

Ecosystem in a Bottle

Real World Ecosystems
Learner Worksheet Answer Key
Grade Level: 5-8



Name:

After reading the Ecosystem in a Bottle Backgrounder and completing the experiment, answer the following questions.

- 1. In many ways, the biosphere bottle and the Earth's biosphere resemble each other. In both cases, the main input is light energy. Other than lights, very little enters or leaves from either system. But there are some significant differences between the Earth and a biosphere bottle. What are some of those differences and why are they important?**

Look for mainly references to **time** required due to the scale of the Earth as compared to the bottle. There are many differences, mainly related to the **scale** of each system. One main difference is the time required for responses to manifest themselves. On Earth, changes in the energy budget, global temperatures, vegetation patterns and other variables require decades and centuries to show up after an initial disturbance. In contrast the biosphere bottle responds to changes in energy within minutes, and the plants can exhibit responses within hours or days. Earth has large oceans, which act as a giant buffer against rapid temperature fluctuations and climatic changes. The biosphere bottle is very susceptible to overheating because it has not large thermal mass with which to buffer against temperature.

- 2. If systems are out of balance in the biosphere bottle, problems arise. State two problems that may arise on Earth when systems are out of balance. Name two things you think humans are doing that may result in an imbalance in existing systems.**

If there is an over-consumption of any item (either matter or energy) beyond the ability of the environment to supply it, organisms may die. That may result in the death of other organisms with which there was a feeding relationship and so on.

Similarly, an overpopulation of one type of organism may deplete certain resources, thus leading to the death of other organisms, and so on.

3. List three ways in which the information you learned from observing your bottle might help you in designing a closed-system community (such as a biosphere).

Sample answer: There could be a variety of factors chosen here, but the main point to look for is the outcome of either an over or under-supply of certain factors of matter and/or energy. Learners may refer to the Earth as a closed system community, or they might make reference to a bottle garden as their examples. Either way, the scale does not change the factors involved.

4. Whose responsibility is it to maintain balance on Earth? Why?

Sample answer: It is the responsibility of all of us. We all contribute to the Earth's problems, so it is our responsibility to do what we can to fix them.

5. Why could Earth be considered a closed system such as the biosphere bottle is?

Sample answer: So far, life from Earth has not been shown capable of leaving Earth permanently to live elsewhere.