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MODSIM-DSS River Basin Management Model Enhancements

Enhanced utility and capabilities of popular river systems modeling tool make it accessible to a wider user-base

What Is The Problem?

The nation faces an increasing set of water resource challenges: aging water infrastructure, rapid population growth in some of the driest regions of the country, depletion of groundwater resources, impaired water quality, conflicts between human and environmental water needs, and climate variability and change, among others. Water shortages and water-use conflicts have become more commonplace in many areas of the United States, even in normal water years. As competition for water resources grows, the need for information and tools to aid water resource managers also grows. Management of complex river basin systems requires effective decision support tools for analyzing all of the system components in an integrated manner.

What Is The Solution?

MODSIM-DSS is a generic river basin management decision support system for developing basin-wide strategies for short-term water management, long-term operational planning, and drought/climate change contingency planning. , Originally conceived in 1978 at Colorado State University (CSU), MODSIM-DSS has been updated to its current version 8.1 through joint collaboration between CSU and Reclamation's Pacific Northwest Regional Office. MODSIM-DSS is available to users without cost or licensing requirements.

Numerous contributions to enhancement of MODSIM-DSS have been made by Reclamation staff at the Pacific Northwest Regional Office, particularly Roger Larson, in collaboration with CSU. These include enhancing the graphical user interface (GUI) ease-of-use and functionality and developing a Water Rights Control form which greatly improves analysis of water rights within a basin. In addition, Larson created valuable modules in MODSIM-DSS that realistically model reservoir operations in Reclamation projects, including multiple storage accounts, a scheme for integrating natural flow rights with ownership of accrued storage, logic for group ownerships, a rent-pool module, and last fill link logic. Because MODSIM-DSS uses Visual C++, custom code modules can be developed for complex reservoir operational logic. The powerful GUI connects MODSIM-DSS with database management components and a network flow optimization model, providing an efficient means of insuring water is allocated according to physical, hydrological, and institutional/ legal/administrative aspects. MODSIM-DSS can also easily be customized for a variety of purposes without recoding the program.

Who Can Benefit?

MODSIM-DSS is used extensively by Reclamation, as well as other water resource management entities at the federal, state, and local levels, and several international organizations. Its use facilitates communication between technical and managerial staff, improves interaction between study coordinators and the public, and reduces the costs of river basin modeling.

Where Have We Applied This Solution?

The Pacific Northwest Regional Office is applying MODSIM-DSS to many river basins (e.g., the Snake, Deschutes and Rogue Rivers) for several purposes, including quantification of impacts of proposed storage reallocation for satisfying instream flow requirements for endangered species.

Future Development Plans

GEO-MODSIM is being developed as a custom extension in ArcGIS® (ESRI, Inc.), allowing full integration of MODSIM-DSS with GIS. Reclamation will continue to collaborate with CSU on further enhancements to MODSIM-DSS.
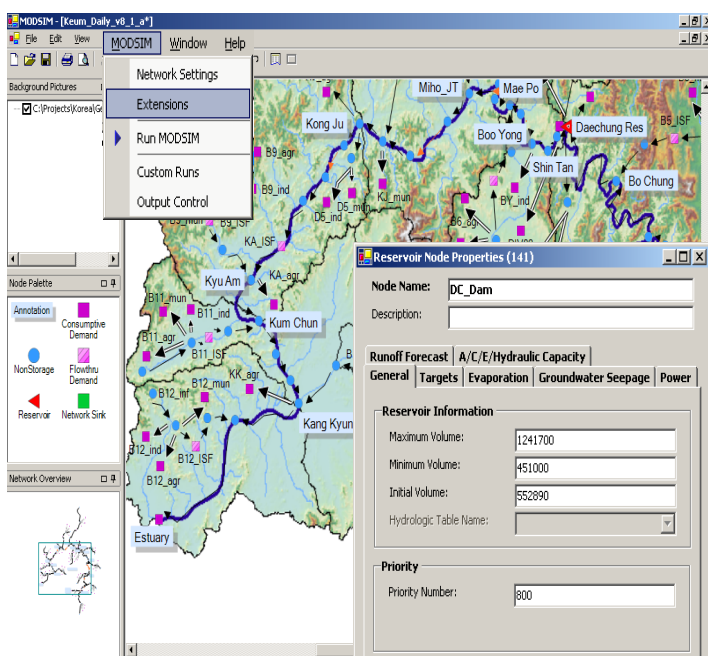
More Information

The MODSIM-DSS 8.1 program, user manuals, and tutorials can be downloaded at: http://modsim.engr.colostate.edu/.

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Collaborators

Reclamation's Science and Technology Program and Pacific Northwest Region and Colorado State University