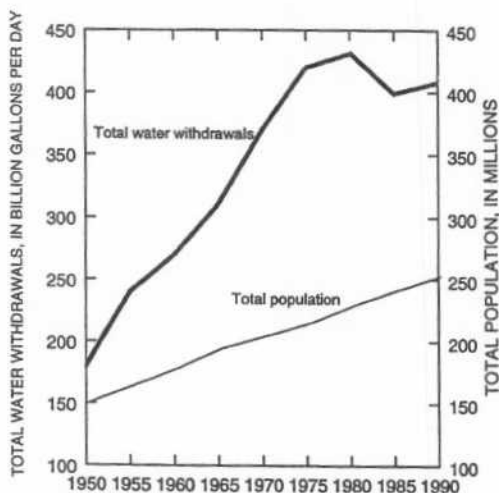


WATER USE IN THE UNITED STATES

by Robert R. Reynolds and Howard A. Perlman

During 1990, 408,000 million gallons per day (Mgal/d) of water was withdrawn from the Nation's surface- and ground-water sources for use by the people of the United States. Of this quantity, about 69,400 Mgal/d was saline. Most of the water withdrawn was returned to the water resources system for possible reuse. In addition to the withdrawals, 3,290,000 Mgal/d of water was used instream to turn turbines to generate hydroelectric power.

Hydrologists calculate that for each person in the United States during 1990, about 1,340 gallons of freshwater per day was withdrawn for all offstream uses, including public supply, domestic, commercial, industrial, mining, thermoelectric power, irrigation, and livestock. This means that 339,000 Mgal/d of freshwater was pumped, piped, or diverted each day, which was about the same as during 1985 and 9 percent less than during 1980. The large demand for a limited supply of water imposes a serious strain on the water resources in some regions of the country, particularly in the arid to semi-arid region of the Southwestern United States.

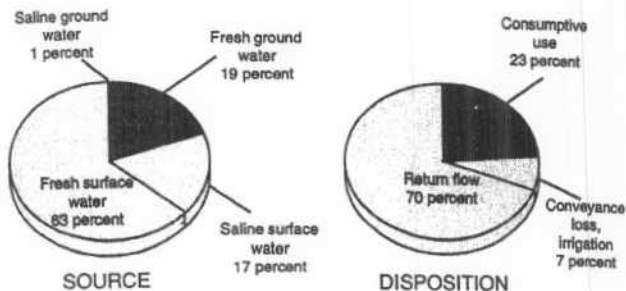


Trends in total water withdrawals and population, 1950-90.

Despite the large demand for water, our overall water supply is more than adequate to meet foreseeable needs in most areas. For example, the average annual streamflow in the United States (1,230,000 Mgal/d) is 3 times the 408,000 Mgal/d withdrawn by all users, and estimates of total ground-water supplies range from 33,000 trillion to 59,000 trillion gallons. To gain some perspective, compare the 33,000 trillion gallons of water that the Mississippi River discharged into the Gulf of Mexico during the last 200 years. Moreover, surface- and ground-water storage areas are recharged periodically by an estimated average of 4,200,000 Mgal/d of precipitation. Even though the United States presently has more than adequate water supplies, our water resources need to be carefully managed and protected to assure adequate supplies of good-quality water for future generations.

Key terms in understanding how the Nation uses its water are:

- Water use** Pertains to human interaction with and influence on the hydrologic cycle.
- Offstream use** Water withdrawn or diverted from a ground- or surface-water source for public supply, domestic, commercial, industry, mining, irrigation, livestock, and thermoelectric power generation.
- Instream use** Water that is used but not withdrawn from a surface- or ground-water source for such purposes as hydroelectric power generation, navigation, water-quality improvement, fish propagation, preservation, and recreation.
- Withdrawal** Water removed from the ground or diverted from a surface-water source for use.
- Delivery/release** The quantity of water delivered to the point of use and the amount released after use; the difference between these amounts usually is the same as the consumptive use.
- Consumptive use** That part of water withdrawn that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the immediate water environment.
- Return flow** The water that reaches a ground- or surface-water source after release from the point of use, and thus becomes available for further use.



