

Using Earth Observations for Integrated Water Resources Management

**Sustainability in the Water-Energy-Food Nexus
Bonn, 19-20 May 2014**

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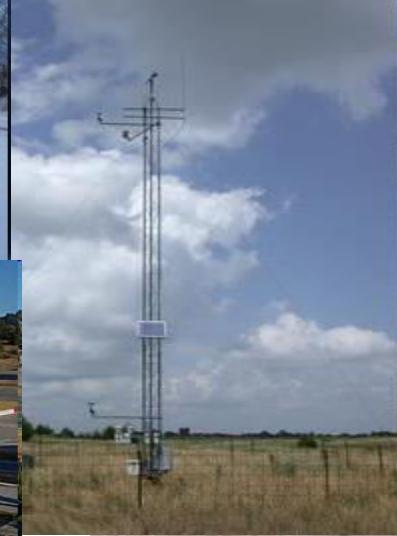
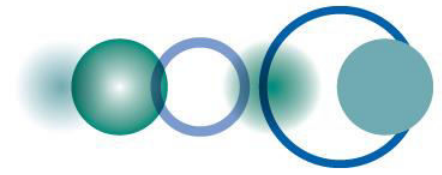


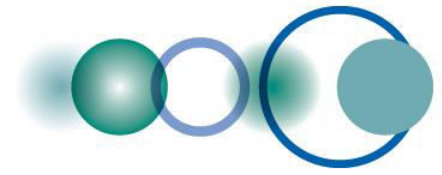


Space-based Assets



In-situ Systems

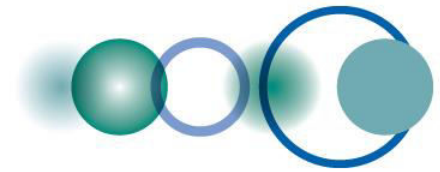




GEO: the Group on Earth Observations

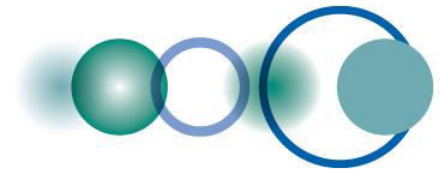
**An Intergovernmental group with 90 Members and
77 Participating Organizations**





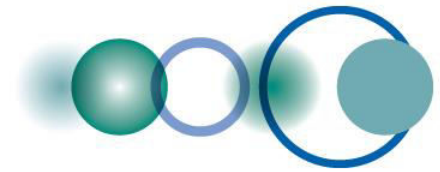
What is GEO?

- launched in **response to calls for action** by the 2002 World Summit on Sustainable Development, Earth Observation Summits, and by the G8 (Group of Eight) leading industrialized countries
- **voluntary partnership** of governments and international organizations
 - 89 member governments + EC
 - 77 Participating Organizations (PO)
- provides a **framework** within which these partners can develop new projects and coordinate their strategies and investments
- charged with **developing GEOSS**



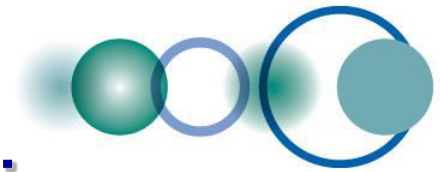
What is GEOSS?

- **Global Earth Observation System of Systems**
- an **integrating public infrastructure**, interconnecting a diverse, growing array of Earth observing instruments and information systems for monitoring and forecasting changes in the global environment
- supports policymakers, resource managers, science researchers and other experts to **support informed decision making for society**
- 10-year **implementation plan**
- **By 2015:**
Global, Coordinated, Comprehensive and Sustained System of Observing Systems



GEOSS Targeted Gaps

- 1. Lack of access to data and associated benefits in developing world**
- 2. Eroding technical infrastructure**
- 3. Large spatial and temporal gaps in specific data sets**
- 4. Inadequate data integration and interoperability**
- 5. Uncertainty over continuity of observations**
- 6. Inadequate user involvement**
- 7. Lack of relevant processing systems to transform data into useful information**

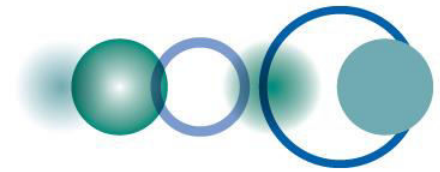


GEOSS Implementation requires: *Data Sharing Principles*

- **Full and Open Exchange of Data...**
 - Recognizing Relevant International Instruments and National Policies and Legislation
- **Data and Products at Minimum Time delay and Minimum Cost**
- **Free of Charge or Cost of Reproduction for Research and Education**



Water



THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS



Before 2015, GEO aims to:

Produce comprehensive sets of data and information products to support decision-making for efficient management of the world's water resources, based on coordinated, sustained observations of the water cycle on multiple scales.

WA-01 Integrated Water Information (incl. Floods and Droughts)

Components:

C1: Integrated Water-cycle Products and Services

C2: Information Systems for Hydro-meteorological Extremes (incl. Floods and Droughts)

