

Muddy Hands

Soil and Water Information for Educators Brought to You
by the Lake and Geauga County Soil and
Water Conservation Districts



Winter 2001

Drinking Water - Where Does it Come From?

It is easy to take water for granted in today's society; when the tap is turned on water appears! It was not always this easy. Many years ago people had to pump and carry their own water for their needs - everything ranging from washing, cooking, bathing, brushing their teeth, drinking, and other needs. The water pump may have been hundreds of yards from the house, and as you can imagine, people consumed much less water because of this. Before running water, an average family may have consumed around 50-60 gallons per day; the average family today consumes around 300 gallons per day.

The reason for this is simple - obtaining water is convenient! All we have to do is turn on the faucet. When the water is pouring out of the faucet it seems infinite; after all 75% of the earth's surface is covered in water - right? Appearances can be deceiving. Although water never actually leaves the earth and is limitless (it is recycled over and over through a process called the *hydrologic cycle*), the amount of drinking water available for human consumption is quite small- less than 1% of the total water on earth! Most of the water is salt water, and the other water is tied up in polar ice caps, lost to the atmosphere through evaporation, or in the clouds as water vapor.

So where do we get our drinking water? About half of the U.S. population receives its water from surface water sources, such as rivers, streams, lakes, and reservoirs. The other half gets its water from the ground, where water is stored in aquifers. This groundwater is stored in the cracks and crevices of rocks (it does not look like an underground river!).

In Geauga County, most of the population gets its water from private wells. These wells vary depending on the depth of the water table. Each household is entitled to use of this groundwater which is recharged during rainfall events. Some of the rainfall evaporates, some infiltrates into the soil and is used by the roots of plants and trees, some transpires into the atmosphere by plants, and the remainder is recharged into the ground. What happens if there is a drought? There is no precipitation to recharge the groundwater. This happened in the summer of 2000 in Texas. The groundwater was being used at a faster rate than it was being recharged. This caused a water shortage, and it became necessary to construct pipes to transport water from a neighboring town.

In Lake County the majority of the population gets its water from the surface. Water conservation is just as important in areas whose water source is surface waters. Residents in northeastern Ohio are fortunate to live near Lake Erie, for they have an abundant source of drinking water. People from the western portion of the United States are not this lucky. They live in a drier climate where water is not so plentiful. The climate is hotter and drier, so surface water evaporates much quicker.

The bottom line is that although water recycles continuously through the hydrologic cycle, the world's supply of drinking water is not infinite. Since drinking water makes up such a small percentage of the total water on earth, it is necessary to understand the importance of water conservation.

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Special Points of Interest:

Water Resources

- Find out where our drinking water comes from.
- How you can conserve water at home!
- Interesting facts about water use.
- Activities to help your students learn the importance of our freshwater resources.
- Education opportunities for you.



Get Students Involved! Poster Contest Sponsored by Your SWCD

Lake and Geauga County SWCDs are sponsoring the 2001 Conservation Poster Contest. The contest is being held in conjunction with the National Association of Conservation Districts and the Ohio Federation of Soil & Water Conservation Districts. "Habitat for Life" is the theme for Soil and Water Stewardship Week. The theme addresses the need for people to provide a healthy habitat for all inhabitants of the earth. A habitat provides for all the needs of its inhabitants - clean and safe shelter, food, water, and air. The purpose of the contest is to instill in our youth an appreciation for the environment and the need to protect our precious soil and water resources.

Lake County schools must submit posters to the local school districts on or before **March 1, 2001** and will then be collected by the Lake SWCD. Geauga County schools must submit posters to the District office on or before May 1, 2001. Judges will consider neatness, choice of color, and adherence to the rules. Prizes will be awarded! All posters become the property of the Lake or Geauga SWCDs.

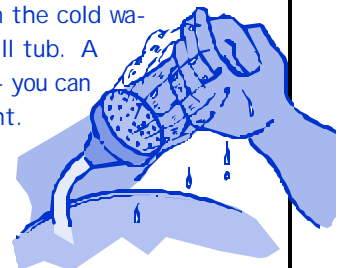
Please call the Lake or Geauga County SWCDs for contest rules before getting started! We hope to hear from you!

"If you are thinking a year ahead, sow a seed. If you are thinking 10 years ahead, plant a tree. If you are thinking 100 years ahead, educate the people."

-Chinese Poet, 500 B.C.

