WHAT'S GROUND WATER?

Fact Sheet 93-24

DIVISION OF WATER RESOURCES

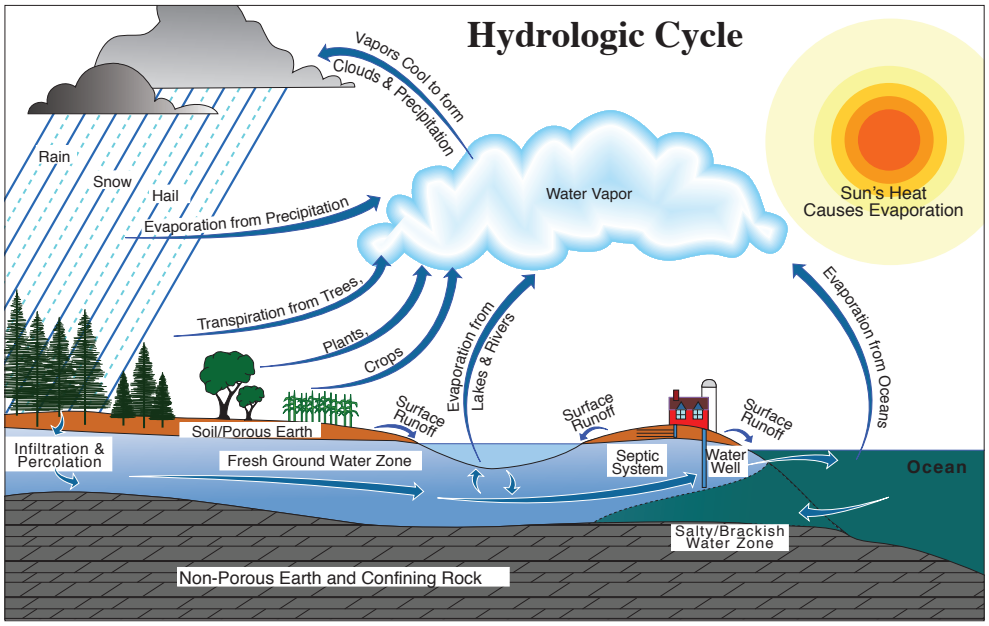
Ground water is water saturating the void spaces, pores, and fractures in the soil and rock at some depth below the earth's surface. While this definition is technically correct, it does not even begin to explain all the complex and varied aspects of ground water, or the importance of ground water to the nation and Ohio.

How Does It Occur?

There has always been some mystery connected with ground water because its source is unseen. Stories of underground lakes and rivers in Ohio are common, despite evidence disproving the existence of such bodies of water. In reality, the ultimate source of all ground water is precipitation. Part of the rain and snow that falls on the earth's surface seeps downward through the soil and collects in porous geologic formations. These formations act something like sponges and temporarily store the water. If these geologic formations are capable of yielding usable quantities of ground water to a well, they are called "aquifers."

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.

The Hydrologic Cycle



Ground water flow is an important component of the natural circulation of all water on earth, commonly called the hydrologic cycle. The hydrologic cycle begins with precipitation falling on the land surface. Some of the water runs off into streams and lakes, some infiltrates into the earth and becomes ground water, and a third portion evaporates back into the atmosphere. The portion which becomes ground water ultimately discharges into streams, lakes, and other surface water bodies. The water in streams and rivers flows into lakes and oceans where it is evaporated into the atmosphere. Water in the atmosphere eventually falls as precipitation on the earth's surface and starts the cycle all over again. More information on the hydrologic cycle may be obtained from the Division of Water fact sheet number 18, entitled "The Hydrologic Cycle."

Like water in streams and rivers, ground water moves, but at a very slow rate. Ground water flow is usually measured in terms of feet per day; in some formations ground water flow may only be a few inches per year.

Ground water flows from areas where precipitation percolates down to the water table, called recharge areas, to locations where it flows out of an aquifer and becomes surface water. If ground water flows out of an aquifer at the land surface, that spot is called a "spring." Most ground water, however, flows directly into streams, rivers, lakes, and wetlands through the stream bed or the bottom of the lake or wetland. Have you ever wondered why streams and rivers still flow during periods of drought? Most of the flow in streams and rivers during drought times is ground water discharging from aquifers into the stream channel.

Hydrologists call this component of stream flow "base flow." Base flow can also be a significant component of stream flow during normal times. In many streams, base flow sustains aquatic life during prolonged dry spells.

How Important Is Ground Water?

Over 98 percent of the available fresh water on earth is ground water. According to the USEPA, 48 percent of the population of the United States relies on ground water to meet its daily water needs. In Ohio, approximately 45 percent of the population (nearly 5.6 million people) depends on ground water. This includes large municipalities, such as Dayton, Canton, and Columbus, which rely on ground water to provide all or part of their water supply, and approximately 615,000 active domestic water wells supplying individual homes throughout the state.

