

# Summary report on The 4<sup>th</sup> International Coordination Group (ICG) Meeting of the GEOSS Asian Water Cycle Initiative (AWCI)

held

at the Kyoto Research Park, Kyoto, Japan, 6 – 7 February 2009.

(final draft: 30 March 2009)

## **1.1 Background of GEOSS AWCI (<http://monsoon.t.u-tokyo.ac.jp/AWCI>)**

The GEOSS Asian Water Cycle Initiative (AWCI) is a regionally cooperative contribution to the GEO socio-benefit area: “Improving water resource management through better understanding of the water cycle”. It has been established based on the regionally common and sharable ideas on the water-related issues in Asia and their natural and socio-economical backgrounds and in recognition of the need for accurate, timely, long-term, water cycle information as a basis for sound and effective water resources and risk management and with regards to the ongoing initiatives pursuing to meet this need.

The AWCI that involves 18 participating countries develops an information system of systems for promoting the implementation of integrated water resources management (IWRM) through data integration and sharing and improvement of understanding and prediction of the water cycle variation as a basis for sound decision making of national water policies and management strategies.

The objectives for AWCI are:

- 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.

The AWCI is a new type of an integrated scientific challenge in cooperation with meteorological and hydrological bureaus and space agencies. Its unique features include:

- Effective combination of the architecture and data and the capacity building;
- Advanced data infrastructure availability including a river basin meta-data registration system, a data quality control interface, and data-integration and downscaling methods;
- A clearly described data sharing policy agreed among the participating countries;
- Strong linkage among science communities, space agencies, and decision makers;
- Well coordination between the research communities and operational sectors with clear strategy for transferring scientific achievements to operational use;
- Effective cooperation with international projects and cooperative frameworks.

The **Fourth GEOSS AWCI ICG meeting** was planned and undertaken to accelerate the GEOSS/AWCI coordination, especially on “Data Integration” and “Capacity Building” and to move ahead with implementation of AWCI in accordance with the strategy outlined in the Implementation Plan that was agreed on at the 3<sup>rd</sup> Asian Water Cycle Symposium in Beppu, Japan, December 2007. The meeting agenda reflected and discussions followed-up on the outcomes of the Third GEOSS AWCI ICG meeting that was held in Beijing, China, November 2008. The outcome of those discussions is summarized in this report. All of the presentation material provided by the participants at the meeting, including abstracts of talks and posters is available on the Internet through the meeting home page at: <http://www.editoria.u-tokyo.ac.jp/awci/4th/presentation.html>.

## **1.2 Executive Summary of Main Issues/Conclusions and Actions**

The meeting was held in conjunction with the 3<sup>rd</sup> GEOSS Asian Pacific Symposium that took place at the same venue, 4 – 6 February 2009 and included a special parallel session on “Water Cycle in the Asia-oceanic region” and a special interdisciplinary session on “Toward Actual Collaboration among Climate, Water Cycle, and Disasters” that were closely related to the AWCI activities.

A brief executive summary of the AWCI ICG meeting and GEOSS AP water-related sessions is given in this section, further details follows in sections 2.1 and 2.2 below.

#### Expanded collaboration among Water Cycle, Climate, and Disaster SBAs

Through the presentations and discussions of the GEOSS AP Symposium special “water” sessions, a possibility for expanded collaboration among the AWCI current activities focused on water cycle issues and other, closely related socio-benefit areas of GEOSS was sought. Water cycle and Climate related Disasters were identified as a suitable theme for such cooperation that is also common to all of the Asia-Pacific countries and the AWCI participating countries as it was reported at the meeting.

Four target topics and fields were defined based on the outcomes of the country reports on disasters that could be considered as the main areas for cooperation. These include:

1. Typhoon, cyclone, and induced floods
2. Drought
3. Cold surge
4. Snow, glaciers, and GLOF

#### AWCI progress and issues

The GEO Secretariat, APN and MEXT representatives highlighted that the AWCI organization, approaches, and activities are fully in accord with the GEO and APN principles and with the MEXT mission in terms of water resources and as such has full support of their respective organizations.

The AWCI meeting included several scientific talks that introduced some new findings and advanced tools and methods that could be exploited in the AWCI activities.

A good progress was reported in the AWCI demonstration projects data and metadata submission. Explanation and demonstration of the data and metadata upload system and data quality control tools was provided during the meeting and well acknowledged by the participants.

