

LEARN ABOUT FORESTS

We all depend on trees and forests! Use this fun, hands-on activity to engage youth in learning about sustainable forest management. It's perfect for educational events, career days, or field visits.



WATER WONDERS

PLAN

KEY CONCEPT: Forest ecosystems include processes such as photosynthesis, energy flow and the cycling of nutrients, water, carbon, and other matter. [PLT Forest Literacy Framework, Concept 1.C.3]

OBJECTIVES: Provide opportunities and materials for learners to

- Describe the various components of the water cycle and the path that a water molecule might take on its way through this cycle.
- Explain why the water cycle is important to living things.

SESSION TIME: 50 minutes

SETTING: Indoors or outdoors



BACKGROUND

Water is constantly moving in a journey called the water cycle, which is powered by energy from the sun and by gravity. In this cycle, water evaporates from oceans and lakes into the atmosphere (as water vapor), condenses into clouds, falls as rain or snow, and eventually returns to oceans through a drainage system of streams and rivers.

In addition to clouds, oceans, rivers, and land, 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 (by breathing or transpiring) or to the soil as liquid (by excreting). Forests help improve water quality by helping to regulate flow, and by filtering out pollutants that could be potentially harmful in streams or groundwater.

BENEFITS OF FORESTS

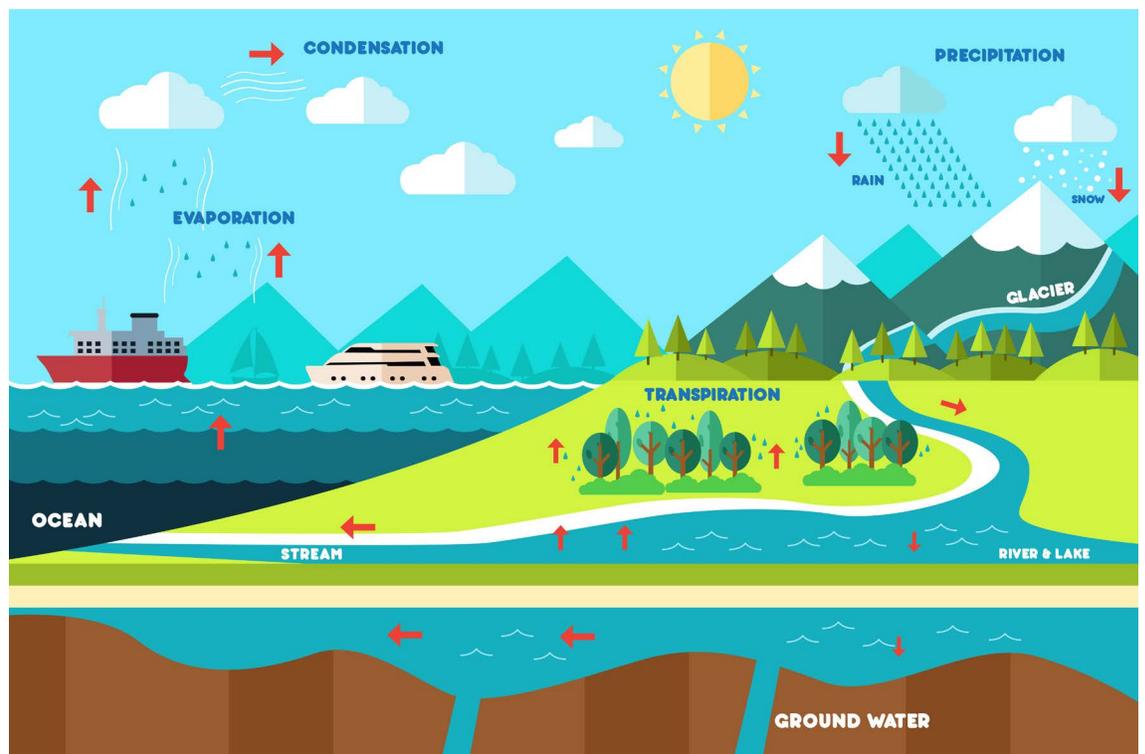
Urban forests and neighborhood trees help to prevent runoff and erosion, thus maintaining water quality. For example, 1 inch of rainfall on a 10,000-square-foot area with no trees will generate 639 cubic feet of runoff, but if 30% of the area is covered by tree canopy, it will generate just 3.9 cubic feet of runoff.



