

Water Wonders

Grade Level: 5th Grade

Subject: Science, Language Arts,

Duration: 30 Minutes

Materials: Station Envelopes containing scenario strips, supplies for hanging them, *Water Drop Destinations* worksheets for each student, pencils, clipboards

Benchmarks:

SC.5.E.7.1 Create a model to explain the parts of the water cycle. Water can be a gas, a liquid, or a solid and can go back and forth from one state to another.

SC.5.E.7.2 Recognize that the ocean is an integral part of the water cycle and is connected to all of Earth's water reservoirs via evaporation and precipitation processes.

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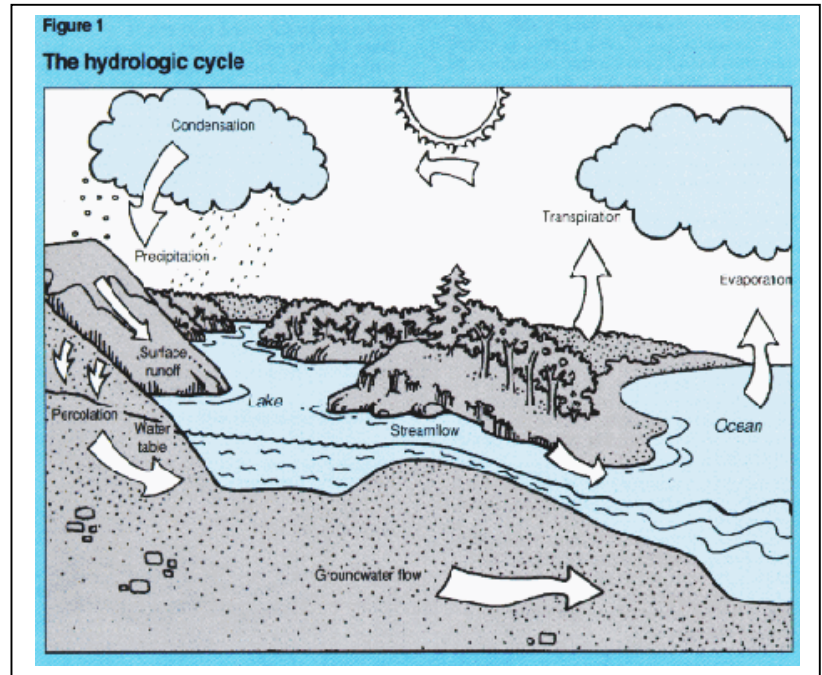
Essential Questions:

- What processes are involved in the water cycle?
- How are the oceans an integral part of the water cycle?

Overview: The water cycle is the system by which Earth's fixed amount of water is collected, purified, and distributed from the environment to living things and back to the environment. Plants play a large part in the cycle by absorbing water with their roots and transpiring it as vapor through their leaves. This activity will introduce students to the various steps of the water cycle and to the various paths water can take. They will also make connections between the water cycle and all living things.

Objectives: Students will describe the various components of the water cycle and the path a water molecule might take on its way through this cycle. Students will explain how the water cycle is important to living things

Background: Water covers 71 percent of Earth. It constitutes 50-70 percent of the weight of all plants and animals, including humans. Water consists of two parts



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hydrogen to one part oxygen. It can exist in liquid, vapor, or solid (ice) forms. Its unique physical properties enable life to exist on Earth. Those properties include water's ability to remain liquid in a wide range of normal Earth temperatures and its ability to dissolve and transport other substances.

Water is constantly moving. In general, it evaporates from oceans into the atmosphere (air), condenses into clouds, falls as rain or snow, and eventually returns to oceans through a drainage system of streams and rivers. This movement is called the **water cycle**. Energy from the sun, which allows evaporation, and gravity are the driving forces that power the cycle.

In the coldest regions of Earth, water is stored for a long time as ice and hard-packed snow. But even ice and snow are in motion; the solid rivers of ice we call **glaciers** slowly melt as they move inch by inch. **Icebergs** break away from glaciers and float in the ocean, slowly melting as they move toward the equator.

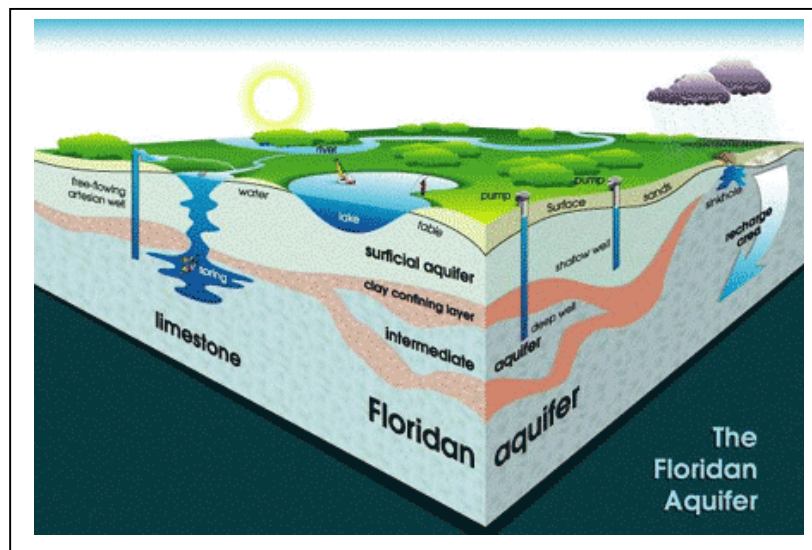
The movement of water is greatly influenced by the contour of land and geologic features such as mountains, valleys, and hills. A **watershed** is the area of land that guides water through small streams toward a major stream or river. Water's movement in the watershed, in turn, creates contours of the land by **erosion** and **sedimentation**.

