

Research Update

Summer 2015
Bulletin 2015-01

Bottom Line

This research project helped develop HydroSense, a publically available modeling code that allows users to conduct hydro-economic analyses of water management alternatives. Reclamation and the Idaho Water Resources Research Institute at the University of Idaho have been developing these methods over the past 8 years.

Better, Faster, Cheaper

Hydro-economic modeling provides a framework for integrating physical, ecological, economic, and social/cultural systems into a single valuation that more completely explains the costs and benefits of management alternatives.

Principal Investigator

Jennifer Johnson, P.E.
Hydraulic Engineer
River and Reservoir
Operations Group
Pacific Northwest Region
208-378-5225
jmjohnson@usbr.gov

Research Office Contact

Erin Foraker
Renewable Energy
Research Coordinator
303-445-3635
eforaker@usbr.gov

HydroSense: Publically Available Model for Evaluating Water Management Decisions

Making the hydro-economic modeling methodology available to the modeling community

Problem

Reclamation water management planning studies often require determining net benefits (benefits minus costs) or benefit-cost ratios (net benefits divided by net costs) for each alternative being considered.

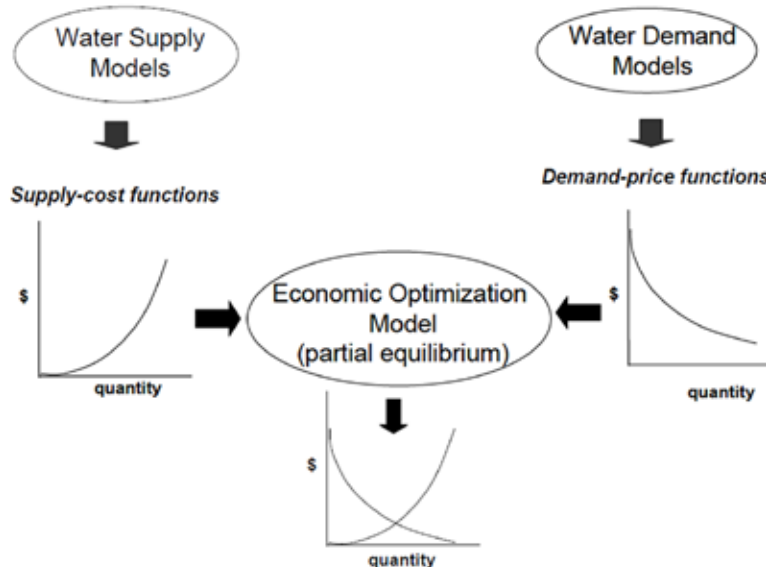
Previous methods used to quantify benefits used a water supply management approach, which only tells part of the story and assumes that demand is static regardless of the cost of the supplied water. To provide a true picture, the changes in water demand that result from the changing cost of the supplied water need to

be considered. Hydro-economic models consider both supply and demand to provide a framework for integrating physical, ecological, economic, and social/cultural systems into a single valuation that more completely explains the costs and benefits of water management alternatives.

Since 2006, Reclamation and the University of Idaho-Idaho Water Resources Research Institute hydrologists and economists have been collaborating to develop a hydro-economic model. The conceptual model and approach has been developed and proved in the Boise Basin, Idaho, resulting in a number of publications. However, applying the method in another basin was fraught with unknowns. How difficult would it be? Could other analysts not familiar with the model use the model to produce meaningful results? Since this method brings better valuations, making the model usable and accessible to future users in many basins is paramount.

