



Alice in Waterland

Reading – Grade 4-6

Students use a simulated field trip, lecture-discussion, and student-gathered data to explore water use and its effects on wildlife habitat.

Materials:

- 1 water consumption chart per student (see following page)
- Several long sheets of paper for murals
- Art materials

Instructions:

1. Using a simulated field trip, ask the students to sit quietly, close their eyes, and imagine that they could shrink down to a size that would let them travel up through their faucet and into their water pipes. Ask the students to picture in their minds what you will describe for them in the following words (feel free to adapt to apply to local settings).

“Picture yourself small enough to climb into the faucet in your kitchen. See yourself with magic powers that allow you to travel through the water that comes from the faucet to its origins. You will be able to pass through all the pipes, valves, and other barriers on the way. The first part of the journey takes you through the pipes in your house to where they connect to your water source. If you live on a farm or ranch, the source would probably be a well or perhaps a spring.

In the city, the water source for your home would probably be far away. First, you link into the water main. Then, you come to a pumping plant where water pressure is maintained. Past the pumping plant is a place where the water is purified. This structure may be very complex – a place with filters, chemical tanks, and treatment equipment.

Beyond the purification plant, the water may be in an aqueduct or open channel coming from a reservoir. The reservoir is a huge lake where water is stored. There are often trees and bushes on its edges. Wildlife is common; fish are usually abundant; and people often use the site for recreation. Natural streams usually flow into the reservoir. They drain large areas of the land’s surface, which are called “watersheds.” A watershed is the land area that catches and transports water through streams, under-ground flow, and rivers. The water in a watershed contains all the water that is naturally available for use by all living things in that area. If you want, stay in the watershed. Or, follow your route all the way back through the reservoir, channels, treatment plant, and pumping plant to the water main and the pipes in from your house and out of your faucet. Then, open your eyes.”

2. After this simulated field trip, discuss the journey of the water from its source to the faucet. Identify the components of the journey. Emphasize the places where wildlife habitats are affected – positively, negatively, or with unknown effects – by the intervention of people as they consume the water or influence how the water is consumed.
3. Repeat the process for a journey down the drain into the wastewater system:



“Picture yourself small again. This time the journey will be down the drain in your sink. You move along through the used-water system to a treatment site. If you live on a farm, the site will probably be a septic tank. A septic tank is usually a large concrete box. Here bacteria break down the substances carried in the water. Once the water is partially cleansed, it flows out through drainage fields and back into the groundwater sources or streams. If you live a city much more water is being used, and large water-treatment plants must attempt to cleanse the water before it is returned to rivers and streams. In the treatment plants are great filters and holding tanks. The water must be held in place for solid substances to settle out by gravity. Air is often pumped through the waste-water to increase the oxygen content so bacteria can break down the impurities more quickly.

Eventually, the treated water is released into rivers and streams. It again re-enters the natural habitat for wildlife. There it provides an essential component for continued life. If all was done well, animals, plants, and humans will safely re-use the water. It will nourish the crayfish caught by the raccoon. It will provide the pond for the box turtle. It will provide the refreshing drink for someone like you in some downstream city. After you have followed the water out into the environment, open your eyes.”

4. Discuss the journey of the water through the waste-water treatment plant. Identify the components of the journey. Emphasize the places where wildlife habitats are affected— positively, negatively, or with unknown effects— by the intervention of people as they consume the water or influence how the water is consumed.
5. Divide students into two groups. Instruct one group to research the water cycle. Ask some students to find out details such as how much precipitation falls in their community and what kinds of contaminant is likely in the precipitation. Instruct others to investigate runoff, where it goes, how much seeps into the ground, and how much travels overland. Why is it important for water to seep into the soil? Could this runoff pick up contaminants along its path? Which ones? How can runoff be reduced? Other students might look at evaporation. What conditions could accelerate or inhibit evaporation? How might changes in evaporation rates affect wildlife?
6. Ask the second group to research the waste treatment process. Some students might look up information on “primary treatment,” some might research “secondary treatment,” and others might find out about “tertiary treatment.” Perhaps some students could find out how much water passes through the local treatment plant, which types of treatment it uses, and how much it costs to operate. Ask one team to compare the kinds of bacteria used in treatment plants to break down wastes with the bacteria that break down wastes in soil and in septic tanks.
7. Have the students in the first group create a mural on a single long sheet of paper, depicting the origins and journey of water through a natural system (i.e., emphasizing the water cycle and watershed processes). Have the students portray wildlife and habitat throughout the mural.
8. Ask the students in the second group to create a mural of the journey of water through a human system (i.e., emphasizing plumbing and waste treatment plant processes). Have them portray human effects along the way.



9. Look at the entire mural – natural and human. Identify, list, and discuss places in which the quality of the water may be affected by human activities, not just the quantity of water available.
10. Now shift the emphasis to the amount of water that people typically use. Pass out copies of the Water Consumption Chart (see following page).
11. Ask the students to keep track of how much water is used in their homes for 5 days. Suggest that the sheet be posted on the refrigerator and that each family member help by putting a mark in the section designated on the sheet after each use. The miscellaneous section is for special uses not listed. Suggest that the students use empty 1- or 2-liter soda containers to estimate amounts.
12. After the water-use data have been gathered, make a master chart that summarizes the total use for the class for the entire week. Discuss places where water might be conserved. Challenge students to intentionally reduce their water consumption and invite their families to join in. Have them monitor use for another 5 days and tabulate the results.
13. Once the results are tabulated, discuss how wildlife, habitat, and humans can benefit from human water use conservation. Discuss the potential appropriateness and effectiveness of a variety of water conservation behaviors. Examine potential negative and positive effects. Discuss not only ways to reduce and conserve water use, but also ways to protect the quality of water we use.



Water Consumption Chart

(all values are approximate)

# of Gallons	Activity	# of Times Performed by Family
3-5 gallons	Flushing a toilet	
3 gallons	Shaving and letting water run	
5 gallons per minute	Shower	
8 gallons	Cooking (3 meals)	
8 gallons	Cleaning house	
10 gallons	Washing dishes (3 meals)	
20-30 gallons	Washing clothes	
30-40 gallons	Watering a lawn	
30-40 gallons	Taking a bath	
30-40 gallons	Washing a car	
???	Miscellaneous use	