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### Title

Information Infrastructure for Publishing and Integrating Water Resource Data from Pacific Rim Universities in Support of Hydrologic Modeling and Integrated Water Resource Management

### Permalink

<https://escholarship.org/uc/item/3dj2f5mt>

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### Publication Date

2010

# **Information Infrastructure for Publishing and Integrating Water Resource Data from Pacific Rim Universities in Support of Hydrologic Modeling and Integrated Water Resource Management**

## **Final Report**

The project has been conducted between Spring 2009 and early 2010. Its main goals have been building capacity of Pacific Rim University partners in publishing and analyzing local water data, configuring a Hydrologic Information Server installed at a local partner university, and developing information sharing capability and expertise in a way that is sensitive to local data sharing and publication practices and available resources.

The goals of the project have been accomplished. Its main outcome has been an international workshop "Hydrologic Data Management and Modeling in South East Asia", conducted at University of Malaya, July 20-24, 2009, and accompanying presentations, server configuration and installation and local data publication efforts.

The activities under this project have been conducted as part of the Hydrologic Data Management and Modeling thrust of the Climate Mitigation and Adaptation (CMAS) project. The international workshop mentioned above was organized with seed funding from the UCSD SSI program (this project), and additional funds contributed by University of Malaya (covering local arrangements and the workshop server), and by the UNDP Cap-Net program (covering travel of SEA participants, and Dr. David Pierce, UCSD, an expert on global climate change). UCSD, University of Malaya and several other universities are partners in the CMAS project, which is conducted under the aegis of the Association of Pacific Rim Universities (APRU).

The workshop focused on three main topics:

- Hydrologic data management and sharing, using CUAHSI Hydrologic Information System (presentations and hands-on);
- Introduction to hydrologic modeling with GeoHMS (presentations and hands-on);
- Introduction to global climate change modeling (presentation).

In addition, the workshop included presentations from each participating country on local water resource management challenges and climate change, and a day-long field trip to water management agencies in Kuala Lumpur.

The workshop was presented to a group of 25 participants from all over South East Asia (Malaysia, Indonesia, Vietnam, Philippines, Myanmar, Laos, Mekong River Commission – the list of participants is attached). The CUAHSI HIS part was an intense two-day training on hydrologic data management and sharing, with a combination of presentations and hands-on exercises. The two days of CUAHSI HIS were followed by a day-long field trip to several key water management agencies in Kuala Lumpur, and another two days which

included introductions to climate change modeling and GeoHMS, and a general discussion of data sharing opportunities (the workshop agenda is attached)

As a result of the workshop, a hydrologic data sharing server was setup at the University of Malaya. The server already hosts 5 datasets contributed by workshop participants, for three SEA countries. The plan is to make it a water data sharing node serving the SEA region, and cultivate a group of data managers from different countries who would collaborate on standards-based publishing of hydrologic data. University of Malaya is in the process of installing a data manager who will be responsible for maintaining datasets contributed by project partners.

Below, we summarize the lessons learned, and potential efforts needed to sustain and further develop this activity:

- It is important to make sure that the workshop is not a one-off event, but a component of a long-term strategy aimed at (1) development of local expertise and capacity in hydrologic data management and modeling, (2) creation of data sharing infrastructure where hydrologic data from multiple partners can be published in a consistent standards-based form, (3) cultivation of a community of interested users who would further promote the data sharing and modeling infrastructure, (4) support of scientific connections between CMAS partner universities .
- To sustain workshop outcomes, the following actions are undertaken by workshop organizers: (1) a data sharing server is established at University of Malaya, supported by a dedicated “data manager” whose job description includes management and publication of hydrologic data, (2) a discussion group is established, where workshop participants can exchange ideas, data, and software for hydrologic data management and modeling of climate change. For longer-term sustainability, a Sustainability Support Center (SST) model may be appropriate. A network of such centers is envisioned, with each center responsible for: (a) collecting, archiving and sharing sustainability-related data, via agreements with local governments and other data collectors; (b) assembling, comparing and tuning local and regional hydrologic and climate models; (c) downscaling global climate models; (d) calibrating remote sensing data with local ground observations; (e) making the model results usable in local decision-making context, and (f) local capacity-building. Such SSCs will serve as regional data sharing and modeling hubs and as collaboration bridges to international development agencies and sustainability research centers.
- A better linkage is needed between the three components of the workshop: global climate modeling, local hydrological modeling (e.g. with GeoHMS) and hydrologic data management. For this purpose, in preparation to future workshops some local data shall be prepared, which can be later exposed in each section of the workshop

- It would be important to connect the climate change, hydrologic data management and sharing, and hydrologic modeling material, with specific mitigation efforts in each country: issues of flood management and forecasting, water quality and sanitation, governance, and other issues considered by CMAS. Country reports presented during the workshop would be useful to consider from these angles – perhaps at the next CMAS meeting.
- Workshop materials are available on the web (<http://spatial.sdsc.edu/lab/tabid/106/Default.aspx>) , and can be used in other CMAS activities, and in future workshops in other cities in the area (the number of participants at this workshop was limited to 25; as a result several participation applications had to be rejected.)
- Participants in the workshop included a mixture of modelers and data analysts, from climate change researchers to heads of government water information departments. While it was important to bring these groups together, participants with different background would benefit from customized content. It may be useful to do hands-on exercises differently for different types of participants (e.g. separately for modelers and for data managers).
- Discussion and extensive communication between workshop presenters and participants was very important. As a result, many common issues were identified, and we received a lot of interesting feedback, in particular about local data collection and sharing constraints, and modeling needs.

Financial support from Cap-NET, UCSD and University of Malaya is gratefully acknowledged, and so is intellectual leadership and contribution from CMAS project participants.

In addition to the workshop, Zaslavsky gave a talk at the Department of Irrigation and Drainage of the Malaysian government ([http://geo.sdsc.edu/ilya/presentations/cuahsi/ppts/DID\\_presentation\\_July24\\_iz.pptx](http://geo.sdsc.edu/ilya/presentations/cuahsi/ppts/DID_presentation_July24_iz.pptx)), and submitted a project proposal to GEO directorate for additional funding (the proposal is in the attachment).

Web sites and URLs reflecting project outcomes:

1) The SEAHydro server installed at the University of Malaya:

data discovery part: <http://seahydro.um.edu.my/search/>

data registration part: <http://seahydro.um.edu.my/hiscentral/>

2) All workshop materials (Powerpoint presentations, exercises, country presentations) are downloadable from <http://spatial.sdsc.edu/lab/tabid/106/Default.aspx>.

3) The workshop page on the AWI-CMAS page: [http://awi-cmas.com/Wiki/doku.php?id=wiki:international\\_workshop\\_on\\_hydrological\\_modelling\\_-\\_july\\_2009\\_-\\_kuala\\_lumpur](http://awi-cmas.com/Wiki/doku.php?id=wiki:international_workshop_on_hydrological_modelling_-_july_2009_-_kuala_lumpur)

4) Additional photographs from the workshop are available at [http://picasaweb.google.com/zin.work/Malaysia\\_workshop?authkey=Gv1sRgCI6zrb2M2-2IKQ#](http://picasaweb.google.com/zin.work/Malaysia_workshop?authkey=Gv1sRgCI6zrb2M2-2IKQ#)

Ilya Zaslavsky, 5/25/2010

### **Appendices.**

1. The list of workshop participants
2. The workshop agenda
3. Phase 1 proposal submitted to GEO directorate reflecting the ideas of the project