Fact Sheet

United States Geological Survey
Programs in Georgia

The USGS provides maps, reports, and information to help others meet their needs to manage, develop, and protect America's water, energy, mineral, and land resources. We help find natural resources needed to build tomorrow, and supply scientific understanding needed to help minimize or mitigate the effects of natural hazards and environmental damage caused by human activities. The results of our efforts touch the daily lives of almost every American.

The U.S. Geological Survey (USGS) has offices in every State and Commonwealth, providing a local presence and facilitating relations with the public and private sectors, academia, State and local agencies, and other Federal agencies. This widely distributed network of scientific personnel provides a long-term earth-science information base that makes the USGS a valued national resource. This Fact Sheet describes a few of the USGS activities in Georgia.

Competing Demands for Water

Georgia historically has been blessed with an abundant supply of freshwater. However, population growth and economic development have led to competing demands for water in areas where water resources are limited. Water use during 1990, excluding use for thermoelectric power generation, was 2,290 million gallons per day (fig. 1).

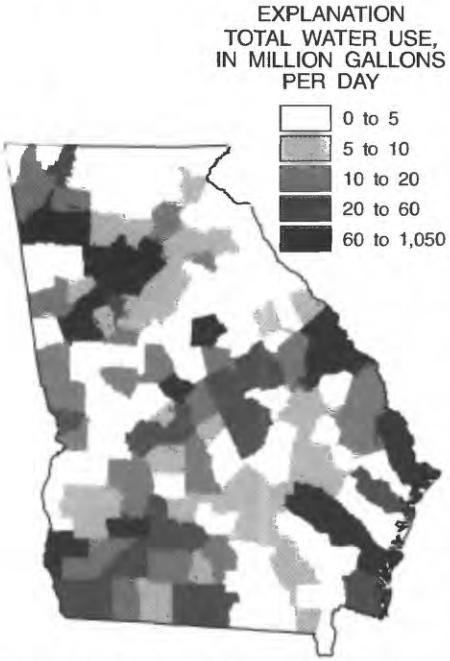

Figure 1. Water use in Georgia by county for 1990.

Competition for water has arisen between individuals, cities, corporations, States, and various Federal agencies as increased use of water has reduced flow in rivers, lowered ground-water levels, and caused saltwater intrusion into aquifers in coastal areas. To resolve these conflicts, State and Federal agencies are attempting to develop water-resource management plans and are evaluating proposed projects to develop water resources in some areas. The USGS provides needed information on water quantity, water quality, and water use, so that planners and other officials can make informed decisions on water-resources issues.

The Apalachicola-Chattahoochee-Flint River Basin

The Apalachicola-Chattahoochee-Flint River Basin is one area of the State where users are competing for water. The upper reach of the basin includes part of the rapidly growing Metropolitan Atlanta area. Between 1970 and 1990, water used for public supply in this basin increased about 260 percent to almost 460 million gallons per day and irrigation use increased 1,300 percent to about 200 million gallons per day, according to data compiled by the USGS in cooperation with the Georgia Geologic Survey. Total water use increased 38 percent in the Georgia part of the river basin. Increased demands for surface and ground water from this river basin in Georgia could affect surface- and ground-water availability in Alabama and Florida, as well as in Georgia. The USGS is cooperating with the Georgia Department of Natural Resources and the U.S. Army Corps of Engineers to evaluate how changes in surface- and ground-water withdrawals affect water availability and streamflow and to identify areas where ground-water resources are over- or under-utilized.

Savannah-Chatham County Area

Current and future demands for water in the Savannah-Chatham County area of Georgia and South Carolina affect both States. Water withdrawal from the Upper Floridan aquifer has resulted in substantial water-level declines and subsequent encroachment of seawater into the aquifer at the northern end of Hilton Head Island, S.C. The USGS conducted a study, in cooperation with the Chatham County-Savannah Metropolitan Planning Commission, to evaluate current water use and availability of ground water and surface water to meet current and future demands. Results from a ground-water model indicated little potential for withdrawing additional water from the Upper Floridan aquifer. For areas where ground water is the only supply of water, several options were evaluated for redistributing current pumpage so that additional ground water could be withdrawn without causing additional water-level decline and saltwater encroachment. The Savannah and Ogeechee Rivers have the quality and quantity of water to supply some of the future demands for water in the area.

USGS's continuing collection of streamflow, ground-water-level, and water-use data provides historical and current information needed to support water-resources studies, such as those in the Apalachicola-Chattahoochee-Flint River Basin and the Savannah-Chatham County area. Basic data collection also helps hydrologists, planners, and regulators to identify other areas where competition for water could arise.

