

High Plains Regional Ground-Water Study: Design and Preliminary Results

Kevin F. Dennehy
U.S. Geological Survey
Denver, Colorado

In 1998, as part of the National Water-Quality Assessment (NAWQA) Program, the U.S. Geological Survey (USGS) began evaluating ground-water quality in the High Plains aquifer. The High Plains aquifer underlies 174,000 square miles in parts of eight States. The High Plains aquifer is the most abundant source of ground water in any agricultural region of the United States. About 96 percent of water pumped from the aquifer is used to irrigate crops on about 27 percent of the irrigated land in the United States, which yields about 30 percent of the Nation's ground water used for irrigation.

A series of studies are planned for the High Plains to determine the occurrence and distribution of chemical constituents in the aquifer and to develop an understanding of the processes that control water quality. The goal of the occurrence and distribution assessment is to characterize, in a nationally consistent manner, the broad-scale geographic distribution of water-quality conditions in relation to major contamination sources and background conditions. To accomplish this goal, ground-water studies of the primary hydrogeologic units that comprise the aquifer and effects of land use on water quality are planned. Additionally, process-oriented studies are planned that are intended to help identify and quantify factors that control ground-water movement and quality. Two examples of process-oriented studies include regional transect studies and unsaturated-zone studies.

Occurrence and distribution studies and process-oriented studies provide a holistic assessment of water quality in the High Plains aquifer. Results of these studies will (1) enable assessment of the rate and movement of water and chemicals entering the aquifer from the unsaturated zone; (2) determine if specific land-use practices affect recently recharged water; and (3) describe the vertical changes in water quality and age of ground water throughout the saturated thickness of the aquifer. This information will be valuable in assessing the long-term sustainability of the aquifer from a water-quality perspective.