

BLUE PLANET

GOAL

To gain an understanding of water on a global scale, both in nature and in our lives.

OBJECTIVES

Students will:

1. Learn about the water cycle (hydrologic cycle) and the three states of water
2. Understand how all living things depend on water for survival and the effects of pollution
3. Take actions towards sustainable living by experimenting with water quality and quantity

VOCABULARY

Chlorination: the process of adding chlorine to purify water for drinking.

Condensation: the process by which a gas or vapour changes to a liquid.

Deposition: occurs when sediment falls into a wetland from fast moving water as the water slows.

Erosion: the wearing away of the earth's surface by water or wind action.

Evaporation: the process by which a liquid changes into a gas or vapour.

Filtration: a physical process for cleaning water by passing it through filters.

Gas (vapour): the state of matter distinguished by low density, great expansion and contraction with changes in pressure and temperature, the ability to diffuse readily, and the spontaneous tendency to become distributed uniformly throughout any container.

Hydrologic (water) cycle: the cycle of evaporation and condensation that controls the distribution of Earth's water as it evaporates from bodies of water, condenses, precipitates, and returns to those bodies of water.

Liquid: the state of matter in which a substance exhibits a characteristic readiness to flow, little or no tendency to disperse, and relatively high incompressibility.

Precipitation: any form of water, such as rain, snow, sleet or hail, that falls to the earth's surface.

Solid: a substance having a definite shape and volume that does not flow readily from one container to another.

Watershed: the land area that drains water into a stream, river or lake.

PRE-VISIT ACTIVITIES

1. Discuss the **water cycle** - It is important to note that the water cycle allows water to be reused and cleaned over and over again. We have a finite supply of water on this planet that is not increasing or decreasing. In fact, we drank the same water as the dinosaurs! This constant cycling makes water the most recycled natural resource. Review some of the vocabulary for the field trip.
2. Have students construct a water cycle in a pop bottle.

Materials: 2L plastic pop bottle (cut it all the way around at the bottom of the plastic label, then remove the label), gravel, potting soil, small plants (1 per bottle) such as seedling evergreens, wild strawberry, clover or baby's breath

Directions:

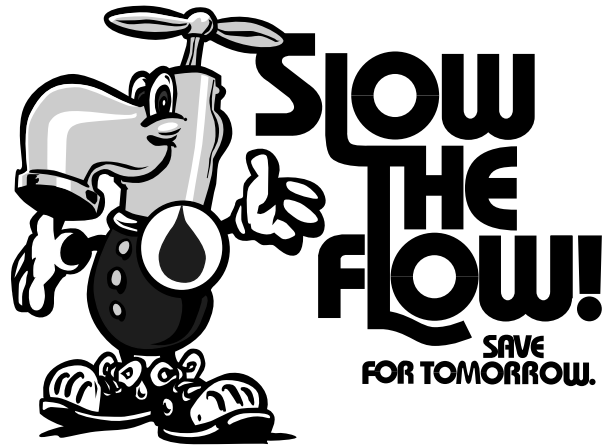
1. In the bottom half of the pop bottle, pour in 2.5 cm of gravel for drainage
2. Cover gravel with 2.5 - 4 cm of potting soil
3. Make a small hole in the soil. Place the plant in the hole so that the roots can be covered.
4. Pack soil around the plant and press firmly.
5. Optional: Decorate the soil with marbles, aquarium rocks or plastic figurines.
6. Water the soil lightly and put the top half of the pop bottle back on the bottom. Tape around your cut with clear tape. Your water cycle will only need one or two teaspoons of water per month.

Place your water cycle in a sunny, warm spot. Some days you will see clouds at the top of your water cycle (it will look a little foggy up there). You will also see condensation on the sides of the bottle and on the decorations on the soil. You may even see transpiration from the tips of the plant leaves. Look at the gravel at the bottom - can you see ground water?

3. Ask students where the water in their school comes from and how it moves through their school building. What is the source of their community's water supply? Is it ground water (wells, aquifers) or surface water (lakes, rivers, dams)?
4. Ask students to make a flow diagram of everything they did in one day. After they have their diagram complete, ask them to draw a water drop beside each item that required the use of water. Some will be obvious such as showers, brushing teeth, washing dishes; but some will be less obvious. Was water required to manufacture their computer, bike or jeans? How much water is required to produce (grow) all the components of a cheeseburger?

POST VISIT ACTIVITIES

1. Call the Water Education Coordinator at the Fort Whyte Centre (989-8358) to ask about *Slow the Flow*. This **FREE** program is a curriculum enrichment for the middle years level and incorporates water conservation activities into core subjects. This binder of materials includes student activity sheets, teacher answer keys and all background materials. *Slow the Flow* was designed in Manitoba and pilot-tested in Winnipeg schools. In following the new Pan Canadian learning outcomes, *Slow the Flow* takes students through the process of learning (STSE), skill development, acquiring knowledge and stewardship.



2. Build a watershed.

Materials: metal baking pan, newspaper, sheet of thin plastic, waterproof marker, spray bottle, water, food coloring.

Directions:

1. Crumple two sheets of newspaper and place them next to each other at one end of the baking pan.
 2. Drape the plastic sheet over the crumpled newspaper, causing it to form hills and valleys. Place the side of the plastic sheet into the container to prevent water from overflowing the pan.
 3. Explain that the plastic sheet represents the ground surface covering the hills and valleys. Have the students use the marker to draw where they believe the main rivers will flow in the model
 4. Spray several pumps of colored water on the model. Point out how water runs down one side or the other of the ridges and forms rivers in the valleys. The ridges divide individual watersheds. Count the number of small watersheds that divide into the main river.
3. Discuss how water affects the lives of your students. Ask students what they expect from water (is it drinkable, clear, cold, etc.) Does their water supply meet their expectations? What if they had no drinkable water available at school? What behaviours and activities could they change?

*Turn this into a game by having a water relay race. In some countries, people have to haul water to their homes from very far away. The average daily water use for students between the ages of 6 and 12 for the city of Winnipeg is about 100 L per day. This figure only includes water used within the home - not outdoors! How easy was it for students to move 100 L of water? Would this be something they could do every day? If they had to haul water manually, their average daily water use would definitely decrease.

4. Observe **evaporation** in the classroom. Place an equal volume of water in two mason jars. Cover one of them tightly. Place both on a table or desk overnight. Check them in the morning and see if there will be less water in the open jar. That missing water is floating around as vapour in your classroom.

This activity can get creative by adding food colouring and salt to water in shallow dishes. The water will evaporate and leave the coloured salt behind! This is an example of how water naturally cleans itself!

5. Have your class design posters that explain methods or habits of water conservation. Students may work in groups or alone to illustrate a conservation technique. Hang the posters in a main school hallway, above water fountains or in washrooms. Hold a water conservation week where the entire class or grade keeps track of their water use. What methods did students discover to save water?
6. Every time we flush the toilet, we waste 20 L of water. Have your class come up with a technique to solve this problem. One way is to displace some of the water in your toilet tank with something else. Students can fill a 2 L pop bottle with water or put a brick or some marbles in a zip-lock bag. Make sure that you have the cooperation of parents in the installation of the displacement devices. A 2 L pop bottle can save you 2 L per flush. Calculate how much water you will save in 1 month, in 6 months, in one year.