PREPARE

MATERIALS: Seven dice, labels for seven stations, watch or stopwatch, chart paper and markers.

GET READY: Set up seven stations and label them: Cloud, Glacier, Stream, Groundwater, Ocean, Plant, and Animal. At each station, place a die and the relevant directions from the Water Wonders Stations Worksheet. (If you have a large group, use two or more dice at each station.) Make one copy of the Water Cycle Data Worksheet for each learner.





LEAD

INTRODUCE:

Divide the group into pairs and ask them to write a description or create a drawing of the water cycle. Have volunteers share their description or drawing with the whole group. Ask learners whether they think water always follows the same path in the water cycle. Challenge them to think of examples of how water may follow a different path.

EXPERIENCE:

1. Explain that learners will model the water cycle to see the different paths a water molecule might take. Distribute the Water Cycle Data Worksheet so they can record the path they follow in the model. Later, they will compare data.
2. Divide learners into seven groups and have each group begin at one of the stations. Explain that each learner will be a water molecule in the model.
3. Have learners roll the die and read the statement for their station corresponding to the number on the die. On their Water Cycle Data Worksheet, they should write their current station, what happens to them according to the die roll, and their next destination. Call out “cycle,” to have learners go to the next station as directed by the station statements.
4. Repeat Step 3 about 10 times or until most learners have cycled through the Cloud station a couple of times.
5. Write the names of the seven stations on the chart paper. Beginning with Cloud, ask learners to share all the different ways they got to Cloud. Show each response by drawing arrows to the word Cloud. Repeat with the other stations.
6. Discuss: Even though individual molecules took different paths, what was similar about the journeys they took? Which stations were visited by the most water molecules, regardless of their journeys? What does this model tell you about the water cycle?

CONNECT:

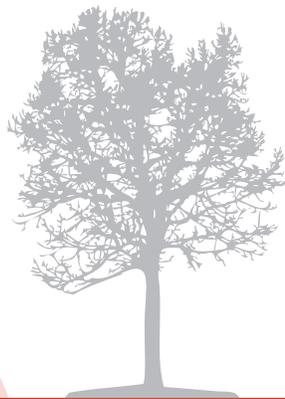
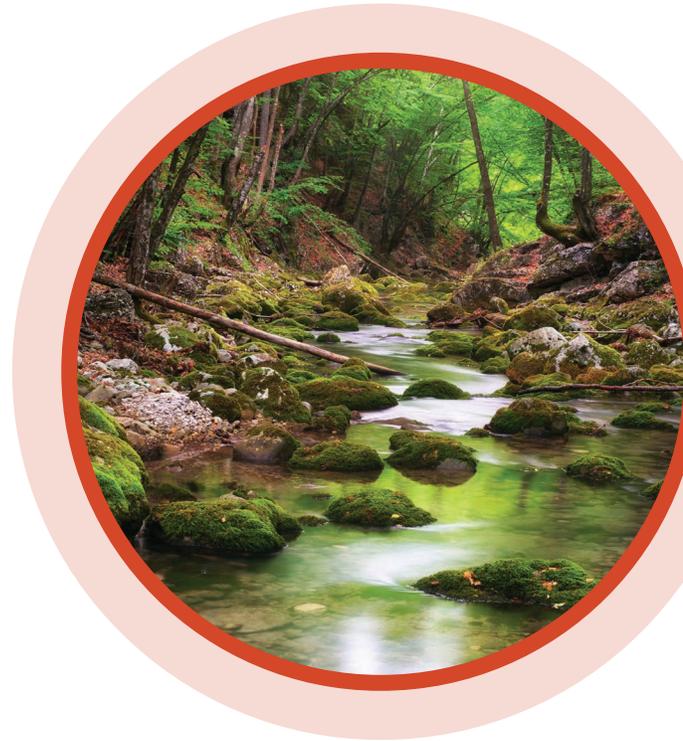
Challenge learners to find evidence of the water cycle at a nearby forest site, such as:

- Evaporation (a dried-up mud puddle, low water levels in a pond, or a dried leaf)
- Condensation (clouds, dew on grass, or fog)
- Precipitation (rain, hail, or snow)

CLOSE

How is the water cycle important to plants and animals?

