The Water Cycle Thread:
A Philippines Example

CEOS-SIT Meeting

March 5, 2009

Rick Lawford and Osamu Ochiai

Agenda Item 12.4

The Water Cycle Thread:
A Philippines example

History
1. CEOS-GEO Remapping Workshop in Silver Spring (Jan 27 and 28)
 - Agreed to set one of candidate threads
2. 5th IGWCO meeting in Kyoto (Feb 2-3)
  - Agreed to start to consider the AWCI Philippines example

   The Water Cycle Thread Team:
    - Flaviana Hilario (AWCI Philippines)
    - Toshio Koike (AWCI lead scientist)
    - Rick Lawford (IGWCO)
    - Martha Maiden (WGISS)
    - Osamu Ochiai (CEOS Water SBA coordinator)

AWCI: Asian Water Cycle Initiative

GEOSS Asian Water Cycle Initiative (AWCI)

- Member Countries -

- Bangladesh
- Bhutan
- Cambodia
- India
- Indonesia
- Japan
- Korea
- Lao
- Malaysia
- Mongolia
- Myanmar
- Nepal
- Pakistan
- Philippines
- Sri Lanka
- Thailand
- Uzbekistan
- Vietnam

- lead by Univ. of Tokyo
- JAXA is one of contributing orgs
- 18 member countries
- 19 river basins for prototype demonstration

AWCI involves the integration of data by using Satellite, In-situ and Numerical Model, the delivery of integrated products, and the decision support tools needed to use these data.

GEOSS/AWCI Observation Convergence, Data Integration, and Information Sharing
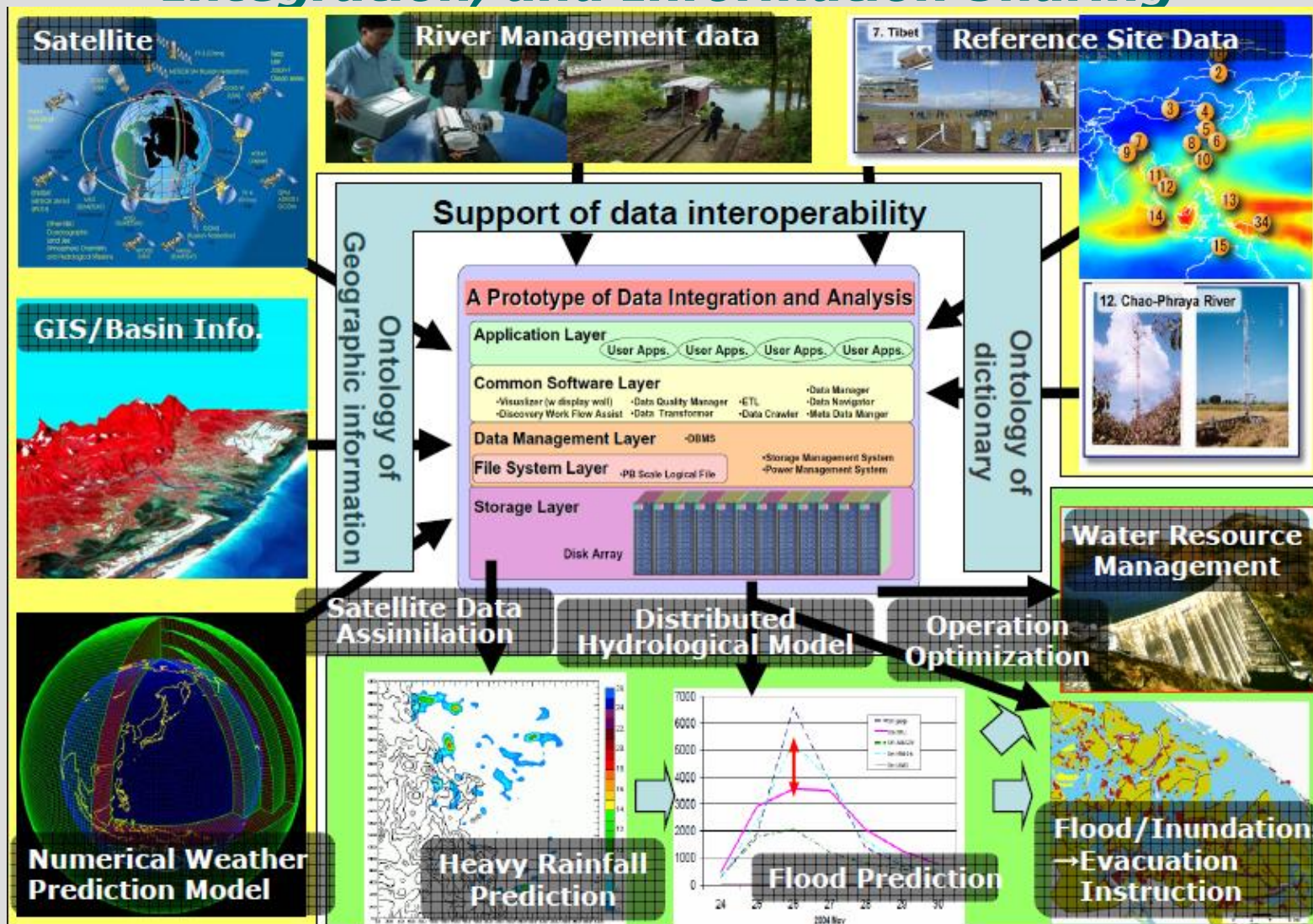
The objectives of AWCI