C3: Information Service for Cold Regions

C4: Global Water-Quality Products and Services

C5: Information System Development and Capacity Building



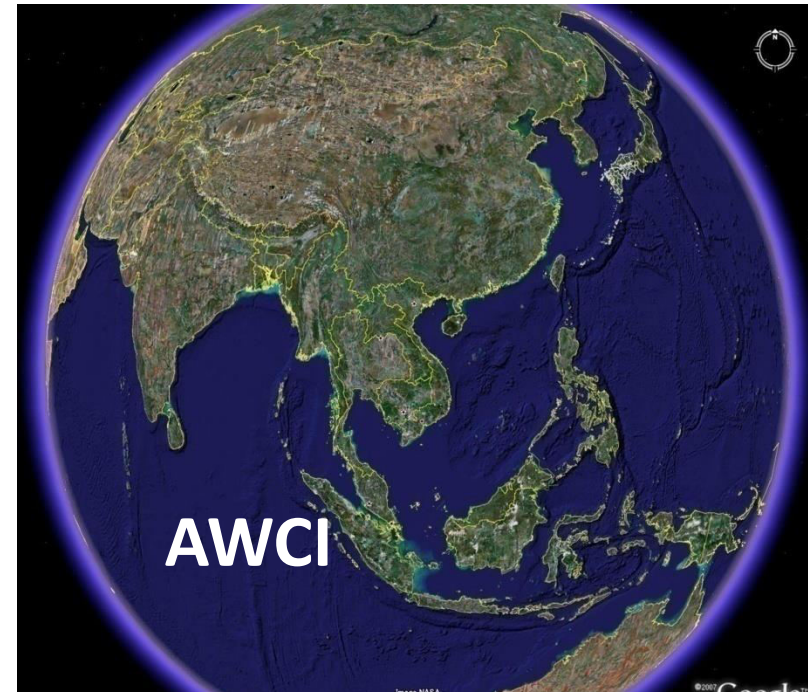
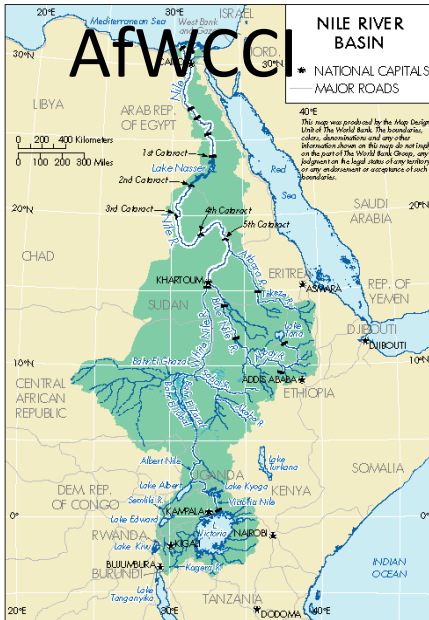
IS

Information System Development and Capacity Building (CIEHLYC, AWCI, AfWCCI, TIGER, IEEE Pilots)