How is it important to people?



TAKE ACTION

Explain that a hydrologist investigates water in forests by studying how it travels through the forest, into the soil, and eventually to a stream. Challenge learners to explore this and other careers related to forests and the water cycle.



CLOUD Station

If you roll a ...

- 1:** You fall as rain onto an ocean. Go to Ocean.
- 2:** You fall as rain onto an ocean. Go to Ocean.
- 3:** You fall as rain onto a stream. Go to Stream.
- 4:** You fall as snow onto a Glacier. Go to Glacier.
- 5:** You fall as snow onto the ground. Go to Groundwater.
- 6:** You fall as rain into a forest. Go to Stream.



GLACIER Station

If you roll a ...

- 1:** You evaporate into the air. Go to Cloud.
- 2:** You stay frozen in ice. Stay at Glacier.
- 3:** You stay frozen in ice. Stay at Glacier.
- 4:** You stay frozen in ice. Stay at Glacier.
- 5:** You melt and become part of a stream. Go to Stream.
- 6:** You break off from the glacier and fall into the ocean. Go to Ocean.



OCEAN Station

If you roll a ...

- 1:** You are one of countless water molecules in an ocean and you stay there. Stay at Ocean.
- 2:** You are one of countless water molecules in an ocean and you stay there. Stay at Ocean.
- 3:** You are one of countless water molecules in an ocean and you stay there. Stay at Ocean.
- 4:** You are one of countless water molecules in an ocean and you stay there. Stay at Ocean.
- 5:** You evaporate into the air. Go to Cloud.
- 6:** You evaporate into the air. Go to Cloud.



STREAM Station

If you roll a ...

- 1:** You evaporate into the air. Go to Cloud.
- 2:** You evaporate into the air. Go to Cloud.
- 3:** An animal comes to the stream and drinks you. Go to Animal.
- 4:** You continue rolling downhill and become part of an ocean. Go to Ocean.
- 5:** You continue rolling downhill and become part of an ocean. Go to Ocean.
- 6:** A human purifies water from the stream and then drinks it. Go to Animal.



GROUNDWATER Station

If you roll a ...

- 1:** You move slowly downward and become part of an aquifer (an underground layer of rock containing water). Stay at Groundwater.
- 2:** You move slowly downward and become part of an aquifer (an underground layer of rock containing water). Stay at Groundwater.
- 3:** You move slowly underground between grains of sediment and eventually flow into a wetland and from there into a stream. Go to Stream.
- 4:** You move slowly underground between grains of sediment and eventually flow into a wetland and from there into a stream. Go to Stream.
- 5:** A plant absorbs you through its roots. Go to Plant.
- 6:** You are pumped out of the ground from a well to irrigate a farm. Go to Plant.



ANIMAL Station

If you roll a ...

- 1:** After using you to process food, the animal urinates and you end up in the ground. Go to Groundwater.
- 2:** After using you to process food, the animal urinates and you end up in the ground. Go to Groundwater.
- 3:** You are exhaled from the animal's lungs into the air as vapor. Go to Cloud.
- 4:** You are exhaled from the animal's lungs into the air as vapor. Go to Cloud.
- 5:** A human uses you for brushing their teeth and spits you out; you travel from the sink down into the pipes, then through a sewage treatment plant and into a stream. Go to Stream.
- 6:** A human drinks you and then urinates. You travel from the toilet down into the pipes, then through a sewage treatment plant and into a stream. Go to Stream.



PLANT Station

If you roll a ...

- 1:** The plant transpires you through its leaves and you evaporate into the air. Go to Cloud.
- 2:** A tree transpires you through its leaves and you evaporate into the air. Go to Cloud.
- 3:** The plant transpires you through its leaves and you evaporate into the air. Go to Cloud.
- 4:** The plant uses you to grow. Stay at Plant.
- 5:** A tree stores you in its edible fruit and you are eaten by an animal. Go to Animal.
- 6:** The plant stores you in its edible leaves and you are eaten by an animal. Go to Animal.

WORKSHEET

WATER CYCLE DATA



NAME _____ DATE _____

ROUND	STATION STOP	WHAT HAPPENS TO THE WATER MOLECULE?	NEXT STOP
<i>Example</i>	<i>Cloud</i>	<i>Falls as rain</i>	<i>Ocean</i>
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

