The Water Cycle

'Round and 'Round it Goes!

Learning Objectives: Students will: (1) identify where water is found in our environment, (2) explain the steps of the water cycle and how water moves from one location to another, (3) define the components of the water cycle and (4) describe how human activities can affect water quality as it passes through the water cycle.

Subjects: Environmental Education, Health Education and Science

Wisconsin Model Academic Standards (WMASs): EE: B.8.10, B.8.15, B.8.18

HE: A.8.2

SC: A.8.6, E.8.1, H.8.3

Grades: 6–9

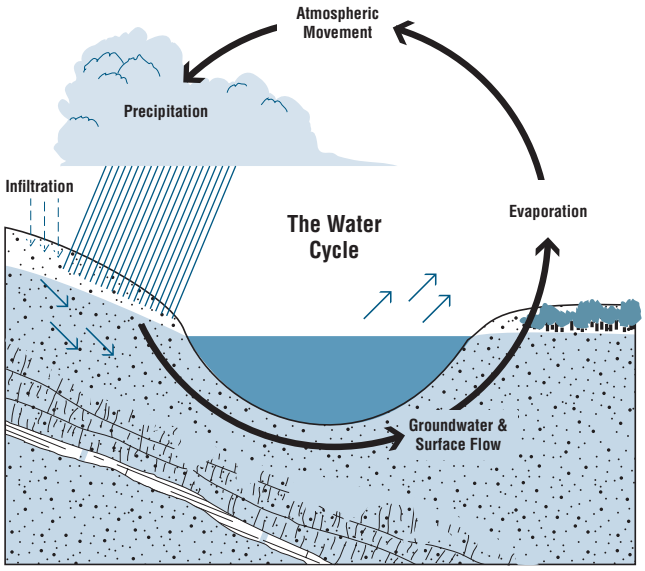
Materials:

- Groundwater and Land Use in the Water Cycle poster
- 'Round and 'Round it Goes! activity sheets
- Dictionary

Background: Water is our most recycled resource. Consider, for example, that the water you bathed in this morning may have contained the same molecules of water that washed over a South Pacific coral reef a million years ago! The amount of water on Earth is basically constant, but the distribution of water changes over time and space due to a dynamic process called the *water cycle or hydrologic cycle.* The water cycle is powered by solar energy and gravity.

Warmth from the sun causes *evaporation* of water from lakes, streams and soils. Solar energy also drives a process called *transpiration*—the release and evaporation of water from tiny pores in the leaves of plants. Evaporated and transpired water vapor is stored in the atmosphere until it condenses and is pulled by gravity back to earth as rain, sleet, snow, hail, dew or frost.

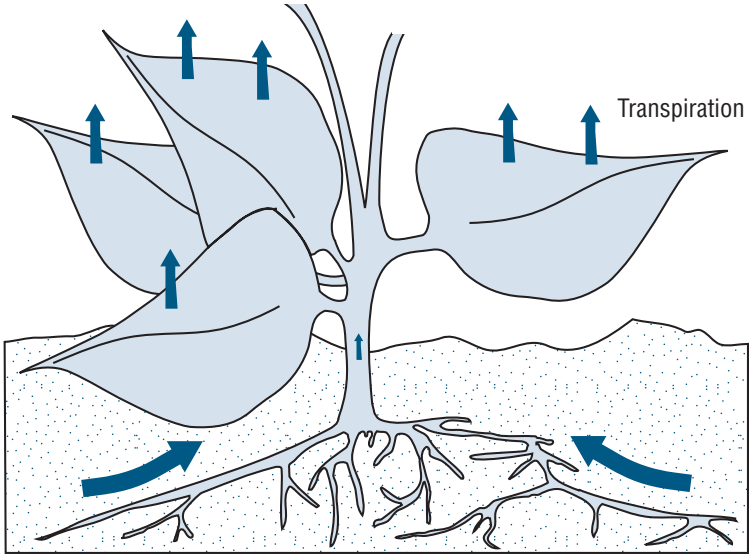
Up to 80 percent of this precipitated water is returned directly to the atmosphere by evaporation. The rest may run



off over land and into lakes and streams or may soak into the ground. Some of the water that soaks into the ground stays in the unsaturated zone. This zone is the rock or soil layer in which some of the spaces between particles are filled with air and some are filled with water. Some of the water in the unsaturated zone is taken up by plant roots and returned to the atmosphere by transpiration.

The rest of the water is pulled deeper into the ground by gravity, filling all the cracks and spaces in the underlying layers of soil, gravel and rock. Water in the saturated zone is called *groundwater*. The top of the saturated zone is the *water table*. Water continues to move underground from areas of high elevation toward lowland areas. This movement is generally slow, from a few feet per day to a few feet per year. Wherever the water table meets the land surface a *spring* may form or groundwater may seep into to a lake, stream, wetland or ocean. Once above ground, the water can evaporate and return to the atmosphere, and the water cycle begins again.

Human activities may affect the quality of water at any point in the cycle. Air pollution can change the chemical composition of rain and snow. Runoff from rainfall and snow melt can pick up soil,



excess plant nutrients, pesticides, animal wastes, and municipal and industrial pollutants as it flows over land and into lakes and streams.

Contaminated runoff can also soak into the ground and pollute groundwater. Water percolating through soil and rock may pick up natural minerals or other contaminants. Knowledge of the water cycle can help us understand how water becomes polluted and how pollution can be prevented (see *Groundwater: Wisconsin's Groundwater* for more information).

