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EPA WaterSense

Teachers' Guide to Using

A DAY IN THE LIFE OF A DROP

Grade Level: 3–5

Key Concepts: Watershed, water uses, drinking water sources, water efficiency, wastewater

Goal: To help students understand the connections between the source of the water they use; the ways their water use habits affect the environment and human health and ways to reduce their impacts by pledging to take steps to use water more efficiently

Background Information

A. Watershed Protection

This activity has been designed to help students understand a variety of concepts related to water use, efficiency, and students' own impacts on their watershed. It is intended for use both in the classroom and at home. The first concept covered in this exercise is, "What is a watershed?" Ideally this concept will be conveyed in the context of the watersheds in which the students live to enhance understanding of the concept and connection to the places where students live. A watershed is an area of land that drains into a specific waterbody. The best way to understand what a watershed is and how it works is to picture it as a bowl or basin. A group of watersheds within the same large area is called a basin. Watersheds catch rain and snowfall and channel it into brooks, creeks, springs, streams and, eventually, rivers. The tops of watersheds, where they join, are at the highest points of land, called ridges. Ridges divide areas so that on one side of them, rivers and streams flow in one direction, and on the other side, they flow in another direction. It is extremely important to convey the idea that watersheds come in all different shapes and sizes and that smaller watersheds are nested inside larger ones, much like Russian dolls. Your small, local watershed lies within a larger watershed, which lies within an even larger regional watershed, and so on. For more information on watersheds, check out this Web site: *www.watersheds.org*.

To begin the exercise, help your students understand not only what a watershed is, but bring the concept home by helping them to identify their own watershed. The following activities are just a few examples of how you can help your students bridge the gap between a large concept, and their home watershed:

A1. Determine which one of the 21 Regional Watersheds you live in and circle the answer:
Hint: If you have access to the Internet, use this Web site as a resource to find the correct answer:
http://wtol.envirocast.net/?pagename=ow_regionalWatersheds

New England	Tennessee River Basin	Arkansas	California
South Atlantic-Gulf	Mississippi River Basin	Texas-Gulf	Hawaii
Great Lakes	Lower Mississippi	Rio Grande	Alaska
Ohio River Basin	Souris River Basins	Great Basin	Caribbean
Lower Colorado	Upper Colorado Region	Pacific Northwest	

A *watershed address* consists of a name and a number (for example, Lower James Watershed, 02080206). The 8-digit number is a **Hydrologic Unit Code** or HUC. The Hydrologic Unit system was developed by the U.S. Geological Survey (USGS) in the 1970s to help keep track of all the different watersheds in our country. Hydrologic units are watershed boundaries organized by size and can have from 2 to 16 digits. The HUC can range from 2 (like the regional watersheds above) to 16 digits long — the higher the number of digits in the HUC, the smaller the watershed. For each watershed size you go down, there are 2 additional digits in the HUC.

A2. Using EPA's Surf Your Watershed (*http://cfpub.epa.gov/surf/locate/index.cfm*) or Enviromapper for Water (*http://map8.epa.gov/enviromapper/*) Web sites, find the name of your watershed:

Watershed name:

10-digit HUC:

This size watershed is still very large, but being able to use the maps online (especially if you can project them onto a screen to show your students) will help you help your students find the answers to the questions throughout the rest of activity.

Bonus: Find the name and number for your 14-digit HUC. At this level you're far more likely to be dealing with familiar landmarks and recognizable land formations that your students might recognize. Maps can be ordered online from USGS at *www.usgs.gov*. Local watershed and conservation groups are also great resources!

B. Water Supply: Where does it come from?

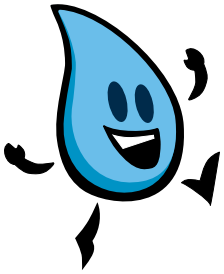
Once the students understand the context that they are working in (their home watershed), the next key concept, understanding where the water they use at home comes from, will be much easier to understand. We hope to bring the level of understanding from *the faucet* to the actual waterbody within their watershed that is the source of their drinking water. Your local water utility or public works department can tell you the source of your public water supply. For more information on drinking water sources and safety, visit *www.pueblo.gsa.gov/cic_text/health/watertap/ch3.htm*. During this portion of the lesson, be sure to talk about waterbodies upstream and downstream in your local watershed. Students should begin the activity with an understanding of the ways their local/regional waterbodies are connected and which direction the water is flowing. For example, students in the fictitious Cub Run watershed know that water from the Big Bear Lake flows into Crackling Creek and on through Cub Pond and various smaller streams and eventually out into Junction River.

C. Water Efficiency

Once students have a better understanding of where their water comes from, the activity moves on to the concepts of using water more efficiently by investigating how we use or waste water, where it comes from and where it goes after it goes down the drain. We hope that this portion of the activity will become a family activity. The tasks in this portion of the activity will be most effective with family participation, although they can be completed by the student alone. (You might want to consider sending home a notice about the activity ahead of time so families are aware of their expected participation.) Below are a few additional activities you might try with your students.

