

Trees and the Water Cycle

Standards Addressed

Environmental Education Standards:

- A. Questioning and Analysis: A.4.2 and A.4.4.
- B. Knowledge of Environmental Processes and Systems: B.4.1 and B.4.7.
- D. Decision and Action Skills: D.4.6.

Key Concepts/ Content

- 🌳 To understand trees, as plants, give off water vapor through transpiration.
- 🌳 To understand plants are an integral part of the water cycle.

Teacher Background

Source: <http://www.newforestsproject.com> select Tree Education and then select Ecology & Trees

Have you ever been walking on a hot day in a field or village and then entered a forest or heavily shaded area? It feels much cooler and even damp!! Why do you think this happens? Trees are often considered natural sponges, which regulate the earth's water supply by holding water. Forest waste matter, such as decomposing leaves or humus, slows down surface evaporation from the soil. Rain first falls on leaves and plants rather than directly hitting the soil, decreasing the rate of water and soil erosion.

Forests help regulate the water in the air through a process called transpiration. They absorb thousands of gallons of water into their roots. The water is carried up through the trunk and into the branches and leaves for food. Excess water is then released through the leaves back into the air.

When the air becomes saturated with enough moisture, clouds form and, if enough moisture is *transpired* into the air, rain will fall. This begins the water cycle all over again.

To see the tiny holes, or stomata, through which leaves transpire water, you must look under a microscope. However, if you wrap a broadleaf plant in clear plastic and place it in the sunlight, in a few hours you will see moisture or condensation clinging to the inside of the bag. The leaves gave off this moisture much like your skin excretes moisture when you perspire.

Getting Ready

1. Visit Missouri Botanical Garden's Website:
www.mobot.org/MBGnet
(you may want to do this with your students)
Go to *What's It Like Where You Live?* and visit the Temperate Deciduous Forest.
2. Find a nearby location with several maple, oak, or other broadleaf trees and obtain permission to use them for this demonstration.
3. Identify the species of trees (so you can answer the students' questions!)

Safety Issues



- ◆ Safety contract (See Appendix)
- ◆ Please respect private property, being careful of plantings, etc.

Materials Needed

- ✿ Plastic bags (clear gallon size, **not** self-closing)
- ✿ Twist ties
- ✿ Journals, pencils, art supplies

Procedures

This should be done on a sunny day, over several hours.
In pairs, students should:

1. Place plastic bags around clusters of leaves. Gather up and close the bag as completely as possible around the cluster or on a branch of the tree.
2. Secure the bag gently with a twist tie, being careful not to damage the tree.
3. After several hours, observe the bag.
4. Record observations.
5. Share and analyze results.
6. Write a description of and illustrate the transpiration demonstration on a journal page. Include an explanation for results observed.

**Evidence of
Student
Understanding**

Demonstration discussion and analysis
Journal entries


Sample rubric for activity:

3	Complete water cycle illustrations and written descriptions of transpiration process, showing tree, roots, conductive tissue, leaves, and stomates.
2	Drawings and writings describe transpiration process generally.
1	Incomplete journaling and illustration
0	Not done

**References/
Resources**

 *Forest and Water: The Green Sponge* DNR publication FR 032 85

 *Project WET*, Montana State University, Bozeman, MT 59717, <http://www.montana.edu/wwwwet/>

 *Trees in the School Grounds: Learning Through Landscapes*, by Rosemary Clark and Peter Walters, See activity “Understanding the Green Machine.”

Activity ASheet

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