*LEVEL: Grades 5-8*

*SUBJECTS: Environmental Education, Science, Language Arts.*

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

*OBJECTIVES: The student will:*
1. *Describe food and habitat needs for specific species of wildlife and humans.*
2. *Discuss what makes up an ecosystem.*
3. *Discuss effects of different land use choices on the environment and other life forms.*
4. *Identify land uses that are considered good (compatible) versus those that are considered harmful or less desirable (conflicting).*
5. *Demonstrate how land use conflicts are solved.*
6. *Demonstrate cooperative problem-solving and decision-making skills.*

*TIMEFRAME: 1 hour 30 minutes.*

*SKILLS: Analyzing, applying, comparing similarities and differences, comprehending, describing, discussing, drawing, evaluating, interpreting, listening, map reading, problem solving, reading, reporting, role playing, understanding cause and effect, valuing, working in small groups.*

*MATERIALS: Writing materials, "The Ecosystem" drawing, "Role Cards" (attached). Optional: Overhead projector, overhead transparencies, dry erase markers.*

*VOCABULARY: Amphibian, aquatic, compatible, conflicting, decaying, decision making, ecosystem, environmentalist, freshwater, global, habitat, mammal, natural resources, nymph, predator, problem solving, reptile, terrestrial, wildlife, woodland.*

# IF YOU OWNED THE ECOSYSTEM

**OVERVIEW:** 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 an ocean, forest, or desert.

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, soil types, and climate.

The biological and physical components of an ecosystem interact naturally in give-and-take, interdependent ways. In a healthy ecosystem, the 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.) involves the use of natural resources. That means ecosystems are directly affected.

Sometimes, the ways we use natural resources and impact ecosystems are compatible or not destructive to one another. Other times, the ways we decide to use resources conflict, and what's good for one part of the ecosystem is not good for another.

In this activity, students work in small groups to decide whether or not to make changes to an ecosystem. The changes will be based on a specific wildlife, 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 not be compatible. 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:**

*PRE-ACTIVITY:*

1. Photocopy one ecosystem drawing for every two to three students and one class copy of both role description pages and role pictures. If possible, photocopy the pages back-to-back. Make sure to match the appropriate pages! You can also glue the two pages together. You may want to cover the cards with clear contact paper or laminate them so they can be used again. Option: Provide each group with an ecosystem drawing on an overhead transparency. They use dry erase markers to mark their changes. The transparency can also be used to make a presentation back to the class.

2. Cut the role cards apart.

*ACTIVITY:*

1. Ask:

**-What is an ecosystem?**

See Overview for more information. 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 space and how it is managed. The school building is an excellent example of compatible use if students need assistance. Others are a community center, park, gymnasium, or sports complex.

2. Divide students into small groups of two to three members. There needs to be at least eight groups, each of which represents a different viewpoint: farmers, students, environmentalists, ecosystem managers, and at least insects, reptiles, fishes, and birds. Additional groups can represent other wildlife species.

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 back of their group's card. They define or look up any vocabulary words that may be unfamiliar, and then answer the following 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 life better. They consider how long the changes will last, 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 changes to the ecosystem to the class, 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 Vocabulary section of this lesson.)

8. After all presentations have been made, the class works to reach a consensus on changes they will make to the ecosystem.

Ask each group to identify:

A. Who would be affected by their changes..

B. How the ecosystem would be affected by their changes.

C. Which changes are compatible; which are not compatible.

9. Summarize by asking:

**-What was the most interesting part of this activity? Least interesting?**

**-What was the hardest part? Easiest part?**

**-How can what you learned in this activity help you in the future?**

**ASSESSMENT:**

1. Evaluate students' participation in the group processes.

2. Have each group give reasons for the changes they made 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 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. 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 who wants 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.

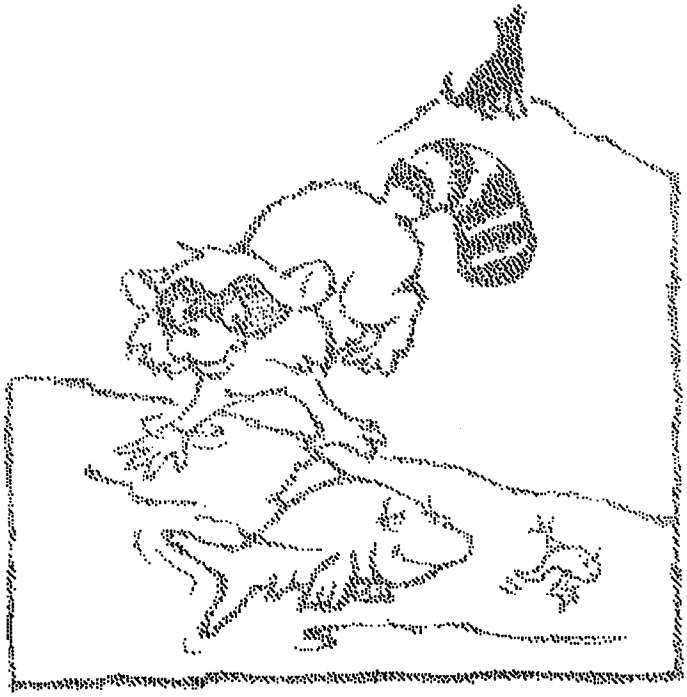
6. Explore and use different consensus-building techniques.