Hydrologic Hazards

Floods and droughts are very damaging natural hazards in Georgia, as was recently demonstrated. In July 1994, rainfall from Tropical Storm Alberto caused flooding in

the Flint and Ocmulgee River Basins. These floods affected 54 counties and hundreds of thousands of people, damaging or destroying highways, water-supply systems, wastewater-treatment plants, crops, and homes. Damage from such a severe flood cannot be averted completely, but with sound hydrologic information, reliable estimates of river stages and discharge can be made and communities can be warned of impending danger. During the flood, data transmitters at 66 USGS continuous stage-monitoring stations provided near-real-time tracking of flooding conditions, which allowed local, State, and Federal agencies to respond to emergency situations better as they developed. The USGS also responded during flooding conditions by measuring peakflow rates and flagging high-water marks so that flood profiles could be determined and indirect computations of peak-flood flow could be made. These types of information help hydrologists make better estimates of future floods that might occur and how the floodwaters will behave under various conditions. The USGS is coordinating efforts to produce digital image files that will serve as background "photo maps" of the flood-damaged area. These photo maps can be used in a geographic information system to plan and prioritize the actions needed to restore the region's communities, infrastructure, and economy.

With accurate estimates of flood magnitude and flood frequency, planners and managers can better design highway bridges and culverts, determine locations for water- and wastewater-treatment facilities, prepare zoning ordinances, and establish flood-insurance rates. To provide the basic data for surface-water studies in Georgia, the USGS operates 122 streamflow-gaging stations and 87 crest-stage stations (fig. 2) in cooperation with other Federal, State, and local agencies, such as the U.S. Army Corps of Engineers, the Georgia Department of Natural Resources, the Georgia Department of Transportation, and several cities, counties, and water authorities. Information from these data-collection stations is used to determine hydraulic and hydrologic characteristics needed for flood-frequency and flood-magnitude estimates. Other beneficiaries of this data collection are the National Weather Service and the Southeast River Forecast Center.

USGS annually publishes streamflow and stage data and prepares reports that describe hydrologically significant floods. Other USGS reports give the results of flood-frequency studies, describe techniques for estimating flood frequencies for certain types of river basins in the State, and describe rainfall and runoff relations in the State. All data collected through either established data-collection stations or special measurements during floods are stored in a computerized data base and are available to the public.

The network of USGS surface-water data-collection stations also is used to document drought conditions and to prepare reports on low flows that occur during droughts. In Georgia, the decade of the 1980's was generally characterized by below-normal flow conditions, and the State experienced at least three significant low-flow events. The USGS, in cooperation with State and other Federal agencies, responded to the drought conditions by making hundreds of nonroutine measurements of low-flow conditions and documented two of the droughts with special reports. Ground-water levels during droughts are recorded by a network of observation wells (fig. 2), which are operated by the USGS in cooperation with local and State agencies.

Potential Contamination

Where soil or ground water has been contaminated by human activities, the potential exists for contaminants to spread to other areas that could affect water supplies or cause direct health hazards for people living in those areas. One such potential source of contamination is the U.S. Department of Energy Savannah River Site in South Carolina (fig. 3), where hazardous materials, including

