

All Water is Somebody's Source Water

by

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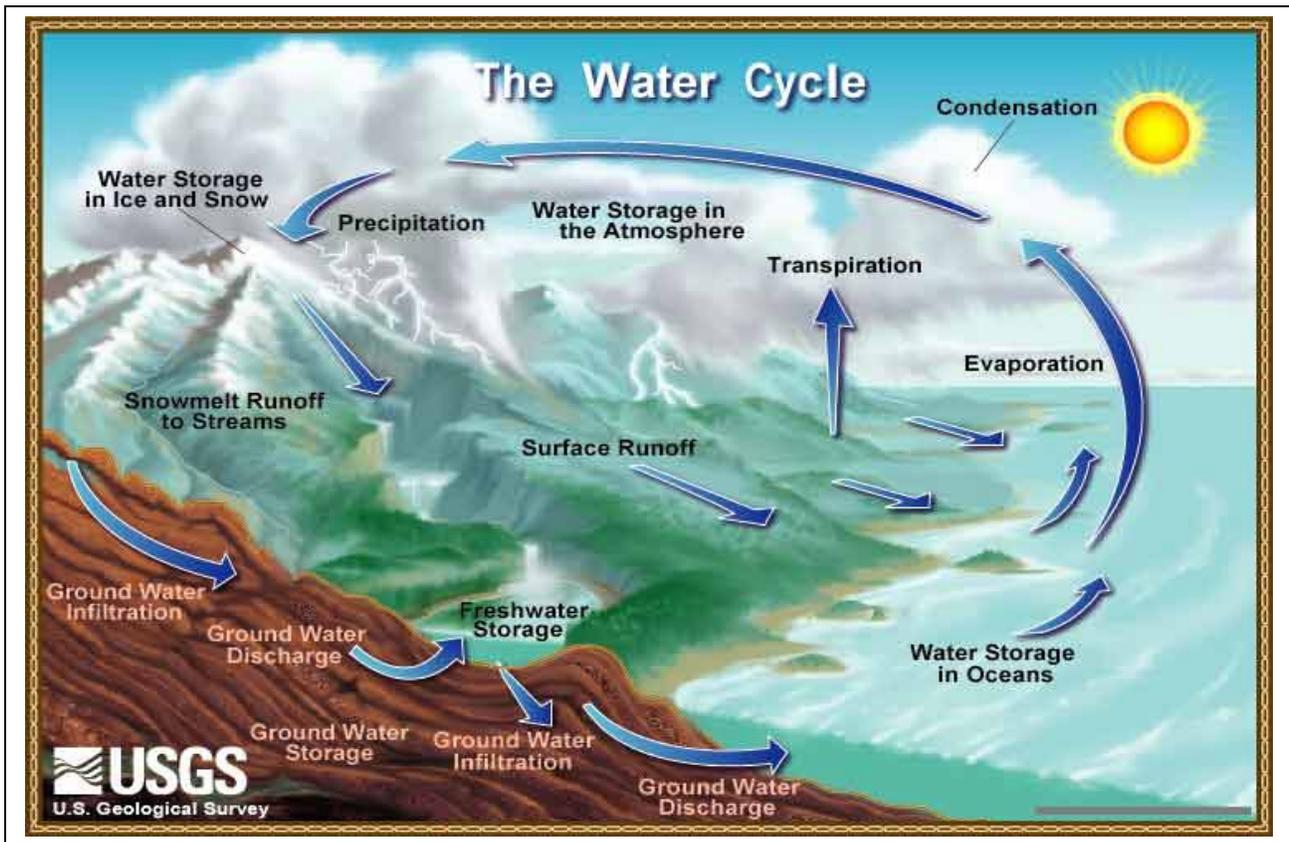
Water is a fundamental element for human existence but many concepts associated with water issues can be confusing. In grade school we learn the basics of the water cycle and “ground” water versus “surface” water. However, one term that many find confusing is “source water”.