**RESOURCES:**

*Helping Wildlife: Working With Nature*, Delwin E. Benson, Wildlife Management Institute, 1977.

*North American Wildlife*, Susan J. Wernert, Editor, The Reader's Digest Association, Inc., 1982.

*Lynn Almer, Beth Boaz, and Pat Mangan contributed to development.*



**DRAGON FLY** (insect): Dragonflies are most often seen flying along the edges of lakes and streams. The larvae, commonly called nymphs, live almost entirely in freshwater. Some species burrow in sand or mud while others cling to vegetation. Nymphs eat microscopic (very tiny) animals, but as they grow they eat mosquitoes, other insect larvae, and small worms. Dragonflies are beneficial insects eating many other pest insects. Birds, frogs, spiders, and fish eat nymphs and adult dragonflies.

**FROG** (amphibian): In the early stages of growth, frogs are called tadpoles. Tadpoles have tails, live mostly in the water and have gills so they can breathe. Frogs do not have tails. Some frogs live in the water, some live on land, and some live in trees. Frogs eat lots of insects, including grasshoppers. Frogs in turn are eaten by birds, mammals, reptiles (especially snakes), and humans (frog legs).

**GRASSHOPPER** (insect): Grasshoppers are generally green or brown. They have long slender bodies with large powerful back legs for jumping. They eat the leaves, stems, or young shoots of plants, often feeding on grass, clover, and other plants. Females lay their eggs in the soil and sometimes in rotting wood. Grasshoppers are found in grasslands, fields, deserts, gardens, lawns, woods, and brushy areas. Frogs and skunks eat grasshoppers.

**TURTLE** (reptile): Some turtles live in the water and some live on land, but all lay their eggs on land. The eggs are usually buried in sand, mud, or decaying vegetation. Some turtles eat mostly plants while others eat only living or dead animals. Turtles have no teeth. The eggs and young turtles may be eaten by other animals.

**LIZARD** (reptile): Lizards are the most abundant of all reptiles. They are found in many habitats in the warmer parts of the world. Most, if not all, lizards can swim. Most lizards eat insects; some of the larger lizards eat vegetation. Lizards can be found in many places: in or under fallen logs, hiding under brush and piles of leaves, on rocky slopes, canyon walls, patches of sandy soil, and deserted buildings. Coyotes, foxes, bobcats, domestic cats and dogs, hawks, snakes, crows, and ravens eat lizards.

**RAINBOW TROUT** (fish): Trout are found in cold, clear lakes and streams, especially where the water is moving rapidly. They are often found in the shadow created by overhanging banks and tree limbs. Eggs are laid in the fall or spring and in a stream or on the stream materials (sand, gravel). They eat aquatic insects and terrestrial insects that land on the water. Otters, mink, herons, other trout, and humans eat rainbow trout.

**SUNFISH** (fish): This fish lives in warm, shallow, weedy ponds and warm, mud-bottomed or rocky streams. They may be in areas of heavy vegetation or under overhanging tree limbs. They eat aquatic insects and terrestrial insects that land on the water. Otters, mink, herons, turtles, water snakes, and other fish eat the sunfish.

**FOX SQUIRREL** (mammal): The fox squirrel uses trees to build a nest, to hide from enemies, and for food. It eats the fruit, buds, and the bark of twigs and often buries gathered food. They sometimes eat birds. Coyotes, foxes, bobcats, domestic cats and dogs, hawks, snakes, crows, and ravens eat squirrel.

**DEER** (mammal): Deer can be found in a variety of habitats throughout the world. They feed on grass, leaves, buds, and twigs of woody bushes. Deer have long been used by humans as a source of meat and hides. Coyotes, mountain lions, and domestic dogs eat deer.

