WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

REGIONAL AQUIFER-SYSTEM ANALYSIS (RASA) PROGRAM

Most ground-water investigations in the United States have been conducted largely on a local scale, within county or State boundaries. Questions often arise, however, regarding the extent of ground-water development and the effects of this development beyond a local study area. In most cases, these questions cannot be answered owing to a lack of information on the regional geology, hydrology, or water chemistry. These facts underscore the need for broad regional evaluations of the Nation's ground-water resources. In response to Federal and State needs for regional information, the U.S. Geological Survey (USGS) began the Regional Aquifer-System Analysis (RASA) Program in 1978, to study the Nation's major aquifer systems on a regional scale.

REGIONAL AQUIFER SYSTEMS

A regional aquifer system may be defined as one of two general types: (1) Aquifers that extend over large areas, such as those underlying the Great Plains, High Plains, Gulf Coastal Plain, and Atlantic Coastal Plain, or (2) A group of virtually independent aquifers that have so many characteristics in common that studies of a few of these aquifers can establish common principles and hydrogeologic factors that control the occurrence, movement, and quality of ground water thoughout these types of aquifers. Examples include aquifers underlying the alluvial basins of Arizona and New Mexico, the glacial aquifers of the Northeastern United States, the Appalachian Valleys, and the Piedmont area, which is a plateau that extends from New Jersey to Alabama and lies east of the Appalachian Mountains.

STUDIES OF THE REGIONAL AQUIFER-SYSTEM ANALYSIS PROGRAM

Twenty-eight major regional aquifer systems have been identified for study under the RASA Program. The objective of each study is to define the regional hydrology and geology, and to establish a framework of background information—geologic, hydrologic, and geochemical—that can be used for assessment of local and regional ground-water resources. Each study is designed to fit the particular needs of the area. Every study uses computer simulation to help understand the flow pattern, characteristics of recharge and discharge, and effects of development on the aquifer system. Information on the quality of water throughout the aquifer system also is assembled and analyzed. Special emphasis is placed on the interaction between water chemistry and rock minerals. Although all studies rely primarily on existing data, some new data are collected and some exploratory wells have been drilled to fill the critical information gaps related to water levels, geology, and chemical quality of water.

ACCOMPLISHMENTS

As of 1988, 22 RASA studies have been started. Of these, 12 have been completed, and 10 are currently active. The remaining six studies have not yet begun. The results of the RASA studies are released in publications of the USGS, or are published in other scientific journals. More than 500 reports from the RASA Program have been published through 1987.

During the studies, technical problems for which there are no readily available solutions are often encountered. Considerable effort has been expended to develop improved techniques for solution of some general types of ground-water problems. For example, a simulation technique was developed to describe the effects of withdrawals from water wells that are hydraulically connected to two or more aquifers. Similarly, improved methods of simulating flow of variable-density ground water and the interaction between streamflow and ground water also were developed.

Agricultural practices also affect aquifer systems. Excess irrigation will increase recharge to aquifers, and may also transport chemicals associated with fertilizers, herbicides, and toxic natural soil minerals into aquifers. Thus, both surface-water and ground-water quality may be affected. In summary, the effect of human activities on aquifer systems is complex. The management and development of water resources is a comprehensive task that requires the consideration of all activities over the entire aquifer area.

USES OF RASA INFORMATION

Information produced by the RASA Program has been extensively used by the USGS in the Federal-State Cooperative Program and other activities. Consultants, private citizens, and Federal, State, and county agencies also use the RASA information extensively. The following are examples:

- The RASA studies identified inconsistencies in the interpretation of geologic and hydrologic data across State boundary lines. The identification of these problems alerted appropriate agencies among the States and fostered interstate coordination in solving the problems. For example, before the RASA study, the extent and thickness of the Floridan aquifer were defined differently among investigators in Florida, Georgia, and South Carolina. After the study, the regional

definition and delineation of the Floridan aquifer system were accepted and standardized by the States involved.

- Computerized ground-water flow models developed in the RASA Program have been widely used: the Environmental Protection Agency (EPA) Chesapeake Bay Program used a RASA-developed flow model to estimate ground-water discharge to the Chesapeake Bay; the New Jersey Department of Environmental Protection used a RASA-developed flow model to manage the coastal plain aquifer in New Jersey; along the United States-Mexico border, the International Boundary and Water Commission used a RASA-developed flow model to evaluate the effects of projected pumpage and locations of well fields on streamflow in the Rio Grande; and, in Florida, the St. Johns River Water Management District and the South Florida Water Management District used a RASA-developed flow model to evaluate the effects of proposed well fields on water-level declines that may cross county or management-district boundaries.
- The U.S. Bureau of Reclamation, EPA, Fish and Wildlife Service, and U.S. Department of Agriculture used RASA-produced information from the Central Valley, Calif., RASA study to evaluate effects of agricultural practices on ground-water quantity and quality in the San Joaquin Valley of California.
- The South Carolina Department of Health and Environmental Control used information from the Floridan RASA study to determine the relation between waste-disposal sites and location of water-supply wells.
- The South Carolina Multi-agency Advisory Committee on stratigraphic and hydrologic nomenclature used information from the Northern Atlantic Coastal Plain RASA study to develop standardized terminology in assessing the coastal plain aquifer in South Carolina.
- The U.S. Internal Revenue Service used information from the High Plains RASA study to evaluate tax depletion allowances for areas where ground water is mined. The Federal Land Bank used depth-to-water information to appraise the value of High Plains farm lands.
- Information from the Snake River Plain RASA study was used by irrigators and hydropower companies in negotiating water rights on the Snake River Plain.
- The Idaho Department of Health and Welfare used information from the Snake River Plain RASA study to help develop a Snake River Plain aquifer management strategy and ground-water quality management plan.

For further information about RASA studies and reports, contact:

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