

Sources of Water

Surface water and groundwater are present throughout Kentucky's 39,486 square miles. Surface water occurs as rivers, streams, ponds, lakes, and wetlands. Groundwater occurs in the pore spaces within rocks and alluvium, in fractures, and in solution openings or conduits in areas underlain by soluble carbonate rocks (for example, limestone).

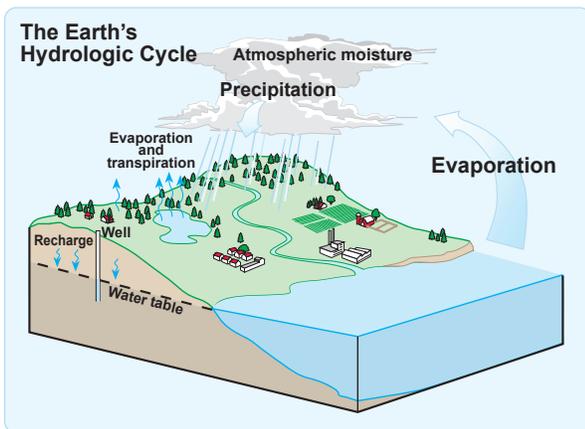
Water Supply

- Approximately 49 inches of precipitation falls on Kentucky every year. About 40 percent of this water runs off into streams, and 60 percent evaporates or is transpired by plants. This is called the hydrologic cycle (see diagram below).

- Kentuckians use more than 4.3 billion gallons of water every day. About 95 percent of this is surface water, and 5 percent is groundwater.

- Almost 94 percent of water used by consumers is returned to streams.

- About 815 public supply systems provide water for 80 percent of the population.



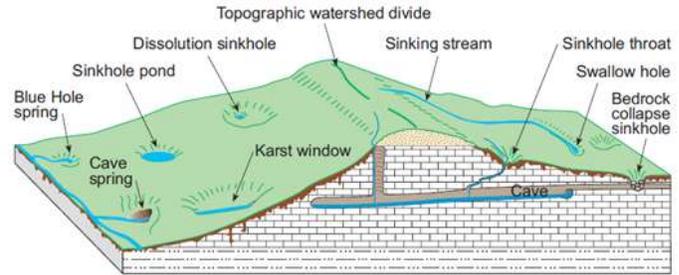
Water Contamination

Surface- and groundwater supplies in Kentucky are susceptible to pollution from both natural and manmade sources. Naturally occurring substances such as iron, manganese, barium, selenium, hydrogen sulfide, and salt may be present at undesirable levels. Bacteria and nitrate-nitrogen from sewage, septic tanks, animal wastes, and fertilizers are a common problem. Some water supplies in Kentucky have been threatened by organic chemicals, including trihalomethanes, a water disinfection byproduct, and trichloroethylene, an industrial solvent.

Karst Topography and Groundwater

Karst topography refers to areas with sinkholes, springs, caves, and underground streams. Approximately 38 percent of Kentucky is underlain by limestone exhibiting some karst development, and 25 percent is

known to have well-developed karst features. As limestone is weathered by slightly acidic rainwater, fractures and solution openings are enlarged over time, creating these features. Although groundwater and surface water are often thought of as two different things, groundwater is frequently the sustaining supply for surface water. In karst areas, surface water often enters or returns to the groundwater system through sinkholes and cave openings (see diagram below).



Rivers and Streams

- Thirteen major river basins, containing more than 90,000 miles of streams, drain the state.

- Kentucky has more navigable miles of water than any other state except Alaska.

- More than 60 miles of streams have been designated "Outstanding National Resource Waters" by the EPA and receive special attention under the Clean Water Act.

- One hundred fourteen miles of nine streams and 26,382 acres of land adjacent to these streams have been designated "Wild Rivers," which have exceptional water quality and aesthetic character.

Lakes and Reservoirs

- There are 45 major lakes in Kentucky, including reservoirs, with 29 dams 50 feet tall or higher. Only three of these lakes are natural.

- East of the Mississippi River, Lake Cumberland in south-central Kentucky is the largest artificial lake in water volume, and Kentucky Lake in western Kentucky is the largest in surface area.

- Reservoir storage in Kentucky totals 2.9 trillion gallons, or 9 million acre-feet.

- Kentucky is the only state bordered on three sides by rivers.

Surface Water

- Surface sources provide about 95 percent of the water used in Kentucky.

- About 3.5 million Kentuckians are served by surface-water sources, which include nearly 700 drinking-water systems.

- Surface-water withdrawals for Kentucky total 489 million gallons per day for public supply, 13 million gallons for domestic use, 167 million gallons for

industrial/mining uses, 81 million gallons for agriculture, and 3,430 million gallons for cooling at thermoelectric power plants.

- Surface water provides domestic water supplies for 92 percent of Kentucky's urban population and for about half of Kentucky's rural population.
- The U.S. Geological Survey maintains 51 stations that monitor stream-water quality.

