Thematic Chapters of GMES and Africa

Marine and Coastal Areas

Water Resources Management

Management of Natural Resources

Implementation plan to be presented next….

Marine and Coastal Areas

Water Resources Management

Management of Natural Resources

MCA: Background / Needs

Coastal and marine environments play a vital role in the socio-economy of many African countries, contributing significantly to national Gross Domestic Products (GDPs), to food security, and supporting a wide range of coastal livelihoods.

The fishery sector provides vital contributions to the protein needs of over 200 million people in Africa. Biodiversity and natural assets of African coasts are important attractors for tourism. In some countries, tourism represents not only the largest employment sector but accounts for significant contributions to national GDPs, for example up to 60% in some SIDS.

Africa is also one of the most vulnerable continents to climate change and climate variability. IPCC-projected sea level rise will increase the number and severity of coastal flooding events causing further severe damage to the coastal and marine environments and the resources and services they provide

A pan-African Earth Observation (EO) monitoring and data management and analysis system will help to understand long term environmental trends, and develop appropriate management responses fully respecting the ecosystem-based approach.

MCA: Existing / new initiatives

The implementation of a GMES and Africa Programme in Marine and Coastal Areas will build upon past and current EO programmes, components and facilities, taking into account the current situation as well as current programming in international and bilateral development cooperation.

The **Europe-Africa Marine EO Network (EAMNet)** has developed networks linking Earth Observation (EO) information providers, user networks and centres of excellence in Europe and Africa in the area of coastal and marine observations towards sustainable development in Africa.

The **DevCoCast** / **AGRICAB** projects, funded through European Union FP-7, provided infrastructure support for satellite transmission of EO products, extending GEOSS **GEONETCast** across the countries of Africa .

MCA: Existing / new initiatives

Partner projects will include:

- African Monitoring of the Environment for Sustainable Development Project (AMESD) and Monitoring of Environment and Security Project (MESA);
- The African Large Marine Ecosystem (LME) Projects and Commissions OceanSAfrica;
- The African Marine and Coastal Atlas Project (IOC/UNESCO);
- Adaptation to Climate and Coastal Change in West Africa (ACCC-Africa), Programme régional de Gestion de la Biodiversité (EDF-COI),
- Réseau des aires protégées d'Afrique Centrale (RAPAC),
- Coastal Oceans Research and Development in the Indian Ocean (CORDIO),
- Data Buoy Cooperation Panel of JCOMM.

MCA: Gaps to be addressed

Despite the considerable investment in observing systems, there is still a clear need for a more robust, operational, Africa-wide programme for earth observation. There is a critical need for improving capacity and infrastructure for delivering EO products to marine and coastal stakeholders.

Elements that need strengthening include:

- Improved acquisition of relevant EO data at appropriate temporal and spatial scales
- *In situ* measurements in their own right, and for validation of EO data to support interpretation and the development of model products
- Effective dissemination of value added products, in near-real time and delayed mode, taking advantage of new and developing broadband links in Africa
- A strong capacity development and maintenance programme, building on existing capacities and training facilities

MCA: *GMES and Africa* MCA Service (1)

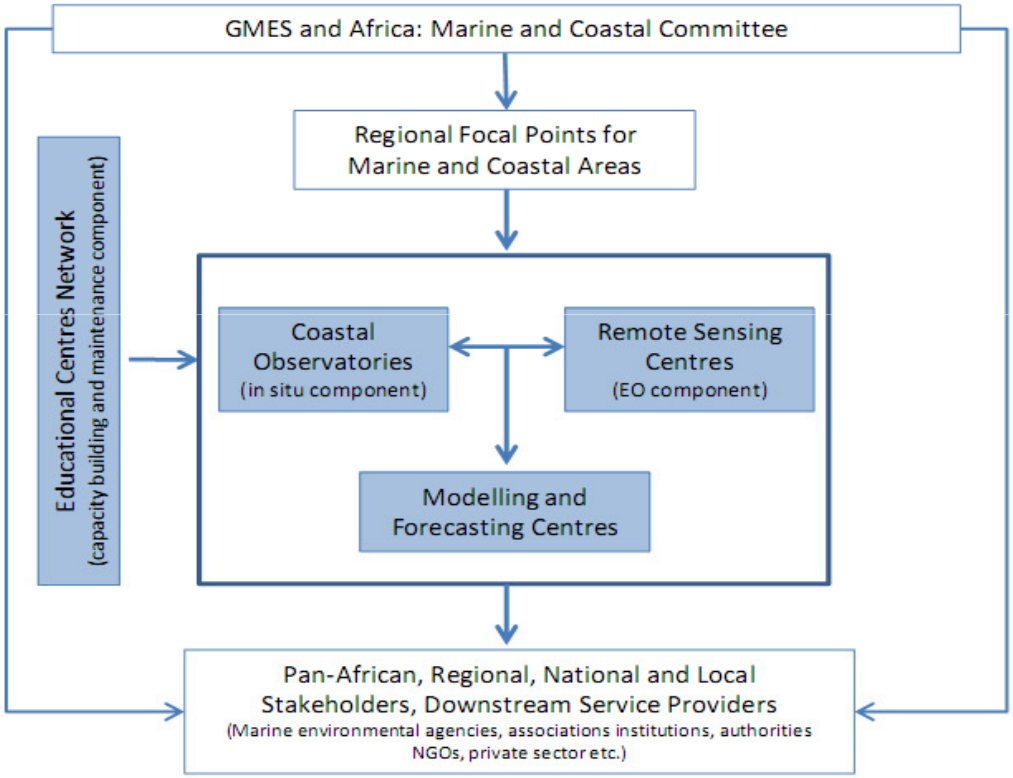
Operational programmes in the marine and coastal sector need to routinely bring information and products of value to users (managers, scientists, policy makers and the general public). To enable this, Africa needs a *GMES and Africa* Service for Marine and Coastal Areas that should be:

- **Pan African:** reaching to all the coastal countries of Africa and operationally utilising Earth Observation from space agencies;
- **Comprehensive:** an end-to-end service from observations, through analysis and forecasts, to the dissemination of value-added products;
- **Built on existing research projects and pilot programmes;**
- **Maintained and operated by Africans**, developing and utilizing African capacity in African Centres of Excellence;
- **Demonstrably useful** for marine and coastal managers and policy makers to maintain sustainability of marine living resources;
- **Feed into local and national governance** schemes that ensure effective consultation with all stakeholders;
- **Equipped with a mechanism for sustainable funding** to maintain long-term sustainability of the Service.

MCA: *GMES and Africa* MCA Service (2)

Organisational scheme:

Effective and sustainable coastal and marine management in Africa can only exist under predictable, efficient, and accountable governance systems. Four components are proposed for the organisational scheme of the GMES and Africa Service for Marine and Coastal Areas – with the overall coordination of the African Union



1. An Africa Network of Modelling and Forecasting Centres

A network of centres would enable the exchange of information and expertise, the development of consistent products, and the efficient dissemination of information using the same (or interoperable) protocols. These centres should be concerned with LME-scale, transboundary product development, with support from Universities and National Departments. (Coordinated by IOC/UNESCO, Large Marine Ecosystem Projects with Universities & National departments)

2. A *GMES and Africa* Network of Marine Remote Sensing Centres

These regional centres would be the fully operational successors to various existing pilot facilities. AMESD/MESA and GeoNetCast Receiving stations would be used. The development of new satellite products at an operational level would be initiated and would be closely linked to the new generation of Sentinel satellites and infrastructure from space agencies. These centres would form an African Marine Remote Sensing Core Service (Institutions with receiving stations; with MESA, IOC/UNESCO and LME Projects, universities and training facilities).

3. A *GMES and Africa* Network of Coastal Observatories

Coastal observatories would take continuous measurements from coastal weather stations, in-situ monitoring of ocean temperature, oxygen and currents, and facilitate regular active monitoring of inshore water quality, productivity, and coastal habitats. Observations would be of value for the improved monitoring of artisanal fisheries, protected areas management, coastal management, and they would also provide validation data for satellite observations. The network would build on existing national monitoring programmes, such as those of the LME Projects, GOOS Africa / IOGOOS components, such as the sea-level GLOSS network, and other national stations. (Coordinated by LME Projects with GOOS Africa and national observing systems)

4. A *GMES and Africa* Capacity Development Network of Higher Education Institutions

The long term viability of GMES & Africa will be dependant on personnel, infrastructure and stable institutions. Capacity development is an ongoing process involving training, exchange of personnel and practices, and the ongoing support for infrastructure and institutions. (Coordinated by IOC/UNESCO, AUC, EU/JRC, MESA, LME Projects, national universities and training facilities)

MCA: *GMES and Africa* Products (1)

1. **Operational coastal sea level, coastal circulation and coastal sea state** for transboundary regions as well as downscaled to smaller coastal and marine management units. These products would have a wide variety of users; for example coastal flooding and coastal erosion events for property owners, planners and coastal managers, and coastal circulation, for offshore oil and gas industry, ports, shipping and for safety at sea.
2. **Operational biological productivity (data, analyses, imagery and mapping)** would have fisheries and biodiversity applications. Zones of high productivity are useful for identifying fishing grounds and managing fishing effort, and harmful algal blooms have an impact on commercial fisheries and tourism. The reporting of chlorophyll, low oxygen and harmful algal blooms will be part of ecosystem health reporting through Long Term Ecosystem Research observational networks in LMEs.
3. **Coastal sensitivity and vulnerability atlases** and **state of environment reporting** is useful for coastal and marine managers, coastal land use planners, city managers, environmental impact assessments and the private sector (eg. the tourism industry, fishery, oil & gas sector).

