

United States Geological Survey

Programs in Mississippi



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.

Collection and Analysis of Flood Data

The U.S. Geological Survey (USGS) works closely with the Mississippi Department of Transportation (MDOT) which spends millions of dollars annually for highway construction. Streamflow records, hydrologic analyses of basins, and hydraulic analyses of the flooding potential at proposed highway crossings provide information used by the MDOT for economical and optimum design of highway-drainage structures.

Flood-frequency and hydraulic characteristics at a highway crossing are determined from historical flood elevations recovered by the USGS, cross-section data, and correlations with nearby gaging stations. This information not only provides the basis for the design of highways and drainage structures, but also is used by local agencies and the general public as a guide in flood-plain management.

National Water-Quality Assessment Program

In 1991, the USGS began the National Water-Quality Assessment (NAWQA) Program. The long-term goals of the NAWQA Program are to describe the status of and trends in the quality of a large part of the Nation's water resources and to identify the major natural and human factors that affect the quality of these resources. In 1994, the Mississippi Embayment study unit was among the 20 NAWQA Program study units selected for study under the phased implementation plan of the program.

The Mississippi Embayment study unit covers an area of about 48,500 square miles and includes parts of Arkansas, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee (fig. 1). More than 75 percent of land use in the study area consists of cropland with interspersed pasture, forest, and woodland. About 5 percent of the study area consists of



Figure 1. Location of the Mississippi Embayment National Water-Quality Assessment study unit.

forested wetlands of the Mississippi River, a unique ecosystem that is not as extensive as it once was.

Pesticides and other organic compounds, nutrient and sediment loads, and trace elements in the area's surface and ground waters will be investigated as part of the Mississippi Embayment study. Aquatic ecology will be evaluated as an integrated indicator of water quality.

Susceptibility of Major Aquifers to Surface and Shallow-Source Contamination

In cooperation with the Mississippi Office of Pollution Control and the Mississippi Department of Agriculture and Commerce, the USGS is evaluating the relative susceptibility of major aquifers in Mississippi to surface and shallow-source contamination. A geographic information system is being used to integrate and analyze geologic, hydrologic, and physiographic data in the evaluation.

Index of Subjects

- Collection and Analysis of Flood Data
- National Water-Quality Assessment Program
- Susceptibility of Major Aquifers to Surface and Shallow-Source Contamination
- Maps Yielding References, Information, Abstracts, and Data Interface
- Ground-Water Resources
- National Mapping Program
- Mississippi Delta Management Systems Evaluation Area
- Evaluation of Scour at Bridges
- Erosion of Coastal Areas
- Oil and Gas Resources
- National Coal Resources Data System and State Cooperatives
- National Coal Assessment
- Surface-Water-Data Collection
- Water-Quality- and Sediment-Data Collection
- Earth Observation Data
- Geologic Information Centers
- Cooperative Programs

MYRIAD Interface—Maps Yielding References, Information, Abstracts, and Data

Every year, the USGS produces reports that describe the results of water-resources investigations. Although recent USGS reports are included in computerized data bases that can be searched with geographic and nongeographic keywords, anyone unfamiliar with the rivers, aquifers, or other geographic features within an area of interest would have difficulty in locating reports that contain the desired information.

The objective of the geo-referenced bibliographic data-base project is to develop a computer data base of USGS reports pertaining to Mississippi that is linked to an on-screen map. A major advantage of the MYRIAD approach to bibliographic data management and retrieval over conventional approaches is the ability of the map-based interface to provide references, information, abstracts, and data for investigations in areas unfamiliar to the user.

Ground-Water Resources

Ground water constitutes 80 percent of all the freshwater used in Mississippi and serves the water-supply needs of most of

the population. Increasing population and the accompanying economic growth are expected to increase the demand for fresh-water supplies. The USGS, in cooperation with local and State agencies, is conducting three investigations of ground-water resources in Mississippi (fig. 2).

The Tuscaloosa aquifer system contains freshwater in an area of about 9,000 square miles in northeastern Mississippi. In about three-fourths of this area, the aquifer system is the primary source of water for public and industrial water supplies. The USGS is using a computer-based model of the aquifer system to describe and quantify the ground-water resources in the area.

