



Adapted from “If You Owned the Ecosystem,” Ecosystem Matters Activity and Resource Guide for Environmental Educators, Rocky Mountain Region, U.S.D.A. Forest Service

**Description:** Through role playing various wildlife species or an individual profession, students make decisions about the use of natural resources within an ecosystem.

**Objectives:** Students will:

- describe food and habitat needs for certain species of wildlife and humans;
- discuss what makes up an ecosystem;
- discuss effects of different land use choices on the environment and other life forms;
- identify land uses that are considered compatible versus those that are considered less desirable or incompatible;
- demonstrate how land use conflicts can be resolved; and
- demonstrate cooperative problem-solving and decision-making skills.

**Materials:** writing materials, “The Ecosystem” drawing from Chapter 2 and role-play cards in this chapter

Optional: overhead projector, overhead transparencies, overhead markers

**Background:** Ecosystems are interacting systems of living things and their non-living physical environments. The word ecosystem is also used to describe the place where these interactions (relationships) occur. Ecosystems can be as small as a tiny pond or as large as the Rio Grande, a forest, a desert, or a planet.

### *40. If You Owned a Bosque Ecosystem*



**Grades:** 3–8

**Time:** One hour and 30 minutes

**Subjects:** science, social studies, language arts

**Terms:** *amphibian, aquatic, ecosystem, decompose, fresh water, habitat, mammal, natural resources, nymph, predator, reptile, terrestrial, wildlife, bosque, biodiversity*



We call the living parts of an ecosystem the biological component. The variety of the living species in an ecosystem is known as biological diversity or biodiversity. The non-living parts of the ecosystem are referred to as physical components and include such things as topography, moisture, soils, and climate.

The biological and physical components of an ecosystem interact naturally in give-and-take, interdependent ways. In a healthy ecosystem, native biodiversity is intact and the system operates in ways to maintain that diversity. Some ecosystems are very resilient, absorbing much change and impact. Some ecosystems are very fragile. For every change there is an effect. The loss of one species or the change in one physical factor can make a huge difference. It can even determine whether or not the entire ecosystem can function and survive.

In addition to the stresses put on ecosystems through forces of nature, today's growing human population continues to need and want more and different things. Most human needs (food, clothing, shelter, space, etc.) involve the use of natural resources. That means ecosystems are directly affected.

At times, human uses of natural resources are not destructive to the ecosystem. In some cases, human involvement is compatible with overall ecosystem health. At other times, human activities can harm and degrade ecosystem health. Some human caused changes may enhance some species and at the same time inhibit other species.

In this activity, students work in small groups to decide whether or not to make changes to a bosque ecosystem. The changes will be based on a specific wildlife, plant, human, or special-interest group they represent. Each group needs to consider what they eat, where they live, what materials they need to build homes or other structures, what they need for protection, how long the changes will last, or how the changes will affect the other groups. Students discover that different groups need many of the same natural resources. Some of the natural resource uses will be compatible and others will be conflicting. Each group has a right to present its members' needs. They must listen to the needs of others, and together make a decision as to the best use of the resources.

**Procedure:****Preparation:**

1. Photocopy one ecosystem drawing for every two to three students and one class copy of role descriptions.

**Option:** Provide each group with an ecosystem drawing on an overhead transparency. They can use overhead markers to mark their changes. The transparency can also be used to make a presentation to the class.

2. Cut the role cards apart.

**Doing the Activity:**

1. **Ask:** What is an ecosystem?

Students must understand that for every change in an ecosystem there is an effect. Everything in an ecosystem is connected at some level. Discuss “compatible use” with students. What examples can they think of, in their personal lives, of a common space that is run or managed with many different interests in mind? Have students briefly explain the area and how it is managed. The school building is an excellent example of compatible use. Others are a community center, park, gymnasium, or sports complex.

2. Divide students into small groups of two to three members. There should be at least eight groups, each of which represents a different viewpoint: farmers, students, citizens, ecosystem managers and, at least, insects, reptiles, fishes, trees, and birds. Additional groups can represent other species or viewpoints.
3. Give each group a copy of “The Ecosystem” and explain that this is the common space about which they will make decisions. Distribute a role card to each group.
4. Have students read the role description on the group’s card. They should define or look up any vocabulary words that may be unfamiliar, and answer these questions in their groups.
  - What do you eat?
  - Where do you live?
  - What are your habits or what do you like to do?
  - What kinds of materials do you need to build a home or shelter?
  - Where will you get the materials?
  - What do you need protection from? (predators )
5. Each group talks about the kind of adjustments or changes they would like to make to the ecosystem. The changes are made from the point of view of the wildlife or human roles they represent. Changes can include planting, building, removing things, and other actions that will make their lives better or



sustainable. They should consider how long the changes will last, if they are permanent or temporary, and what effect the change will have on the other groups.

6. "The Ecosystem" can be used to make a rough copy of the changes.
7. Each group presents its recommendations for changes to the ecosystem, including who is being represented and pertinent information from the role card. They also define, for the group, any vocabulary words that come up in their group and may not be familiar to the class. (see *Terms*, this activity, and Appendix A: Glossary).
8. After all presentations have been made, the class must work to reach a consensus on changes they will make to the bosque ecosystem. Begin by asking each group to identify:
  - A. Who would be affected by your changes?
  - B. How would the ecosystem be affected by your changes?
  - C. Which changes are compatible, which are conflicting?
9. Summarize by asking:
  - A. What was the most interesting part of this activity? Least interesting?
  - B. What was the hardest part? Easiest part?
  - C. Is there anything you learned in this activity that will help you in the future?

