

Moving Water

Grade Levels:5-9

Nutshell

Students will examine how surface and groundwater move through the hydrologic cycle by using a watershed model. They will explore how human activities can affect the quantity and quality of available water.

Objectives

Upon completion of this lesson, students will be able to

- Define a *watershed* and trace one on a map;
- Define a simple water cycle;
- Relate how groundwater affects lake surface water;
- Describe how humans affect the quantity of water in a watershed;
- List four examples of how humans can affect the quality of water in a watershed;
- Describe one current water-related environmental issue.

Moving Water Pre-visit Activities

The following materials are aids to help prepare your students for their visit to the Central Wisconsin Environmental Station. The vocabulary list contains terms and concepts your students will encounter in their visit. Please modify the definitions as needed. The activities listed below are merely options—it is not necessary to do them all or to follow any particular order. Keep in mind that your students' learning experiences at CWES will be enhanced if they are familiar with these concepts and terms prior to the on-site activities.

Vocabulary

Condensation:	the change from a gas to a liquid (water vapor or gas collects on objects or in clouds to form large water droplets).
Evaporation:	the process of converting a liquid is changed to a gas (liquid water changes to water vapor and mixes with the air).
Ground Water:	natural reservoir of fresh water collected below the surface of the earth.
Percolation:	downward flow or filtration of water through pores or spaces in rock or soil.
Precipitation:	water droplets collected in clouds that become heavy enough to fall to the earth as rain, snow, sleet, hail, or mist.
Runoff:	the portion of rainfall, melted snow, or irrigation that drains directly off the surface of the land and collects in streams, rivers, or lakes; run-off can pick up pollutants from the air or land and carry them to the receiving waters.
Transpiration:	the process by which water vapor evaporates from living plants through specialized leaf cells (stomata).
Water Cycle:	the continuous movement of water through the biosphere.
Watershed:	the area drained by a given river or river system.
Water table:	the highest level of groundwater at any given time.

Moving Water Pre-visit Activities

Activity #1

Have the students keep track of all the ways which they use water directly during one day-flushing the toilet, drinking, cooking, washing, and so on. If the students have a water meter at home, have them figure out the quantity of water used by their family in one day or the average use over a week. If they do not have a water meter, they should try to calculate their estimated daily water use with the following figures. (Note: These are only approximate.)

Here are some facts you may not know.

- Flushing the toilet uses 5-7 gallons per flush. New toilets have 1.6 gallon tanks or less.
- A shower uses about 5-10 gallons of water per minute.
- Filling the bathtub could use from 25-50 gallons (It depends on how full!)
- Brushing your teeth with the water running can use 2 gallons of water.
- A clothes washer uses 25-50 gallons per load (large machines need up to 50 gallons of water.)
- A dishwasher uses 15 gallons per load.
- The bathroom faucet left running can use 3-5 gallons per minute.
- Even a leaky faucet losing one drop of water each second wastes 4 gallons of water each day, if the faucet leaks a small stream of water, over 25 gallons of water can be lost in a day.

From the above figures, calculate a class average of daily water use. How much water would all the students in your school use each day? Your local community? (See the Post-Visit Activities for ways to cut water use.)

Note: The activity is adapted from Project Learning Tree.

Activity #2

Explain to the students that although 71% of the earth is covered with water, not all of it is available for human use and consumption. The majority of this water is salt water. Tell the students that as a group, they are going to calculate the percentage of fresh water available for human use. Start with a liter of water and say that it represents all of the water on Earth. Ask where most of the water on Earth is located (oceans). Pour 30 milliliters (ml) of water from the original liter. The 30ml represents all of the fresh water. Eighty percent of this water is frozen in ice caps and glaciers at the North and South Poles. Pour 6ml of the fresh water into a small dish. This 6ml is the non-frozen fresh water into a small dish. This 6ml is the non-frozen fresh water. Use an eye dropper to remove a drop of water from the dish (0.003 ml). This drop represents clean, fresh water that is not polluted or unavailable for use (0.00003 %) of the total!

Moving Water Pre-visit Activities

Adapted from Project WET. Bozeman, MT: The watercourse and Western Regional Environmental Education Council, 1995.

Activity #3

Give each student a cup of water. Have a different student read each stanza of the poem "Recycled" by Dr. Verne Rockcastle. At the end of the poem have the class take a sip of water as a "toast" to water.

Moving Water Pre-visit Activities

Recycled

The glass of water you're about to drink
Deserves a second thought, I think,
For Avogadro, oceans, and those who you follow
Are all involved in every swallow.

