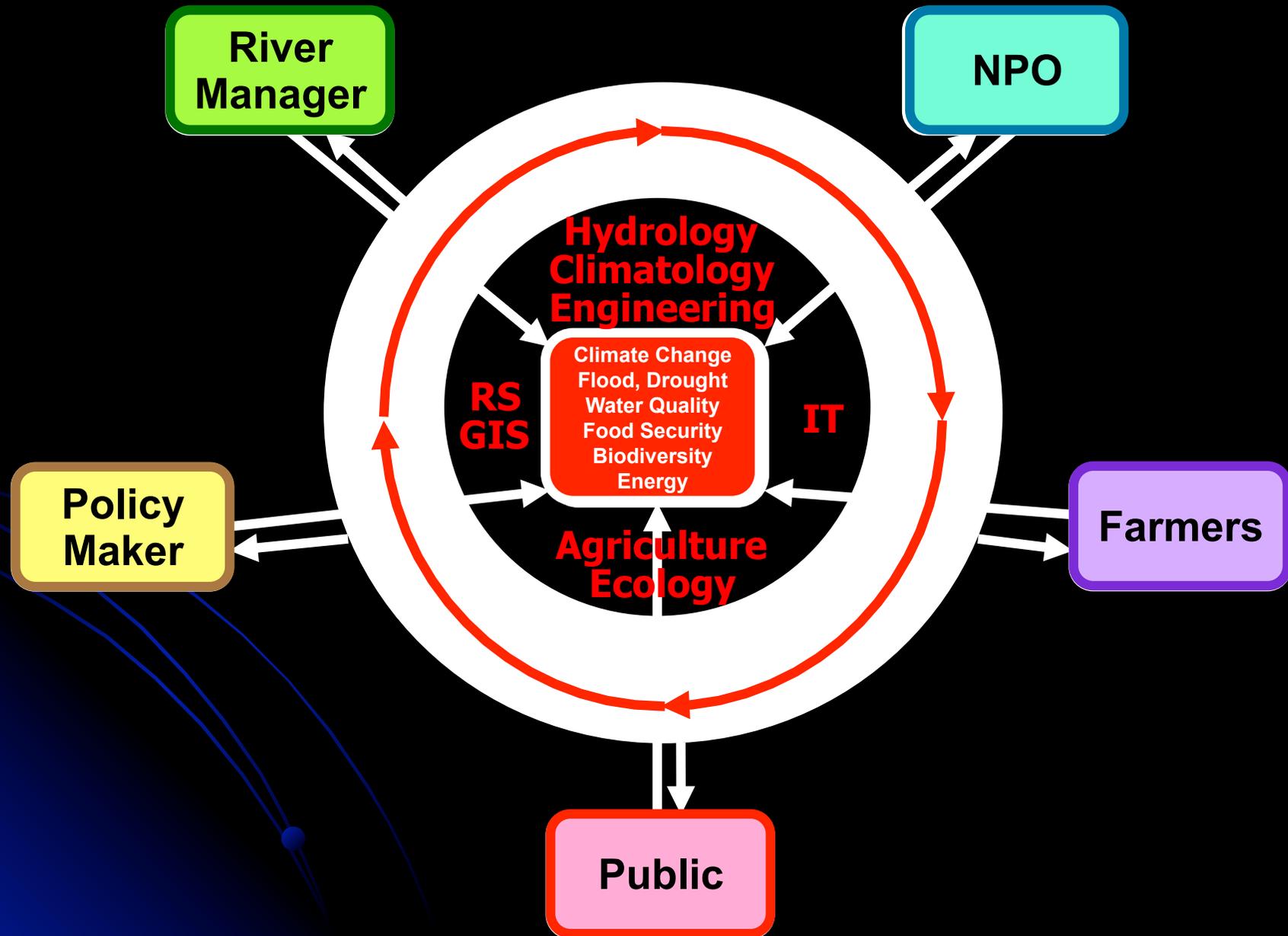


Scientific Integrator Contributing to Societal Benefits

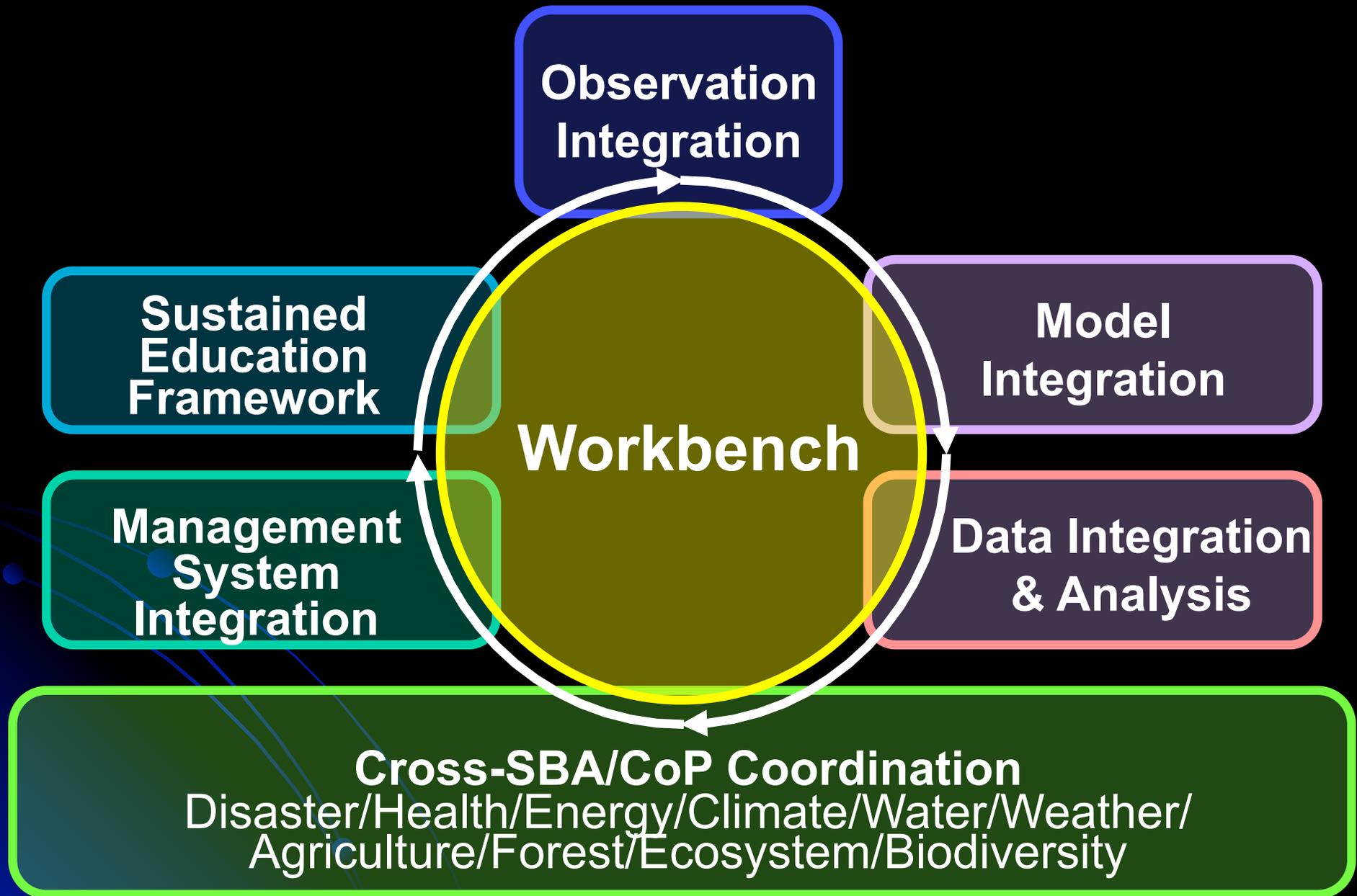


Toshio Koike, The University of Tokyo

Sharing Data and Information Exchanging Knowledge, Experiences and Ideas Working Together



Integrated & Coordinated Approach



Integrated & Coordinated Approach

**Cooperative
Framework**

**Observation
Integration**

**System for
Integration**

**Sustained
Education
Framework**

**Model
Integration**

**Management
System
Integration**

**Data Integration
& Analysis**

Workbench

Cross-SBA/CoP Coordination
Disaster/Health/Energy/Climate/Water/Weather/
Agriculture/Forest/Ecosystem/Biodiversity

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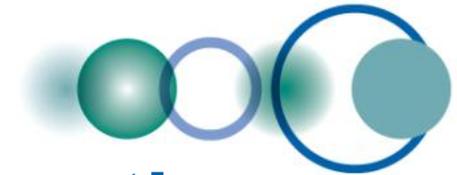
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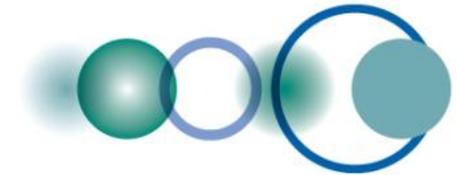


GEO, the Group on Earth Observations

An Intergovernmental Body
with 89 Members & 61 Participating Organizations

- *Earth Observation Summit I (July 2003: Washington DC)*
- *EO Summit II (April 2004: Tokyo)*
- *EO Summit III (February 2005: Brussels)*
- *EO Summit IV (November 2007: Cape Town)*
- *EO Summit V (November 2010: Beijing)*



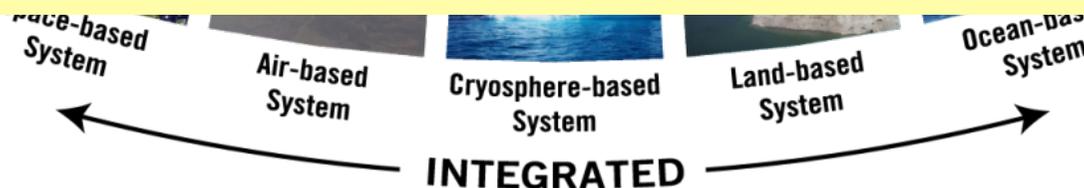


Global Earth Observation System of Systems



Vision for GEOSS

The vision for GEOSS is to realize a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations and information.