Potential Sources of Surface-Water Pollution

- Nonpoint sources pollute about three and a half times as many miles of streams as point sources.
- Primary nonpoint sources of pollution are:
 - Mining, 31 percent
 - Agriculture, 29 percent
 - Land disposal/septic systems, 20 percent
 - Urban runoff, 10 percent
- Municipal sewage treatment plants account for 70 percent of the point sources of pollution.

Water Wells

- It is estimated that Kentucky has more than 200,000 water wells. Known wells include 52,000 domestic wells, 31,000 monitoring wells, 1,300 public supply wells, 1,100 irrigation wells, and 700 industrial wells (see diagram below).
- Since 1985, all water wells and monitoring wells in Kentucky must be drilled by certified well drillers, and reported to the Kentucky Division of Water.
- Average depths to groundwater range from 40 feet in the Bluegrass Region to 60 feet in the Jackson Purchase Region.

Groundwater Use

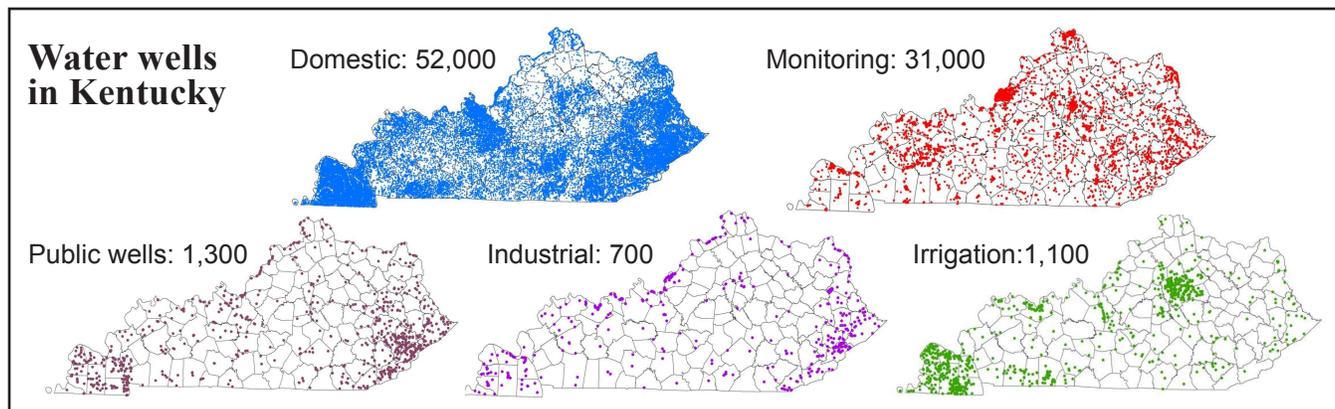
- More than 1.5 million Kentuckians are served by 185 public water-supply systems that rely on

groundwater, and 416,000 Kentuckians use water wells or springs.

- Kentuckians use about 156 million gallons of groundwater per day.
 - Groundwater withdrawals per day for Kentucky include 69 million gallons for public supply, 22 million gallons for domestic use, 56 million gallons for industrial/mining uses, 4 million gallons for agriculture, and 5 million gallons for cooling at thermoelectric power plants.
 - Groundwater, cisterns, and hauled water supply about half of Kentucky's rural population.
- Potential sources of groundwater pollution
- 125,000 unplugged oil and gas wells
 - 500,000 septic tanks
 - 40,000 underground storage tanks
 - More than 600 inactive landfills
 - 5,000 open dumps
 - Nearly 3,500 permitted hazardous waste-handling facilities
 - About 3,400 Class 2 injection wells (for brine disposal) associated with the production of oil or natural gas

Kentucky Groundwater Data Repository

The repository, managed by the Kentucky Geological Survey, was established in 1990 by State mandate to archive and distribute groundwater data collected by State agencies, independent researchers, universities, and other organizations. It provides the public with online access to information on water wells, well construction, springs, and groundwater quality. The repository can be accessed at kgs.uky.edu/kgsweb/DataSearching/watersearch.asp.



Additional Water Information

The Water Resources Section at the Kentucky Geological Survey conducts a variety of hydrogeologic investigations and acts as a scientific-technical resource to assist the groundwater data needs of State and federal agencies, other KGS research sections and UK research faculty, professional geoscientists and engineers, and the general public. More information is available at www.uky.edu/KGS/water.

The Kentucky Division of Water in Frankfort is the regulatory agency in Kentucky for water-related issues. Their mission is to manage, protect, and enhance Kentucky's water resources through voluntary, regulatory, and educational programs. More information is available at water.ky.gov.

The U.S. Geological Survey's Kentucky Water Science Center in Louisville also helps to manage and characterize water resources in Kentucky. More information is available at ky.water.usgs.gov.

Sources

Kentucky Geological Survey, Kentucky Division of Water, U.S. Geological Survey, Kentucky Environmental Quality Commission, U.S. Census Bureau.