# Implementation plan to be presented next….

Marine and Coastal Areas

**Water Resources Management**

Management of Natural Resources

# WRM: Background / Needs

Africa's water resources are either abundant or scarce depending on season and place.

Most prominent needs are:

- To meet safe drinking water and sanitation MDG's;
- To manage transboundary rivers;
- To improve the use of water for food security, development of hydro-power and satisfy growing water demands;
- To prevent land degradation and water pollution;
- To manage water under climate variability / change.

# WRM: Existing / new initiatives

Several completed, on-going or planned long term programmes and initiatives in Africa using EO technology for Water Resources Management. Some examples are:

- Global:
  - GEWEX, Meteo - Climatological modelling centres, COPERNICUS and WHYCOS
- African on-going:
  - (PUMA-AMESD-) MESA and TIGER
- African new:
  - African Water Cycle Coordination Initiative and AfriGEOSS

# WRM: EO and *In-situ* gaps

- Continental: lack of (continuous – reliable provision of) a core set of continental scale products covering different components of the water cycle:
  - Precipitation; Evapotranspiration; Soil moisture; Water quality; Surface and ground water levels; (short / long range) and forecasting products.
- Regional (transboundary river basin) and National: lack of operational observation capability for information services addressing the needs of riparian states and stakeholders on major transboundary river basins:
  - Base mapping for supporting infrastructure development (water supply and sanitation);
  - Irrigation areas, crop mapping; Ephemeral water bodies; flooding; Mapping groundwater aquifers; EIA for hydro power, water diversions and impoundment or other water related engineering – diversion plans.
- Inappropriate *in-situ* networks for water management and monitoring.

# WRM: Gaps to be addressed (1)

- Ensuring that all of the African water challenges are ultimately fully covered:
  - at national, transboundary, regional and continental scales;
  - acquisition and use of *in-situ*, EO data and their utilization.
- Translating science into operational services:
  - having the capacity to develop products relevant to water resource problems at various scales;
  - dissemination of (validated) products derived from EO data in a manner that is readily accessible to the users.

# WRM: Gaps to be addressed (2)

- Overcome general institutional, technical and human blockages to address continental and regional needs in such a manner that all countries have opportunities to develop the capacity which will enable them to participate in utilizing EO data and sharing information also at regional and continental scales.

# WRM: *GMES and Africa* WRM Service (1)

- Pan-African and utilizing EO data from space agencies;
- Comprehensive such that end-to-end services are provided with value-added products;
- Build on existing (research) programmes (e.g. to ensure incorporation of their achievements);
- Maintained and operated by Africans (through further strengthening of African capacity in various African centres of excellence);
- Linked with national, regional and continental governance schemes and ensure effective consultation with all stakeholders involved;
- Equipped with sufficient and continuous funding to achieve sustainable operation of the service.

# WRM: *GMES and Africa* WRM Service (2)

**The following key points for implementation are critical for the success of the *GMES and Africa* WRM Service:**

•AMCOW, the RECs and transboundary river basin organizations need to commit themselves to owning and supporting implementation of the *GMES and Africa* WRM Service. Suitable mechanisms should be established in order to enhance the dialogue with different stakeholders;

•*GMES and Africa* is an African driven process aimed at establishing long-term sustainable information services in Africa and addressing African priorities and needs. In this context, governance of *GMES and Africa* should ensure that African institutions retain the programmatic leadership and ownership including ensuring sustainability of collection of data, development of products and their dissemination from both *in-situ* networks and EO;

•*GMES and Africa* data policy should enable free access to data. More (GEONETCast) ground receiving stations covering Africa should be established to enable use of EO data as well as the use of telecommunication based dissemination techniques for provision of products generated by the *GMES and Africa* Service. Observational infrastructure and network integration will be another key feature to achieve operational sustainability of *GMES and Africa* WRM service.

# WRM: *GMES and Africa* Products (1)

At Continental scale:

•Provision of a core set of continental scale EO-derived products covering different components of the water cycle at low spatial (approx. 1 Km) but higher temporal resolution (once per day) e.g.:

- Precipitation, potential and actual Evapotranspiration, Soil moisture, Rivers and (ephemeral) lake water levels.;

•Basic meteorological products and short – medium range outlooks;

•Water quality monitoring in large lakes:

- temperature, suspended sediments, chlorophyll;

•Integration of some products to:

- derive regional scale water balances;
- facilitate regional scale hydrological modelling.

# WRM: *GMES and Africa* Products (2)

At regional (trans-boundary river basins) and national scales:

•Base mapping, linked with socio-economic information, for enhancing infrastructure development with focus on water supply and sanitation at high resolution (approx. 10m or higher if required);

•Catchments characterization including a core set of (time series) products at basin scale at high resolution (10-100 meters):

- Components of the water cycle validated with *in-situ* observations also (ground) water levels and discharge/ abstraction rates; irrigated areas / crop and vegetation mapping; Water quality of inland open water bodies; DEM's at relevant (vertical) resolution; Hydrological Network, including morphometric characteristics like stream slope and cross-section information.

•Regional scale hydrological modelling in conjunction with in-situ observations.

# WRM: *GMES and Africa* Products (3)

- Ephemeral water bodies identification and monitoring in arid and semi-arid regions at high resolution (10-20 meters);
- Support groundwater management including (from 10 to 250 meters):
  - Estimation of water extraction;
  - Groundwater exploration (e.g., identification of recharge - infiltration areas) and rates;
  - Lineament mapping and bare rock unit classification;
- Early warning and outlook for droughts and floods;
- Rapid mapping of flood affected areas at high resolution (10-20 m);
- Change analysis, especially over reservoirs and reservoir storage capacity assessments.

# WRM: Main stakeholders and Users

- National authorities, basin authorities, hydrological services, local communities, farming communities, fisheries industry and other stakeholders.
- Many of the proposed products also address transversal needs. In particular many of them may cover the needs of:
  - Agricultural agencies;
  - Environmental agencies;
  - Developing agencies (for monitoring and assessment purposes);
  - Forestry agencies;
  - Weather services;
  - Civil protection agencies;
  - Research community