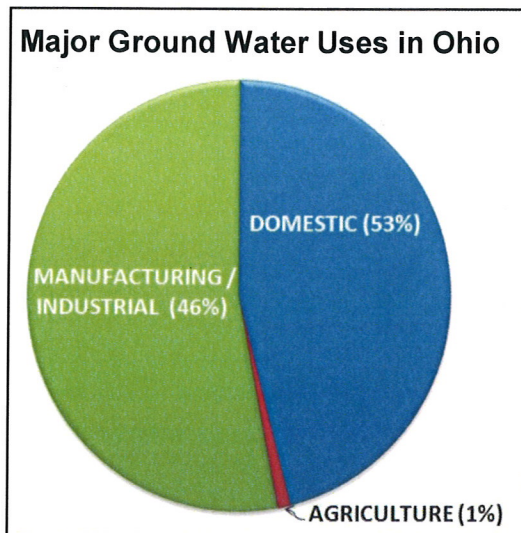


Ground Water in Ohio

Ground Water is a precious resource. Over 98 percent of the available fresh water on earth is ground water. Its users include homeowners, farmers, manufacturers, and schools. In Ohio, nearly half of all cities, villages, schools, businesses, and industries depend on ground water as their source of drinking water, processing and irrigation. This amounts to over one billion gallons per day!

Major Ground Water Uses in Ohio

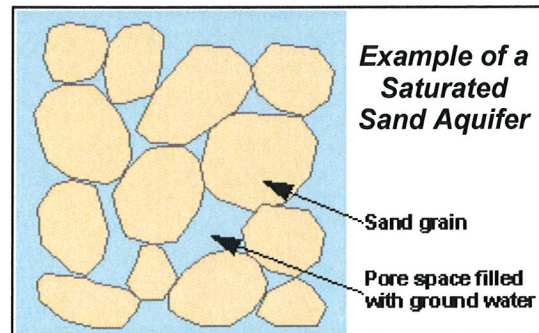


What is Ground Water?

In the most general case, ground water is simply water that exists below the land surface and which fills the spaces (pores) between soils and sand grains or the cracks and crevices in rocks. If the earth material is capable of yielding usable quantities of ground water to a well or spring, it is called an aquifer. In most areas, ground water moves slowly (sometimes only a few feet per year).

There are two basic types of aquifers in Ohio, sand and gravel aquifers and bedrock aquifers. Ground water in sand and gravel

aquifers occurs in pore spaces between individual grains of sand and gravel. In bedrock aquifers, ground water occurs in pore spaces and along fractures, joints, voids, and contacts between different formations.



Where Does Ground Water Come From?

Rain and melted snow infiltrating through the soil column are the main sources of ground water. Much of the water entering the soil is used by plants. A small amount is held in the soil, and the rest moves downward to the aquifer. An aquifer has to be saturated (all pore spaces are filled with water) to allow water to flow to a well or stream. The top of the saturated zone is the water table. Between rainfall events, the ground water discharges to streams. In Ohio, it is typical for the water table to fluctuate a few feet between wet and dry seasons. Streams and lakes occur where the water table is at or above the ground surface.