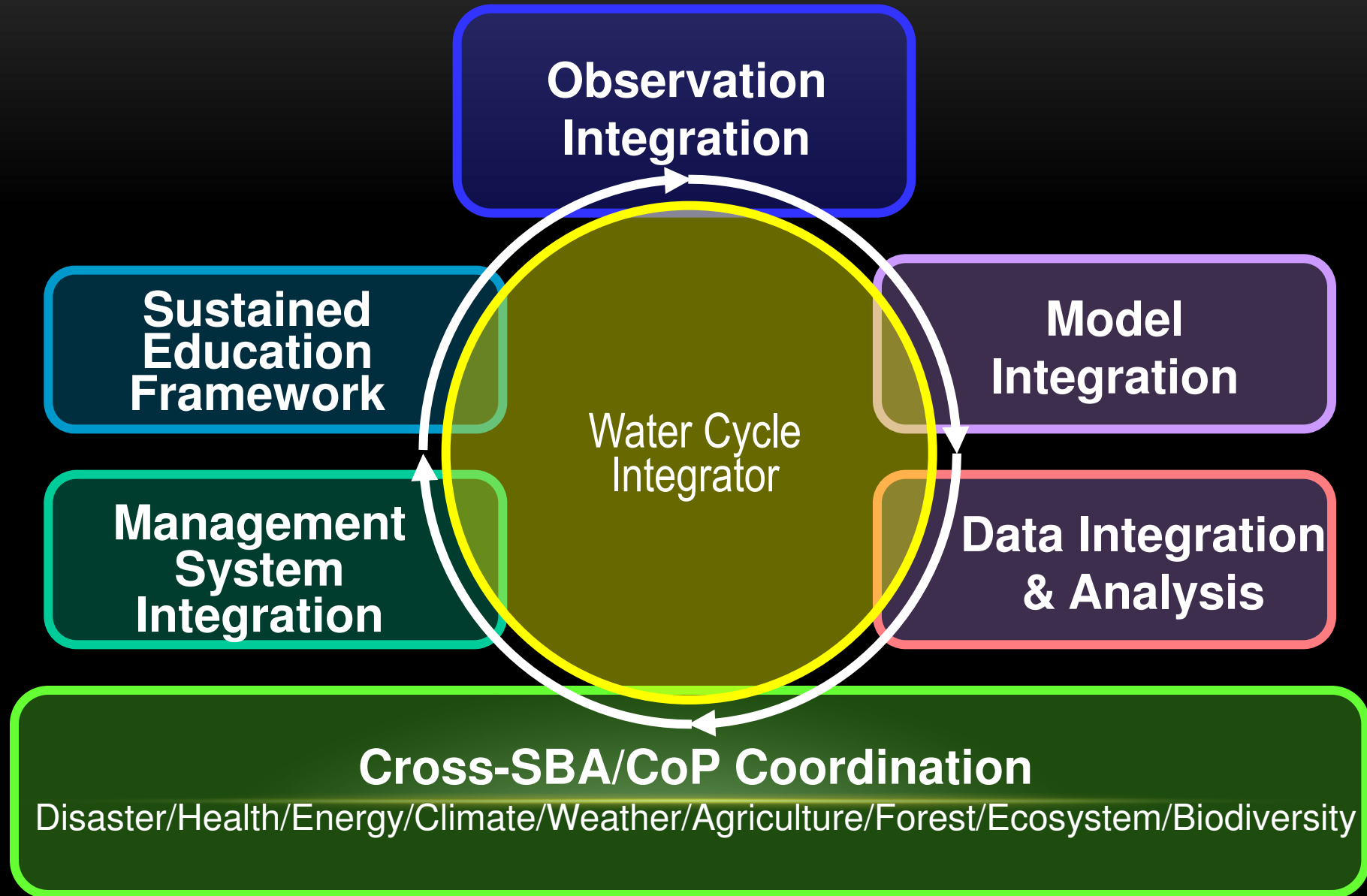
**GEOSS
Water
Cycle
Integrator
(WCI)**

Water Cycle Capacity-Building Workshop

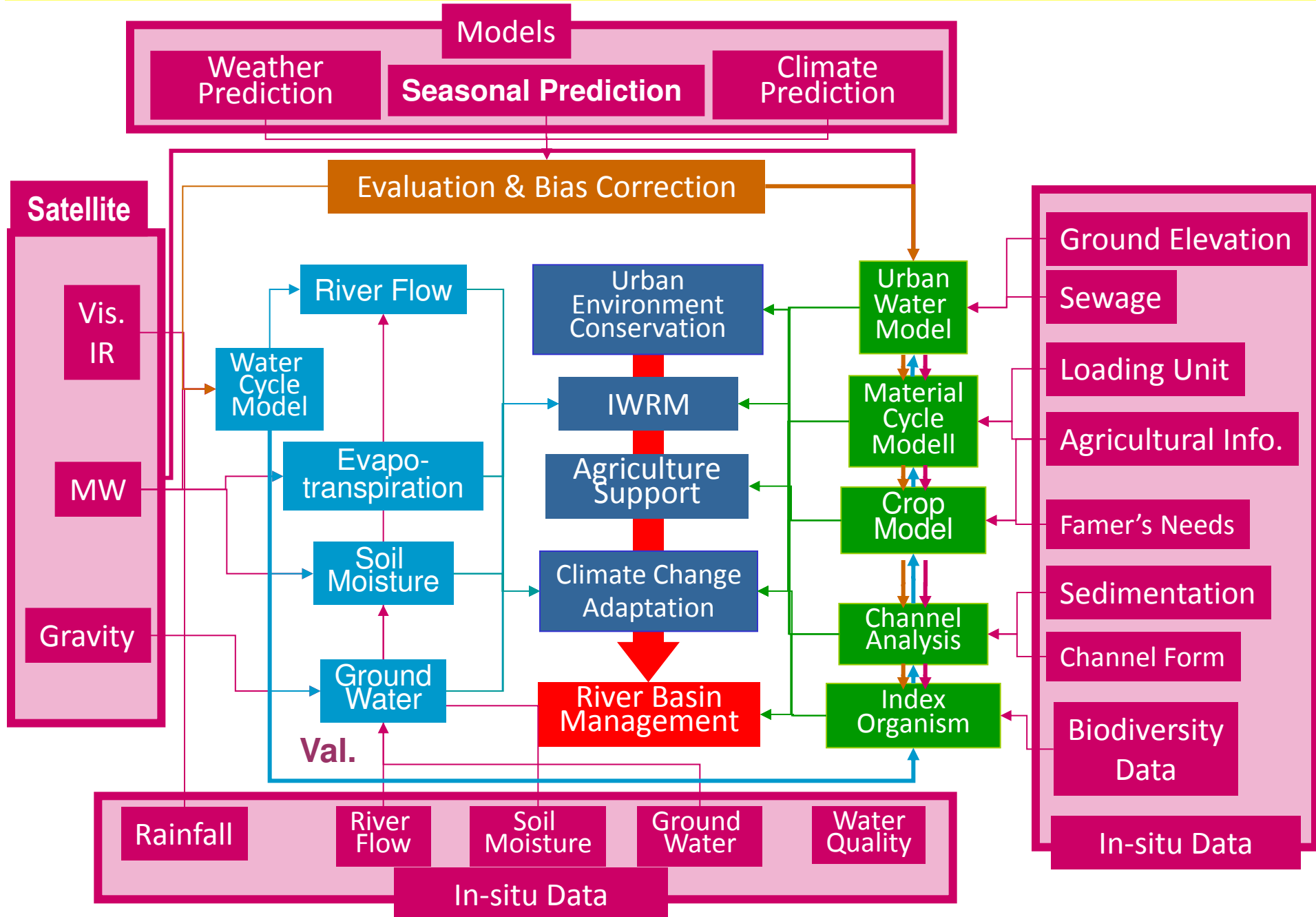
Cartagena-Colombia 2011
November 28 - December 2



Promotion of Integration and Interoperability



Water Cycle Integrator





1st Asian Water Cycle Symposium, Tokyo, Nov. 2005



1st Task Team Meeting, Bangkok, Sep. 2006



1st Capacity Building Workshop, Sep. 2006



2nd Asian Water Cycle Symposium, Tokyo, Jan. 2007



1st GEOSS AP Symposium, Tokyo, Jan. 2007



1st International Coordination Group Meeting, Bali, Sep. 2007



3rd Asian Water Cycle Symposium, Beppu, Dec. 2007

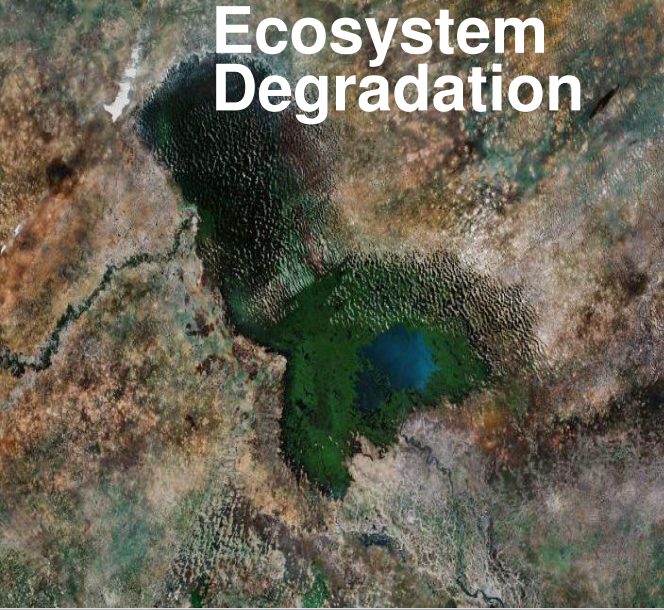
GEOSS Asian Water Cycle Initiative (AWCI)

To promote integrated water resources management by making usable information from GEOSS, for addressing the common water-related problems in the **Asia-Pacific** region.

