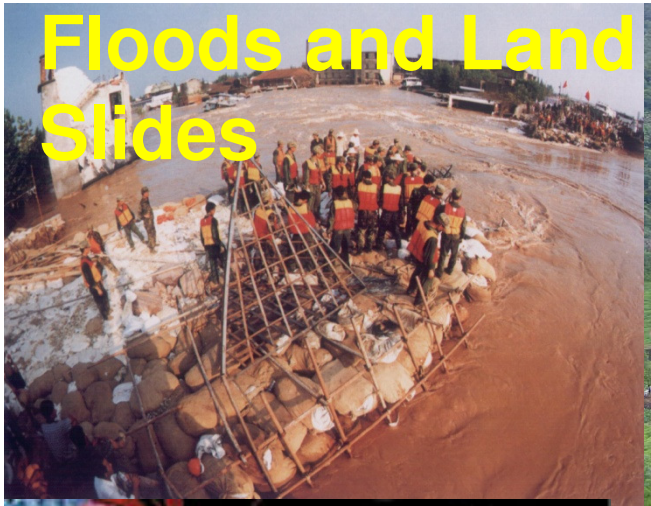
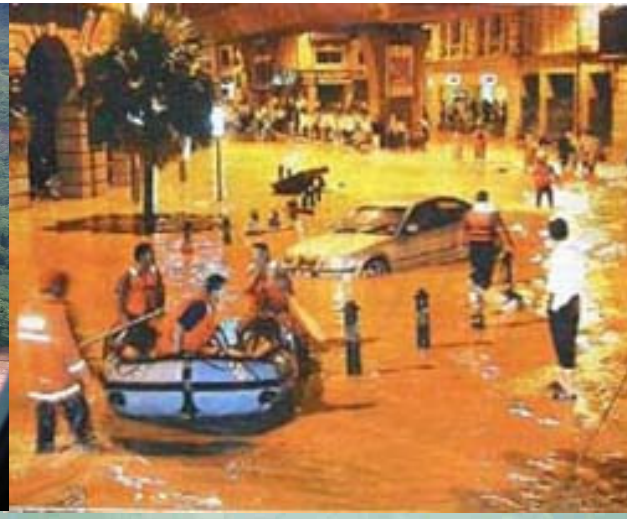
10th GEO IGWCO COP Meeting

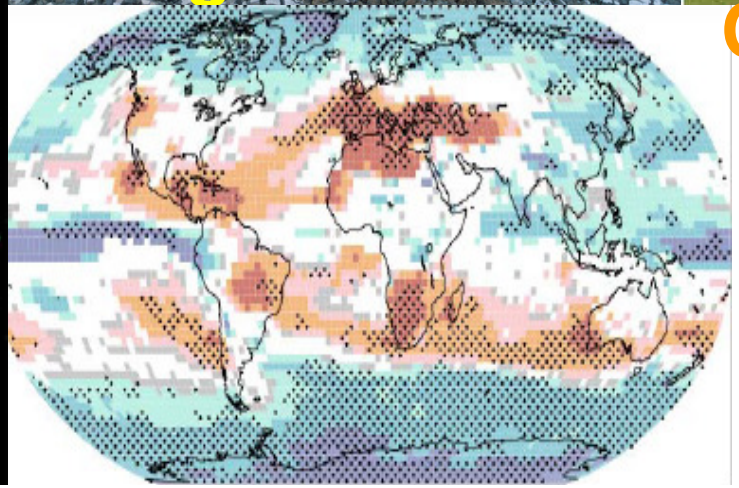
# Introduction and overview of AWCI and AfWCCI

