



## Activity 2-2 The Spice of Life

### AT A GLANCE

Explore beliefs and values about why biodiversity is important and why it should be protected.

### OBJECTIVES

Explain personal beliefs and values about protecting biodiversity. List several reasons why people believe it is important to protect biodiversity.

### SUBJECTS

English language arts, science

### SKILLS

organizing (prioritizing), analyzing (discussing), presenting (articulating), citizenship (debating, evaluating a position, taking a position, defending a position)

### LINKS TO ILLINOIS BIODIVERSITY BASICS CONCEPTUAL FRAMEWORK

values and beliefs

### VOCABULARY

ecological processes, economics, extinct, pollination

### TIME

one class period

### MATERIALS

poster-sized paper; markers

### CORRELATION TO COMMON CORE STANDARDS AND NEXT GENERATION SCIENCE STANDARDS

English language arts: Writing Standards for Literacy in Science, Production and Distribution of Writing, 4  
science: MS-LS2-5

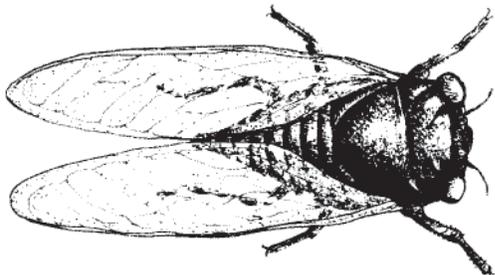
People's feelings about biodiversity issues, including the importance people place on wild species and spaces and whether they think biodiversity should be protected, do not depend on just their knowledge of these issues and the sciences that relate to them (ecology, biology, sociology, political science, economics and so on). People's feelings also depend on personal belief systems and values. This activity is designed to give your students a chance to examine their values and to sharpen their own thinking by sharing their opinions and feelings with their peers. The students first discuss their points of view in small groups and then talk about biodiversity conservation as a whole group. A series of questions is provided to get the students thinking about a range of biodiversity-related concerns, as well as additional guiding questions to help direct the discussions. You may want to add your own questions to these lists and think about other ways to engage your group.

### BEFORE YOU BEGIN

Write each of the "Why Care About Biodiversity?" statements (page 70) on six separate pieces of poster-sized paper. You can adapt, shorten, add or combine as needed. Write the word "Other" on a seventh piece of poster-sized paper. Make sure that the students can read the statements from all areas of the room.

### WHAT TO DO

- 1. Discuss the meaning of biodiversity with your students.**  
Biodiversity is the variety of life on earth. It includes the sheer variety of species on earth, the earth's many ecosystems and genetic diversity, which refers to the variety of genes within a species.
- 2. Ask your students whether protecting biodiversity is important and why they feel the way they do.**  
Explain that many people feel that it's important to protect biodiversity and that they have diverse reasons for thinking so. Ask your students how they feel. What reasons can they give to protect biodiversity? These may be reasons they have read, reasons they have heard others express or their own, personal views. Write their ideas on a piece of poster-sized paper or a chalkboard. (It may also help to give them a few minutes to write their ideas before talking.)





## Activity 2-2

### The Spice of Life (continued)

#### 3. Put up the “Why Care About Biodiversity?” statements and read each one out loud.

Using a different location for each one, tape the seven statements you copied earlier around the room. Place each one high enough for everyone to see. Explain that the statements represent many of the key reasons people have given for why it is important to protect biodiversity. As a group, go over each of the statements. Compare the ideas represented in the statements with the lists that the students generated.

#### 4. Students choose a statement to stand near.

Ask your students to carefully consider all of the statements. Have each student pick one of the statements and then go and stand near it. Explain that the statement each student chooses should be one that he/she feels strongly about—either because he/she thinks it is an important reason to protect biodiversity, or because he/she disagrees with it. If they don’t see a sign that reflects their viewpoint, they can stand at the sign marked “Other.” Explain that there is no correct answer and that it’s OK to stand either alone or with a group.

