

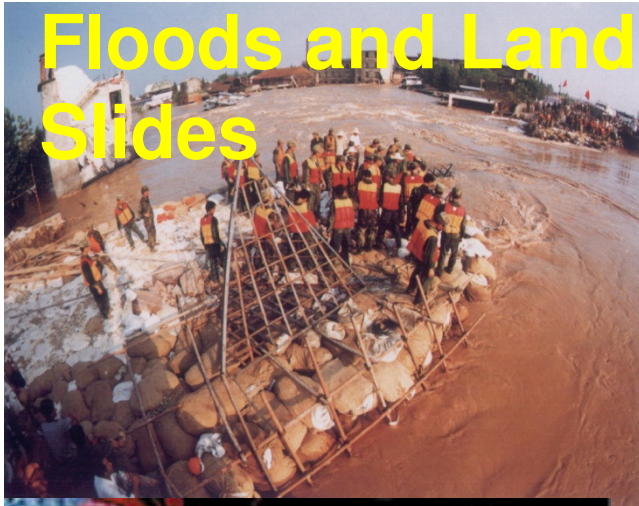
10th GEO IGWCO COP Meeting

**Introduction and overview of
AWCI and AfWCCI**



Toshio Koike
The Univeristy of Tokyo

Floods and Land Slides



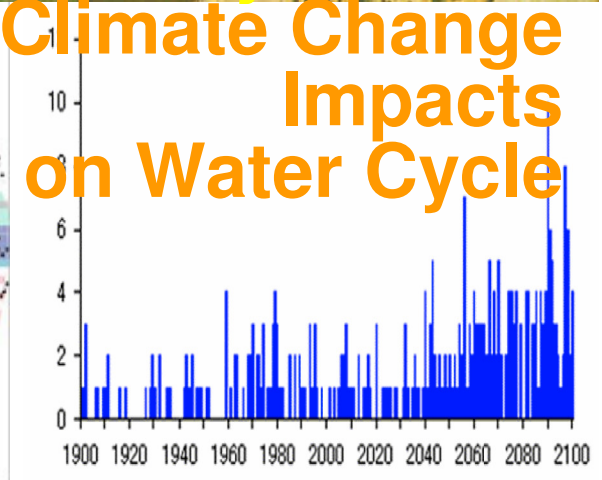
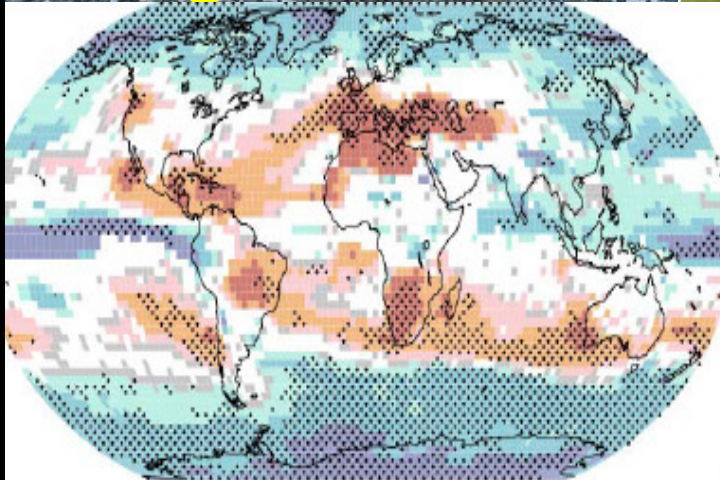
Water Pollution and Ecosystem Degradation