Solution

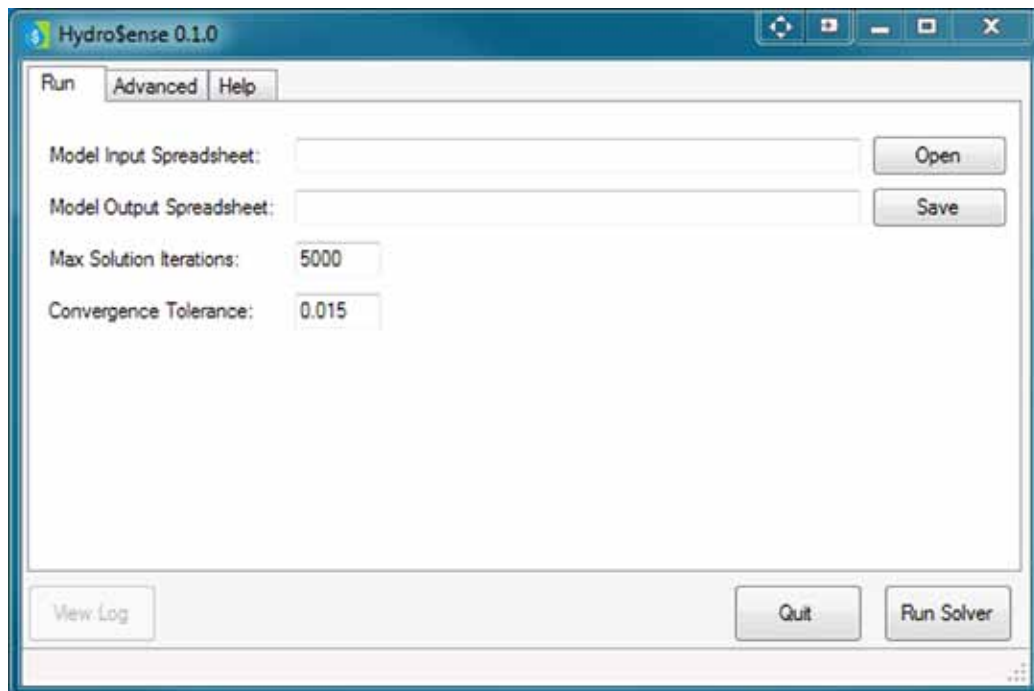
To ensure that future Reclamation studies could use this hydro-economic model, this Reclamation Science and Technology Program research project entailed writing a generalized instruction manual for the hydro-economic modeling methodology



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and developing HydroSense, an open source code that could be used to conduct hydro-economic analysis. To prove the model was useful in a basin other than the Boise Basin, this project applied the methodology to the Henrys Fork Basin in eastern Idaho.



HydroSense 0.1.0 interface, developed by Bob Lounsbury, Hydraulic Engineer, Reclamation's Pacific Northwest Region.

Future Plans

This methodology has been gaining recognition in the economic community and has proven to be useful in evaluating possible water management alternatives.

Now that it is publically available with a user's manual describing the methodology, it can be used by hydrologists and economists throughout Reclamation when evaluating water management alternatives. Others in Reclamation have expressed interest in adapting HydroSense for operational use.

Once technical staff are familiar and comfortable with the theory behind this methodology and application of the HydroSense tool through the proposed training and outreach, future potential uses by Reclamation could lead to project-level development of operational scenarios or other applications.

*HydroSense logo
created by
Bobby Gaytan, Illustrator,
Reclamation's Pacific
Northwest Region.*



“HydroSense is open-source code that can be used to conduct hydro-economic analysis using the methodology developed by Reclamation and University of Idaho-Idaho Water Resources Research Institute. It can provide a more complete valuation of water than the more traditional economic approaches, so it has the potential to lead to better, more informed water management decisions.”

Jennifer Johnson
Hydraulic Engineer,
Reclamation's Pacific Northwest
Region

Collaborators

- **Reclamation:**
 - ◇ Pacific Northwest Regional Office
 - ◇ Snake River Area Office
 - ◇ Technical Service Center
- **University of Idaho-Idaho Water Resources Research Institute**

More information

www.usbr.gov/research/projects/detail.cfm?id=8937

HydroSense code available at:
<https://github.com/usbr/hydrosense>

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For printable version see: www.usbr.gov/research/docs/updates/2015-01-hydrosense.pdf