#### 5. Discuss the choices that students made.

After everyone has made a selection, have the students at each statement discuss among themselves why they chose that particular statement. Remind them that each person will have personal reasons for making the choice he or she made and that they should explore some of those reasons. Give the students about five minutes to discuss their thoughts before asking one person from each group to summarize the discussion. You may want to record each group’s points on the piece of poster-sized paper.

#### 6. Open the discussion to the entire class.

After all the groups have given their summaries, use the “Valuing Biodiversity” questions (pages 69-70) to spur a group discussion of some of the arguments that biologists, conservationists, ecologists, economists and others have put forth for protecting biodiversity. Read one of the numbered questions and have the students react to it. You can use the guiding questions to challenge the students’ thinking and to help direct their discussion as needed. You do not

need to ask the class all the guiding questions, and the students do not need to discuss each of the numbered questions in turn. The discussion may naturally flow from one topic to another. However, during the course of the discussion, make sure that the students confront the issues highlighted by each numbered question and that they explain why they feel the way they do. Have them give examples whenever they can and be sure to challenge their ideas—especially when the students reach answers quickly or all of them seem to be agreeing with each other. Allow enough time for the students to fully discuss their points of view. Also give them an opportunity to re-search issues that come up.

## WRAPPING IT UP

### Assessment

1. Have the students write a personal statement about the importance of protecting biodiversity. Explain that there is no right or wrong answer to this assignment—and that they don’t even have to think protecting biodiversity is important at all. However, they should carefully consider everything they’ve learned about biodiversity as well as all of the points made during their discussion in order to make a well-reasoned and well-supported statement. Encourage the students to consider medical, economic and ecological implications of biodiversity protection, as well as recreational considerations, artistic inspiration and any obligations of present generations to future ones. Tell them to use examples to illustrate their points.
2. Have the students use the following statement as a journal starter: “Some ideas or thoughts I had before the activity are different now. They include . . .”
3. Have the students write a dialogue between two people who have different viewpoints on protecting biodiversity.



## Activity 2-2 The Spice of Life (continued)

### Portfolio

The student's biodiversity protection statement (created in the assessment) can be included in the portfolio.

### Extension

Have each student or small group of students choose one of the "Why Care About Biodiversity?" statements to use as a theme for a collage. Have the students make a display of the collages.

### Resources

- Kellert, Stephen. 1997. *The value of life: biological diversity and human society*. Island Press, Washington, D. C. 263 pp.
- Lean, Geoffrey and Don Hinrichsen. 1996. *World Wildlife Fund atlas of the environment*. Prentice Hall Press, New York. 192 pp.
- Takacs, David. 1996. *The idea of biodiversity: philosophies of paradise*. Johns Hopkins University Press, Baltimore, Maryland. 393 pp.
- Wilson, Edward O. 1992. *The diversity of life*. Belknap Press, Cambridge, Massachusetts. 424 pp.

*"The twentieth century has been extra-ordinarily successful for the human species—perhaps too successful. As our population has grown from 1 billion to 6 billion and the economy has exploded to more than 20 times its size in 1900, we have overwhelmed the natural systems from which we emerged and created the dangerous illusion that we no longer depend on a healthy environment. As a result, humanity now faces a challenge that rivals any in history; restoring balance with nature while expanding economic opportunities for the billions of people whose basic needs—for food and clean water, for example—are still not being met."*

*—Lester Brown, President, World Watch Institute*



## Educator Page

# Valuing Biodiversity

### 1. It is important to conserve the diversity of life for medical and economic reasons.

#### Guiding Questions

- Do people actually need wild plants and animals for either medicinal or economic reasons?
- Can't people synthesize in a laboratory all the medicines they need?
- If genetic material is what's important, wouldn't it be sufficient if people froze wild plant and animal tissue samples, didn't worry about the actual organisms and then used the samples when needed?
- If a plant or animal species is not known to have any medical or economic benefit to people, is it then OK to let the species die out?

### 2. It's important to protect the diversity of life because biodiversity helps maintain important ecological processes that help support life on earth.