The USGS is conducting an investigation of the ground-water resources in several areas in southern Mississippi where local overpumping of water from the Miocene aquifer system has led to ground-water-level declines and water-supply problems. Although the aquifer system is capable of supplying the current demand, significant increases in withdrawals will require careful management of the ground-water resources.

The Mississippi River alluvial aquifer is the most heavily pumped aquifer in Mississippi, supplying about 2 billion gallons per day of water for agricultural and

industrial use in the Mississippi Delta. Recharge to the alluvial aquifer is from the Mississippi River, local streams and lakes, precipitation, and from underlying aquifers. To improve understanding of the recharge to the alluvial aquifer, the USGS is conducting a study to determine the thickness and areal extent of the top and underlying clay beds that separate the aquifer from the surface environment and from underlying water-bearing units.

National Mapping Program

Among the most popular and versatile products of the USGS are 1:24,000-scale topographic maps (1 inch on the map represents 2,000 feet on the ground). Some of the map data are available in various digital formats (fig. 3). 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. Mississippi is covered by 850 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 hunting, hiking, camping, exploring, and fishing expeditions.

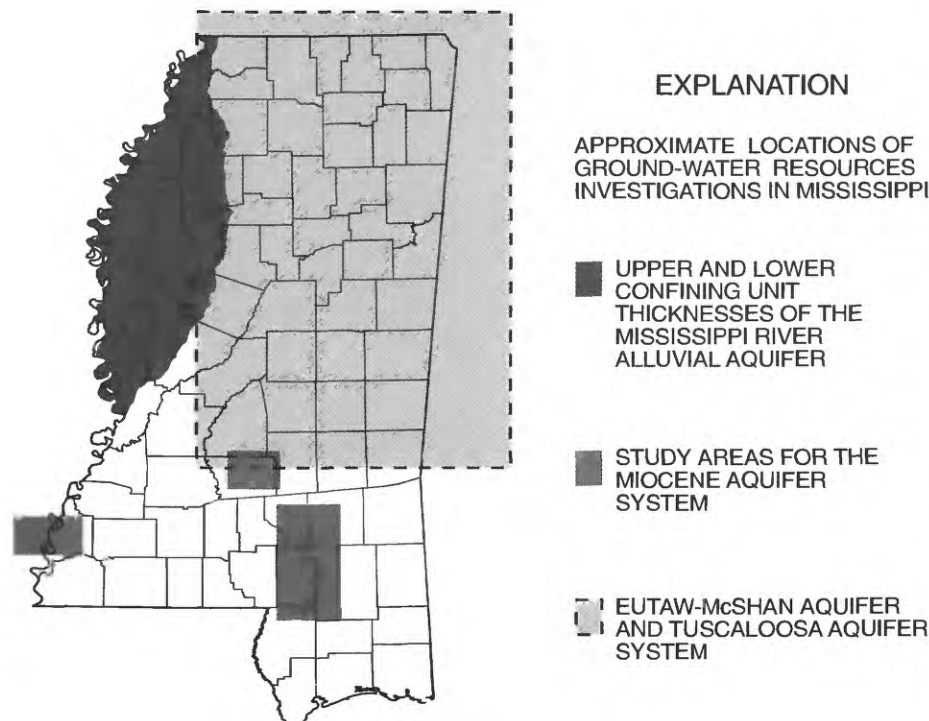


Figure 2. Location of recent ground-water-resources investigations in Mississippi.



Figure 3. Digital elevation model data for Mississippi.

Mississippi Delta Management Systems Evaluation Area

The Mississippi Delta Management Systems Evaluation Area (MSEA) is a 5-year project involving several local, State, and Federal agencies, as well as local universities and organizations, to assess how agricultural activities affect the water resources in the Mississippi Delta, and to increase the knowledge needed to design and evaluate management practices as components of farming systems. The study will be conducted at sites within three Delta oxbow-lake watersheds, which will be primarily in cotton production. The first watershed will be selected as a "control" in which no (or few) specialized management practices will be used; in the second watershed, management practices common to the region will be monitored; and in the third watershed, management practices that may be considered more innovative or that require more research will be monitored. Comparisons will be made with respect to surface runoff, ground water, soils, and lake ecology between the control watershed and the watersheds in which management practices are monitored.