The AWCI capacity building program has also progressed. The UNU group developed an on-line repository (<http://unufms.net:8080/seaside/gcs/AWCI>) that will facilitate effective planning of CB activities. Several seminars/workshops took place in 2008 and their outcomes were reported. The AWCI working groups held breakout sessions and proposed concrete activities in the 2009 – 2010 timeframe. A possible water quality study in cooperation with other groups was discussed during a special panel discussion and a framework and basic features of such study were proposed.

#### Conclusion

The participants concluded that: “Data information, science and technology, cooperation framework, and the members are now ready to expand interdisciplinary cooperation that would bring mutual benefits”.

Particular steps were proposed to step forward:

- Countries and organizations will submit proposal on the targeting topic(s)
- A three-day workshop will be held in the September – October 2009 timeframe to discuss:
  1. Sharing Societal Needs, Scientific Ideas, Observation Capability, Modeling Capability, Experiences
  2. Seeking Data Sharing Possibility: Data Policy, Meta Data Generation and Data Infrastructure
  3. Establishing Cooperation Framework under GEO
- Forming a Task Team for drafting an Implementation Plan
- Discussing the draft at the 4<sup>th</sup> GEOSS AP Symposium in Bali, Indonesia, 2010



Vietnam. Floods were identified as the most severe and most common disasters that all countries are suffering from. Also common features of floods in different regions were identified. The representatives also introduced methods and systems used for floods and other disasters predictions, risk management, and impact mitigation. While in some countries, advanced integrated systems are being made operational, other countries still have high needs for capacity building in this area.

The main presentation and discussion points of the Water Cycle in the Asia-Oceanic Region session were summarized in the Table 1 below. The common issues and available/needed capacities suggested possible areas for closer collaboration including the effective framework established through the GEOSS AWCI. The strategy of such expanded collaboration was discussed at the following interdisciplinary session "Toward Actual Collaboration among Climate, Water Cycle, and Disasters".

**Table 1: The session summary table. Yellow color indicates items highlighted by individual country representatives**

		BD	BT	CB	IN	ID	JP	MY	MM	MN	NP	PK	PH	SL	TH	UZ	VT
Flood	13																
Typhoon/Cyclone	5																
Localized torrential rainfall	3																
GLOF	1																
Snowmelt Flood	1																
Avalanche	1																
Glacier	3																
Landslide/Mudflow	6																
Bank Erosion	2																
Tsunami	3																
Drought	5																
Water Logging	1																
Cold Wave	1																
Climate Change	8																
Meteorological Observation	3																
Hydrological Observation	2																
Data and Information System	4																
Weather Forecast	1																
Flood Forecast	1																
Land Use	1																
Hazard & Risk Mapping	3																
Counter Measure/Mitigation	5																
Decision Making Support	1																

## **2.2 Toward Actual Collaboration among Climate, Water Cycle, and Disasters SBAs**

Climate observation and prediction systems provide data and information that is broadly useful to the Water Cycle area. The Water Cycle SBA/projects then combine their own data with outputs from Climate systems/projects, producing integrated data sets and other derived products, which can in turn be passed on to other societal benefit areas, for example, Disasters SBA. In this way, a comprehensive understanding of issues in the Disasters area can be gained through interoperable use of data and information from the other areas. As the managers of Climate systems react to this broader market for their outputs, they become more attuned to making products that are responsive to these broader user requirements.

GEOSS will be able to provide opportunities for such interconnection between various societal benefit areas. To accelerate to share implementation experiences, as well as their data product availability and requirements of contributing systems, it was discussed how to cooperate and coordinate among different societal benefit areas, Climate, Water cycle and Disasters, and to make plans for carrying the ideas into actions.