#### Guiding Questions

- What sorts of ecological processes does biodiversity help maintain?
- People have developed an amazing array of technologies to deal with particular problems, everything from water treatment plants that purify sewage water to scrubbers that can take pollutants from factory smokestacks out of the air. Isn't it fair to assume that people will be able to develop technologies that can perform essential ecological processes in place of biodiversity?
- Are there any down sides to technological solutions?

### 3. Our lives would not be as rich if we lost species such as North American river otters, fireflies, red-tailed hawks, treefrogs, yellow mud turtles and bobcats.

#### Guiding Questions

- Is there anything about these species that makes them special?

- Would you feel the same way if the species we lost were venomous snakes, biting insects and other species that may be harmful to people?
- Are there species that you think are more important to protect than others? Which ones? Why?

### 4. All species have a right to exist.

#### Guiding Questions

- Do people have the right to use any of the world's resources as they see fit? Why or why not?
- Does the right to exist apply to ugly, obscure species that are of no use to people?
- Some species have been around for millions of years—and have survived incredible periods of destruction and change on the planet. Should that influence whether we decide to protect a species?
- Do people have any responsibilities to other living things?
- Do people have the right to drive species to extinction?

### 5. No generation has the right to destroy the environment and resources that future generations will depend on.

#### Guiding Questions

- Why should people today do without things they want, when we don't even know what future generations will need or want?
- How do you feel about the state of the world? Do you feel that past generations have left you with the environment and resources you need to live?
- There used to be millions of passenger pigeons in the United States. Today these birds are extinct. Has your life been affected in any way by the lack of passenger pigeons in the world? Will future generations really care about species that disappeared before they were born?



## Educator Page

# Valuing Biodiversity (continued)

### 6. Diversity of life is important for inspiring inventors and artists and for spurring curiosity and imagination.

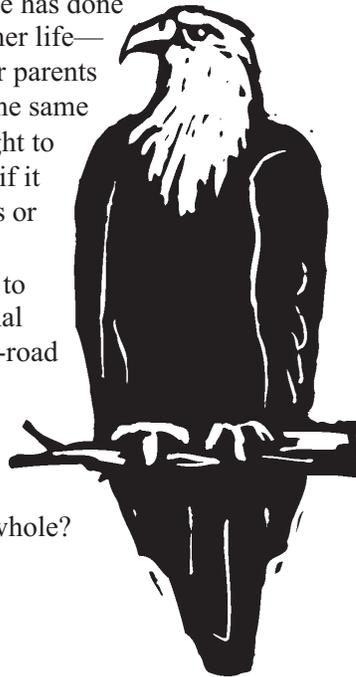
#### Guiding Questions

- What human pursuits look to nature for inspiration?
- What inventions, stories or works of art can you think of that were inspired by living things? Could these have been produced without the inspiration of nature?
- Isn't it reasonable to assume that all the photographs and films that have been made of wild plants and animals can provide inspiration to future writers and artists?

### 7. Diversity of life is important for recreational activities.

#### Guiding Questions

- What kinds of recreational activities rely on wild spaces or species?
- Can well-tended golf courses and manicured parks provide the outdoor green space people need?
- Is it right to save an area so people can hike and fish if it means that other people lose their jobs?
- Does the fact that someone has done a particular job all his or her life—and that perhaps his or her parents or grandparents also did the same job—give the person a right to keep doing that job, even if it means wiping out a species or harming the environment?
- Should people be allowed to take part in any recreational activity (such as some off-road vehicle races) even if it harms the environment? How do we balance the rights of individuals and the rights of society as a whole?



### Why Care about Biodiversity?

It is important to conserve the diversity of life for medical and economic reasons. Plants and animals could provide us with additional foods, medicines and other products that will save lives and benefit society.

It is important to protect the diversity of life because biodiversity helps maintain important ecological processes such as oxygen production, pollination and flood control that, in turn, help support all life on earth.

Our lives would not be as rich if we lost species such as North American river otters, fireflies, red-tailed hawks, treefrogs, yellow mud turtles and bobcats and the habitats where they live. The rich diversity of life also allows for important recreational activities such as hiking, fishing, camping and birding.

