



Ecosystems Connect Lesson Plan

Overview

In the Ecosystems Connect lesson, students will investigate ecosystems near their school, and view satellite images of ecosystems that can be found across the world (Brazilian rain forest, African desert, United States prairie and wetlands, etc.). Students will access the Internet to learn more about different ecosystems (e.g. deciduous forest, rainforest, desert, prairie, marshland).

Suggested Lesson Sequence	Please see Greenlinks and Global Visions module descriptions
Level	Intermediate
Science Connections	<p>Students will learn that ecosystems are self-supporting natural systems that include living (biotic) and non-living (abiotic) elements.</p> <p>Students will learn that interdependence among the living (biotic) and nonliving (abiotic) elements is an important part of healthy ecosystems.</p>
Technology Connections	<p>Students observe satellite images to compare different ecosystems (e.g. deciduous forest, rainforest, desert, prairie, marshland).</p> <p>Students use the Internet to research an ecosystem of their choice.</p>
Human Connections	<p>Students learn that people are not only dependent upon ecosystems, but can affect and even create new types of ecosystems.</p>
Lesson Assessment	<p>Assessment and Standards Table (Word)</p> <p>Assessment Activity Description (below)</p> <p>Authentic Assessment (below)</p>

Materials

This lesson requires Powerpoint Reader ([Windows](#) / [Mac](#)), and [Adobe Reader](#).

[What's an Ecosystem?](#) slideshow

[Ecosystems Websites](#) activity sheet

[Ecosystems from Space](#) activity sheet

[Playground Observations](#) activity sheet

Thermometer

Computer and projection device (optional)

Digital camera (optional)

About the slideshow: this slideshow is not meant for students to read through on their own. It is intended to be viewed together, to outline and illustrate a discussion of the lesson's themes, led by the teacher. You might have a different student read each slide's text.

Vocabulary

Ecosystem: A community of organisms and its environment, which function as an interrelated unit.

Interdependence: Mutually beneficial relationships between biotic and abiotic elements in an ecosystem.

Biotic: A term that refers to any living organism or part of an organism.

Abiotic: A term that refers to non-living substances or influences in an ecosystem (for example, wind, sunlight, rocks, and water).

Climate: The general condition of the weather at a place that is usually consistent over a period of years; described as normal temperatures, wind speeds, precipitation, etc.

Topography: The physical terrain features of an ecosystem.

Biome: A major ecological community (e.g., a tropical rain forest, grassland, desert, ocean, etc.)

Organism: An individual form of life.

Vocabulary Note: students will likely be unfamiliar with other vocabulary presented in this lesson. This is done intentionally, to spur additional conversations and discussion about these words and their meanings. Encourage your students to ask about words they may be unfamiliar with.

Procedure

This lesson has three parts that will each likely take a full class period. In this lesson, students compare and contrast ecosystems near their school and across the world as they identify both living (biotic) and non-living (abiotic) elements of each. Compelling satellite imagery will be used to observe ecosystems from various continents around the globe. The use of computers or projectors is desirable.

I. Assessing Prior Knowledge

As a way of introducing the topic of ecosystems while at the same time assessing your students' prior knowledge, begin by showing the students pictures of desert and rainforest

ecosystems and ask them about the differences and similarities they might find if they were to travel to these places.

Take special note if the students mention both biotic (living) components and abiotic (nonliving) components of these ecosystems. Possible biotic factors might include the types of animals, plants, or insects that live in the two places. Possible abiotic factors might include the amount and types of precipitation, the average daily temperature and the differences in soil. Students might also make statements about how abiotic factors such as the amount of rainfall affect the different types of plants or animals that can live in each place. For instance, the students might hypothesize that the desert contains cacti because they require very little rainwater. You may wish to introduce the terms in the vocabulary list, and perhaps list the abiotic and biotic components mentioned by students on the blackboard.

II. Contextual Preparation

After the students have brainstormed about the pictures, introduce this series of activities by explaining that they will be observing satellite imagery to learn about other ecosystems such as grasslands, tundra, deciduous forest, ponds and lakes, and oceans.

Your students' brainstorming about the rainforest and desert can serve as the basis for a continued discussion. For instance, students may have suggested plants, weather, or geographical features common to various ecosystems. These categories can be used to compare and contrast ecosystems. For example, although it might rain in the desert, rain is not typical for that ecosystem.

