Eastern Snake Plain Aquifer — Development of a Comprehensive Aquifer Management Plan (Section III, Principle 2)

In the southeastern corner of Idaho, an aquifer covering approximately 10,800 square miles plays a critical role in helping farmers produce an estimated $10 billion per year in goods and services. When conflict between water users related to declining aquifer levels reached a boiling point in 2006, the Idaho Water Resource Board (the Board) embarked on the preparation of a Comprehensive Aquifer Management Plan (CAMP). CDR Associates, experts in natural resource conflict resolution, conducted over 90 interviews with stakeholders and facilitated public meetings to craft a framework for the plan. In 2007, the Idaho Legislature approved a Framework containing one central goal with five supporting objectives. To implement the Framework, the Legislature selected an Advisory Committee representing water users and other interests in the basin. For two years, this committee met, debated, and eventually created a CAMP for the aquifer that the Legislature approved in 2009.

Both the political need of the Legislature and Board to follow their Framework with action and the increasingly dire water situation in the aquifer kept pressure on the group to find common ground. From the beginning, the focus on stakeholder involvement brought divergent interests to the table as equal partners. The facilitators communicated constantly with stakeholder representatives, and almost all parties chose to stay involved throughout the process. Consequently, new relationships formed and participants with divergent interests began long-term dialogues. A broad coalition emerged to support the Committee's work, influencing Legislators and ensuring adoption of the CAMP. Observers credited this success to the high level of constituent involvement over the 3 year development process.

For more information on this process, visit the Idaho Water Resource Board at http://www.idwr.idaho.gov/waterboard/WaterPlanning/CAMP/ESPA/.

Computer Software for Collaborative Modeling (Section III, Principle 3)

(From the Collaborative Planning Toolkit, Chapter 4)

Software Tool(s)	Applications/Uses	Software Type
STELLA, Vensim, GoldSim	Problem definition, analysis, or synthesis of any system	System dynamics / simulation with user-friendly interface features
Analytica	Analysis	Spreadsheet with simulation and optimization option
EXCEL	Analysis	Spreadsheet with options for building user interface
HEC-ResSim	Analysis of reservoir operations	Simulation with map interface
OASIS	Analysis of water routing	Simulation & optimization
RiverWare	Analysis of river and reservoir systems, esp hydroelectric systems	Simulation & optimization
WEAP	Analysis of integrated water resources planning, including economics	GIS-ARCView interface supported by spreadsheets
HEC PRM	Multi objective reservoir system optimization	Optimization with penalty functions

Case Example: Consider a "Toolbox Approach" to Modeling (Section III, Principle 3)

A single model might not always be sufficient; rather a suite of tools may be needed, each with a specific purpose. One may need a detailed model to define environmental flows and economic impacts as well as a decision interface to allow stakeholders to explore the decision space. For example, the Alabama Coosa Tallapoosa Apalachicola Chattahoochee Flint River Basin (ACT-ACF) Shared Vision Planning initiative (1994-1996) combined EXCEL and STELLA, in a dynamic data exchange linkage. EXCEL was used both for input data storage and management and for post processing of the results. The Lake Ontario-St. Lawrence River Shared Vision Planning Study (2000-2005) used the same pairing but also included C++ and FORTRAN models that were run from the Board Room, the central EXCEL model. Even when only a single software platform is used for collaborative modeling, it will almost always use relationships and functions from other models, potentially including:

- Stage-flow relationships from hydraulic models
- Stage-impact relationships from a variety of impact estimating models
- Hydrology derived from climate change models