A Global, Coordinated, Comprehensive and Sustained System of Observing Systems



The First GEOSS Asia-Pacific Symposium

-Integrated Observation for Sustainable Development
in the Asia-Pacific Region-



Date: 11 - 12 January, 2007
Venue: Dai-ichi Hotel Tokyo Seafort
[Tokyo, Japan]
Attendee: 311 participants from 29 countries
Key Objective: Gaining a common understanding of future activities for realizing GEOSS (Global Earth Observation System of Systems) that can contribute to sustainable development in the Asia-Pacific region.
Keynote Speech: "Preparing for Rare, Great Earthquakes"
Dr. Hiroo Kanamori
<Professor, California Institute of Technology>
Country Report: China, India, Indonesia, Iran, Japan, Korea, Malaysia, Nepal, Philippines, Thailand
Technical Session:

- ▶ Monitoring Ecosystems and Biodiversity
- ▶ Resolving the Climate Change and Water Cycle
- ▶ Monitoring Forest Fire
- ▶ Monitoring Earthquakes

Further information:
<http://www2.restec.or.jp/geoss/index.php>



Keynote Speech



The Fourth GEOSS Asia-Pacific Symposium

-Towards a Global Earth Observation System of Systems that Supports
the Societal Benefit Areas of Climate and Biodiversity-



Date: 10 - 12 March 2010
Venue: Sanur Paradise Plaza [Bali, Indonesia]
Attendee: 220 participants from 26 countries
Key Objective: To strengthen international networking among member countries in the region. It promoted national, regional, and international synergies for building and maintaining Earth observation networks that contribute to GEOSS.
Keynote Speech:
Prof. (Hon) Rachmat Witoelar
<Executive Chair, National Council on Climate Change-Indonesia>
Dr. Arjun Thapan <Special Senior Advisor, Infrastructure and Water, Office of the President, Asian Development Bank>
Country and Regional Report: Australia, Bangladesh, China, Indonesia, Japan, Nepal, Pakistan, Philippines, APN
Technical Session:

- ▶ Asia-Pacific Regional Climate Variability and Monitoring Capacity
- ▶ Hydrometeorological-Related Disaster and Water Resources Management
- ▶ Forest Carbon Tracking
- ▶ Asia-Pacific Biodiversity Observation Network (AP-BON).

Further information:
http://www.lapanrs.com/geoss_ap_4th/



Keynote Speech



Keynote Speech



The 6th GEOSS Asia-Pacific Symposium

Date : 25-27 February, 2013

Venue : Ahmedabad, India

Theme :

Establishment of Data Sharing and Data Integration in the Asia-Pacific Region.

Objective :

to promote the exchange of data and information through the Global Earth Observation System of Systems (GEOSS) and to find solutions for achieving societal benefits through GEOSS in the Asia-Pacific region.

Working Groups:



WG1:	Asian Water Cycle Initiative (AWCI)
WG2:	Agriculture and Food Security
WG3:	Forest Carbon Tracking (FCT)
WG4:	Asia-Pacific Biodiversity Observation Network (AP-BON)
WG5:	Ocean Observation and Climate

GEOSS Asian Water Cycle Initiative (AWCI)



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



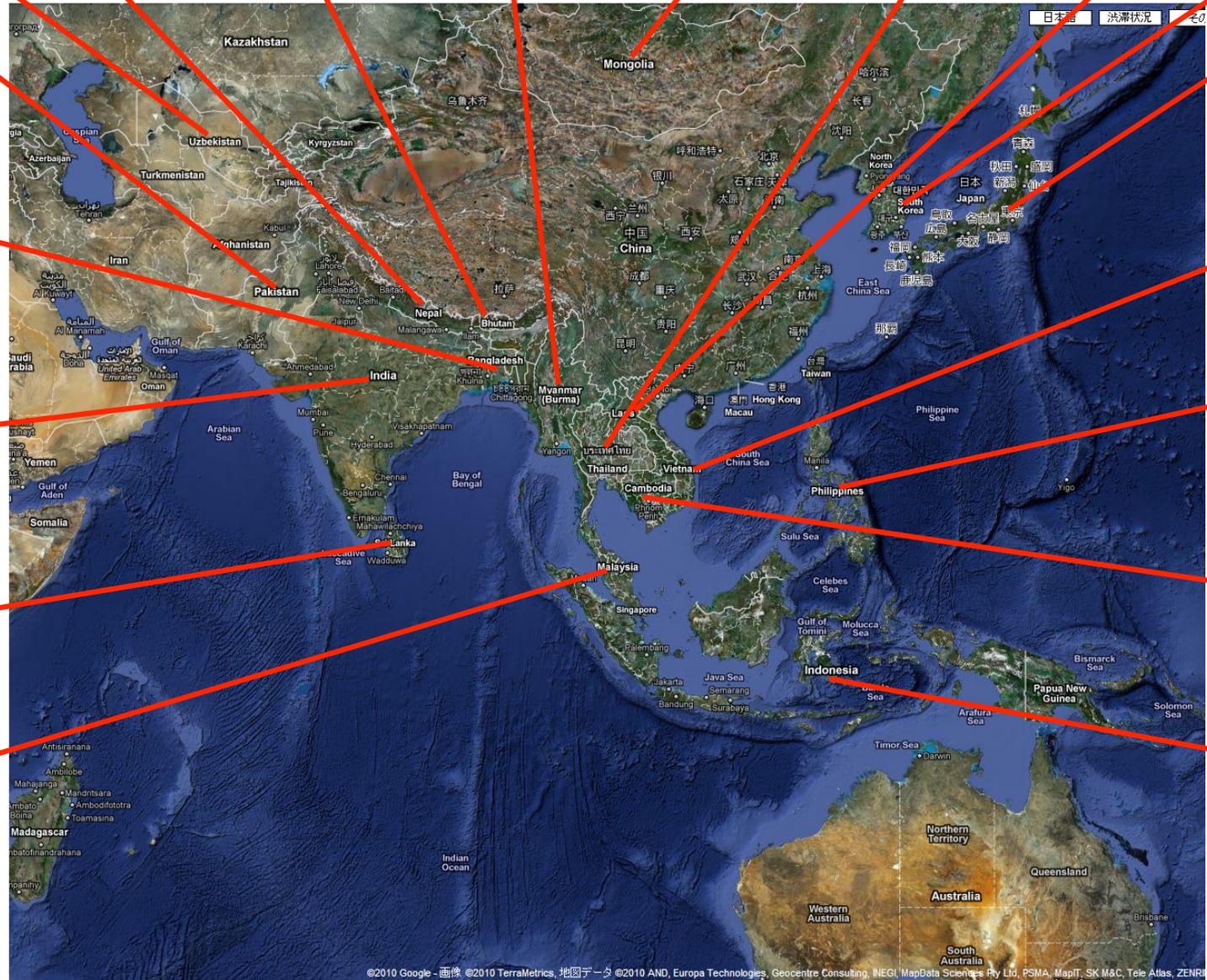
1st International Coordination Group Meeting, Bali, Sep. 2007

