

CUAHSI Education and Outreach Committee 2011

Report to the Board of Directors

11 July 2011

Chair: Benjamin L. Ruddell, Arizona State University

Board Liaison: David Freyberg, Stanford University

Members: Beverley Wemple, University of Vermont

Mark Green, Plymouth State University

Christina Tague, University of California – Santa Barbara

Tony Berthelote, Salish Kootenai Tribal College

Diana Dalbotten, University of Minnesota/NCED

Background

Initial Meeting: May 16, 2011. Present: Ruddell (Chair), Wemple, Green.

Second Meeting: June 30, 2011. Present: Ruddell (Chair), Wemple, Tague, Freyberg (Liaison).

Report Review: July 2011. All committee members.

1. Introduction

This is the report of the 2011 CUAHSI Education and Outreach (EOC) Committee to the CUAHSI Executive Committee. In 2011, the CUAHSI Executive Committee charged the EOC with *three specific tasks*:

1. Review and prioritize three currently funded CUAHSI educational activities,
2. Review and prioritize several proposed new educational activities, and
3. Review the Scope, Strategy, and Goals for the CUAHSI E&O program for the next three years.

We will begin by reviewing the CUAHSI Strategic Plan for Education and Outreach for its scope and responsiveness to the community's E&O needs and the National Science Foundation's criteria, and then proceed to review existing and proposed new E&O activities to establish priorities and evaluate the activities with respect to the strategic plan.

2. Review of the CUAHSI Strategic Plan for Education and Outreach

The mission of CUAHSI as a community-based science organization is fundamentally educational, so the Education and Outreach strategy is at the core of CUAHSI's priorities. The bulk of CUAHSI's energies are directed toward improving science and society by educating both the *public*, about hydrologic issues, and the *scientific community*, about data resources and community-based research opportunities. The CUAHSI mission statement emphasizes six broad strategic objectives for the consortium:

- a. Hydrologic research infrastructure,
- b. Access to data, information, and models,
- c. Collaborative community-based research and observations,
- d. Facilitating interactions among water researchers,
- e. Promoting water science education, and
- f. Translating water science into effective water management and policy.

Each of these emphasis areas requires effective Education and Outreach activities, with the possible exception of (a). Therefore, CUAHSI's E&O activities should combine to address each of these emphasis areas in CUAHSI's mission. The CUAHSI strategic plan identifies several *strategic objectives for its E&O activities* in order to achieve its mission; these are summarized below:

1. Host and organize (hydrology) learning materials for all education levels
2. Support member university workshops for local science teacher training
3. Survey, document, and articulate national needs for education on water science and sustainability
4. Participate in international capacity-building activities in water science
5. Build an online directory for access to local water experts
6. Provide training for water scientists to communicate more effectively with the public and with policy makers
7. Raise public awareness of water issues by communicating scientific findings

The EOC's consensus on these E&O strategic objectives is that they are all fundamentally sound and worthy of pursuit by CUAHSI. The committee also observes that these strategic E&O objectives tend to emphasize certain parts of the CUAHSI mission, especially (e) promoting water science education and (f) translating water science into effective action, over the first four components of the CUAHSI mission. This is probably intentional, to the extent that other CUAHSI and CUAHSI-related activities are providing attention to those parts of the mission. By this we specifically refer to the Hydrologic Information System project which emphasizes data and models, the AGU and annual CUAHSI meetings which promote interactions, and the various CUAHSI-promoted observatory and synthesis projects which promote community-based research and observations. The EOC further observes that some of the existing and proposed E&O activities appear to emphasize the broader CUAHSI mission in addition to the explicitly stated E&O strategic objectives. This is a good thing, but it may also result in mis-prioritization of activities that emphasize education in the area of, for example, modeling and data, which is part of the CUAHSI mission but is not explicitly recognized as an E&O objective. At the Executive Committee's discretion, it may be worth considering additional E&O strategic objectives that address education and communication to the hydrology science community regarding data and models, collaborative research and observations, and opportunities for interaction. In other words, we suggest that the Executive Committee reconsider the scope and definition of the E&O activities to specifically include educational objectives addressing all aspects of the CUAHSI mission statement.

The EOC notes that some of the E&O objectives are not currently being addressed by any funded E&O activities; for example, international capacity building in water science. However, this does not mean that CUAHSI is neglecting these objectives. In most cases, it appears that another part of the CUAHSI organization, or the activities of its member organizations, is explicitly addressing these E&O objectives. We suggest that a new category of activity be created- an "affiliate" category, perhaps- which represents an E&O activity by CUAHSI members that addresses CUAHSI's E&O objectives, but which does not receive funding through CUAHSI.

In the activity review section to follow, we highlight the CUAHSI E&O objectives that appear to be addressed by each existing or proposed activity. The EOC suggests that future proposed activities be required to specifically enumerate and explain which E&O objectives are being addressed by the proposed activity.

