



BIO-DILEMMAS

Materials:

- ☆ set of Dilemma Cards
- ☆ reference materials such as biology, zoology, botany and ecology texts or field guides

Rationale

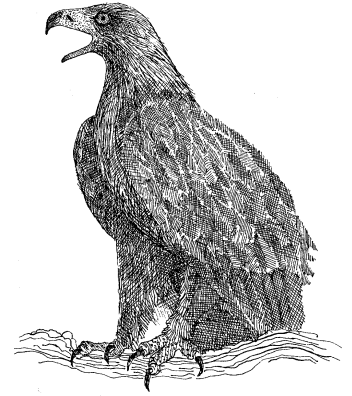
The overall aim of the biological diversity curriculum is to give students the information that they need to make sound decisions about environmental issues. This lesson gives them practice in doing that .

Objectives

1. Students will evaluate actions they might take that could have an impact on biological diversity.
2. Students will practice working together toward a common solution.

Procedure

1. Read a dilemma to the class. Have students discuss what solution they would choose and why (they may choose one of the solutions offered or they may come up with other ideas to solve the problem). However, the class must reach consensus on one solution.
2. Make a graph to represent their choices. Have students act out what the majority of the class chose first.
3. Now tell students to pretend that it is twenty years later. Have them discuss each solution they considered in light of long term benefits or problems it could have caused for biological diversity.



Correlation to National Science Standards

Life Science, Science in Personal & Social Perspectives

Correlation to Arkansas Frameworks

Science: 5-8: LS 2.12, LS 3.2, LS 3.3, 9-12: LS 1.6, LS 2.11, LS 2.18

DILEMMA ONE

Your teacher just received a grant of \$1,000 that is to be spent at your school.

Do you...

- A. Buy new playground equipment
- B. Make a garden for butterflies
- C. Plant trees on the grounds
- D. Buy books and art supplies for your classroom

DILEMMA TWO

- A. You always get birthday money from your grandparents. This year they told you that
- B. You can have \$10 if you use it to buy materials and help them build bluebird houses with them
- C. They will give you \$5 and you can buy a new toy right away

DILEMMA THREE

A. Your family is going on vacation and you get to choose the destination. Will you....

Go to an amusement park such as Disney World

- A. Go on a canoe trip and take part in a river clean-up
- B. Stay at home and donate the money you would have used to an environmental cause

DILEMMA FOUR

This fall your family plans to landscape your large back yard. Each family member has come up with a different suggestion. Which would you choose?

- A. Plant a wildflower garden
- B. Have a nursery come in and plant what most of the neighbors have
- C. Let the space go wild with native plants

DILEMMA FIVE

The old lawn mower just broke down for the last time. Since it is your job to mow the rather small yard, your parents are letting you choose the new mower. Will you pick.....

- A. The latest model riding mower
- B. A manual push mower
- C. A small electric mower
- D. A large gasoline mower that bags the grass clippings

DILEMMA SIX

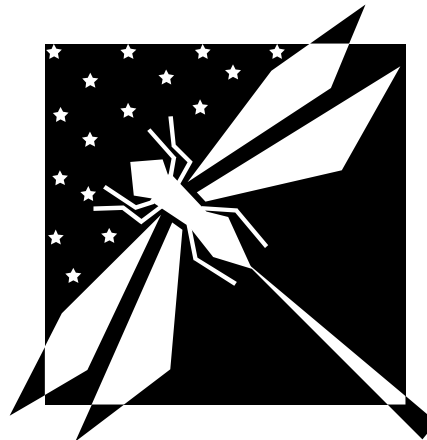
You have been on a trip to visit your aunt in West Texas, and you brought home a horned lizard. You are tired of catching bugs for it to eat. What can you do?

- A. Turn it loose in the city park near your house
- B. Take it back to your aunt's the next time you visit
- C. Give it to your little brother. He loves to catch bugs

DILEMMA SEVEN

The mosquitoes are so bad you can't play outside without being bitten all over. This is no fun. What can you do about it?