C1. First, ask the students how much water per day they think a leaky faucet loses. Ask students to guess how much water a faucet that loses 48 drips per minute would waste in one day. You can set it up as a team competition, a quick bonus question, or give them several practice ones so they can see how quickly drops can add up and then have a contest…be creative! In question 9 of Worksheet #1 (with or without the additional activity described above), students are asked to brainstorm ways to use water more efficiently. To determine how much water this leaky faucet is wasting per day, month, and year, you can use one of two methods. If you have access to the Internet, you can get a more exact answer by using this drip calculator provided by the American Water Works Association: *www.awwa.org/awwa/waterwiser/dripcalc.cfm*. If you don't have access to the Internet, you can use the chart on page 3 to estimate.

C2. The activity then moves back into the home watershed, and students are asked how water gets into and out of their watershed and about different types of impacts that wasting water (using water inefficiently) might have. This is an extremely important point that should be highlighted during the lesson. *Using water inefficiently is directly tied to designated uses, which are tied directly to water quality.*



Students should come away from this activity with a greater understanding of why it is important to use water efficiently and what the effects on local waterbodies can be when too much water is removed from the watershed at any given time.

When we use water, we are taking it out of the watershed, and the amount of available freshwater goes down. We use water in many different ways and eventually return it to the environment in various conditions. How much we use and how we use it can have significant effects other water uses, such as aquatic life uses, recreation, fishing, and the like. (For more information on the environmental effects of excess water use, see: *www.epa.gov/WaterSense/water/benefits.htm*.)

C3. To encourage lasting changes in behavior, the activity concludes with a pledge that students and members of their family are to complete. The pledge form requires students and family members to commit to making specific changes to use water more efficiently. Students should bring these back to school once they are completed and copies should be made of each one. One copy should stay in the classroom for reference in later lessons, and one copy should be sent home to remind family members of their pledge.

One great way to help kids take the message about using water efficiently home to their parents is to teach them to help their parents look for the WaterSense® label when they buy new faucets, toilets or irrigation supplies for their yards. You can explain that kids (and parents) can easily identify water-efficient products simply by looking for products that have the WaterSense label on them. You can also direct them to the WaterSense Web site to learn more about these products, other WaterSense programs and for more ideas on how to use water more efficiently. The Web site also has pages especially geared toward kids, which includes a WaterSense game. The game can be played in its entirety online at *www.epa.gov/WaterSense* or can be downloaded in a printer-friendly format as a quiz game at: *www.epa.gov/WaterSense/kids/pdf/kidsquiz.pdf*.

Estimated Water Loss Through Leaky Fixtures

Drips per minute	Water wasted per day (gallons)	Water wasted per month (gallons)	Water wasted per year (gallons)
5	.75	22	263
10	1.5	43	526
20	2.9	86	1,051
30	4.3	130	1,577
40	5.8	173	2,103
50	7.2	216	2,628
60	8.6	259	3,154
70	10.1	302	3,679
80	11.5	346	4,205
90	13	389	4,731
100	14.4	432	5,256

Please Note: When working with big issues that have portions that can be perceived as *doom and gloom*, students can start to feel overwhelmed. It is important to remind your students that they are each just one person. Alone they can't save the world, but they can make a difference. And the more people who commit to making a difference, the bigger the change will be!

Interdisciplinary Activities

A Day in the Life of a Drop was designed with the hope that teachers in multiple subjects will take the opportunity to collaborate and make the activity and pledge the basis for a rich, interdisciplinary learning experience where water usage serves as an integrating context. While the activity can be used in many ways, it is our hope that it will be incorporated into lesson plans in mathematics, science, social studies/geography, and language arts. The lesson can also be easily adapted for classroom use rather than a home activity. (Use of the lesson in the classroom might help to reduce challenges associated with variables such as multi-bathroom homes, or math skills that have not yet been covered which could potentially take away from the primary messages.) *A Day in the Life of a Drop* allows students to apply practical skills to real life situations with a unifying context that everyone can relate to...water!

Don't Let Math Hold You Back!

A Day in the Life of a Drop provides a framework for discussing where water comes from and where it goes, different types of water uses, the effects of those uses, and individual responsibility. The activity itself (without other suggested lessons and activities) has a significant mathematics component. We recognize that while the skills used in this lesson are consistent with national mathematics standards for 3rd–5th graders, students' abilities in this area will vary depending on when the lesson is used. For this reason, we recommend that teachers communicate with parents about the level of support necessary for the students' successful completion of the activity. Also, based on your students' skill level, you should decide before beginning the activity if you want your students to use whole numbers, decimals, and whether or not you would like them to round the numbers. Students who have not yet mastered all the math skills required to complete the activity should still benefit from the lesson as a whole with support from teachers and family members and the use of tools such as computers and calculators. Teachers using the activity in subjects other than math, or not in cooperation with math teachers, should design assistance strategically so as not to detract from other important lessons to be learned from the activity.