## The session agenda

<b>13:00-13:10</b>	<b>Opening “Climate-Water Cycle-Disasters” Joint Session</b>	
13:00-13:10	Breakout Session Design	E. Nakakita
<b>13:10-15:00</b>	<b>Short reports on “What is on-going and/or planned?”</b>	(10min each)
-	Climate Projection	A. Kitoh (MRI)
-	Applications of Climate Models to Water-related Disaster	E. Nakakita (KU/DPRI)
-	GEOSS-WCRP collaboration in MAHASRI and HARIMAU	M. Yamanaka, J. Matsumoto (JAMSTEC)
-	Recent change in global sea surface layer salinity detected by Argo float array - Footprint of enhanced hydrological cycle	S. Hosoda (JAMSTEC)
-	Abnormal hydrological condition and disaster due to Arctic	T. Ohata (JAMSTEC)
-	Water Productivity Mapping using Remote Sensing to solve Global Food Crisis	P. Thenkabail (USGS)
-	Global Mapping Project	Y. Fukushima (MLIT/GSI)
-	Sentinel Asia and SAFE	T. Moriyama (JAXA)
-	ICHARM Commitments to enhance regional cooperation in Asia and Pacific	K. Fukami (ICHARM)
-	Water for the World	T. Wiener (IEEE)
-	WCRP/GEWEX/CEOP	S. Williams (NCAR/EOL)
<b>15:00-15:20</b>	<b>Break</b>	
<b>15:20-17:30</b>	<b>Direction of Alliance’s Efforts</b>	
14:50-15:20	Data and Information Sharing Approach	R. Shibasaki
15:20-17:30	Discussion for Implementation	All
	▪ Target Topics and Fields: <i>Typhoon and Cyclone/Drought/Cold Surge/Snow and Glacier</i>	
	▪ Regional Coordination Framework	
	▪ Linkage to Global Coordination Framework	
	▪ Building capacity	
	▪ Planning Strategy	
<b>17:30-18:00</b>	<b>Closing “Climate-Water Cycle-Disaster” Joint Session</b>	
17:30-17:50	Session Summary	T. Koike
17:50-18:00	Concluding Remarks	GEO Secretariat

### Opening

The session was opened by Prof. Eiji Nakakita, Kyoto University, Disaster Prevention Research Institute, who explained the purposes for organizing this interdisciplinary session among different societal benefit areas and its design and objectives. He has emphasized that all the GEO SBAs are naturally related but in particular in case of Climate, Water Cycle and Disasters, the mutual connections are substantial and the interdisciplinary approach towards addressing the pressing issues would be beneficial for all groups.

### Short reports on on-going/planned activities related to the Climate, Water Cycle and Disasters SBAs

A total of 11 talks were given in this session as listed in the session agenda that introduced various on-going and planned activities that either were truly interdisciplinary dealing jointly with the Climate, Water Cycle and Disasters SBA issues or could be exploited in more collaborative way to address other SBA issues than originally designed for. The introduced activities included projects focusing on climate projection methods and climate scenarios impacts assessment; projects on further research into the climate changes and their impacts on regional and global level; projects on advanced mapping technologies and their capabilities; integrated observation and data integration systems projects; and projects focusing on capacity building and enhancing cooperation in the region.

### Direction of Alliance’s Efforts

This session was opened by Prof. Ryosuke Shibasaki, University of Tokyo, who emphasized the importance of proper metadata without which data sharing would be very difficult. He explained the basic principles for making data and data products interoperable and mentioned the example of the metadata structure definition based on ISO-19115 that is being used for DIAS, CEOP, and AWCI projects. He also highlighted the need to develop metadata registries offering tools that enable data providers to generate metadata on their data in an effective manner. It was pointed out that GEO Architecture and Data Committee has inputted a task in their Task plan on metadata registry and ontology to support data providers as well as metadata design development.

The session further continued through the planning strategy discussion for cooperation/coordination that resulted in identification of next step activities. Four target topics and fields were defined based on the outcomes of the country reports on disasters that could be considered as the main areas for cooperation. These include:

1. Typhoon, cyclone, and induced floods
2. Drought
3. Cold surge
4. Snow, glaciers, GLOF

The discussion on each of the above target topics included the four items: (i) regional coordination framework; (ii) linkage to global coordination framework; (iii) building capacity; and (iv) planning strategy, considering the on-going and planned activities introduced in the previous session. The enthusiastic and productive discussion brought plenty of ideas and suggestions for enhanced cooperation.

In case of Typhoon and cyclone theme, the focus should be on integrated data systems that would enable data and information sharing on a real- or near real-time basis that is critical for early warning and disaster management. Also the need to advance the research into the mechanisms of the typhoon and cyclone phenomena within the context of larger scale situation was mentioned. Oceanographic data are of high importance and thus closer collaboration is needed with oceanography groups.

The importance of a regional approach to the drought issues was emphasized as droughts are usually affecting larger areas. Collaboration with agriculture experts is desirable.

The basic mechanism of Cold Surge was explained and its role in heavy rain events in some areas emphasized. The effect of local processes in connection with large-scale circulation is crucial in case of Cold Surge and needs to be further studied. A collaborative study between science communities and operational sectors maybe needed.