Ground Water in Ohio

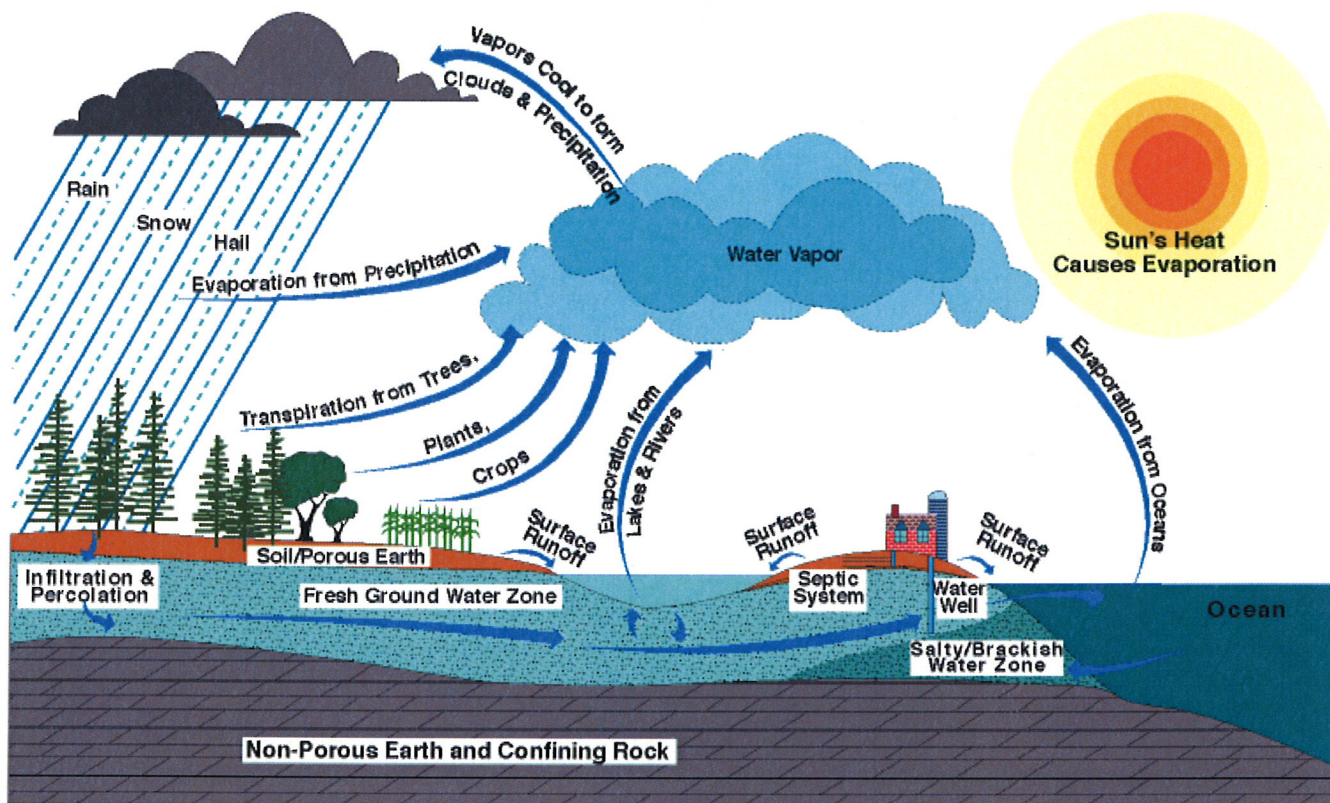


Image courtesy of Ohio Department of Natural Resources

The Hydrologic Cycle

Water's natural recycling between the atmosphere and the earth is called the hydrologic cycle, or the water cycle. The main components of this cycle include precipitation, runoff, infiltration, evaporation, and evapotranspiration.

As precipitation falls on the land surface, some of the water collects in streams and lakes (runoff), and some infiltrates into the soil (infiltration). Some of the water is used by plants and returned to the atmosphere (evapotranspiration). The remaining water migrates downward through the soil to become ground water.

The portion that becomes ground water may discharge into streams, lakes and other surface water bodies. Some of the water in these surface water bodies and in the soil evaporates into the atmosphere. The water that returned to

the atmosphere via evaporation and evapotranspiration eventually falls back to the earth as precipitation and starts the hydrologic cycle all over again.

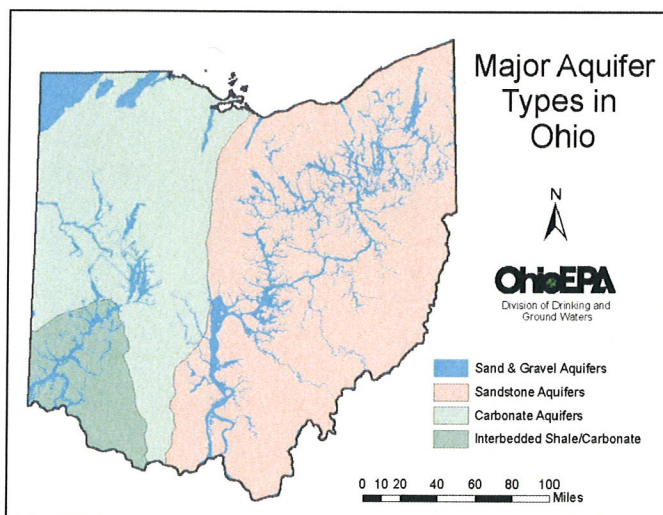
The hydrologic cycle has a seasonal component. During warmer times of the year when plants are active, high rates of evapotranspiration limit the amount of infiltration to ground water. A more obvious example of seasonality is the varying rate of precipitation throughout the year.