Uniqueness

- A River Basin of Each Country
- Observation Convergence
- Interoperability Arrangement
- Data Integration
- Open Data & Source Policies
- Capacity Building
- Early Achievements

Ecosystem Degradation

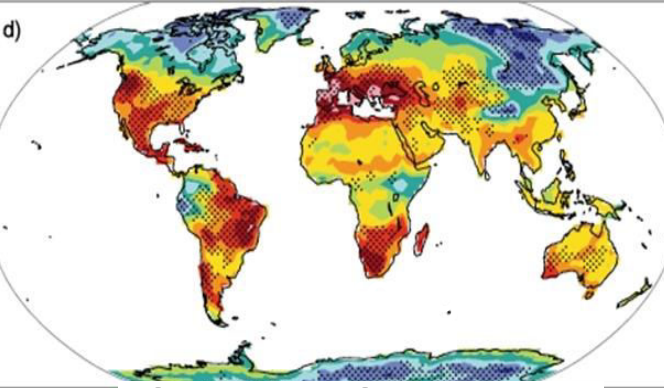


Access to Water



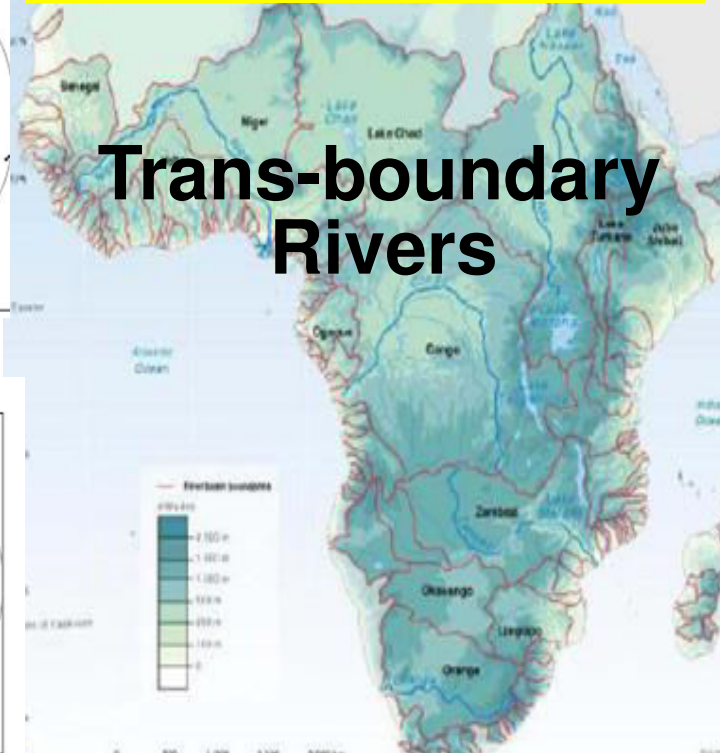
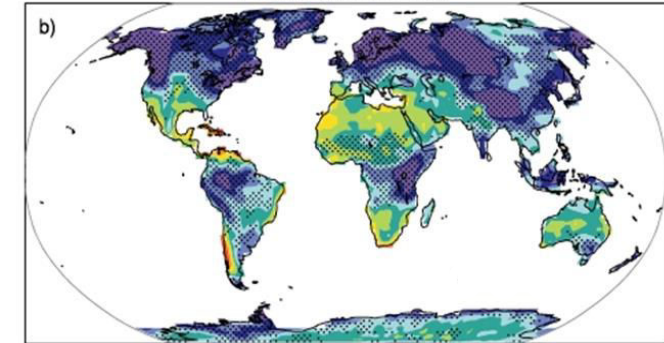
Health

GEOSS
African Water Cycle
Coordination Initiative

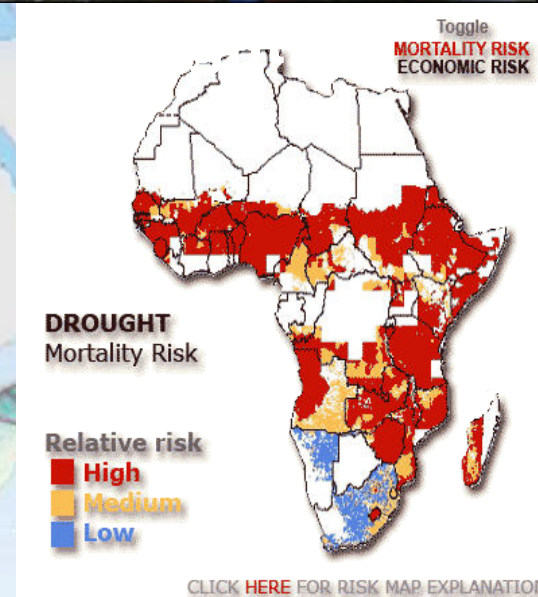


Climate Change

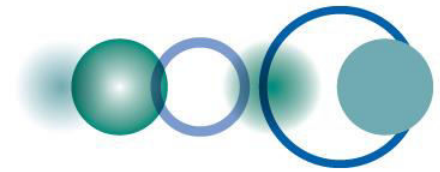
Precipitation intensity



Trans-boundary Rivers



Flood



GEOSS African Water Cycle Symposium

**Key messages regarding challenges facing Africa
in the water sector:**

lack of access to data and data sharing

**lack of infrastructure for collecting and analyzing
data**

lack of funding and resources

**need for capacity building, enhancement of
capabilities , and retention of expertise**

**political buy-in and role of national government is
critical to the success of any initiative**





GEOSS Portal

Discover, Access, Contribute
Earth Observations and Information & Services



- HOME
- VIDEO TUTORIAL
- SEND FEEDBACK

SEARCH

Enter search word

Related Topics

- + Themes
- + Country/Geography
- + Data Access Conditions
- + Earth Observation Catalogs

Start Date End Date

CLEAR SEARCH



WHAT IS GEOSS PORTAL

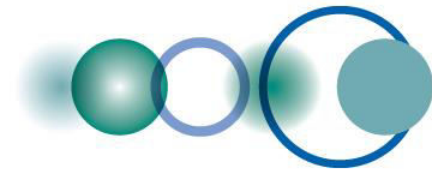
The GEOSS Portal is your main entry point to Earth Observation data from all over the world. [Search our data](#) or [Contribute](#) to our resources and data discovery tools. We also link world-wide community of practice in nine SOCIETAL BENEFIT AREA

[Register Your Resources](#)
Make your Geospatial Data discoverable here.

