

United States Geological Survey

Programs in Iowa



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.

Water Supplies

Population growth and (or) increased use of water in some Iowa locations has caused local water suppliers to seek additional sources of surface and ground water to meet these needs. Iowa generally has abundant sources of water for most uses. However, obtaining water of good quality from sources that are free of excessive natural and manmade chemicals is becoming increasingly difficult economically. The U.S. Geological Survey (USGS), in cooperation with the Iowa Department of Natural Resources and the University Hygienic Laboratory, is monitoring the quality of water in the State's aquifers to determine when and where changes in water quality are occurring. The USGS also is studying the hydrology and water quality of southeastern Iowa to determine the safe yields of aquifers and to understand the processes that affect the water quality of these sources.

In areas where ground-water sources are not viable, many Iowa water users obtain water for drinking or other uses from reservoirs. The quality of the water in these reservoirs is of concern, especially because water is becoming increasingly affected by chemicals from non-point sources, such as agricultural chemicals. The USGS, in cooperation with the Iowa Department of Natural Resources, is determining the effects of land-use-management practices on the quality of surface runoff. USGS data and interpretations are used by water managers in making decisions regarding water supplies. Informed decisions have a direct influence on the health of the people using the water and on the costs of the water to the users.

Missouri Basin Study

The USGS and the State Geological Surveys of Iowa, Kansas, Missouri, and Nebraska have formed a partnership to study geologic aspects of land-use issues in the Middle Missouri Basin. These studies are conducted in a corridor encompassing Omaha and Lincoln, Nebraska, Council Bluffs, Iowa, Kansas City, Missouri and Kansas, and Topeka, Kansas. Most of the areas between the cities are a mix of smaller urban centers and intervening rural areas that support intensive agricultural activities. A variety of geologic factors affect land use in the corridor. Geologic constraints, such as collapsing or expanding soils, landslides, subsidence, and flooding, pose problems, especially in urban and urbanizing areas. Disposal of municipal and industrial wastes, including hazardous wastes, are of concern in terms of past practices and future needs. Erosion, sedimentation, and pollution from nonpoint discharge are major issues in the basin. The identification, protection, and extraction of construction materials present a continuing problem, as does reclamation of mining areas. Geologic information obtained in these studies is essential to understanding the carrying capacity of the land, identifying potential consequences of land uses on the natural system, and determining methods to reduce or mitigate those conflicts and consequences.

National Water-Quality Assessment Program

The long-term goals of the National Water-Quality Assessment (NAWQA) Program are to describe the status and trends in the quality of a large representative part of the Nation's surface- and ground-water resources and to identify the natural and human factors that affect

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their quality. The Program produces a wealth of water-quality information that is useful to policymakers and water managers at the local, State, and national levels.

The Eastern Iowa Basins NAWQA Program study is underway in Iowa (fig. 1). Communication and coordination among the USGS and water-management and other water-resource agencies are key components of this study. A variety of reports to local, State, and Federal agencies are planned as results of the study become available.

A critical requirement of the NAWQA Program is up-to-date information on land use/land cover to determine their influence on water quality in the Eastern Iowa Basins. The USGS, in cooperation with several Federal agencies, is acquiring sat-



Figure 1. National Water-Quality Assessment Program study area in Iowa.

ellite image data for the entire United States. These data are processed according to a consistent standard, then forwarded to NAWQA Program projects, as well as to other water-resource agencies, for water-quality research applications.

Oil and Gas Resources

In an effort to assess the future energy resource potential of the Nation properly, the USGS is conducting a National Petroleum Assessment of undiscovered conventional and unconventional natural gas and oil resources. The USGS has the personnel, expertise, physical resources, and experience to produce unbiased estimates of the Nation's resources. With these estimates, energy planners can chart a course for the future.

Iowa is situated along a geologic feature known as the midcontinent rift system. This feature could have produced structures capable of trapping natural gas and oil resources. As part of the USGS's ongoing National Petroleum Assessment, this area is being evaluated for its potential to contain and produce commercial quantities of petroleum. Scientists from the USGS are working with Iowa Geological Survey Bureau personnel to determine the potential for hydrocarbon in this region.