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

Uniqueness

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

Demonstration River Basins



Observation Metadata Registration

Complete

Document Metadata Registration

Complete

Quality Controlling

Complete

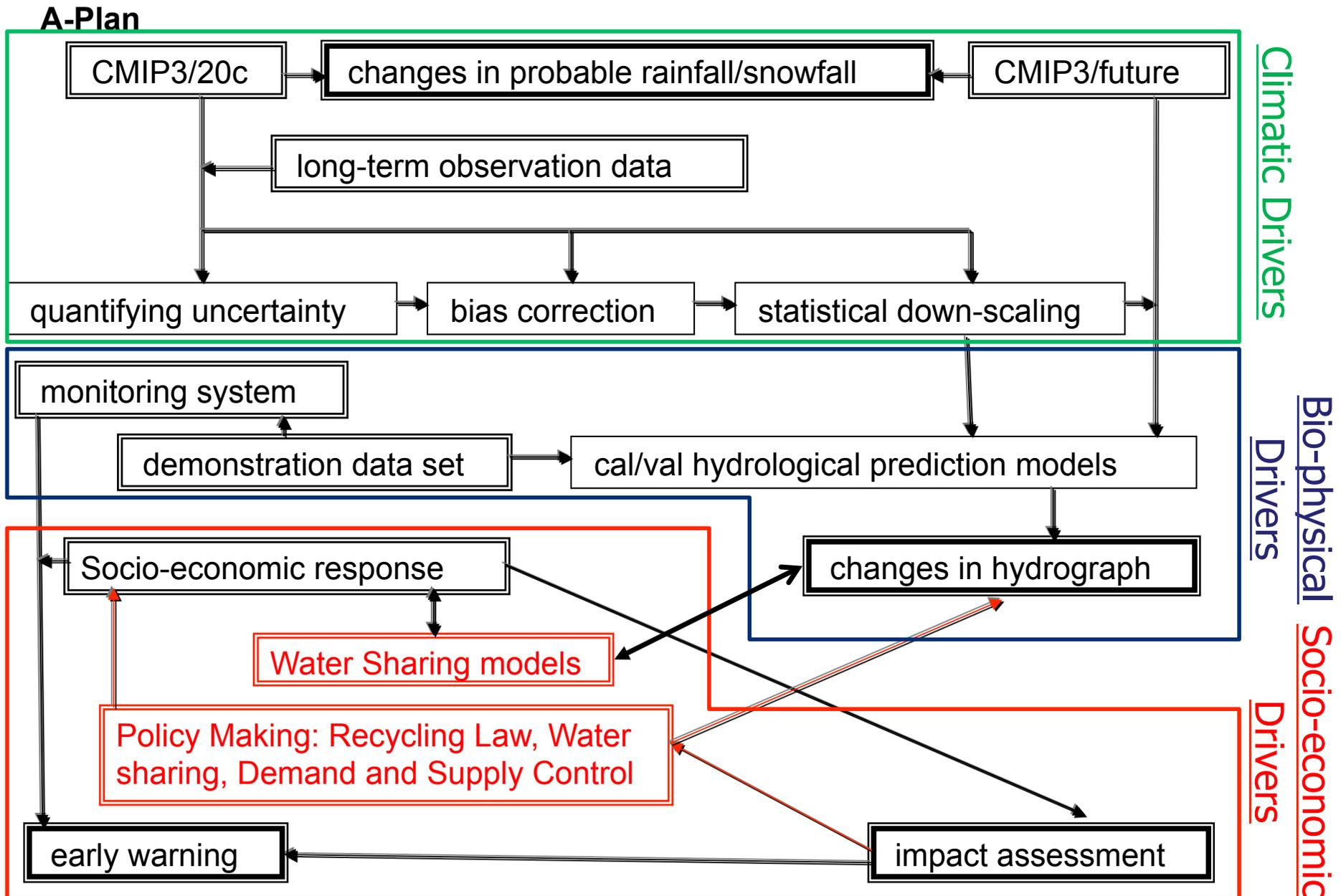
Data Uploading

Complete

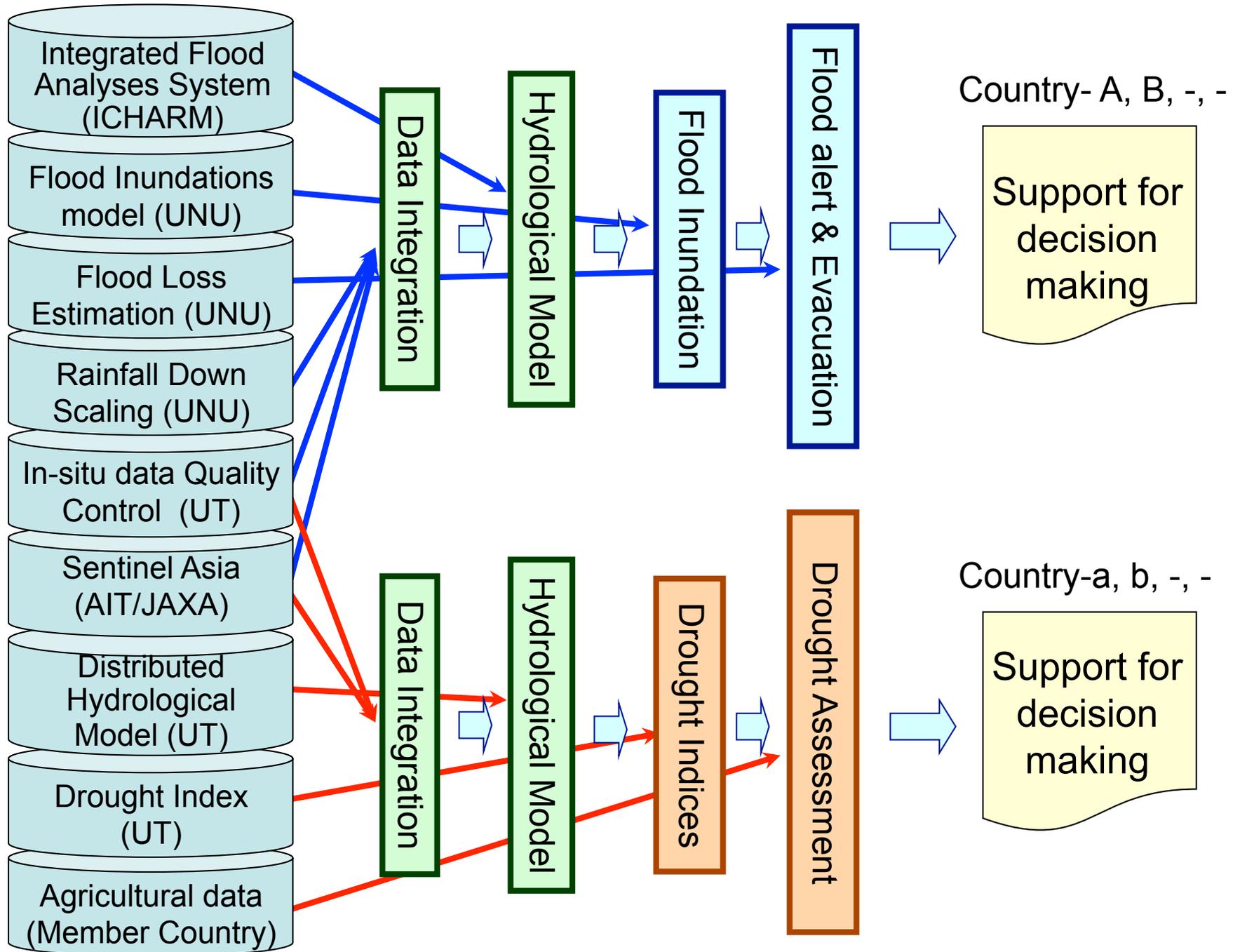


Implementation Planning

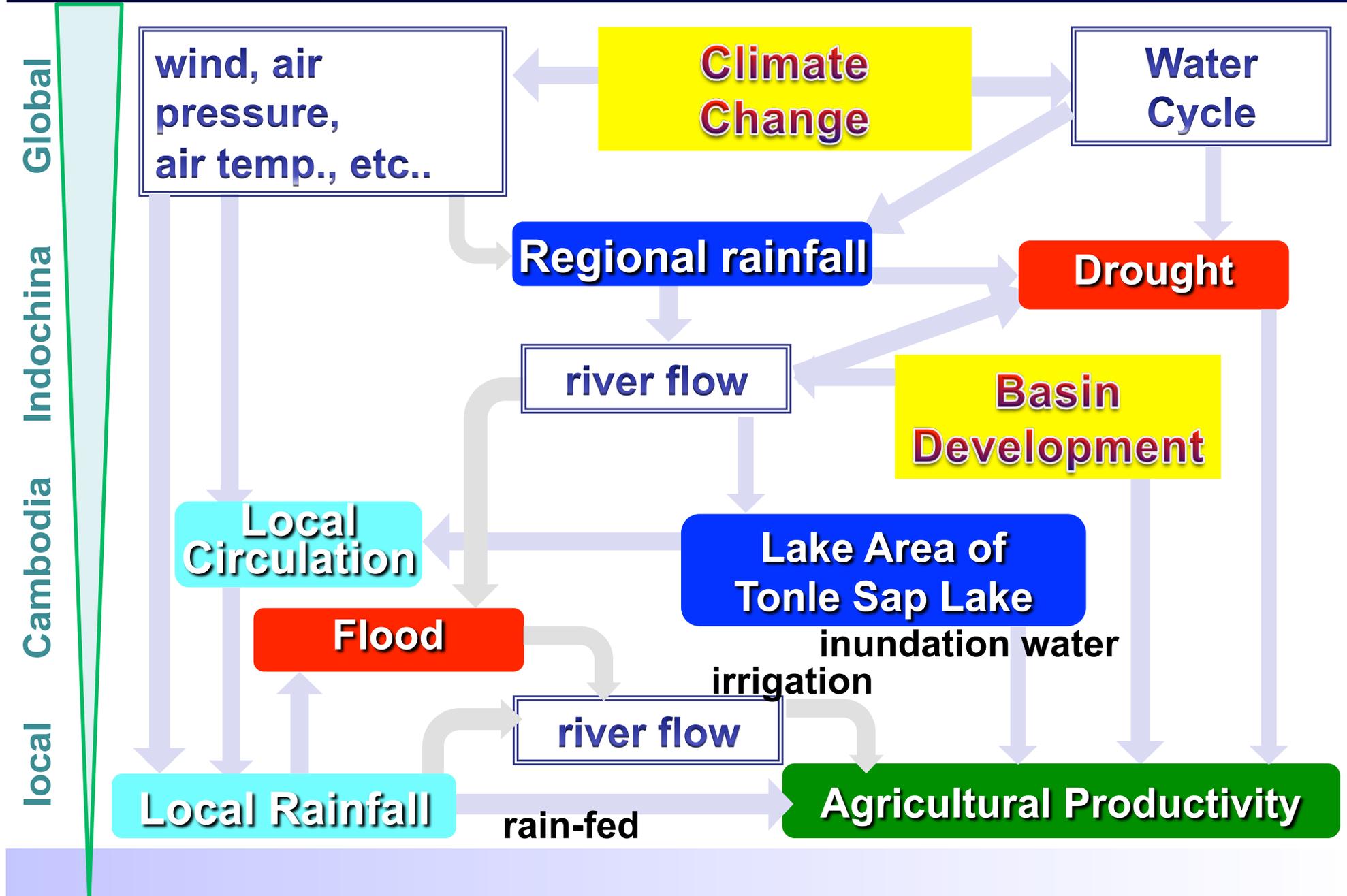
Question 1: What should be added, removed and modified?



Training Modules Training Course



hydro-meteorological situation in Cambodia



Integrated Research on Disaster Risk (ICSU/ISSC/UNISDR)

Key questions & a response:

Why, despite advances in the natural and social science of hazards and disasters, do losses continue to increase?

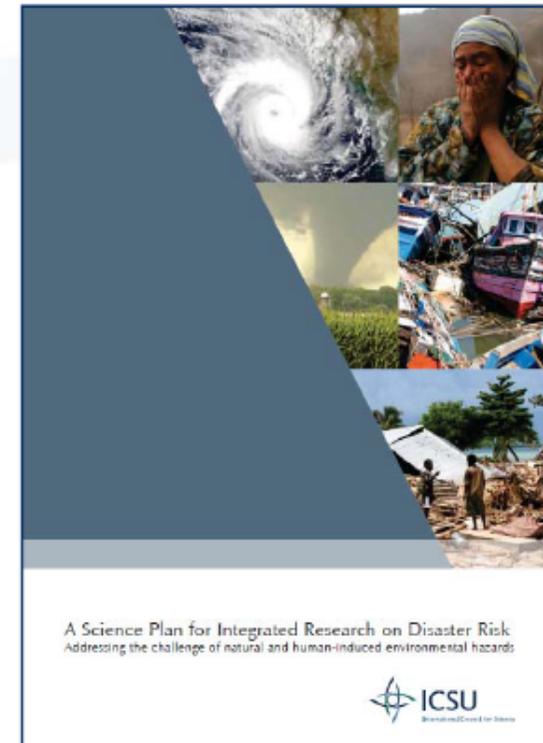
To what extent is the world-wide growth in disaster losses a symptom and indicator of unsustainable development?

The IRDR Science Plan: addressing the challenge of natural and human-induced environmental hazards with an integrated approach to research on disaster risk through: an international, multidisciplinary (natural, health, engineering and social sciences, including socio-economic analysis) collaborative research programme.

