



WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY GROUND-WATER STUDIES IN ARIZONA

GROUND-WATER ISSUES

Water demands in the northern and southeastern parts of Arizona are met almost entirely from ground-water sources. Water demands in the south-central part of Arizona are met by the conjunctive use of ground water and surface water imported from the Colorado River. Water demands along the flood plain of the Colorado River in western Arizona are met by diversion of surface water from the river and by pumping shallow ground water. In 1985, ground-water sources supplied about 48 percent of the total water used in Arizona. Of the total quantity of ground water withdrawn, 82 percent was used to irrigate slightly more than 1 million acres of crops, 13 percent was used for public supply, and about 5 percent was used for domestic, commercial, and industrial uses. Public supplies in Arizona provide ground water to about 1,930,000 people. The major issues related to ground water in Arizona include:

- Availability of supplies,
- Contamination, and
- Depletion of supplies.

U.S. GEOLOGICAL SURVEY PROGRAMS

The U.S. Geological Survey (USGS), established in 1879, is the principal source of scientific and technical expertise in the earth sciences within the Federal government. The mission of the Water Resources Division of the USGS is to develop and disseminate scientific information on the Nation's water resources. The activities of the Water Resources Division in Arizona are conducted by scientists, technicians, and support staff in offices in Tucson, Phoenix, Thatcher, Flagstaff, and Yuma.

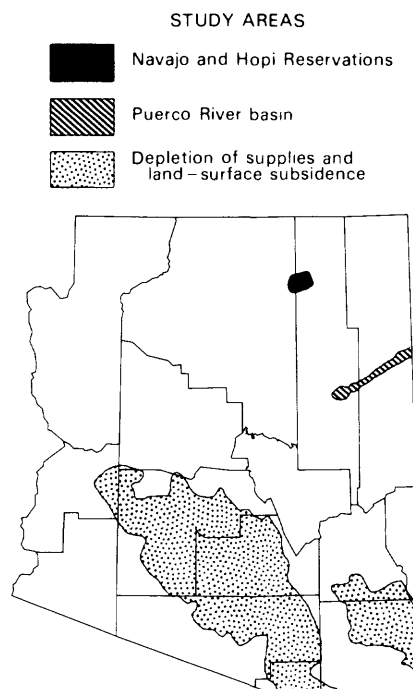
During 1987, the USGS, in cooperation with Federal, State, and local agencies, maintained a network of about 1,100 observation wells in Arizona to monitor fluctuations of water levels. Information on water levels, water-level changes, and ground-water pumpage are collected and published each year. The USGS has conducted more than 500 hydrologic investigations in Arizona. During fiscal year 1987, the USGS entered into cooperative or cost-sharing agreements with 29 Federal, State, and local agencies involving 40 hydrologic investigations in Arizona; 11 of these investigations included studies of ground-water quantity and quality. These investigations provide information needed to answer hydrologic questions that are specific to the State's principal ground-water issues. Three examples of ground-water studies by the USGS that address specific ground-water issues in Arizona are discussed in the following sections.

Quality of Water Supplies, Navajo and Hopi Reservations

The USGS has been involved in studies of water supplies on Indian reservations in Arizona since 1895. As part of recent studies in cooperation with the Bureau of Indian Affairs, well designs were developed to abate the high arsenic concentrations in ground water in parts of northeastern Arizona. These designs are being used for wells that provide potable water from a multiple-aquifer system for domestic and livestock use on the Navajo and Hopi Indian Reservations.

Contamination, Puerco River Basin

Contamination is a major concern because ground water is the sole source for public water supplies in many parts of Arizona. Uranium mining and milling in northwestern New Mexico have resulted in releases of radionuclides and other hazardous trace elements into the Puerco River that drains westward into northeastern Arizona. In 1979, the single largest spill of uranium-tailings liquid in United States history occurred in the headwaters of the Puerco River in New Mexico. The



USGS, in cooperation with the Navajo and Hopi Relocation Commission (NHRC), verified radionuclide contamination of water in the alluvial aquifer along the river. The results of this study will be used by the NHRC to develop an expanded program to determine the areal extent and the severity of ground-water contamination.

Depletion of Supplies and Land-Surface Subsidence

Withdrawals of ground water in southern Arizona have caused water-level declines of more than 100 feet in many areas, and more than 500 feet in parts of central Arizona. Depletion of ground water in the alluvial-aquifer system has necessitated the deepening of many wells and pumping from deeper confined aquifers. Ground-water withdrawals have caused large areas of land surface to subside and to develop fissures over more than 3,000 square miles in southern Arizona, including the Tucson and Phoenix metropolitan areas. The subsidence has damaged a variety of engineering structures, including buildings, streets, highways, railroads, earthen dams, water wells, canals, and sewage-disposal facilities. The USGS has evaluated land subsidence and earth-fissure hazards along the Central Arizona Project aqueduct between Phoenix and Tucson in cooperation with the U.S. Bureau of Reclamation. The results of these evaluations have been used in the design of the Central Arizona Project aqueducts and pumping plants. Similar studies are being conducted in cooperation with the city of Tucson to evaluate potential land subsidence in the Tucson basin and in Avra Valley. Use of these studies will help the city of Tucson to plan water-resources development in a manner that will minimize the effects of land-surface subsidence.

GROUND-WATER MANAGEMENT

The Groundwater Management Act of 1980 established the Arizona Department of Water Resources as the administrator of programs that regulate ground-water withdrawals and reduce ground-water overdraft. The Arizona Environmental Quality Act of 1986 established the Arizona Department of Environmental Quality as administrator of State programs to protect the quality of the State's water. Both agencies use ground-water data and the results of ground-water studies provided by the USGS. During fiscal year 1988, the following Federal, State, and local agencies entered into interagency or cooperative agreements

with the USGS to conduct ground-water investigations in Arizona:

Arizona Department of Environmental Quality
Arizona Department of Water Resources
Arizona Bureau of Geology and Mineral Technology
City of Tucson
Maricopa County Municipal Water Conservation District No. 1
Salt River Valley Water User's Association
U.S. Bureau of Indian Affairs
U.S. Bureau of Reclamation
U.S. Department of Commerce
U.S. Environmental Protection Agency
U.S. National Park Service

SELECTED REFERENCES

- Schumann, H.H., and Genualdi, R.B., 1986, Land subsidence, earth fissures, and water-level change in southern Arizona: Arizona Bureau of Geology and Mineral Technology, Geological Survey Branch, Map 23, 1 sheet.
- U.S. Geological Survey, 1984, National water summary 1983—Hydrologic events and issues: U.S. Geological Survey Water-Supply Paper 2250, 243 p.
- , 1985, National water summary 1984—Hydrologic events, selected water-quality trends, and ground-water resources: U.S. Geological Survey Water-Supply Paper 2275, 467 p.
- Webb, R.H., Rink, G.R., and Radtke, D.B., 1987, Preliminary assessment of water quality in the alluvial aquifer of Puerco River basin, northeastern Arizona: U.S. Geological Survey Water-Resources Investigations Report 87-4126, 70 p.

Information on technical reports and data related to ground water in Arizona can be obtained from:

District Chief
U.S. Geological Survey
Water Resources Division
300 West Congress Street
Tucson, Arizona 85701-1393

Director
Water Resources Research Center
University of Arizona
Tucson, Arizona 85721

Open-File Report 88-164

Herbert H. Schumann, 1988