Toshio Koike
The Univeristy of Tokyo

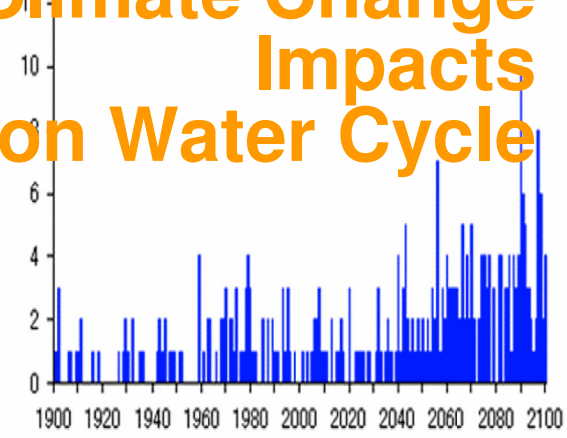






Climate Change Impacts on Water Cycle

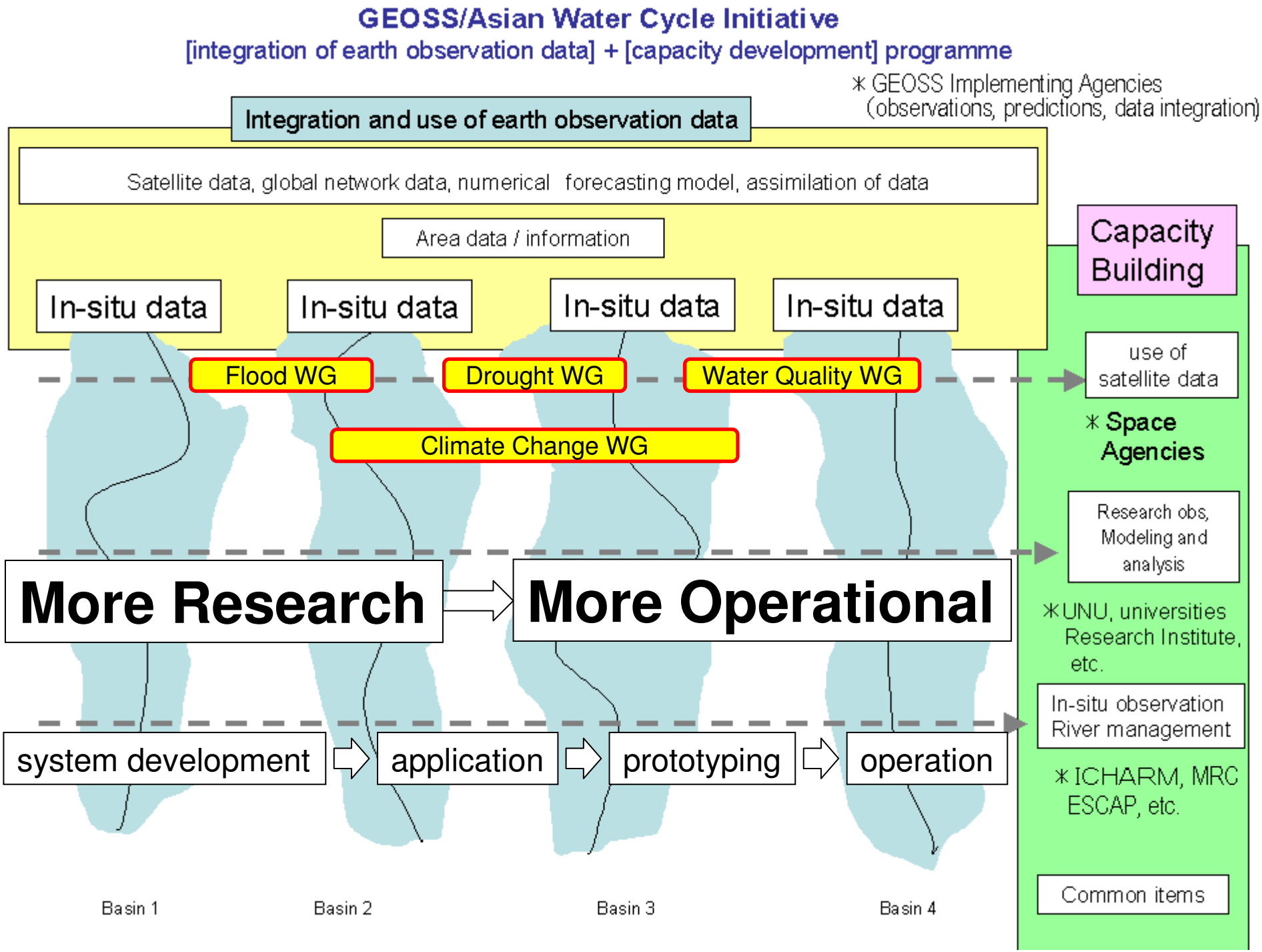



# GEOSS
# Asian Water Cycle Initiative (AWCI)

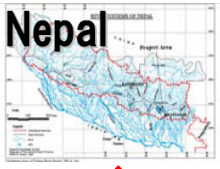
**To promote integrated water resources management by making usable information from GEOSS, for addressing the common water-related problems in Asia.**

## Uniqueness

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


GEOSS/Asian Water Cycle Initiative
[integration of earth observation data] + [capacity development] programme
∗ GEOSS Implementing Agencies
(observations, predictions, data integration)
Integration and use of earth observation data
Satellite data, global network data, numerical forecasting model, assimilation of data
Area data / information
In-situ data
In-situ data
In-situ data
In-situ data
Capacity Building
Flood WG
Drought WG
Water Quality WG
Climate Change WG
use of satellite data
∗ Space Agencies
Research obs, Modeling and analysis
More Research
More Operational
∗UNU, universities Research Institute, etc.
In-situ observation River management
system development
application
prototyping
operation
∗ ICHARM, MRC ESCAP, etc.
Common items
Basin 1
Basin 2
Basin 3
Basin 4

