

Groundwater Facts

04/2010

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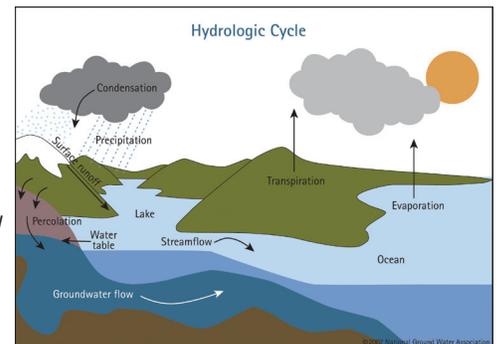
Groundwater is the water that fills cracks and other openings in beds of rocks and sand. Each drop of rain that soaks into the soils moves downward to the water table, which is the water level in the groundwater reservoir. Groundwater does not normally occur in underground streams, lakes, or veins. Groundwater is found in soils and sands able to retain the water—much like a sponge holds water.

Some 2.78 million trillion gallons of groundwater, 30.1 percent of the world's freshwater, are estimated for the planet.¹ Of the total 349 billion gallons of freshwater the United States withdraws each day, groundwater is estimated to be 79.6 billion gallons, or 26 percent.²

There is a relationship between groundwater and surface water.

About a quarter of all U.S. rainfall becomes groundwater. Groundwater provides much of the flow of many streams; many lakes and streams are "windows" to the water table. In large part, the flow in a stream represents water that has flowed from the ground into the stream channel. It is estimated by the U.S. Geological Survey that about 30 percent of U.S. streamflow is from groundwater, although it is higher in some locations, and less in others.³

About 90 percent of our freshwater supplies lie underground, but less than 27 percent of the water Americans use comes from underground sources, which illustrates the underutilization of groundwater.⁴



Groundwater is a significant water supply source—the amount of groundwater storage dwarfs our present surface water supply.

Hydrologists estimate, according to the National Geographic Society, U.S. groundwater reserves to be at least 33,000 trillion gallons—equal to the amount discharged into the Gulf of Mexico by the Mississippi River in the past 200 years.⁵

At any given moment, groundwater is 20 to 30 times greater than the amount in all the lakes, streams, and rivers of the United States.⁶

The United States uses 79.6 billion gallons per day of fresh groundwater for public supply, private supply, irrigation, livestock, manufacturing, mining, thermoelectric power, and other purposes.⁷

California pumps 10.7 billion gallons per day of groundwater for all purposes, a third more as the second-ranked state—Texas (8.02 bgd).⁸

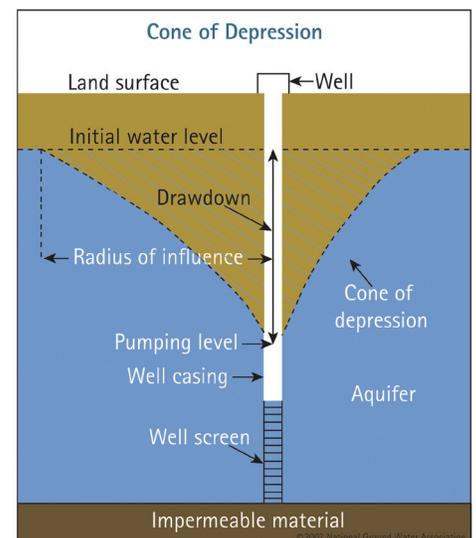
Groundwater is tapped through wells placed in water-bearing soils and rocks beneath the surface of the earth.

More than 15.9 million water wells for all purposes serve the United States.⁹

Approximately 500,000 new residential wells are constructed annually, according to NGWA estimates. The construction of these vitally needed water supply systems involves the use of more than 18,460 drilling machines by an estimated 8,085 groundwater contracting firms.¹⁰

Groundwater is a renewable resource.

In most parts of the country, water removed from the ground is constantly replaced, although in some parts of the country such as arid and semiarid regions, a low rate of replenishment is exceeded by the rate of groundwater pumping, resulting in problems of groundwater mining.



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Adequate time is needed to allow replenishment of underlying groundwater reservoirs (aquifers); also such areas must be properly managed in order to prevent water-soluble waste products stored in these areas from infiltrating and polluting the underground supply.