[Tell US what you think](#)
Your Feedback helps us improve the GEO Portal

POPULAR SEARCHES

- Precipitation
- Land Surface
- Temperature
- Land Cover
- Urbanization
- Sea Surface
- Temperature
- River Flow
- Observation
- Surface Atmospheric Condition
- Elevation
- Soil



Priorities for GEO post-2015...

1: Address urgent global challenges

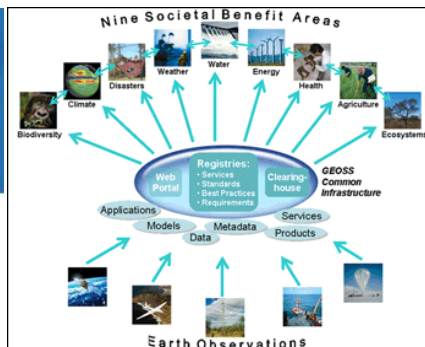


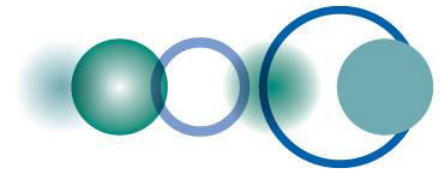
2: Support for Sustainable Development

(Earth observations for monitoring progress towards SDGs)



3. Build on Accomplishments of GEO





Rio + 20: “The future we want”



RIO+20
United Nations
Conference on
Sustainable
Development

274. We recognize the importance of space-technology-based data, in situ monitoring and reliable geospatial information for sustainable development policymaking, programming and project operations. In this context, we note the relevance of global mapping, and recognize the efforts in developing global environmental observing systems, including [...] through the **Global Earth Observation System of Systems**. We recognize the need to support developing countries in their efforts to collect environmental data.

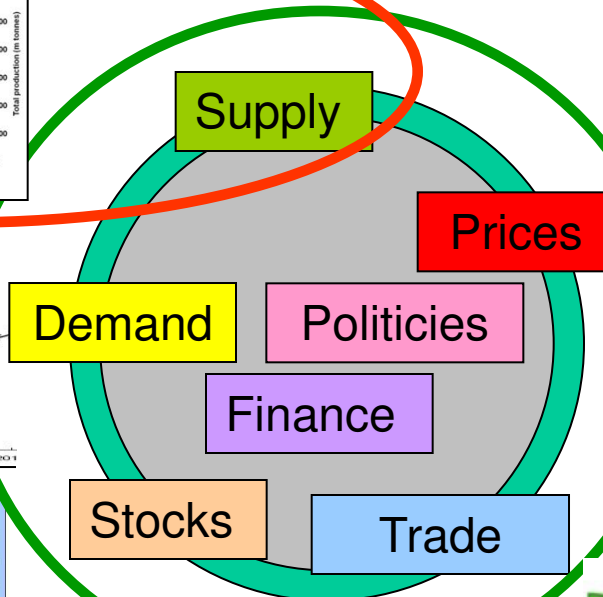
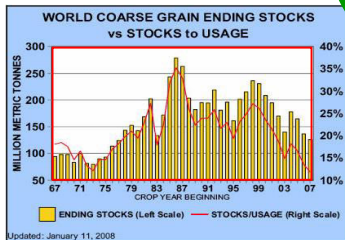
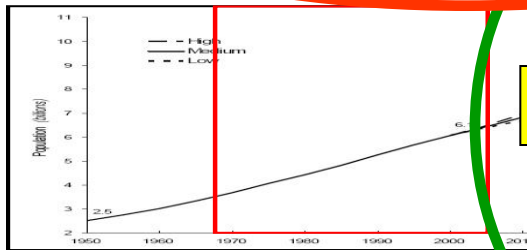
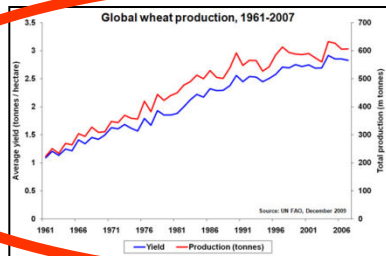
Priority

GEOGLAM & AMIS

- Two initiatives to increase information availability, quality and transparency :

GEOGLAM : improve information on supply (GEO)

AMIS : improve information on markets (FAO)