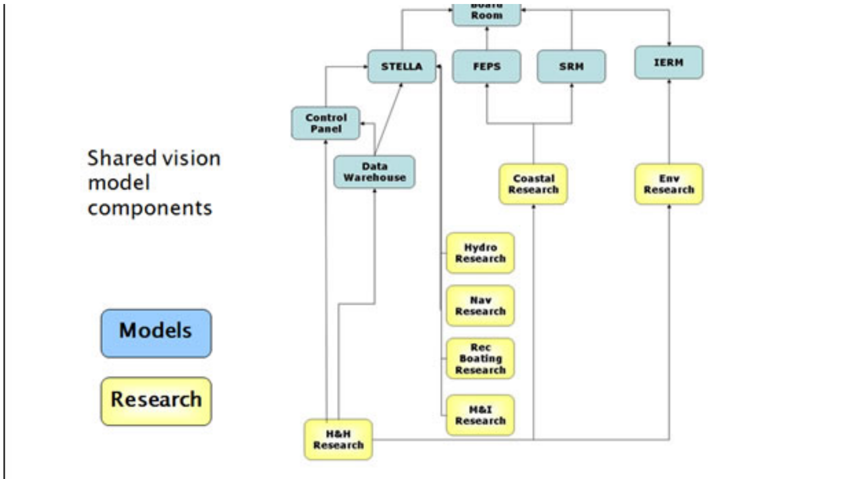


FIGURE: THE SYSTEM OF MODELS AND RESEARCH IN THE SHARED VISION PLANNING EFFORT FOR THE LAKE ONTARIO STUDY

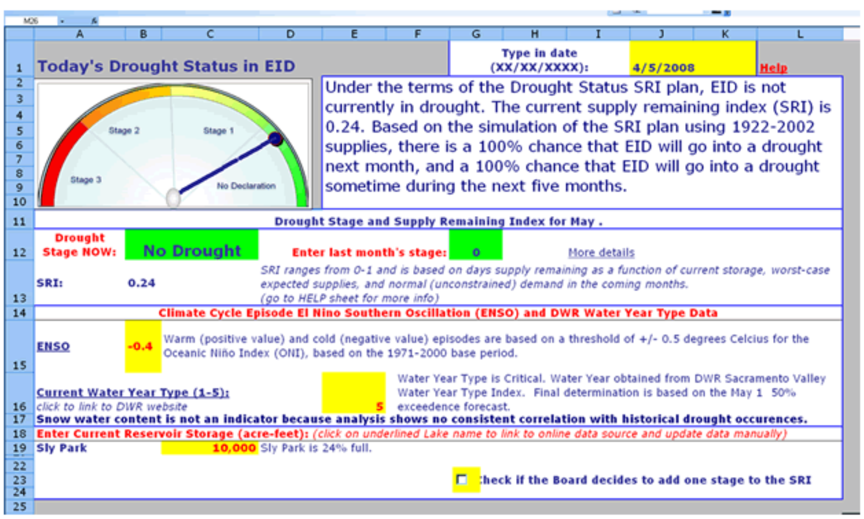
Case Example: Lake Ontario - St. Lawrence River Study (Section III, Principle 3)

The International Lake Ontario - St. Lawrence River Study Board developed a Shared Vision Planning Model of the Lake Ontario and St. Lawrence River system. The model linked numerous complex models together. Study Board members and study participants could analyze and investigate results from the Shared Vision Model using "the Boardroom," a large Microsoft Excel file. Use of Excel was chosen because its widespread availability and common usage would facilitate understanding and access. A summary of key material from the Boardroom was also posted on a website for public use.

Case Example: El Dorado Drought Preparedness Study (Section III, Principle 3)

In 2004, California' s El Dorado Irrigation District and El Dorado County Water Agency developed a Shared Vision Planning model to examine alternatives for a comprehensive drought preparedness program. The model used a familiar visual to display synthesized results: a dashboard. If the measurement fell within the green zone, then it indicated acceptable performance; if it fell within the yellow zone it indicated a level of concern regarding performance and that steps needed to be considered to improve the situation; if it fell within the red zone, it indicated that immediate action was required to improve performance. Use of familiar visuals and colors facilitated quick understanding. It alsoprovided an ability to use real-time technical information in official decision-making by elected officials. Deciding to declare a drought and the stage of the drought can be a big deal, and having a technically sound graphic helps a lot.

Case Example: Dashboard User Interface



Model Documentation Types by RAND Corp. (Section III, Principle 3, Item 6)

RAND Corporation uses a standard of three types of documentation, which accommodate different levels of users:

(1) **Executive summary**
Describes the computer program in non technical terms. It is a concise description to help policymakers and planners understand how the model can be used for policy analysis.
(2) **Users' manual**
Gives complete instructions for collecting data and operating the program. It also presents the mathematical details underlying the model's calculations.
(3) **Program description**
A manual primarily for computer programmers. It includes file specifications, installation instructions, etc.