Regarding the Snow, glaciers, and GLOF theme, it was reported that certain databases exist in the Himalayan area and further cryospheric observation network and database for the Asian region is being developed through joint research projects. What is needed to be developed are prediction models of snow and ice mass changes and early warning systems for disasters associated with GLOF and other cryosphere-related events.

In general, it was concluded that good and relatively comprehensive datasets would be available for:

1. Integrated Water Resources Management focus in each country
2. Regional activities focused on the four target topics for which regional coordination framework is very important.

In addition, it was emphasized that it would be mutually beneficial to share ideas and policies on adaptation and disaster management on common issues. A matrix was developed showing possible cooperation linkages that is shown in Table 2.

#### Conclusion of the two Water-related sessions

The “Water Cycle in the Asia-Oceanic Region” and “Toward Actual Collaboration among Climate, Water Cycle, and Disasters” sessions were concluded with the message that: “Data information, science and technology, cooperation framework, and the members are now ready to expand interdisciplinary cooperation that would bring mutual benefits”.

The group has proposed planning strategy with a particular steps that will be undertaken before the next, 4<sup>th</sup> GEOSS AP Symposium:

- Countries and organizations will submit proposal on the targeting topic(s)
- A three-day workshop will be held to discuss:
  1. Sharing Societal Needs, Scientific Ideas, Observation Capability, Modeling Capability, Experiences
  2. Seeking Data Sharing Possibility: Data Policy, Meta Data Generation and Data Infrastructure
  3. Establishing Cooperation Framework under GEO
- Forming a Task Team for drafting an Implementation Plan
- Discussing the draft at the 4<sup>th</sup> GEOSS AP Symposium

**Table 2: Cooperation Linkages**

		IWRM	Typhoon/Cyclone Adaptation	Drought	Cold Surge	Snow/Glacier/GLOF
Hydro. Obs.	AWCI Demo Basin	X	X	X	X	X
Basin Meta	AWCI Demo Basin	X	X	X	X	X
<u>Integrated Obs.</u>						
Land-Atmos.	JAMSTEC, CEOP	X	X	X	X	X
Ocean	JAMSTEC	X	X		X	
Model Weather	NWPCs, CEOP	X	X	X	X	X
Model Climate	KAKUSHIN, CMIP3/5	X	X	X	X	X
	DIAS	X	X	X	X	X
Satellite	Sentinel Asia	X	X	X	X	X
	SAFE	X	X	X	X	X
	CEOS	X	X	X	X	X
	CEOP	X	X	X	X	X
	WCRP CliC					X
Climate Obs.	Nations, GCOS	X	X	X	X	X
Geographic Data	GMP, Global DEM	X	X	X	X	X
Irrigation/Rain fed Productivity	GIAM, GMRCA (IWMI, USGS)	X		X		
Scientific Knowledge	Intl. Sci. Communities					
	KAKUSHIN	X	X	X		X
	CEOP	X	X	X	X	X
Capacity Building	AWCI/CB	X	X	X	X	X
Regional Coordination	APN	X		X		
	ICHARM	X	X	X		X
	Typhoon Committee		X			
	ICIMOD					X
	UNU, ADB,					
Case Study	IEEE	X				
	Member countries					
Counter Measures	Member countries					

### 2.3 The 4<sup>th</sup> International Coordination Group Meeting of the GEOSS AWCI ICG

To accelerate the GEOSS/AWCI coordination, especially on “Data Integration” and “Capacity Building”, by reviewing and sharing the updated status of the GEOSS, the AWCI demonstration projects, and the related sciences.

#### The session agenda

**Friday, 6 February 2009:**

**13:30 – 14:00 1. Opening by Guest Speakers**

- 1.1 Hirota Tani, MEXT
- 1.2 Linda Anne Stevenson, APN
- 1.3 Douglas Cripe, GEO Secretariat

**14:00 – 14:20 2. GEOSS/AWCI Overview and Meeting Objectives**

*T. Koike*

**14:20 – 15:00 3. Science Interaction Session – Land Use**

- 3.1 Paddy Field Monitoring by Satellite
- 3.2 Global Irrigated Area Map (GIAM) and Global Map of Rainfed Cropland Areas (GMRCA)

*W. Takeuchi*

*P. S. Thenkabail*

**15:00 – 15:20 Break**

**15:20 – 17:30 4. “Capacity Building” Implementation Plan Development**

- 4.1 Plenary session; Objectives and guidance
- 4.2 Breakout sessions
  - Floods WG

