

## How Do Trees Benefit Our Environment?

There are many reasons why we need trees in our environment (see sidebar) but one of the reasons is to save our water quality. Yet this reason seems to defy basic logic when we consider the rules of gravity. How do trees filter groundwater and soak up water in the first place?

The process of water uptake and transport in trees can be likened to the vascular system of the body. There is a

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system of interconnected cells that form a vast pipeline within trees. What's obviously missing in this analogy is the pumping action of the heart. Trees rely on a much simpler vacuum process to transport water, its lifeblood.

Cell walls in the tree, called xylem tissues, form the pipeline from the roots to the leaves. When water is lost through the leaves in a process called

transpiration, a vacuum is created within the pipeline or the xylem tissues. Once this happens, water is pulled back into the leaves from the roots on up. The roots, if in well-hydrated soil, will pull the water from the surrounding soil bed.

When leaf transpiration decreases, as in nightfall or during cloudy days, the vacuum is much less and so there is a corresponding lower draw of water from the xylem tissues.

So the simple answer to the question about what propels water from the roots to the leaves is that the sun's energy does it: heat from the sun causes the water to evaporate, setting the water chain in motion.

This chain of motion can have a significant impact on water in the surrounding environment. In one estimate, a healthy large tree can store upwards of ten cubic feet of stormwater runoff. In a five-acre stand of 100 trees with average trunk diameters of 11 inches, 70 cubic feet of stormwater can be stored.

– Adapted from article in Scientific American

### The Subtle Assets of Trees

There are many benefits trees offer to our environment, although they may not be obvious to everyone. Here are a few of the positives that we owe to our trees:

- ...**Oxygen Replenishment** – in the process of photosynthesis, trees convert carbon dioxide and water into carbohydrates and oxygen.
- ...**Carbon Dioxide Sequestration** – in order to photosynthesize and release oxygen, trees absorb carbon dioxide from the atmosphere.
- ...**Save Energy** – as few as 3 trees around your home can cut air conditioning bills in half.
- ...**Clean Ground Water** – the hair-like root fibers of trees help filter ground water, trapping nutrients and pollutants that could contaminate it.
- ...**Pollution Control** – tree leaves and roots act as natural filters of air and water (rain and ground), removing particulate matter.
- ...**Soil Retention & Rejuvenation** – tree roots hold soil in place so it cannot easily be washed away by wind or water; the decaying of dead tree parts returns nutrients to the soil.
- ...**Flood Water Control** – the root systems of trees hold in place soil that, if washed away by heavy rains, would flow into streams and rivers, making them shallower and allowing flood waters to overflow protective banks.
- ...**Mineral and Nutrients Cycling and Retention** – through growth, transpiration, and death, trees tie up minerals and nutrients from air, water, and soil.
- ...**Climate Control** – trees work as natural barriers to wind, snow, rain, and solar rays to control climate in micro-areas.
- ...**Habitat for Wildlife** – trees and forests provide homes for many different species of animals.
- ...**Aesthetics** – trees beautify urban and community areas such as parks, streets, and schoolyards.

– American Forests