In addition to clouds, oceans, rivers, and valleys, living organisms are part of the water cycle. All living things need water to live because it is essential to their bodily functions. Plants and animals take in water and return it to the atmosphere as vapor (breathing, transpiring) or to the soil as liquid (excreting).

Forests greatly affect watersheds. Trees, small plants, and forest litter absorb rainwater, reducing erosion and **runoff**. When rain falls on bare ground, the full force of raindrops can wash soil into streams, making them muddy. But when rain falls on the forest, it drips down through leaves and branches to the forest floor. The forest's canopies, as well as layers of plant litter under trees, protect the soil from the full force of rain. Tree roots hold the soil in place so that it doesn't wash away.

Forests also help improve water quality by filtering out impurities that could be potentially harmful in streams or **groundwater**. As water is absorbed by tree roots and then **transpired** as **vapor** through leaves, impurities (many of which are good for a tree) remain in the tree.

Most of Florida's drinking water comes from aquifers. An **aquifer** is a layer of rocks or layers of sand



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and gravel within the earth's crust which store and move water. Open spaces in the rocks (or sand and gravel) are filled with water. In Florida, most communities get their drinking water from the underground water source called the Floridan Aquifer. The aquifer is comprised primarily of limestone that holds and stores water in small holes and spaces much like a sponge. The Floridan Aquifer extends underground for hundreds of miles and it's estimated that it stores more than two quadrillion gallons of water! Water in the aquifer flows underground and some of it is pumped out for drinking and in some places it comes up from the ground to form **springs**. The same water that we pump up from the ground to use for drinking water is the same water that comes out of springs. <http://www.floridasprings.org/resources/>

Although tile gradual wearing down and erosion of soil is a natural process, without proper management human activities such as clearing vegetation for development, logging, dam building, farming, and draining wetlands will increase the rate of erosion in watersheds and can reduce water quality. By the same token, reforestation, certain types of farming and landscaping, and restoring wetlands can reverse those trends.

Suggested Procedure:

1. Ask students to describe the water cycle. How does it start?
2. If necessary use the following questions to focus students' attention:
 - If every living thing needs so much water, how come water isn't used up?
 - Where does the water go when a puddle dries up?
 - Why don't oceans and lakes dry up like puddles do?
 - Where does rain come from?
3. Explain that the water cycle is really a simplified model for looking at the "journey" of a water molecule. So students may learn more about the different paths water might take, invite them to play a game in which they each will be a water molecule.
4. Divide students into 7 approximately equal groups, and have each group begin at a station.
5. Have students each remove a strip from the envelope at their station.
6. Student reads the strip and completes the following on the worksheet
 - write down their current station stop,
 - summarize what happens to them,
 - write their destination - where they are going next
7. Important: return the strip to the envelope.
8. Allow students (water droplets) to flow freely and complete all 10 stations at their own pace.

Alternative: You may call out "cycle" for students to go to the next station as directed on their strip. Repeat about 10 times or until most students have cycled

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through the Cloud station a couple of times.

In the Classroom:

On the chalkboard, write the names of the seven stations.

Discuss the following questions:

- Identify the states of water is in while moving through the water cycle
- Even though individual molecules took different paths, was anything similar about the journeys they took?
- In the activity, which stations seemed to be visited by the most water molecules, regardless of their particular journey? What can we infer from this?
- Can you think of other parts of the water cycle that were not included in the game? (lakes, reservoirs, rivers, wells, puddles) Where might they be included in the cycle?

Extension:

- Use water bracelets from SWFWMD to reinforce the parts of the water cycle
- Using their travel log, students will write a story about their life as a water drop and illustrate
- Have students investigate how water becomes polluted and is cleaned as it moves through the water cycle
- Analyze how the water cycle impacts the weather in FL

Vocabulary

- Hydrologic cycle
- Evaporation
- Condensation
- Precipitation
- Percolation
- Transpiration
- Runoff
- Watershed

This is a section of Water Wonders, Activity #44 in the Project Learning Tree Environmental Activity Guide. It is re-written here for teacher information. To obtain the PLT Activity Guide teachers must attend a PLT 6-hour workshop.