Earth Observation for development

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12 April 201, WB, Washington,
what is EARSC?

There is no sustainable development without adequate information about the state of the Earth and its environment"_ PrepCom II statement of CEOS in 2002 Johannesburg

- EARSC is a non-profit-making organisation created in 1989 as the voice of the European geo-information EO service industry
- Mission & objectives:
  - to foster the development of the European Geo-Information Service Industry
  - to stimulate a sustainable market for GIS using EO data, openly accessible to all members
- Today EARSC has 69 members in more than 20 countries, and is a recognized association worldwide
- Represents European geo-information providers creating a sustainable network between industry, decision makers and users
- Communications - website, newsletter, directorate, numerous events on both European and International stages
How can EARSC help the World Bank?

Geoinformation services help the international financial development projects to take stock of progress in achieving the three pillars of sustainable development — economic growth, social development and environmental protection.

- Bridge to the EU EO services industry beyond individual company contacts.
- Neutral advice on EO services and what they can do
- Support to meetings / international fora
- Assistance to procure future services.

Plus,

- EOpages is a web-based marketplace for the EO Service Industry & Users showing the capabilities on offer. Open to the World Bank to request services and find partners.
what can EO do for the WB?

EO service industry therefore need to ensure the availability of the technical means to acquire all possible information to improve our knowledge of the planet which is our home.

- Reduce loss of life from natural and human-induced disasters,
- Monitor environmental factors affecting human health
- Improve management of energy resources,
- Assess and predict, impact of climate variability and change,
- Improve water resource management
- Improve weather information, forecasting and warning,
- Improve the management and protection of terrestrial, coastal and marine ecosystems,
- Support sustainable agriculture and combat desertification,
- Understand and monitor biodiversity.
Integrating EO into World Bank Group operations

“We reaffirm the need for timely, quality, long-term global information as a basis for sound decision making……integrating satellite measurements with ground information to better understand the Earth……World Summit on Sustainable development in Johannesburg 2002”

- World Bank mission is “to fight poverty with passion and professionalism for lasting results and to help people help themselves and their environment by providing resources, sharing knowledge, building capacity and forging partnerships”

- Geo-information services can help World Bank operations through improved visualization, at all scales, at lower cost and at less risk.
  - Project planning
  - Implementation of projects in the field
  - Monitoring that project goals are met and sustained

- EO Services can contribute at each phase of a WB project.
Industrial partners have played a major role, not only through the performance of contracted research and development, but also through their commitment to contribute with their know-how and effort on many sustainable development projects.

Its accomplishments include the development of plans for air quality, disaster reduction, and drought integrated observing systems. Implementing plans will deliver the benefits of integration to many sectors of society with tangible results.

- Infrastructure Development Planning
- Image support for land tenure mapping
- Wide-area Urban Development
- Assisting urban planning activities
- Assessing Natural Hazards & Climate Change Risks
- Habitat monitoring and infrastructures
- Mapping long term trends in deforestation
- Supporting agricultural and food security decisions
- Implementing & managing agriculture projects
Infrastructure Development Planning

• **Users**: Int. Fund Agricultural Development, Madagascar

• **Need**: Situation awareness information of large areas in Madagascar to contribute to an improved development planning for agricultural production

• **Challenge**: Identify service areas with potential for further agricultural activities within the region

• **Initiative**: Production of Land Cover Maps for agricultural activities within the river valleys and Digital Elevation Models to support the actual development planning within the region using high spatial and thematic accuracy.

• **Results**: The information provided through this service and its product has led to a more efficient development planning

• **Service provider**: GAF-AG (www.gaf.de)
Image support for land tenure mapping

**Earth Observation Support to Urban Development**

- **Users:** Int. Fund Agricultural Development, Madagascar
- **Need:** Support the current land reform programme (facilitating the issuance of land certificates)
- **Challenge:** Provision of earth observation to facilitate the delineation of titled land parcels
- **Initiative:** Very High Resolution optical satellite data can provide a detailed and homogeneous view of agricultural areas (identify and delineate of land concessions on a very detailed level)
- **Results:** Land titling creates a security of tenure and increases investment in land, agricultural productivity, and land values hence an overall improvement of income situation and standard of living
- **Service provider:** Eurosense (www.eurosense.com)
- **More info:** www.ifad.org, www.eomd.esa.int/index.asp

Presentation to the World Bank April 12th 2011
Wide-area Urban Development

• **Users**: Ministry of Land and Resources in China

• **Need**: Complete and uniform coverage for mapping, monitoring and change detection

• **Challenge**: Full area coverage within 6 months window; optimal collection of low or cloud-free data to be delivered on time

• **Initiative**: RapidEye satellite constellation is an operational system with the combination of capabilities which allow for repetitive coverage of large areas acquiring consistent data in high resolution with an option for daily revisit to an area. Some uses were focus on monitor their agricultural lands and protecting it from illegal urban sprawl

• **Results**: Quick coverage and delivery of the country (5.8 Milion km², 60%) during the 2009-2010 growing season

• **More Info**: RapidEye (www.rapideye.de)
Assisting urban planning activities
Earth Observation Support to Urban Development

• **Users:** World Bank

• **Need:** Assist urban planning activities

• **Challenge:** Provision of up-to-date EO based land monitoring products focused on various aspects of urbanized areas

• **Initiative:** Identification of infrastructure, settlements including classification into urban density classes, hydrology or environmental threats at different levels of detail.