- Executive Summary, Chaiken and Walker 1985 (21 pages): http://www.rand.org/pubs/reports/R3087z1.html
- Users' Manual, Chaiken and Walker 1985 (133 pages): http://www.rand.org/pubs/reports/R3087z2.html
- Program Description, Chaiken, Walker and Dormont 1985 (233 pages): http://www.rand.org/pubs/reports/R3087z3.html

Sample Ground Rules (Section III, Principle 4)

This example is based on this rules established in 2008 for the Halligan-Seaman Reservoir Expansion Shared Vision Planning project. They are provided for illustration only; you should customize rules for your own application.

SAMPLE RULES FOR PARTICIPATING IN COLLABORATIVE MODELING

1. The Golden Rule - Do unto others as you would have them do unto you.
2. Facilitators and modelers offer expert advice but remain neutral on all issues and decisions
3. No one acts outside the group to undermine the collaborative process.
4. Everyone understands that participation serves the interests of each participant.
5. Use the Best Alternative to a Negotiated Agreement as the benchmark to determine whether you or your organization should participate (if the entity you represent would be better served by not participating in this process, then others must accept that you may have an ethical obligation not to participate).
6. Share information that would change others' decision about the best alternative.
7. Honor laws and policies about privacy, proprietary information. If you can share, share, if not, withdraw from the process or express your concern and negotiate a solution with other participants.
8. Your exit from the process may be crippling, so let us know as soon as possible and see if we can avoid it.
9. Check with others before issuing press releases.

Enforcing the Rules

1. If you are breaking a rule, stop.
2. If you find out someone is breaking a rule, inform them yourself.
3. If you don't want to confront the person or if it doesn't work, elevate the issue according to the procedures we agree to.

Press Releases

A review group will be formed to review and approve all press releases. Participants will not issue press releases

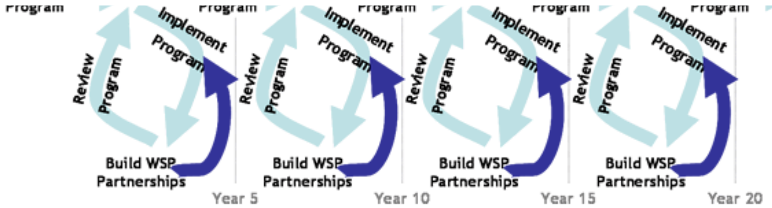
Case Example: El Dorado Drought Preparedness Plan (Section III, Principle 4)

In 2004, California' s El Dorado Irrigation District and El Dorado County Water Agency joined together to update drought and conservation plans and to develop and fund a comprehensive drought preparedness program. They used a Shared Vision Planning process that involved numerous stakeholders. One of the most challenging aspects of the study related to integrating climate change input into the computer model. Some participants felt strongly that climate change needed to be addressed, while others felt just as strongly that all the fuss over climate change was a hoax. By agreeing to look at a diversity of scenarios and likely resource constraints, the group was able to cover needed ground without either endorsing or debunking climate change specifically. The ability to find a suitable path on a polarizing topic helped build trust among participants and in the process.

Deister, Ane D. (in press). Ch 8: Drought Preparedness in Northern California: People, Practices, Principles and Perceptions. *in* Bourget, E.C. (ed.) Converging Waters*:* Integrating Collaborative Modeling with Participatory Processes to Make Water Resources Decisions

Case Example: Virginia Water Resources Planning (Section III, Principle 4)

In the spring of 2010, hydrologic models were established by the state for each major river basin in the state. As each local or regional plan is developed, a model container is generated of the planning unit's 30-year water supply planning alternatives. This forms the basis of an on-line decision support system for collaborative modeling.



This on-line collaborative modeling tool provides a frame of reference for diverse stakeholders to balance the water needs of these often conflicting beneficial uses and provides an opportunity for the state to build state and local water supply planning partnerships. This approach supports locally delegated, state mandated water supply planning, allowing stakeholders to conduct "what if" scenarios related to vet future water supply alternatives to determine their impacts on water allocated for other beneficial uses, their associated potential for conflicts, and their ability to optimize the benefits among multiple uses at the regional or basin-wide scale.