Drought and Water Scarcity



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

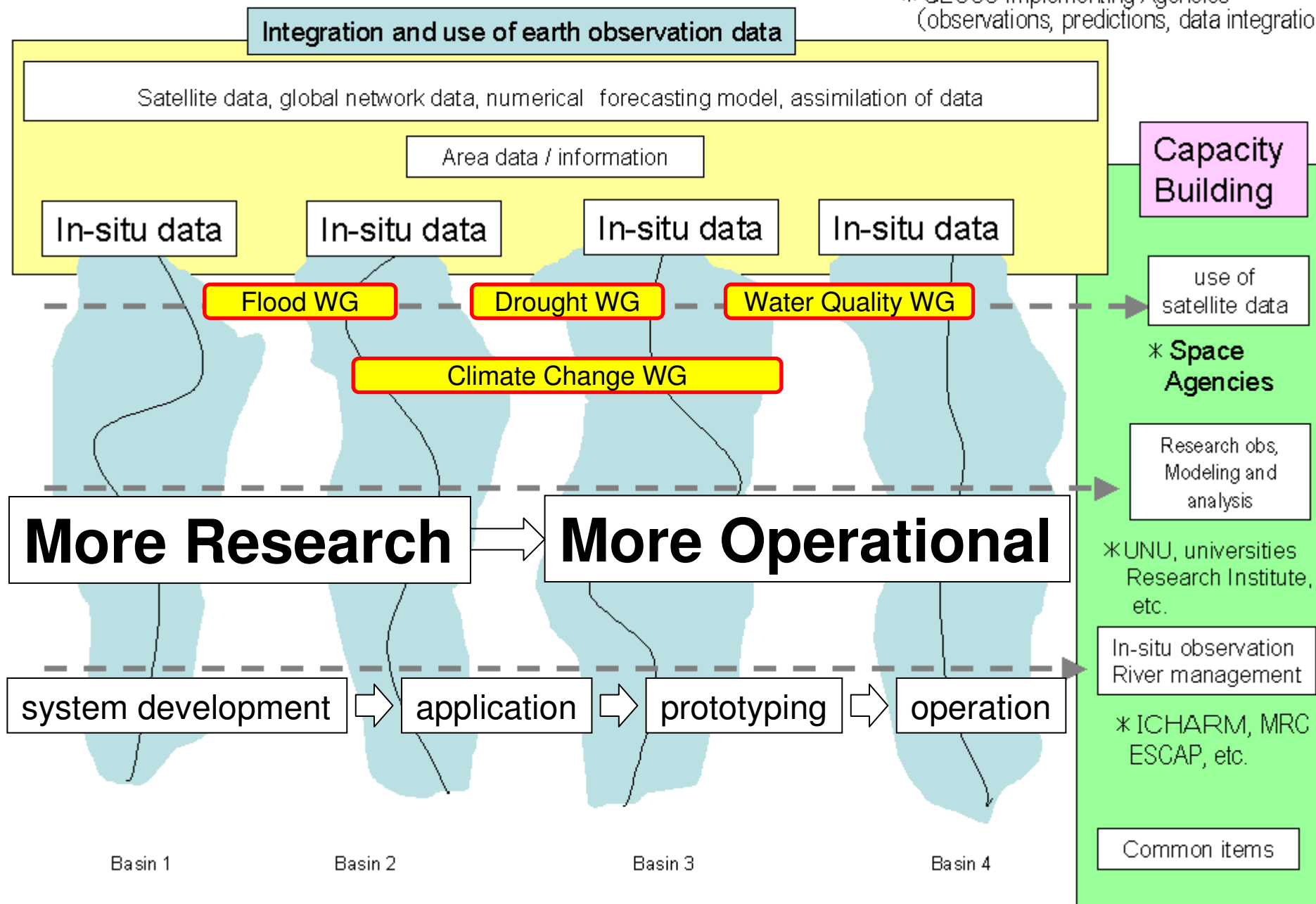
- A River Basin of Each Country**
- Observation Convergence**
- Interoperability Arrangement**
- Data Integration**
- Open Data & Source Policies**
- Capacity Building**
- Early Achievements**