Drinking-Water Standards

Water suppliers that are subject to enforceable drinking-water standards have noticed a trend in increasing numbers of chemicals that need to be analyzed for and, at times, in tightening of existing enforceable standards. This has caused some water supplies that were of acceptable quality to exceed permissible levels of some contaminants because of revisions in water-quality standards. The result has been either an implementation of higher cost treatment facilities or the selection of an alternative source of better quality water. The USGS is determining potential threats to water supplies and assessing the source of water to public supplies and the quality of the source water in southeastern Iowa. This USGS effort contributes to the decisionmaking process of local water managers by providing information that allows an in-

formed decision to be made when they consider alternatives to protect, treat, or relocate water supplies.

Federal Response to the Midwest Floods of 1993

In response to extensive flooding in the Midwest during summer 1993, the White House Interagency Floodplain Management Task Force directed seven Federal agencies to establish a Scientific Assessment and Strategy Team (SAST) to determine the immediate effects of flooding and longer term implications for floodplain management within the region. The team was hosted by the USGS because of its extensive computer-based technological capabilities, multidisciplinary staff, and experience in the development, scientific application, and management of large amounts of geographically referenced information. One of the team's initial objectives was to develop an interactive data base containing various types of flood-relevant information for the affected nine-State region that included Iowa. The data base included geographically referenced information on manmade structures, hazardous and toxic waste sites, water-treatment facilities, land cover and land use, fish and wildlife habitats, rainfall, topography, surficial geology and soils, stream and river hydrology and hydrography, demography, and economic bases. Digital data bases for large geographic areas were compiled, and essential data for flood-related land management and environmental research have been consolidated and made available through Internet-accessible programs for State planning officials and natural-resource investigations.

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. Iowa is covered by 1,129 maps at this scale, which is useful for civil engineering, land-use plan-

ning, natural-resource monitoring, and other technical applications. These maps have long been favorites with the public for outdoor uses, including hiking, camping, exploring, and back-country fishing expeditions.

The USGS has jointly funded and produced printed maps for many years and, more recently, computerized (digital) geographic data products in cooperation with Federal and State governmental agencies in Iowa. For example, in 1993, 1:100,000-scale digital topographic data sets were completed statewide, primarily through the use of a joint funding agreement among the Iowa Department of Natural Resources, the Iowa Geological Survey Bureau, and the USGS. Digital geographic and topographic data serve many uses for addressing various natural-resources, conservation, waste-disposal, emergency, hazard, and other environmental and societal issues confronting the State's citizens.

Collection of Hydrologic Data

The USGS collects hydrologic data at many sites throughout Iowa (fig. 2). These data are essential to interpretive studies that provide information for making decisions about water issues that can affect millions of people. For example, ground-water data are used by water managers to determine optimal well spacing and the most economical rates of pumping from aquifers.

The cyclical nature of climatic conditions results in annual and seasonal variations in precipitation and, therefore, affects surface-water and shallow ground-water resources. During times of excess precipitation, floods of varying magnitudes have occurred, most recently the record flooding of 1993. The most recent drought conditions occurred during 1988-89. The USGS has a network of stream-flow-gaging stations and ground-water observation wells that are measured on a regular basis to document and report on the hydrologic conditions in Iowa. The USGS data are used to guide reservoir operations during floods and droughts, to predict flood stages and timing, to determine the amount of flow in streams during drought, and to measure water-

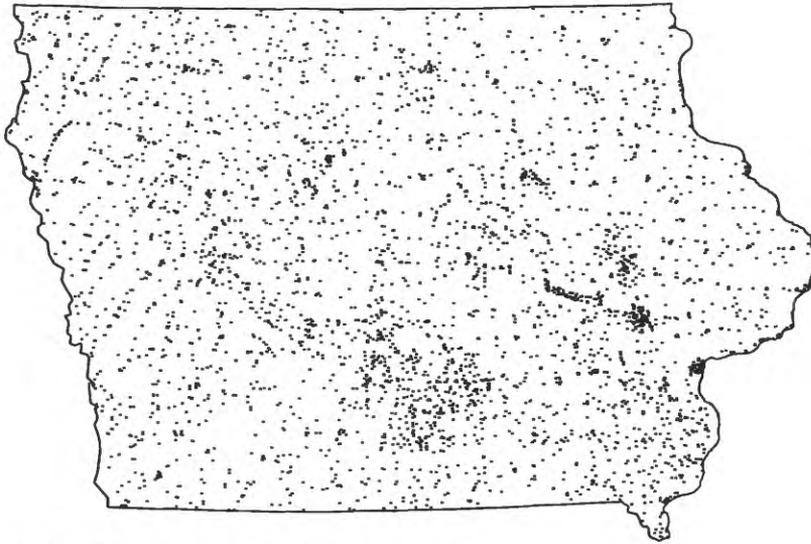


Figure 2. Water-quality data-collection sites in Iowa.

level declines in aquifers that are used for public water supply or irrigation.