Case Example: Lake Ontario - St. Lawrence River Study (Section III, Principle 5)

The International Lake Ontario â€“ St. Lawrence River Study used a Shared Vision model to examine options for regulating water levels and flows in the Lake Ontario â€“ St. Lawrence River system. The model incorporated numerous performance measures to address a variety of interests, such as recreational boating and tourism, shoreline impacts, hydropower generation, and environmental effects. One approach to stimulate thinking regarding possible alternatives was to develop hypothetical "fencepost" alternatives. A fencepost alternative described ideal regulation for a single interest if impacts to other interests could be completely disregarded. These single-interest fencepost alternatives not only illustrated the consequences for other interests of such ideal conditions, but helped establish the likely outer limits of any supportable solution. The combination of outer limits from these fencepost alternatives framed the likely "solution space" for alternatives taking into account all interests.

Example of a Mock Model: Chili River Basin (Section III, Principle 6)

The figure provides an example of a mock model for the Chili River Basin Model, including one of several explanatory embedded Power Point slideshows, as well as one of several hyper linked arrows that guides users through the key parts of the model.

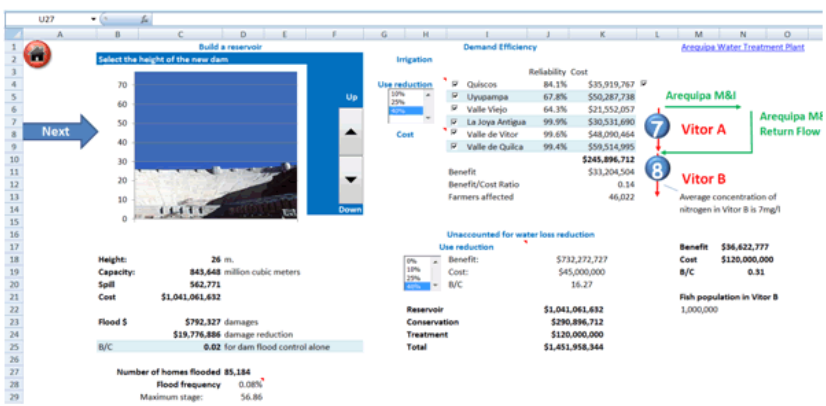
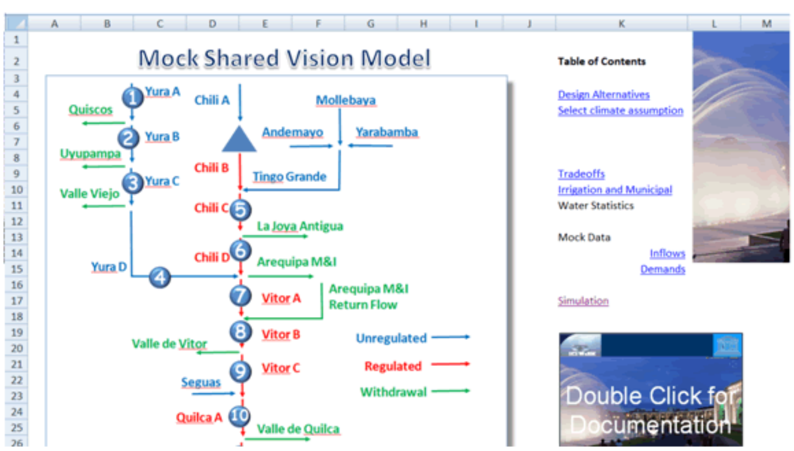


FIGURE A: MOCK CHILI RIVER BASIN MODEL, ALTERNATIVES PAGE



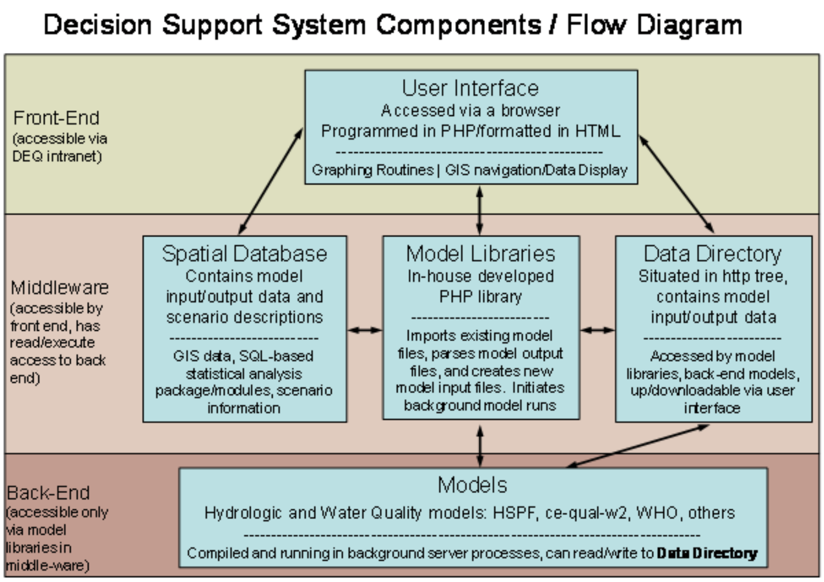
Heirloom or Legacy Models (Section III, Principle 6)