- to develop **Integrated Water Resources Management** (IWRM) approaches;

- to share timely, quality, long-term information on water quantity and quality, and their variation as a basis for sound **national and regional decision making**;

- to construct a comprehensive, coordinated and sustained observational system of systems, such as prediction systems and **decision support capabilities**, under the GEOSS;

- to develop **capacity building** for making maximum use of globally integrated data and information for local purposes as well as for observation and collecting data.
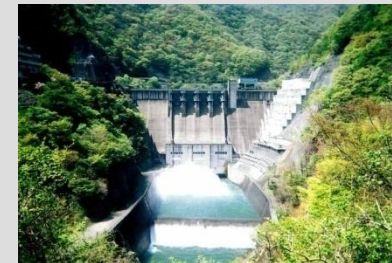
Step 1: Identifying the users' requirements for information

* Uses:

PAMPANGA RIVER BASIN
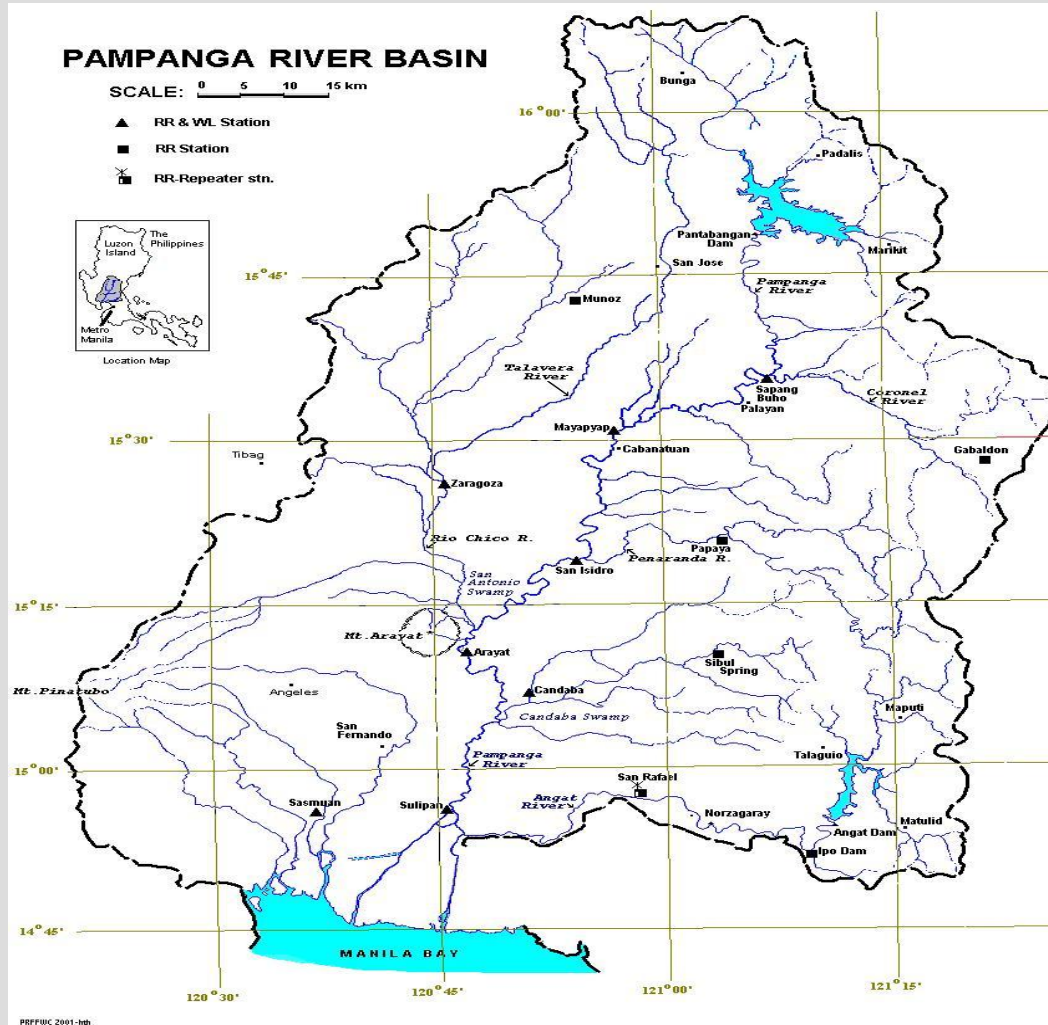
Manilla water supply
Irrigation
Hydropower
Flood control