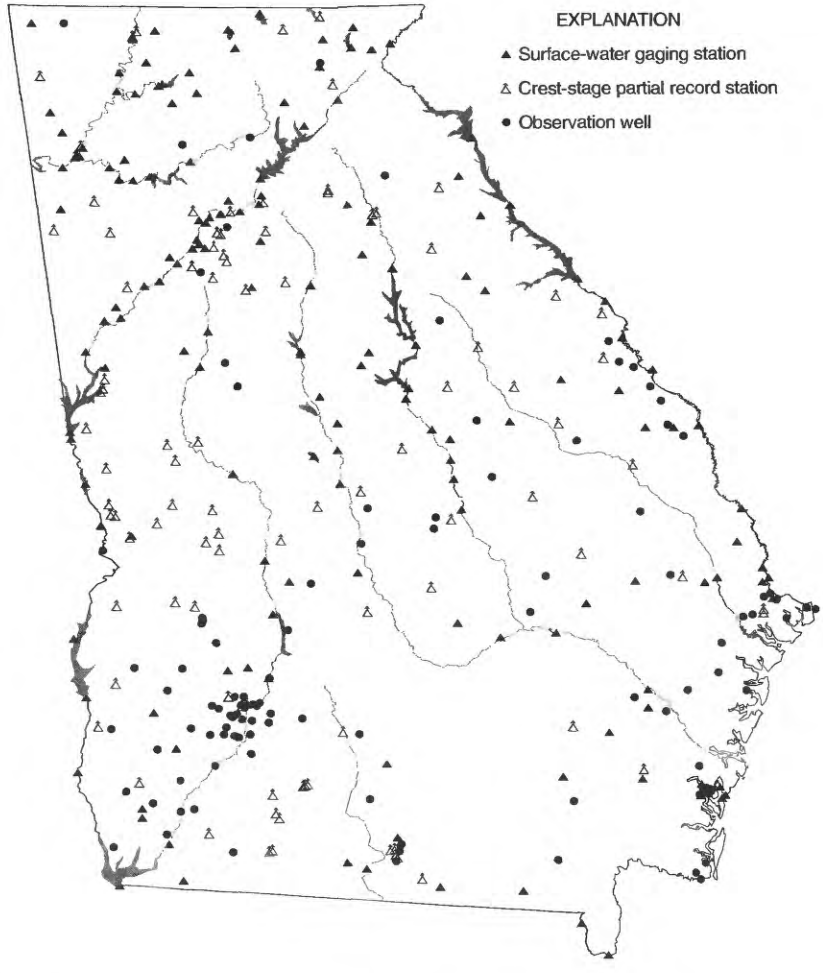

Figure 2. Surface-water and ground-water data-collection stations in Georgia.

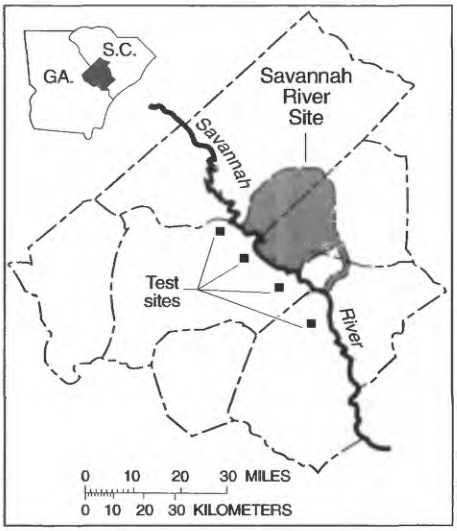

Figure 3. Location of test sites near the Savannah River Site, South Carolina.

radionuclides, volatile organic compounds, and trace metals, are disposed of or stored. The potential exists for contaminants to infiltrate into ground water and flow through aquifers in South Carolina, beneath the Savannah River, and into Georgia (transriver flow). The existing ground-water flow directions and the conditions under which those flow directions might change in response to ground-water pumping are not well understood. The USGS, in cooperation with the U.S. Department of Energy, the Georgia Department of Natural Resources, and Clemson University, is conducting a comprehensive study of ground-water flow and stream-aquifer relations in the vicinity of the Savannah River Site.

The first phase of the study has defined the geologic, hydrologic, and water-quality conditions in the area. At four sites in Georgia, clusters of test wells were drilled and samples of the sediments were analyzed to obtain a detailed description of their geologic characteristics. Data on the water quality and water levels in the wells, along with information on the flow in the Savannah River, were analyzed to determine which aquifers are hydraulically connected, and which aquifers are affected by the water level of the river. The quality of water also was analyzed to determine if any contamination had occurred at the test sites. Data from the four test sites, together with data from an additional 110 wells, were used to prepare geologic maps showing the depth and thickness of six aquifers and their confining units. Additional geologic information was obtained from 18 auger borings in the Savannah River flood plain to determine how deeply the ancient Savannah River had cut into the underlying aquifers, an important control over transriver flow. This information currently is being documented in a series of reports.

Effects of Global Climate Change

Nationally, another area where the USGS is working to supply the information needed to mitigate the effects of human activities is the Global Climate Change Program; the purposes of this program are to understand and predict what effects global climate change might have on the environment. Global temperatures may increase because of increasing atmospheric carbon dioxide concentration, which results from the burning of fossil fuels. Carbon is present in many forms in the environment, including humus in the soil, wood and leaves, animal tissue, and various dissolved forms in water. The USGS is studying the hydrologic, geochemical, and biological processes that control the cycling of carbon among these forms.

In the Southeastern United States, the principal stores of carbon are wood in trees and humus in the soil. Major factors that affect the carbon cycle in the Southeast are (1) changes in the amount of rainfall, (2) the distribution of the rainfall during the year (which affects tree growth), and (3) the effects of air pollution on the chemical reactions that influence soil fertility. The USGS is conducting long-term field investigations at the Panola Mountain Research Watershed near Stockbridge, Georgia, to study these carbon-cycle factors (along with other geochemical cycles such as sulfur and calcium) and the effects that climate change might have on them. This research is complemented by research on acid-rain effects at the same site. Historic patterns of rainfall in the area are being studied by dendrochronology—examining tree rings to assess the effects climate may have had on the growth of trees at Panola Mountain during the last 50 to 70 years. In addition to the implications for global environmental policy to reduce climate change, the research also can have more immediate implications for forestry management. The Panola Mountain studies are funded through the USGS Acid Deposition and Global Change Hydrology Programs.