The USGS will be primarily responsible for the surface-water-runoff sampling component of the MSEA project.

Evaluation of Scour at Bridges

Scour of streambanks and channels in the vicinity of bridge piers and abutments during floods has resulted in more bridge failures than all other causes in recent history. The design and maintenance of bridge foundations require consideration of the maximum depth of scour that could likely occur during an extreme flood. The MDOT is mandated by the Federal Highway Administration to evaluate the potential for scour at about 1,200 bridges crossing Mississippi streams by 1997.

In 1993, the USGS, in cooperation with the MDOT, began a 5-year study to evaluate the observed and potential scour conditions at selected bridges.

Erosion of Coastal Areas

Recent USGS studies of the Mississippi coastal area address concerns about erosion of the mainland coast and the transitory nature of the Mississippi Gulf Islands. In cooperation with the Gulf Coast Research Laboratory (University of Southern Mississippi) and the National Park Service, the USGS drilled test holes on the mainland in Jackson County and on Horn Island in the Gulf Islands National Seashore. Geologists studying samples from these test holes are able to describe the recent geologic history of the Mississippi coastal zone as a framework for understanding the modern geologic processes of that area. For example, a test hole on Horn Island contains a sediment record for the past 10,000 years that documents the rise of sea level in the area and the original development and subsequent geologic history of Horn Island.

Oil and Gas Resources

Much of southern Mississippi lies in the Gulf Coast region. This region has a long history of producing large amounts of petroleum. This region is experiencing a resurgence in exploration opportunities, such as the trapping of petroleum around and underneath large salt structures in the subsurface. The USGS has recently initiated a new geologic framework study of the region in an effort to examine these structures, to understand how they are formed, and to evaluate their potential for trapping petroleum.

National Coal Resources Data System and State Cooperatives

Federal, State, and regional planners, as well as scientists and industry, require current, credible, understandable, and standardized information on the location, quantity, and quality of coal resources in the United States to provide the basis for optimum energy development and utilization policies. A joint venture between the USGS and the State Geological Surveys was initiated in 1975 to develop the National Coal Resources Data System (NCRDS); the USGS provides the central hardware, software, and analytical capabilities, and the USGS and the States build and use the data bases. Cooperative projects are ongoing with 22 States that represent 98 percent of current United States coal production.

A cooperative project between the USGS and Mississippi Office of Geology was initiated in 1988 to collect, evaluate, and correlate drill hole, mine, and outcrop data; to encode and enter geologic and geochemical data into the NCRDS; and to access the NCRDS data bases and software to generate new maps, reports, and resource assessments for the State.

National Coal Assessment

Coal accounts for one-third of the total energy and more than one-half of the electricity generated in the United States. Even with substantial increases in energy conservation and in the use of natural gas to meet increased demands for energy, coal will continue to be a major contributor. New technologies to use coal will require resources that fit explicitly defined quality parameters. Therefore, the location, quantity, and quality of the Nation's coal resources to be consumed during the next 20 years, classed particularly by its best end use, will be necessary information for national and regional planners. In the National Coal Assessment, the USGS will work with the Mississippi Office of Geology to identify the location and quality of coal resources, including coal potentially suitable for the export market, on public and private lands. The USGS

also is working with several State and Federal agencies to aid Mississippi and its industry to develop cost-effective strategies to mitigate potential future acid-mine-drainage and acid-rain problems and to clean up present contamination.

Surface-Water-Data Collection

Surface-water information is needed for purposes of surveillance, planning, design, hazard warning, operation, and management in water-related activities, such as water supply, hydroelectric-power generation, flood control, irrigation, bridge and culvert design, wildlife management, pollution abatement, flood-plain management, and water-resources development. The USGS has collected surface-water data in Mississippi since 1948 (fig. 4) in cooperation with many local, State, and other Federal agencies. These data are stored in computerized local and national data bases and disseminated to cooperators, educational institutions, private organizations, and the public.