Step 1: Identifying the users' requirements for information

The operators use information on:

- Precipitation (daily, monthly, seasonal)
- Runoff
- Soil moisture

– In the past these data have come from in-situ networks and national data systems that made little use of satellite data.

Philippines is expanding its radar network.

Step 1: Identifying the users' requirements for information

Steps involved in this Thread Analysis:

1) Interviews will be held with representative water resource managers from each group in the region to see how they use Earth Observations and what information benefits them the most. Issues relating to timeliness, resolution, accuracy, and formats will be reviewed. Sample questions could address:

   - **how farmers compute irrigation needs,**

   - **how the dam operator makes decisions to ensure that the water for irrigation is available when needed.**

Step 1: Identifying the user's requirement for information

Steps involved in this Thread Analysis:

2) The options for producing this information using a wider range of products will be explored along with the benefits of having more reliable products for decision making in each user group.

3) The needs for better data products and the requirements for more data on those variables that currently limit the production of reliable data products will be identified.

Step 2: Operational systems for delivering information

Inventory Operational Systems available in the Philippines and the services they provide.

- **Hydrological prediction services**: These services take the meteorological inputs and produce forecasts and other products for water resource managers.

- **Weather prediction services**: This prediction capability provides forecasts for rain and floods, generally on a relatively short term basis.

- **Climate prediction services**: Provide long term information necessary for the strategic movement of water and for the strategies for dealing with climate change.

Step 2: Operational systems for delivering information

The study will inventory regional and global scale operational Service that could benefit water resource managers in the Philippines.

Possible international sources of information for decision
  making include:
- JMA
- ECMWF
- NCEP
- IRI
- ESA

- JAXA (ALOS, TRMM)
- NOAA
- NASA
- ETC

Step 2: Operational systems for delivering information

Thread analysis:

- In order to develop the information that is required the Philippean team member would lead in the documentation of national services supplemented by the team's knowledge of international services.

- Approach: The approach would rely on government documents, surveys of information on the web and interviews.

- Assessment: An assessment of the degree to which the needs are met (and could be met) for each user group would be carried out and gaps would be identified. The adequacy of decision support tools would be assessed.

Step 2: Operational *systems* for delivering information

Thread analysis:

- Different classes of service are anticipated:

A) those where the service is available and used.

B) those where the service is available and not used or not accessible in a timely way.

C) those where experimental products are available but not operational products.