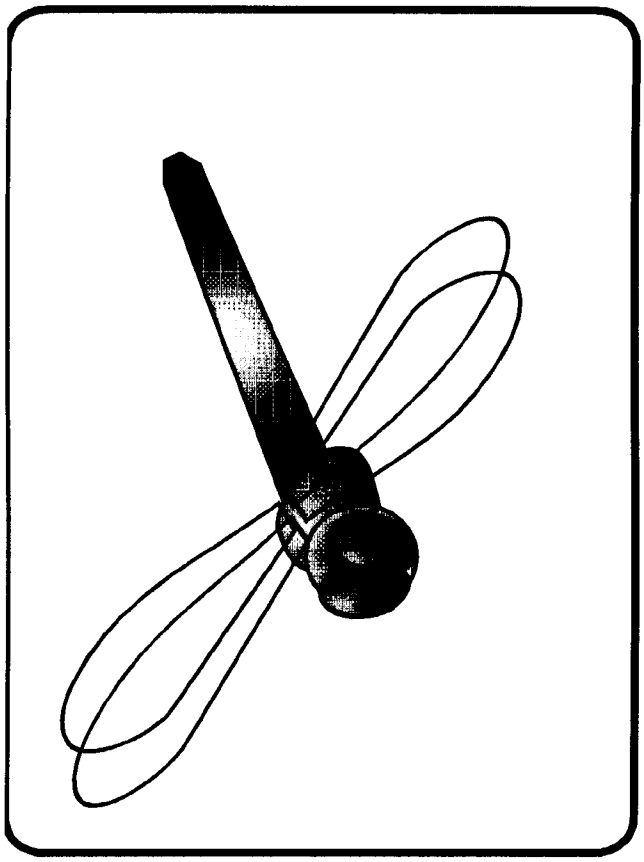
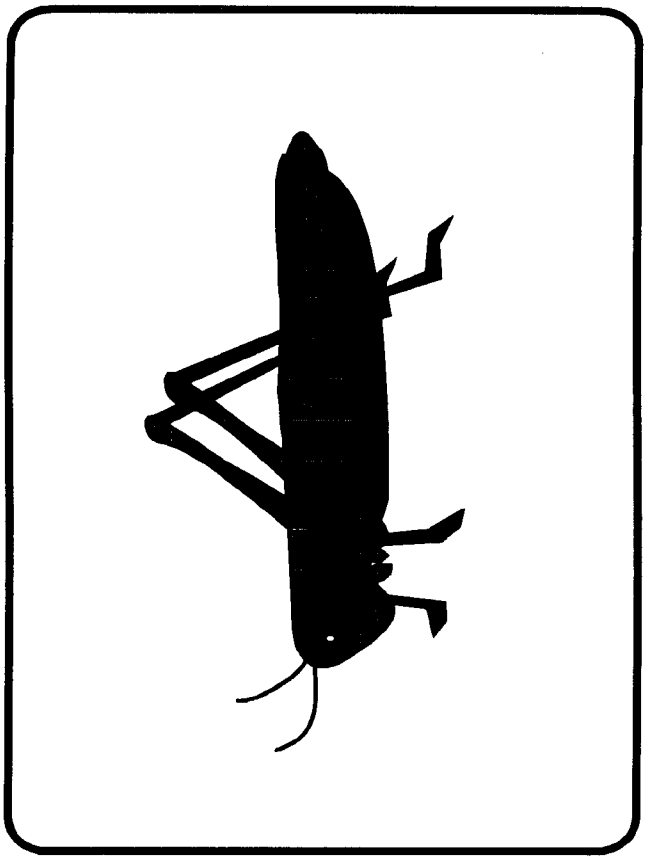
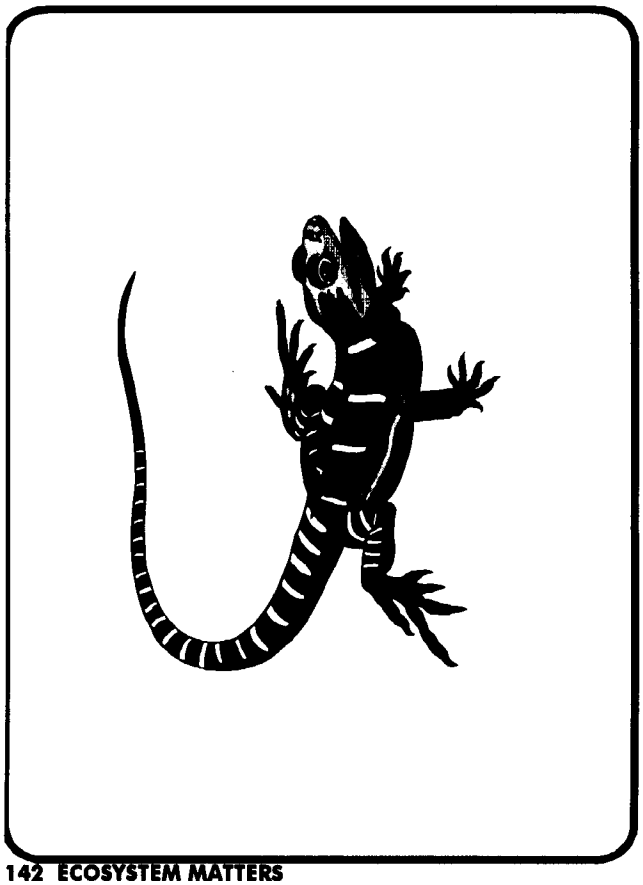
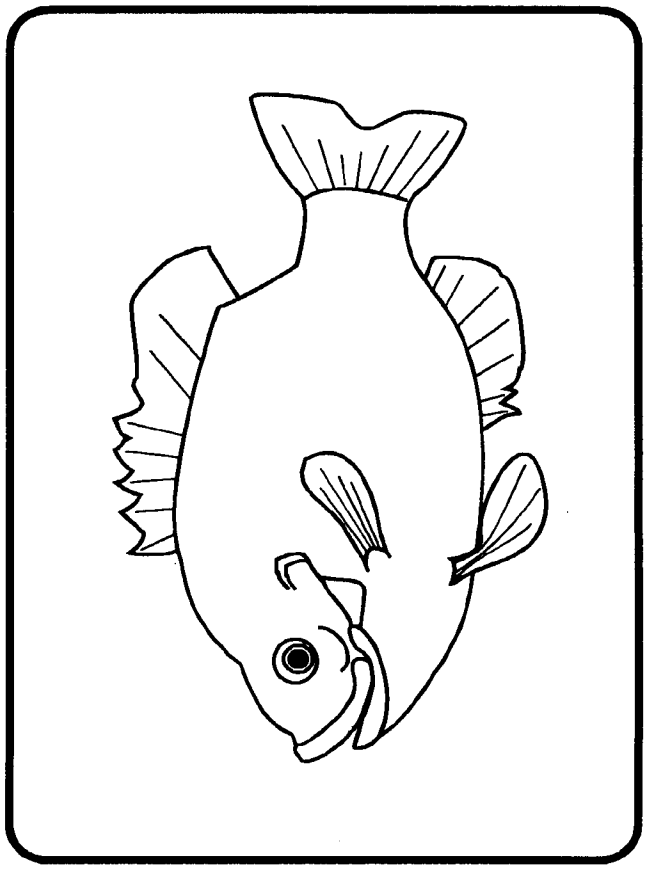
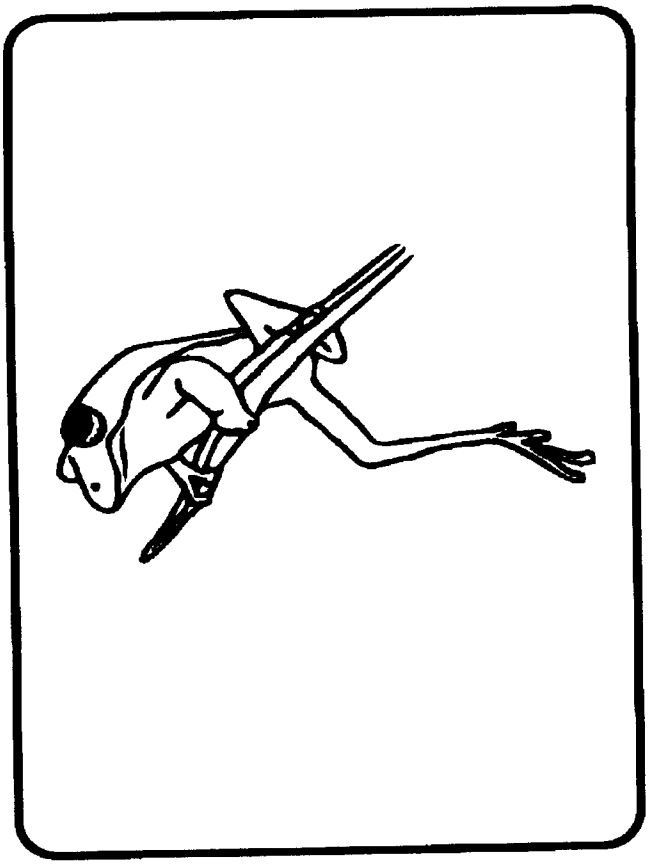