A Google search of “Source Water Protection” resulted in 224,000 hits! The topics range from drinking water protections to surface water quality to wellhead protections to recommendations for open space acquisitions. The one clear connection between all the sources of water and efforts to protect them seems to be whether someone drinks the water in question. Wells draw from groundwater and are therefore, source water. Public water systems often pull from local rivers, streams and reservoirs and they are source water too. So it seems that “source water” is any water that is the source of someone's drinking supply.

Pennsylvania has more miles of creeks, streams and rivers than any other state except Alaska; many of them are the source water for municipal water supplies. Pennsylvania is also blessed with abundant ground water supplies. But if all water is someone's source water, is it possible to protect every drop? Maybe it is best to start with our elementary basics and see where the water flows.

A drop of rainwater forms as water vapor in the atmosphere condenses and falls as precipitation. Our little raindrop either soaks into the surface materials where it lands or begins a long journey to the ocean where it will evaporate and begin the cycle anew. If our raindrop falls on a tree, chances are good that it will remain there for a while as it slowly works its way down through the leaves or trickles down the limbs and trunk. During a typical, moderate rain shower, trees can hold thousands of gallons of stormwater. Not only do trees slow the rate of stormwater run-off, the leafy debris on the forest floor protects the soil, keeping it loose and loamy. Forest soils are like giant sponges, protecting source water by recharging groundwater supplies and filtering out contaminants such as sediments, chemicals and the substances that drip from our cars.

If our little raindrop makes its way into the ground water supply, it becomes part of the local aquifer – sometimes referred to as the water table. This nebulous feature is not so much an underground reservoir as it is a vast series of cracks, crevices and porous stone that are part of the local geology. Water continues to move underground and often re-emerges to the surface as wetlands and ponds. Underground water also feeds creeks and rivers from below, especially when the water table is high and close to the surface. Surface water features like creeks and wetlands need a constant flush of fresh water to maintain water quality and ecological health. When seasonal rains are light or non-existent, ground water may be the only source of fresh water that keeps aquatic organisms and plants alive.



In a natural system, the groundwater system is regularly recharged by precipitation that slowly makes its way into the ground through vegetation and loamy soils. In areas like Pennsylvania that receive about 43 inches of precipitation each year and are naturally wooded, more than a third of the annual rainfall can find its way into groundwater supplies to ensure sufficient water flows for local wells and to maintain healthy creeks, rivers and wetlands.

But when the water table is not constantly recharged, it slowly drops deeper and deeper below the Earth's surface and reduces the opportunities for our little raindrop to resurface in a creek or wetland. This is bad news for surface water but also for those who use wells to reach their source water. In recent years, many older, shallower wells have been redrilled to deeper levels due to the changing elevation of local water tables. A sinking water table is also one reason many creeks and streams nearly disappear during the driest part of summer.

So why is the water table retreating? Many local actions that we take for granted cause interruptions to the basic water cycle and threaten the ground and surface water sources we rely upon.

“Water mining” is a term that refers to extracting water from ground or surface sources, and eventually shipping it out to sea. Between the time our little raindrop is drawn from its source and the time it reaches the sea, it may have been pumped across watersheds, used in a home or business, been sent to a treatment plant where it is chlorinated and aerated and discharged to a local stream. From the discharge point to the sea, the treated

water, now known as effluent, will have very little chance to rejoin the local water table. As communities “mine” more water, they can draw down the local water table, affecting local wells as well as local habitats and ecosystems.

In addition, our little raindrop will have even fewer opportunities to join the water table as our communities grow and develop. Traditional stormwater management systems short-change groundwater recharge by collecting stormwater before it can percolate into the soil. Stormwater is then discharged directly to local creeks and “exported” from the area as quickly as possible.

As we convert land uses from natural vegetation to impervious surfaces, compacted soils and traditional stormwater management devices, nearly all of our annual precipitation becomes run-off and immediately starts its journey to the sea without nourishing local ecosystems or recharging groundwater.

From this closer inspection we find that groundwater and surface water are interchangeable at many levels, sometimes moving to the surface to supply creeks and streams and other times being pulled deeper as the groundwater supply recedes. Stormwater even seems to be a critical component of the source water puzzle since it is the source of fresh water coming into the local system. The only conclusion to be drawn from all this is that “All water is someone’s source water” and therefore, worthy of protection.