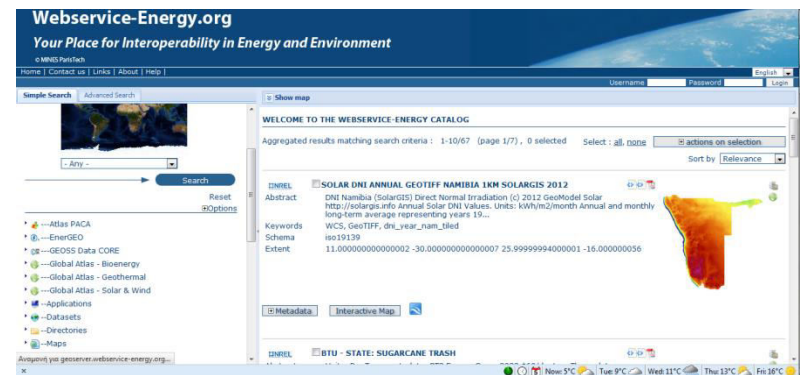


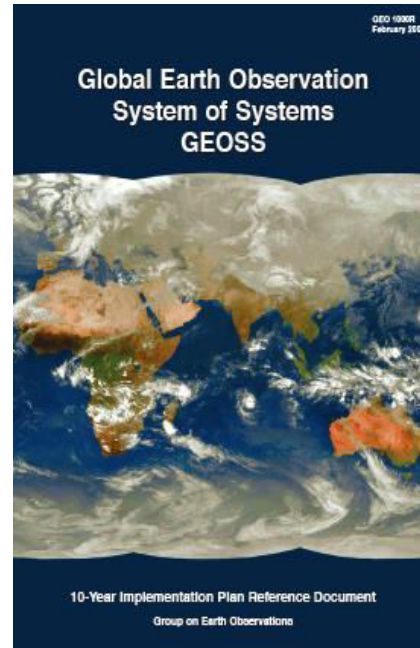
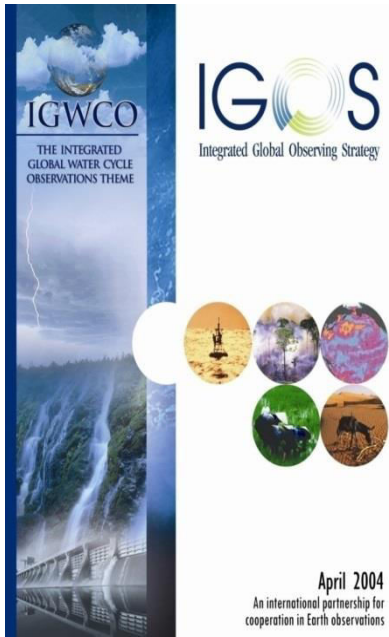
W-E-F Nexus: Bioenergy

Global:
Contribution to the Global
Renewable Energy Atlas of IRENA
– Bioenergy segment

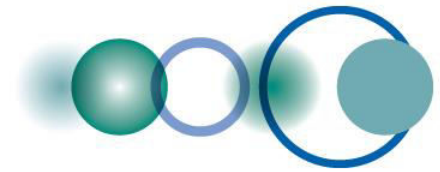
Regional:
Development of the Bioenergy
Atlas for Africa (BAfA) led by South
Africa

National:
Optimization of bioenergy plants
sitting in Pakistan





Water-Energy-Food Nexus recognized as a primary theme of the recently completed GEOS Water Strategy Report



GEO and Future Earth

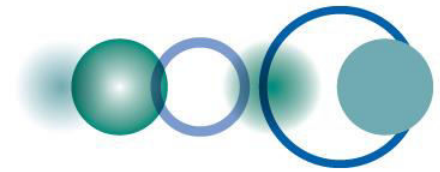
Future Earth Objective:

- build the knowledge required for societies to face risks

Through:

- enabling integrated research on grand challenges and *transformations to sustainability*
 - strengthening global partnerships between researchers, funders and partners of research
 - communicating science to society and vice versa
- ***GEO can provide political support and supply EOs needed to meet these goals***





G8-2008



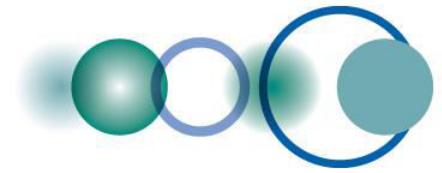
“...we will accelerate efforts within the Global Earth Observation System of Systems (GEOSS), ... in priority areas, inter alia, climate change and water resources management, by strengthening observation, prediction and data sharing. ... capacity building for developing countries ... interoperability and linkage ...”

Thank you!

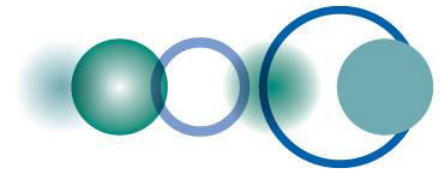
www.earthobservations.org

dcripe@geosec.org





Extras

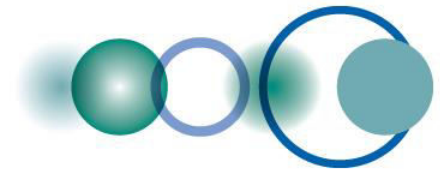


Energy task dedicated to International Energy Targets

**Contributes to the UN Secretary General's
Sustainability Energy for All (SE4All) Initiative
and the SDGs**

- 1. double the share of renewable energy in the global energy mix,***
- 2. ensure universal access to modern energy services, and***
- 3. double the global rate of improvement in energy efficiency in buildings, industry, agriculture, and transportation sectors***

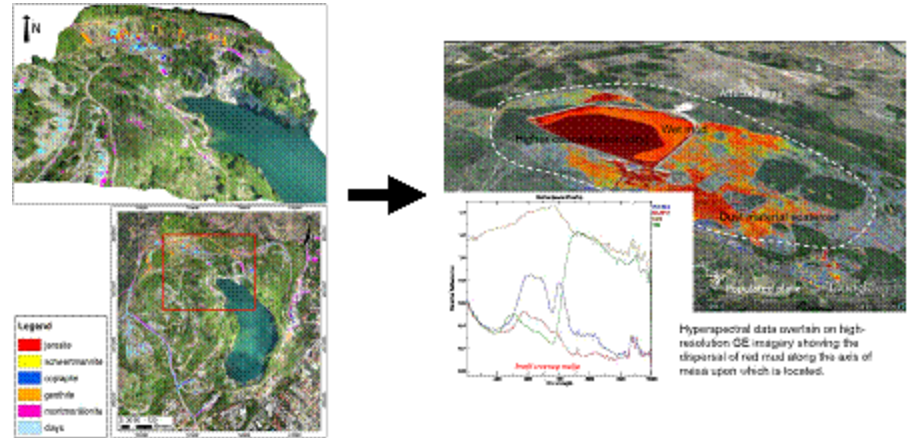




W-E-F Nexus: Other than Bioenergy

Hydropower:

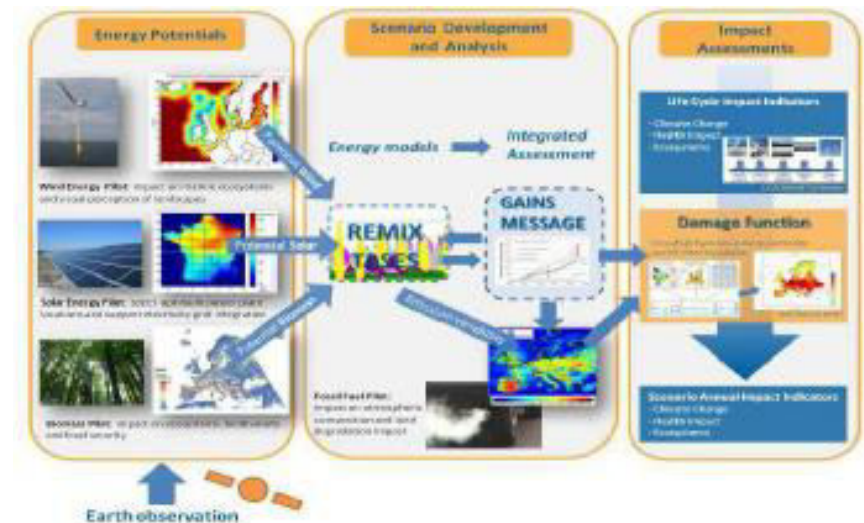
Contribution to the Global Renewable Energy Atlas of IRENA – Hydropower segment