Science Plan

An *integrated approach* to research on disaster risk (trans-disciplinary, collaborative research programme)

1. Characterization of hazard, vulnerability and risk
2. Effective decision-making in complex and changing risk context
3. Reducing risk and curbing losses through knowledge-based actions



IRDR Science Plan at:

<http://www.irdrinternational.org/>

Data needed for managing and reducing the risk of disasters

Three main types of data:

- Data on **disaster losses**
- Data on **natural events or phenomena**
- Data on **vulnerability** (human, social, physical, institutional, economic, ecological)



IRDR

Integrated Research on Disaster Risk

FORIN Research

- In-depth investigation into complex and underlying causes
- Common template & methodology
 - Fundamental causes of disasters
 - Trace out and assign causal explanation of losses and intervening conditions that increased or reduce losses
- Series of case studies



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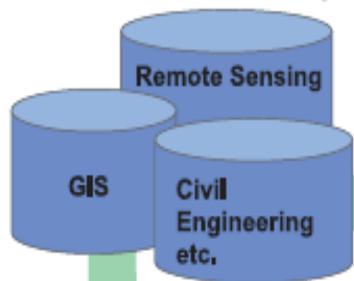
**Management
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**Data Integration
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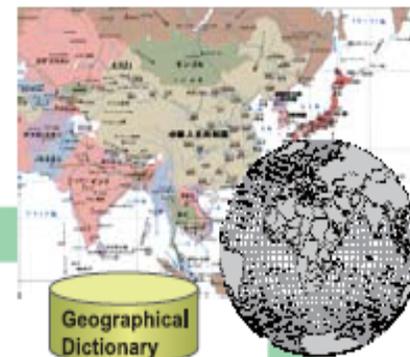
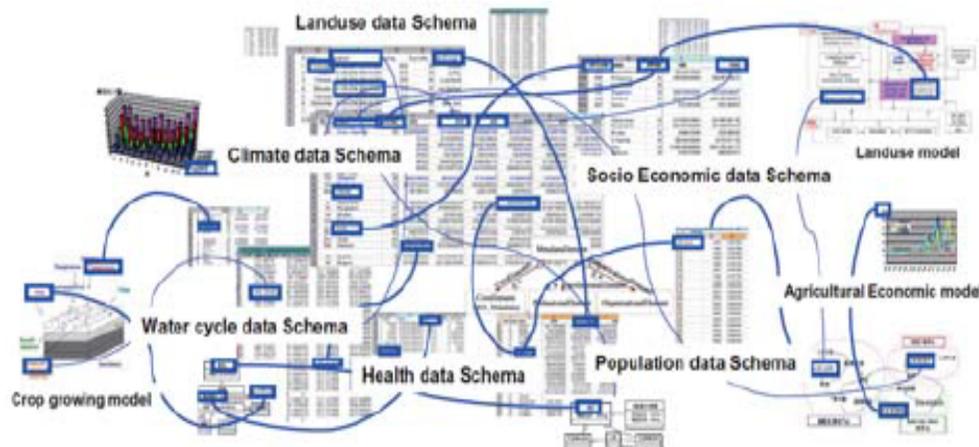
Workbench

Cross-SBA/CoP Coordination
Disaster/Health/Energy/Climate/Water/Weather/
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Technical Term Dictionary