Water Saving Ideas (provided by Ohio EPA)

- ◆ **Kitchen Sink** - Scrape dishes and rinse all at once. Soak pots and pans overnight if dirty.
- ◆ **Household Cleaning** - Recycled water is great for heavy cleaning followed by a clean rinse. To cut down on rinse water, pre-soak.
- ◆ **Driveway or street**- wash car sensibly. Use short spurts from hose- do not leave water running. Use a car wash that recycles water (many of them do). Try to wash car near hedges, shrubs for a "free drink"
- ◆ **Drinking Water** - Promote water conservation at the table - don't let the waiter bring you water unless you request it.
- ◆ **Dishwasher** - Scrape off dishes. Soak pots and pans overnight if necessary. Wash only full loads.
- ◆ **Backyard Pool** - Cover when not in use to prevent evaporation. Don't fill all the way up - high water splashes easily. Recycle wading water for plants and lawn.
- ◆ **Lawn and Garden** - Let grass grow higher in dry weather. Use mulch. Water slowly, thoroughly, and as infrequently as possible. Water at night to minimize evaporation.
- ◆ **Faucets**- Repair all leaks. Replace worn washers, o-rings, and faulty fixtures. Conduct a "leak check" twice per year.
- ◆ **Bath tub** - Don't waste cold water - stopper tub before turning on water. You can warm the cold water by adding hot. Don't over fill tub. A bath tub holds up to 50 gallons- you can bathe in a quarter of the amount.
- ◆ **Bathroom sink** - Quickly rinse shaving razor - don't leave faucet running. For teeth use a cup to rinse.



Where on Earth is Water?

At any point in the hydrological cycle, more than 97% of the water is contained in the ocean, approximately 2.5% is stored on the land, and .001% is contained in the atmosphere. While the amount of water in the atmosphere seems very low, it is a very active part. It is estimated that the atmosphere recycles its water every 8-10 days.

Of the 2.5% stored on land, approximately 79% is ice, 20% is in the ground, and 1% is on the surface. The ground and surface water not tied up in ice is the watershed water that your stream depends on.

Oceans	97.4704%
Land	2.5286%
Glaciers/Polar Ice	2.0%
Groundwater	0.5%
Lakes	0.0175%
Soil moisture	0.011%
Rivers	0.0001%
Atmosphere	0.001%

Information provided by The Streamkeeper's Field Guide

Activities For Your Classroom...

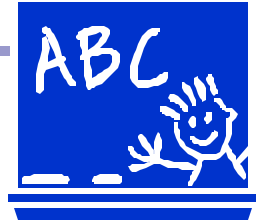
Every Drop Counts (Grades 4-8) A Project Learning Tree Activity

It's easy to waste water and even easier to take water for granted. Water pours out of our faucets as though it were endlessly available. But the truth is that freshwater supplies are dwindling. Fortunately, it's just as easy to conserve water as it is to waste it. Try this activity to help your class (and maybe the whole school) cut back on water waste.

The Activity

1. Show students an empty beverage container (1/2 gallon or 2-liter bottle) and tell them how much water it holds. Have students predict how much water he or she will use at school that day.
2. Have students monitor their water use for the rest of the day. They'll need to record the ways they use water and the number of times they used the water in that way. In some cases, such as when they wash their hands, get a drink from the fountain, etc., they'll need to record the length of time (or average) the water was running.
3. The next day, have students calculate the rate at which water comes out of the water fountain and wash basin. Time how long it takes the water to fill a container of known volume, and convert this rate to gallons or liters per minute. Have students use these rates to help them calculate the amount of water they used at school. Be sure to tell them the average amount of water used per toilet flush, shower, etc.
4. Have students compare their calculations to the predictions they made earlier. Discuss the differences.
5. Have students brainstorm a list of ways that they can consistently cut down on water waste at school and at home.
6. Repeat the monitoring process the next day and have the students calculate how much water they used and determine their "water savings" and discuss it with the rest of the group.
7. Have students work in groups to estimate how much water could be saved in one day if everyone in the school (including staff) tried to conserve it. Consider installation of water-saving devices, and consider conservation practices in maintaining school grounds and fields.

Hot Water (High School) A Project WET Activity



Participating in a formal debate helps students practice skills - such as impromptu speaking, effective listening, critical thinking, and sound reasoning - that help them to express their point of view and support their side of an argument. Debate provides an opportunity for individuals to present their respective views regarding an issue. Constructive speeches support and defend a viewpoint, while rebuttal speeches refute an opposing one.

The Activity

1. Have students brainstorm a list of controversial water topics that are characterized by two opposing viewpoints. Write the ideas on the board, presenting each issue in the form of a proposition. Some suggestions: pros and cons of water storage, use of pesticides and herbicides, drought management, and water rights.
2. Explain that the purpose of a debate is to provide an opportunity for two opposing sides to defend or argue a given viewpoint. One side will present positive support, and the other will argue against.
3. Have students pair up. Assign each pair of students the responsibility of presenting a particular viewpoint (pro or con) of a specific issue.
4. Have students research their assigned water issue and record pertinent information on note cards. The evidence they collect must either support the particular viewpoint they are representing or refute opposing arguments.
5. Two pairs of students assigned to opposite sides of an issue will sit at the front of the classroom. The remaining students will act as judges, keeping score and deciding who wins.
6. The judging can be done by assigning a value from 1 to 4 (with 1 being the most convincing argument and 4 being the least convincing) for both the constructive and rebuttal sections.