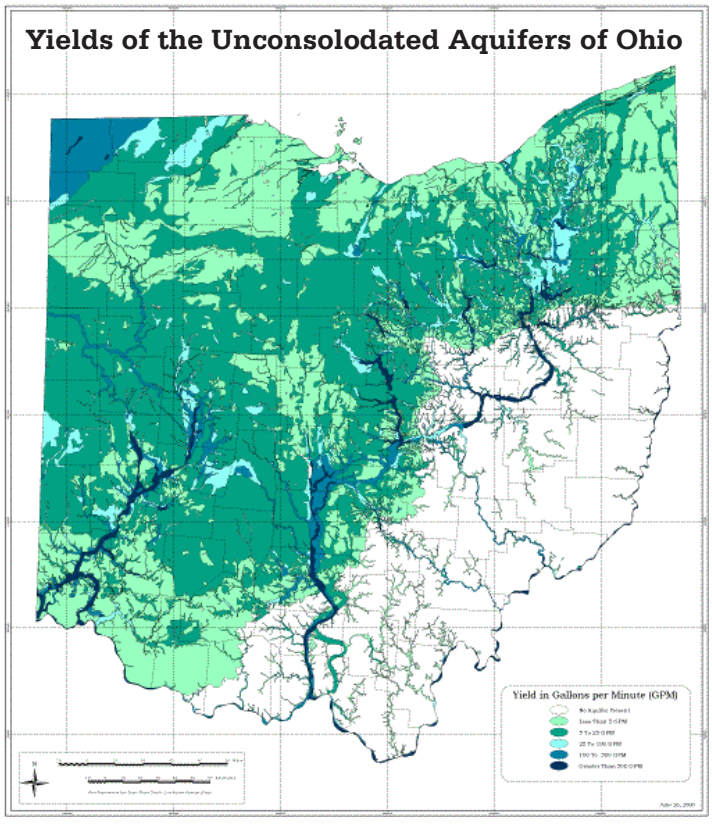
Industries in Ohio pump over 120 million gallons of ground water per day; irrigation withdrawals total almost 13 million gallons per day. Total ground water pumped for all uses in Ohio is about 860 million gallons per day. That's over 313 billion gallons per year, enough water to flood the entire City of Columbus to a depth of almost 7 feet.

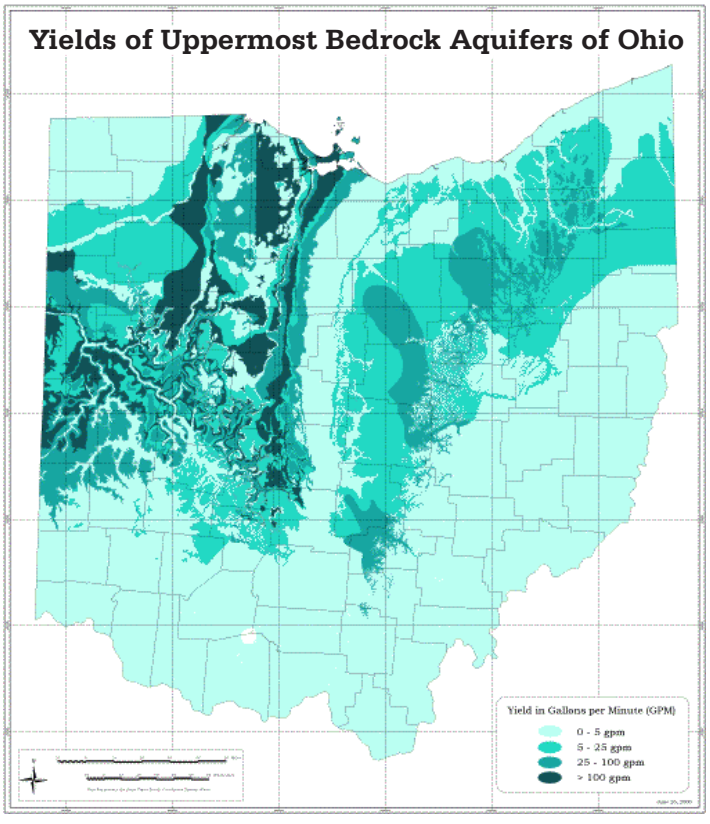
Where Is Ground Water Found?

Although the quantity of ground water used in Ohio is impressive, ground water does not occur everywhere with the same prevalence. The most productive aquifers in the state are the buried valley aquifers in the southwest, south-central, and east-central portions of the state. These aquifers consist of thick layers of sand and gravel deposited in valleys eroded deeply into the surrounding bedrock.

Some of the poorest aquifers in the state occur where the bedrock resists the flow of ground water. These types of formation are especially prevalent in the southeast portion of state, but also occur in some parts of the southwest and south-central portions of the state, and in a band along the eastern Lake Erie shore. The bedrock aquifers in these locations contain a very high percentage of clay minerals. Formations with high clay content are poor aquifers because they have very few or very small pore spaces for ground water to be stored in, or flow through.

The maps below illustrate, in a very general way, the availability of ground water in Ohio.





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