Water Resources Assessment and Research Subactivity

Program	1999 Estimate	Uncontrol. & Related Chgs	Program	Program Changes	FY 2000 Budget Request	Change from 1999
Ground-Water Resources	**3,170**	**96**	**-851**	**0**	**2,415**	**-755**
National Water-Quality Assessment	71,593	2,165	-12,532	0	61,226	-10,367
Toxic Substances Hydrology	14,659	433	-3,284	474	12,282	-2,377
Hydrologic Research & Development	15,011	450	-2,786	-300	12,375	-2,636
Total Requirements $000	104,433	3,144	-19,453	174	88,298	-16,135

Note: The Program Redirect column reflects the redirection of funds to the Integrated Science, Science Support, and Facilities activities.

Ground-Water Resources

Current Program Highlights

Ground water is one of the Nation's most important natural resources. Aquifers supply drinking water to about 130 million U.S. residents (about 50 percent of the population), and ground water is used in all 50 States. Much of the water used for irrigation by the Nation's important agricultural sector is provided by ground water. About 42 million people, including most of the rural population, supply their own drinking water from individual wells. Ground water also plays a crucial role in sustaining streamflow. During low-flow periods, most streamflow is derived from ground water. Ground-water pumping decreases the amount of ground water that flows to streams, or causes streams to seep to ground water. As a result, ground-water users and surface-water users commonly compete for the same resource. Ground water is vital to the health of lakes and wetlands. Moreover, plants and aquatic animals greatly depend upon the ground water that discharges to the streams, lakes, and wetlands in which they live.

The USGS Ground-Water Resources Program: (1) evaluates the availability of ground water in the Nation's major aquifer systems, (2) develops quantitative assessments of ground-water flow in major aquifers systems and the interaction of ground water with surface water, and (3) evaluates the hydrologic, geologic, and geochemical controls that govern the response of major aquifer systems to pumping, droughts, and other stresses. The program complements the USGS Federal-State Cooperative Water Program, which evaluates water resources on a more local scale in response to concerns raised by State and local water managers. The Ground-Water Resources Program comprises the following components:

Investigations of Critical Regional Aquifer Systems

- **Middle Rio Grande Basin, New Mexico** — Studies by the New Mexico Bureau of Mines and Mineral Resources and the USGS, in cooperation with the City of Albuquerque, have shown that ground water is not as plentiful as once thought. Work is underway by the USGS to improve understanding and accuracy of estimates of the quantities and distribution of water moving into and through the ground-water system of the entire Middle Rio Grande Basin.

Regional Assessments of Key Ground-Water Issues

- **Southwestern United States** — Surface water in the southwestern U.S. is generally fully appropriated, and considerable ground-water development has taken place. New water supplies increasingly rely on conjunctive use of surface water and ground water. The dependence of sensitive ecosystems on ground water creates further competition for scarce water resources. To address these concerns, the USGS has begun a study of the interaction of ground water and surface water in the Southwest.

- **Atlantic Coast** — Development of ground-water resources along the Atlantic coast has caused saltwater to intrude many highly productive aquifers. Related concerns exist about the effects of changes in ground-water discharge to coastal ecosystems. A project to review what is known about these freshwater-saltwater issues along the Atlantic coast has recently begun.

National Aquifer Database — A long-term goal of this component is to build a database that contains up-to-date information on major features of each regional aquifer system. Features such as aquifer extent, water-level maps, aquifer thickness, hydraulic properties, and major geochemical characteristics would be available as digital files over the Internet. Preliminary planning is underway for the database.

Recent Accomplishments

Middle Rio Grande Basin Study — The Ground-Water Resources Program is supporting a 5-year multi-divisional study of the hydrology, geology, and land-surface characteristics of the Middle Rio Grande Basin. Rapid population and economic growth in the Basin has caused water-supply concerns that require additional scientific information for water-resources management. The study is being conducted as a partnership among Federal, State, and local water agencies to deal with the area's water-resources concerns at various scales. Stakeholders meetings were held in 1997 and 1998 and additional meetings are planned for 1999 and 2000 when the project will conclude. Proceedings from the stakeholders meetings were published in 1998 as USGS reports with 94 articles describing scientific contributions to the study. The main product of the study will be an improved ground-water-flow model for the Middle Rio Grande Basin that will be used by water managers to better plan for a sustained water supply for the region.

Ground Water Atlas of the United States — The USGS has completed an atlas of the Nation's major aquifers. The atlas comprises a series of printed publications that describe the location, extent, and geologic and hydrologic characteristics of important aquifers in the United States. The series consists of 13 chapters that describe the ground-water resources of regions that, collectively, cover the 50 states, Puerto Rico, and the U.S. Virgin Islands. A summary chapter of the Atlas is being prepared. More information on the Ground Water Atlas can be found on the USGS Web site at **http://wwwcapp.er.usgs.gov/publicdocs/gwa/**.

Geophysical Applications for Ground-Water Studies — The USGS conducts research into new geophysical techniques for water supply and contamination studies. One area of research is ground-water flow through fractured rocks, which is one of the most difficult hydrologic settings to describe and simulate accurately. New geophysical techniques are being used to characterize these settings in ways not previously possible with standard technology. For example, a novel borehole radar system was used to locate subsurface fractures and assess ground-water supply in the Atlanta, Georgia area.

USGS Designated as a Groundwater Guardian National Partner — In 1998, the Groundwater Foundation selected the USGS as the national partner to be honored at its annual awards ceremony for the Groundwater Guardian Program in Anaheim, California. This is the first time this award has been given to a partner by the Groundwater Foundation.

Solutions for Hydraulic Interaction of Stream-Aquifer Systems — Ground-water/surface-water interaction is increasingly recognized as an important part of the hydrologic cycle. As a result, USGS hydrologists wrote and published two new computer programs that evaluate analytical solutions for stream-aquifer interaction for 10 typical hydrologic settings. The programs can be used by government and private sector hydrologists to determine aquifer hydraulic properties, design stream-aquifer data collection networks, and determine ground-water discharge rates to streams.