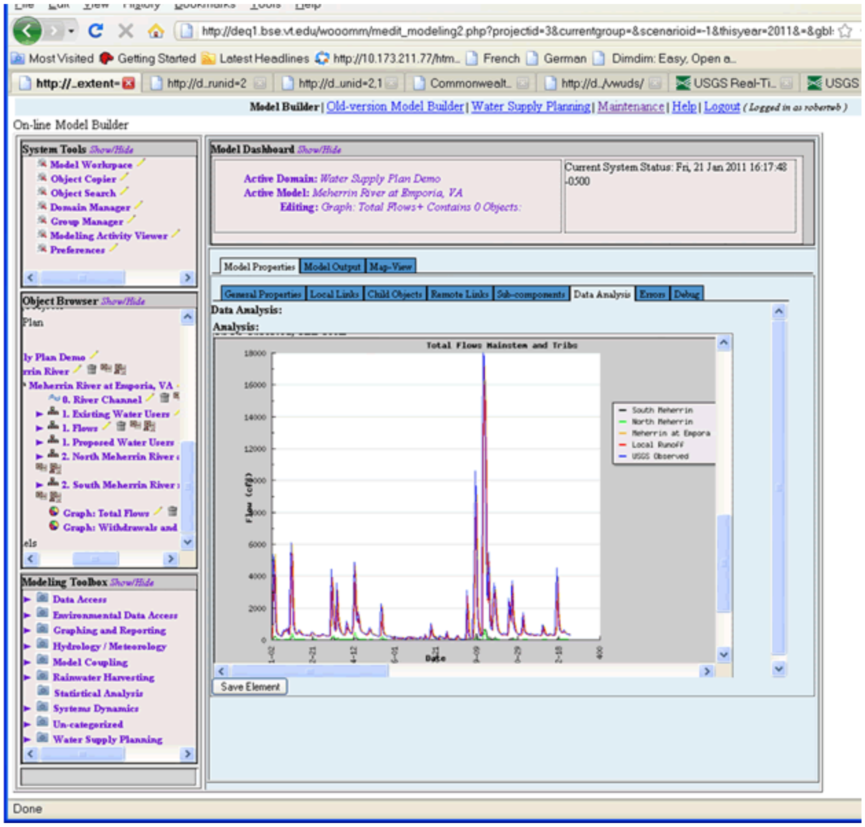
Previous to any attempt to do collaborative modeling, someone may have built a model related to the region and problems challenging the collaborative modeling team. In many cases these "legacy" models will be black boxes requiring specialized modeling skills, and the modelers with those skills may have incentives for challenging the collaborative modeling process. First, they may perceive the collaborative model as a replacement for their model and their skills (and this may be true). Second, their design perspective may be centered on the requirements of their specific model rather than on the issues that will be modeled. For example, a water quality modeler might insist that the model requires short time step data (which is necessary to calculate mixing and biological processes; but not typically for planning issues such as determining if population growth and climate change will reduce dissolved oxygen concentrations below the trout survival threshold). Third, they may argue that there is no need to "redo" what has already been done—which is true if the legacy model directly supports all the group's needs, but may not be true if it does not. All of this said, legacy or specialized models are often a necessary part of collaborative modeling because they provide important functional relationships (in this case, perhaps, dissolved oxygen minima as functions of flow, return rates and temperature increase).

Case Example: Virginia Water Resources Planning (Section III, Principle 7)

The meta-modeling approach provided an environment to loosely or tightly couple other models such as operations models, fish habitat models, and water quality models.

The benefits realized to date include an improved focus on science and use of the best available information for planning; water supply planning that is more dynamic and supports the water withdrawal permitting process; and the permitting of projects that provide greater resource optimization.





revised 18 Feb 2011