Case Study: Ogallala Aquifer

Do you use Ogallala water? The underground Ogallala Aquifer, also known as the High Plains Aquifer, once held as much water as Lake Huron (three billion acre-feet*). If pumped out over the United States, the aquifer would cover all 50 states with one and one-half feet of water. The aquifer is like a bucket full of wet gravel with all the pore spaces filled with water and a bedrock seal on the bottom. As the largest groundwater system in North America, the aquifer runs under parts of eight states: southern South Dakota, eastern Wyoming, most of Nebraska, eastern Colorado, western Kansas, western Oklahoma, western Texas, and eastern New Mexico.

Figure 1 Ogallala Aquifer

Source: North Plains Groundwater Conservation District

When the practice of irrigation became popular after World War II, people believed the Ogallala was an inexhaustible resource fed from an underground river originating in the Rocky Mountains. Farmers and landowners pumped extravagant amounts of water without any thought of conservation. A fourfold rise in use occurred between 1940 and 1970. By the 1970s, the Ogallala watered one-fifth of the total land under irrigation in the United States. Today, approximately 95 percent of the water pumped from the aquifer is devoted to irrigation. The water irrigates crops such as alfalfa, corn, cotton, and wheat, much of which is used to feed livestock.

The shaded area on the map represents the aquifer (see Figure 1): When the aquifer started to show signs of depletion, communities across state lines began negotiating. University of Kansas reported that "Farmers around Sublette, Kansas, figured in 1970 they had about 300 years of water left. In 1980 they reckoned they had 70 years' supply; in 1990, less than 30. Half the accessible water was gone by 1993.… While it took many millennia to fill, the Ogallala's usefulness to humankind will almost surely last less than a century."

*An acre-foot is equivalent to the volume of water required to cover 1 acre to a depth of 1 foot.

Case Study: Ogallala Aquifer (cont.)

Regional decision makers continue to struggle with the issue. They face the dual challenges of continued growth and economic dependence on the resource. To date, people have not limited their use of the aquifer to sustainable levels. Instead, citizens have pumped out water faster than it can be replenished. The Ogallala holds fossil water, which is water that has accumulated over the past 10,000 to 25,000 years. The only method of recharging this aquifer is the slow percolation of water through the soil. Because most of the High Plains soils are not very porous, recharging may occur at a rate of only an inch or so per year.

Ogallala water supports a significant portion of the nation's food supply. Yet, far too many people rely on greater groundwater yields than would be possible with the natural recharge rate. Farmers drained the aquifer at a rate of 1 percent per year in the late 1970s, drawing water 10 times faster than the aquifer could recharge under the best conditions. From the 1940s to 1980, the aquifer declined an average of 10 feet, with some areas in Texas declining nearly 100 feet. However, during the 1980s, the aquifer declined only another foot because of improved irrigation practices and new technologies. According to water scientists at the Kansas

Geological Survey, about 40 percent of the aquifer should be able to support pumping for the next 100 years, if water is used at the 1978–98 rate of withdraw. (Data for the remaining area of the aquifer were incomplete; therefore, the team at KGS was unable to project depletion rates for the entire aquifer.) To view maps of water level changes in the Ogallala Aquifer, go to http://ne.water.usgs.gov.

Sources:
Guru and Horne 2005 (E).
McNeill 2000 (A).
Romanek 1997 (E).
Texas Water Resources Institute 1998 [1978] (E).
University of Kansas 2001 (E).