Reverse Dictionary



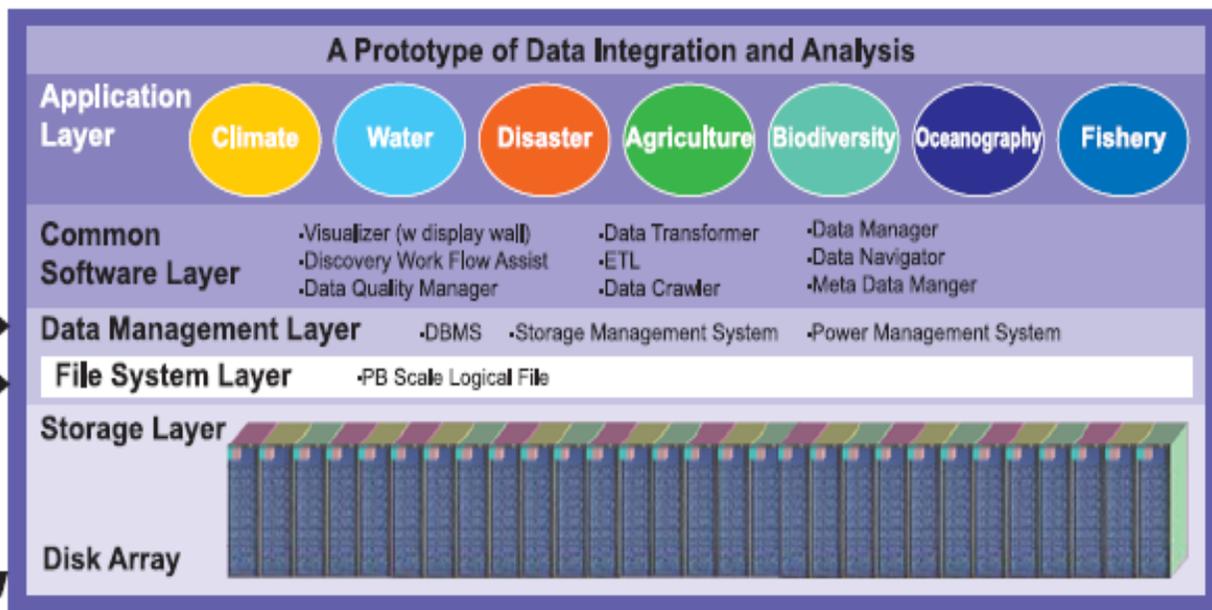
Geographical Dictionary

Extra Diversity and Complex Relativity of Data and Information

Data model Searching System



Hierarchical Diagram



Data Related information Archive System

OWL Association/Link Knowledge



Database Across Searching System

Extra-Large Volume data from various data and information source



In-situ Observation



Citizen Observation



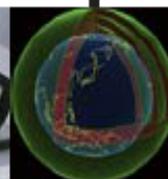
Oceanographic Observation



Satellite Observation



Weather and Climate Model

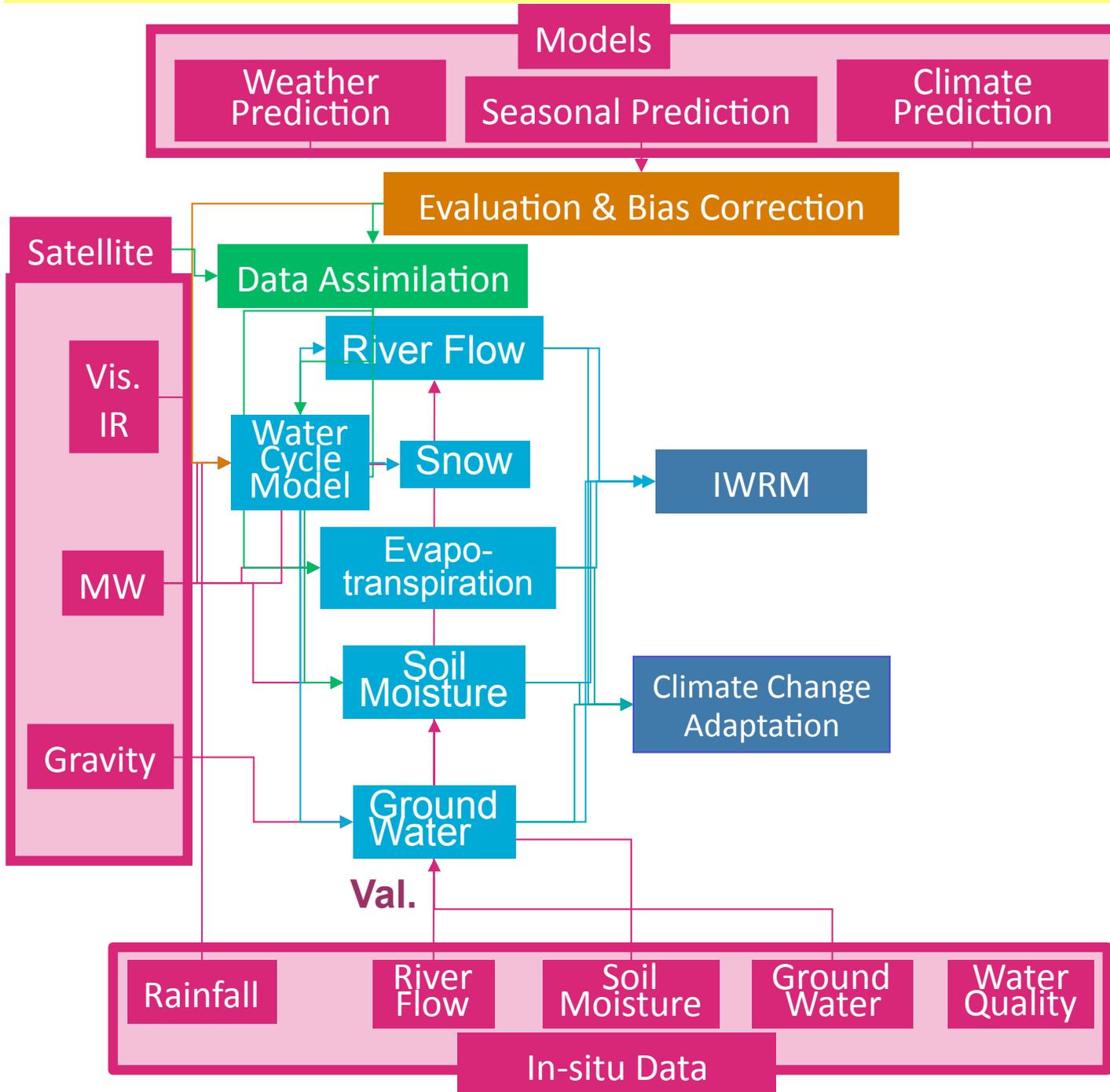


Operational Observation

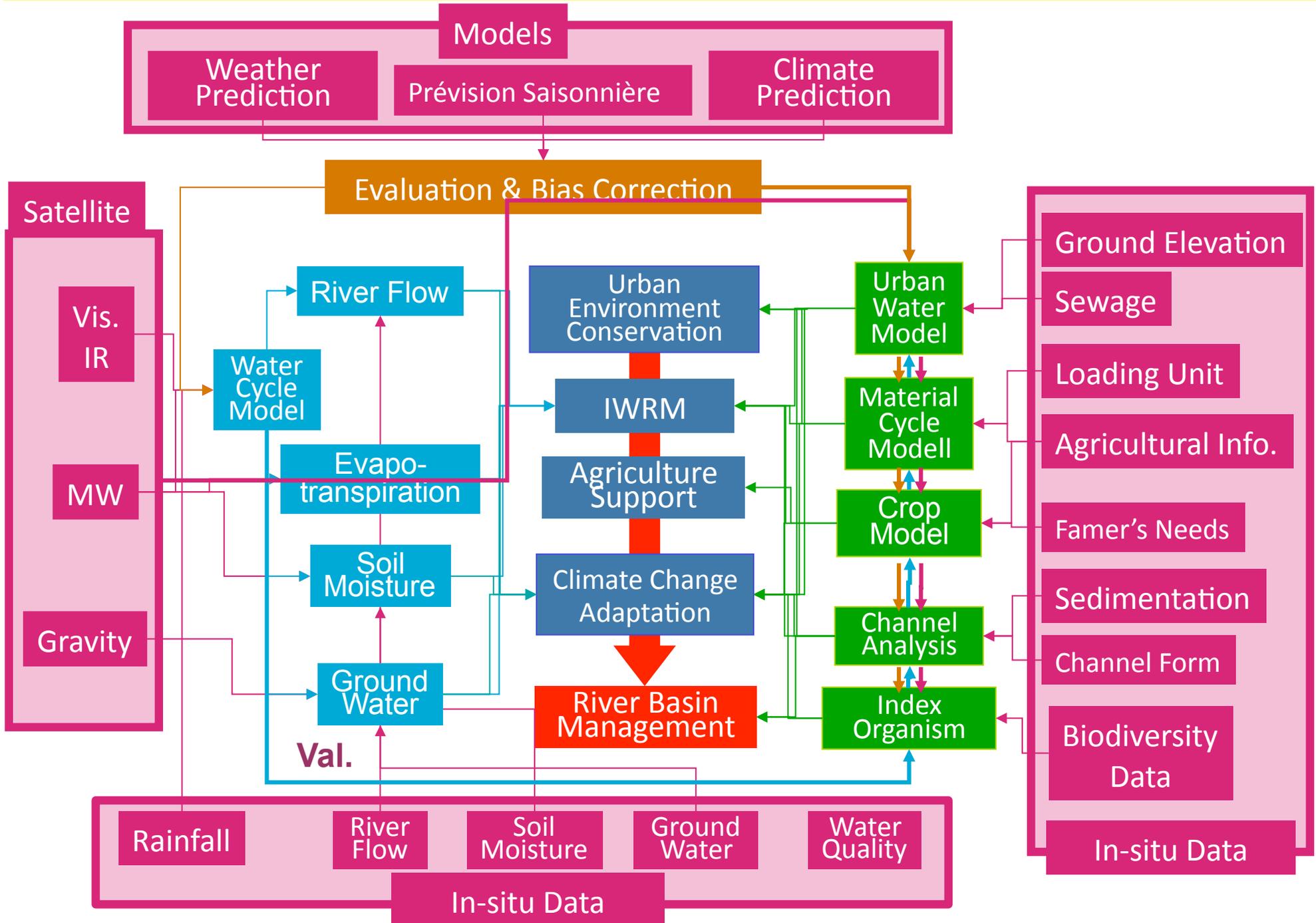


Operational Information

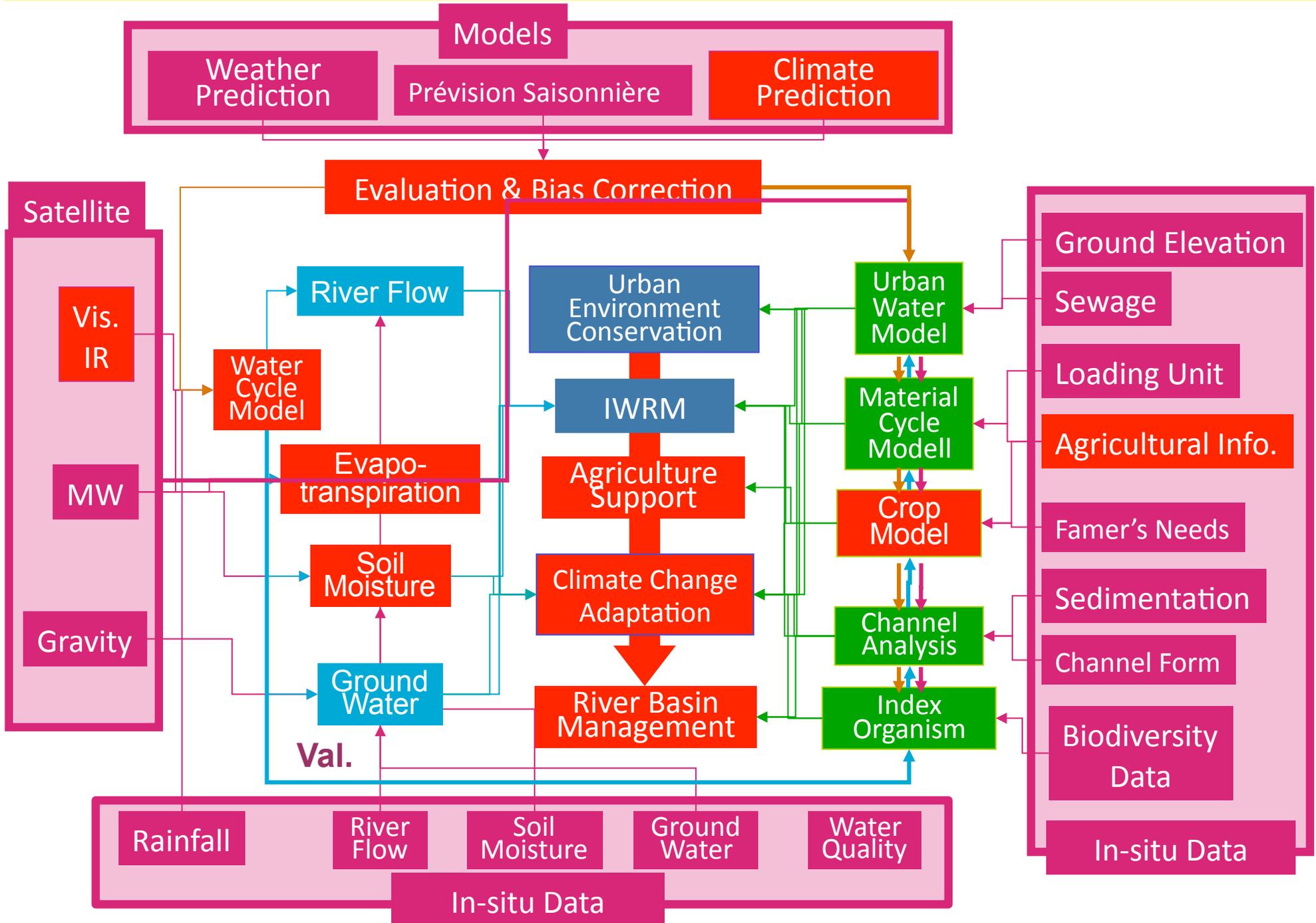