# Demonstration River Basins

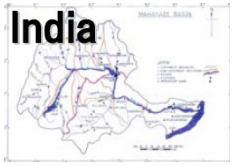





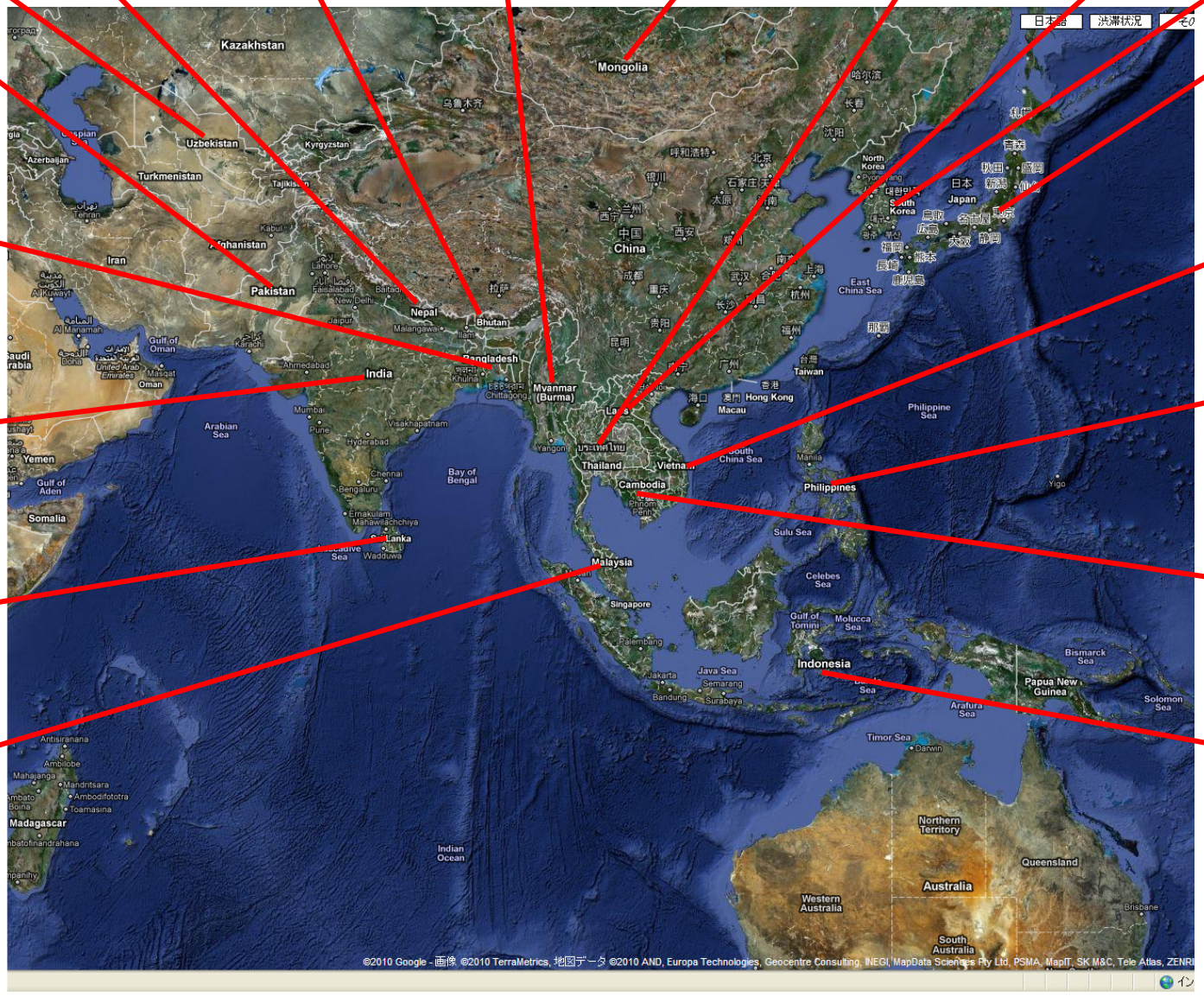








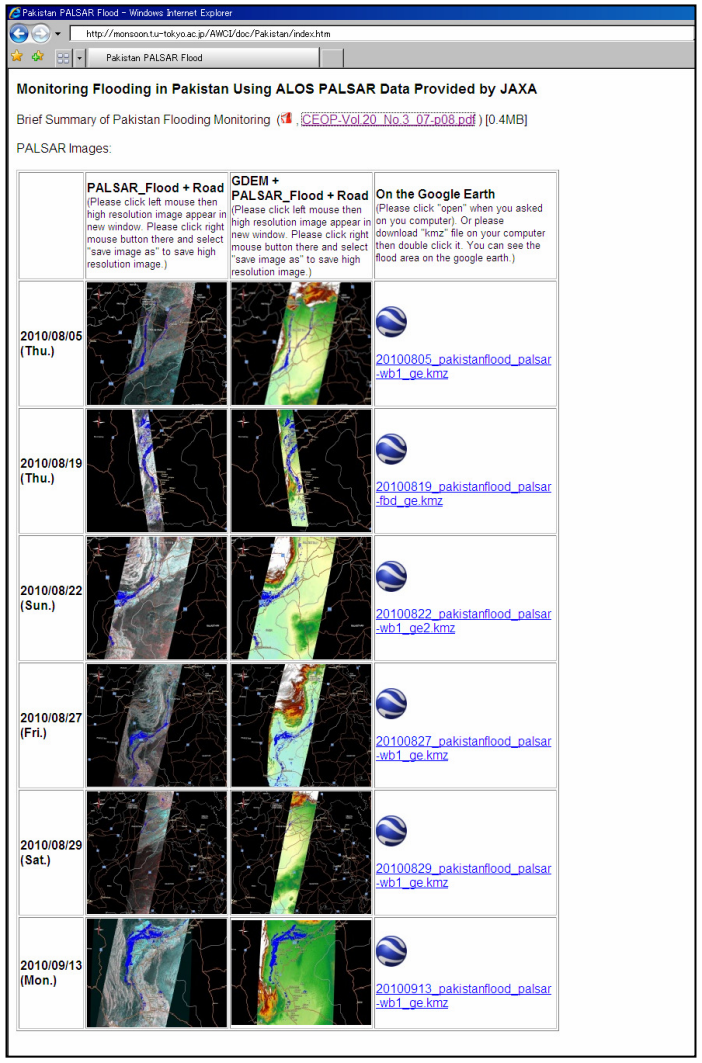




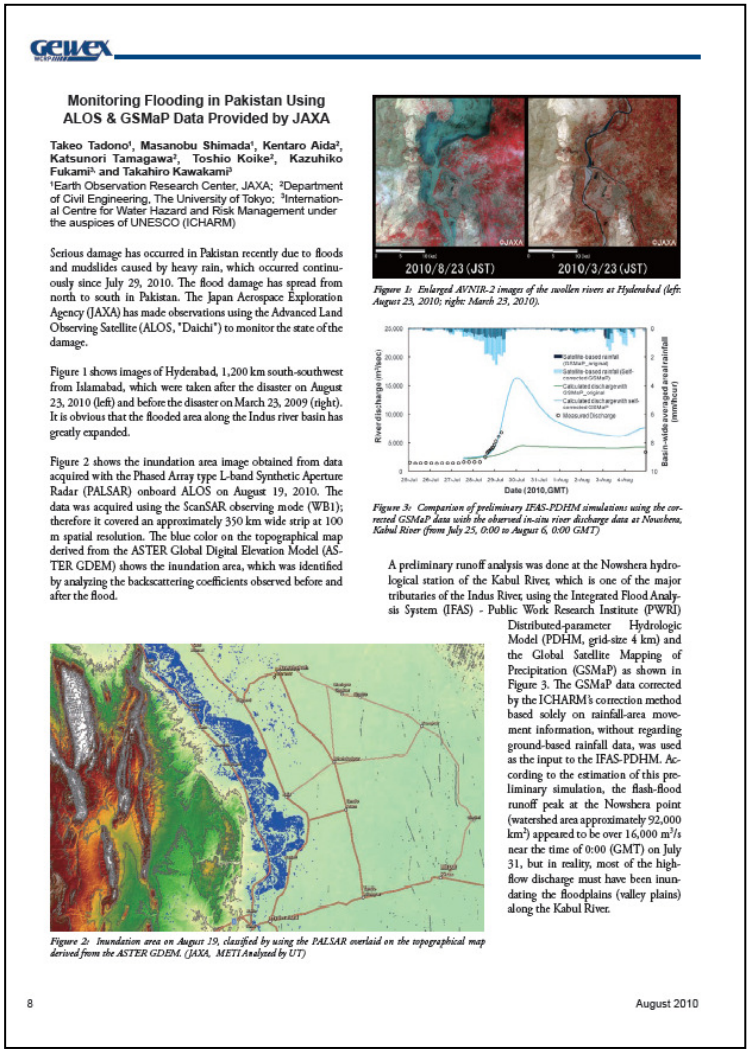


Asian Water Cycle Initiative

# Pakistan Flood Information in 2010



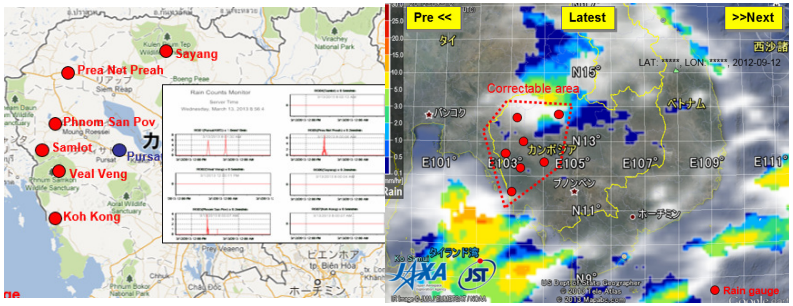

GEOSS/AWCI Website:
http://monsoon.t.u-tokyo.ac.jp/AWCI/doc/Pakistan/index.htm




Takeo Tadono et al., "Monitoring Flooding in Pakistan Using ALOS & GSMap Provided by JAXA" GEWEX Newsletter, Special CEOP Issue, Vol. 20, No. 3, p. 8, August 2010.

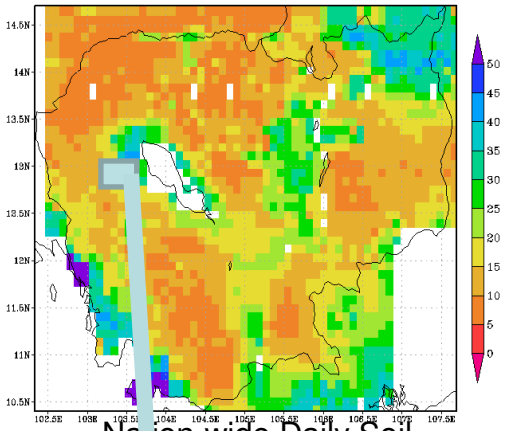
# Water-Climate-Agriculture Workbench in Cambodia