Geologic and Geohydrologic Studies in North Georgia

Geologic mapping in the northern half of Georgia is providing information that can help manage, develop, and protect mineral, water, and land resources. Since the early 1970's, the USGS has been engaged in the long-term Georgia Appalachians Project to provide a base of modern geologic mapping of the Piedmont-Blue Ridge and the Valley and Ridge Provinces in Georgia. The project is developing an inventory of locations and sizes of deposits of industrial mineral and rock products used in construction of buildings, dams, roadways, and other uses that require large quantities of crushed stone or building stone and an inventory of locations of industrial materials such as carbonate rock for fillers, paper whiteners, and industrial chemicals, and other materials such as ocher and manganese-dioxide for pigmentation and chemical products. Work also is done to determine the basic engineering characteristics of rock units that might be suitable for roadbed, road-surface, and other construction uses.

USGS geologists and hydrologists are working together to evaluate the potential for ground-water resources for residential, community, and industrial development in the Piedmont-Blue Ridge Province; to find areas that need protection to maintain ground-water quality and quantity; and to determine the suitability of locations for hazardous or nonhazardous waste disposal, including the development of geologic and engineering parameters for siting landfills and other possible contaminant-producing facilities. The Georgia Appalachians Project is providing the scientific basis for evaluating contamination and remediation at hazardous-materials sites and how the contamination might affect ground and surface water and the basis for evaluating geologic hazards, such as sinkholes, minor earthquakes, and pollution from mining or

quarrying operations. This geologic mapping also is the foundation for understanding the evolution of the Appalachian Mountain system. USGS scientists are using all these types of geologic and hydrologic information to educate the public about earth history, the effect of geology and hydrology on the environment, and geologic hazards.

National Mapping Program

Among the most popular and versatile products of the USGS are its 1:24,000-scale topographic maps (1 inch on the map represents 2,000 feet on the ground). These maps depict basic natural and cultural features of the landscape, such as lakes and streams, highways and railroads, boundaries, and geographic names. Contour lines are used to depict the elevation and shape of terrain. The entire State is covered by 1,017 maps at this scale, which is useful for civil engineering, land-use planning, natural-resource monitoring, and other technical applications. These maps have long been favorites with the general public for outdoor uses, including hiking, camping, exploring, and other back-country expeditions. Topographic maps are produced by cooperative efforts between the USGS and other Federal, State, and local agencies in the State of Georgia.

Presently, the USGS is working with the Department of Community Affairs, the Department of Transportation, and other State agencies to produce digital image files of the sites for the 1996 Summer Olympics. During the past 2 years, the USGS has worked with agencies in Georgia to produce computerized-mapping image files of other parts of the State and to acquire aerial photographs for mapping through the National Aerial Photography Program (completed in the spring of 1993). These image files, derived from aerial photographs, are used to update USGS base maps and can also be used with a geographic information system (GIS). The USGS also provides digital data on roads, streams, and other map information that can be used in a GIS. GIS is used by local, State, other Federal agencies, and private companies for traffic-management studies, environmental planning and analysis, and many other types of geographic studies to manage, develop, or protect natural resources.

Earth Observation Data

Through its Earth Resources Observation Systems Data Center near Sioux Falls, South Dakota, the USGS distributes a variety of aerial photographs and satellite image data products that cover the entire State. Mapping photographs of some sites go back at least 40 years. Satellite images can be used to study changes in regional landscapes dating from 1972.

Geologic Information Centers

The National Earthquake Information Center (NEIC) in Golden, Colorado, collects, processes, and distributes information from more than 20,000 seismic events each year. This information is distributed in the form of alerts, bulletins, and routine catalogs to emergency management officials at the Federal and State levels, operators of critical facilities, news media, the general public, and the earthquake research community. These catalogs of recent and historical earthquake information are used in earthquake hazards assessments. In order to better fulfill its mission, the NEIC has developed, and is deploying, the U.S. National Seismograph Network (USNSN), which, when completed, will consist of approximately 60 seismograph stations nationwide. The USNSN monitors nationwide seismicity, provides early notification of seismic events to national-level emergency services personnel, and provides public information on earthquakes. A USNSN station in Eatonton, Georgia, is operated in cooperation with the University of Georgia.

Cooperative Programs

USGS work in Georgia is pursued in partnership with many State and local agencies. A few examples not referenced above are the City of Brunswick; the Albany Water, Gas, and Light Commission, Glynn County, the Georgia Forestry Commission; and the U.S. Federal Emergency Management Agency.

The USGS provides support to the Georgia Environmental Resources Center, which conducts a program of research, education, and information and technology transfer.

For more information contact any of the following:

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National Earthquake Information Center
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Mail Stop 967
Denver, Colorado 80225
(303) 273-8500

Additional earth science information can be found by accessing the USGS "Home Page" on the World Wide Web at "http://www.usgs.gov".

For more information on all USGS reports and products (including maps, images, and computerized data), call 1-800-USA-MAPS.

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