**Assessment:**

1. Evaluate students' participation in the group processes.
2. Have each group give reasons for the changes they make to the ecosystem.
3. If there is no consensus on change(s), have students identify reasons why consensus was not possible. What could have made consensus possible?

**Extensions:**

1. Have students do research to learn more about each of the birds, fish, and other wildlife and interest groups described on the cards. For example, find out how they protect themselves from predators (enemies), find an interesting fact (i.e., the importance of a squirrel's tail), etc.
2. Use this activity to lead into a discussion of the food web. (See "The Web" in this chapter.) Is anything missing from this ecosystem?
3. Have students add different animals to the ecosystem and prepare additional cards. Do the activity again with the new animals.

4. Have students create different land use scenarios. For example, the farmer has decided to sell her land to a developer to build a shopping mall.
5. Individually or in small groups, have students design ecosystems of their own. What animals, land uses, etc. would be included? Include any local land-use controversies near the school or within the community.
6. Explore and use different consensus-building techniques.
7. Explore ways the ecosystem could be protected for future generations.





### **Ecosystem Manager**

I am interested in balancing human needs with the needs of animals and vegetation. My career requires that most of my time is spent working with a specific ecosystem. For example, I might be responsible for taking care of the natural resources (air, water, land, soil, plants, animals) at a national wildlife refuge, a park, forest, etc.

### **Citizen**

I care about the environment, everything from the air we breathe to the water we drink. I believe we all can do something to help protect our environment, whether it is recycling or walking to school or work whenever possible. I believe it is important to balance human needs with the needs of animals and vegetation. I am concerned with issues ranging from local government to the global (world) environment. I do things such as writing letters to Congress and cleaning up rivers.

### **Student**

You can create your own role. Think about what you do at home, in school and outdoors. Prepare your self-description based on: what you eat, where you live, your habits and what you like to do, materials needed to build a home or shelter, where you will get the materials and what you need protection from.

### **Farmer**

I grow alfalfa on about 1,000 acres of land in this community. I do not use fertilizers or pesticides. Irrigation water is needed from the river to make the plants grow. Alfalfa plants return nitrogen to the soil, which helps other plants grow. Alfalfa is used to feed my cows, providing people with beef to eat.



### **Red-tailed Hawk**

(bird) I am usually found in open woodland areas. I build a nest in a tree or sometimes in a cliff or human-made building. My nest is usually large and made of sticks, lined with grass and green leaves. I generally hunt for live animals during the day, eating mice, rabbits, squirrels, beaver, prairie dogs and snakes. Coyotes, foxes, bobcats, other hawks, snakes, crows and ravens try to eat me.

### **Mallard**

(bird) I live in marshes, shallow fresh-water ponds, rivers and coastal waters. I get my food by dipping my bill and head into the water looking for seeds, aquatic vegetation and small fish. I also eat grains and vegetation near the water's edge. Coyotes, foxes, bobcats, domestic cats and dogs, hawks, snakes, crows and ravens try to eat me and my eggs.

### **Frog**

(amphibian) In the early stages of growth, my young are called tadpoles. Tadpoles have tails and live mostly in slow water such as ponds or marshes. They have gills so they can breathe like fish. They eat plant material. When I become an adult frog, I lose my tail. Some of my relatives (other frogs) live in the water, some live on land and some live in trees. I eat insects. Birds, mammals, reptiles (especially snakes) and humans (for frog legs) try to eat me.

### **Cottonwood Tree**

(plant) I grow well only where my roots can reach into moisture provided by underground water. My seeds need to fall on bare, moist soil to germinate. They need a permanent water supply to survive and prosper. Many insects live in my branches, so many different kinds of birds come to eat these insects. My fallen leaves add nutrients to the soil when they decompose on the bosque floor.



### **Leaf-roller**

(insect) As a caterpillar, I eat leaves of cottonwood trees. I also roll the leaves and tie them with silk. I hide inside and metamorphose into a small moth. It's easy to find the rolled-up leaves on the ground after they fall out of the trees. Birds often eat me when I'm young.

### **Mayfly**

(insect) I have six legs and three tails. I spend most of my time under water in places where the sand moves around. I usually eat algae and detritus (small pieces of dead plants or animals in the water). As an adult, I live only for a day or two and I don't eat. I attach my eggs to stones or other objects in the water. Many fish eat me, both when I'm young and as an adult. I am named for the month when I can often be seen.

### **Garter Snake**

(reptile) I am a reptile without any legs or arms. I have a long yellowish-white stripe down my back. I eat fish, frogs, toads, tadpoles, lizards and worms. I swim well, but usually I slide along the moist ground under the plants. Herons, roadrunners and some mammals try to catch me.

### **Silvery Minnow**

(fish) I am a small, silvery fish with fins and scales. I have small eyes. I rarely get longer than 8 cm (3.5 inches) I hatched from a floating egg. I eat algae and tiny plant pieces I find floating in the water and on the gooey river bottom. Sometimes I eat old insect skins. I usually travel in large groups called schools. I prefer slow-moving waters where the river meanders and braids.



## **Meadow Jumping Mouse**

(mammal) I jump like a frog with my long hind feet, but I have fur and a tail. I favor now-rare wet meadow habitats. My family lives around marshes. I mostly eat the flowers and seeds of grasses and other plants. I hibernate for half the year, living entirely on fat stored in my body. Coyotes, snakes, hawks and owls try to eat me.

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