Fossil Fuels:

Development of several tools and indicators for the impacts of coal-mining activities on water quality and land use

Sustainability Impact assessment: Development of Life Cycle integrated tools for decision making

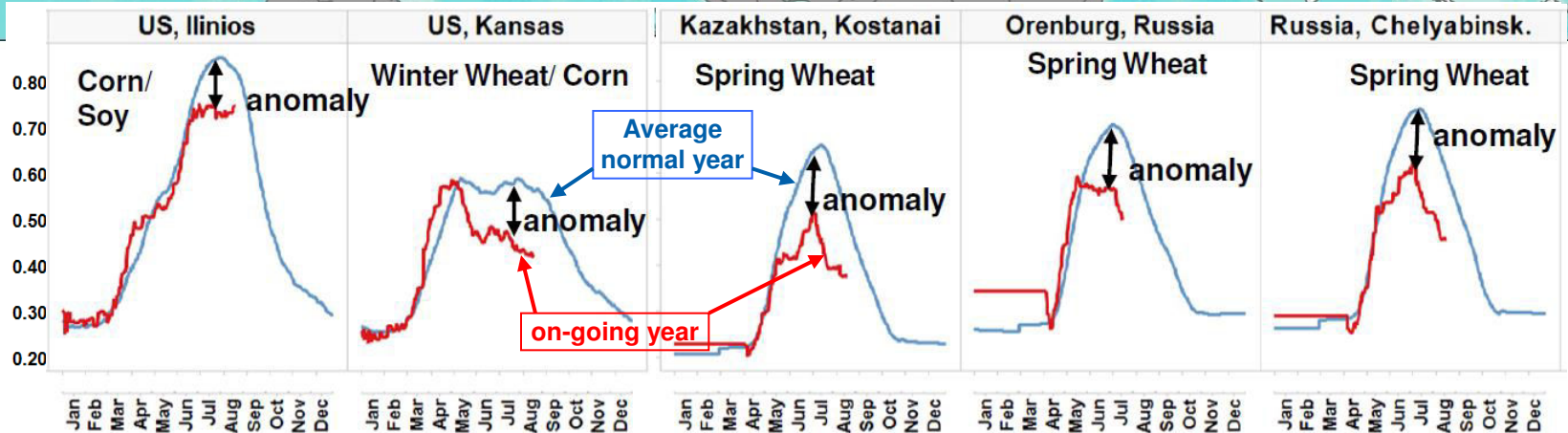
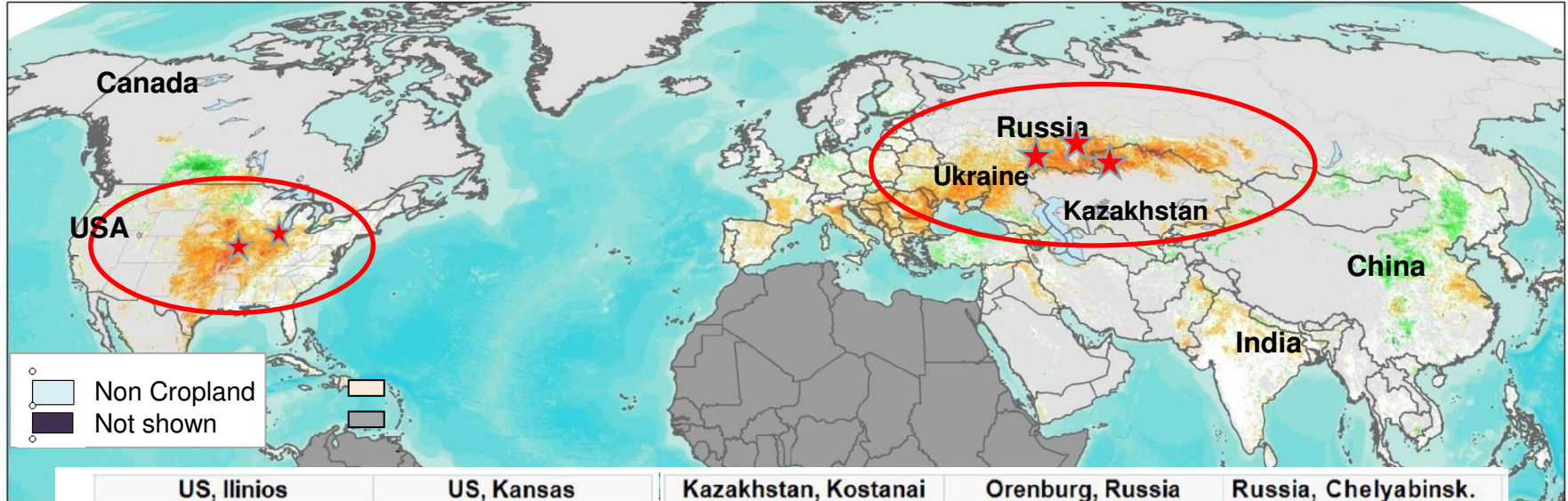


GEO Global Agricultural Monitoring Task Goals

1. **Global monitoring of agricultural production**, facilitating reduction of risk and increased productivity at a range of scales
2. Timely & accurate **national (sub-nat.) agricultural statistical reporting**
3. **Accurate forecasting of shortfalls** in Crop production & Food supply
4. **Effective Early warning of famine**, enabling a timely mobilization of an international response in food aid
5. Global mapping, monitoring and modeling of **changes in agricultural land use, type and distribution**, in the context of socio-economic and climate change

Example of Crop Crisis Situation: 2012

Northern Hemisphere Crop NDVI Anomalies - August 13th 2012



GEOGLAM Capacity Building Component

Ex : Pakistan Agricultural Information System

(Collaboration among CRS, FAO, SUPARCO, UMD & USDA)

Global Agriculture Monitoring -- 250-meter MODIS/NDVI Time Series Database Pakistan -- 2012-Jun-09 to Jun-24

Regional Image | View 1
Click to Show Detail. Red box indicates bounds of detail image. Each pixel is 2.5km.