After this discussion, show students the "[What's an Ecosystem?](#)" slideshow. It is best if this slide show can be projected onto a large screen or viewed on a computer screen so that each student can follow along at the same time. This slide show is designed to get students to think about ecosystems using visual imagery. Use the imagery to spur additional discussion.

III. Student Activities

1. Distribute the [Ecosystems Websites](#) activity sheet. For this activity, students should have access to online computers to view the websites. This website is maintained by the Missouri Botanical Garden. Students should explore the website and choose one ecosystem to study and later share with the class. The questions on the activity sheet will help guide students' navigation and exploration of the websites detailing various ecosystems.

You may want to begin by exploring a particular ecosystem-- the desert for example-- as a class (projecting on the screen) to model expectations for the investigating that students might do with the websites. This exploration will help the students to navigate the website and review the meaning of key words such as climate and topography.

After this introduction, students should be encouraged to more fully explore an ecosystem either on their own or in small groups depending on the availability of computers with Internet access. They can share this information with their classmates, perhaps through the creation of posters that can be displayed around the room.

The final question on the activity sheet can help provide the basis for discussion about the differences and similarities between the ecosystems the students studied and begin to focus the students' attention on the interdependence of the plants, animals and climate of each ecosystem.

2. Students should use the activity sheet [Ecosystems from Space](#) to view satellite images of ecosystems in different parts of the world. Satellite images are helpful to scientists who study ecosystems. Students will similarly examine the satellite images of different types of ecosystems to identify features, similarities, and differences among different ecosystems as seen from space. Questions and answers are provided *on the activity sheet*, although students should be encouraged to engage the questions before looking at the answers. For the best results and viewing opportunity of these beautiful images, students should view the satellite images on individual computers, or they can be projected on a TV or large screen. Students can answer these questions on a separate piece of paper.

3. To help students learn about the ecosystem(s) in your particular region, take them outside to visit and study your school playground. Using the [Playground Observations](#) activity sheet as a guide, students should record their observations of the playground. Students should record the temperature and describe the weather on this day, topography, and any animals and/or plants observed. Some measuring devices (thermometer, rain gauge, etc.) may be desired. Encourage students to consider any life form on the playground. In many cases, insects and weeds may be the only organisms on the playground. Have the students explore these living things to understand how they are able to live on the playground.

Students should think about the interdependence among the living and nonliving factors they observed. For example, students should consider how the playground climate (abiotic factor) influences the plants and animals (biotic factor).

What ecosystem would the school playground be part of? It may not be evident to students in urban areas that they are part of a larger ecosystem. If so, ask students what they think the environment was like before the city was built. Guide a discussion based on your knowledge of the surrounding local area. The Internet is an invaluable source of information about historical ecosystem types across the United States.

IV. Assessment

Through research on the web, viewing satellite images of ecosystems, and making careful observations on the playground, students should understand the interdependence of living

(plants, animals) and non-living factors on ecosystems.

Final assessment questions might include:

1. How are living and non-living things related in ecosystems? Give examples.

Plant growth is dependent on soil type and water availability. Plants and/or the topography of an ecosystem may provide shelter for animals. Animals may pollinate flowers to allow seed production. Water, nutrients, and energy cycle through the ecosystem to support life.

2. How would you compare ecosystems from different parts of the world?

Answer will vary; however, by referring to the Missouri Botanical Garden website (<http://mbgnet.mobot.org/sets/index.htm>) and satellite images, students can learn how different ecosystems are dependent on climate. For example, the lush vegetation in the tropical rainforest is dependent on a warm, moist climate. In the desert, one would find sparse vegetation and animals and plants adapted to dry, warm conditions.

Lesson Extensions for Authentic Assessment

1. Have students write a story about an ecosystem. Drawings and digital photos can be used for illustrations. Stories can be fictional accounts of events that happen to the animals and plants in the ecosystem, or descriptions of the ecosystem itself. You may wish to have students write two stories about the same exact ecosystem: one story as if the student were a biotic part of the ecosystem, and a second story as if the student were an abiotic part of the ecosystem. Students could use the vocabulary list to build their story.
2. Conduct an ecosystem restoration (or creation) project on your playground! A small plastic children's pool can serve as an excellent place to construct a small wetland or grassland ecosystem. Peat moss and other soils can be seeded with native plant seeds (available at a local nursery). Students can keep a log book of the insects and other animals that use the ecosystem through time.