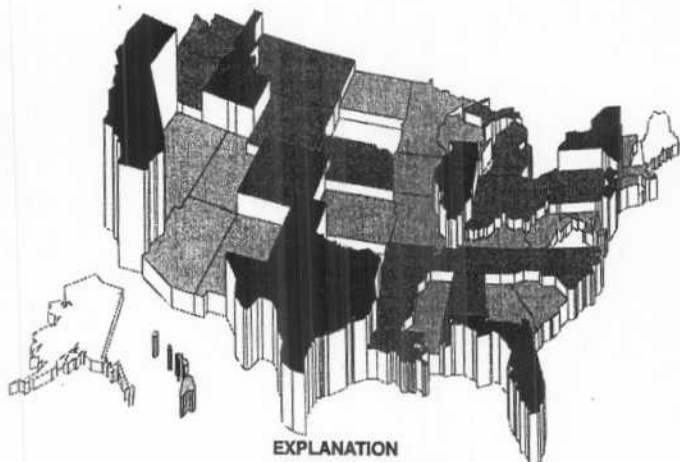
408,000 MILLION GALLONS PER DAY WITHDRAWN

Total offshore water withdrawals by source and disposition, 1990.

WATER-USE CATEGORIES

The following water-use categories, except hydroelectric power, which is an instream use, are considered to be off-stream uses because water is withdrawn or diverted from ground or surface water:

Public supply	Water withdrawn by public and private water suppliers and delivered to users. Public suppliers provide water for a variety of uses, such as domestic, commercial, thermoelectric power, industrial, and public water use.
Domestic	Water for household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, washing cars, and watering lawns and gardens.
Commercial	Water for hotels, motels, restaurants, office buildings, other commercial facilities, and institutions.
Industrial	Water used for industrial purposes such as fabrication, processing, washing, and cooling.
Thermoelectric power	Water used for cooling in the process of generating thermoelectric power.
Irrigation	The artificial application of water on lands to assist in the growing of crops and pastures or to maintain vegetative growth in recreation lands such as parks and golf courses.
Livestock	Water for livestock watering, feed lots, dairy operations, fish farming, and other on-farm needs.
Hydroelectric power	The use of water in the generation of electricity at plants where the turbine generators are driven by falling water.



EXPLANATION
Water use, in million gallons per day



Total water use by State, 1990.

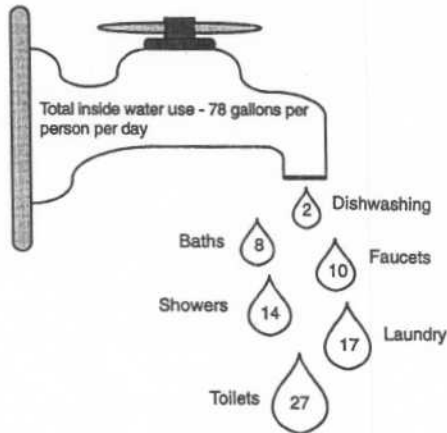
The quantity of water withdrawn for use varies significantly in different States and depends largely on the quantity of water used for irrigation or thermoelectric power generation. California, with the largest population and the most intensive irrigation system in the United States, withdrew the largest quantity of water, some 46,800 Mgal/d during 1990. Other large water-use States include Texas (25,200 Mgal/d), Idaho (19,700 Mgal/d), New York (19,000 Mgal/d), Illinois (18,000 Mgal/d), and Florida (17,900 Mgal/d). Rhode Island withdrew the smallest quantity (526 Mgal/d).

The two largest categories of water use are thermoelectric power and irrigation. During 1990, 131,000 Mgal/d of freshwater (same as 1985) and 64,500 Mgal/d of saline water were withdrawn to generate thermoelectric power. Farmers used about 137,000 Mgal/d to irrigate approximately 57.4 million acres of farmland.

During 1990, consumptive use was about 94,000 Mgal/d with irrigation water accounting for the largest portion of consumptive use, an estimated 76,000 Mgal/d.

