



WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY GROUND-WATER STUDIES IN CONNECTICUT

GROUND-WATER ISSUES

Water demands in Connecticut are met by the conjunctive use of ground water and surface water. These water resources are abundant, but they are not uniformly distributed and they are not always near demand centers. Ground-water sources supply 12 percent of the total freshwater demand and about one-third of the State's approximately 3.2 million people. Of the total quantity of ground water used in 1985, 46 percent was for public supply, 27 percent was for rural domestic supplies, 18 percent was for self-supplied industrial and commercial establishments, and 9 percent was for agriculture and thermo-electric power generation (unpublished water-use data on file at the Connecticut Department of Environmental Protection, Hartford, Conn.). About 250,000 wells supply this ground water, 1,500 of which are public-supply wells. The major issues related to ground water in Connecticut are:

- Effects of land use on water quality.
- Allocation of water resources among competing uses, and
- Contamination by hazardous wastes and agricultural chemicals.

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 scientific information on the Nation's water resources. The activities of the Water Resources Division in Connecticut are conducted by scientists, technicians, and support staff in Hartford.

Hydrologic-data stations are maintained at selected locations throughout Connecticut to record stream discharge and stage; reservoir and lake storage; ground-water levels; suspended sediment in streams; and the quality of precipitation, surface water, and ground water. Water-use data also are collected statewide through a cooperative program with the Connecticut Department of Environmental Protection (DEP). All water-resources data are stored in the USGS National Water Data Storage and Retrieval System data base. These data are used by water planners and others involved in decisions that affect Connecticut's water resources. Specific applications include water-quality management, water-supply planning, permitting of waste discharges and diversions, flood and drought forecasting, and water allocation.

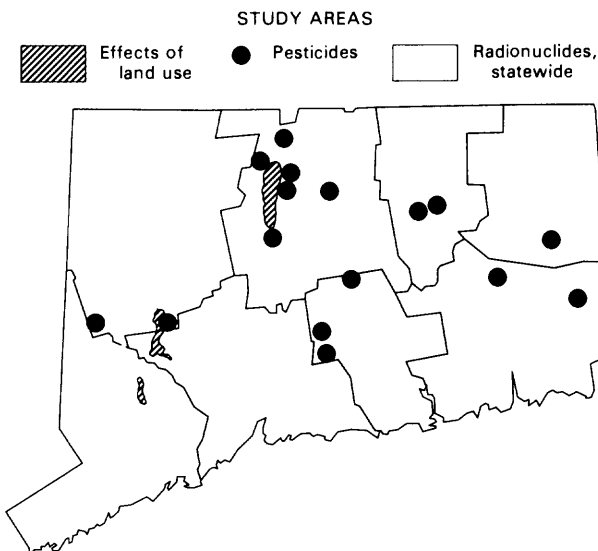
During 1987, the USGS maintained a network of 40 observation wells in Connecticut to monitor fluctuations in water

levels, in cooperation with the DEP. Water-level measurements in wells are used to monitor ground-water trends; however, they must be integrated with other observations and ground-water investigations to be most relevant and useful.

The USGS has conducted more than 75 ground-water investigations in Connecticut. During fiscal year 1987, the USGS entered into agreements with 9 Federal, State, and local agencies involving 14 hydrologic investigations in Connecticut; seven investigations included studies of ground-water quantity and quality. These investigations will provide information needed to answer hydrologic questions that are specific to the State's principal ground-water issues. Also, some of these investigations will provide information on statewide, multistate, and national hydrologic problems. Three examples of ground-water studies by the USGS that address specific ground-water issues in Connecticut are discussed in the following sections.

Effects of Land Use on Ground-Water Quality

Several types of land use common to Connecticut have resulted in numerous incidences of ground-water contamination. To assess the quality of the State's ground water and the extent and severity of contamination problems, it is necessary to evaluate the cumulative effects of activities associated with the prevalent types of land use. The information also is needed to guide land-use planning and water-quality management in a rapidly urbanizing region. In 1984, the USGS initiated a regional



ground-water-quality study in Connecticut as part of a larger national program. This study focused on water quality in stratified-drift aquifers, the major source of large supplies of ground water in the State. From 1984 to 1987, the USGS studied the relation between land use and water quality in two stratified-drift aquifers in western Connecticut. The hydraulic properties and residence time of water were evaluated for each aquifer, and land-use inventories were updated. Historic ground-water-quality data were augmented by sampling water from 21 new wells and subsequent analyses for selected major inorganic constituents, trace elements, and selected organic compounds. Statistical comparisons of the data indicate that human activities associated with agricultural, residential, and industrial-commercial land uses have affected the quality of water in the stratified-drift aquifers. Additional aquifers are being studied to determine if the observed relations are transferable. If transferable, this research will aid in developing management strategies for the State's high- and moderate-yield aquifers, including wellhead-protection programs.

