Workshop on

Monitoring and Assessment of Drylands: Forests, Rangelands, Trees, and Agrosilvopastoral Systems

Combining local surveillance and spatial observation for environmental monitoring in the Circum-Sahara: The OSS experience

Rome, Italy, 19-21 January 2015
Environmental information in Africa: Context

Significant mass of data and information is produced:

BUT How?

- Poorly archived and cataloged
- Not accessible, restricted...
- Heterogeneous: multi-source, scales, approaches
- Old, Out-of-date
- Absence of common reference systems
- Not well valorized and used
Environmental information in Africa: Context

Significant mass of data and information is shared:

- Little known by African countries
- Poorly or not used by decision makers in Africa
- Induced by Offer and not Demand

BUT with who?

OSS activities are at the center of those concerns!
Sahara and Sahel Observatory
Observatoire du Sahara et du Sahel

Underpinning Sustainable Development in the peri-Saharan Region

since 1992
International intergovernmental Organization

www.oss-online.org

Area of operation

- North Africa [UMA+ Egypt]
- East Africa [IGAD]
- West Africa [CILSS]

Membership

- 22 African States
- 5 non-African States: Canada, France, Germany, Italy, Switzerland
- 5 sub-regional organizations
- UN System organizations: UNESCO, FAO, UNCCD, UNITAR
- 1 NGO: Centre d’Actions et de Réalisations Internationales (CARI)
The Sahara and Sahel Observatory

Mission

- North-South-South partnership platform
- Science-Policy-Action interface
- Instrument at the disposal of member countries

Governance

- Executive Secretariat: multidisciplinary, diverse team
- Strategic Orientation Committee: advisory body
- Executive Board: convenes annually
- General Assembly: convenes every 4 years
The 2020 strategy

A Strategic framework

- Regional policies and initiatives: (Agriculture, Water, Development)
- MEA: desertification, biodiversity, climate change

“A Scientific and technical program on Water and Land management, underpinned by observation and considering climatic and socio-economic interactions”

Expanding and sharing knowledge

The 2020 Strategy implementation will be underpinned by communication and Knowledge Management
The Water Axis

Three flagship projects

- SASS: Northwestern Sahara Aquifer System - North Africa
- IAS: Iullemeden Aquifer System, extended to the Taoudeni-Tanezrouft - West Africa
- Shared Water resources of the IGAD sub-region - East Africa
The first fully fledged consultation mechanism on the SASS aquifer (Algeria, Libya, Tunisia): operational since June 2008

Efforts underway to set up a similar mechanism on Iullemeden Aquifer System (Mali, Niger, Nigeria), on IGAD sub-region and on the Senegalo Mauritanian Aquifer System

The Water Axis

Northwestern Sahara Aquifer System (North Africa)

IGAD Sub Region (East Africa)

Iullemeden Taoudéni Tanezrouft Aquifer System (West Africa)
The Land Axis

The Land Axis is geared towards Knowledge generation

- Provision of environmental information at the national, sub-regional and regional levels for knowledge-based Policymaking

- Development of relevant indicator sets serving as decision-support “dashboards” for natural resource management and development actors
OSS has built monitoring systems

- **Observation**
  identify and analyze change trends

- **Early-Warning**
  prevent and/or mitigate disasters

- **Monitoring-Evaluation**
  guide policy/program implementation
Environmental monitoring at OSS

1. **Spatial integration**
   - Local level
   - National level
   - Basin level
   - Global level

2. **Thematic Integration**
   - Ecology
   - Climate
   - Hydrology
   - Socio-economy

3. **Integration of techniques and tools**
   - Monitoring Networks, remote sensing, modelling, IS and GIS

Relevant and timely information to support decision making
Environmental monitoring at OSS

- Water
- Soil
- Climate
- Socio-economics

Multi-dimensional monitoring systems

Modeling
Forecasting
Environmental monitoring at OSS

Multi-dimensional monitoring systems

In-situ observation
Observatoires: ecological & socioeconomic data collection

Spatial observation
Earth observation, GIS, Mapping

Harmonised indicators

Livelihood
SLWM
Adaptation to CC
## Environmental monitoring at OSS

### Collected data

<table>
<thead>
<tr>
<th>Bio-physical data</th>
<th>Interface data</th>
<th>Socio-eco data</th>
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<tbody>
<tr>
<td>Themes</td>
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<td>Pedology</td>
<td>Infrastructure</td>
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<td>Geomorphology</td>
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<td>Water system</td>
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<td>Administrative limits</td>
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### Continuous monitoring

<table>
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<th>Themes</th>
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<td>Soil</td>
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<td>Water</td>
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<td>Land cover</td>
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<td>Vegetation indices</td>
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<td>Operating area</td>
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<td>Availability</td>
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<td>Withdrawals</td>
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<td>Population</td>
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<td>Operating systems</td>
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<td>Micro-economy</td>
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</tbody>
</table>
• **Capacity building**: development of training kits and organization of workshops on data collection and processing and computation of indicators

• **Harmonization of approaches**: elaboration of methodological guides

• **Development of tools**: functional observatories for local environment surveillance

• **Sensitization activities**: targeting local populations as well as decision makers