Water Cycle Integrator

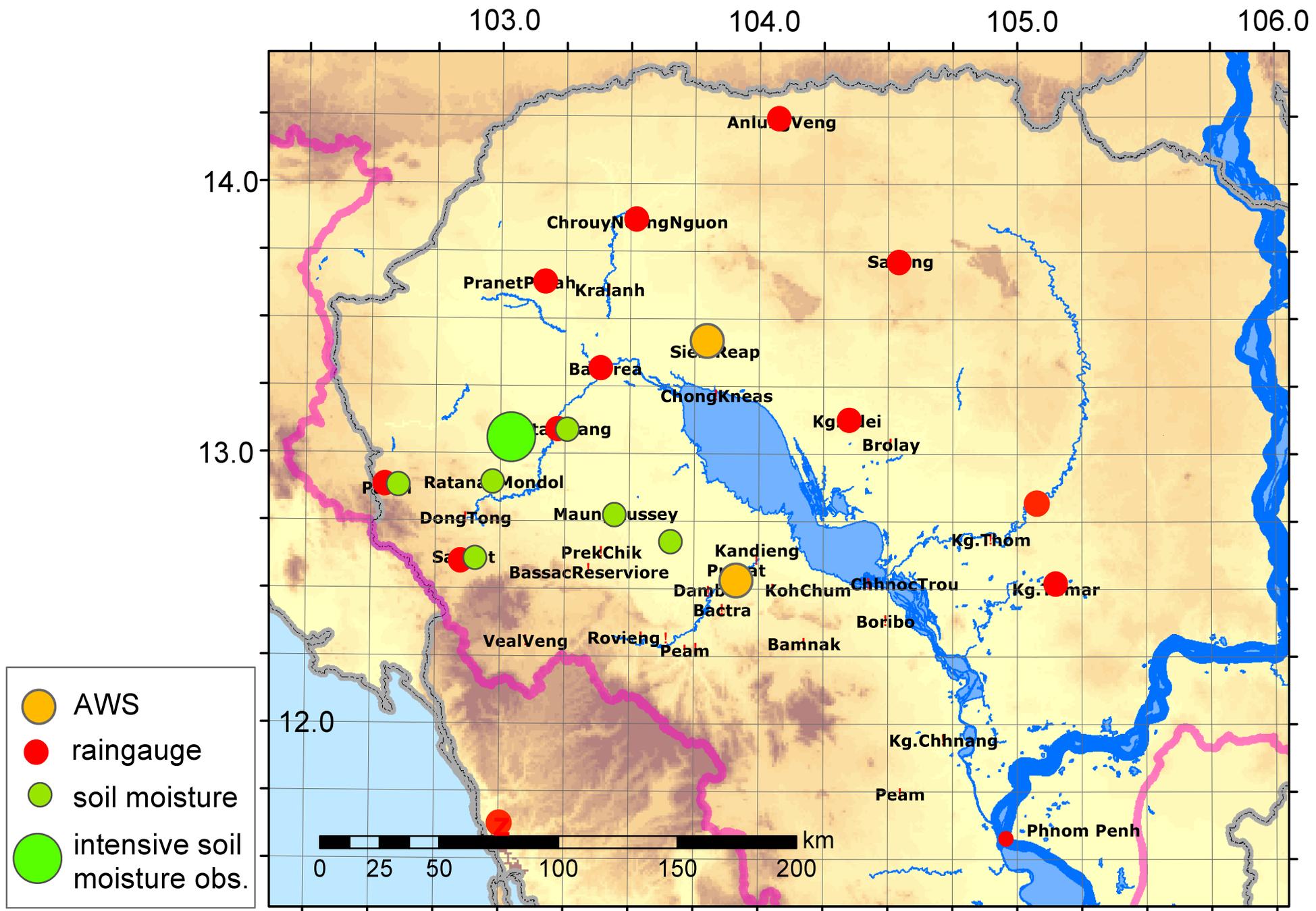


Water Cycle Integrator

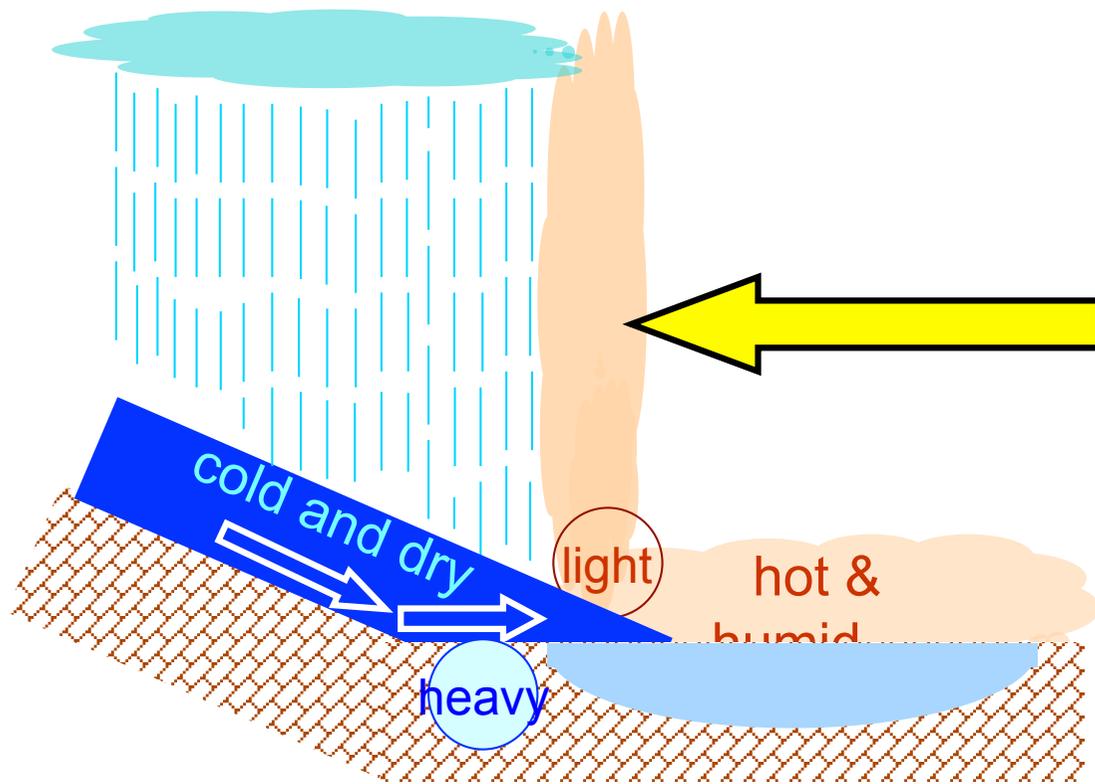


Water Cycle Integrator

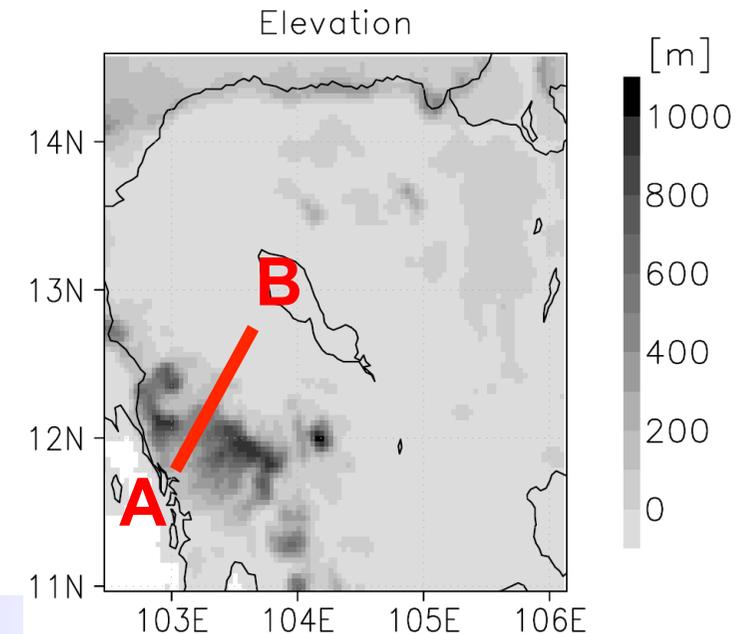
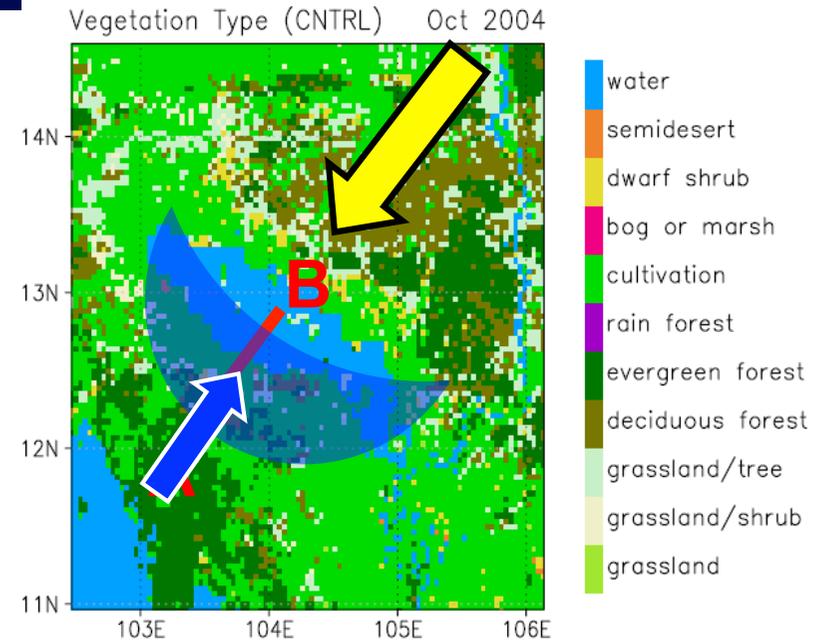




Mechanism of the locally-driven rainfall



A **B**
 SW NE

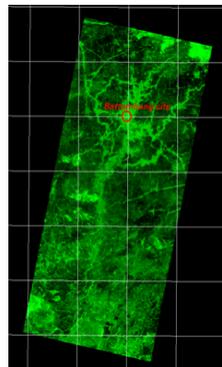




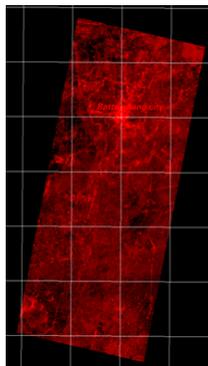
Training courses and
Capacity building

Soil moisture estimation by using PALSAR

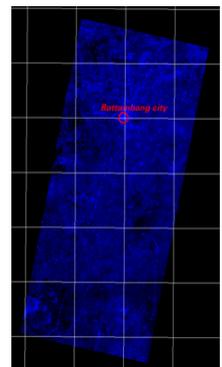
PALSAR polarization data



σ^0_{VH}



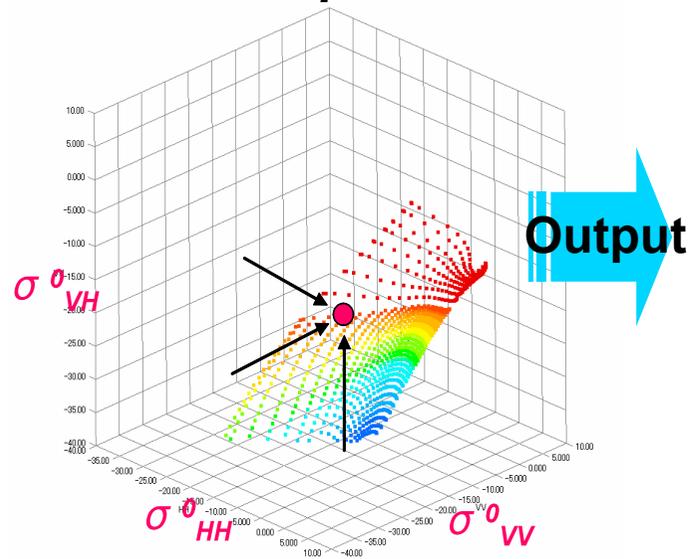
σ^0_{HH}



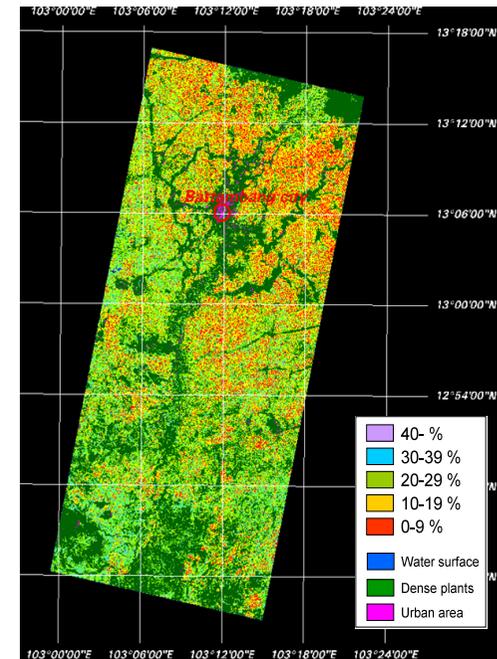
σ^0_{VV}

To identify three unknown parameters, we need three different observation data.