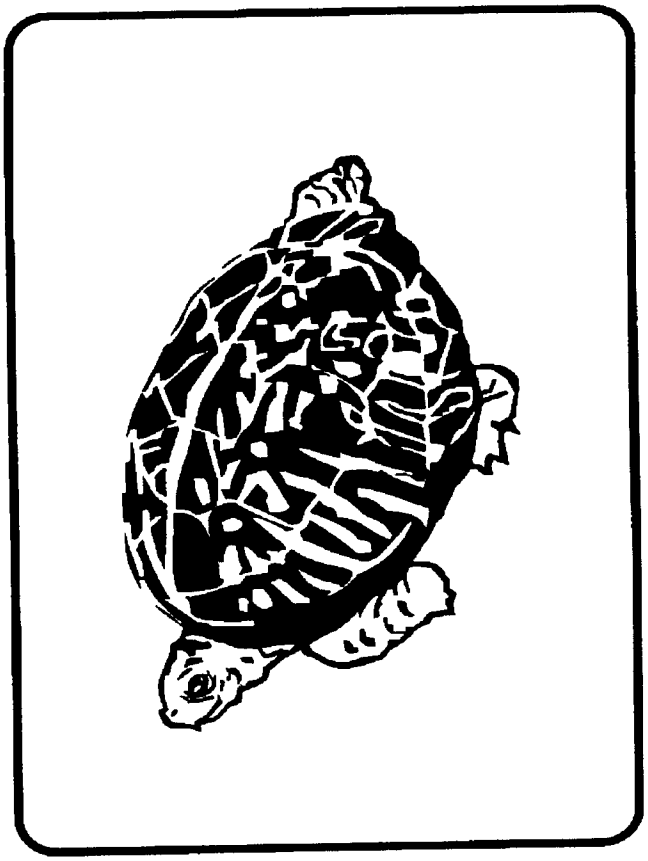
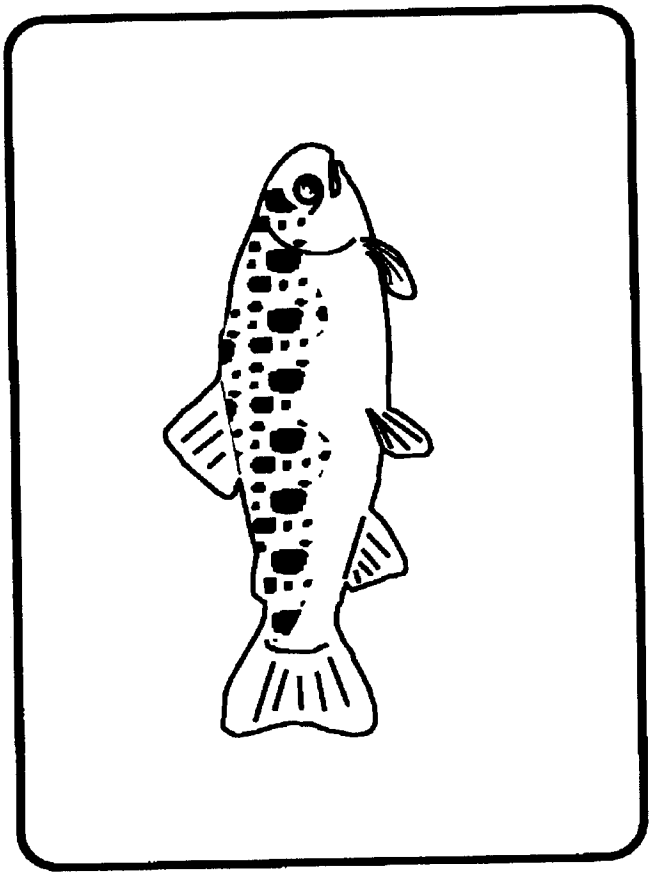
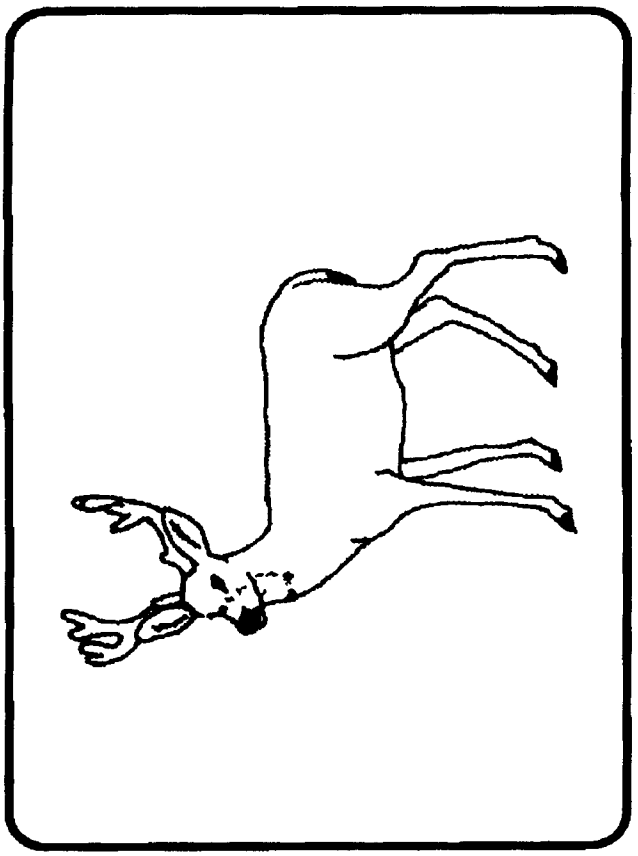
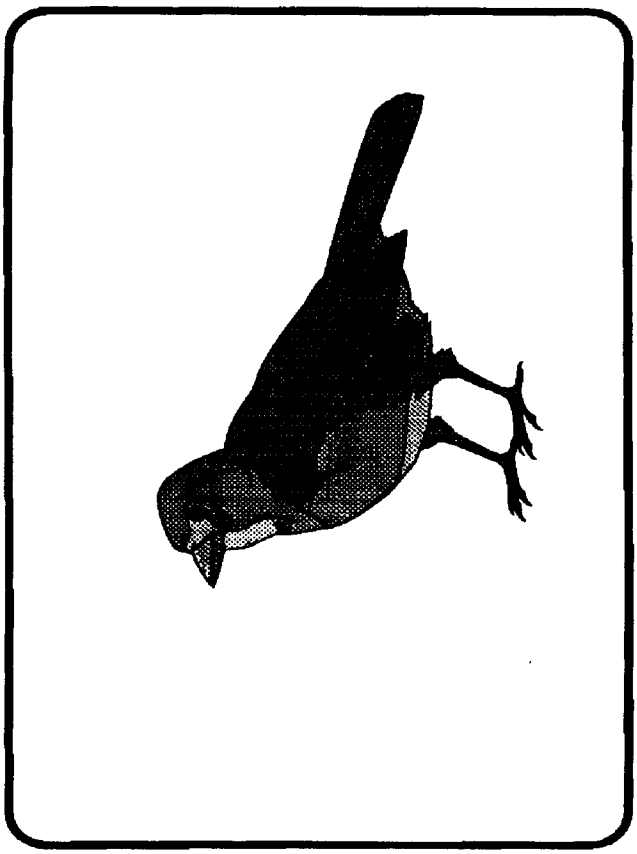
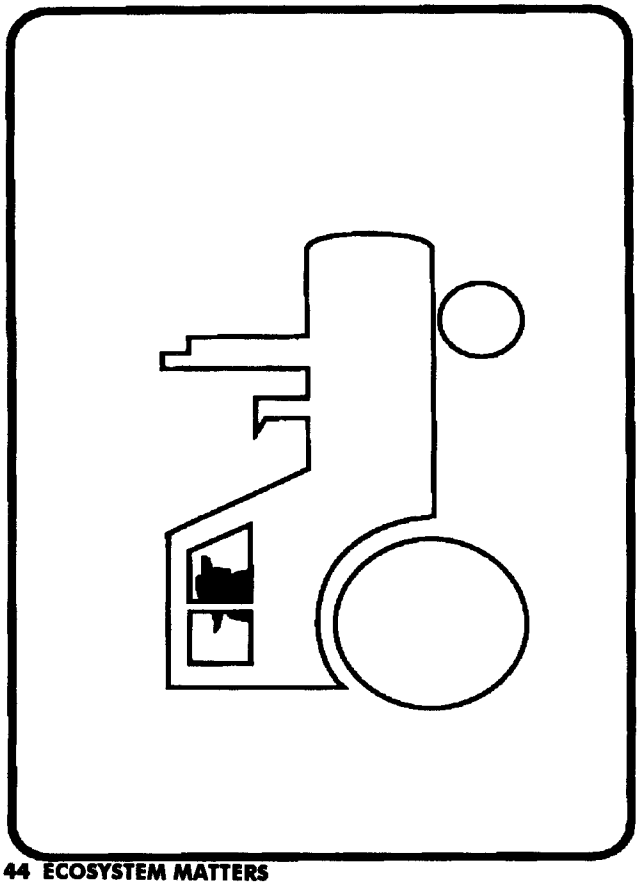