Stakeholder Meeting

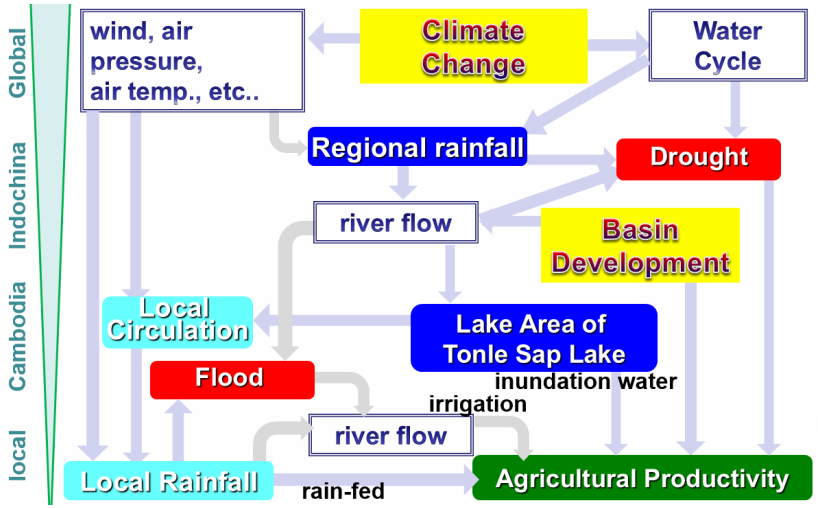



Real-time Rain Gauge → Satellite Data Correction → Wide Data Dissemination

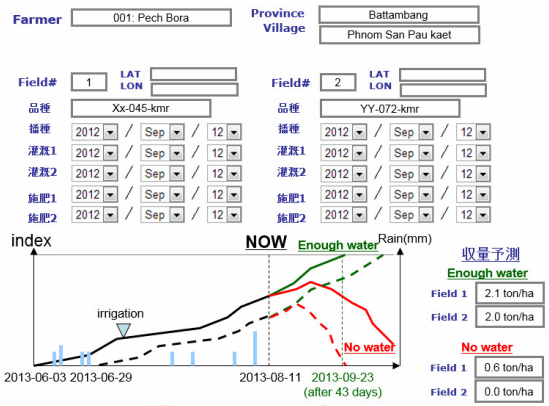
Famers' Needs & Experiences



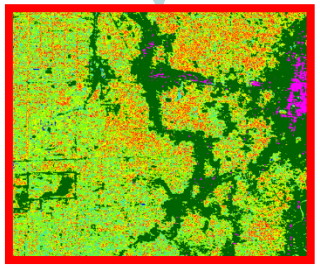
Nation-wide Daily Soil Moisture from Satellite