It is important to protect the diversity of life because no generation has the right to destroy the environment and resources on which future generations depend. It is our responsibility to take care of the diversity of life.

It is important to protect the diversity of life because biodiversity provides inspiration and provokes curiosity and imagination. Diversity of life often inspires the creation of art, music and poetry, as well as many technological advances, such as flight.

It is important to conserve the diversity of life because all species have a right to exist.



## Activity 2-3 Secret Services

### AT A GLANCE

Perform simulations that demonstrate some of the important ecosystem services that biodiversity provides.

### OBJECTIVES

Perform a series of simulations that demonstrate ecosystem services. Identify and discuss the services illustrated in the simulations.

### SUBJECTS

science

### SKILLS

organizing (manipulating materials), interpreting (identifying cause and effect, inferring, making models), presenting (demonstrating, explaining), citizenship (working in a group)

### LINKS TO ILLINOIS BIODIVERSITY BASICS

#### CONCEPTUAL FRAMEWORK

genetic/species/ecological diversity

### VOCABULARY

atmosphere, evaporation, heavy metals, impurity, mineral, pesticides, photosynthesis, sediment, toxic substance, transpiration, wetland

### TIME

two class periods

### MATERIALS

**station #1:** clear funnel or clear plastic soda bottle with the bottom cut off and the label removed; clear plastic cup, tall jar or flask; cotton balls or toilet paper; activated charcoal; sand; potting soil; water

**station #2:** fresh celery stalks with leaves; a jar or beaker; red or blue food coloring; water; paring knife; magnifying glass

**station #3:** several sponges; a doormat or a piece of artificial turf; two flat sheets of wood or plastic similar in size to the doormat; two shallow aluminum trays; soil; two containers of water; props to tilt the models

**station #4:** two large, clear-plastic cups; a six-inch square piece of waxed paper; geranium plant leaf with stem; cobalt chloride paper (available from science supply catalogs); petroleum jelly; paper clip; tape; water

**station #5:** large bowl; water; measuring cup; tablespoon; baking soda; drinking glass; lamp; water plant such as *Elodea* or *Anacharis* (available from stores that sell live fishes) copy of “The Secret’s Out!” for each student

### CORRELATION TO COMMON CORE STANDARDS AND NEXT GENERATION SCIENCE STANDARDS

science: MS-LS2-5

Ecosystems and the variety of species within them provide many important services that help make life possible or at least more livable. These services are happening all the time—they are so common that we often don’t notice them or think about how important they are. This activity is a series of five simulations that illustrate a variety of these services. (More advanced students can try to develop their own simulations after learning more about ecosystem services.)

### BEFORE YOU BEGIN

There are a number of ways you can use this activity with your students. We suggest that students be grouped into five secret service teams. Assign each team the task of setting up and testing one of the simulations on Day 1. On Day 2, have each team present its secret service simulation to the class. After watching each presentation, students will use the handout “The Secret’s Out!” to identify the ecosystem service being demonstrated in the simulations.

You will need to arrange stations for each team’s simulation. Put a copy of the directions and the necessary materials at each station. Label each of the five stations. Also make one copy of “The Secret’s Out!” for each student. (Please note that Station #2 is shorter than the others, yet it still requires two days. It can be combined with Station #3. Stations #2 and #3 require some preparation ahead of time. Stations #1, #4 and #5 require activated charcoal, cobalt chloride paper and *Elodea*, respectively. Activated charcoal and *Elodea* can be found in most pet stores that sell fishes. Cobalt chloride paper can be ordered through science supply catalogues.)

### WHAT TO DO

#### 1. Day 1: Setting the stage.

Divide your class into five teams and assign one team to each station. Explain that the students will be working together to complete a simulation. Each team will be responsible for a different simulation. Students should not discuss their simulation with other members of the class. The simulations illustrate various ways that ecosystems provide important services for us and the environment. Identify the five stations around the room.