

Ecosystems and their components

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Target grades: 5-7

Assessed standard: Life science benchmark 4 (identify and relate interactions populations of organisms within an ecosystem), indicator 1 (recognize that all populations living together and the physical factors with which they interact compose an ecosystem)

Unit Objectives:

- I. What is an ecosystem?
- II. Define *biotic* and *abiotic* components.
- III. Know how organisms interact within ecosystems.

Learning Objective: By the end of the lesson, students will be able to...

- Describe what an ecosystem is.
- Determine whether something is a *biotic* or *abiotic* component.
- Identify interactions within the ecosystems between *biotic* components of ecosystems.
- Identify interactions within the ecosystems between *biotic* and *abiotic* components of ecosystems
- Identify interactions within the ecosystems between *abiotic* components of ecosystems

Materials: Whiteboard, chalkboard, or large sheets of paper and markers; computers or library for research; shovel or hand trowel, tarp (optional for spreading soil), earthworm collecting kit.

Vocabulary Terms:

Ecosystem - all of the living and non-living things that interact with each other in a given area.

Biotic - living. A tree is a biotic component of a forest ecosystem.

Abiotic - non-living. Oxygen in the air is an abiotic component of a forest ecosystem.

Activity 1 - Brainstorming Ecosystems (Allow 15 minutes)

As a class, describe an outdoor area. This can be done at an area outside the school or students can describe their backyard to their classmates. Have students focus on all five of their senses (Sight, Smell, Sound, Touch, and Taste). List the observations that the students make on the board or on a large sheet of paper.

After making the list, have students try to identify interactions within individual items on the list. Mark these interactions with arrows. *If you have some additional time, you can also mark which of these items are living and which are non-living components, you can always return to this activity at a later time.*

Activity 2 - Ecosystem Introductions (Allow 60 minutes for this activity—10 minutes to define *ecosystem*, 45 minutes for research and diagramming)

Provide several examples of ecosystems (desert, grassland, forests, tundra, etc.). Ask for volunteers to come up with a class definition of *ecosystems*. Guide their responses to ensure the best possible definition.

Now that your class has a working definition of an ecosystem, place students into four different groups. Each group will target a different type of ecosystem. With larger classes, you can have two groups for each ecosystem. Students should then research their ecosystem and draw a representative diagram of it. Part of the student research should involve learning the

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terms *abiotic components* (non-living things) and *biotic components* (living things). Diagrams should have at least three animals, three plants, and three non-living components of the ecosystem. Students should draw their diagrams on sheets of paper large enough to display for the entire class.

Activity 3 - Biotic and Abiotic Components of Ecosystems (Allow 20-30 minutes)

Have students post their diagrams so that all groups are able to see them. Students can either present what they have learned to their classmates, or groups can move from one “station” (ecosystem diagram) to the next (gallery walk). If you choose to use the gallery walk method, consider having one member of the group stay with the diagram to answer any questions that might arise.

Students should compare and contrast the different ecosystems, focusing on how the biotic components and abiotic components are similar and different. As a further extension, you can also create class lists for the ecosystems’ biotic and abiotic components.

Activity 4 - Exploring an Ecosystem (Allow 60 minutes)

In order to study interactions between ecosystem components, take students to an area outside of the classroom. This can almost anywhere, however try to find as “natural” an area as possible. Also, you may be digging several small holes. Please consider the impact to the land before choosing a site. Some administrators will not look kindly upon twenty small ditches in the grass outside of the building.

Start by digging a small hole (about the size of a basketball), and spread the soil from the hole out for students to examine. Whenever a student finds a living organism in the soil, have the class stop and identify any interactions that may exist between the organism and other biotic and abiotic components. Living organisms that you may expect to find will include insects, millipedes, centipedes, plants, and earthworms to name only a few. Abiotic components may include soil, rocks, air, and sunlight. **Whenever a student finds an earthworm, please follow the proper collection instructions. The earthworms will be used as a part of a scientific study at Kansas State University.** When you have completed discussing the ecosystem components you have found, return all of the organisms and soil to the hole.