- A. Call the city to spray pesticides around your neighborhood
- B. Put up purple martin boxes hoping the martins will eat the mosquitoes
- C. Glob on lots of bug repellent and live with some bites
- D. Try to attract dragon flies to your yard to eat the mosquitoes

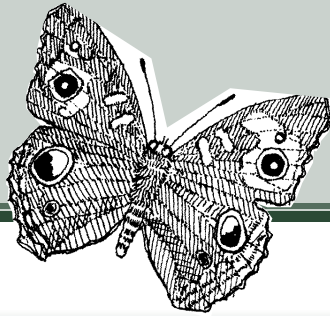




BIO-DELIIMMAS

Materials:

- ★ set of dilemma cards



Rationale

The overall aim of the biological diversity curriculum is to lead students to make sound decisions about environmental issues. This lesson gives them practice in doing that.

Objectives

1. Students will be able to examine their own values and beliefs related to biological diversity and environmental problems that appear in the six natural divisions of Arkansas.
2. Students will evaluate actions they might take that could have an impact on the biotic and abiotic elements of the natural divisions.
3. Students will practice working together toward a common solution.

Procedure

1. Divide the class into small groups and give each group a dilemma card. Groups should study the situation and possible solutions described on the card, then decide what to do about the dilemma. They should be prepared to offer reasons for their decisions. Time allotted for discussion will vary with the group. Probably five to ten minutes on a dilemma should be sufficient. Students may not all agree, but each group must reach consensus.
2. Have each group share their dilemma and solution with the rest of the class. Allow students to discuss points of agreement and disagreement.

VARIATIONS:

- The teacher may choose a dilemma and read it to the class. The class will then discuss the dilemma and reach a decision.
- The teacher may choose a dilemma and read it to the class. The class will brainstorm reasons for choosing different solutions. Based on the brainstorming activity, each student will write a paragraph stating the solution he/she would choose and why.
- Divide the class into small groups. Give each group a stack of dilemma cards placed face down. One student should draw a card and decide on a solution and reasons for that solution. The student then must present his/her decision to

the group. Group members may comment, question and/or state what they would do in the situation. The student with the dilemma card may respond to comments and/or clarify his/her position. When the discussion is finished, the student places the card at the bottom of the stack. This process continues until each student has participated.

3. For assessment, a student will choose a dilemma and present positive and negative effects of all options. They should indicate if any additional information is needed to make an informed decision. They will make a decision and defend it either orally or in writing.

Extensions

Students may choose problems specific to their own region of the state and create their own dilemma cards. Ideally these cards will deal with specific biodiversity-related problems. Each student should be responsible for developing one card that includes a dilemma and at least four solutions.

Correlation to National Science Standards

Life Science, Science in Personal & Social Perspectives

Correlation to Arkansas Frameworks

Science: 5-8: LS 2.12, LS 3.2, LS 3.3, 9-12: LS 1.6, LS 2.11, LS 2.18

DILEMMA ONE

Your family has lived in the Ouachita Mountains of Arkansas for four generations. During this time, plantations of fast-growing loblolly pine have replaced most old-growth forests. An active nesting cavity for the endangered red-cockaded woodpecker has been sighted on the edge of a forest owned by your family. A contractor has approached your family and offered to buy all of your pine timber above 14 inches DBH (diameter, breast height). The family could really use the money. Should you:

- sell to the contractor
- contact the U. S. Forest Service or the U. S. Fish and Wildlife Service and ask them to help you preserve the woodpecker habitat
- call a timber company and ask them to buy your land in the hope that they will help preserve the habitat
- other

DILEMMA TWO

You are president of the local school board. The board has decided to build a new football field. The ecology class points out that an undisturbed prairie lies in the middle of the designated construction site. Class members have heard prairie mole crickets on the site and they recently saw an ornate box turtle. Should you recommend that the school:

- go ahead and build the football field as planned
- select a different, but more costly, site on the same property
- relocate the crickets and turtles
- sell the land, but don't inform the new owner about the prairie and its inhabitants
- other

DILEMMA THREE

You are a private landowner who happens to own 20 of the 540 acres just below Mount Magazine where the entire population of the Magazine Mountain shagreen snail is located. You realize the uniqueness of this land and this species, and have always tried to preserve it. In recent years, crop prices have dropped drastically but you have managed to support your family by farming. Predictions for the future now look grim and you realize that you may need to farm that twenty acres if prices keep plummeting. In the meantime, a private conservation group has offered to buy your land but they cannot pay full market value. Do you:

- farm the land in hopes of supporting your family
- sell the land to the private group at a reduced price
- continue to preserve the area on your own and hope for better times
- other

DILEMMA FOUR

Ecologists want you, as the manager of a large lumber company, to set back a sizable tract of prime forest land along the Arkansas River as a refuge for the Bald Eagle. You and the ecologists realize that this bird has been removed from the Federal Endangered Species List, and that its status in Arkansas is threatened but improving. No one has presented evidence that the birds are nesting in this area and the loss of this land would mean the loss of several thousand dollars a year to your company. What should you do?

- continue to work the indicated area
- set up the refuge
- agree only if at least one other threatened species can be located nearby
- other



DILEMMA FIVE

As a professor of ecology at a large university, you have for several years been taking your classes to various remote spots around the state that possess rare beauty and ecological significance. This practice is beginning to meet with resistance from several environmentalists who feel that these areas should be entered as little as possible, and only by trained personnel who realize how fragile many ecosystems are. You agree in part with this philosophy, but wonder how your students will develop their own environmental ethic if they do not have this exposure. What should you do?

- continue to take your classes into the areas
- take only a few select students into the areas
- stop taking students into the areas
- other

DILEMMA SIX

You live and farm next to four thousand acres of wetland owned by a group of private landowners in a hunting club. Periodically the lake overflows flooding part of your cropland. For years the president of this club has promised to make restitution for the money you have lost (and continue to lose each year), but these promises are never kept. Recently the Corps of Engineers revealed plans to dam the river feeding the wetland and to build a recreation area. This dam will completely change the ecological profile of the wetlands and alleviate flooding in your fields, but its construction may endanger a population of American Alligator. What should you do?

- support the Corps plan
- help club members fight the Corps plans
- do nothing and accept whatever is decided by others
- other

DILEMMA SEVEN

You are the mayor of a small town, and the majority of your constituents are rice farmers who live in outlying areas. A large corporation is considering building a processing plant in your town, and the town would benefit greatly from new jobs and added revenue. In reviewing the plans, you discover that the processing plant requires enormous quantities of water. The farmers in your area have been aware of water problems and have voiced their concerns to you. You hire a consultant who tells you that the water consumed by the processing plant would seriously lower the water table within five years. The water table can feasibly support farming or the processing plant, but not both. Local environmentalists have also mentioned that the Fat Pocketbook Mussel, found only in the drainage of the St. Francis River, will be affected. You must make a decision on whether to accept the new business or not. Do you:

- Agree to accept the plant. Why?
- Refuse the plant. Why?
- other

DILEMMA EIGHT

Earth has become so polluted it will no longer support life. All the trees, flowers and animals are gone. The people of earth are traveling in huge space ships to a far-off unpolluted planet to make a new home. Your group is the crew in charge of the last ship to leave earth. Among those on your passenger list are some farmers who refused to follow good soil conservation practices and who used pesticides and herbicides carelessly; some factory owners who dumped toxic wastes into rivers; some land managers who mis-managed their forests; some auto mechanics dumped used motor oil in ditches behind their shops. You are afraid these people will treat the new planet as they treated earth, but if you leave them on earth they will die. What will you do?

