

Pop Bottle Water-Cycling Terrarium

Credit: Science World

Level: Grades 4-9

Overview:

In this activity, students make and take home their own water-cycling terrarium. They will experience how an environment changes and grows as well as how water is conserved through the mini water cycle in their terrarium.

Terrariums are a mostly self-contained environment. Once they are established, terrariums need very little from the outside except for some indirect sunlight and perhaps minimal water.

Moisture in the terrarium is taken up by roots, and evaporates from the soil and plant leaves. It condenses on the terrarium roof and walls. Then, the condensed water falls down (like rain) and re-moistens the soil in a continual closed loop process. As long as the top is sealed, this process can continue cycling for months. This cycle mimics the **water cycle** found on a global scale. Nature is the best water saver, because water cycles in a full system—our Earth.

In Arizona, there is a very large-scale model of how systems of ecosystems function. Acting like a gigantic terrarium, this 3.14 acre closed system model, called the [Biosphere 2](#), allows scientists to study nature's cycles in a more controlled setting. At the end of 2012, a new 10 year study has started looking at how water moves through three environments within the Biosphere 2 to better understand the impact of climate change.

Although we can mimic nature's water cycle through terrariums or even the Biosphere 2, it is important to remember that we cannot replace nature. Its water cycle is incredibly complex, full of interactions on micro and macro levels, and provides us with many benefits that we rely on.

Objectives:

- Describe methods and the importance of water conservation
- Make a terrarium

Materials:

Per Student:

- 1 plastic 2 L soda pop bottle with cap

Per Class:

- a pair of sharp scissors
- a couple of handfuls of sand or small rocks (for drainage)
- 1 bag of dirt or potting soil
- 2 paper cups
- rocks, pine needles/cones and small dried twigs (optional, just for decoration)
- seeds, small plants, and/or moss
- 2 spray bottles

Key Questions:

- How often do you think you will have to water your terrarium?
- What else will you add to your terrarium over time?
- How does a terrarium relate to a greenhouse?

Steps:

Preparation:

1. With the pop bottles laid down sideways, cut out a door that opens upwards and is big enough for small hands to fit through. Cut only three edges, one long, two wide. Suggested dimensions: 11 cm x 4.5 cm.

Set-up:

1. Brainstorm what plants need to stay alive, and how this will be incorporated into the terrarium.
2. Hand out a pop bottle to each student.

Instructions:

1. Keep the pop bottle sideways, with the cut flap on top. All ingredients should be added through the flap.
2. Using the cups as a scoop, add sand or small rocks to the bottom. Next, add the soil to the bottom, to create the ground. They can move the pop bottle lightly from side to side if they want a flat surface of soil.
3. Spray water on the soil to lightly moisten the soil. Very little is needed. Do not overwater.
4. Sow seeds by pushing them into the soil with a finger just a couple of centimeters deep. If planting small plants make a hole in the soil, place down plant, then pat down lightly. If using moss, place lightly on the top of soil or rocks, and pat down lightly.
5. Lightly lightly water the seeds and soil.
6. Then, put the cap on the bottle.

7. Keeping the bottle sideways, place in a somewhat sunny spot. Students can observe how their plants grow and watch the water cycle.
8. Have students spray with water only once the soil becomes dry again.

Extensions:

- What happens if you put the cap on? Put it in a sunny spot?
- Terrariums can be homes not only for plants, but also for invertebrates. Research what a snail, grasshopper, cricket, worm or beetle needs to live a happy life. Add these resources to the terrarium. Then add the invertebrate for a short stay.
- Make records of how your terrarium changes over time. Try introducing new plants and see how they do.
- Make a larger terrarium that fills an entire aquarium. See how these little ecosystems can get more complex the larger they get.