produces and disseminates monthly early warning for the Greater Horn of Africa.

### **Coordination of African Reference Frame (AFREF) and University Network on Disaster Reduction in Africa (UNEDRA)**

The Centre coordinates the AFREF initiatives whose main objectives are:

- Define a continental geodetic reference frame for Africa
- Establish precise and uniform African geoid
- Establish permanent GNSS base stations such that each nation and users have free access to GNSS data and product from such stations
- Establish an in-country expertise for implementation, operation, management, analysis and presentation GNSS data and products.
- Determine transformation parameters between GNSS and ITRF to/from local reference systems
- Understand the necessary geodetic requirements of participating nationals and international agencies
- Promote the use and application of GNSS technology for African development
- Promote African development through GNSS and ICT products and technology transfer within the continent and at international level

This initiative is supported by African countries and various international organizations including UN Economic Commission for Africa (UNECA), International Association of Geodesy (IAG) etc. For more information visit the website: <http://geoinfo.uneca.org/afref/>

The Centre also coordinates the activities of UNEDRA. The main objective of the network is to forge interaction amongst universities in Africa with interest in capacity building in disaster risk reduction through teaching, seminars and workshops, sharing information and collaborative research with emphasis on the use of geo-information. For more details about the network, see the document enclosed herewith and the visit the website: <http://www.itc.nl/unu/dgim/unedra/default.asp>

### **Research and Development**

In collaboration with its partners, the Centre is involved in the formulation and implementation of various research and development projects. The projects focus mainly on the different applications of satellite data. These applications include but not limited to food security and early warning, environmental and disaster monitoring, mapping of socio-economic activities, poverty, diseases etc.

To promote research capacity in geo-information, the Centre in collaboration with various universities provides data and research facilities for students undertaking M.Sc. and PhD studies that entail the use of modern geo-information technologies.

### **CONCLUSION**

Due to the increasing awareness of the importance of geo-information in sustainable development, the demand for capacity building in the same is increasing in Africa. Since it is a new and fast evolving discipline, most institutions in Africa have yet to introduce it as a fully fledged discipline in the academic programs. Instead the subject is taught on unit basis in some of the faculties. The full introduction of geo-information training at most universities in Africa is hampered by lack of hardware and software as well as qualified human resources. It is therefore important that these institutions have to be supported in building their capacity to offer training in geo-information technologies and their applications in sustainable development. Equally regional Centres like RECTAS, RCMRD should be supported to continue offering their training courses and advisory services which focus mainly on geo-information application in sustainable development in Africa.

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