

Throwing water away

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Massachusetts is facing serious water shortages in spite of receiving an average of 45 inches of rainfall a year, or nearly 6.5 trillion gallons of precipitation - enough water to fill 12,922,465 Olympic-sized swimming pools. What is happening to all that water? The scientists and water policy experts at Charles River Watershed Association, located at 190 Park Street in Weston, are studying this complex problem and seeking sustainable solutions.

Groundwater (water in underground aquifers) and surface water (streams, rivers, and lakes, which are slowly replenished by aquifers) in the area surrounding the Charles River have been steadily decreasing for years. Many streams now go dry in summer months, and water use limits are being imposed by some municipalities. The water shortages are primarily the result of the "engineered water cycle" created through uncontrolled development, improper stormwater management, and current wastewater disposal and treatment techniques.

The I-495 technology corridor, one of the fastest growing areas in the state, is a perfect example of what is happening. Land is being rapidly developed, buildings and roads constructed, and traffic congestion is worsening. High-impact development creates more demand for water, to be used in businesses and industries. But the real problem is that the increase in impervious surfaces - roads, parking lots, sidewalks, driveways and buildings - prevent rainwater from infiltrating into the ground and recharging aquifers. In Boston, groundwater infiltration "losses" of stormwater have more than doubled in the past 20 years - in other words, half as much rain now gets through the soil and into the groundwater.

When water cannot percolate through the ground, filtering as it goes down into the aquifer, more contaminants enter the surface waters and negatively impact aquatic habitats. Rainwater is polluted through coming into contact with oil, gasoline, and other substances on roads and buildings, and it is discharged through elaborate drain systems to nearby water bodies. Additionally, during heavy rains, sewer pipes are often designed to overflow and discharge sewage waste directly to rivers and coastal areas.

Our approach to wastewater disposal is another element in the water crisis. Instead of treating wastewater from homes and businesses and then returning it to where it came from, it is piped away to be treated, and often discharged to the ocean or a river. Treating water initially helps reduce local water pollution impacts, but in the long term this results in substantial water loss on the local level. Another problem is in the actual sewage infrastructure - as pipes age, they crack and begin to draw in clean groundwater, which is prone to move into the pipes because the water inside pipes moves much faster than groundwater. On average, about 60% of the wastewater treated at the MWRA's Deer Island treatment plant is clean ground and storm water that has entered the sewer system through leaks, sump pumps, or roof leaders.

There are two fundamental problems with current approaches to water use and water engineering. First, drinking water, wastewater, and stormwater are looked at as three completely different entities. But water is water. By using it, we do not change its nature.

However, when we withdraw water from ground and surface sources, use it, and then throw it away as if it were a waste product, we create enormous consequences for the environment and undermine efforts to sustain water resources. Second, capturing, storing, and centralizing water resource over large regions is unnatural. Nature likes to keep water local, filtering it through the ground, and only in the last instant releasing it as groundwater springs to tributaries and rivers and allowing it to escape to the sea.

To overcome the water shortages Eastern Massachusetts is currently experiencing, we must think about how nature intended the water cycle to be. There is plenty of water, but due to increased development there is not enough filtering through natural surfaces into the groundwater. We need to keep water local, instead of shipping it away to be treated. It is time to stop throwing water away.

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