

Collaborative Tools and Processes for US Water Solutions

Summary

The about-to-be released SWAQ report, *A Strategy for Federal Science and Technology to Support Fresh Water Availability and Quality in the United States*, surveys the challenges facing the United States today and recommends federal research towards developing collaborative tools and processes for solutions to US water problems. Upon further consultation with experts from this area across the federal water establishment, this proposal refines that recommendation by proposing that the SWAQ promote a coordinated federal initiative to ***develop and advance the integration of computer based modeling tools within multi-stakeholder public decision processes for US water solutions***. Components of the proposed initiative include: A review of current uses and programs focused on the use of “collaborative decision support tools”; development of a framework for evaluation of the effectiveness of combinations of various computer tools and collaborative interventions across of range of water problems and settings; and targeted “pilot” or “demonstration” projects, or even “experiments,” that can be explicitly designed to be studied and evaluated with the intent of developing recommended approaches and methodologies. The initiative will directly and concretely address the *government-wide emphasis on increased use of collaborative processes*, and both *assist state and local governments* and *support existing federal water management* roles. Federal agencies are well-positioned to conduct and coordinate interdisciplinary research, and this initiative will provide the efficiency of a central focus for research and knowledge and provide unified direction and consistency over time. Results of the initiative will include focused interagency research on the needs for collaborative problem solving of water problems, coordinated development and dissemination of principles and best practices for effective combination of modeling and multi-stakeholder public processes, and, ultimately, reduced level of water conflict through more broadly-acceptable, timely and sustainable solutions.

What is the Problem? What’s the Objective?

Persistent conflict among competing interests and needs is increasingly common in water resources management. Too frequently, conflicts bubble outside of the control of water managers, as individuals illegally open irrigation gates, groups organize mass demonstrations to reject privatization of water services, and states sue each other over water withdrawals. At best major water resources decision-making results in gridlock, or a protracted, inefficient, litigious decision-process that takes too long, costs too much, and leaves us without broad consensus on the decisions. These conflicts occur because of both the complexity and uncertainty in the natural systems and the conflicting interests and values across individuals, and groups. We know water managers need technical information to identify and evaluate solutions to water problems, but federal, state and local water managers also need to engage a broad range of stakeholders for those same tasks – eliciting a broad range of values and local knowledge to collaboratively identify and judge potential solutions. They need to better understand how to develop trust in both the analysis and in the process for decision making. To do that will require an understanding of process skills like facilitation, negotiation and alternative dispute resolution. And it will require a better understanding of how to integrate the technical analysis of water problems into decision making processes for *public* resources that involve multiple stakeholders. How can water managers work with stakeholders and technical information to jointly structure the problem definition and identify realistic solutions? Modelers will need to modify existing technical tools, and practitioners will need to modify how these tools are used to interact with stakeholders. Water managers need to understand how to best

involve stakeholder groups – not just once but through a longer term process of engagement - in discussions of impacts of different management alternatives, of risks and potential consequences.

Previous efforts demonstrate the value of applying technically-informed collaborative planning and management methods. These methods involve open, collaborative decision-making processes, supported by transparent computer models. Presently, small communities of practitioners are working on such methods, often independent of each other and with limited sharing of knowledge and techniques. Occasionally, agencies have modeling capabilities that are used in aiding negotiations, but very few agencies have the capacity for near real-time development of appropriate and useful decision support tools for envisioning and evaluating options.

To help water managers at all levels integrate the technical issues within collaborative processes for US water solutions, we urge SWAQ to endorse and support a federal initiative whose objective is to *develop and advance the integration of computer based modeling tools within multi-stakeholder public decision processes for US water solutions*. Researchers from across the federal government will need to be engaged, across social sciences, ecology, hydrology, and other disciplines.

What Current and Recent Activities Coordinate this Effort across Multiple Agencies?