3. Review of Existing and Proposed Activities

In this section the EOC provides a brief review and priority-ranking for each of the existing and proposed CUAHSI E&O activities. We were not asked to consider funding or other practical constraints, but rather

the *objectives* and *outcomes* of the activities relative to CUAHSI's E&O objectives. We were also charged with prioritizing activities that can be strongly evaluated according to the National Science Foundation's criteria for services funded through CUAHSI, listed as follows. Is it necessary? Is it provided by other entities? Is there community consensus that this service is the most important and high-demand service? Does the service fit the overall strategy? Can the costs of the service leverage other NSF or external investments? Can the service be sustained after NSF funding ends? Each of these NSF criteria, along with the objectives and outcomes relative to CUAHSI's E&O objectives, are considered in the review and ranking of the activities. The EOC concludes each review with its recommendations and a rating of "1", meaning the activity should be pursued, "2", meaning the activity should be pursued if important changes are made, or "3", meaning the activity should not be pursued by CUAHSI as an E&O activity.

3.1. Review of Existing Activity: Cyberseminars

Overall, this is a highly successful program. The EOC was very surprised to see how many downloads and "hits" are associated with each cyberseminar; several thousand hits per event. The cost has recently been reduced, which is a plus for financial sustainability. This is CUAHSI's best activity currently for training and educating water students and researchers on important and current science topics, and is also useful for fostering interactions between researchers.

The EOC recommends that the Cyberseminars continue as they are. We suggest that more general cyberseminars be developed for new audiences and topics; perhaps this could be done to also serve the "Talk" activities with short expert videos.

EOC rating: "1", highly recommended.

3.2. Review of Existing Activity: Pathfinder Fellowships

The EOC's overall impression of the Pathfinder fellowships is that they are a promising and successful program, but that there has not yet been much feedback after two years of program operation. Two classes of students have passed through the program to date. There have not been a large number of applicants to the program, but there have been sufficient applicants to make the targeted 4 to 6 awards in both years to highly qualified and worth projects. An initial round of reports from 2009 participants provides an initial indication that these students had successful experiences. This program addresses

international capacity building, facilitates interactions between researchers, and use of community research and observation facilities.

The EOC recommends that a significantly greater effort be made to advertise the Pathfinder program by getting it on CUAHSI-member university graduate funding listservs. Specific recommendations for wide-visibility listservs include Ecology serv, the COS servers (www.cos.com), and the listserv of the Gilbert Club, organized through UC Berkeley and distributed to a wide-list of users in surface processes and hydrology (<http://eps.berkeley.edu/gilbert/gilbert.htm>). One or two more classes of students will provide the basis for a more comprehensive evaluation of the program- perhaps in another three years. Phone calls and interviews with participants and advisors could be a good basis for such an evaluation. The committee also discussed the need to better articulate the goal of the Pathfinder fellowships to applicants, in particular the emphasis on site visits and travel that would enhance an existing research project by adding data/observations from additional site(s). Adding examples of successful applications, testimonials, and follow-up reports to the CUAHSI website would help promote the program. An effort should be made to reach out to fellowship programs in parallel research communities- perhaps EPA, NASA, LTER, NCAR, NEON, and other graduate fellowship programs; the scope might be explicitly expanded to promote hydrology students working at non-hydrology sites and non-hydrology students working at hydrology sites.

EOC rating: “1”, highly recommended.

3.3. Review of Existing Activity: Let’s Talk About Water

The EOC generally agrees that this is a high priority activity, and that it reaches out to a very different and much more general-public community than all other activities. It addresses most of the E&O strategic objectives, particularly those related to public science communication, access to local water scientists, addressing public policy, training science teachers, and training water scientists on public communication.

The EOC recommends that any CUAHSI-led “Talk” events be refocused on high-impact, politically meaningful, “strategic” events that are likely to get greater press coverage and political attention. CUAHSI should otherwise possibly concentrate on the development of “how-to” and training materials for how to pull off a successful “Talk” event, on advertising the “Talk” model to its partners, and on using its network to help secure the right water experts, science teachers, public officials, etc.- rather than spending its scarce resources to make a large number of “Talk” events happen. There are many lecture series’, school events and classrooms, and public forums that are always looking for events and CUAHSI should let them carry the burden of organizing the events. This strategy could significantly increase CUAHSI’s overall impact. The “Talk” program is a likely target for external funding, and this

should be actively sought. One final idea is that CUAHSI could organize a “road show” taking the event on a national tour to reach audiences not commonly reached by water science. The committee felt the “Talk” program is an activity that extends CUAHSI’s activities to an audience (largely undergraduate university students) that is not widely reached through the consortium’s other activities, and that CUAHSI might consider pursuing funding through the Division of Undergraduate Education to develop this activity further.

EOC rating: “1”, highly recommended.