The molecules of water in a single glass
In number, at least five times, outclass
The glasses of water in stream and sea,
Or wherever else water can be.

The water in you is between and betwixt,
And having traversed you is thoroughly mixed,
So someone quenching a future thirst
Could easily drink what you drank first.

The water you're about to taste
No doubt represents a bit of waste
From Prehistoric beast and bird,
A notion not at all absurd.

The fountain spraying in the park
Could well spout bits from Joan of Ark,
Or Adam, Eve, and all their kin;
You'd be surprised where your drink has been!

Just think! The water you cannot retain
Will someday hence return as rain,
Or behold as the purest dew,
Though long age, it passed through you!

Adapted from Project WET. Bozeman, MT: The Watercourse and Western Regional
Environmental Education Council, 1995.

Moving Water Post-visit Activities

A visit to the Central Wisconsin Environmental Station can be a school-year highlight for both students and their educators. We feel the knowledge and concepts gained during a Station visit apply outside the Station as well. The following activities will allow students to expand their knowledge and help them incorporate those lessons into their everyday lives. Feel free to pick from and modify the activities as best suits your group.

Activity #1

Remind the students that in the Pre-Visit Activities they looked at their current personal water use, and while at the Station they examined a watershed model to see the impact people's use of water can have on both the quantity and the quality of water. Tell the students, "If we can cut down our own use of water we will be helping everybody!"

Ask the students to invent ways they can cut their water use in half. Compile a list of possible ways. Below are some examples.

- Take shorter showers, and turn the water off when lathering with soap (a "sailor shower.")
- Don't leave the water running when washing or brushing your teeth.
- Use a water glass instead of a water fountain of drinking directly from a running faucet.
- Don't run the water to get a cool drink-instead keep a container of water handy in the refrigerator.
- Run your clothes washer and dishwasher only when they are full.
- Water your lawn and garden only during a very dry spell, and even then give it only one soaking per week in the evening.
- Place bricks or glass bottles full of water into your toilet tank.
- Put your garbage on your garden as compost, instead of using water to send it through your kitchen garbage disposal.
- Bend the float in your toilet tank to adjust the water level if you have an older toilet.

Now don't stop here! Make it a class assignment to discuss some of these options with their parents, get permission, and try some suggestions at home for three days. Have students examine their water meters and record their use (family members could help too) each day. An award could be given for the student who has cut their water use the most.

Activity #2

Have the students investigate the source of their water (wells, rivers, springs), the type of treatment it gets prior to use, and what happens to the water after its used. Ask them to draw their personal water cycle.

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Moving Water Post-visit Activities

Activity #3

Explain to the students that water can be made unclean or impure by many things humans cannot see. Tell the students that they are going to conduct an experiment to check the quality of water from different sources. Divide the students into five or six groups. Have each group collect a sample of water in a small jar from a place they select (e.g., pond water, rain water, city faucet water, well water, bottled water, or water from a roadside puddle). Or, you may collect the samples prior to the activity and hand them out to student groups.

Have the students record any visual observations of the sample along with the type of sample, the date, etc. Have the students put a coffee filter over the mouth of a large, empty container. They should pour their sample through the filter. Is the filter discolored? Are there any particles that were caught by the filter? Ask the students to again record the results. As a class, discuss the various observations.

Adapted from Schwartz, Linda. *Earthbook for Kids*. Santa Barbara, CA: The Learning Works Inc., 1990

Activity #4

Have the students investigate the cost-effectiveness of low flow toilets versus regular toilets. What is the initial cost difference? In the long run, which is less expensive?

Moving Water Resources

Teacher Resources

Chase, Valerie. *Water: The Source of Life*. Gallimard, TN: Expert Reader, 1995.

Schmid, Eleonore. *The Water's Journey*. New York: North-South Books, 1990.

Science Book of Water. Harcourt Brace, 1991.

What Can We Do About Wasting Water? Franklin Watts, 1992.

Youth Resources

Asimov, Isaac, and Elizabeth Kaplan. 1993. *What Happens When I Flush the Toilet?* Milwaukee, WI: Gareth Stevens Publishing Co. (Grades K-6)

Dorros, Arthur. 1991. *Follow the Water from Brook to Ocean*. New York: Harper Collins Children's Books. (Grades K-6)

Hoff, Mary and Mary M. Rodgers. 1991. *Our Endangered Planet: Groundwater*. Minneapolis, MN: Learner Publications Co. (Grades 4-9)

Peters, Lisa W. 1991. *Water's Way*. New York: Little, Brown and Company. (Grades K-4)