



What's In an Ecosystem?

NC Standard 5.L.2.1

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Grade 5 Life Science

Activity Description & Estimated Class Time

Throughout the guide, teaching tips are in red.

This set of activities requires two and a half 50-minute class periods. Students work in teams to read information sheets for five different types of ecosystems, and then use Venn diagrams to compare and contrast the organisms and physical features of these ecosystems. These activities should be done after students have set up their ecocolumns and read the Reading Selections included in Lessons 3-6 of the Ecosystems Student Activity Books.

Objectives

Students will demonstrate knowledge and understanding of the following ideas and content:

- there are several different types of ecosystems in the world,
- ecosystems differ from one another in the types of plants and animals they contain,
- different ecosystems have characteristic climates and/or other physical features associated with them.

Students demonstrate this knowledge and understanding by describing some of the organisms commonly found in estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands, as well as the physical features of each ecosystem. They also create Venn diagrams to compare these ecosystems.

Correlations to NC Science Standards

5.L.2.1. Compare the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands.

Brief Science Background

Ecosystems are communities of organisms interacting as a system with the air, water soil, and other nonliving components in an environment. An ecosystem's environment is usually a specific place (unless you count the whole earth as an ecosystem) defined by the network of interactions among and between organisms and the abiotic environment in that place. The components of ecosystems are linked through nutrient cycles and the flow through the system of energy, water, nitrogen, minerals, and other abiotic components. Except in rare cases such as thermal vents on the sea floor, the energy flowing through most ecosystems comes originally from the sun, usually through the process of photosynthesis capturing carbon from the atmosphere. The major system components are producers, consumers, and decomposers. Producers, such as plants, convert energy from the sun into forms usable by other organisms. Consumers play an important role in moving matter and energy through the system, and they influence the quantity of producers. As organisms die, decomposers help convert the nutrients in them back into forms that plants and microbes can use.



Part 1 Getting to Know Different Ecosystems – 50 minutes

Materials

Materials for the whole class

- science notebooks, one per student (provided by teacher)
- sets of ecosystem sheets – 2 sets for each type of ecosystem (Estuaries and Salt Marshes, Oceans, Ponds and Lakes, Forests, and Grasslands)

Materials for groups of 4 students

- sheets from one type of Ecosystem (e.g., Forests). Distribute all of the different types of Ecosystem sheets so that all ecosystems will be represented.

Preparation

Go to <http://ciblearning.org/lesson-materials> and click on “grade 5 materials.” Enter login `cibl5` and password `class12*` to locate a PowerPoint series of photographs representing each of the ecosystems listed in this lesson. Click “Ecosystems Powerpoint.” Be prepared to project the images from this presentation in random order.

Procedure

1. Project one of the images from the Ecosystems Powerpoint and ask students what they know about the ecosystem it represents. Accept all answers and continue to project images, taking a few responses from students on each one. Ask students if they've ever seen places like those shown. Spend less than five minutes in all. Explain that the class will soon learn more about the organisms that live in the places they've just seen.
2. Divide the class into teams of four students. Explain that each team will have a set of information sheets about a particular ecosystem. Ask them to list the organisms found in that ecosystem on a page in their science notebooks as they read the information on the sheets.
3. After all members of a team complete their lists of organisms, ask students to share their lists within the team to check for completeness.
4. Ask a person from the team to gather their Ecosystems Sheets and exchange them with another team for a different set of Ecosystem Sheets. Eventually, every team will have all five ecosystems and complete a list of organisms for each.

Remind students to title each notebook page with the appropriate ecosystem name.



**Part 1
(cont.)**

Wrap Up

Ask students to choose one of the ecosystems they read about, and for that ecosystem, describe a relationship between two or more organisms that can be affected by human actions. In particular, ask them to describe in their own words how each of the organisms are affected either positively or negatively.

Students might describe effects of sea otter hunting on kelp beds, the near extinction of black footed ferrets, pollutants washing into estuaries, or how water hyacinths can affect lakes and ponds.

Part 2 Comparing Ecosystems – 30 minutes

This activity gives students information about organisms and challenges them to compare different ecosystems. In the process, they see examples of different organisms performing similar functions in different ecosystems.

Materials

Materials for the whole class

- 20-30 sheets of blank white paper such as copier paper (provided by teacher)
- roll of transparent tape (from kit)
- sets of Ecosystem sheets – 2 sets of sheets for each type of ecosystem (Estuaries and Salt Marshes, Oceans, Lakes and Ponds, Forests, and Grasslands)

Materials for pairs of students

- 1 blank Venn diagram (see Preparation below)

Preparation

Make blank Venn diagrams by placing two sheets of the blank paper side-by-side and overlapping them slightly. Cut small strips of tape from the large roll included in the kit and use them to join the overlapped sheets. Turn the joined papers over and draw a pair of overlapping circles or ovals for Venn diagrams. Make sure the area of intersection is large enough for students to write in.