Options

- Product Type: MOD44/MYD44 (16-day)
- Image Date: 2012-Jun-09 to Jun-24
- Image Type: Current Image
- Water Mask: Standard (MOD12)
- Crop Mask: None
- Palette: Color (Ramp)
- Click Type: Polygon: Provinces

Pakistan Polygon Options

Draw? Label? Zoom To

Provinces: Punjab

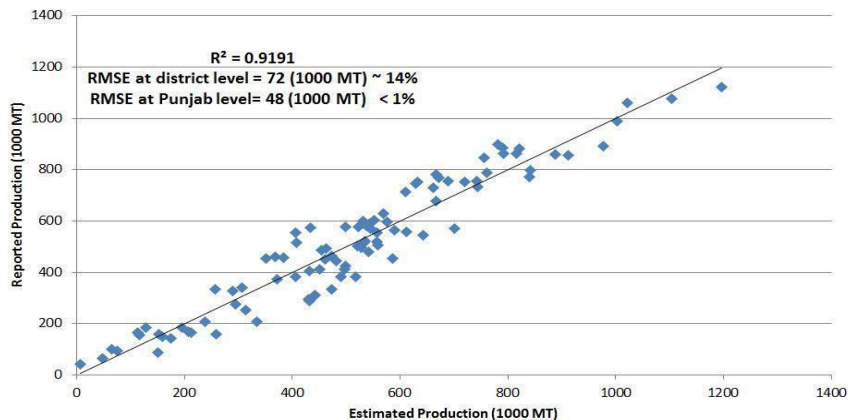
MODIS NDVI (Terra) (MOD09 8-day) Graph

MODIS NDVI (Terra) (MOD09 8-day) : Dera Ghazi Khan (Crops Only)

Crop condition

Crop type classification

EO Estimated vs Reported Wheat Production



PAKISTAN AGRICULTURE INFORMATION SYSTEM
Building Provincial Capacity for Crop Estimation, Forecasting, and Reporting using Remote Sensing

HOME

Project GCP/PAK/125/USA
Building Provincial Capacity in Pakistan for Crop Estimation, Forecasting, and Reporting based on the integral use of Remotely Sensed Data

RECENT UPDATES

12-18 Nov 2012: First advanced training course on crop monitoring through satellite technology at SUPARCO.

7 Sep 2012: STO Report to release in region, an effort to improve and document crop specific methodology at SUPARCO.

1 Aug 2012: New publications on provincial level the same advanced training on crop monitoring and reporting and SUPARCO methodology for crop estimates and forecasts.

16-28 Jun 2012: 3rd Targeted training course: "Advanced Training on Assessing of Crops through Satellite Technology for CRIS staff for a provincial CRIS staff"

RELATED LINKS

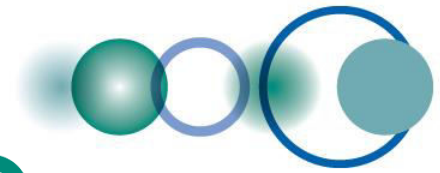
Google group: "Pakistan Agriculture Sector" PAC rice price and more. www...

UMD and PAO: metrics with... www...

Crop bulletins and reports from...

Countries at risk

- **Subsistence agriculture & Pastoralism**
 - basis of livelihood systems in many countries
 - highly climate-sensitive
- **Climate station networks not well working (sparse, bad or late reporting)**
- **Satellite remote sensing & Models can fill the gap**
 - and provide the basis for early detection of agricultural droughts
- ***On all continents:***
 - ***Africa*** : Senegal, Mauritania, Mali, Burkina, Niger, Chad, Somalia, Sudan, Eritrea, Ethiopia, Djibouti, Somalia, Kenya, Uganda, Rwanda, Tanzania, Zambia, Mozambique, Zimbabwe, Botswana, South Africa, Lesotho, Swaziland...
 - ***Central America***: Guatemala, Honduras, El Salvador, Nicaragua
 - ***Caribbean***: Haiti
 - ***Central Asia***: Afghanistan



About **20** brokered data providers – capacities, systems, Communities



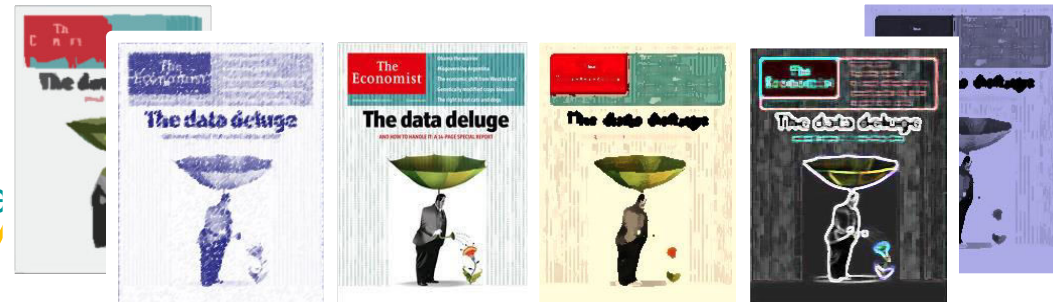
Publish

More than **7 Million** (**1.2 Million** GEOSS Data Core) potentially Discoverable and Accessible resources (mix of data collections, datasets and individual images)



Contain [source: data providers]

More than **65 Million** (**50 Million** GEOSS Data Core) potentially Discoverable and Accessible resources (e.g. satellite scene rain gauge record)



Resources