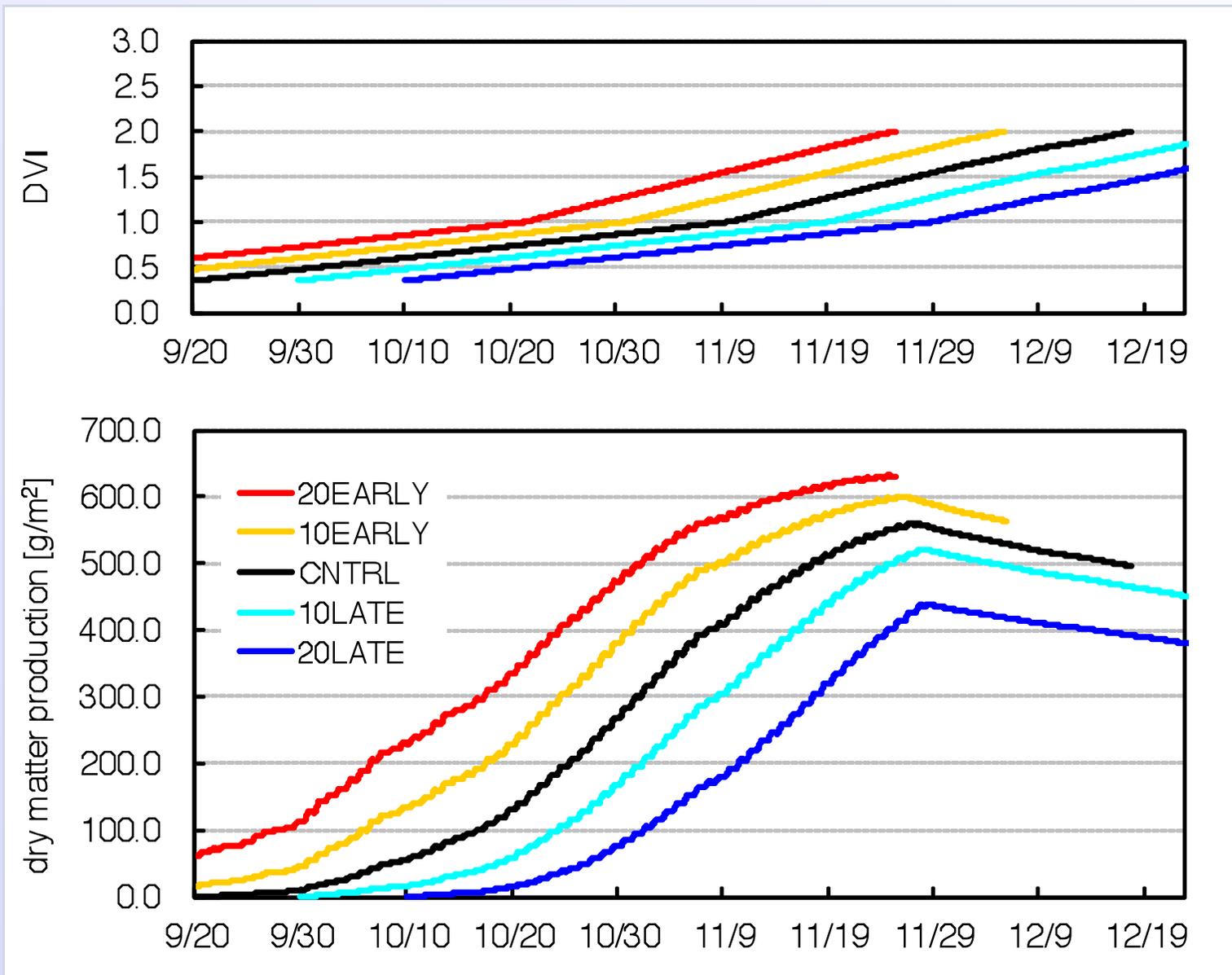
Look-up table



Soil moisture map (10m resolution)



Sensitivity study 1: transplanting date



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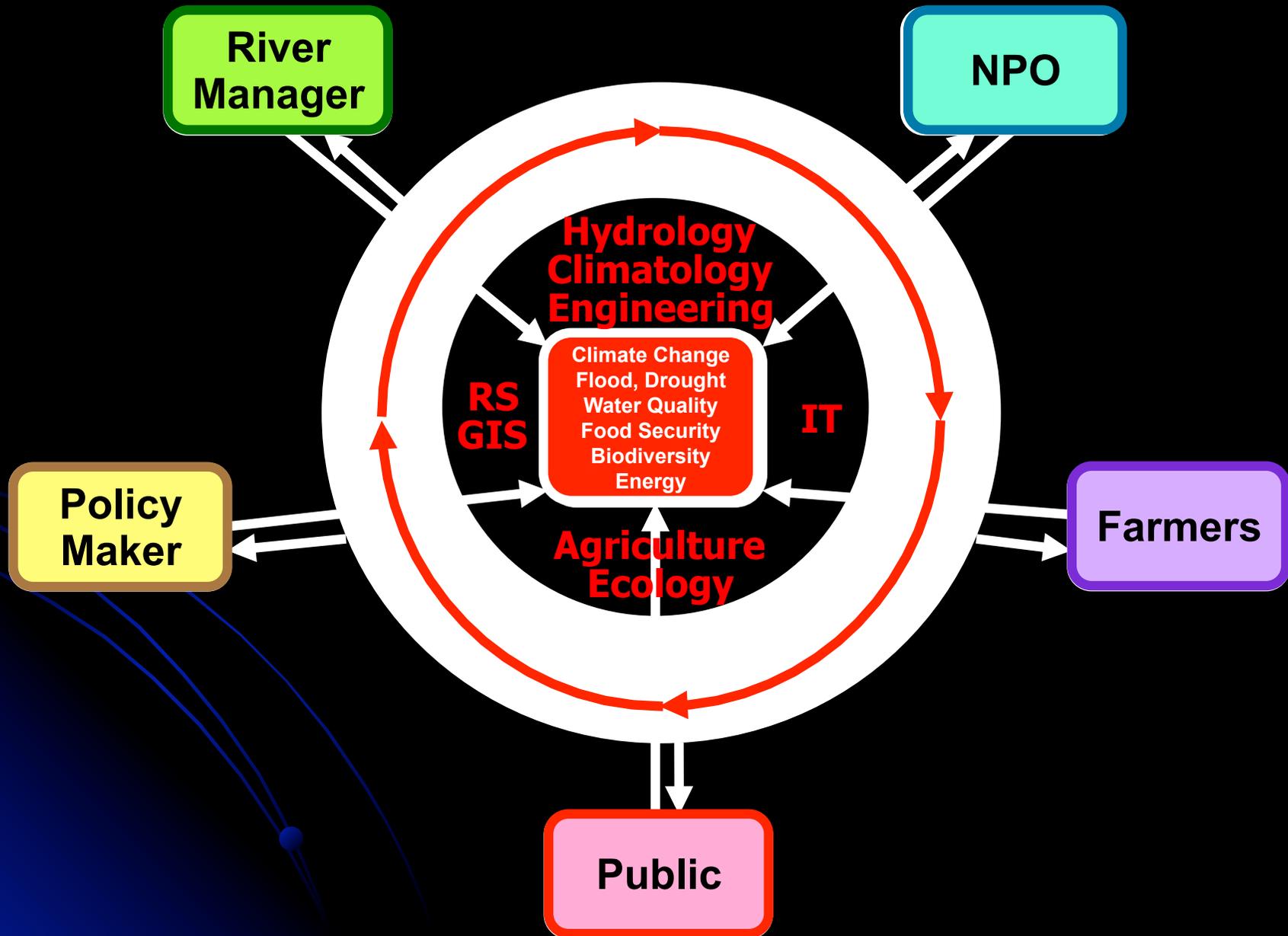
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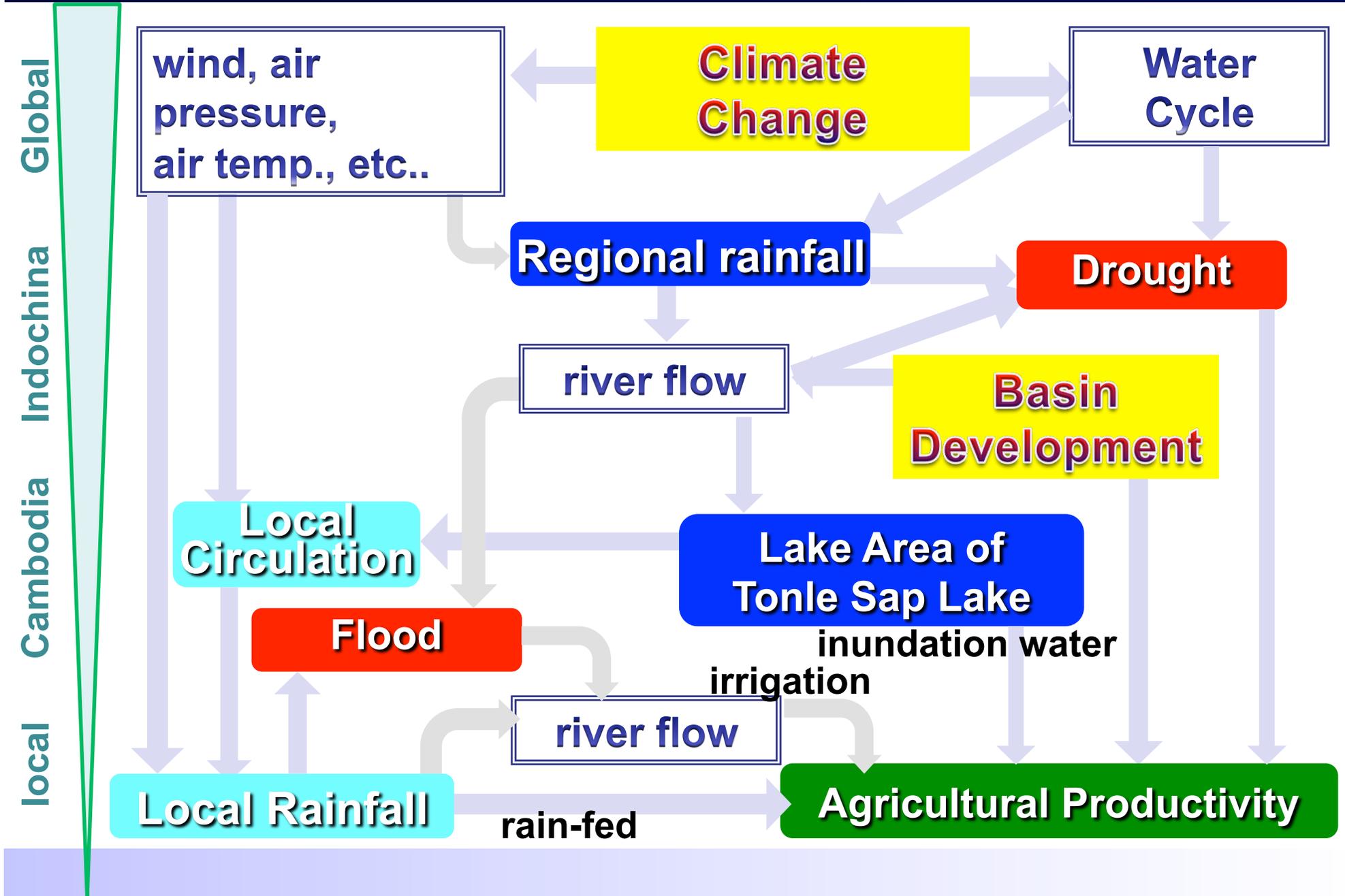
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Sharing Data and Information Exchanging Knowledge, Experiences and Ideas Working Together



hydro-meteorological situation in Cambodia







What you can do in “Cambodian group”?