Very limited formal interagency activities exist to exchange ideas and facilitate integration of computer based modeling tools within multi-stakeholder public decision processes. In part this is because the research requires skills from an array of disciplines that do not have joint annual meetings or established fora for interaction. Although the advances in computer software and increasing requirements for public access to and openness in the technical analysis have led many individual researchers and practitioners to meld the use of computer tools with collaborative processes, in most cases researchers have not been connected to exchange information and experiences. Below is a description of some of the known examples of efforts to coordinate research across multiple agencies.

- The US Institute for Environmental Conflict Resolution is a federal focus for collaborative processes for environmental problems. A recent (2005) USIECR conference had a few presentations and one session on integrating computer modeling into the decision process. USIECR's connection to the "process" community is a valuable asset to bringing together process people and modelers to jointly craft the integration of computer based modeling tools within multi-stakeholder public decision processes.
- The Bureau of Reclamation recently (2005) sponsored a forum on institutional and collaborative approaches to water solutions. While primarily focused on BuRec, representatives from the US Geological Survey, U.S. Army Corps of Engineers, DOE labs, and universities attended the meeting. BuRec is presently working with the USGS's MIT-Science Impact Collaborative program on integrating stakeholder processes with transparent decision support tools in a southeastern Colorado basin.
- The Executive Order on Cooperative Conservation (2004) and the CEQ/OMB Joint Memo directed agency heads to increase "appropriate and effective" use of environmental conflict resolution and collaborative problem solving approaches. This effort is focused broadly on collaborative approaches and not specifically on linkages between computer tools and public multi-stakeholder processes.
- The Federal Interagency Hydrologic Modeling conference is an interagency forum that brings together modeling experts from across the federal government. Currently the conference focuses on technical presentations, but it may be an appropriate venue to sponsor a track that would emphasize the integration of multi-stakeholder processes with the modeling tools.
- In 2006, the U.S. Army Corps of Engineer's Institute for Water Resource and DOE's Sandia National Laboratory began collaborating on demonstration projects, and have proposed a interagency center on Computer-Assisted Dispute Resolution. The vision of the center is to bring together multiple federal,

state and academic partners to focus on computer assisted dispute resolution techniques, through training, methodological development, and technical assistance on water problems. A June 2007 symposium on Computer Assisted Dispute Resolution for water solutions is being planned with the emphasis on practitioners from Federal and state agencies.

- Internet-based resource networks such as the Ecosystem-Based Management Tools Network, The Global Water Partnership's ToolKit, Desert Research Institute's Center for Advanced Visualization, Computation and Modeling (CAVCaM), and the Ecosystem Management Decision Support (EMDS) are increasingly available for use by the public as well as scientists and managers for integration into public multi-stakeholder processes.

We caution that many of these efforts focus on one aspect of the problem (e.g. ecosystem modeling, or primarily the collaborative processes research). The examples of interagency coordination of research that explicitly link the use of modeling within public multi-stakeholders processes are very limited. Furthermore, the interaction is frequently peer-to-peer or focused on a specific water problem (e.g. Everglades restoration) without a more comprehensive look at ongoing federal research and needs.

How Can We Enhance Coordination of Existing Efforts?

The examples summarized above demonstrate that there is ongoing development of collaborative decision-making tools, but this development is sporadic, and often agency-specific. The following measures using existing mechanisms may bring focus to activities across the federal research establishment and identify specific research needs and opportunities for evaluation of tools and techniques. Building on the activities identified above, we recommend the following actions:

- Develop a track on integrating computer modeling into the public decision processes at the next USIECR conference (2008).
- Develop a similar track within the Federal Interagency Hydrologic Modeling conference.
- Identify ways within the Cooperative Conservation Initiative to promote linkages between computer tools and public multi-stakeholder processes.
- Use the upcoming June 2007 symposium on Computer Assisted Dispute Resolution to focus on research needs and opportunities for demonstration programs.
- Develop agreements (MOUs) to support a federal interagency center for Computer-Assisted Dispute Resolution. Use the center to coordinate research and demonstration projects, and provide linkages to tool boxes and references.

What Might Be Major Initiative Components?

