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Water Woes

How Our Careless Relationship with Water is Draining the Supply

Written by Sydney Rosensaft
Illustrated by Susan Robinson-Cloete

As humans, water serves us more than we give it credit for. Water does not just provide us with cool glasses of water or warm showers; it is behind each and every food we eat – even the dry ones. Without the water that cycles through our atmosphere, you would not be able to walk through the grocery aisles and see fresh fruits and vegetables, dried grains, or even frozen meals.

Earth's water cycle is a common topic in almost any science class.

We learn how water melts from snowy mountaintops and glaciers, running down into rivers, streams, lakes, and into the oceans. On its way, some water is pulled underground to join other groundwater in cracks in soil and rocks. The roots of plants pull up some of the water and evaporate from the surface of the leaves of the plants. Evaporation from land and ocean surfaces also turns water into water vapor in the atmosphere. In the atmosphere, water vapor condenses into clouds. It precipitates back down onto the Earth's surface as snow or rain, falling onto soils, plants, and bodies of water, where it cycles through again. That seems like a pretty simple cycle, right?

However, humans' dominance over the planet has changed our once memorized water cycle. Deforestation releases water vapor stored in trees, creating a short-term localized humidity and increase in precipitation. In the long run, however, fewer trees mean less water that can evaporate, leading to less rain and drying out lands previously packed with forestry. Human agricultural practices often use pesticides that introduce toxic chemicals into

rivers, lakes, and oceans as water runoff passes through agricultural land. Polluted waters lead to algal blooms, marine animal diseases, and ocean acidification. Excess carbon dioxide and greenhouse gasses emitted by humans lead to Earth's warming temperature, melting both land and sea ice and causing sea levels to rise. We are continuously altering the overarching water cycle through our actions.

It is important to examine what humans are putting into the water cycle, pesticides, plastic, etc., and what we are taking out of this crucial atmospheric cycle. Irrigation is the removal of water from its natural source to artificially water lands and supplement natural precipitation. Irrigation is used for industrial, agricultural, and domestic purposes, making up 70 percent of global water withdrawals – the largest water sector use. There are a variety of irrigation methods. Each type of irrigation has different benefits and consequences, but they all impact the water cycle in different ways.

Irrigation is not inherently harmful – it was invented as an agricultural practice for a reason. A reliable water source is necessary to grow fruits, vegetables, grains, and any other food. Irrigation can protect these crops from freezing or wilting and allow agricultural practices to spread to drier areas, like Californian deserts. This is crucial for producing a certain amount of food needed to sustain

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the increasing global population. Since we need more food, we need more water to grow that food, and more land to be available to farmers. Irrigation allows for this level of food production to be possible. Without irrigation systems, the next time you go to the grocery store, you probably would not see such a colorful variety of produce or even basic breads.

The positive effects of irrigation on agricultural systems have also allowed the US economy to flourish. In 2017, agriculture in the US contributed more than one trillion dollars to the gross domestic product (GDP), 5.4 percent of the total GDP. Agriculture and food sectors are responsible for 11 percent of total US employment, of more than 22 million full and part-time jobs. Despite the economic benefits of irrigation, these practices can turn sour if overused.

The problem lies within the careless use of water to irrigate land. We sometimes treat water like a cheap, unlimited commodity that will always exist to hydrate us and endlessly absorb our toxins. Excessive irrigation increases runoff water and releases more pesticide-contaminated water into streams, polluting waterways even more. Too much irrigation can also cause land erosion and push sediment into bodies of water. This clouds the water, affecting how much sunlight can reach aquatic plants and clogging the gills of fish. Additionally, some irrigation systems pump groundwater stored under the surface. The shrinkage of these underground water reserves is hidden, but still a loss of water threatens food security and agricultural economies. For example, food-producing regions of China, India, Pakistan, the Middle East, Mexico, and the United States are experiencing depletion of their underground water reserves.

Furthermore, only half of the water used for irrigation returns to the water cycle for reuse. Throughout irrigation practices, some water is lost by evaporation into the air, some is lost by evapotranspiration from the plants it watered, and some is even lost in transit, for example, from leaky pipes. Areas with heavy irrigation system use are seeing decreased water flow down streams, threatening local ecosystems. For instance, in southwestern Georgia's lower Flint River Basin, mussel populations rely on clean, flowing water to survive and reproduce. As groundwater is pumped to irrigate cotton and peanuts, river flows are depleted and not appropriately replenished, putting mussel populations at risk. This jeopardizes the river's ecosystem and has potential ripple effects on other marine ecosystems and even human lives.

The water cycle will not continue to support our agricultural practices with clean, safe water if we continue to use its supply in excessive amounts. However, we need to continue farming to feed our planet, and we need irrigation at a sufficient scale, especially as the population grows rapidly. Luckily, there are solutions to increase the sustainability of our current irrigation practices. Farmers can improve the efficiency of their water use. By measuring actual crop needs of water and applying only what is necessary, farmers can prevent excessive irrigation that leads to increased runoff and erosion. For example, researchers are trying to program an irrigation sprinkler with a GPS. This would tell the irrigation sprinkler to stop spraying whenever it passes over a section of rocks, wetland, or an area without crops planted. This cuts down on water used to irrigate areas that do not need it and can potentially reduce water use by 15 percent. Another option is to program schedules into irrigation systems to apply water at intervals only when crops need hydration. Being conscious of what kind of irrigation system is used can increase water use efficiency. For example, a drip irrigation

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system allows for control over how many pesticides leak into the irrigation water. Additionally, drip systems decrease the amount of water lost to ditches or evaporation compared to furrow irrigation systems.

Awareness of how much water we are taking out of the water cycle and the quality of water that is put back in is crucial in fixing humans' current harmful trajectory. So next time you are at the grocery store, I hope you can find some appreciation for the water that went into each item in your cart, and remember there is a water cycle out there that is hurting.