

Talking sustainability

FEDERAL INITIATIVES TARGET MAJOR WATER RESOURCES CONCERNS

Federal initiatives are large-scale projects, often encompassing multiple counties, regions, or states, made possible by congressional funding. The following Texas Water Resources Institute (TWRI) projects have impacted major water resource problems in Texas and beyond.

OGALLALA AQUIFER PROJECT

The Ogallala Aquifer, stretching from South Dakota to Texas, covers 174,000 square miles, including 36,080 square miles in the Texas High Plains. In western Kansas and the Texas High Plains, the aquifer is declining at an unacceptable rate. Aquifer depletion rates of 1 to 3 feet per year are common in that region, and recharges are very small. Water availability, cost, and policy, together with technology development and adoption rates, are reshaping the rural landscape.

In 2003 a multi-state group of researchers tackled the problems associated with aquifer decline, and since then the *Ogallala Aquifer Project* has addressed the complex issues related to sustaining the Ogallala Aquifer

and maintaining a stable rural economy. The U.S. Department of Agriculture's Agricultural Research Service (ARS), with identified project funds provided by Congress, funds the project.

The collaborative *Ogallala Aquifer Project* involves the ARS's laboratories at Bushland and Lubbock, and four other partners: Kansas State University, The Texas A&M University System, Texas Tech University, and West Texas A&M University; about 85 engineers and scientists are on the research team.

The researchers have been tasked with—among numerous other objectives—improving water management for crops to decrease dependence on ground-water resources; assessing the interrelationships with future climate forecasts, cropping patterns, and water-use policies and regulations; developing and evaluating water-saving technologies for agricultural industries; and estimating the economic impacts of water management activities.

As the project progresses, researchers make significant water discoveries. A research team determined that irrigation

demand on the Texas High Plains could outpace the capacity to pump water from the aquifer if rainfall decreases during severe droughts due to global climate change. Other researchers developed marker and electrophoresis technologies that will aid in screening peanut germplasm for drought and heat tolerance and will help develop water-saving cultivars.

Another research team's database of current water-use practices and technologies will be used for a more extensive agricultural and economic database for counties in Texas and Kansas that access the aquifer. Researchers also determined that using water-efficient crop varieties that increase yield by 30 percent, coupled with some water use restrictions, would increase the amount of water left in the Ogallala Aquifer in 2060 and increase agricultural economic activity over the baseline.

With results such as these, the *Ogallala Aquifer Project* can help preserve the sustainability of the aquifer.

**PARTICIPANTS TAKE
STREAM CROSS-SECTIONAL
MEASUREMENTS AS PART OF
STREAM RESTORATION TRAINING.**



U.S.-MEXICO TRANSBOUNDARY AQUIFER ASSESSMENT

In the desert region of the U.S.-Mexico border, where the population is growing and the surface water is unreliable, groundwater is an essential drinking water source. Declining aquifers and water quality, coupled with increasing water demand, are raising concerns about long-term availability of these supplies.

The *U.S.-Mexico Transboundary Aquifer Assessment Project* is conducting scientific research to assess binational aquifers, important water sources for the U.S.-Mexico border region.

Providing a scientific foundation for state and local officials to address water resources challenges in this region, this project is developing binational groundwater information for water resources agencies, managers, and water users that depend on these border aquifers. The new information will be applied to analyze strategies to protect water quality and enhance supplies.

“Groundwater is used for all the drinking water in southern New Mexico; for all of Juarez, Mexico; and for half of the El Paso area,” said Dr. Ari Michelsen, director of the Texas AgriLife Research and Extension Center at El Paso and principal investigator for Texas on this project. “In many areas it is the only water source for much of the U.S.-Mexico border region.”

Four aquifers in the project’s scope are Mesilla Basin and Hueco Bolson aquifers in New Mexico, Texas, and Mexico, and the Upper Santa Cruz and Upper San Pedro aquifers in Arizona and Mexico.

TWRI and the Water Resources Research Institutes in New Mexico and Arizona, in cooperation with the U.S. Geological Survey (USGS), administer this project. Scientists from New Mexico State University, Texas AgriLife Research, University of Arizona, USGS, and state agencies and their Mexican counterparts are collecting and evaluating new and existing data to develop comprehensive groundwater quantity, quality, and flow models for binational aquifers.

Researchers currently are analyzing geographic information system data for the Mesilla Basin. Project personnel also coordinate meetings with Mexico at national, state, and local levels.

NORTH CENTRAL TEXAS WATER QUALITY

Five of the major reservoirs in the Trinity River Basin managed by Tarrant Regional Water District (TRWD) serve 1.6 million people in 11 counties and are expected to serve 2.66 million by 2050. Water quality in these north central Texas reservoirs is a growing concern.

Since 2004, TWRI and Texas A&M AgriLife have worked with TRWD to study sediment and nutrient loading and potential improvements in these reservoirs. Sediment loading affects reservoir capacity and water clarity; nutrient loading causes algae growth that impacts water treatment and recreational use.

This project has assembled information for specific TRWD-managed reservoirs and associated streams: Benbrook, Bridgeport, Cedar Creek, Eagle Mountain, and ➔



ONE OF THE TASKS OF THE OGALLALA AQUIFER PROJECT IS TO IMPROVE THE DESIGN, PERFORMANCE, AND MANAGEMENT OF IRRIGATION PRACTICES AND SYSTEMS. PHOTO BY TEXAS TECH UNIVERSITY

Richland Chambers reservoirs. Researchers are using computer models to analyze the biological, physical, and economic feasibility of alternative management practices and facilities.

“This project is helping to improve and maintain the water quality within the five reservoirs through education, outreach, and the watershed protection planning process,” said Allen Berthold, TWRI project manager. “The project’s ultimate goal is to accommodate growing populations and increased urbanization with sufficient high-quality water.”

Congressional funding for this project is provided through the U.S. Department of Agriculture’s Natural Resources Conservation Service. The numerous collaborators involved with TWRI on this project include TRWD, Texas AgriLife Research, the Texas AgriLife Extension

Service, Texas A&M University’s Spatial Sciences Laboratory, Alan Plummer Associates Inc., and Espey Consultants Inc. AgriLife Research scientists, AgriLife Extension specialists and agents, and selected private consultants are assisting TRWD in developing and implementing watershed protection plans (WPPs) for Cedar Creek and Eagle Mountain reservoirs, while modeling and economic studies are being conducted on Richland Chambers, Bridgeport, and Benbrook reservoirs.

Public stakeholder meetings are providing educational programs about water quality protection. These meetings directly affect the content and implementation of WPPs, Berthold said. “The watershed protection planning process and its stakeholder involvement are important because it takes not only a reactive approach to address certain parameters of

impairment, but also a proactive approach to other concerns within the watershed,” he said.

In 2008 project personnel created an AgriLife Extension curriculum guide to demonstrate the effects of soil erosion and sediment transport in the region. This guide is used with demonstration trailers to illustrate the importance of watershed management. Project members have conducted more than 120 educational programs dealing with watershed management and water quality for about 6,000 school-age children and 900 adults. The project has also conducted watershed management training sessions in north central Texas for city and county officials, state and federal agency personnel, and community members.

Links to these initiatives can be found in the web version of this story at twri.tamu.edu/txH2O. 