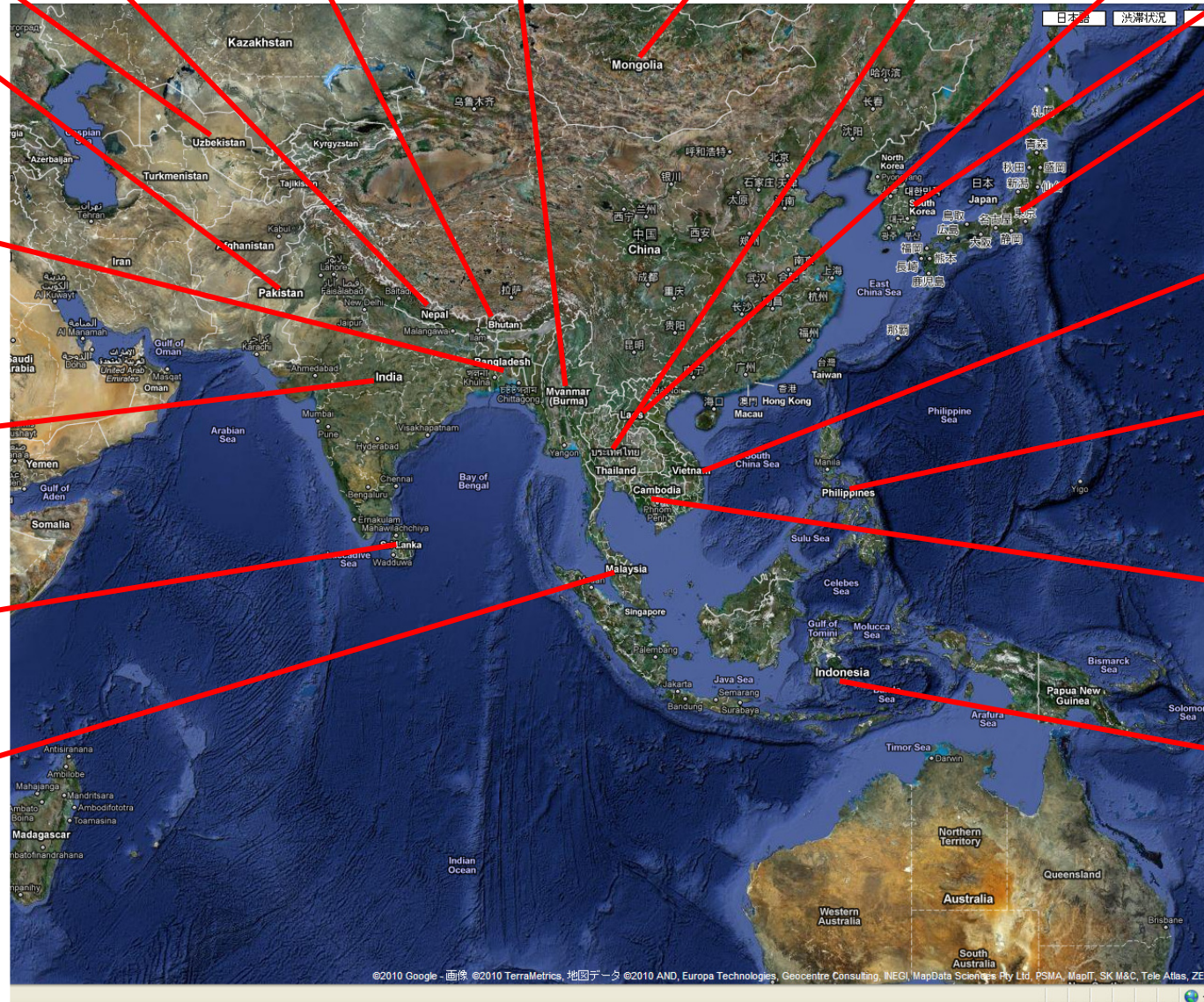
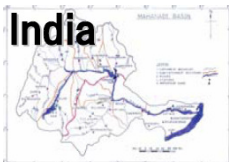
GEOSS/Asian Water Cycle Initiative

[integration of earth observation data] + [capacity development] programme

* GEOSS Implementing Agencies
(observations, predictions, data integration)



Demonstration River Basins



Pakistan Flood Information in 2010

Pakistan PALSAR Flood - Windows Internet Explorer
 http://monsoon.t.u-tokyo.ac.jp/AWCI/doc/Pakistan/index.htm

Monitoring Flooding in Pakistan Using ALOS PALSAR Data Provided by JAXA

Brief Summary of Pakistan Flooding Monitoring (CEOP-Vol.20_No.3_07_p08.pdf) [0.4MB]

PALSAR Images:

	PALSAR_Flood + Road (Please click left mouse then high resolution image appear in new window. Please click right mouse button there and select "save image as" to save high resolution image.)	GDEM + PALSAR_Flood + Road (Please click left mouse then high resolution image appear in new window. Please click right mouse button there and select "save image as" to save high resolution image.)	On the Google Earth (Please click "open" when you asked on your computer). Or please download "kmz" file on your computer then double click it. You can see the flood area on the google earth.)
2010/08/05 (Thu.)			 20100805_pakistanflood_palsar_wb1_ge.kmz
2010/08/19 (Thu.)			 20100819_pakistanflood_palsar_fhd_ge.kmz
2010/08/22 (Sun.)			 20100822_pakistanflood_palsar_wb1_ge2.kmz
2010/08/27 (Fri.)			 20100827_pakistanflood_palsar_wb1_ge.kmz
2010/08/29 (Sat.)			 20100829_pakistanflood_palsar_wb1_ge.kmz
2010/09/13 (Mon.)			 20100913_pakistanflood_palsar_wb1_ge.kmz

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

GEWEX

Monitoring Flooding in Pakistan Using ALOS & GSMaP Data Provided by JAXA

Takeo Tadono¹, Masanobu Shimada¹, Kentaro Aida², Katsunori Tamagawa¹, Toshio Koike¹, Kazuhiko Fukami³ and Takahiro Kawakami³
¹Earth Observation Research Center, JAXA; ²Department of Civil Engineering, The University of Tokyo; ³International Centre for Water Hazard and Risk Management under the auspices of UNESCO (ICHARM)

Serious damage has occurred in Pakistan recently due to floods and mudslides caused by heavy rain, which occurred continuously since July 29, 2010. The flood damage has spread from north to south in Pakistan. The Japan Aerospace Exploration Agency (JAXA) has made observations using the Advanced Land Observing Satellite (ALOS, 'Daichi') to monitor the state of the damage.

Figure 1 shows images of Hyderabad, 1,200 km south-southwest from Islamabad, which were taken after the disaster on August 23, 2010 (left) and before the disaster on March 23, 2010 (right). It is obvious that the flooded area along the Indus river basin has greatly expanded.