MCA: *GMES and Africa* Products (2)

4. **Ship traffic situation and maps.** A real-time view of ship traffic is needed for operational monitoring for MCS activities as well as safety at sea. Historic patterns of ship traffic, by ship type, season, time of day, etc., are needed for long-term management and planning. Satellite imagery is essential to monitor ship traffic that cannot be tracked with coastal sensors or with voluntary ship reporting systems, providing a cost-effective alternative or complement to patrols.
5. **Regional weather forecast systems** (5 to 7-day horizon) to complement sea state forecasts are essential for the safety of recreational and commercial vessels. Longer term climate forecasts (1-3 months) are dependent on ocean monitoring; for example the Indian Ocean Dipole and ENSO state can be used to improve seasonal rainfall forecasts over East and southern Africa.

MCA: *GMES and Africa* Products (3)

6. **Real-time Disaster Warning Systems** such as storm surge warnings (sea state forecasts) and tsunami warnings (from strategically placed tide gauges and GPS monitoring of faults) rely on in-situ sensors as well as satellite communications for the rapid dissemination of warnings.
7. **Mapping of coastal land use and nearshore coastal and marine habitats** is essential for marine spatial planning, integrated coastal zone management and the monitoring of the health of the coastal and marine habitats that are so important for sustaining artisanal fisheries.
8. **Mapping marine and coastal ecosystem services.** In line with the Millennium Ecosystem Assessment (2005), quantification and mapping of marine ecosystem services is an important step for allocation of natural resources and for policy development and decision-makers to identify areas requiring specific protection measures.

MCA: Main stakeholders and Users

- National and local authorities, technical experts, regional planning commissions, policy makers, commercial enterprises and other stakeholders.
- Many of the proposed products also address needs of other sectors. In particular many of them may cover the needs of:
  - Environmental agencies;
  - Fishery agencies;
  - Weather services;
  - Civil protection agencies;
  - Research communities
  - Coastal communities

MCA: Action plan / timeline (1)

Short term (months 1-24): In the short term, GMES and Africa activities will be concerned with consolidating the contributions from partners that have committed to supporting the strategy. There needs to be a deeper and more robust engagement with partners and stakeholders - not only to secure co-financing, but also to benefit from existing funded work and to ensure that GMES and Africa is used and developed in the long term. Assessments of requirements for infrastructure and training have already been carried out by AMESD, MESA, EAMnet, LME projects and the IOC/UNESCO; short term activities would be dedicated to validating these and securing proposed partnerships. The development of high priority operational products would also commence, including:

- **Operational coastal sea level, coastal circulation and coastal sea state products (data, analyses, imagery and mapping)**
- **Operational biological productivity products (data, analyses, imagery and mapping)**
- **Development of the organisational structure for governance, and capacity building and training are also high priority, crosscutting activities**.

MCA: Action plan / timeline (2)

Medium term (24-36 months): In the medium term, strategies for long term financial and technical support must be established. An integrated capacity building/retention programme must be implemented built on the activities of regional partners. This could use the existing Large Marine Ecosystem and EAMNet reviews of needs and the draft roadmap already produced. Integrated operational products and dissemination systems for products would mature:

- **Strengthen vessel monitoring systems to assist monitoring, control and surveillance;**

- **Integrated training programmes across countries should be operational;**

- **The African Marine and Coastal Atlas,** supported by ODINAFRICA of the IOC/UNESCO should be supported for additional functionality to organise and disseminate data and metadata from GMES services.

MCA: Action plan / timeline (3)

Medium-term to long-term (36 months onward): These activities would begin in the short term, with demonstration projects and product development, but the continent-wide roll-out of operational products would only be seen after the first 24 months:

•**Integrated methods and protocols for data collection, EO and modelling need to be finalised and operational across the continent**, based on the operational systems developed and expanded from year 1. This will ensure a sustainable, consistent approach to long term monitoring and product development.

•**Gaps in in-situ networks should be filled**; for example in the array of temperature recorders, coastal weather stations and coastal tide gauges. Regional coastal observatories should be identified in the short term and established in the medium to long term, based on the Large Marine Ecosystems.

•**Strengthen and expand the monitoring of critical habitat**s for artisanal fisheries – including reefs, mangroves, seagrass beds, soft-bottom habitats and sandy beaches depending on regional priorities.