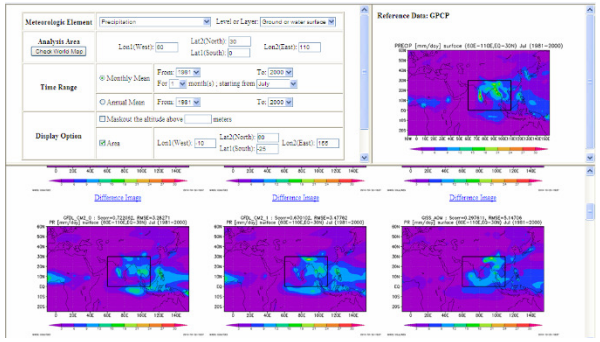

Holistic View of Water-Climate-Agriculture Problems




Water Cycle-Rice Production Coupled Model

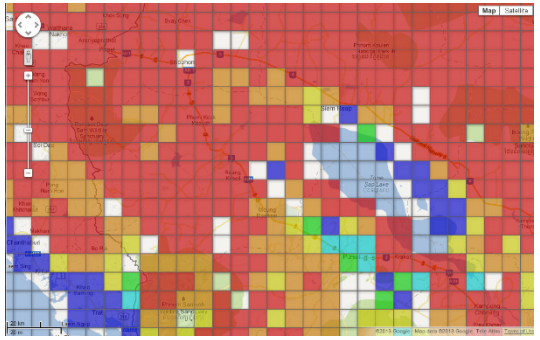


Local Information

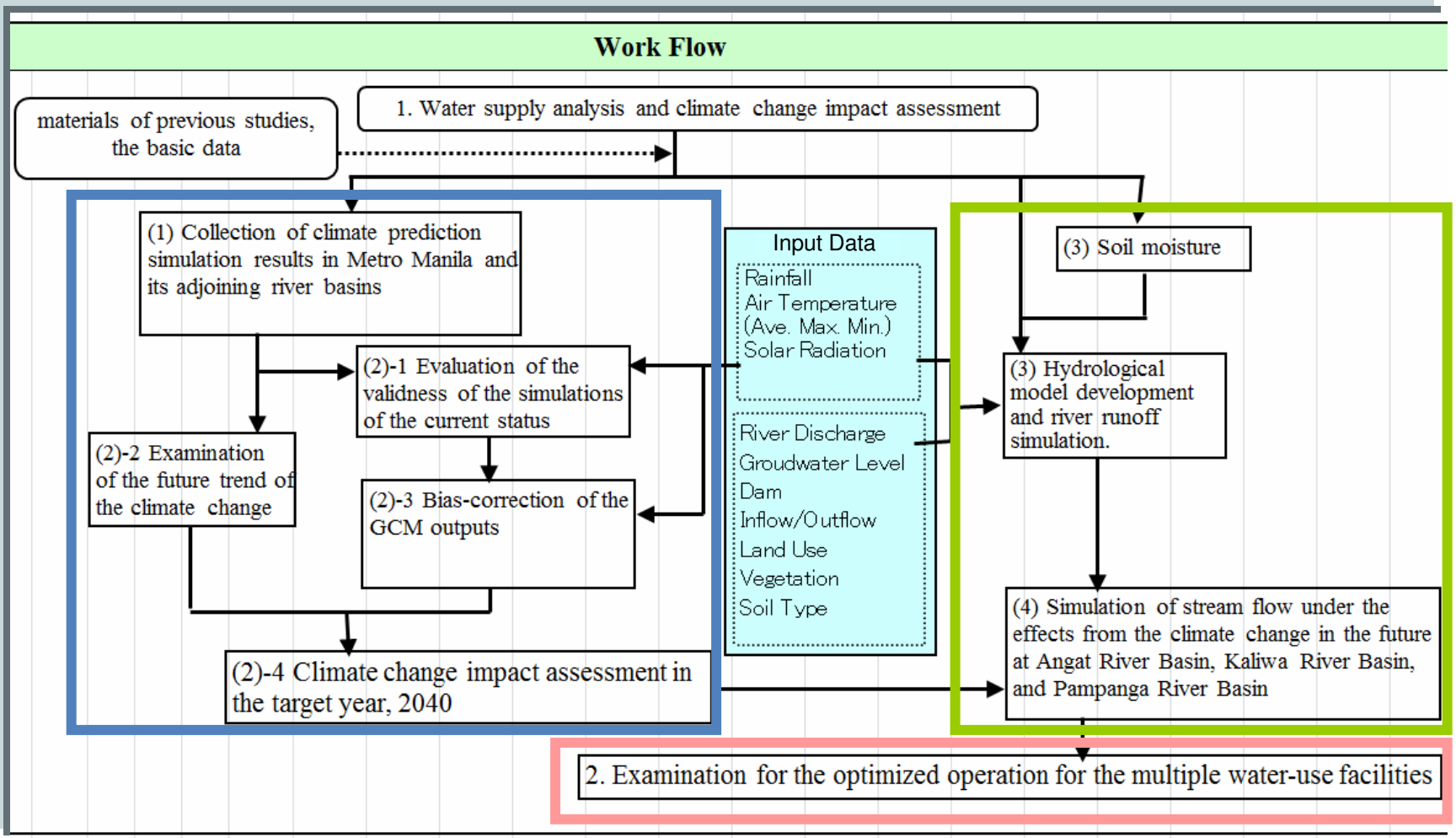


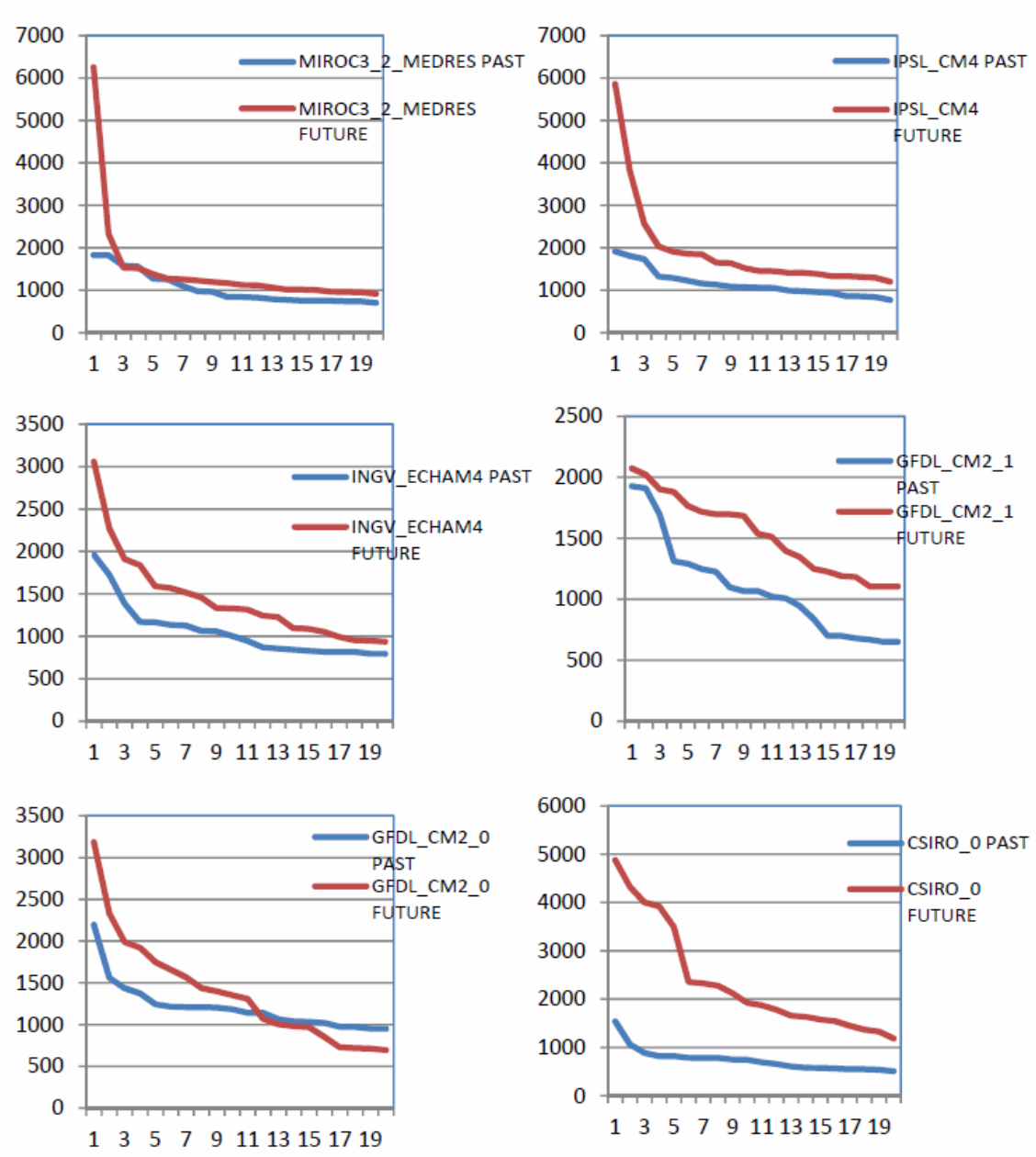
Climate Change Analysis Tools

OJT for Local Practitioners



Rice Production Monitoring

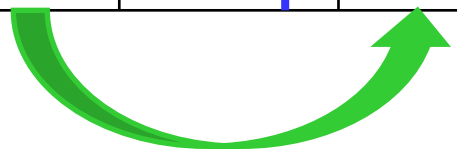

Work Flow
materials of previous studies, the basic data
1. Water supply analysis and climate change impact assessment
(1) Collection of climate prediction simulation results in Metro Manila and its adjoining river basins
(2)-1 Evaluation of the validness of the simulations of the current status
(2)-2 Examination of the future trend of the climate change
(2)-3 Bias-correction of the GCM outputs
(2)-4 Climate change impact assessment in the target year, 2040
Input Data
Rainfall
Air Temperature (Ave. Max. Min.)
Solar Radiation
River Discharge
Groudwater Level
Dam
Inflow/Outflow
Land Use
Vegetation
Soil Type
(3) Soil moisture
(3) Hydrological model development and river runoff simulation.
(4) Simulation of stream flow under the effects from the climate change in the future at Angat River Basin, Kaliwa River Basin, and Pampanga River Basin
2. Examination for the optimized operation for the multiple water-use facilities