Figure 4. Surface-water data-collection sites in Mississippi.

Water-Quality- and Sediment-Data Collection

Water-resource planning and water-quality assessment require a nationwide base of standardized information. For effective planning and realistic assessment of water resources, the chemical and physical quality of ground and surface water (including sediment concentrations) needs to be defined and monitored.

To obtain and document an inventory of water-quality data for use in the planning and development of the water resources of Mississippi, water-quality samples have been collected by the USGS at surface- and ground-water sites since 1966 (fig. 5) and at sediment-data sites since 1981.

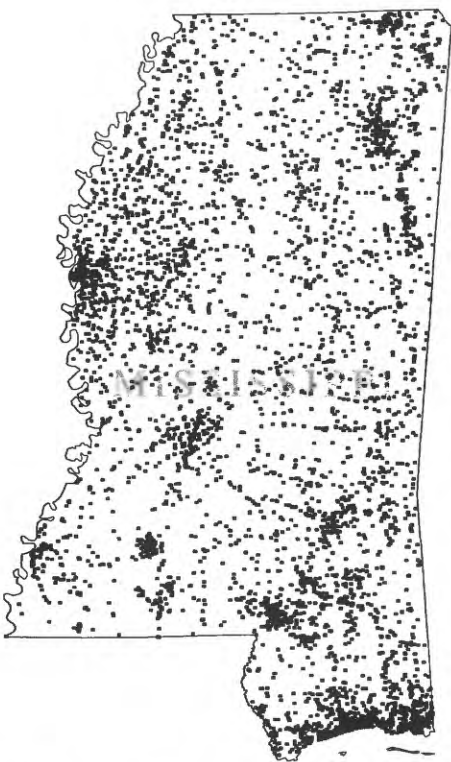


Figure 5. Water-quality data-collection sites in Mississippi.

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 Mississippi. Mapping photographs of some sites go back about 40 years. Satellite images dating from 1972 can be used to study changes in regional landscapes.

Geologic Information Centers

The USGS operates Geologic Information Centers that focus on topics of interest to people in Mississippi.

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 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. The NEIC has developed and is deploying the U.S. National Seismograph Network (USNSN), which, when completed, will consist of about 60 seismograph stations nationwide. The USNSN monitors nationwide seismicity, provides early notification of seismic events to national level emergency-services personnel, maintains an archive of high-quality digital data on national seismicity, and provides public information. There is a USNSN station in Oxford, Mississippi, that sends data by satellite to NEIC.

The USGS Center for Coastal Geology and Regional Marine Studies was established in 1988 in cooperation with the University of South Florida. The Center

conducts a wide variety of research on mineral resources and on coastal and regional marine problems, including coastal erosion, climate change, wetlands deterioration, and coastal pollution. This research is leading to more accurate predictions of future coastal erosion, the evolution of wetlands, the fate of polluted sediments, and the location of economically valuable sand and gravel, as well as other minerals.

Cooperative Programs

The work of the USGS in Mississippi is accomplished in large part through cooperation with local, State, and other Federal agencies who share in the planning and financial support of the program. Agencies that provided funding and services in support of water-resources investigations in Mississippi during 1993-94 include the city of Jackson, the Harrison County Board of Supervisors, the Harrison County Development Commission, the Jackson County Board of Supervisors, the Jackson County Port Authority, the Mississippi Department of Agriculture and Commerce, the Mississippi Department of Environmental Quality, the Mississippi Department of Transportation, the Mississippi Soil and Water Conservation Commission, the Pat Harrison Waterway District, the Pearl River Basin Development District, the Pearl River Valley Water Supply District, the Tombigbee River Valley Water Management District, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Navy, and the Yazoo Mississippi Delta Joint Water Management District.

The USGS works with and provides support to the Mississippi Water Resources Research Institute, which conducts programs involving research, education, and information and technology transfer.

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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.

U.S. Department of the Interior
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