Make a few extra blank diagrams in case students need to start over, or if any teams have time to create a second one.



Procedure

1. As needed, briefly review using Venn diagrams to compare things. Give out the blank diagrams and assign each team two ecosystems to compare:
 - oceans vs. ponds and lakes
 - forests vs. grasslands
 - grasslands vs. estuaries and salt marshes
 - estuaries and salt marshes vs. oceans
 - ponds and lakes vs. forests
 - forests vs. estuaries and salt marshes.

2. Instruct teams to:
 - label each of the circles in their diagrams by writing the names of their assigned ecosystems above the circles.
 - list the organisms found in each ecosystem in the appropriate circle. In each circle, include the physical characteristics of each ecosystem:
 - climate (wet or dry)
 - type of water (fresh, salt, or a mix)
 - amount of sunlight (sunny, shady, or a mix)
 - any other physical features they can think of that might affect the organisms living there.

Wrap-Up

Ask the teams to post their Venn diagrams around the room when they are finished, and have the teams examine each other's diagrams, making note of any organisms that are found in several different ecosystems. Discuss their observations.

Answer Key

Students should notice that birds and worms are found in all of the ecosystems, along with bacteria that serve to return nutrients to the ecosystems. At least one type of crustacean is also found in all of the ecosystems, but if students forget that isopods are crustaceans they may overlook this fact. Snails, spiders, and fungi are found in several of the ecosystems, and for most of the ecosystems students should be able to identify one or two top predators.

Guided Practice

Guided Practices are similar to typical tests, but require students to reveal their thinking about content. They serve as a practice before a test and should not be graded. They are intended to expose misconceptions *before* an assessment and to provide opportunities for discussion, re-teaching, and for students to justify answers. They are best given as individual assignments without the manipulatives used in the activity. In that context, pose the following “test items” to the class. Ask them to write responses in notebooks.

Part 2
(cont.)

1. Complete the following sentence with the correct response: There aren't many trees in grasslands because:
 - a. the climate is too dry for trees to grow well.
 - b. the soil isn't rich enough for trees to grow well.
 - c. there are too many plant-eating animals for trees to grow well.
2. Three students found an apple on the playground. One of them turned it over. All three saw that it was rotten underneath. She said, "The apple is rotting because bacteria and fungi are eating it." The second student said, "The bacteria and fungi live in the soil. That's why the part that was touching the ground is rotten." The third said, "That can't be. Bacteria and fungi make people sick. When you throw food away it rots all by itself."

Are the students' statements correct? If not, why aren't they correct?

3. Jonah and Will were talking about whales. Jonah said, "All whales eat fish." "Not all," Will replied. "Some whales eat very small crustaceans instead of fish." "That's crazy," said Jonah. How can a great big whale live on little crustaceans? Even killer whales eat fish, and for whales, they're small."

Which student do you agree with? Do you think the size of what an animal eats is related to how big the animal is? List some examples of large animals in other ecosystems. Next to each, write down what they eat and whether it is large or small.

Answer Key

Discuss wrong answers and ask for explanations of why they are wrong.

1. a. is correct. Grasses can survive in conditions that are too dry for trees because they have very deep roots. When the surface soil dries out the roots can extract water held in the deeper soil below.
2. The first two students are correct. The third student is correct in that *some* types of bacteria and fungi can cause illnesses or infections (such as strep throat (a bacterium) and ringworm (a fungus, not a worm!), but most bacteria and fungi are harmless or even helpful. In particular, those in the soil help return the nutrients from dead organisms back into the ecosystem.
3. Answers will vary, but students might note that:
 - elephants and buffalos eat grass (very large eats small)
 - prairie dogs eat grass (small eats small)
 - zooplankton eats phytoplankton (tiny eats tinier)
 - lions and cheetahs eat wildebeest, wolves eat buffalos (smaller eats larger)
 - tunas eat smaller fish, birds eat insects (larger eats smaller)
 - terrapins eat snails, and sandpipers eat worms (larger eats smaller)

Although larger organisms eat smaller ones in most cases, there are exceptions. It is also true that in some cases the largest animals of all (elephants and baleen whales) eat some of the smallest plants and animals of all.



Appendix

Common Student Preconceptions About This Topic

Most children and many adults believe that plants get their food from the soil. Even after learning about photosynthesis, it is difficult for most people to accept that plants make their own food, mostly from air. We tend to think of food as something edible and solid, so it makes more sense that plants must get their food from soil—not from gases in the air. Once students begin to accept the idea of photosynthesis, many still think that plants get some of their food from the environment. In this case they may broaden their definition of food to include anything taken in from the environment, which can include water, minerals, fertilizers, carbon dioxide, and even sunlight.

Many children are not aware of the role that microorganisms play as nature's decomposers and recyclers of plant nutrients. Instead, they believe that when plants and animals die, they begin to rot of their own accord. Then insects arrive to further break it down.