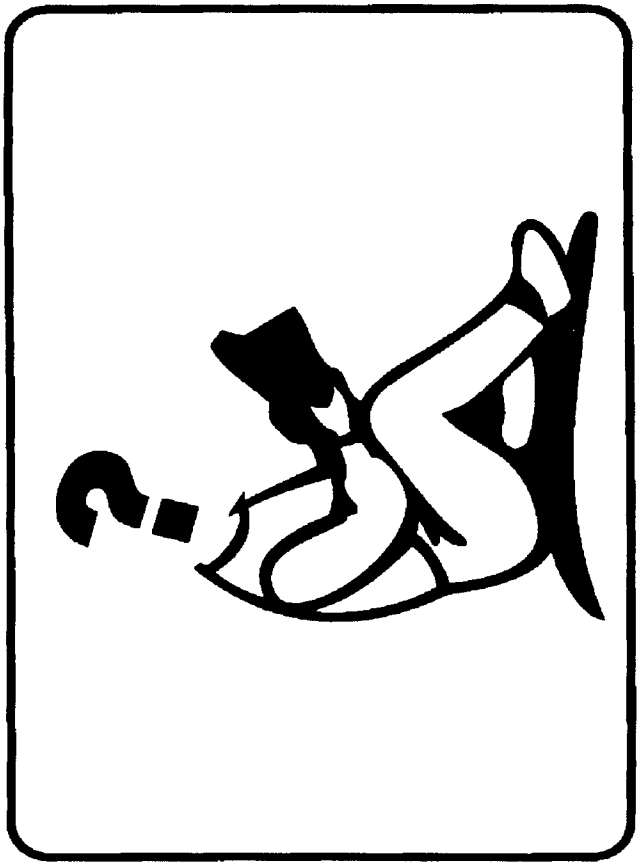
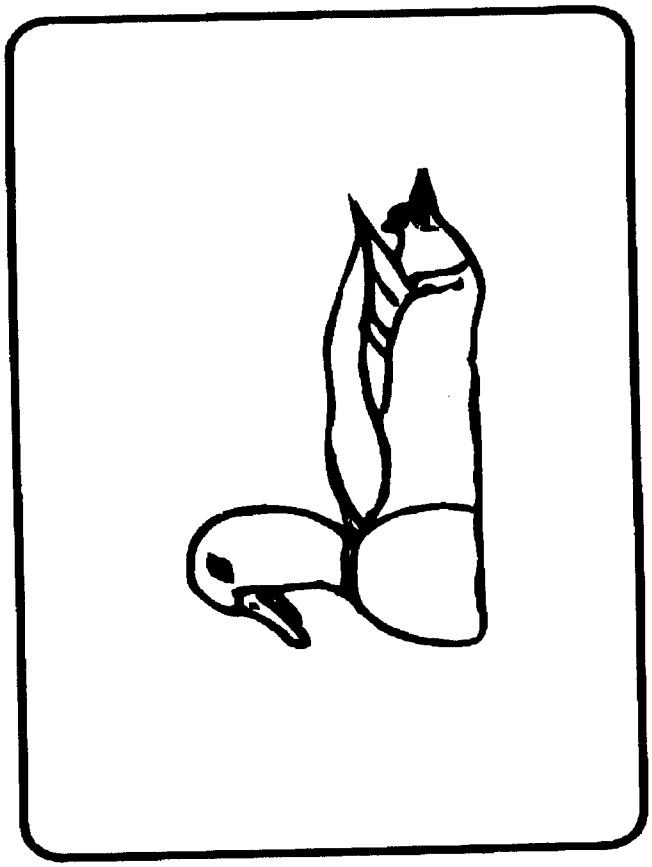
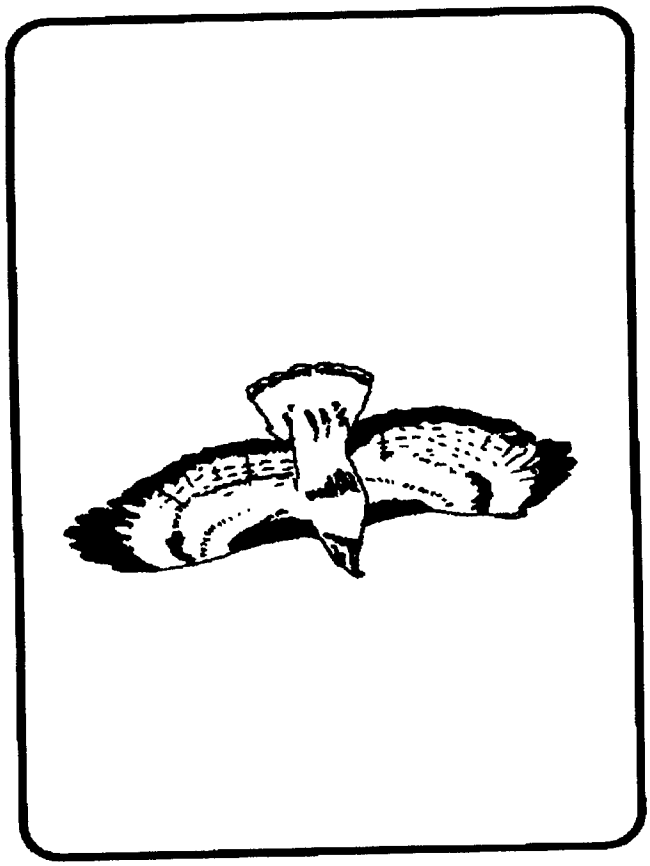
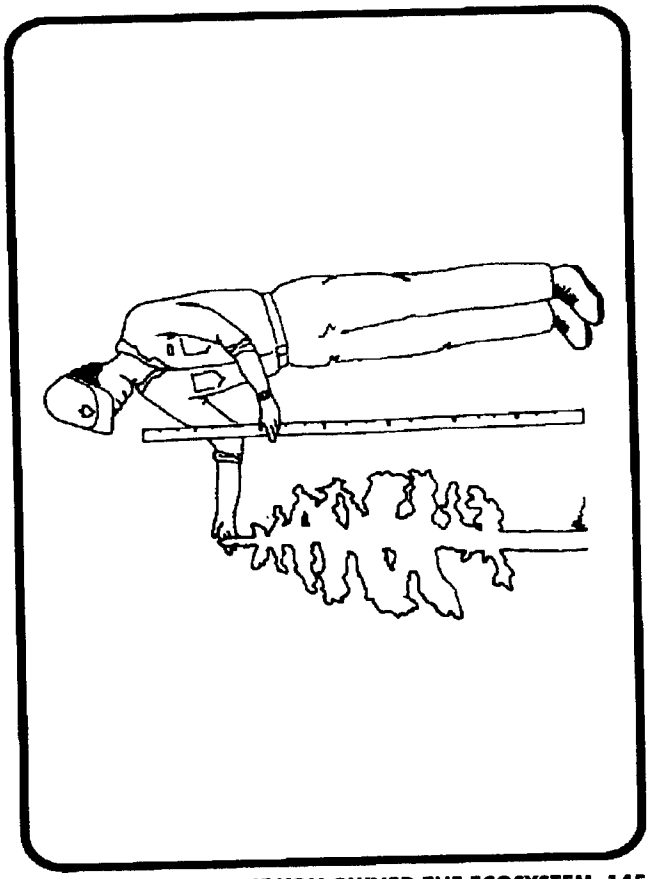
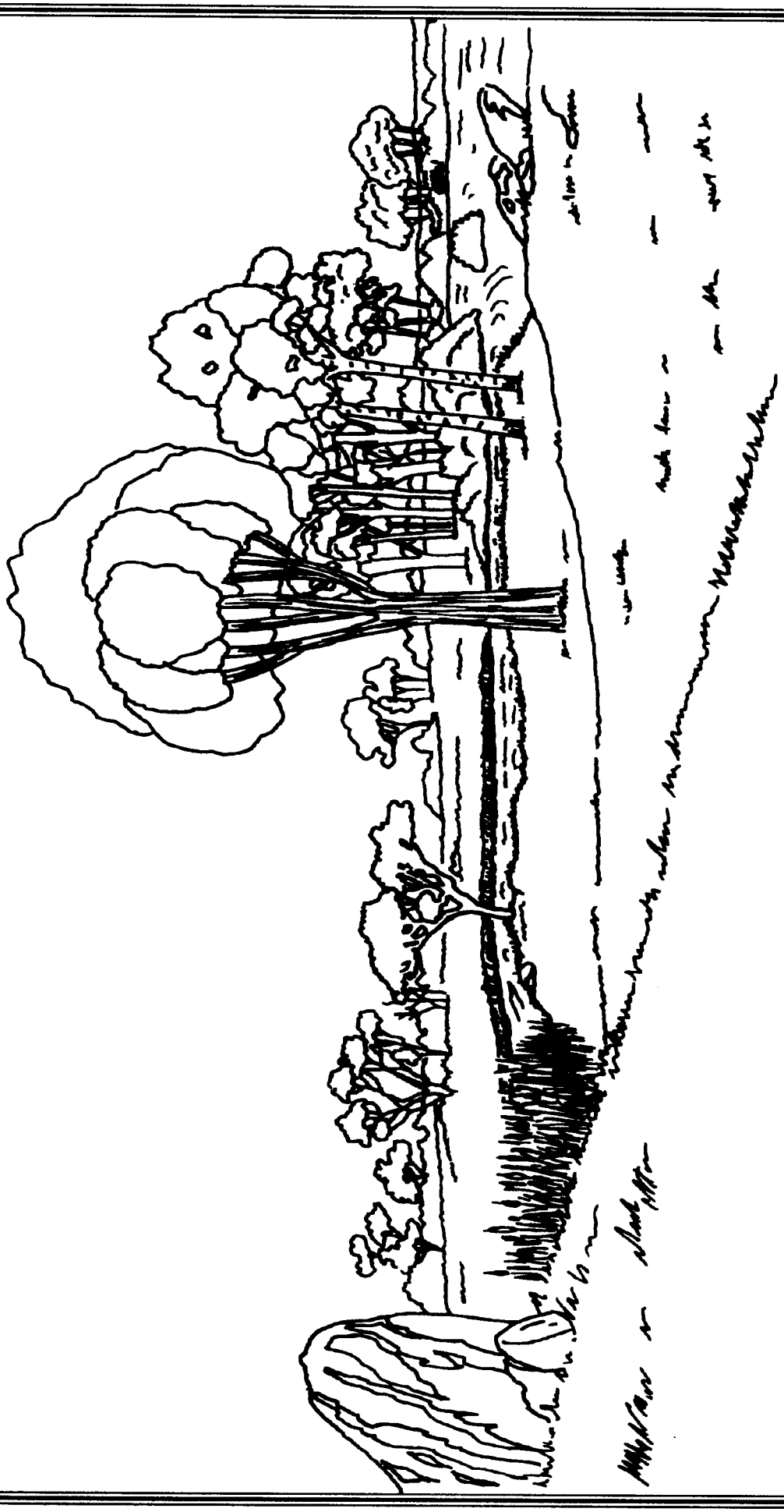
**MALLARD** (bird): Mallards live in marshes, shallow freshwater ponds and coastal waters. They get their food by dipping their bills and heads into the water looking for seeds, aquatic vegetation, and small fish. They also eat grains and vegetation. Their nest is hidden in vegetation near the water's edge. Coyotes, foxes, bobcats, domestic cats and dogs, hawks, snakes, crows, and ravens eat mallards and their eggs.

