FORUM

The Ogallala: Cooperative Efforts To Preserve, Protect It

Nolan Clark says that a 10-percent across-the-board reduction in irrigation would solve the Ogallala Aquifer's overdraft problem. Clark has worked for ARS for 37 of the 50-plus years the agency has been involved in Ogallala area water-conservation research and now oversees the Ogallala Aquifer Program. The U.S. Department of Agriculture's involvement goes back even further, to the creation of the Bushland, Texas, facility in the 1930s as a response to the Dust Bowl. After the droughts of the 1930s and 1950s, farmers starting digging wells to get water from this vast aquifer, which ironically had underlain the area during those infamous drought years, just out of reach.

In 2005, a routine review panel concluded that ARS remains the leader in research on water resources related to agriculture. But the team also recommended that we needed to pay more attention to total system analysis, specifically in terms of economic analysis, social considerations, and conservation of energy and water.

The Ogallala Aquifer Program of 2004 provides us with a perfect vehicle to fulfill those recommendations in the Ogallala region, in partnership with the region's universities. Its goal is to protect the towns and their livelihoods, including agricultural industries, by stopping the overdraft of the aquifer.

Lucia Barbato's and Kevin Mulligan's Geographic Information System (GIS) maps, produced at Texas Tech University's Center for Geospatial Technology in Lubbock, show that water in the portion of the Ogallala Aquifer underlying Texas has declined at the average rate of just under 1 percent a year between 1990 and 2004. But that average masks the varying conditions from county to county, depending mainly on the underlying geology. The aquifer's thickness varies from a high of 282 feet in Roberts County to a low of 28 feet in Oldham County.

Most specialists agree that this rate of decline under the Texas High Plains is unacceptable, as are similar rates of decline throughout the aquifer.

The 173,000-square-mile Ogallala Aquifer is North American's largest. It extends from the southern portion of the Texas High Plains and eastern New Mexico, northward through the panhandle areas of Texas and Oklahoma into central to western Kansas and eastern Colorado, through Nebraska and Wyoming, and ending in southern South Dakota. Driving north towards Lubbock, as you climb up onto the flat tabletop that is the Great Plains, you can see—on the cut roadbanks—the striated layers of the ancient sands and gravel that hold the aquifer's water like a giant sponge.

Barbato and Mulligan are mapping the Ogallala's Texas portion, an area of about 33,400 square miles in 41 counties. By taking more than 42,000 water level measurements from numerous irrigation wells in the aquifer, they mapped the saturation thickness, available water in storage, and water used. They also generated maps of individual counties and saw that some show an increase in stored water, while others show declines.

Overall, the Ogallala's saturated thickness averages 200 feet, ranging from 0 to 1,200 feet. The areas with the greatest saturated thickness are in Nebraska and the panhandle areas of Texas and Oklahoma into southwestern Kansas. Some of the shallowest areas are to the south of the Panhandle, such as Big Spring and Lubbock. Because the rate of withdrawal has far exceeded the rates of recharge, well yields have declined. This is especially true in the southern part of the Texas High Plains, including the Big Spring and Lubbock area, eastern New Mexico, and central to northwestern Kansas and eastern Colorado. This gives a new meaning to the term "deficit spending."

ARS funds and participates in the Ogallala Aquifer Program, which includes a variety of research projects on water conservation through a consortium that includes ARS laboratories in Bushland and Lubbock, Texas, and Kansas State, Texas A&M, West Texas A&M, and Texas Tech universities. All told, more than 100 researchers are involved in 80 projects that cover 1 or more of the initiative's 7 priorities for reducing water use. These are: cropping and tillage systems, crop-livestock operations, improved irrigation equipment and systems, economic analyses, predicting the rate of the aquifer's decline, measuring how much water plants need, and conserving water on feedlots.

Sukant K. Misra, associate dean of research at Texas Tech University in Lubbock, says that while work on economic policies is high on Texas Tech's agenda, it's but one of many components being studied by university researchers involved in the Ogallala Initiative.

"Speaking as an administrator, the program has worked very, very well over the past 4 or 5 years," Misra says. "It is truly a collaborative effort, involving several universities and the Texas A&M Experiment Station, as well as ARS."

Jeff Johnson, of Texas Tech, is part of a group of economists studying the effects of different economic policy scenarios on water conservation and the economic effects on industries. Says Misra, "We also have a group of agronomists who are studying ways to conserve water, using different irrigation technologies. We have a group of GIS people who are mapping the aquifer, its levels, and rates of depletion. And we have researchers working on crop management practices, hydrology, and many other aspects related to conserving Ogallala water."

To see how ARS projects tie in with and complement these research objectives, go to the story beginning on page 4, "The Ogallala: Gauging, Protecting the Aquifer's Health."

Mark Walbridge
ARS National Program Leader
Water Availability and Watershed Management
Beltsville, Maryland