

NEW MEXICO DYNAMIC STATEWIDE WATER BUDGET

NSF HIGHLIGHTS—TRACK 1 RESEARCH

TITLE

Dynamic Statewide Water Budget: Improving oversight and management of New Mexico's limited water resources

OUTCOME

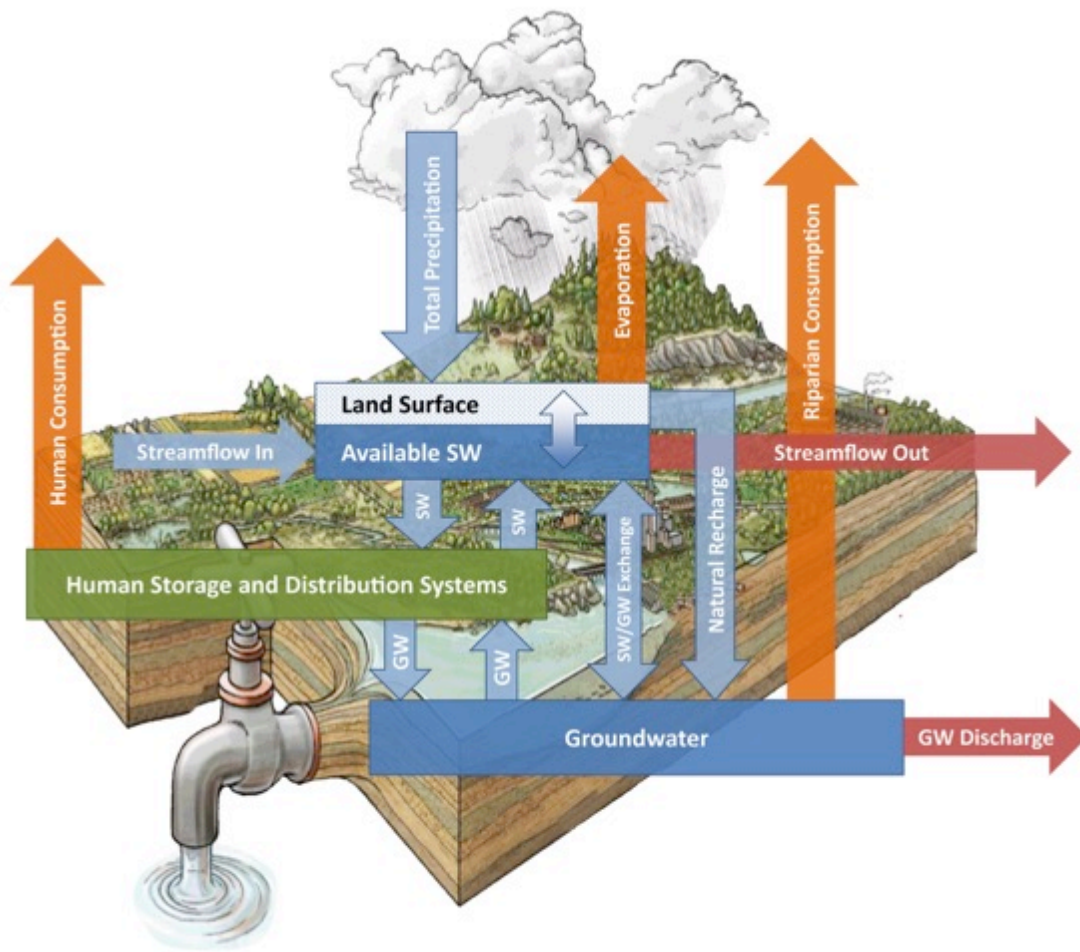
The New Mexico Dynamic Statewide Water Budget (DSWB) is a system dynamics model that will support local and regional planning of New Mexico's limited and critically important water resources. The DSWB for the first time synthesizes water supply and demand information from across the state into a single, easily accessible location, and in such a way that users can view information at a variety of spatial scales. The model provides mass balance calculations for river basins and water planning regions across the state, which is critically important information for water planners, particularly in light of climate change. The DSWB will ultimately be part of a living web-based State Water Plan housed at the New Mexico Interstate Stream Commission and also will be merged into a larger system dynamics model that combines water availability with energy development, demand, and social preferences data.

IMPACT/BENEFITS

The New Mexico Water Resources and Research Institute (WRI) at New Mexico State University (NMSU) was able to leverage EPSCoR funding for the DSWB to gain significant additional support from the State of New Mexico to complete a Statewide Water Assessment. Multiple state agencies, universities, and a national laboratory participated in the DSWB effort to provide new and cutting-edge water resources information. Some of the new information developed includes statewide assessments of recharge to groundwater, groundwater levels and storage changes, remotely sensed/modeled evapotranspiration and precipitation data, and surface water flow statistics. Of particular importance, new research is adding to our understanding of evapotranspiration rates in New Mexico, an important component of the water balance that previously was only modeled or estimated. EPSCoR-supported graduate students have been trained in system dynamics modeling and have begun research on case studies in the Lower Rio Grande watershed that will be integrated with the DSWB to inform tradeoffs between water availability and energy and agricultural production.

EXPLANATION

NM EPSCoR supported the WRRRI at NMSU to create a Dynamic Statewide Water Budget system dynamics model. System dynamics is an approach to model complex systems over time and is often used in accounting or budget type models, making it well suited to complete a statewide budget of a variable resource. Systems dynamics models use stocks, fluxes, internal feedbacks, and time delays. The stocks represent storages, and the fluxes represent movement into, out of, or between stocks and/or external sources. The DSWB provides mass balance calculations of New Mexico's water systems at a variety of spatial scales: 7 major river basins, 16 water planning regions, 33 counties, and a single statewide calculation. The DSWB is the first major step in completing a larger statewide, interdisciplinary system dynamics model that will integrate social and natural sciences by joining three energy/water nexus budgets: energy, social preferences, and water.



Schematic of the New Mexico Dynamic Statewide Water Budget system dynamics model. Thirteen different inputs/outputs form the core water budget terms.



Determining the water mass balance calculation for the Rio Grande watershed has important implications for water supply planning in arid cities of the Southwestern United States