Figure 2 shows the inundation area image obtained from data acquired with the Phased Array type L-band Synthetic Aperture Radar (PALSAR) onboard ALOS on August 19, 2010. The data was acquired using the ScanSAR observing mode (WB1); therefore it covered an approximately 350 km wide strip at 100 m spatial resolution. The blue color on the topographical map derived from the ASTER Global Digital Elevation Model (ASTER GDEM) shows the inundation area, which was identified by analyzing the backscattering coefficients observed before and after the flood.

Figure 3: Comparison of preliminary IFAS-PDHM simulations using the corrected GSMaP data with the observed in-situ river discharge data at Nowshera, Kabul River from July 25, 0:00 to August 6, 0:00 GMT

A preliminary runoff analysis was done at the Nowshera hydrological station of the Kabul River, which is one of the major tributaries of the Indus River, using the Integrated Flood Analysis System (IFAS) - Public Work Research Institute (PWRI) Distributed-parameter Hydrologic Model (PDHM), grid-size 4 km and the Global Satellite Mapping of Precipitation (GSMaP) as shown in Figure 3. The GSMaP data corrected by the ICHARM's correction method based solely on rainfall-area moment information, without regarding ground-based rainfall data, was used as the input to the IFAS-PDHM. According to the estimation of this preliminary simulation, the flash-flood runoff peak at the Nowshera point (watershed area approximately 92,000 km²) appeared to be over 16,000 m³/s near the time of 0:00 (GMT) on July 31, but in reality, most of the high-flow discharge must have been inundating the floodplains (valley plains) along the Kabul River.

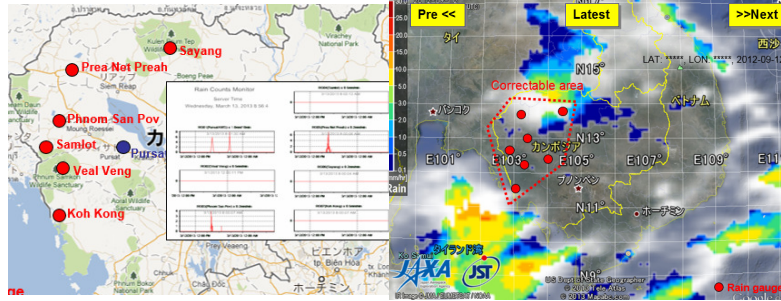
August 2010

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



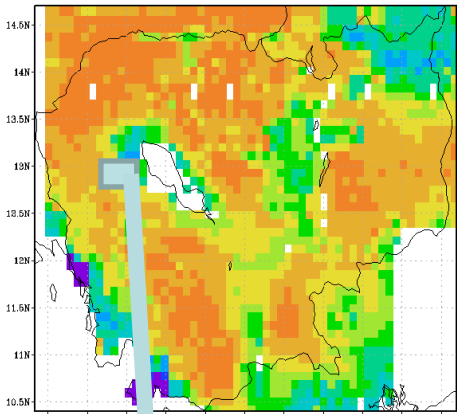
Stakeholder Meeting



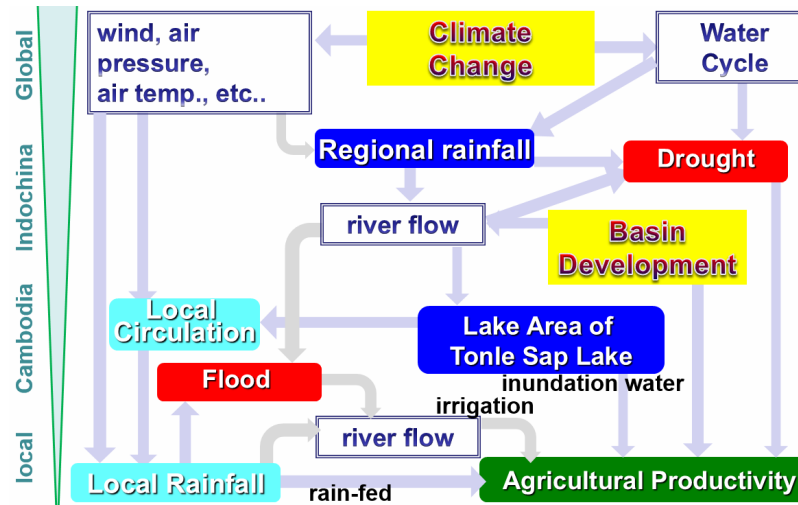
Real-time Rain Gauge → Satellite Data Correction
→ Wide Data Dissemination



