



# WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

## U.S. GEOLOGICAL SURVEY GROUND-WATER STUDIES IN MISSISSIPPI

### GROUND-WATER ISSUES

Mississippi depends heavily on its abundant ground-water resources. Aquifers capable of yielding large volumes of water that is suitable for most uses have led to the nearly exclusive use of ground water for public and industrial water supplies. Ground water constitutes 86 percent of the water used for public supply and serves the water-supply needs of about 2.3 million people in Mississippi (93 percent of the population). Ground-water is the source of supply for 54 percent of all the freshwater used in the State. In 1985, 49 percent of the total ground water withdrawn was for irrigation, 20 percent for fish farming, 19 percent for public supply, and 12 percent for self-supplied industrial uses. The major issues related to ground water in Mississippi are:

- Declining water levels;
- Decreasing supplies;
- Saltwater encroachment in some coastal areas; and
- Effects of oil-field brines and agricultural chemicals on water quality.

### 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. USGS activities include research and services in the fields of geology, hydrology, and cartography. The mission of the Water Resources Division of the USGS is to develop and disseminate information on the Nation's water resources. The activities of the Water Resources Division in Mississippi are conducted by scientists, technicians, and support staff in Jackson, Tupelo, and Bay St. Louis.

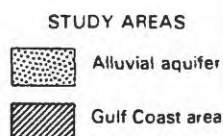
Hydrologic data-collection stations are maintained at selected locations throughout Mississippi to obtain data on stream discharge and stage, reservoir and lake stage, ground-water levels, well yields, and the quality of surface and ground water. Water-resources data are stored in the USGS National Water Data Storage and Retrieval System data base. These data are used by water planners, numerous State and local agencies, and others involved in making decisions that affect the water resources of Mississippi.

During 1987, the USGS, in cooperation with Federal, State, and local agencies, maintained a network of about 500 observation wells in Mississippi to monitor fluctuations of water levels. Water-level measurements from wells are used to monitor ground-water trends. These data need to be integrated with other observations and ground-water investigations, however, so that the resource can be properly managed and protected.

The USGS has conducted more than 100 hydrologic investigations in Mississippi. During fiscal year 1987, USGS entered into cooperative agreements with 15 Federal, State, and local agencies involving 17 hydrologic investigations in Mississippi; 9 investigations included studies of ground-water quantity and quality. Ground-water studies that have made significant contributions toward understanding the hydrologic problems facing Mississippi are discussed in the following sections.

### Alluvial Aquifer of Northwestern Mississippi

Large ground-water withdrawals for rice irrigation, catfish farming, and row-crop irrigation in the alluvial plain in northwestern Mississippi have resulted in long-term water-level declines in the shallow aquifer in the most important agricultural area in the State. Concern over the ability of the aquifer to meet the increasing demand for water led to a cooperative investigation of the alluvial aquifer by the USGS and the Bureau of Land and Water Resources (BLWR) of the Mississippi Department of Natural Resources. This investigation included the collection of water-level data from about 500 wells during a 3-year period and the development of a computer model of ground-water flow. The model was used to evaluate the water-level response of the



aquifer to several alternative ground-water pumping rates and distribution patterns. The study indicated that recharge to the aquifer could not support the withdrawals and that, by the year 2003, ground-water levels would be substantially lowered in a large area in the central part of the alluvial plain. The results of this investigation were instrumental in the enactment of State water-management legislation in 1985. These laws provide for the regulation of ground-water withdrawals through a permit system and authorize the creation of local water-management districts. The first water-management district to be proposed under the 1985 law is being considered by the 18 counties in the area included in the alluvial aquifer study.

### Mississippi Gulf Coast Area

Intense development of the aquifer system along the Mississippi Gulf Coast has resulted in large water-level declines and altered ground-water flow patterns. Water levels in some of the aquifers have been declining about 2 feet per year since 1940. Flowing wells were once common throughout the area, but ground-water levels in much of the area are now as much as 80 feet below sea level. These declines have resulted in the gradual movement of saltwater toward the major pumping centers. Concern about the ability of the aquifers to meet the growing demand for water and the threat of saltwater encroachment into the freshwater aquifers along the Gulf Coast led to a cooperative investigation of the ground-water resources by the USGS and the BLWR. This 3-year investigation included the study of geohydrologic data at more than a thousand sites and the collection of ground-water quality data at several hundred wells. An eight-layer computer model of the aquifer system was used to evaluate the response of water levels in the various aquifers or layers to projected increases in ground-water withdrawals through the year 2005. Model results indicated that water levels near the larger pumping centers would decline an additional 40 to 135 feet by the year 2005. An analysis of the projected declines indicated that, in the most critical areas, saltwater is expected to reach the southern edge of municipal and industrial well fields within 10 years. The results of this investigation prompted the BLWR to announce its intention to deny ground-water withdrawal permit applications in critical areas beginning in 1996. Efforts by local entities to establish a local water-management district and to study the technical and financial feasibility of developing a surface-water supply are underway.

### GROUND-WATER MANAGEMENT

The principal State agencies responsible for ground-water management in Mississippi are the Bureau of Land and Water Resources and the Bureau of Pollution Control of the Mississippi Department of Natural Resources. The Bureau of Land and Water Resources administers and enforces the State's water law,

and is the primary regulatory agency for the withdrawal and use of surface and ground water. The Bureau of Pollution Control is responsible for issuing permits for waste discharges and for monitoring those discharges, including the underground injection of wastes (other than wastes associated with oil and gas production, which has not been delegated to the State and remains with the U.S. Environmental Protection Agency). Both of the State agencies involved with the management and protection of ground-water resources rely on data and results of investigations provided by the USGS. During fiscal year 1988, the following Federal, State, and local agencies entered into interagency or cooperative cost-sharing programs with the USGS to conduct ground-water investigations in Mississippi.

City of Jackson  
Harrison County  
Jackson County  
Mississippi Department of Natural Resources  
Bureau of Land and Water Resources  
Bureau of Pollution Control  
Mississippi Gulf Coast Regional Planning Commission  
U.S. Army Corps of Engineers

### SELECTED REFERENCES

- Sumner, D.M., and Wasson, B.E., 1984, Geohydrology and simulated effects of large ground-water withdrawals on the Mississippi River alluvial aquifer in northwestern Mississippi: U.S. Geological Survey Open-File Report 84-822, 83 p.
- Sumner, D.M., Wasson, B.E., and Kalkhoff, S.J., 1987, Geohydrology and simulated effects of withdrawals on the Miocene aquifer system in the Mississippi Gulf Coast area: U.S. Geological Survey Water-Resources Investigations Report 87-4172, 203 p.
- 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.

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

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