• **Results:** Investment done will return in practical consequences of the fact that planning activities in Greater Baku area in following years could be based on accurate and up-to-date information

• **Service provider:** Gisat ([www.gisat.cz/content/en](http://www.gisat.cz/content/en))

• **More info:** [www.respond-int.org](http://www.respond-int.org)

Fig. Baku regional development graphic
Assessing Natural Hazards & Climate Change Risks
Integration of Satellite EO Technology in Disaster Management

• Need: Evaluate spatial assessment of natural hazards and climate change risks and help to address the critical knowledge and capacity gaps of local governments in dealing with rapid peri-urban expansion into areas that may face vulnerability to natural hazards, including those risks associated with climate variability

• Challenge: Develop, demonstrate and provide a method for identification and diagnostics for Peri-Urban Expansion Risks

• Initiative: Provide series of information on: Multi-temporal land cover mapping and population distribution, natural single and multi-hazard potential, social exposure and vulnerability, built-up areas and vacant land exposed to hazards

• Results: Critical information for the formulation of action plans to ramp up natural hazard and climate change risk management practices


Fig. Hydrologic modelling output of flood risk areas in part of semi-urban areas outside of Dakar, Senegal.

Users: World Bank’s Spatial and Local Development Team (FEU, SDN), WB Senegal Office

Integration of Satellite EO Technology in Disaster Management
Presentation to the World Bank April 12th 2011
Habitat monitoring and infrastructures

Integration of Satellite EO Technology in Infrastructures

• **Users:** European Investment Bank

• **Need:** Assess the environmental impact of the project as well as new, improved information for the creation of a new baseline and a more precise analysis of future changes

• **Challenge:** Road alignment meeting all the environmental demands, as well as to reducing the impacts on the brown bear habitat

• **Initiative:** Land cover maps were used for the calculation of different landscape fragmentation indicators to assess the impact of road during and after the end of its construction on the surrounding habitats.

• **Results:** monitoring the progress of the construction work

Perform synoptic and periodic progress monitoring of large construction projects and its environmental impact.

Contribution to a fast and cost-efficient monitoring strategy

• **Service provider:** Geoville (www.geoville.com)

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Fig, High resolution land cover mapping in a 1 km corridor along the Egnatia motorway

Presentation to the World Bank April 12th 2011
Mapping long term trends in deforestation in tropical regions

Integration of Satellite EO Technology in Climate Change

• Users: Brazilian National Institute Space Research (INPE)

• Need: Satellite imagery to estimate Amazon Basin deforestation assessment, rapid revisit times and wide area coverage.

• Challenge: Achieving a full coverage in short imaging windows to achieve homogeneity of data for analysis and reducing the impact of cloud cover common to tropical rainforest regions.

• Initiative: DMC wide swath images can cover huge areas and they reduce the time of the analysis significantly. It provided reliable annual large area coverage, and multi-temporal coverage of high risk areas.

• Results: Frequent forest monitoring with timely action leads to significant decrease of deforestation and prevents forest loss.

• Service provider: DMCii (www.dmcii.com)

Presentation to the World Bank April 12th 2011
Supporting agricultural and food security decisions

Earth Observation Support to Agriculture and Rural Development

• **Users**: Centre Suivi Ecologique, Senegal and CONAB, Brazil

• **Need**: Accurate and timely information on the growing season utmost importance for decision making

• **Challenge**: Implementation of appropriate interventions aimed to manage the risk of food insecurity in time

• **Initiative**: Use low cost data, daily meteo achieves and field observation to obtain Vegetation Productivity Indicators to develop further tools for faster and more adequate decisions

• **Results**: Early warning. EO data ensures rapid, accurate and timely information over large areas of the countries

• **Service provider**: VITO (www.vito.be)

• **More info**: www.gmfs.info, www.devcocast.eu

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Fig 1. Frequency analysis of negative anomalies at the start of the growing season. Red indicates high anomalies

Fig 2. Comparison of family agriculture in Brazil, Food Acquisition Programme
Implementing & managing agriculture projects

Earth Observation Support to Agriculture and Rural Development

• Users: Ministry Agriculture Malawi

• Need: Develop a sustainable irrigation plan and environmental impact assessments

• Challenge: Preparation for an irrigation plan to avoid erosion and reduced transport capacity of the water flow

• Initiative: Very high resolution images on irrigation sites used to make a detailed map outlining the irrigation scheme (timing of cultivation steps & greenness of the crops) providing a good inventory of the infrastructure. Information was derived by visual interpretation, image classification, analysis of NDVI-temporal profile

• Results: Land cover maps facilitate the selection of new irrigation sites, or the impact assessment of existing schemes helping to target field visits or to make the management of very large schemes more efficient

• Service provider: VITO (www.vito.be)

Fig 1. Map showing parcel management of a small scale irrigation scheme during dry season of 2010.

Fig 2. Overview of a small scale irrigation scheme with a false colour near infrared image of 1m resolution.

Presentation to the World Bank April 12th 2011
EARSC can provide the World Bank with an effective interface to the EU EO services industry

- Neutral support to find suppliers and obtain contractual services
- Ready to discuss setting up specific web-based tools to help with the interface
- Eopages will provide a first entry point to the full range of services being offered.

WWW.EARSC.EU