Ecosystem in a Bottle

ACTIVITY

What is an Ecosystem?

An ecosystem includes all of the living things in a given area that interact with each other and with their environment. In an ecosystem each element has its own role to play. A change in one part of the environment can have effects one the rest of the living components within that ecosystem.

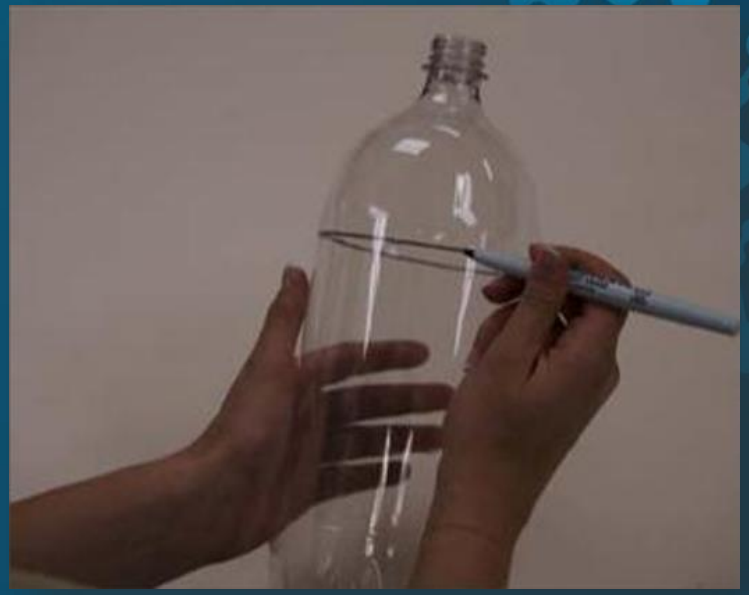
With "Ecosystem in a Bottle," you will create a TerrAqua Column, a model that allows you to explore the relationships between elements that live or relate to both land habitats and aquatic habitats. This model has three basic components: soil, water, and plants. Once you've established the basic ecosystem, you'll find there are endless ways to experiment and learn from variations!

What you'll need to get started:

- Two 2-liter bottles with caps
- Soil
- Seeds (fast-growing seeds are ideal)
- Two candle wicks
- Water
- Ruler or measuring tape
- Box cutter (only with an adult's help)
- Scissors
- Drill (only with an adult's help)
- Locking pliers (also known as a vice grip)
- Safety glasses
- Marker
- A helpful adult

Directions:

1. With the marker, draw a line around one of the bottles about 2 inches (5 cm) below the curve.
2. Put on your safety glasses.
3. Ask an adult to use the box cutter to create a slit along the line that your scissors can fit into.



Directions:

4. Use the scissors to cut the rest of the way around the line. The bottom part of the bottle will be the lower section of your ecosystem, the “reservoir” for your water. The top of the bottle, with the cap on, will be the lid for your planter.

Directions:

5. On the second bottle, draw a line about 2 inches (5 cm) from the bottom.
6. With the help of an adult, cut the along the line as you did with the first bottle. The top portion of the bottle will be the planter.

Directions:

7. With the help of an adult, place the other bottle cap in the vice grip. Then drill a hole through the center of the cap large enough for two wicks.
8. Soak the two wicks in water and thread through the hole in the cap.

Directions:

9. Screw the cap onto the planter bottle.
10. Fill 1/3 of the reservoir bottle with water. Then place the planter bottle inside the reservoir bottle with the cap-side pointed down, making sure the wicks reach the bottom of the water.

Directions:

11. Add soil* to the planter making sure that the top halves of the wicks are buried in the soil and not stuck to the side of the planter.

*For better drainage, you can add a layer of gravel or sand in the bottom of the soil unit.

Directions:

12. Plant seeds* in the soil at the appropriate depth and spacing for the type of seed.
13. Put the lid bottle on top of the ecosystem and place in a warm spot for the seeds to germinate.

*Grasses, particularly lawn seed mixes, work well. Beans and peas, or other fast-growing edible plants, can also work.

Now...Observe and Learn

Over the next few weeks, you will see changes in the environment you have created. Take lots of notes and make drawings of your observations.

- When did you see the seeds germinate?
- What do the leaves look like?
- How much water is being absorbed?

Then...Add a Variable

Once you have established your ecosystem, you can explore how a single variable can affect the whole system.

If you do an Internet search for "TerrAqua Column," you will find many ideas for variables to experiment with. For example: How does salt affect the growth of plants? How does adding fertilizer to the soil affect algal growth in the water chamber? What happens when you add an animal, such as an earthworm or tadpole, to the ecosystem?

Keep it Simple

Keep your investigations very simple by changing only one variable of the system at a time. OR...you can create another ecosystem with different materials to compare with the first one. For example, use pond water or soil from a different location. If you do create more than one ecosystem, be sure to label each one clearly with a marker.

Continue to journal your observations, including dates, measurements, and colorful descriptions. And, most of all, have fun learning about science at home!


BAYER