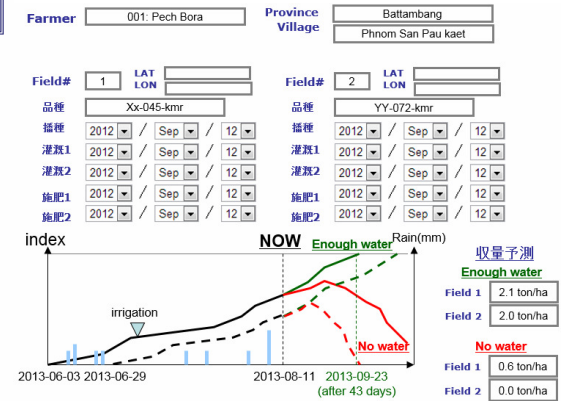
Farmers' Needs & Experiences



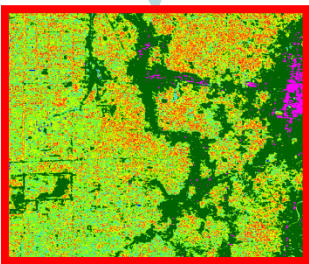
Nation-wide Daily Soil Moisture from Satellite



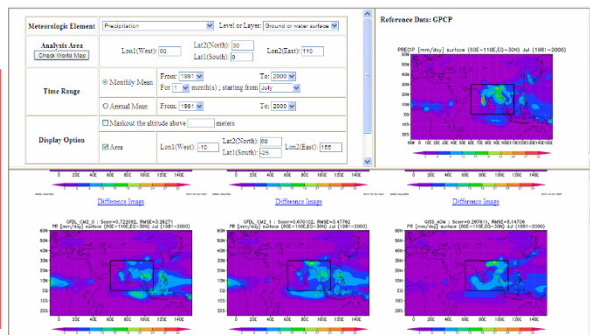
Holistic View of Water-Climate-Agriculture Problems