*S. Herath and C. Ishida*

*All*

- Drought WG
  - Water quality WG
  - Climate Change WG
- 4.3 Plenary session; WG reports and coordination

**17:30 ADJOURN**

**Saturday, 7 February 2009:**

**9:00 – 9:40 5. Scientific Reports**

- 5.1 Land-Lake-Atmosphere Interaction and its Effects on Local Water Use
- 5.2 WEB-DHM and IWRM

*K. Tsujimoto  
L. Wang*

**9:40 – 10:30 6. Data Management (1)**

- 6.1 GEOSS/AWCI data archiving update
- 6.2 Data loading and quality check

*K. Tamagawa  
E. Ikoma*

**10:30 – 10:50 Break**

**10:50 – 12:00 6. Data Management (2)**

- 6.3 Thailand Hydroinformatics System
- 6.4 Data Infrastructure – present situation and future prospects
- 6.5 Meta-data Registry

*S. Malaikrisanachalee  
M. Kitsuregawa  
H. Kinutani*

**12:00 – 13:00 Lunch**

**13:00 – 14:30 7. Special Panel Session on “Promotion of Water Quality Study”**

*H. Furumai, and Flood/Drought/Climate Change WG Chairs*

**14:30 – 15:00 8. Summary and Way Forward**

*T. Koike*

Opening

The meeting was opened by representatives of Ministry of Education, Culture, Sports, Science, and Technology, Japan (MEXT), Asia-Pacific Network for Global Change Research (APN), and GEO Secretariat. **Mr. Hirota Tani, MEXT**, emphasized the Ministry's recognition of the importance of water resources issues and expressed Ministry's support of the data integration and analysis efforts and capacity building activities that are being undertaken by GEO and GEOSS AWCI. **Dr. Linda A. Stevenson, APN**, mentioned that APN strongly supports activities of GEOSS AWCI that was initiated with a significant contribution of an APN funded project. Currently, three projects under AWCI are financially supported by APN through ARCP and CAPaBLE. Dr. Stevenson advised the participants that APN's budget would be increased and APN planned to allocate the additional funds to enhance activities in climate change theme, in particularly training sessions on downscaling the global information for local use. **Dr. Douglas Cripe, GEO Secretariat**, highlighted the principles for GEO capacity building that include: (i) focus on user needs; (ii) building on existing efforts and best practices; (iii) fostering collaboration and partnership; (iv) enhancing the sustainability of earth observations; and (v) holistic approach: consider all the SBAs at the global, regional, and local levels.

GEOSS/AWCI Overview and Meeting Objectives

The opening talks were followed by introduction of the meeting objectives and the GEOSS AWCI overview given by the AWCI leader, **Prof. Toshio Koike, University of Tokyo**. Prof. Koike summarized the outcomes of the **3<sup>rd</sup> GEOSS AWCI ICG meeting** that was held in Beijing, 6 November 2008 and was connected to the 4<sup>th</sup> Conference of the Asia Pacific Association of Hydrology and Water Resources (APHW). At this occasion, a special AWCI session was held as a part of the APHW conference that introduced scientific work related to the AWCI activities. The 3<sup>rd</sup> AWCI ICG meeting sessions included demonstration project update reports, AWCI activity reports (GEOSS current status, undertaken capacity building activities, and working group reports), establishing a new working group on “Climate Change Impacts and Adaptation”, metadata and data archiving and data quality check demonstration, and capacity building implementation strategy discussion. The 3<sup>rd</sup> AWCI ICG meeting outcomes included:

1. New AWCI working group on climate change impacts and adaptation was established, the Co-Chairs are Prof. Deg-Hyo Bae, Korea, and Prof. Mafizur Rahman, Bangladesh.



- The metadata and data upload system is ready the actual data and metadata provision by countries has begun but it is desirable to expedite this process in accordance with the demonstration projects implementation plan. Progress would be reported at the 4<sup>th</sup> AWCI ICG meeting in Kyoto, February 2009.
- Capacity building strategy focuses on the identified 3 target groups: (i) researchers/scientists, (ii) professional/practitioners, and (iii) administrative/local government officers; and follows 3 approaches towards the capacity building pilot projects (PP) proposed and agreed earlier: (i) country based PP; (ii) training module based PP; and (iii) country data plus training module based PP. The ICG members are expected to introduce concrete proposals by the Kyoto meeting, where actual plans will be discussed.