Wrap Up

Ask students how they felt about the outcome of each debate. Have them summarize which approach worked (and which did not) in the debate. Discuss how strategies and skills acquired during the debate can be applied to other areas of students' lives.



Daily Water Use (Gallons*)

Flushing the Toilet	1.5-7
Taking a Shower (10 minutes)	25-50
Taking a Bath	36
Washing Clothes	35-60
Washing Dishes (Machine)	10
Washing Dishes by hand (Water running)	30
Brushing Teeth (Water running)	2

**394 billion gallons (1491 liters) of water
are used daily in the United States!!**

Washing Hands	2
Watering the Lawn	5-10 gal/min.
Leaky faucet (per day)	25-30
Washing Car (Hose running)	180

*To convert gallons to liters, multiply by 3.785.



More Activities...

Where's Our Water? (Lower-Middle School)

Materials: globe or map; milk jug (or other clear container with 10-cup capacity); 1/3 measuring cup; tablespoon; ice cube tray; teaspoon; small pebbles; eyedropper; 3 clear containers.

Discuss how much of the earth's surface is covered with water - approx. 75%. The activity demonstrates the ratio of freshwater (drinking water) available for human consumption compared to total water.

- 1) Start with 10 cups of water (measured out beforehand; put the water in a milk jug). This is the **total water** on earth.
- 2) Set aside 1/3 of a cup of water. This represents **all freshwater** on earth. The remaining water is salt water.
- 3) Explain that when water gets cold it turns into ice. Take 6 tablespoons from the 1/3 freshwater and pour them into the ice cube tray. This is the **2/3 of the world's freshwater** that is tied up in **polar ice caps**.
- 4) Pour all but 1 teaspoon of the remaining freshwater into a jar containing rocks. The water in the jar represents **groundwater**. This is a source of drinking water for about half of the people in the U.S.
- 5) Show the remaining teaspoon to the class- this is all of the **fresh surface water** in the world (lakes, rivers, etc.). Surface water is drinking water for about half of the U.S.
- 6) With the eyedropper take three drops of the remaining freshwater and tell the class that it represents the **Great Lakes** (Superior, Michigan, Huron, Erie, and Ontario)
- 7) Mention that water vapor (clouds) holds an even smaller amount of water - too small to demonstrate.

Interesting facts: *Water covers 75% of earth, 97% is in oceans, <3% is freshwater, 2/3 of that is in glaciers/ice caps, of all water on earth, <1% is available for use.*

Your SWCD Contacts

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Educational Opportunities

Winter Snow - Out We Go - Feb. 2-4 - The winter season offers teachers exciting opportunities to enrich curriculum with interesting and fun outdoor and indoor activities. This workshop is designed to provide you with hands-on and minds-on activities, ideas and resources. Located at the Cuyahoga Valley Environmental Education Center in the Cuyahoga Valley National Park. For information, call the CVEEC at 330-657-2796 or Susan Cook at 330-264-0425

Project WET Workshop - March 3, 8:30-3:00 - Participants will become familiarized with the Project WET activity guide, which is full of hands-on activities that teach students K-12 water-related issues and concepts. The guide contains excellent background information for teachers on each concept. Workshop at Geauga SWCD Office in Burton. Register ASAP - space is limited.

Ohio Oil and Gas Energy Education Program - The OOGEEP Petro Pro Program is offering a 4-12 Inquiry Based Earth Science Teacher's Workshop. The workshop is offered on the following dates: March 15 in Columbus; July 24 in Marietta; and October 2 in Canton. Topics to be covered include Petroleum Geology, Oil Leases, Regulations, and Safety, Petroleum Refining and Basic Concepts of Ohio Geology. For more information, contact the OOGEEP at 740-587-0410 or 740-587-0446.

Attention Elementary Teachers! - The Eisenhower Program will provide tuition, room, and board for selected teachers and administrators to study in and near Yellowstone and Grand Teton Nat'l Parks in summer 2001, while receiving graduate credit. The program aims to provide elementary school teachers with instruction in the principles of environmental science. Please call Lake or Geauga SWCD for more information!

ODNR's Hit the Trail for Bluebirds School Project - This program has 2 goals. First, to help the Eastern bluebird in Ohio and, second, to provide to Ohio schools, individual students, and other interested parties a practical, educational conservation project. The project is available to a limited number of qualifying applicants, so please call Lake or Geauga SWCD for more information!

EPA Division of Water - Water activities for kids
<http://www.epa.gov/safewater/kids/index.html>

Water Science for Schools - Great facts, Q&A, activities
<http://www.ga.usgs.gov/edu/>

All Lake and Geauga SWCD and USDA programs and services are available without regard to race, color, national origin, religion, sex, age, marital status, or handicap.