Water Cycle-Rice Production Coupled Model



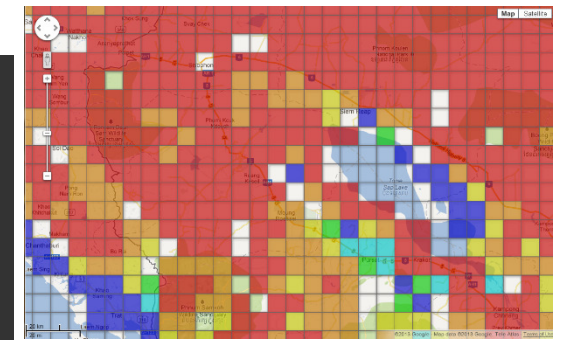
Local Information



Climate Change Analysis Tools

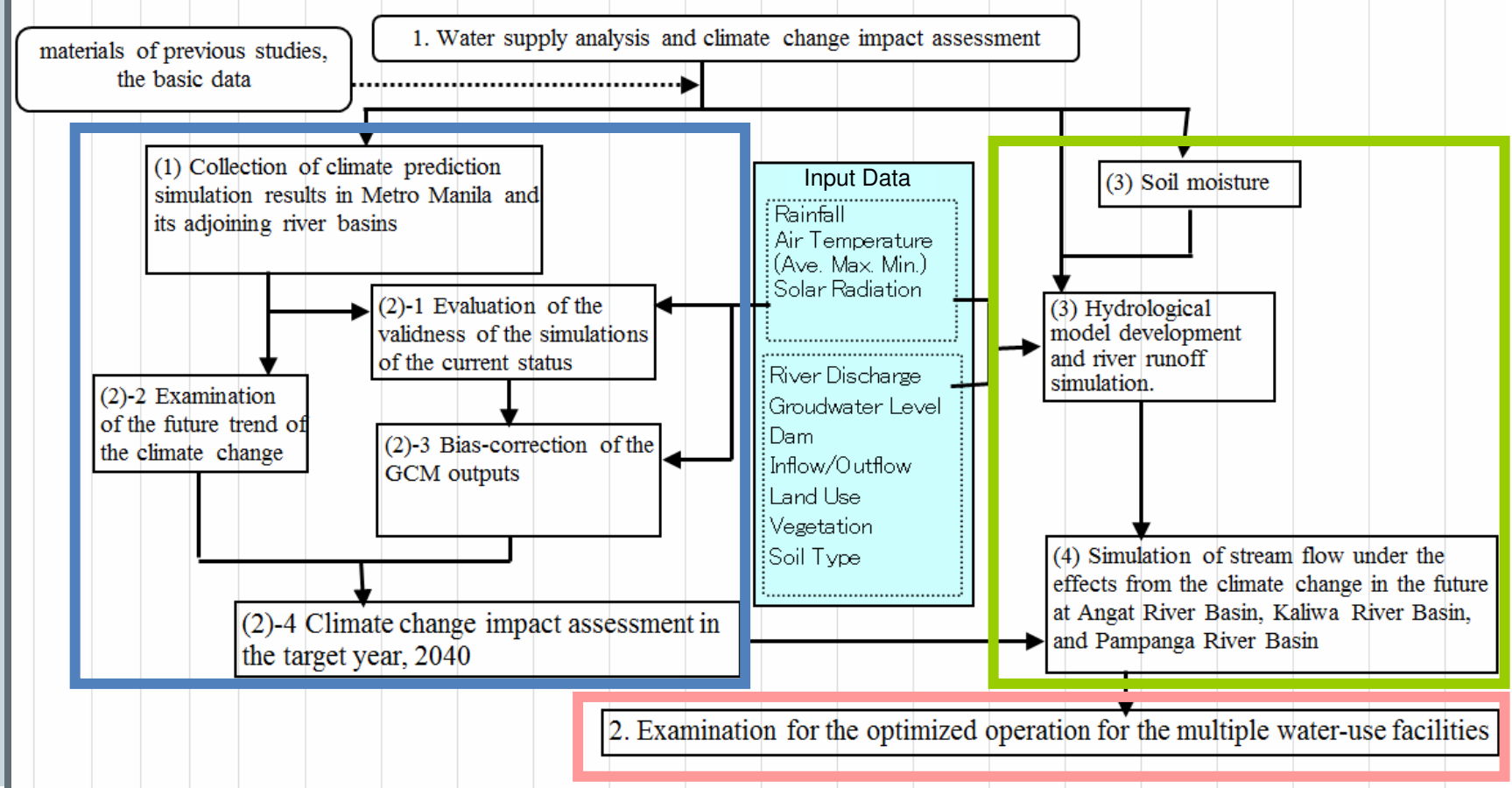


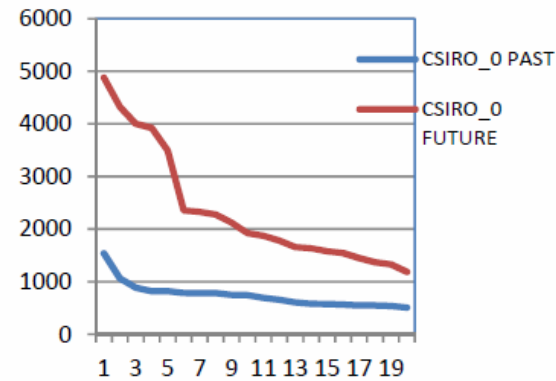
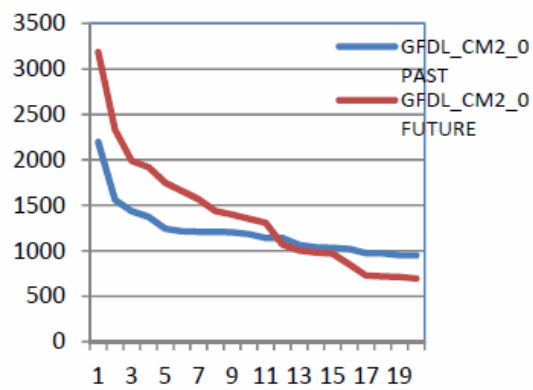
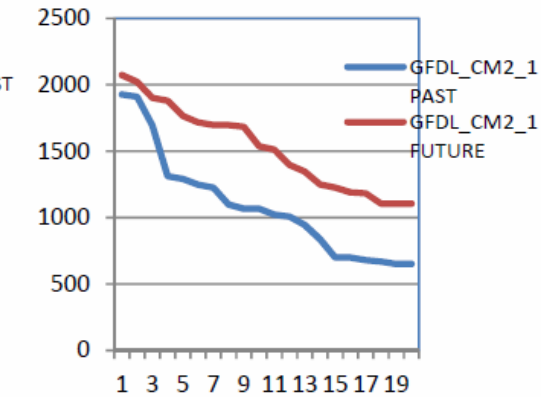
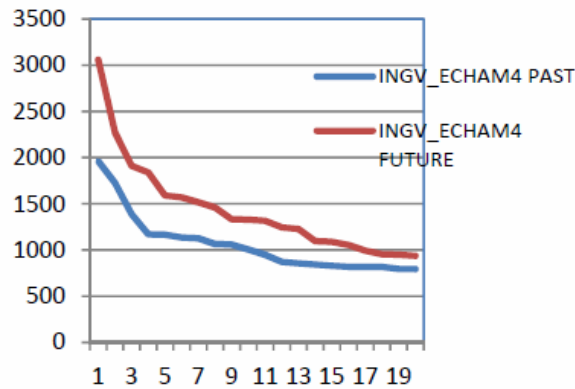
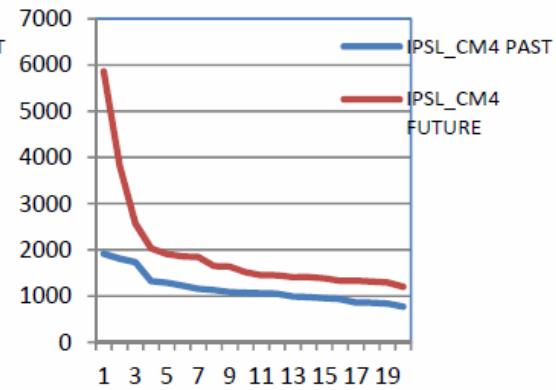
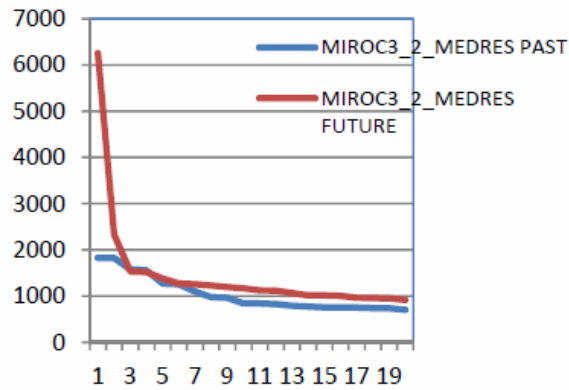
OJT for Local Practitioners



