All Ecosystems Go

Components of an Ecosystem
Grades 7 - 9

Discover and analyse everything required for a closed ecosystem to thrive. Work on your own sealed biosphere and take a closer look at the factors needed in living systems.

Background Information

A Biosphere is a mostly closed ecosystem that contains living (biotic) and non-living (abiotic) things. These biotic and abiotic parts are interconnected and work together to preserve a balance within their environment. Biospheres are called closed systems because, other than energy from sunlight shining down, nothing enters or leaves the system. All the other materials and nutrients an ecosystem needs (such as water, oxygen, carbon dioxide, and nitrogen) are already in the system and are used and recycled by the organisms living there.

Let's gather some information on different types of biospheres. The most famous biosphere of all is our Earth! All the materials on our Earth are constantly reused and recycled, whether that be the abiotic factors like water or air, or biotic factors like plants that get broken down and reused. Nothing except for the energy from the sun can enter or leave (unless you own a spaceship!).

The Earth is a natural closed system. Humans also make artificial closed systems because they help us do work. For example we can turn greenhouses into closed systems to completely control the growing conditions for the plants inside. Controlling these conditions is useful when growing fragile plants that are sensitive to small changes in temperature or humidity.

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Background Information Cont.

What do Biospheres need to thrive? It's important that your ecosystem has producers, such as plants, to help capture useful energy. Plants can use sunlight and carbon dioxide to create their own food and make oxygen through a process called photosynthesis. Plants are also very important for any microscopic consumers or decomposers to use as a food source. Plants in turn need nutrient rich soil and enough water to grow.

Knowing this information, it's time to reflect on which details are key for your biosphere to prosper! Consider what to include in your ecosystem so that once closed, it can thrive by recycling the things you've included. Use an observation chart like the one below to help you identify relationships between components of ecosystems around you. This chart can help you decide what factors are most important to the survival of your own biosphere. Communicate your findings by showing what it takes for an ecosystem to survive, including all the important components inside your biosphere.

Monitor your biosphere over the next couple of weeks to collect any further findings about your ecosystem. Do you notice any changes? Can you see any evidence of water, nutrients, or energy cycling through your ecosystem? How does your ecosystem relate to other closed systems we discussed like the Earth's overall biosphere? Use your chart to help you note these observations over time. Are the components of your biosphere interacting in the way you expected?

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Materials

- A clear jar, pop bottle, or container that can be closed with a lid, or taped closed.
- Materials for your ecosystem such as soil, water, plants, and rocks. Just remember to be careful of protected plants and ecosystems when you are gathering your materials!
- A small shovel to help you collect materials if needed.
- A sunny place to put your biosphere once it is completed.

Instructions

- Gather the biosphere components you consider to be key to a thriving closed ecosystem.
- Take your container outside to an area where you can find soil, plants, and rocks.
- Place a thick layer of soil along the bottom of your container. Find a plant that you would like to add to your biosphere and gently remove it from the ground, roots included. Place it into the soil in your container and make sure the roots are fully covered in soil. Add any rocks or other plants that you'd like to observe. Be careful not to overcrowd your ecosystem by adding too many plants.
- Add a small amount of water to your biosphere so the soil is damp but not muddy.
- Seal your container and place it in a sunny spot that does not get too hot or too cold.
- Observe your biosphere for the next two weeks to learn about the ecosystem inside your container.

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Observation Chart for Recording Findings

	Observations of Biotic Factors	Observations of Abiotic Factors	Evidence of Water Cycle	Picture
Observations of biospheres around you				
My biosphere:				
Day 1				
Day 7				
Day 14				
Day 21				
Day 28				

Questions for Reflection & Activity Extensions

- How are nutrients and energy cycling through your ecosystem?
- What happens to the plants in your ecosystem at night when there is no sunlight?
- Does your biosphere contain microorganisms? If so, where did they come from?
- How does your biosphere relate to other closed systems?
- What would happen if you took something away from your biosphere (such as taking out the plants)?
- Where did you place your biosphere and why?