

## **The Value of Scenario Development in Environmental and Socio-economic Policy Applications within the U.S. Southwest**

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Increasing scarcity, growing demand, and a burdened water supply have generated concerns about the sustainability of the southwest's regional water infrastructure. Water managers and decision-makers have to routinely make critical management decisions under highly complex and uncertain circumstances. This necessitates the adoption of improved water management practices and policies better suited to contemporary water resource dilemmas. Enhancement of water management applications requires supporting science to be intimately connected to active decision-making.

Scenarios introduce an innovative aspect to strategic long-term planning that is currently absent from current decision-making and resource management activities. Since scenarios depict and examine alternative views of how the future may unfold, the development of scenarios allows decision-makers, water managers, and stakeholders to target predominant issues of interest in environmental/socio-economic policy. Scenario studies can inform environmental practices, examine implications of various current and future management policies, and suggest alternatives to existing strategies. In this manner, significant impacts of plausible alternative futures can be integrated into ongoing policy and management decisions. Due to a lack of formal guidance material on how to adopt a scenario development process, scenario planning has not been fully utilized in environmental resource management studies. For the purpose of assessing future water resources management and sustainability needs within the region, the formal approach to scenario development adopted by scientists and researchers at the University of Arizona's SAHRA (Sustainability of semi-Arid Hydrology and Riparian Areas) center is suggested.

Through workshops and meetings with regional and state stakeholders, several dominant themes of interest for water resources management emerged. The dimensions identified as most impacting drivers of change with respect to water resources in the future were climate, land use/development, technology, and socio-economics. A historical analysis of several key variables associated with these major themes provided insight on the future uncertainty in projections and assumptions adopted in early examples of future planning in the southwest. It became clear that certain assumptions about policy regulations in Arizona have resulted in trends that were unexpected and unplanned for. Some of the key variables inducing changes in regional water supply include copper mining, agricultural farming, domestic wells, population growth, home ownership/construction, and energy usage/production. Analysis of these key variables indicates that historical assumptions and projections in the dimensions of the environment, climate, and socio-economics lacked the dynamic planning foresight that tools such as scenarios can provide.