3.4. Review of Proposed Activity: CUAHSI services to promote learning about water

This activity proposes to provide an online environment, or “Portal”, for hydrology learning. This is a worthy goal and objective, but the EOC is concerned about recommending this proposal to the Executive Committee for multiple reasons. First, this will be an expensive and time consuming project. Second, conversations with the NSF have revealed that the NSF is not prioritizing more portals at this time. Third, there is growing awareness that portals are often difficult to make successful, due to a lack of community interest and participation; there is insufficient evidence that there is a demand for this service, and it is therefore unlikely to achieve its stated outcomes. Finally, the service already exists in multiple forms; CUAHSI has a website where it can advertise essential resources, there are multiple nonprofits devoted to water information, the MOCHA, WaterHUB, and other CUAHSI-affiliated efforts. The EOC notes that the SERC at Carleton College (which is a pathway to the National Science Digital Library) provides an excellent hydrology education dissemination system. Because of these factors, the EOC recommends that CUAHSI attempt to disseminate hydrology education materials and information through its existing website, partner websites, and dissemination systems like SERC before putting significant resources toward a new type of service.

EOC Rating: “3”, not recommended.

3.5. Review of Proposed Activity: Educating hydrologists on hydrologic modeling

This activity proposes to create a forum and curriculum materials to teach about hydrology modeling. This would address the E&O objective of providing learning materials, especially at the University level. The EOC notes that there are two separate issues here: one of general modeling skills and conceptual hydrology modeling education, and a separate issue of specific model and software tutorials. The former should be addressed through existing programs (e.g. MOCHA). The latter is definitely an important and

worthy subject for CUAHSI's attention, and is an area of great need in the broader community. A number of models could be used to do this type of training: NSF funded workshops (workshop funding is under-utilized), cyberseminars, webinars, "instrumentation-workshop" type events with expert and site instructor support, published web videos and tutorials, etc. CUAHSI could support these events by providing competitive solicitations and small amounts of travel support for (a) the experts and instructors to get together to develop these materials, for (b) the presentation of these materials for other instructors to utilize in their modeling courses and research groups, and for (c) the gathering of groups of graduate students to learn specific modeling skills. However, the committee notes that there are already significant efforts underway on this topic which should be leveraged rather than duplicated. A newly NSF-funded project at Purdue led by PI Venkatesh Merwade is known to the committee and focuses on the topic of hydrologic model education, and there is an ongoing project on the Water/Hydro HUB by CUAHSI members which aims to organize and disseminate hydrologic models. With further development that includes more details of implementation of the training component of the activity, and that specifically incorporates and leverages the existing hydro modeling efforts (e.g. Purdue, MOCHA, WaterHUB), this is definitely an activity that CUAHSI should be pursuing and funding.

One possible "pilot" program, that could be done in the short run, would be a cyber-seminar education series around principles of hydrologic modeling. The idea would be to recruit eminent, accomplished hydrologic modelers and ask them to give a one hour cyber-seminar that would be appropriate for a first year grad student. The talk may focus on a particular model or type of model, but we would be looking for a more "visionary" type talk where they share their wisdom, experience, and general concepts or philosophy of hydrologic modeling. This might be a start to creating more comprehensive model education or tutorial programs, and could be a valuable resource for graduate students and their advisors, as well as an interesting seminar series for the broader community. It could be archived, and be a long-lived resource.

EOC Rating: "2", recommended with changes.

3.6. Review of Proposed Activity: Early Career Workshops

The Consensus of the EOC is that Early Career Workshops, while an important activity, are already being provided in many forms to the hydrology community. It is essential for early career hydrologists to get out of their departments to national meetings, but once there these hydrologists have ample opportunities for interaction. The AGU and other organizations provide this type of opportunity. An alternative is that CUAHSI could hold a lunch session at the Fall Meeting of the AGU, for networking purposes. Or, CUAHSI could make an effort to include at least one early career scientist in its other E&O activities such as cyberseminars.

EOC Rating: “3”, not recommended.

3.7. Review of Proposed Activity: Research Experiences for Undergraduates

The NSF has recommended that CUAHSI develop an undergraduate research experiment program, and the E&O committee has been asked to comment on this. The EOC is strongly supportive of this suggestion. We recommend that the planners of the project carefully consider existing models from parallel projects to CUAHSI, to learn about how this type of REU can be most successfully advertised, organized, and intergrated with existing research projects. We further recommend that very careful attention be paid to the difficult problem of aligning short-term encapsulated undergraduate research experiences with what are often much longer and differently-paced hydrology modeling and observation experiments. Hydrologic science data collection and modeling often takes multiple years at a relatively slow and episodal pace of field work, and can be challenging to integrate with a short term research experience for this reason. The EOC recommends moving ahead with the pilot project with the highest level of priority.

3.8. Summary of Rankings of Existing and Proposed Activities

The EOC’s consensus ranking of priorities for the existing and proposed activities which are recommended to CUAHSI are as follows.

1. Cyberseminars (rated “1”)
2. Pathfinder Fellowships (rated “1”)
2. Let’s Talk about Water (rated “1”, tied with Pathfinder in rank)
3. Educating hydrologists on hydrologic modeling (rated “2”)

Research Experiences for Undergraduates (has a separate funding source, so is unranked)