Domestic activities in highly developed nations use a great deal of water. For example, each person in an American home generally uses from 50 to 200 gallons of water each day for activities such as drinking, cooking, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. Western States usually exhibit larger per-capita use patterns (due to outdoor uses), but even these figures can vary

substantially when improved water-conserving measures are employed, such as specially designed plumbing fixtures. Most water used for normal household purposes and to meet municipal and industrial needs is returned to streams through sewer or other systems and is, therefore, available for future uses.

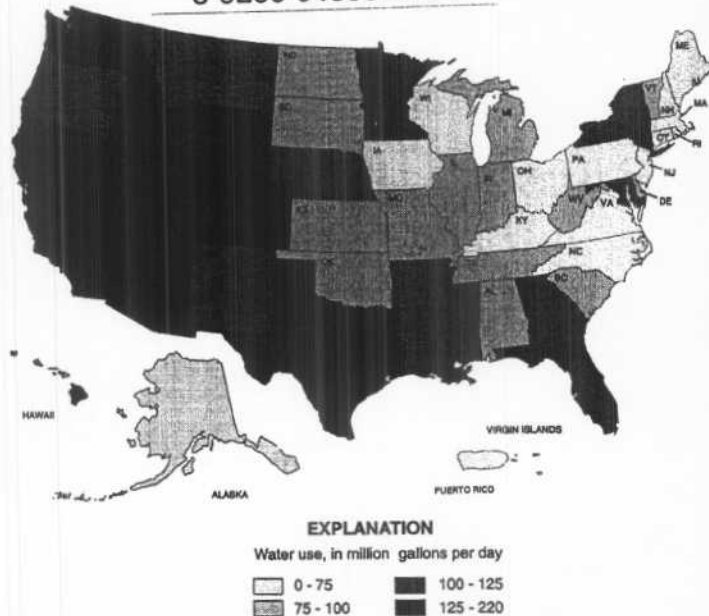


Typical breakdown of water use inside the home, in gallons per person per day.

In recent years a number of innovative programs in towns and cities across the country have demonstrated substantial savings in the volume of water and energy costs associated with water use in everyday settings of our lives. The use of retrofitted plumbing devices in two of these settings, home and school, has produced very positive results. A study sponsored by the U.S. Department of Housing and Urban Development in the Denver, Colorado, area contrasted water savings from common plumbing fixtures in homes with and without water saving devices. The net savings of the conservation program were about 23 percent or 18 gallons per person on a daily basis.

Similarly, the University of California at Santa Barbara initiated an active water-conservation program in 1990 by installing 1,355 low-flow toilets in its housing and residential service units. The toilets cost \$246,226 installed. Assuming an interest rate of 5 percent and a 20-year useful life of the fixtures, the net present value of savings in water and sewage charges for the life of the fixtures is estimated to be over 3 million dollars. Moreover, these devices will return the cost of

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Domestic freshwater per capita use, 1990.

installation in less than two years, and save more than 25 million gallons of water a year.

By recording and analyzing the vast quantities of information concerning water supply and demand, hydrologists are able to assist water managers and planners in solving their various water problems. Although water itself cannot be destroyed, its usefulness and availability can be. Like any natural resource, our water resources need to be protected if the Nation is to have enough good-quality water for present and future generations.

The foregoing information illustrates one of the national areas of program activity of the United States Geological Survey. Understanding how we use our water today is the first step in appreciating our need for water tomorrow. In 1977, the Congress of the United States recognized the need for uniform information on water use and directed the U.S. Geological Survey to establish a National Water-Use Information Program as a cooperative program between the States and the Federal Government. The information in this document was developed through the efforts of this program.

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U.S. Department of the Interior/U.S. Geological Survey

WATER USE IN THE UNITED STATE

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

For additional water-use information see USGS Circular 1081, "Estimated Use of Water in the United States in 1990," free on request to the National Water Information Clearinghouse, 1-800-426-9000. Circular 1081 is the latest one in a series of water-use reports prepared by the USGS every 5 years since 1950. This series of reports can be used to develop and evaluate trends in water use and to plan for more effective uses of the Nation's water resources in the future.

This publication is one of a series of general interest publications prepared by the U.S. Geological Survey to provide information about the earth sciences, natural resources, and the environment. To obtain a catalog of additional titles in the series "General Interest Publications of the U.S. Geological Survey," write:

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