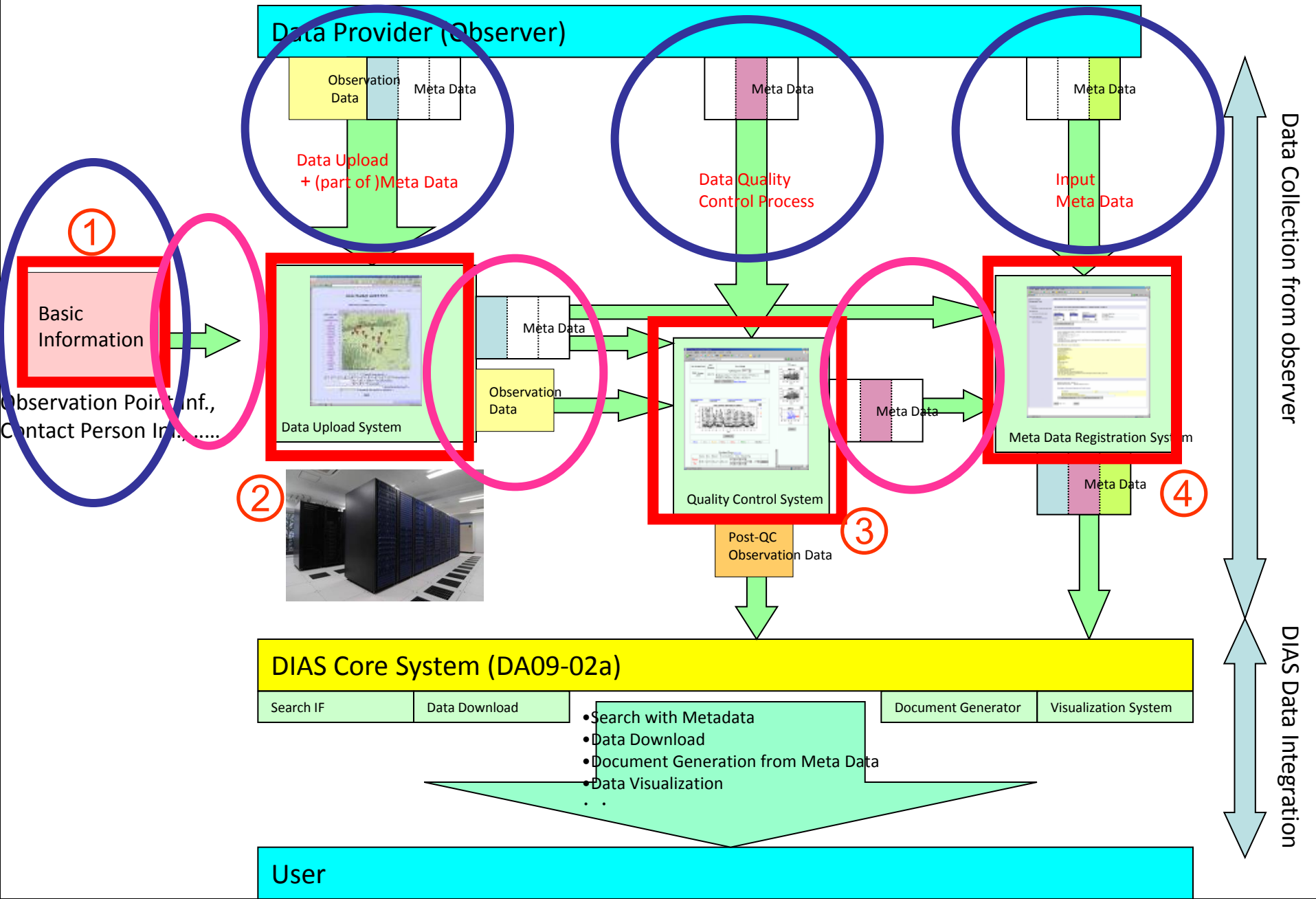D) those where even an experimental product does not exist.

Based on gaps identified recommendations would be made for moving products from D to A.

Step 3: Development of new systems

Gap analysis:

- Role of local data in the integrated information system

- Role of satellite data in these products

- Gaps in satellite data services (variables, products, accessibility, timeliness, resolution, latency, etc)

- Role (or potential role) of CEOS and GEO is supporting these developments

- Assess which DIAS products are used, which aren't and why some are more preferable than others

- Method: These issues would be addressed through interviews, documentation on AWCI and DIAS, and a users workshop.

Framework on DIAS Core System

Data Provider (Observer)

Observation Data   Meta Data

Meta Data

Meta Data

Data Upload + (part of)Meta Data

Data Quality Control Process

Input Meta Data

① Basic Information

Observation Point Inf., Contact Person Inf.,.....

② Data Upload System

Meta Data

Observation Data

Quality Control System

Meta Data

③

Post-QC Observation Data

Meta Data Registration System

Meta Data

④

DIAS Core System (DA09-02a)

Search IF	Data Download		Document Generator	Visualization System

- Search with Metadata
- Data Download
- Document Generation from Meta Data
- Data Visualization
・・

User

Data Collection from observer

DIAS Data Integration

Step 4: Role of CEOS and GEO in strengthening services

Conduct an analysis of these results to assess the possible expanded contributions of CEOS (and GEO) at product level to these and similar applications worldwide by identifying:

- missing variables and how CEOS could contribute (sensors, missions)

- missing products (lack of analysis and integration capability)

- missing services (data not being distributed, lack of local capacity)

Based on this case study analysis the areas of strong contributions and gaps would be identified.

