



Understanding Evapotranspiration

Objectives and Standards

- To understand the role of plants in the water cycle through the process of evapotranspiration

NSTA Standards Addressed

Content Standards

A, B, C, D, F, G

4-H SET Abilities Addressed

Predict

Problem Solve/Design Solutions

Observe

Communicate

Summarize/Relate

Interpret/Analyze/Reason

Background

In the hydrologic cycle, or water cycle, there are a few obvious culprits that contribute to the cycling of water, like rivers, clouds, and lakes. However, there is another important player in the hydrologic cycle that is frequently overlooked. Evapotranspiration happens when plants absorb water through their roots and then evaporates off their leaves. This activity explores the role of plants in the hydrologic cycle.

Preparation Needed

1. Place celery or carnation in water for several hours until leaves or petals are colored with the food coloring.
2. Print off, or draw on the board, a diagram of the water cycle with vegetation. Have students label the water cycle (they will usually forget evapotranspiration).

Supplies Needed

- diagram of the water cycle
- celery stalks or white carnations
- clear container filled with water-colored food coloring
- paper towel tube
- paper cut into a series of connected circles that is slightly longer than the paper towel tube and can fit inside the tube
- clear plastic bag and twist tie for each group/youth

Activity

Part 1.

1. Show youth the celery or carnation that has been soaking in colored water and ask how the leaves got colored.
2. Ask youth to consider a 20 foot tree; how do its leaves get water?
3. Show youth the paper towel tube with the cut-out circles placed inside and sticking out. The tube represents the part of the tissue inside a plant (xylem). The paper represents water molecules.
4. Point out the water molecule near the top of the tube, explaining that this represents a molecule at stoma (or pore) of a leaf. Heat energy from the sun is stronger than the forces holding the water

molecules together.

5. Rip off a circle to represent the bonds breaking the water molecule hold. As you do, pull another water molecule out of the top of the tube. This represents a water molecule breaking away, which causes a pull on the remaining water molecules, drawing them further up the tree's xylem.

Part 2. (Works best on a sunny day after a rainstorm or after an area has been watered)

1. Divide into small groups; give each group an empty plastic bag and a twist-tie.
2. Assign each group a plant (tree or shrub) outside.
3. Have each group carefully place its bag over a part of a limb of a tree or shrub.
4. Groups count and record the number of leaves in each bag.



Have youth develop a method to estimate the number of leaves on their tree (x leaves per branch, x branches on a tree, etc). How is a tree identified? This step can take 20 minutes, or leave the tree and engage in another activity until about a half hour has passed.

6. After 30 minutes or more, have each group remove their bag from the limb, being careful not to remove any leaves or branches.

7. Ask youth to observe what has happened to their bags. why do they now have water/condensation in them? Explain that this is called transpiration, much like how humans experience respiration. If every leaf on every tree transpired as much as our leaves did, would that be a lot of water?

Discussion

The celery or carnation shows how water travels from the roots of a plant to the leaves. The forces used to cause the travel were demonstrated with the paper and the paper towel tube. Finally, using the bags and twist-ties, we demonstrated how water leaves the plant through transpiration.

Have youth evaluate their drawing and labeling of the water cycle. Did they factor in the vegetation in their model? Where does the water go when it is pulled from the tree by heat energy? It evaporates! Youth should label this source of evaporation on their water cycles, and point out that it is called Evapotranspiration!





Please send us your feedback!

As a 4-H Educator, you know what has worked well, what has not, and how we can improve the *Tracking Climate in Your Backyard* curriculum. Please share your feedback about the curriculum. We'd love to receive copies of any reports or newspaper coverage about completed *Tracking Climate in Your Backyard* projects.

Fax or mail your completed feedback to Trisha Smrecak, Museum of the Earth, 1259 Trumansburg Rd., Ithaca, NY, 14850 or fax to: 607-273-6620.

Check the activity completed	Suggestions for improving the activity
Rainfall Activities <input type="checkbox"/> Make It Rain <input type="checkbox"/> Where Does the Rain Come From? <input type="checkbox"/> Stormy Weather	
Snowfall Activities <input type="checkbox"/> Confetti Snow Maps <input type="checkbox"/> How Much Water? <input type="checkbox"/> Edible Education <input type="checkbox"/> The Snowflake Game <input type="checkbox"/> Snow Journaling	
Temperature Activities <input type="checkbox"/> Energetic Weather <input type="checkbox"/> Shade of the Old Oak Tree <input type="checkbox"/> Temperature Through Time	
Wind Activities <input type="checkbox"/> Why Does the Wind Blow? <input type="checkbox"/> Make Your Own Wind Dial	
Hydrologic Cycle Activities <input type="checkbox"/> The Incredible Journey <input type="checkbox"/> Understanding Evapotranspiration <input type="checkbox"/> Pinecones: Mother Nature's Weather Forecasters <input type="checkbox"/> What is a Watershed?	
Climate Activities <input type="checkbox"/> Where is My Backyard? <input type="checkbox"/> Soak up the CO ₂ <input type="checkbox"/> Buckets O' CO ₂ : How Your Backyard Can Change the Ocean <input type="checkbox"/> Raise the Waters	
CoCoRaHS Participation <input type="checkbox"/> Precipitation measurements and other activities	

Please share your suggestions for improving the Tracking Climate in Your Backyard curriculum.

How have you used Tracking Climate in Your Backyard in your community?

Thank you for completing the Tracking Climate in Your Backyard curriculum feedback. We appreciate learning about how you are using the curriculum and receiving your suggestions for improving it.

Organization _____ Contact Person _____
 Email _____ Date _____