Technology: Model development

- ♣ Hydrological Modeling + crop model + irrigation
- ♣ Data Assimilation Vegetation, Cloud
- ♣ Rainfall forecasting

Technology: Satellite observation

- ♣ soil moisture: PALSAR+ WEH-DHM
- ♣ DA of soil-moisture

- ♣ soil moisture: AMSR-E + LDAS-UT

- ♣ rainfall: TRMM + in-situ

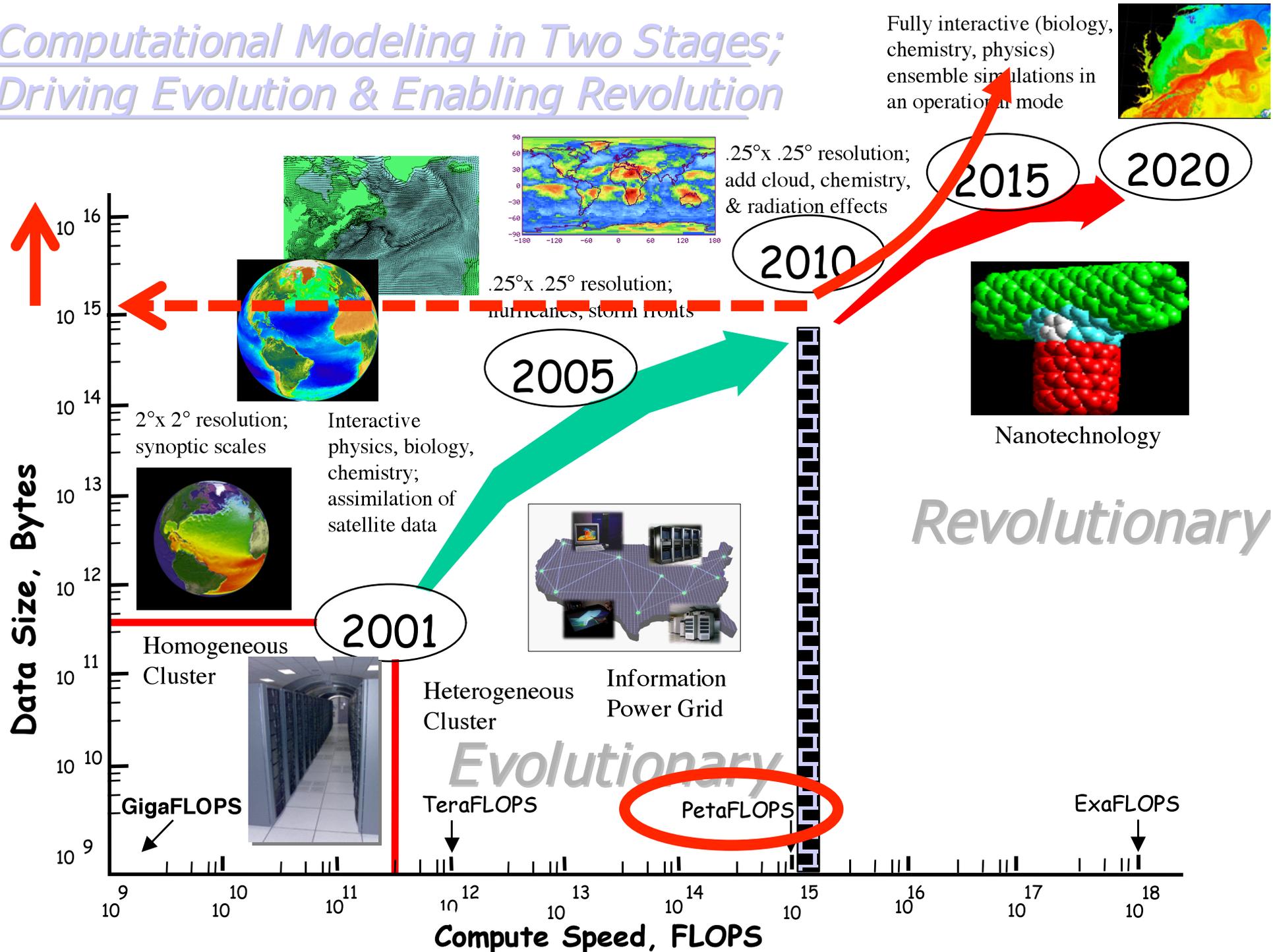
- ♣ role of Tonle Sap Lake for the local circulation
- ♣ later withdrawal of IP monsoon
- ♣ effect of the climate change (local & large-scale)

- ♣ optimization of crop calendar
- ♣ impact of climate change
- ♣ impact of land-use change
- ♣ impact of basin development incl. dam construction

**Model application + Science:
mechanism study**

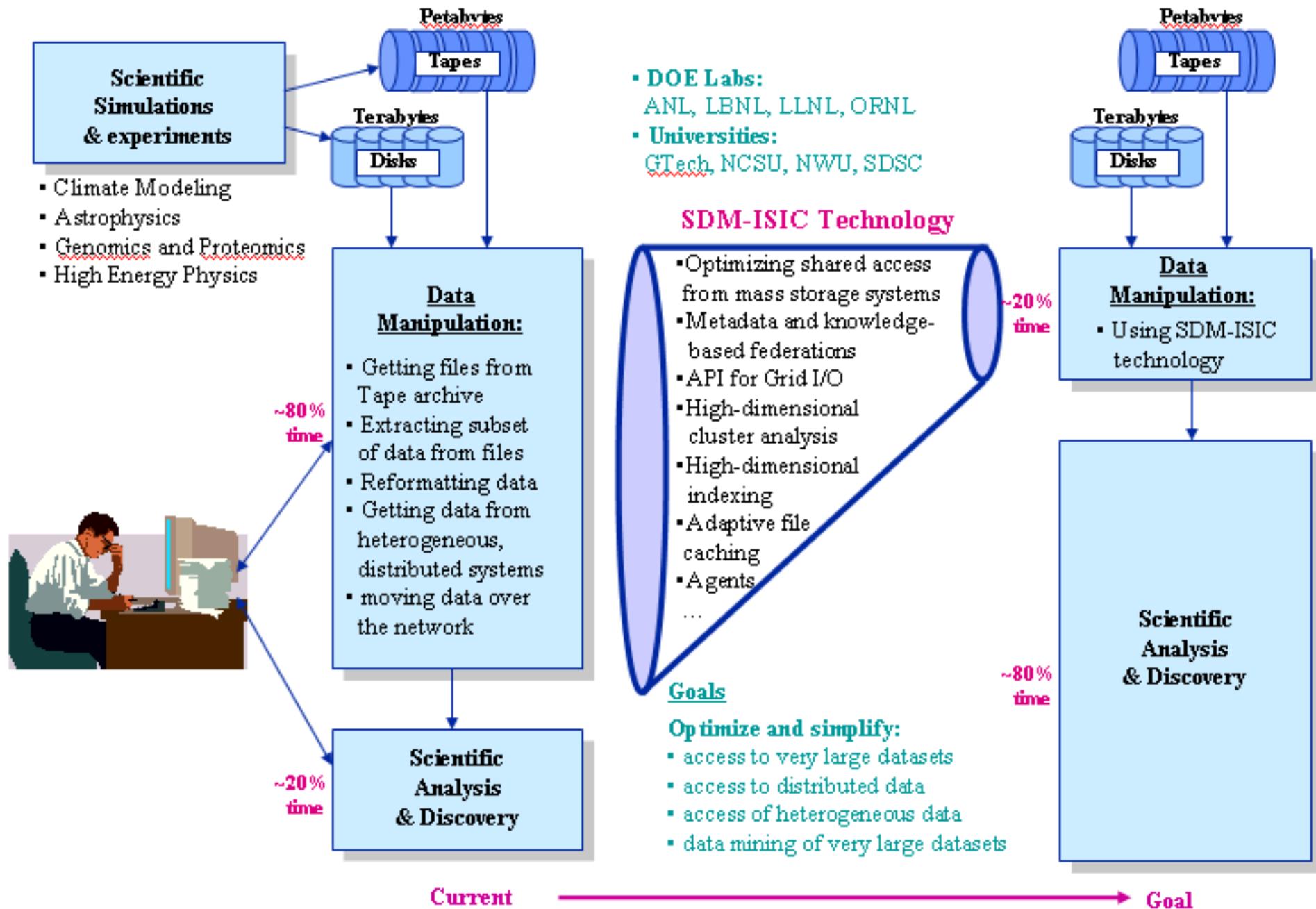
**Model application +
Assessment**

Computational Modeling in Two Stages; Driving Evolution & Enabling Revolution



Real Demonstrated Performance doing useful Science

Scientific Data Management ISIC



Global Trends - Disasters are NOT natural

Greater exposure to natural and human-induced hazards, climate change and variability

Socio-economic: poverty & unsustainable development styles, unplanned urban growth and migrations, lack of risk awareness & risk governance institutions & accountability...

Physical: insufficient land use planning, housing & critical infrastructure in hazard prone areas, little safety awareness...

Ecosystem & natural resource depletion (coastal - coral reefs, mangroves...-, mountains, watersheds, wetlands, forests...)

HAZARDS +
EXTREME EVENTS

VULNERABILITY



IRDR

Integrated Research on Disaster Risk