Pesticides in Ground Water

Before 1983, few incidences of ground-water contamination in Connecticut were attributable to pesticides. In 1983, contamination of ground water by ethylene dibromide (EDB), a soil fumigant, was detected and subsequently found to affect at least 50 square miles in north-central Connecticut. As of 1988, pesticide contamination accounts for more than 25 percent of the known incidences of water contamination in wells. In 1987, the USGS and the DEP began a cooperative study to assess the magnitude and severity of the pesticide threat to ground-water quality. Other participants in the study include the Connecticut Agricultural Experiment Station (AES), the University of Connecticut College of Agriculture, and the Connecticut Department of Health Services (DHS). During 1987, shallow wells were installed and the water tested for selected pesticides. All sites are underlain by stratified-drift aquifers and predominantly used to grow corn. Pesticides have been detected in water from 40 percent of the sites. Concentrations exceed either health advisory levels of the U.S. Environmental Protection Agency or Connecticut drinking water standards at three sites. Compounds detected were all herbicides, except for soil fumigants EDB and 1,2-D. The USGS will collect additional samples from existing sites and instrument new sites where the underlying aquifers are composed of fractured bedrock. The AES will analyze soil cores collected by the USGS for selected pesticides. Information from this study will provide a better understanding of the fate of pesticides in the State's principal hydrogeologic settings and thereby aid in development of improved agricultural practices and contamination-abatement strategies.

Radionuclides in Ground Water, Statewide

By the mid 1980's, water-quality monitoring had shown that elevated concentrations of radon were common in water from bedrock aquifers in northern New England. The DEP and DHS, concerned about possible health effects, initiated a reconnaissance program to measure radon in similar aquifers. Radon concentrations in some samples had concentrations equal to or greater than the State's interim guideline for radon in water. In 1988, the USGS and the DEP began a cooperative study to assess radon, as well as radium and uranium, in ground water. The main study objective is to determine the relation of these radionuclides to geology and hydrology. The USGS and the DEP

are using geologic and hydrologic information from earlier cooperative studies to select sampling sites. About 600 samples are being collected. Periodic samples of water from wells with elevated radon concentrations will be used to evaluate seasonal changes. The results of the study are intended to guide development of monitoring, management, and corrective programs for radionuclides in ground water.

GROUND-WATER MANAGEMENT

The principal State agencies responsible for ground-water management are the Connecticut Department of Environmental Protection and the Connecticut Department of Health Services. The DEP is the lead agency for ground-water management. The DHS administers programs under the Safe Drinking Water Act to develop and enforce quality standards for drinking water. Both agencies are involved in water-supply planning and the protection of public-supply sources. The USGS provides ground-water data and conducts hydrogeologic studies to support the State's ground-water planning and management activities. Development of Connecticut's Water Quality Standards and Classifications, the keystone of the State's ground-water management, was made possible through the use of hydrogeologic information provided by the USGS programs. During 1987-88, the following State and local agencies entered into cooperative cost-sharing agreements with the USGS to conduct ground-water investigations in Connecticut:

Connecticut Department of Environmental Protection
South Central Connecticut Regional Water Authority

SELECTED REFERENCES

- Grady, S.J., and Weaver, M.F., 1988, Preliminary appraisal of the effects of land use on water quality in stratified-drift aquifers in Connecticut: U.S. Geological Survey Water-Resources Investigations Report 87-4005, 41 p.
- Handman, E.H., Grossman, I.G., Bingham, J.W., and Rolston, J.L., 1979, Major sources of ground-water contamination in Connecticut: U.S. Geological Survey Water-Resources Investigations Report 79-1069, 59 p.
- Melvin, R.L., Grady, S.J., Healy, D.F., and Banach, Fred, 1988, Connecticut ground-water quality: U.S. Geological Survey Open-File Report 87-0717, 9 p.
- Ragone, S.E., 1984, U.S. Geological Survey toxic waste—ground-water contamination program—fiscal Year 1983: U.S. Geological Survey Open-File Report 84-474, 56 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 Connecticut can be obtained from:

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