The importance of flood data to citizens is directly related to their health, public safety, and property damage. USGS data are used to relate specific flood flows to the amount of land inundated by high water. This, combined with USGS determinations of flood frequency, is used to determine areas along streams that are vulnerable to repeated flooding. Many agencies, such as the Iowa Department of Transportation, use flood information to design safe, appropriately sized bridges.

USGS hydrologic data also are used at times other than floods or drought. One example is for the management of the flows in the Missouri River. The Missouri River drainage basin covers a large multi-State area. The upper basin, which is upstream from Sioux City, is characterized by large impoundments on the mainstem river. The reservoirs provide flood control and releases of water to support commercial navigation from St. Louis, Missouri, to Sioux City. The reservoirs provide recreational use and habitat for fish and wildlife in the upper basin. The U.S. Army Corps of Engineers (COE) is responsible for the management of the river system. There are competing uses of the Missouri River between the Upper Basin States, which derive economic benefits from the storage of water in the reservoirs, and the Lower Basin States,

which derive economic benefits from reservoir releases that allow commercial navigation. The USGS operates stream-flow stations in cooperation with the COE and provides frequent measurements of flow downstream from the mainstem reservoirs. These data are used by the COE to regulate the release of water from the reservoir system. The benefit to the citizens of the Upper and the Lower Basin States is a mitigation of water-use claims made by each side because decisions are made on the basis of factual hydrologic information.

Surficial Geology

Iowa faces immediate and long-term problems of land use and land management, engineering construction, and water quality that require new sources of construction materials and water. Inconsistent land-use practices contribute to environmental changes (erosion, reservoir siltation) and natural hazards (floods, landslides, swelling and collapsing soils). USGS geologists, in cooperation with the Iowa Geological Survey Bureau, are involved in studies to provide information about the distribution of geologic resources and to identify potential consequences of land-use and land-management policies. The distribution, thickness, and chemical, physical, and engineering characteristics of surficial deposits in Iowa are being mapped.

Coal-Reserves Data Base

Federal, State, and regional planners, as well as scientists, industry, and Government agencies, require current, credible, understandable, and standardized information on the location, quantity, and quality of the coal resources of the United States to provide the basis for optimum energy development and utilization policies. A joint venture between the USGS and State Geological Surveys was initiated in 1975 to develop the National Coal Resources Data System (NCRDS); the USGS provides the central computer hardware, software, and analytical capabilities, and the USGS and the States build and use the data bases. Currently (1995), cooperative projects are ongoing with 22 States representing 98 percent of current U.S. coal production.

A cooperative project between the USGS and the Iowa Geological Survey Bureau was initiated in 1978 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 coal-resource assessments. The continued data collection and support of the NCRDS data bases provides baseline information that can be accessed for annual State resource updates and recast to meet many needs as they arise.

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 about 40 years. Satellite images dating from 1972 can be used to study changes in regional landscapes.

Cooperative Programs

The USGS cooperates with more than 30 local, State, and Federal agencies in Iowa. Cooperators include municipal public works departments, public health agencies, natural-resource agencies, Federal agencies, and many more. Cooperative activities include water-resources-

data collection, interpretive water-availability and water-quality studies, mineral-resource assessments, and mapping. When local and State agencies are involved, activities typically are funded on a matching basis. In addition to agencies mentioned above, the USGS cooper-

ates with the U.S. Department of Agriculture, the U.S. Environmental Protection Agency, Iowa State University, the University of Iowa, and the cities of Davenport, Des Moines, Iowa City, Sioux City, and Waterloo, to name only a few.

The USGS also provides support to the Iowa Water Resources Research Institute, which conducts a program of 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>".

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