

## Key Lessons Learned from the Masters Degree Program in Water Resources Planning and Management

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The need for practical inter-disciplinary approaches to water resource management has never been greater in the U.S. as it faces major challenges, ranging from an aging water infrastructure, to increased demands for water usage from competing sectors, to a greater incidence of coastal storm and inland flood events. As with flood damage reduction, navigation or environmental rehabilitation projects are no longer devised with a single objective in mind. Similarly, the stakeholder community has expanded appreciably in recent years, necessitating a professional staff not only technically skilled, but also able to effectively interact with diverse and often competing interests. However, as Kirshen et al., (2004) suggest, the design and execution of integrated, multidisciplinary curricula faces significant hurdles (see Russell in this issue).

Planners from resource agencies such as the Corps of Engineers and the Bureau of Reclamation traditionally receive their academic training within a single discipline, such as civil engineering or ecology, thus limiting their exposure to other critical areas that today's projects entail. Recognizing the challenges they faced with multi-objective planning, combined with a loss of senior planners largely due to attrition, the Corps' leadership established a task force (USACE 2001) to make recommendations for strengthening expertise throughout its planning community. The resulting Planning Excellence Program included the development of the Corps' Master's Degree Program in Water Resources Planning and Management (Masters Program).

The Master's Program, which was formed in partnership with the Universities Council on Water Resources (UCOWR), was unique in its emphasis

on inter-departmental curricula. Seven "core" courses were identified to ensure that prospective students were exposed to the varied topics of economics, law, hydrology, engineering, ecology, and participatory planning (UCOWR 2001). A capstone seminar was envisioned to integrate the disciplines through practical test cases. After soliciting interest throughout the UCOWR network, it was determined that five separate universities were equipped and receptive to participating in the program. They were not only willing to promote an inter-disciplinary degree program, but also to waive some of the on-campus residency requirements. The universities eventually agreeing to participate were the University of Florida, the University of Arizona, Southern Illinois University, the Johns Hopkins University and Harvard University.

At the time the program was devised, the Corps had ample training programs to which interested students within the Corps were encouraged to apply. Unfortunately, by the time the Master's Program was launched in 2002, those targeted training budgets were either terminated or significantly curtailed. The resulting loss of centralized training opportunities meant that the individual Corps districts would, in large measure, have to fund their students within their own budgets. The end result was a much lower level of applicants than expected. Consequently, the training model that seemed to have all the right ingredients thus far appears to be unworkable, given the loss of application incentives. This meant that the universities that helped create the program were required to devise their own means to keep their respective programs viable. The University of Arizona, for example, has appealed to regional organizations outside the Corps as a means to attract students, while the

University of Florida has maximized the use of distance learning.

In an attempt to bolster the program, a survey was conducted in the summer of 2006 under the auspices of the American Water Resources Association. It was carried out to solicit viewpoints from academicians and practitioners alike on how best to design and implement an integrated education program to meet water manager needs. The results of that survey were published later that year (Bourget 2006) and will not be duplicated here other than to suggest that the notion of integrated water resources management, along with any related training, remains fairly elusive. A study conducted previously at the Institute for Water Resources (Cardwell, et. al. unpublished) likened IWRM more to a process than an achievable goal, and the survey results seemed to mirror those sentiments.

Although respondents were largely dissatisfied with the standard “stove-piped” academic training, the various solutions offered for improvement tended to conflict. The argument over the importance of engineering versus the “soft” sciences clearly persists. Further, there was no clear indication in the responses as to which department (engineering, geography, economics) if any should assume the lead role in managing an inter-departmental program of this nature (see Russell in this issue).

A panel to discuss the survey results was convened in conjunction with AWRA’s 2006 annual meeting. Session participants reemphasized the importance of training within practical job settings. It was felt that IWRM was best realized within a teaming arrangement where diverse experts could focus on a common problem set. There was consensus that training guidelines would be helpful and best developed by a mixed group of academicians and field practitioners.

Cross-disciplinary training is clearly needed, but it is clear that there is no “one size to fit all” in the equation. Since the launch of the Corps’ Master’s Program, other universities have launched integrated water resources degree programs. Several survey respondents, however, suggested that many of these programs are struggling and need further incentives in order to survive. Based on the lessons learned thus far, the following considerations are offered as possible means of

achieving sustainable inter-disciplinary training programs.

**Distance Learning.** Distance learning has been met with mixed reactions. Many respondents to the questionnaire felt that it was simply not suited to the water resources field of study, stating that there is no substitute for on-site lab and field work. Universities must also make sizable up-front investments for viable distance learning programs. On the flip side, however, for the working professional who travels frequently, has a demanding job, and limited access to accredited universities, distance learning may be his or her only option for pursuing graduate studies. Further studies on the effectiveness of distance learning and its start-up and maintenance costs are warranted.

**Targeted Partnerships.** There are readily identifiable water resource issues being addressed at both a regional level (Florida Everglades, post-Katrina recovery) and a thematic level (coastal zone management, drought management, adaptive management) that would, in all likelihood, benefit from strategic partnerships focused on advanced studies. The goal in this case would be to target grant-based graduate studies that address specific problems through directed public-private-academic partnerships or other means.

**Certification Programs.** For those individuals who already possess advanced degrees or are simply not interested in pursuing a graduate degree, there is the option of developing professional certification programs geared for water resource practitioners. Short courses on IWRM are presently being developed through a partnership with IWR, UNESCO-IHE and other academic centers of expertise. Although these are largely geared for other countries, these courses could also serve as the basis for establishing a national certification program. Non-profit organizations such as the Environmental and Water Resources Institute, UCOWR and AWRA could act as honest brokers for advancing a U.S. certification process.

**Training and Educational Guidelines.** The UCOWR paper “Development of a Curriculum for a Masters Degree Program in Water Resources Planning” (UCOWR 2001) was developed in partnership with the Corps. Survey respondents and the subsequent AWRA panel audience expressed the

needs both for developing training and educational guidelines for the field of IWRM. This paper could serve as an excellent starting point for developing those guidelines and targeting certificate programs through the doctoral level. A new panel of diverse experts would need to be convened to re-scope this document, and tailor it towards a wider group of water resource practitioners.

In summary, the Corps' original program was devised under the assumption that a streamlined, inter-disciplinary curriculum, targeting the master's degree level student, would naturally attract a constant student base. To date, that has not been the case in viewing the program as a whole. In spite of the recent setbacks in training budgets, the original vision for the program remains intact and has grown in importance in the wake of events such as Hurricane Katrina, the results of which emphasize the importance of system-wide water resources planning and management. A great opportunity remains to reshape the program, designing it in a more flexible manner in order to attract a broader array of students and universities.

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