The water cycle and the resulting water movement controls the migration of water resources to the ground water that supplies drinking water to wells. Water that infiltrates to the underlying aquifer can be polluted by chemicals, nutrients, and/or organic wastes leaching from the land surface or just below the surface, such as septic systems or underground storage tanks. Improper use, handling, or storage of chemicals or hazardous materials increase the likelihood that these materials will be transported to aquifers via infiltration.

Ground Water in Ohio

Where is Ground Water Found in Ohio?

Ohio has abundant ground water resources. Average rainfall ranges between 30 to 44 inches a year (increasing from northwest to southeast). Infiltration of 3 to 16 inches re-charges the states aquifers. Ohio's aquifers can be divided into three major types of productive aquifers. Sand and gravel valley aquifers are distributed through the state. The valleys filled by these sands are cut into sandstone and shale in the eastern half of the state, and into carbonate aquifers in the western half of the state. The sandstone and carbonate aquifers generally provide sufficient production for water wells except where dominated by shale, as in southwest and southeast Ohio.



Why is Ground Water Important?

Nearly half of Ohio's citizens, businesses and industries use ground water as their main source of drinking water. Almost five million people in Ohio are provided ground water by community public water systems, and over 700,000 more have their own wells. Ground water resources will become even more valuable in the years ahead as Ohio copes with increasing water demands.

Why is Ground Water Contamination a Concern?

Ground water contamination is a serious problem because contaminants often travel unnoticed until detected in a water supply well. Once contaminated, an aquifer is both difficult and expensive to clean up, largely due to slow ground water flow rates. In many cases, the costs are passed along to consumers through increased water bills or taxes. Contaminated drinking water causes problems that can range from harmless effects (such as an unpleasant taste) to serious health problems. In most cases, prevention is simpler and less expensive than the cure.

Land Use Impacts on Your Drinking Water Supply

Activities that occur on the land surface can have a negative effect on your drinking water supply. Even if activities are well managed, accidents and spills can still happen. Some ground water in Ohio has become contaminated over the years due to poor land use and management practices, inadequate control of spills and subsequent cleanup, and improper disposal of wastes and chemicals. In some cases, aquifers were so contaminated that public water systems had to abandon their wells and find alternative sources of drinking water, such as new wellfields

Urban areas have many activities occurring that can potentially contaminate an aquifer. Potential pollution sources are industry, fertilizers from lawns and gardens, construction sites, and street runoff of oil, gas and road salt. Vegetation, which normally slows the rate at which contaminants travel, is scarce in urban areas, allowing contaminants to more easily enter the soil and travel faster over land.

The main sources of pollution in rural areas are agricultural activities and septic systems. These sources, if not managed properly, can impact aquifers with nitrates and bacteria.

Ground Water in Ohio

What Can You Do?

As a homeowner, we encourage you to learn about things that can be done around your home to help protect your ground water resources. These include: limiting the use of pesticides, fertilizers, and other lawn and garden chemicals; not pouring chemicals down the drain; recycling used motor oil and anti-freeze; reporting any spills or illegal dumping; joining in a stream, beach or wetland cleanup; having septic systems inspected regularly; and cleaning up after your pets. More suggestions can be found at:

<http://cfpub.epa.gov/safewater/sourcewater/sourcewater.cfm?action=Involvement>.

Ground water is a shared resource. Do your part to protect it.



Additional Ground Water Resources

For information on public water systems, drinking water source protection areas, strategies for protecting ground water, and ground water quality:

The Ohio Environmental Protection Agency

Division of Drinking and Ground Waters

(614) 644-2752

Web: <http://www.epa.ohio.gov/ddagw>

For information on private water systems, household sewage disposal systems (septic systems), water well driller registration, and water well construction:

The Ohio Department of Health

Bureau of Local and Environmental Health Services

(614) 466-1390

Web: <http://www.odh.ohio.gov/>

For information on ground water resources in Ohio, potential pollution maps, glacial and bedrock aquifer maps, and water well records:

The Ohio Department of Natural Resources

Division of Water

(614) 265-6739

Web: <http://www.dnr.state.oh.us/tabid/3252/Default.aspx>

For information on ground water special studies in Ohio:

The United States Geological Survey

Water Resources Division - Ohio District

(614) 430-7700

Web: <http://oh.water.usgs.gov>