

# Growing With Groundwater

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## What is the water cycle?

The water cycle is the endless process of water moving throughout the oceans, atmosphere, groundwater, streams, etc. Water on the surface is evaporated from the earth by the energy of the sun. The water vapor forms clouds in the sky. Depending on the temperature and weather conditions, the water vapor condenses and falls to the earth as precipitation (rain, snow, hail, etc.). Some precipitation runs from high areas to low areas on the earth's surface. This is known as surface runoff. Other precipitation seeps into the ground and is stored as groundwater.

**Key Topic:** Aquifer, Groundwater, Recharge, Water cycle

**Grade Level:** This activity can be adapted for many age groups and settings

**Duration:** 20 minutes

## Objectives

Create a miniature terrarium that demonstrates the different phases of the water cycle.

Identify the four basic elements (soil, water, sun light, and air) needed for plant/animal/human survival. Stress the importance of water as one of the four elements and the importance of having healthy water, soil, and air.

## Items Needed:

- Plastic cups and lids
- Soil
- Gravel
- Containers to hold water
- Spray bottles
- Rubber bands (if lids are not available)
- Plastic wrap (if lids are not available)
- Seeds
- Water
- Large spoons
- Small jar filled with soil (optional)
- Small jar filled with water (optional)
- Small jar filled with air (optional)
- Small jar filled with light (optional)



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## Activity Steps:

1. Discuss the four essential elements or pass around four containers with water, soil, air, and light. Ask students what are in the containers. When a student answers discuss that element. (See detailed discussion section.)
2. Once all of the elements have been discussed and all of the students have seen the containers, tell the students they are going to be planting their own seeds and will be able to take them home to watch them grow into plants.
3. Have each student add gravel to the plastic cup (about an inch of gravel)
4. Add a small amount of water and watch as the water trickles down through the gravel layer. This is a simple model of groundwater.
5. Cover the gravel with soil so that the cup is about  $\frac{3}{4}$  full.
6. Pass out seeds for each student
7. Read the seed packet for planting instructions. Typically, the seeds do not need to be planted deep into the soil.
8. Water the seeds. Once again watch how the water moves down through the soil. This is how rain and snow recharge aquifers.
9. Cover each cup with a lid or make a lid with the plastic wrap and secure with a rubber band.
10. Place in a sunny location.
11. Over the next few days, watch as the sides of the cup become foggy. This is condensation. Heat from the warm sun causes water to evaporate from the soil (become a vapor). When the vapor touches the side of the cup it cools and condenses (becomes a liquid again). As the water on the sides and lid of the cup becomes heavy it will fall back to the soil and will water the seeds. Some of the water will move deeper into the soil and reach the gravel layer in the cup, becoming groundwater. This is the same process as the water cycle: Water on the surface evaporates and moves into the atmosphere, then it cools and forms clouds, and eventually it falls as precipitation (rain, snow, sleet, hail, etc.). From there, the water either runoffs to surface water (streams, rivers, lakes, oceans) or soaks into the ground where it might eventually become groundwater.



# Discussion:

## SOIL

Soil is where plants grow. The earth's soil is made up of rock that has been broken down through weathering (physical or chemical process) as well as organic matter from decomposed plants and animals. Soil has nutrients and minerals in it which are used by plants to grow. Soil also helps plant roots to receive water. Sometimes water washes away the rich soils (rivers, floods, heavy rain) needed to grow plants. This is called erosion. Plants are important because many serve as food and shelter for animals and humans. Many products we use are made from plants. Can you think of materials/products that are made from plants? Wood/paper, cotton, food, etc.

## AIR

Air is a mixture of many gases in the earth's atmosphere. Oxygen, nitrogen, argon, carbon dioxide, hydrogen, neon, helium, etc. Animals, people, and plants use oxygen.

## SUNLIGHT

Sunlight, also known as sunshine, is a source of energy (solar energy).

Sunlight helps to warm the Earth's surface. The temperature is dependent on how much sunlight is able to reach the Earth.

Plants use the energy from the sun to grow. Plants make sugar from carbon dioxide (air) and water, this is called photosynthesis.

## WATER

The water we have on Earth is all we have. There is no new water. Water travels in a cycle called the water cycle or the hydrologic cycle. Water can be found in this cycle in three forms: Liquid, solid (ice/snow), and gas (water vapor from evaporation). Water is also known as  $H_2O$  where the 'H' stands for Hydrogen and the 'O' stands for Oxygen. Water is a vital resource to plants, animals, and humans. How do plants/animals/people use water? Plants use water to grow/animals depend on water for survival and habitat/humans use water everyday for taking showers, cleaning, and drinking. Without enough water or a healthy supply of water, plants, animals, and people would not be able to survive.

