

Story by Kathy Wythe

Saving a Dwindling River

Project evaluates Pecos River Basin, writes watershed protection plan

A group of researchers, educators and stakeholders are deciphering the Pecos River Basin and its ecosystem as the first step in solving the watershed's water quality and quantity problems. This multi-agency group is evaluating the river and developing a watershed protection plan as part of the Pecos River Assessment Program.

The Pecos River, which winds more than 800 miles through semi-arid and arid landscapes of eastern New Mexico and West Texas, is crucial to many communities, mainly for irrigation, recreational and environmental use and recharging underlying aquifers. The river is the largest U.S. tributary flowing into the Rio Grande, accounting for 11 percent of stream inflow into the Amistad Reservoir.

The Pecos was once a grand river, providing early settlers with abundant water to irrigate crops and furnishing their families with drinking water.

Today, however, the river's flow has dwindled—to a trickle in some areas. The spread of non-native water-thirsty saltcedars and inefficient irrigation systems and reoccurring droughts have depleted the water supply. The river's salinity is so high that the water is sometimes harmful for irrigation, livestock and drinking. This salinity stems from natural saline deposits—remnants of the shallow Permian Sea that once covered the area—in soils and rocks. The reduced quality and quantity has also harmed the river basin's biodiversity. These problems have persisted for many years and have only been intensified by human influences.

The three-year project that began in 2004 is a collaborative effort of Texas Cooperative Extension, Texas Agricultural Experiment Station, Texas Water Resources Institute and the U.S. International Boundary Water Commission's (IBWC) Clean Rivers Program. The Texas State Soil and Water Conservation Board (TSSWCB) funded the project through the Clean Water Act, Section 319 from the U.S. Environmental Protection Agency.

“The river's importance—historically, biologically, hydrologically and economically—to the future of the entire Pecos River Basin and the Rio Grande is huge,”

said Will Hatler, project coordinator. “If the integrity of the Pecos is to be improved and maintained, it is crucial that its water quality and quantity be increased.”


According to Dr. Charles Hart, project director, the project's first objective is establishing a research baseline for the watershed by identifying and evaluating the river basin's physical features, from both a historical view as well as current conditions.

“We needed to determine what we could do to alleviate some of the problems,” said Hart, an Extension range specialist and professor in Texas A&M's Department of Rangeland Ecology and Management.

Aerial photographs, delineations and characterizations of riparian zones and the river system are currently being incorporated into multi-layered, interactive maps, Hart said. These maps will cover the entire basin and link with a database allowing users to access information about specific points, such as water quality testing sites.

High salinity was already known to be the river's biggest water quality concern—it is one of the saltiest rivers in North America—and has affected the river's biodiversity as well as making it nonpalatable for livestock or irrigation use.

According to Dr. Seiichi Miyamoto, professor at The Texas A&M University System Agricultural Research and Extension Center at El Paso, the flow of the Pecos accounts for a significant amount of salts entering Amistad International Reservoir, a water supply source for much of the lower Rio Grande Valley. The reservoir provides water for municipal as well as agricultural uses. Its salinity reached 1,000 mg per liter (the upper limit of secondary drinking water standard) in 1988, Miyamoto said, and, unless salinity is controlled, there is a concern that such incidents may occur with greater frequency.

Miyamoto, Fasong Yuan and Shilpa Anand of the El Paso center analyzed the streamflow and salinity data from 11 gauging stations and found much of the Pecos Basin's salinity stems from dissolution of salts from natural sources that are remnants of the shallow 



Permian Sea that once covered the area. They also found that the main salt loading is occurring upstream of Red Bluff Reservoir, north of the Texas/New Mexico border. More detailed information on this research is available by downloading TWRI Technical Report 291, “Reconnaissance Survey of Salt Sources and Loading into the Pecos River,” at <http://twri.tamu.edu/reports.php>.

The research team has also compared flow and salinity data from the Pecos River to salinity levels in Amistad International Reservoir. Their report, “Influence of Tributaries on the Salinity of Amistad International Reservoir,” was completed in April 2006 and is available to download as TWRI Technical Report 292 at <http://twri.tamu.edu/reports.php>

Another portion of the project assesses the fate of salvaged water from controlling saltcedar, a non-native, water-thirsty plant. Hart, Hatler, Alyson McDonald, a range management specialist for Extension in Fort Stockton, and Dr. Zhuping Sheng, assistant professor at the El Paso center, are evaluating how much water can be salvaged by eliminating saltcedar and how water flows between the river and the shallow aquifer.

“Our preliminary results show that an acre of saltcedar uses two-to-four acre-feet of water a year,” Hart said. “And we are able to salvage about 65 percent of that” by controlling the plant with aerial spraying of herbicides and other methods of control.

Controlling saltcedar was the focus of another project, the Pecos River Ecosystem Project.

Hart, McDonald and Sheng are also assessing the amount of water saved with saltcedar control that may contribute to downstream flow and/or groundwater recharge. Monitoring data demonstrate a good interaction between the river water and shallow groundwater. Hydrologic conditions control whether the saltcedar control can generate a greater stream-flow or a greater recharge into the shallow aquifer. The information collected will help predict the effect of saltcedar control on water quantity as well as quality under different management scenarios.

“We are expecting that by treating saltcedar, base flows in the river will increase,” Hatler said.

Both Hatler and Hart said having local landowners and other stakeholders involved in the project was important. The team conducted a survey and held stakeholder meetings to receive their input. The survey found that most stakeholders believe the invasive, water-thirsty saltcedar and debris left from killing it are the biggest concerns for the river.

“We have taken all the information gained from the survey and meetings and incorporated it into the watershed protection plan,” Hatler said. The plan is now a working document and is being reviewed and refined. Once the project’s team finishes the draft, local stakeholders will give their input on the plan. The watershed protection plan will assess current management measures as well as determine what future management measures need to be implemented in the river basin to protect the river’s water quality.

The project team has also developed a historical paper, “The Influence of Human Activities on the Waters of the Pecos Basin of Texas: A Brief Overview” as well as a historical fact sheet, “Historic Water Issues Facing the Pecos Basin of Texas.” These publications give stakeholders an overview of the river, its history and issues.

Other state and federal agencies also have research on the Pecos.

IBWC, Texas Commission on Environmental Quality’s Clean Rivers Program, Texas Parks and Wildlife Department and the U. S. Geological Survey are conducting ongoing programs to monitor the river’s water quality and biology. Monitoring the aquatic species that are present in the Pecos River will provide insights to assess the effects of point and nonpoint sources of pollution such as nutrient enrichment and sedimentation. This information can also be used to develop plans to protect threatened and endangered species in the region and to increase the diversity of aquatic species in the Pecos River.

The Texas Nature Conservancy is working with private landowners to acquire, protect and manage critical habitat in the lower reach of the river near its confluence with Independence Creek.

Hatler said it will take a long-term commitment from everyone involved, especially stakeholders, to restore the Pecos. “We want to see success in long-term management,” he said.

For more information on the project, contact Will Hatler at wihatler@ag.tamu.edu or go to the Web site at <http://pecosbasin.tamu.edu>. 