

# EXPERIMENTS: TREES AND WATER

**Materials:** Magnifying glass, three empty cans of the same size, ruler, Popsicle sticks, plastic bag, journal

**Background:** There are many species of trees that grow in West Virginia including conifers (evergreen) and deciduous trees. Tree experts, called arborists, plant different types of trees in different places because of the services they can give to communities. One service trees perform is protecting communities from strong rains by slowing down the water like an umbrella. Communities want to know which type of tree is best at slowing down rain to prevent runoff and keep water off of buildings.

**Directions Experiment One:** In this experiment, you will look at how water moves inside a tree during photosynthesis and respiration. Remember that photosynthesis is how plants use carbon dioxide and water with the power of sunlight to create glucose (sugar) and oxygen. Respiration is how plants and animals make energy for themselves using glucose and oxygen and “breathe out” carbon dioxide and water as byproducts. Trees need to perform both photosynthesis and respiration in order to live and grow. Both of these processes take place in the leaves of trees. Usually it is impossible to see this happening, however, with this experiment, you will be able to see the byproduct of respiration over time.

Find a low branch of a tree that you have permission to visit. Make sure this branch is alive and has plenty of green leaves. Take a plastic bag and tie the bag around the end of the branch with leaves inside. Make sure the bag is tied tightly around the branch to keep all the gases inside. Check back on your branch every day for a week. On each day, take notes in your journal about what you see through the bag (do not untie the bag). With these observations, see how much water collects inside the bag and if you can find out where the water came from.

## WHY IS THIS IMPORTANT?

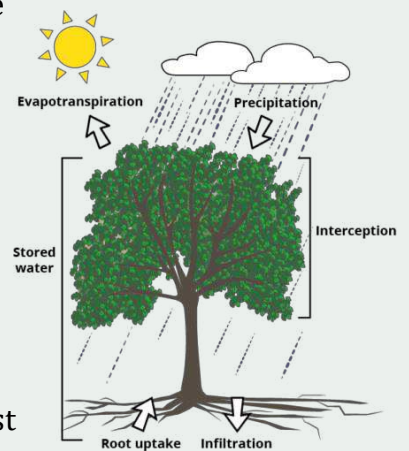
Trees are an important part of the ecosystem in West Virginia and help people every day. Trees protect people, buildings, and the ground from hard rains. If it rains too hard, dirt and litter can be carried away with the rainwater towards streams causing pollution. Trees are like umbrellas; they slow down the strong rains to keep pollution out of streams and rivers. Different types of trees may be better at protecting us from the rain. Tree experts use experiments like this to determine which types of trees are best for rain protection and use this information to help communities plant more trees that will help. Water also moves inside the tree during photosynthesis and respiration which helps the tree stay alive and to grow.

**Directions Experiment Two:** This experiment will look at how the type of tree affects the amount of water that is intercepted (blocked) by the canopy (leaf layer). For this experiment, you will need to find three different areas: one underneath a deciduous tree (broad, flat leaves which fall off in autumn), one underneath a conifer tree (evergreen), and one in an area out in the open. Make sure you can visit these areas again and have permission to leave things in this area. In your journal make observations about these three spots including what is around you, what the tree looks like, and what the canopy looks like above you. You will also form a hypothesis (scientific guess) in your journal. Write down which of the three areas that you think will have the least amount of rain fall onto the ground. Think about how the leaves will block the rain.

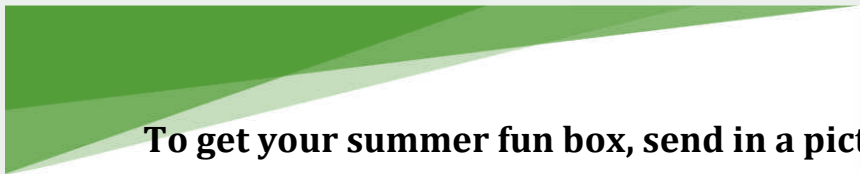


After you write your hypothesis, place one of your cans in each spot, open to the sky right before a rainstorm. Make sure that the can will stay in place during a rainstorm. When the rain is over, take your journal, a ruler, and three dry Popsicle sticks to the three areas. In each can will be rainwater collected like a rain gauge and you will measure the amount of water that has collected in each can.

Dip a dry Popsicle stick into the can for a few moments but keep the can level or on the ground (do not tip the can in any direction). Take out the Popsicle stick and look for the line where the water rose to. Using a ruler, determine how much water was in each can by measuring from the bottom of the stick to the wet line in centimeters. Write down this measurement for each area that you have observations about. Using this information, you can figure out which area intercepted (blocked) the most rain because it will have the lowest amount of water in the can. Repeat your experiment for several more rainstorms, keeping careful notes and measurements each time. Over time, use the data and your observations to either prove or disprove your hypothesis and see if your guess was correct.



Courtesy of Mississippi Watershed Management Organization.  
Illustration by MWMO Intern Rachel Johnson.



**To get your summer fun box, send in a picture of your journal observations and hypothesis plus measurements at <https://www.cacaponinstitute.org/teach/stream-scholars-summer-camp/>**