Rice Production Monitoring

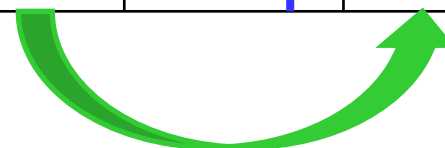
Work Flow





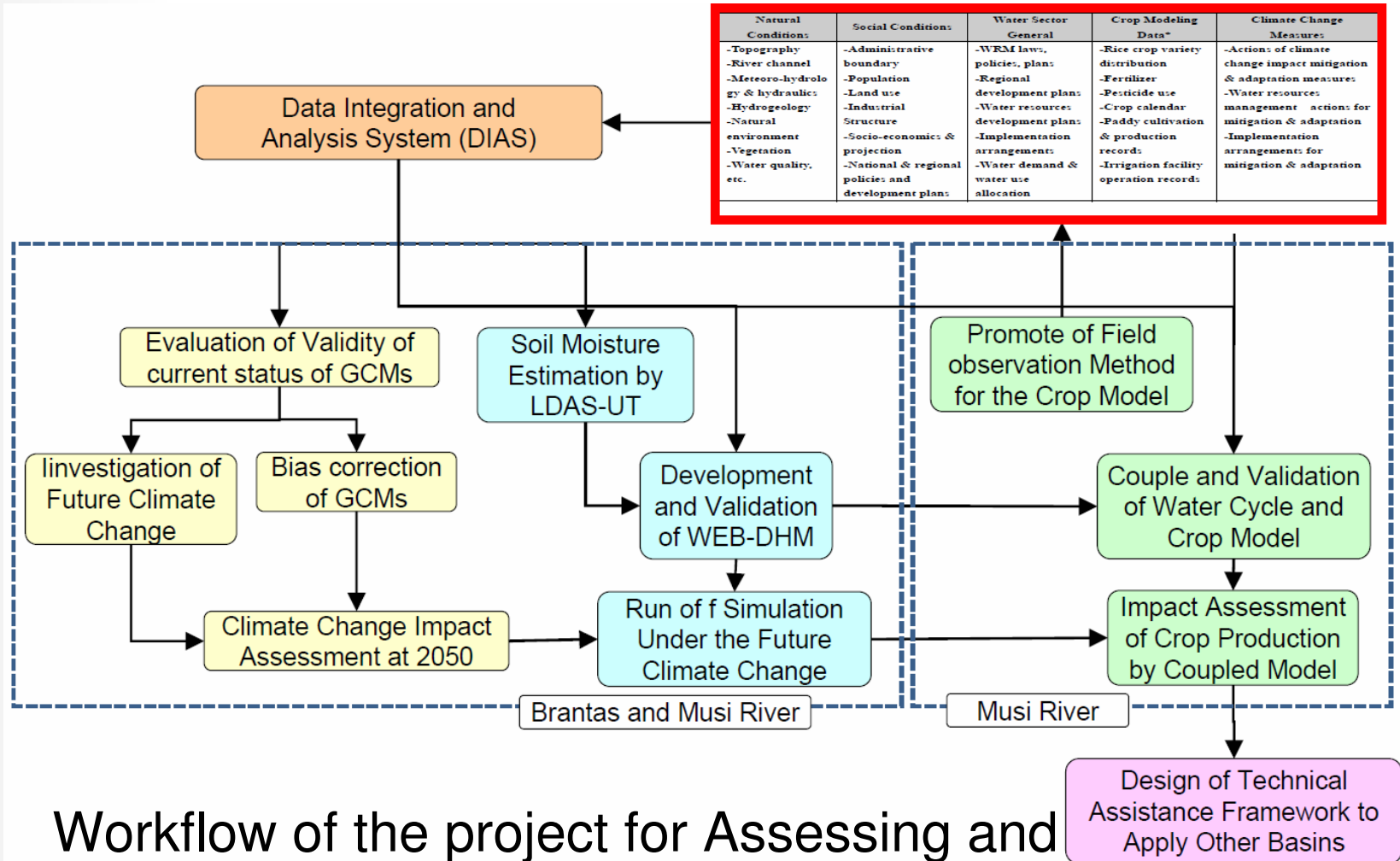
Past versus future Annual Average Discharge for each GCM for Angat dam inflow.