In addition, Prof. Koike gave an overview of the “water” breakout sessions that took place as a part of the GEOSS AP Symposium on Thursday 5 February and introduced the outcomes of these sessions and implication for further AWCI development.

#### Scientific sessions

The meeting included two scientific sessions. The first one focused on land use issues and introduced the methodology for paddy field monitoring using satellite data and the global maps of irrigated and rainfed croplands. The outcomes of these efforts might be very useful in various AWCI projects. The second scientific session scheduled a talk on land-lake-atmosphere interaction at a local scale and a talk on applicability of an advanced distributed hydrological model for the IWRM purposes. These talks were also very inspiring for the AWCI project planning.

#### “Capacity Building” Implementation Plan Development

The session was opened by **Mr. Chu Ishida** who summarized the past developments of the AWCI integrated capacity building strategy that was formulated based on the outcomes of capacity needs and available resources surveys. The objective is to show the applicability of available data, information, models, algorithms, and systems at AWCI demonstration basins in order to overcome water issues.

Modules available from resource organizations include:

- Data Integration System, quality control (CEOP)
- Global flood alert system, hazard mapping (ICHARM)
- Satellite Data, Mini-projects, Sentinel Asia (JAXA)
- Flood hazard mapping, emergency manage (MRC)
- Floods inundation modeling, rainfall downscaling (UNU)
- Radar rainfall, real-time forecast (Sejong University)
- Flood simulation, dam operation (University of Tokyo)

The location of the training modules is schematically shown in Figure 1.

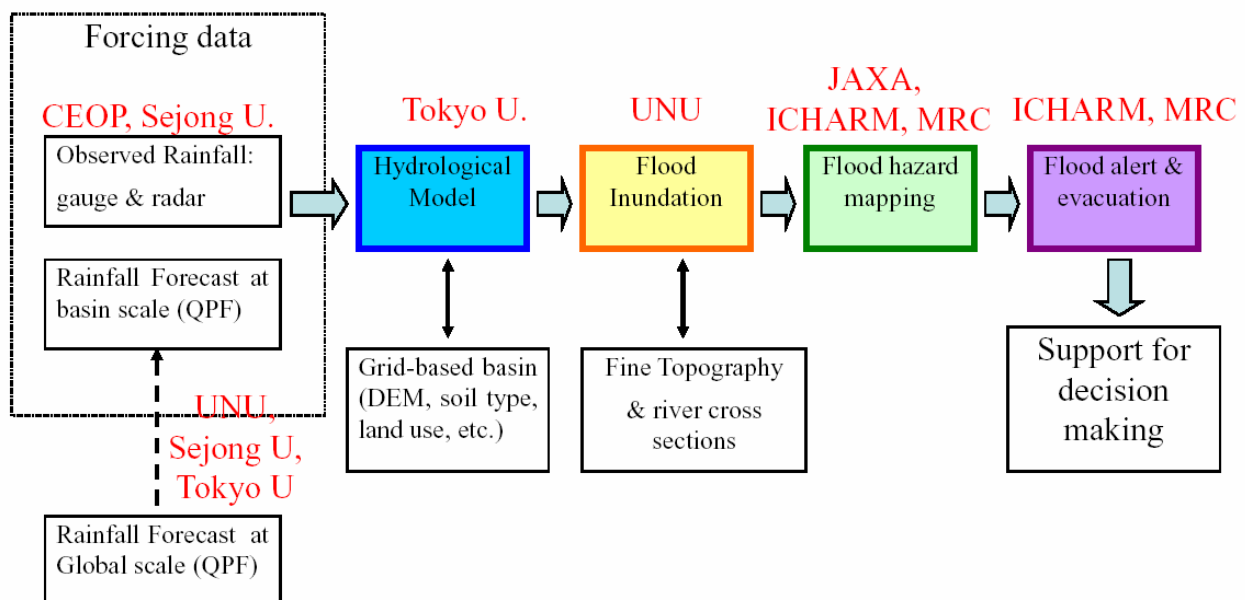


Figure 1: Location of capacity building training modules

In addition, Mr. Ishida introduced present JAXA's Capacity Building Activities for the Asia-Pacific Region that include number of Mini-projects in cooperation with Geo-Informatics Center, Asian Institute of Technology (GIC-AIT).