Changes of Flood in Angat Dam Basin

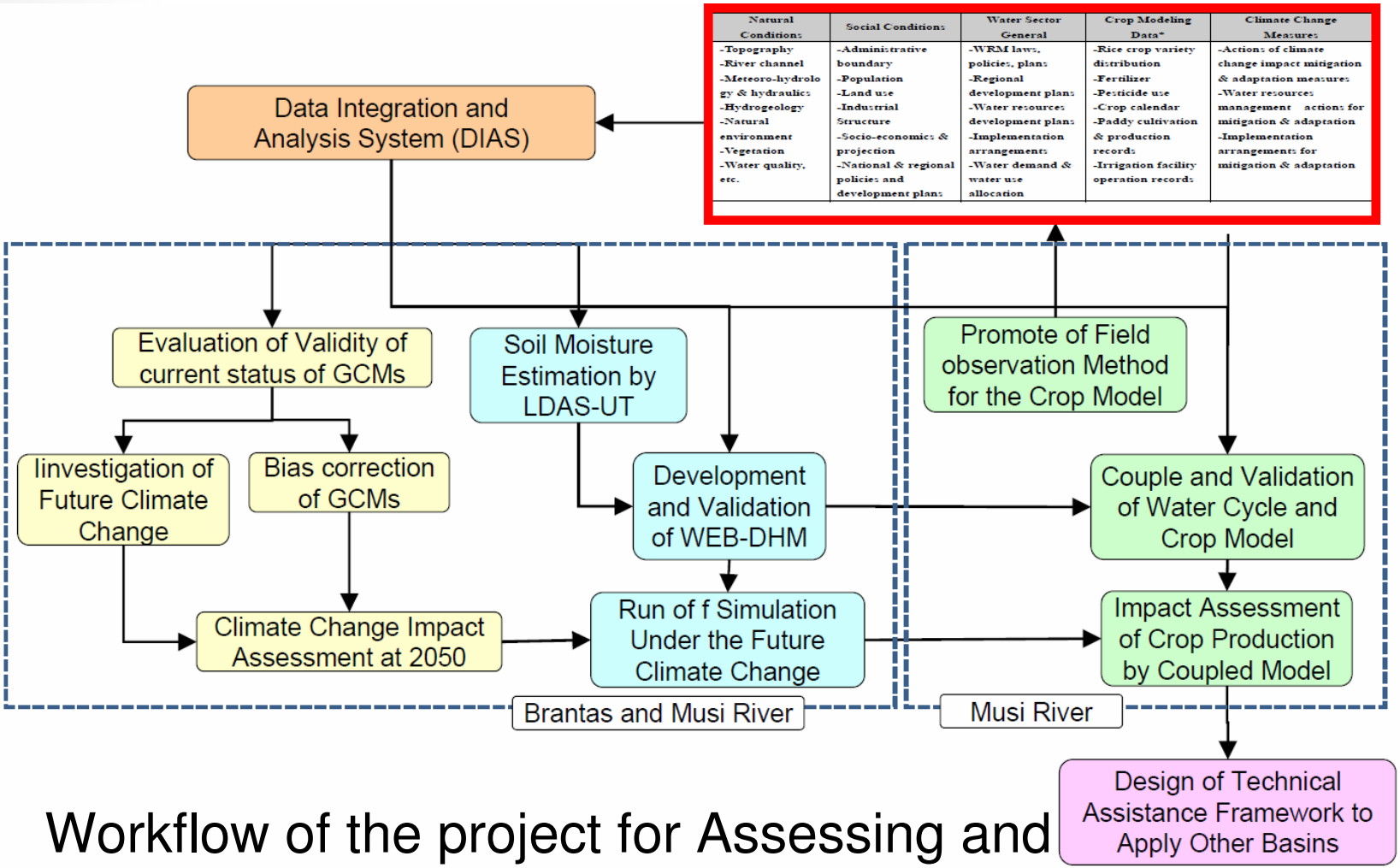
Past versus future Annual Average Discharge for each GCM for Angat dam inflow.

| GCM | Annual Average Discharge ($m^3/s$) | | | |
|---|---|---|---|---|
| | Past | | Future | |
| | Average | Stdev | Average | Stdev |
| **MIROC** | 28.3 | 80.3 | 27.8 | 114.6 |
| **IPSL** | 35.3 | 94.4 | 63.7 | 159.7 |
| **INGV** | 32.8 | 85.0 | 35.4 | 105.4 |
| **GFDL_1** | 32.6 | 85.4 | 31.3 | 109.79 |
| **GFDL_0** | 35.0 | 90.3 | 34.2 | 101.66 |
| **CSIRO** | 28.5 | 67.1 | 30.3 | 152.80 |

