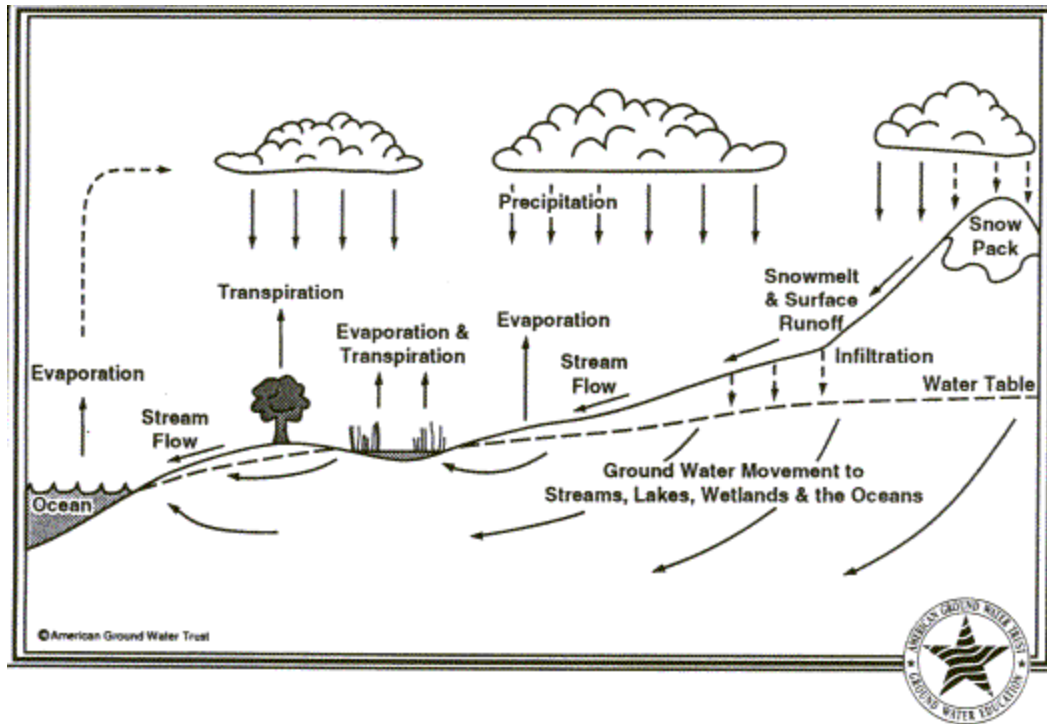


WHERE DOES GROUND WATER COME FROM?

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Ground water is precious. If it becomes contaminated - we can't use it. If it is over exploited we lose the opportunity to achieve sustainability by balancing use and natural replenishment. Knowing where it comes from is an important first step. This month's ground water topic is a basic education building block that explains the origins of ground water. Questions often asked are: How old is ground water? Where would it go if we didn't use it? How far does ground water travel beneath the surface? The basic cross-section drawing below, showing the hydrologic system can help answer some of these questions.



The hydrologic system (sometimes called the hydrologic cycle or water cycle), consists of a series of transfers of water involving the atmosphere, soils, plants, rocks, rivers, lakes, oceans and glacial ice. Water may occur as a liquid, solid (ice) or a gas (water vapor). Water drops are made up of thousands of water molecules, two atoms of hydrogen and one of oxygen, (H₂O). An individual water molecule may move rapidly through the hydrologic system in the space of a few days or may be in storage (for example as ice or ground water) for hundreds of years.

Ground water can occur in pore spaces in some sedimentary rocks (and in sediments such as sands and gravels) and in cracks and fissures in any type of solid rock. Aquifer is the correct technical word to describe water saturated rock formations. Some ground water is tens of thousands of years old, but most ground water used for drinking supplies in the U.S. has only been underground for a few months or years. Some ground water may be recharged from leakage through rivers and lakes, but rainfall and snowmelt soaking into the ground is the principal source of recharge. However, not all rainfall recharges ground water. Water from light rain is likely to be evaporated from soils or used by plants before it has a chance to soak deep underground.

Virtually all ground water is slowly on the move and will eventually reach the ocean or a wetland stream or lake. Most rivers receive about half their flow from ground water. How else can rivers flow after weeks and weeks of no rain? In some geologic situations, ground water may move hundreds of miles from the point of recharge to where it eventually reaches the surface. It is possible to have rock layers with ground water of recent origin overlying rock layers containing much older ground water. A well drilled in such geologic situations will contain a "cocktail" of ground water of different ages.

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