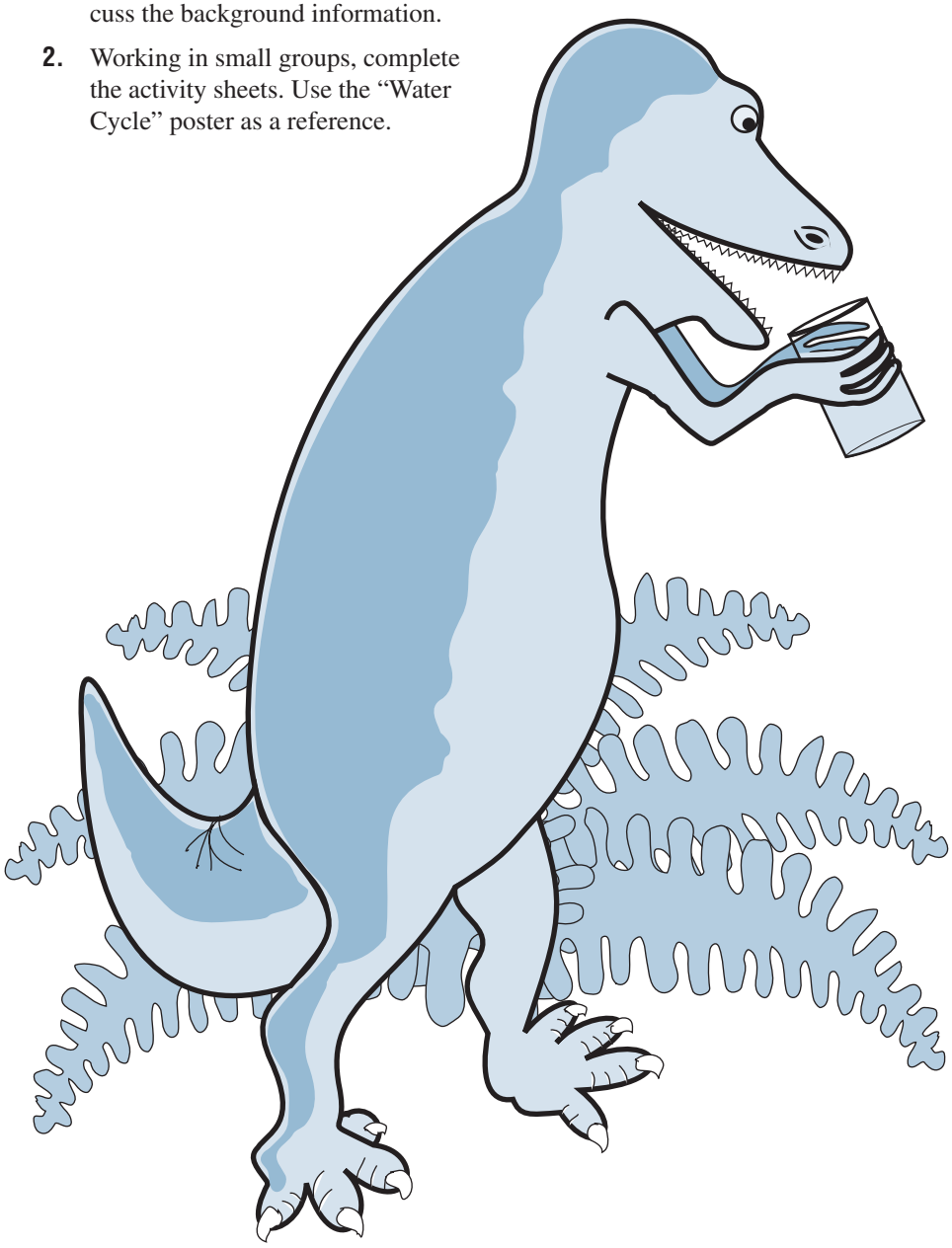
Procedure:

1. Distribute copies of the poster. Discuss the background information.
2. Working in small groups, complete the activity sheets. Use the "Water Cycle" poster as a reference.

Going Beyond:

1. Your students can learn about the water cycle online at: **dnr.wi.gov/eek/earth/groundwater/watercycle.htm** or **ga.water.usgs.gov/edu/watercycle.htm**.
2. Design and construct a graphic or mural of the water cycle for your community. Include the community's water system and local human impacts on the water cycle.
3. Create a mini-water cycle for your classroom. In an aquarium (terrarium) or wide-mouth glass jar, put a one-inch layer of gravel for drainage. Next, add a layer of peat moss and then a layer of soil. Small houseplants such as violets and ferns can be planted in the terrarium. Water your terrarium lightly and cover it with a piece of glass, leaving approximately ½ inch uncovered for air movement. Keep the terrarium in your classroom and watch what happens over the next week. The plants will take moisture from the soil and release (transpire) it from their leaves. Water molecules will condense on the glass and "rain" back onto the soil.
4. Research how long it might take a drop of water to pass through the entire water cycle.

Adapted from: *Groundwater Study Guide,* 1984, Wisconsin Department of Natural Resources, Bureau of Information and Education (out of print).



Recycled

The glass of water you're about to drink
Deserves a second thought, I think
For Avogadro, oceans and those 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 that water can be.
The water in you is between and betwixt,
And having traversed is thoroughly mixed,
So someone quenching a future thirst
Could easily drink what you drank first!
The water you are about to taste
No doubt represents a bit of waste
From prehistoric beast and bird—
A notion you may find absurd.
The fountain spraying in the park
Could well spout bits of Joan of Arc,
or Adam, Eve, and all their kin;
You'd be surprised where your drink has been!
Just think! The water you cannot retain
Will some day hence return as rain,
Or be held as the purest dew.
Though long ago it passed through you!

Verne N. Rockcastle