DILEMMA NINE

This is your tenth year as an Arkansas state senator. During this time you supported many important decisions in favor of caring for the environment. Other members of the senate follow your lead on environmental issues. As a senator you often have pressure put on you by special interest groups. An urgent problem at this time involves transportation of hazardous materials along two major highways in northwest Arkansas. There has already been one toxic spill that affected nearby streams. Scientists fear groundwater contamination from toxic chemicals entering these streams could harm the cave crayfish and/or the Ozark cavefish. A senate bill has been introduced to allow doubling of the amounts now transported with no regulation of travel route, truck markings or transportation containers. Supporting lobbyists for this bill include the truckers and a number of manufacturing companies that transport their wastes and raw materials. These lobbyists have enough influence in your voting district to impact your re-election. Many of your fellow senators favor the bill because of the increased tax revenue it will generate. They argue that monetary benefits for such programs as day-care, pre-school programs, aid to the elderly and money for state parks outweighs any danger to the public. What should you do? Could there be a compromise?

DILEMMA TEN

You and your family have been on vacation in South America. A tour guide there talked to you about the destruction of tropical forests and about how this destruction is causing the death of many organisms. You feel sorry that a number of plants and animals may become extinct because of man's actions over the years. You decide to help save one of these creatures, the Giant Amazon Toad. This toad is large (two feet long), mainly carnivorous (will eat anything it can, including lizards, birds, mice, other frogs and a variety of insects), and will be able to survive in Arkansas even during the winter months. You collect fifteen tadpoles and carefully pack them in a spill-proof jar for the trip home. You plan to raise the tadpoles then release the young toads in a marshy area near your home. When you try to carry your tadpoles on board the plane, they are confiscated by a customs officer who tells you it is illegal to transport certain organisms across the U. S. border. Is this fair? Why do you think there are rules to regulate the artificial movement of species across international borders? What should you do?

DILEMMA ELEVEN

You live in Anytown, Arkansas, a town of around fifteen thousand people. Last year Anytown won a national award for the environmental spirit and efforts of its citizens. Your science class did its part by keeping the city park clean and free of litter. Down the center of this park runs a clear, cool river surrounded by large, shady trees. Many small animals make their homes in and around the river, which is fed by several springs flowing from various parts of town. One of these streams runs between your house and that of your best friend who lives next door to you. Almost every weekend your friend's father burns trash in his backyard. This Saturday he changed the oil in their car and you noticed he dumped the used oil into the stream. You would like to talk to your friend's father about proper care of the environment, but you remember him yelling at your friend for wasting weekends cleaning up the park when she could have been studying or helping at home. What can you do?

DILEMMA TWELVE

You are the mayor of a large and once beautiful town faced with the specter of urban sprawl. The population in your city has increased substantially over the years and more housing is urgently needed. Some members of the city council favor restoring a large section of downtown, which now has a high crime rate. Others prefer to build new housing on the edge of town where there is a lovely forest. Inhabitants of that forest include the Indiana Bat and Moore's Delphinium, both threatened species. Which should take higher priority, threatened organisms or the people of your city who need jobs and homes? Should you:

- encourage revitalization of downtown
- agree to removal of part of the forest
- resign as mayor and let someone else worry about it
- other



DILEMMA THIRTEEN

An area lake has traditionally been used for skiing, swimming, camping and biking. Now it even has trails for motorcycles and four-wheelers. Tourists have become so numerous that the lake is noisy and pollution is increasing. County revenues have gone up as sales to the tourists have increased, but you worry that fragile species of fish in the lake will give way to “trash fish” such as catfish and buffalo and that biodiversity will be diminished. Should access to the lake be regulated, and if so, how should that be accomplished?