**ROBIN** (bird): The American robin lives in open forests, farmlands, parks, and suburbs. They generally build their nests on branches, in forks of trees, or on houses or barns where there are ledges. Mud, twigs, roots, grass, and paper are used to make the nest. They eat berries, worms, and insects. Coyotes, foxes, bobcats, domestic cats and dogs, hawks, snakes, crows, and ravens eat robins and their eggs.

**RED-TAILED HAWK** (bird): This hawk is usually found in open woodland areas. Nests are built in trees and sometimes in cliffs and human-made structures like tall buildings. The nest is usually large and made of sticks, lined with grass and green leaves. These hawks generally hunt for live animals during the day. They eat mice, rabbits, squirrels, beavers, prairie dogs, and snakes. Coyotes, foxes, bobcats, domestic cats and dogs, other hawks, snakes, crows, and ravens eat the red-tailed hawk.

**COMMODITY USER (FARMER)**: In our community, this agricultural producer is growing winter wheat on about 1,000 acres of land. No fertilizers or pesticides are being used. Every two-three years, the wheat crop is rotated with a soybean crop. This crop rotation practice helps maintain good soil quality. A machine called a combine is used to harvest the wheat. Soybean plants return nitrogen to the soil, which helps other plants grow.

**ENVIRONMENTALIST**: This person cares about the environment, everything from the air we breathe to the water we drink. Most believe we all can do something to help protect our environment, whether it is recycling or walking to school or work whenever possible. Most believe it is important to balance human needs with the needs of animals and vegetation. This person may be concerned with issues ranging from local government to the global (world) environment. Actions taken by this person vary from writing letters to Congress to 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 habitats or what you like to do, materials needed to build a home or shelter, where you will get the materials, and from what you need protection.

**ECOSYSTEM MANAGER**: This person is interested in balancing human needs with the needs of animals and vegetation. The Ecosystem Manager's career requires that most of his/her time is spent working with a specific ecosystem. For example, this person might be responsible for taking care of the natural resources (air, water, land, soil, plants, animals) at a wildlife refuge, national park or forest, etc.