

Dynamic Decision Support System (D²S²) for Regional Water Resource Management

Authors: Kathleen O'Neil; Julie Padowski; Burcin Unel; Sanford V. Berg; James Jawitz.; Gregory Kiker;; Kris Esterson; Jason Godin;; Bevin Beaudet; Tom Miller

Water managers are today faced with the dilemma of large capital investments without a 'whole system' framework to evaluate the efficiency and sustainability of alternatives. In a multi-disciplinary collaboration with the UF Water Institute, National Center for Atmospheric Research (NCAR), Stockholm Environment Institute (SEI), and Awwa Reseach Foundation (AwwaRF), this project builds a Dynamic Decision Support System (D²S²) for Integrated Resource Planning (IRP). Sponsored by the Palm Beach County Water Utility, the tool is a unique combination of systems simulation model with multi-criteria decision analysis. The output supports 'Triple Bottom Line' accounting with a systematic and defensible method of ranking alternatives against social, environmental, and economic sustainability criteria.

Collaboration with a simultaneous AwwaRF-NCAR project, expands the application to incorporate climate change predictions in scenario analysis and the decision framework using SEI's Water Evaluation and Planning (WEAP) tool. Collaboration with the UF Water Institute offers expertise ranging from public utility economics to integrated water resource management. Proposed research includes an inverse modeling case study and examination of value based trading programs.

D²S² provides an interactive tool for 'What-if' scenario testing for alternative water supply and management projects. Uses include capital planning, public benefit evaluation, complex alternatives analysis, and regional mediation. The research hopes to advance concepts in decision analysis, including:

- Linking decision analysis to dynamic systems models evaluating sustainable alternatives,
- Incorporation of triple-bottom-line accounting into sustainability criteria,
- Uncertainty as a decision criteria in alternatives analysis,
- Climate change in water supply planning, and
- Economic risk management and pricing in regional water-sharing programs.

Key Words: Integrated Resource Planning, Regional Water Management, Systems Dynamics, Multi-Criteria Decision Analysis