DILEMMA FOURTEEN

Your city has no mall closer than an hour’s drive away and there are very few available activities for teenagers. As a member of a concerned parents’ group, you are looking for ways to entertain teenagers without harming the surrounding environment and without losing that wonderful small town atmosphere. Should your group campaign for a mall to be built in your city even though development in any direction will require loss of habitat for both the endangered Plains Harvest Mouse and the badgers that prey on them? Your group’s position:

- put teens to work cleaning up the roadsides
- tell the older folk to shut up, times are changing
- point out that driving to the mall increases pollution and wastes energy
- other

DILEMMA FIFTEEN

You live in a very small town in the Gulf Coastal Plain of southern Arkansas. Declining population is proving to be a great problem in this whole area. Taxes are low and your school is in danger of being consolidated with a school that is your biggest sports rival (horrors). About the only high point right now is that a number of peregrine falcons were sighted during the period from Mid-September through mid-May of last year. An industry has proposed coming to your town and employing a large number of people. This will increase the tax base and allow the school to remain intact. However, the industry must be built on the only forested land nearby. What will you advise the Chamber of Commerce to do and why?

DILEMMA SIXTEEN

You are a zoologist at a local university and you have found a large population of American burying beetles on land that is owned by a third-generation cattle farmer. Once found in 32 states and in Canada, these beetles now are found only in Arkansas and three other states. Your job is to protect the beetle. You must educate and communicate with the cattle farmer to be completely successful. How would you use your scientific knowledge, public relations skills, interpersonal and media skills to protect this special species? What must you prevent and what could you encourage? How could you establish a working relationship with the farmer?

DILEMMA SEVENTEEN

You live in a sleepy little Delta community that is having a terrible problem with mosquitoes. No one can spend any length of time out of doors, even at noon, without losing a considerable amount (relatively speaking) of blood to them. Kids can't play outside, folks can't work their gardens, even the livestock and pets are suffering. To make matters worse, last week an *Anopheles* mosquito (carries malaria) was identified. Some community members want to spray for mosquitoes daily, however, Buzz Beekeeper says the pesticides used to kill mosquitoes will kill his bees and a number of other beneficial insects. The insects that do not die may be contaminated and harm their predators such as birds and bats. Also the genetically resistant mosquitoes that survive the pesticide will reproduce, resulting in resistant populations. This means stronger and stronger pesticides will be needed to kill the resistant populations of mosquitoes. You know these things are true. How will you go about informing the powers that be and getting them to listen. Is there a solution that could solve everyone's problems?

DILEMMA EIGHTEEN

Anglers and environmentalists complain that gravel mining is making an eighty-two mile scenic stream muddier, warmer, wider and shallower. Landowners and gravel miners contend the mining has no effect on the stream and that mining is crucial to the local economy. The Leopard Darter and the Fatmucket Mussel are in danger of losing their habitat, but many people say these species are of no use anyway, so why worry about them. As an avid fisherman you realize that habitat is important, but so are jobs. Should you:

- support limited gravel mining in the stream
- institute research into moving the darter and the mussel
- suggest that people rely on ecotourism for industry
- other

DILEMMA NINETEEN

As lack of water becomes more of a problem for Arkansas farmers, growing towns and recreational users the idea of pumping water from Arkansas' rivers keeps coming up. This is compounded by the fact that states around Arkansas also need additional water. Fragile Least Terns nest in small colonies on sandbars in the Arkansas, Mississippi and White Rivers. Dredging, all-terrain vehicles and the manipulation of river flows already threaten their nesting habitat. Suggest solutions that will satisfy the increased need for water while preserving the Least Tern and other animals that live in and around the rivers. Or is the Least Tern really all that important? Why or why not?

DILEMMA TWENTY

Deer are coming into your back yard, eating your rose bushes and pooping on your patio. A couple of weeks ago one crashed through your neighbor's picture window and caused a tremendous amount of damage, both to the house and to itself. You're afraid to let the kids play outside in the spring because a rutting stag might attack them. The idea of opening up the area to hunting has been suggested a number of times in neighborhood meetings. The city prohibits the use of firearms inside city limits, but no ordinance addresses archery. This means hunting on private property within city limits is legal as long as hunters have permission from landowners. You worry about someone being accidentally shot by one of these city hunters. What can be done?

- open up hunting season in the city and let people duck
- argue that we moved into the deer territory so make the best of it
- reintroduce wolves and cougars to prey on the deer
- other