The next talk, given by **Prof. Srikantha Herath, UNU**, reiterated the guiding principles of capacity development and emphasized that the capacity development program is based on the local needs. The AWCI capacity building activities are closely related to the AWCI demonstration projects and are pursued through the framework of four working groups (Flood, Drought, Water Quality, and Climate Change). Prof. Herath further reported on the UNU capacity building activities, especially training seminars and workshops for scientists and researchers using country data. In support of the AWCI CB program, the UNU group has constructed an on-line repository that contains information on AWCI CB activities including available training modules and is editable by all members. It provides a module information template for organizations to provide information on available training modules. The site is available at: <http://unufms.net:8080/seaside/gcs/AWCI> and countries were invited to propose hosting of workshop or seminar in their country.

#### Breakout group sessions

After the two introductory talks, the breakout sessions on Flood, Drought, Water Quality, and Climate Change took place. The groups were asked to discuss and formulate a concrete proposal for training modules:

Flood WG proposed a workshop to be held at AIT, Thailand, in FY2009 that would last 2 days at least, include GFAS and IFAS, and consider 10 – 20 participants. In addition training on rainfall downscaling with WRF model was proposed for country representatives to be followed by local roving seminar.

Drought WG reported the need to continue the scientific discussion to finalize the details of the proposed drought monitoring study, especially to identify common drought indices. Accordingly, the group proposed a scientific workshop on drought research to be held in the September-October 2009 timeframe that will be followed by a drought monitoring training workshop.

Water Quality WG reiterated its past activities and reported the need of recognition of the water quality issues at "effective level" because without considering water quality, IWRM cannot be implemented. Also emphasized was the need of capacity building at the scientific level and improve water quality monitoring. The group proposed following items for AWCI CB program: (i) identify hydrological models that could be coupled with water quality models, (ii) satellite data for watershed management monitoring, and (iii) an on-going training initiative utilized to help water quality experts to use satellite data.

Climate Change WG was formed at the Beijing meeting in November 2008 and thus outlined its plans that include (i) historical observation data analysis for finding the evidence of climate change and (ii) future projections by GCM outputs from specific greenhouse gas emission scenarios, downscaling and hydrological model applications. The focus will be on assessment of the impact on food security and water cycle. The near future action plan includes work with the flood working group regarding capacity building for the data downscaling; preparation and submission of a project proposal; and workshop on the developed methodology for the climate change and impact assessment.

#### Data Management

This session reviewed the status of the AWCI demonstration project metadata and data submission and also provided a comprehensive guidelines for utilizing the tools designed for metadata and data upload and data quality control that were developed by the University of Tokyo in cooperation with the DIAS project. A good progress has been reported in terms of the demonstration project metadata and data submissions. The current status is summarized in the Table 3 below.

In addition to the AWCI data system detailed introduction and its use demonstration, Dr. S. Malaikrisanachalee presented the Thailand Hydroinformatics System and its development and capabilities. Furthermore, Prof. M. Kitsuregawa gave an overview of the present situation and future prospects of data infrastructure. He introduced "cloud computing" and "elastic services" – newly emerging terms in the IT community and emphasized the importance of data and care of data that has been recognized by scientists and experts in all the fields but still need to be fully appreciated by policy and decision makers.

#### Special Panel Session on "Promotion of Water Quality Study"

This session was planned in order to promote the water quality study within the context of other AWCI activities and was opened by a summary of **Dr. Bilqis Hoque's** presentation from the previous day emphasizing the idea to carry out an integrated study of flood and water quality. After that, **Prof. Hiroaki**

**Furumai** introduced their recent study on Water quality monitoring under dry and wet weather conditions in the downtown of Hanoi city that could be expanded into the proposed integrated study of flood and water quality.