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

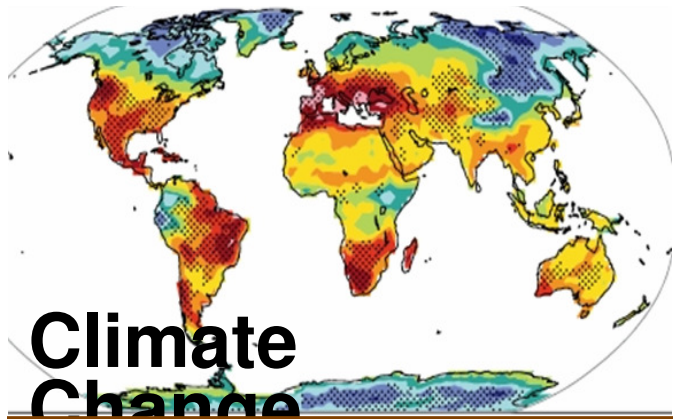


Conclusion

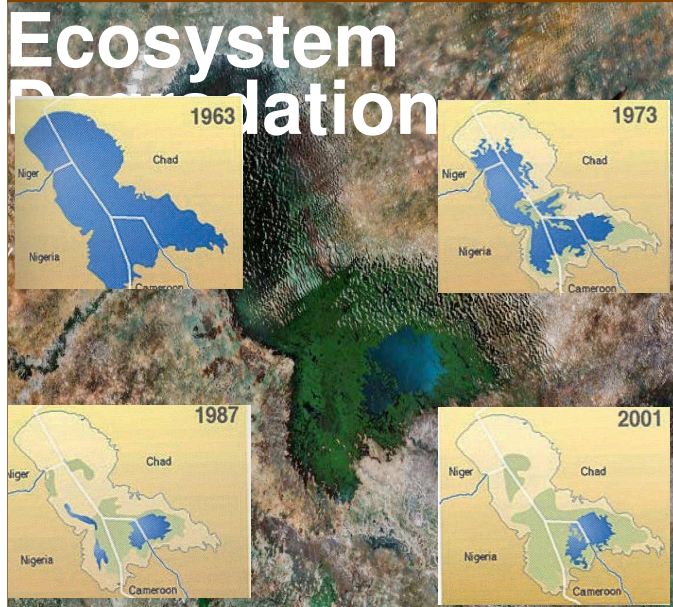
- River discharge datasets in Angat, Kaliwa and Pampanga River Basins were completed by considering the climate in past and future. The same analyses will be followed in Umiray and Pasig Marikina River Basins and Laguna Lake Basin to complete the Water Balance Study in whole study area.
- It is virtually 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.



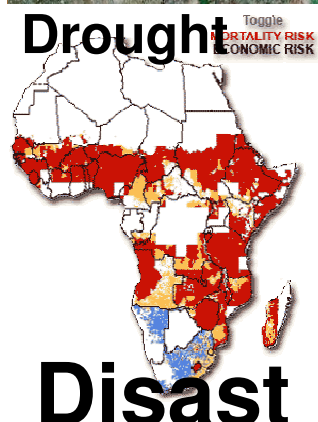
Workflow of the project for Assessing and Integrating Climate Change Impact into the Water Resources Management Plans



Climate Change

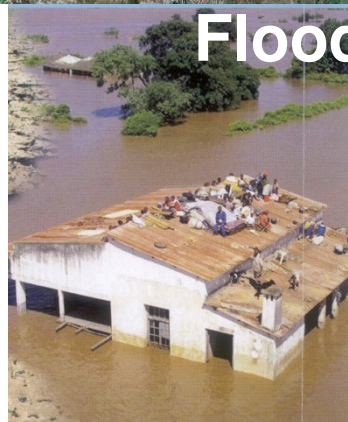


Ecosystem Population



Drought

Disast



Flood



Access to Water

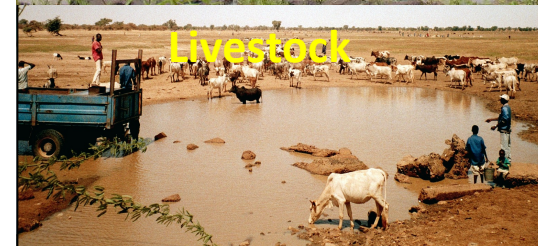


Health

- 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.



Food



Agriculture

Livestock



Energy

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 Plan*

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