To move beyond the important stage of sharing experiences and advances, a combined federal initiative will bring focus to specific research questions and identify needs, capabilities and opportunities (for pilot studies, etc) across federal agencies. The components of such an initiative would include:

1. *A review of current uses and programs* focused on the use of “collaborative decision support tools” in water problems with a focus on the integration of computer-based tools with collaborative process design. Highlight successful illustrative case examples.
2. Development of a *framework for evaluation of the effectiveness* of combinations of various computer tools and collaborative interventions across of range of water problems and settings. Scholars have developed methods for evaluating collaborative processes, and a large body of research focuses on program evaluation. We anticipate drawing on this considerable body of work to construct an evaluation tool. The tool will provide subjective and objective feedback about the process of utilizing computer tools in collaborative problem solving endeavors, and the outcomes of those efforts.

3. Using this framework, explicitly design *targeted “pilots” or “demonstrations”* to be studied and evaluated with the intent of developing basic principles and best practices to computer assisted multi-stakeholder approaches and methodologies. The focus on these demonstrations will be on tangible high priority needs facing the nation such as TMDLs or modified operations from multi-purpose reservoir systems. Recruit teams of experts from across the federal research establishment to jointly apply their expertise to these “ripe” decision making situations. The demonstrations will be used for learning purposes to improve methodologies and process design, and highlighted to promote best practices or pitfalls.
4. Development of a focal point or center to facilitate coordinated federal research. Use the center to coordinate research and demonstration projects, provide linkages, promote methodological development, and enable innovative applications of collaborative decision support tools.

Potential research questions might include:

- What model features or attributes (e.g. ability to do “what-if scenarios” and sensitivity analysis, transparency, integration of multiple processes) facilitate a collaborative multi-stakeholder process?
- When developing models, what actions can be taken to assure relevance to decision?
- What computer technology platforms, designs and capabilities, can improve public participation in analytic-deliberative decision making within large groups?
- How can the effectiveness of different computer-assisted techniques in a reducing conflict be measured?
- How can computer models be used to establish a common understanding of policy options across stakeholders? An example would be an agency by agency vs. more collaborative modeling approach in the Everglades.
- At what points in the process are different computer-assisted representations of risk (games, graphics, etc) most appropriate for communicating with different segments of the public?

What is the Justification for Increased Federal Investment?

The federal government is uniquely positioned to address the issue of providing tools for collaborative processes involving water resources. Many of the decisions to which these tools will be applied include federal interests and resources, and federal leadership is already an important part of the collaborative process. The benefits and rationale for moving forward with a plan to provide science leadership in the area of providing tools include the following:

- This initiative directly and concretely addresses the *government-wide emphasis on increased use of collaborative processes*
- By providing new understanding and tools to support collaborative solutions to water issues, this initiative will both *assist state and local governments* and *support existing federal water management* roles.
- An important function of the clearinghouse will be to bring together researchers and practitioners from a variety of disciplines. The work envisioned in this proposal will require inter-disciplinary research, and federal agencies are well positioned to conduct and coordinate such research on a national or international level.
- This initiative can provide the efficiency of a central focus by forming a clearinghouse for research and knowledge about melding model use with collaborative processes. While universities and the private sector are likely partners in this endeavor, a federal presence will provide unified direction and consistency over time. University staff and graduate students may be expected to have the expertise and interest to perform some of the work, but the short time frames of graduate students and funding realities of university professors lead to the conclusion that federal agency personnel

should provide the long term research, development, and monitoring capabilities. This is a role to which federal agencies are well suited (e.g. NAWQA).

- Federal agencies operate on a public service mission. The problems of water availability and quality are central to the well being of the nation as a whole, and public servants are able to apply their expertise and service ethic to these problems.

What are the Anticipated Results of the Initiative?

Results of the initiative will include focused interagency research on the needs for collaborative problem solving of water problems, coordinated development and dissemination of principles and best practices for effective combination of modeling and multi-stakeholder public processes, and, ultimately, reduced level of water conflict through more broadly-acceptable, timely and sustainable solutions

Who Helped Draft this Initiative?

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