Step 4: Role of CEOS and GEO in strengthening services

Identification of areas where CEOS could provide more support through:

– Development and validation of new integrated data products.

– Assessment of the success of data policies in terms of ensuring local data input to DIAS.

– Assessment of the needs and opportunities for capacity building in the Philippines (e.g., which groups, subject matter, etc).

– Identification of areas where new scientific understanding is needed to improve products, assimilation systems and models.

Water Thread

Societal Benefit

Decision Topic

- how farmers compute irrigation needs,
- how the dam operator makes decisions to ensure that the water for irrigation is available when needed.

GEOSS Asian Water Cycle Initiative (AWCI)
Member Countries -
- Bangladesh
- Bhutan
- Cambodia
- India
- Indonesia
- Japan
- Korea
- Lao
- Malaysia
- Mongolia
- Myanmar
- Nepal
- Pakistan
- Philippines
- Sri Lanka
- Thailand
- Uzbekistan
- Vietnam

Information Products and Services

- Hydrological prediction services
- Weather prediction services:
- Climate prediction services:

The meteorological inputs and produce forecasts and other products for water resource managers.

This prediction capability provides forecasts for rain and floods, generally on a relatively short term basis.

Provide long term information necessary for the strategic movement of water and for the strategies for dealing with climate change.

Science Knowledge and Models
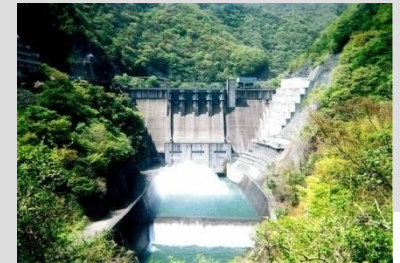
Relevant GEO Tasks and CEOS Actions*
- WA-06-02 Droughts, Floods, and Water Resource Management
- WA-06-07c Capacity Building for Water Resource Management, Asia
- WA-08-01 Integrated Products for Water Resource Management and Research
- AR-09-02a Virtual Constellation
- DA-09-02a Data Integration and Analysis System

-Precipitation (daily, monthly, seasonal)
-Runoff
-Soil moisture
and others

Measurements

Contributions from TRMM and ALOS onboard instruments and others

Instruments and Missions
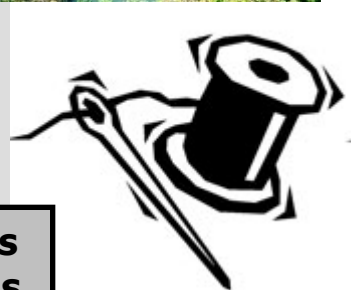
SUMMARY

- AWCI is an on-going initiative to support local water resource management (Philippines as an example).

- Satellite, in-situ and numerical model data integration, and its capacity building.

- Currently, most efforts are being focused to collect in-situ datasets from each river basin station, and they are typically hard jobs (Quality Control, Uploading data to DIAS, Metadata creation and registration) – step by step grass root

- Satellite datasets and numerical model datasets would be the next steps, and CEOS could be able to contribute to support a systematic and multiple Satellite data provision and Capacity Building not only for the Philipines case but also for the entire 18 river basins.

BENEFITS OF THE THREADS ANALYSIS

The Threads analysis is expected to provide:

- An analysis of an approach to user services (involving AWCI and JAXA) that other countries could learn from.

- A success story for CEOS to show how its members have worked together to address a problem in the developing world.

- An assessment of additional needs in terms of satellite data and analysis that CEOS can assist in providing.

- An overview of how satellite data can be best used in an operational environment which also relies on in-situ data and forecasts.

- Feedback for AWCI on how local users perceive the benefits they derive from AWCI and what they would like to see done differently.

NEXT STEP

In particular, the threads analysis will result in a report to
CEOS that will describe:

     1) how users make decisions based on Earth Obs.,
     2) how operational services produce information
       in a developing country,
     3) how experimental products and research/
       applications projects contribute to operational
       services and the expanded use of Earth Observations,
     4) a set of recommendations for CEOS and its
       members based on this review.