NGWA has determined that 44 percent of the U.S. population depends on groundwater for its drinking water supply—be it from either a public source or private well.¹¹

Private household wells constitute the largest share of all water wells in the United States—more than 13.249 million year-round occupied households have their own well.¹²

Other kinds of wells are used for municipal systems, industry, agriculture, and quality monitoring. Groundwater accounts for 33 percent of all the water used by U.S. municipalities.¹³

Michigan, with an estimated 1,121,075 households served by private water wells, is the largest state market, followed by Pennsylvania, North Carolina, New York, and Florida.¹⁴

Irrigation accounts for the largest use of groundwater in the United States. Some 53.5 billion gallons of groundwater are used daily for agricultural irrigation from 407,913 wells.¹⁵ In 1900, the U.S. used an estimated 2.2 billion gallons of groundwater daily for irrigation from 17,000 wells.

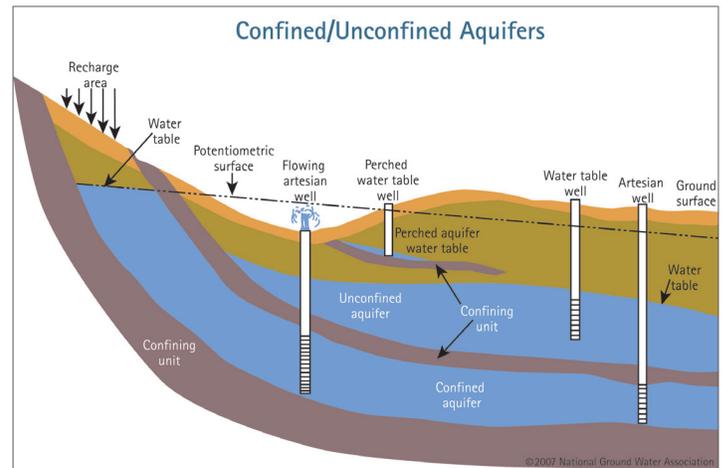
More than 90 percent of the groundwater pumped from the Ogallala, the nation's largest aquifer underlying some 250,000 square miles stretching from Texas to South Dakota, is used for agricultural irrigation. Representing about one-third of all U.S. irrigated agriculture, it creates about \$20 billion annually in food and fiber.

If spread across the surface of the entire U.S., the Ogallala's groundwater would cover all 50 states with 1.5 feet of water. Scientists estimate it could take 6,000 years to refill naturally if it were ever to be fully withdrawn.¹⁶

Texas leads the nation in the number of irrigation wells used with 77,389.¹⁷

The following myths continue to be perpetuated about groundwater:

- Groundwater moves rapidly.
- Groundwater migrates thousands of miles.
- There is no relationship between groundwater and surface water.
- Groundwater removed from the earth is never returned.
- Groundwater is mysterious and occult.
- Groundwater is not a significant source of water supply.



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¹ *National Geographic*, April 2010, p. 47

² *Estimated Use of Water in the United States in 2005*, U.S. Geological Survey Circular 1344, October 2009

³ *Sustainability of Ground-water Resources*, U.S. Geological Survey Circular 1186, 1999

⁴ *Estimated Use of Water in the United States in 2005*, U.S. Geological Survey Circular 1344, October 2009

⁵ "Water" map, National Geographic Society, November 1993

⁶ Calculations derived from multiple sources

⁷ *Estimated Use of Water in the United States in 2005*, U.S. Geological Survey Circular 1344, October 2009

⁸ *Ibid.*

⁹ Estimate prepared by the National Ground Water Association from various federal data sources at U.S. EPA, U.S. Department of Agriculture, and the U.S. Census

¹⁰ Estimate prepared by the National Ground Water Association from various association-sponsored industry surveys

¹¹ Resident population of the U.S. 2005 was 296,410,404, U.S. Census

¹² *American Housing Survey*, U.S. Bureau of the Census, 2008.

¹³ *Estimated Use of Water in the United States in 2005*, U.S. Geological Survey Circular 1344, October 2009; U.S. EPA, Drinking Water and Ground Water Statistics 2007, March 2008

¹⁴ U.S. Census, 1990 (best available data by state)

¹⁵ U.S. Department of Agriculture, *Farm and Ranch Irrigation Survey 2008*, November 2009 and U.S. Geological Survey, October 2009 report on 2005 water use

¹⁶ *Scientific American Water 3.0*, March 2008; *Understanding Water Risks*, World Wildlife Fund, March 2009; *State of the Water Industry*, TechKnowledge Strategic Group, March 2009

¹⁷ U.S. Department of Agriculture, *Farm and Ranch Irrigation Survey 2008*, November 2009