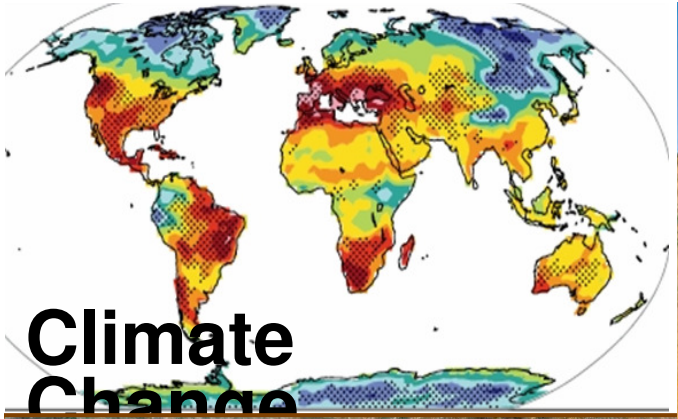


# Conclusion

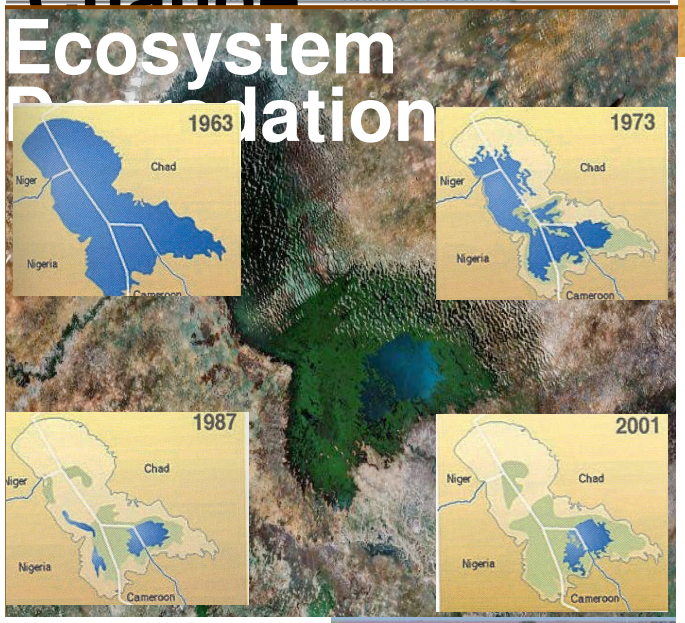
- River discharge datasets in Angat, Kaliwa and Pampanga River Basins were completed by considering the climate in past and future. The same analyses will be followed in Umiray and Pasig Marikina River Basins and Laguna Lake Basin to complete the Water Balance Study in whole study area.
- It is virtually certain that larger floods will occur more often.
- It is about as likely as not that severer droughts will occur more often.
- Optimization of dam operation is one of effective measures for adapting to the climate change.



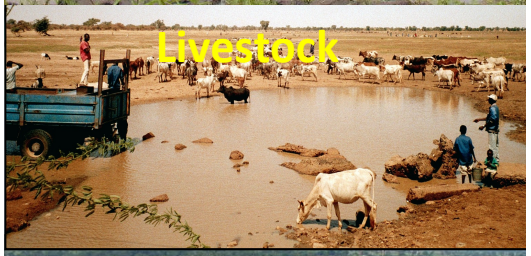

# Workflow of the project for Assessing and Integrating Climate Change Impact into the Water Resources Management Plans



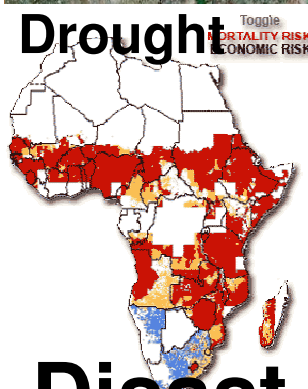


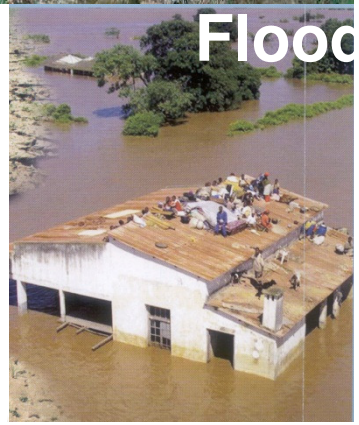




- On track to meet the MDG drinking water target: only 26 of the 53 countries
- Water related diseases: more than 80% → deaths for children under 5
- Deficient agricultural water management: e.g. only 10% of irrigable lands are actually irrigated in WA.
- Hydropower development < 7% of the potential
- 5-25% of GDP due to droughts and floods in affected countries
- Climate impacts are greatest in poor countries.





**Jan. 2009** — 1st GEOSS African Water Cycle Symposium in Tunis, *Water-related Issues & Roles of EO*

**Sept. 2009** — 1st Task Team Meeting in Geneva, *Strategy for Coordinated EO and CB*

**Feb. 2011** — 2nd African Water Cycle Symposium in Addis Ababa
Planning for Demonstration

**Jan. 2012** — GEO-UNESCO Joint Workshop in Nairobi
Report on Demonstrations and IWRM CB Program

**Feb. 2012** — 3rd African Water Cycle Symposium in Libreville
Basic Idea of Implementation, Statement to Rio+20

**Feb. 2013** — 3rd African Water Cycle Coordination Initiative Workshop in El Jadida, Draft Implementation Plar

**Nov. 2013** — 1st GEOSS Africa & Asia Joint Water Cycle Symposium in Tokyo
*1st AfWCCI Implementation Plan and 2nd AWCI Implementation Plan*

# GEOSS African Water Cycle Coordination Initiative (AfWCCI)

Based on a collaboration between the **Group on Earth Observations** (GEO) and RBOs in Africa, **Global Earth Observation System of Systems** (GEOSS) supports application of coordinated, comprehensive and sustained Earth Observations and information across trans-boundary river basins in Africa, particularly focusing on:

- Observation and data management
- Capacity development on:
  - observation
  - data archiving
  - Modeling
  - Prediction
  - climate change impact assessment
  - data integration

→ Improvement of the water resources management capacity

***Participating***
***Medjerda, Niger, Nile, L/Victoria, L/Chad, Okavango, Orange-Senqu, Senegal, Zambezi, Oum Er-Rabia, L'Ogooue***

**Goal : To facilitate better management in trans-boundary rivers in Africa**