• **Results dissemination**: Data collection reports, regional synthesis…

**Environmental monitoring**: In-situ observation
Environmental monitoring: In-situ observation

Regional level: Observatories network
Environmental monitoring: *In-situ observation*

**National level: Environmental Monitoring Device**

**ROSELT Niger**

Un Réseau national d'Observatoires pour la surveillance environnementale à long terme

**TORODI - DANTIANDOU - TONDIKANDIA**

- Responsable: Union Abécédaire (UAAA)
- Thématique Spécifique: Dynamique et de la biodiversité

**TAMOU**

- Responsable: Tchad-Boucan (UAMF)
- Thématique Spécifique: Dynamique de la biodiversité

**FALMEY - GAYA**

- Responsable: Sahel Unifié (UAMF)
- Thématique Spécifique: Dynamique de l'Occupation des Terres

**MARADI**

- Responsable: Yennenga Bouba (UAMF)
- Thématique Spécifique: Dynamique de l'Intensification des systèmes agro-éco-

**AZAWAK**

- Responsable: Zinder (UAMF)
- Thématique Spécifique: Dynamique de l'Intensification des systèmes agro-

**AIR - TENÉRE**

- Responsable: Diffa (UAMF)
- Thématique Spécifique: Dynamique des systèmes de production

**ZINDER**

- Responsable: Zinder (UAMF)
- Thématique Spécifique: Dynamique de l'Intensification des systèmes agro-

**DIFFA**

- Responsable: Diffa (UAMF)
- Thématique Spécifique: Dynamique des systèmes de production

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**Réseau d'Observatoires de Surveillance Ecologique et Environnementale à Long Terme (ROSELT)**

**OSS**

Ministère de l’Hydraulique de l’Environnement et de la Lutte contre la Désertification

**REPUBLIQUE DU NIGER**
Environmental monitoring: Spatial observation

- **Capacity building**: training and continuous technical guidance of national institution partners

- **Mobilization of partners and technical institutions** at national, regional and international levels (ASAL, AGRHYMET, ESA…)

- **Conception and realization of cartographic products** based on earth observation data and spatial analysis techniques

- **Data dissemination**: development and realization of thematic atlases, geoportals…
Environmental monitoring: Spatial observation

Capacity building activities

- Development of Training Kits
- Organization of training sessions at regional and national levels
Environmental monitoring: Spatial observation

Land cover mapping at local scale

Nouakchott, Mauritania

Bourem, Mali

Tondikandia, Niger

Hautes steppes oranaises, Algérie

Oued Mird, Morocco

Menzel Habib, Tunisia
Environmental monitoring: Spatial observation

Land cover mapping at national and regional scales
Environmental monitoring: Spatial observation

Climate change vulnerability analysis and related risks
Environmental monitoring: Spatial observation

Near real-time monitoring of bioclimatic indicators

Data collected from the satellite receiving station: GEONETCast
Environmental monitoring: Spatial observation

Earth observation in support for transboundary aquifer management

Basin wide Evapotranspiration, Precipitation and Water Balance (SAI aquifer)

Water and Vegetation Monitoring over entire Aquifer (SAI aquifer)

Estimation of crop water consumption (SASS aquifer)
Environmental monitoring: Combining in-situ and spatial observation

Example of application: Carbon sequestration potential

1) In-situ biomass measures
2) Calibration Model using NDVI data
3) Carbon sequestration map
Environmental monitoring: Data dissemination

Thematic Atlas, web map servers and Geo-catalogues
Environmental monitoring: Current activities at OSS

**REPSAHEL**
- Specifications of map products
- Land cover and vegetation maps
- Guidance and technical support
- Web map server

**ORIXAS**
Spatial models for:
- Land cover changes
- Desertification
- Forest-savannah and savanna-steppe transition zones

**AGRICAB**
- Operational satellite receiving station (GEONETCast)
- Near real time EO data (meteosat, MODIS,...)
- Development of models to monitor bioclimatic indicators

**TIGER**
- Capacity building in the use of EO techniques for water resources management
Environmental monitoring: Current activities at OSS

**BRICKS**
- Atlas for the GGW region
- Geoportal
- Spatial M&E tools
- Methodological and technical and support

**ILWAC**
- Land cover mapping
- CC related risks mapping
- SLM practices mapping
- Data dissemination: Atlas, Geoportal

**SASS**
- Spatialization of water demand in the basin scale
- Assessment of withdrawals rates at aquifer level using remote sensing
- Data dissemination: Geoportal

**GICRESAIT**
- Aquifer recharge maps
- Hydrodynamic parameters maps
- CC vulnerability of groundwater
- Risk of groundwater pollution by human activities
Environmental information in Africa: Lessons learned

- Strong dependence on international aid in terms of data production and processing
- Poor understanding of the needs of data users (clients)
- Little integration of information systems at a national level, and even less at a regional level
- Duplication of effort at the regional scale in the areas of the acquisition and processing of regional-scale satellite remote sensing products
Environmental information in Africa: Lessons learned

- **Harmonize** environmental monitoring tools and methods
- Implement **global and comprehensive** monitoring systems involving the concerned stakeholders
- **Build the capacities** of national institutions in the collection, processing and dissemination of useful environmental data
- **Transform** raw data into information and make it accessible in the needed space, time and form
- **Share best practices** at regional and global scales
Thank you

Visit our Website: www.oss-online.org