**Table 3: Status of the AWCI demonstration project metadata and data submission**

	Country	Basin Name	Basic Info.	Raw Data Upload		Quality Control		Metadata Initial Registration		Metadata Update	Remarks
			Complete	Ready	Complete	Ready	Complete	Ready	Complete	Complete	
1	Bangladesh	Meghna	09/01/20	09/01/20							
2	Bhutan	Punatsangchhu	09/01/20	09/01/22	09/02/03	09/02/05	△	09/02/05			
3	Cambodia	Sangkaner	08/10/30	09/02/06	△			08/11/04			
4	India	Seonath	08/07/22	08/08/22	○						
5	Indonesia	Mamberamo	09/01/20	09/01/20	○						
6	Japan	Tone	08/10/30	08/12/26	08/12/26	09/01/18	△	08/12/26			
7	Korea	Upper Chungju-dam	08/08/05	08/08/05	08/10/02	08/11/02		08/11/04			
8	Lao PDR	Sebangfai									
9	Malaysia	Langat	09/02/06	09/02/06							
10	Mongolia	Selbe	08/07/22	08/08/22							
11	Myanmar	Shwegyin	09/01/22	09/01/22	○						
12	Nepal	Bagmati	08/11/10	08/11/12	09/01/17						
13	Pakistan	Swat	08/07/22	08/08/22	△						
14	Philippines	Pampanga	08/08/05	08/08/22	○						
15	Sri Lanka	Kalu Ganga	08/08/05	08/08/22	09/01/20						
16	Thailand	Mae Wang	08/08/05	08/09/01	09/01/31						
17	Uzbekistan	Chirchik-Okhangan	08/08/05	08/09/01	○						
18	Vietnam	Huong	08/07/22	08/09/04	○						

YY/MM/DD : Handling Date

 Completely Finished

○ : Full Data provided by offline

△ : Partial Data provided by offline

 Partially Finished

After the introductory talks, the panel discussion took place that focused on the following items:

- Idea on the integrated study of flood and water quality – case study is needed
- Candidate basins

The proposed ideas for the water quality study included:

1. ICHARM has been carrying study on water quality degradation in diminishing water resources that involves distributed hydrological model coupled with a module introducing pollution sources. This model can be used for the AWCI water quality pilot study.
2. WEB DHM developed at the University of Tokyo can also be coupled with a water quality module or the model introduced by Prof. Furumai. A study is already being planned in the Hue river basin in Vietnam.
3. The study should be carried out in the context of water quantity, i.e. flood/normal conditions/drought.
4. Exploration of possibilities to use remote sensing data for water quality issues through enhanced discussion with experts in this field. Remote sensing for inundation mapping.
5. Need to involve more water quality experts from AWCI participating countries to activate the water quality study.

The candidate basin should fulfill the following criteria:

- Longer data record in basin (climatology analysis desirable)
- Reasonable size including urban area (pollution source)

- Flood and drought conditions occurring in the basin
- Hydrological model calibrated for the basin

It was concluded that possible candidate is the Hue river basin in Vietnam including Hue city urban area. It has a reasonable size, hydrological and water quality studies have been carried out and hydrological model has been developed there. The issue may be with the water quality data, additional sampling in the upstream of the Hue city is necessary.

*Closing of the 4<sup>th</sup> AWCI ICG meeting*

**Prof. Toshio Koike**, UT, summarized the meeting including the message from the GEOSS AP Symposium “water” sessions. He emphasized good potential for expanded collaboration between AWCI current activities and Disasters and Climate Change SBAs of GEOSS.

The scientific talks introduced some new findings and advanced tools and methods that could be exploited in the AWCI activities and great interest of participants in these methods/tools was shown in ensuing discussions.

A good progress was reported in the AWCI demonstration projects data and metadata submission and the AWCI representatives expressed their intention to continue in this effort at the same level. They acknowledged the provided explanation and demonstration of the data and metadata upload system and data quality control tools.

The AWCI capacity building program has been developing well and concrete training seminars are being proposed. The on-line repository developed by UNU was found very useful and will facilitate effective planning of CB activities. Several seminars/workshops took place in 2008 and their outcomes were reported. The AWCI working groups are at different level of development and thus have different needs for capacity building programs. These needs were discussed and concrete activities proposed. A possible water quality study in cooperation with other groups was discussed during a special panel discussion and a framework and basic features of such study were proposed.

In his closing remark, **Dr. Douglas Cripe**, GEO Secretariat, acknowledged the progress of the AWCI and its openness to expand collaboration across other GEOSS SBAs. He highlighted that the AWCI organization, approaches, and activities are fully in accord with the GEO principles and as such has full support of the GEO Secretariat.

In conclusion, particular steps were proposed to step forward that include:

- Countries and organizations will submit proposal on the targeting topic(s)
- A three-day workshop will be held to discuss:
  4. Sharing Societal Needs, Scientific Ideas, Observation Capability, Modeling Capability, Experiences
  5. Seeking Data Sharing Possibility: Data Policy, Meta Data Generation and Data Infrastructure
  6. Establishing Cooperation Framework under GEO
- Forming a Task Team for drafting an Implementation Plan
- Discussing the draft at the 4<sup>th</sup> GEOSS AP Symposium